Sparkill Creek
Watershed Characterization Report

September 2024

Hudson River
Watershed Alliance

Acknowledgements

The Sparkill Creek Watershed Characterization Advisory Committee provided critical advice and feedback to inform the project. Members of the Advisory Committee include:

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The watershed characterization project team included Emily Vail, Executive Director, Hudson River Watershed Alliance; Karen Strong, Principal, Strong Outcomes, LLC; and Kate Meierdiercks, Ph.D., Associate Professor, Department of Environmental Studies and Sciences, Siena College and Board Member, Hudson River Watershed Alliance. Adirondack Research/Green Goat Maps provided map design and cartography. Tracey Ledder, Delaware Engineering, DPC and Board Member, Hudson River Watershed Alliance, provided Quality Assurance Project Plan review. The project also benefited from planning support from Jen Benson and Amanda Cabanillas.

Cover photo: Tappan at Library, 2012, by Larry Vail.

It is with gratitude and humility that we acknowledge that the Sparkill Creek watershed is part of the ancestral homelands of the Munsee speaking Lenape people, who are the indigenous peoples of this land. Despite tremendous hardship in being forced from here, today their communities in Wisconsin, Oklahoma, and Ontario, Canada maintain strong connections to these lands and waters. We pay honor and respect to their ancestors past and present as we commit to building a more inclusive and equitable space for all.

Hudson River Watershed Alliance

The Hudson River Watershed Alliance unites and empowers communities to protect our shared waters. We work across the Hudson River watershed to support watershed groups, help communities work together on water issues, and communicate as a collective voice.

This project was supported by funding from the Hudson River Estuary Program, New York State Department of Environmental Conservation, with support from the New York State Environmental Protection Fund, in cooperation with NEIWPCC.

NEW YORK STATE Department of Environmental Conservation | Hudson River Estuary Program

NEIWPCC

Executive Summary

This watershed characterization report was created to help the communities of the Sparkill Creek watershed understand the current conditions of their shared land and water resources. It compiles existing information in one place, describing and illustrating the physical characteristics, lands, waters, and people of the Sparkill Creek watershed.

The Sparkill Creek watershed spans 11.2 square miles of diverse land uses, including commercial, industrial, and residential areas, as well as parklands in elevated regions. It encompasses the Town of Orangetown and Village of Piermont in Rockland County, NY, along with the Boroughs of Northvale, Rockleigh, Norwood, and Alpine in Bergen County, NJ. The Sparkill Creek flows south from Clausland Mountain Park and Blauvelt State Park through Orangeburg and Tappan, meeting the Sparkill Brook, which originates in New Jersey. From there, it flows north through the hamlet of Sparkill to the Village of Piermont, where it empties into the Hudson River at Piermont Marsh. The creek is tidal up to Ferdon Pond Dam and is the southernmost tributary of the Hudson River Estuary on the west side of the Hudson River in New York State.

Two main challenges in compiling data for this watershed characterization were the large number of studies conducted on the New York portion of the watershed and the differing data collection and sharing practices between New York and New Jersey. For the first time, this report brings together the information needed to better understand the environmental challenges facing the Sparkill Creek watershed.

The findings reveal significant issues stemming from centuries of development and the ongoing impacts of climate change. Flooding in the watershed has historically been caused by undersized drainage systems and development in wetlands and floodplains. Climate change has worsened these problems, with increasing storm intensity and frequency exacerbating the risks. Piermont Marsh and the tidal portion of the creek face growing threats from rising sea levels.

Water quality in the Sparkill Creek is compromised by high levels of nutrients, bacteria from suspected sewage sources, erosion, sediment, emerging contaminants like microplastics, and industrial chemical contamination of groundwater in both New York and New Jersey. These issues highlight the need for coordinated action to protect and restore the creek's health.

Despite the challenges, there is hope in the local people who have advocated and cared for the creek over the decades. Educators, local government officials, scientists, students, private sector experts, agency staff, and numerous volunteers have all contributed to a better understanding of the Sparkill Creek and its watershed. By continuing to understand the watershed, talk with neighbors and local leaders, and take informed action, the community can work together towards a healthier and more resilient Sparkill Creek watershed for generations to come. The findings from this report will help guide local decision-makers, the Sparkill Watershed Alliance, and community members in developing a watershed-based approach for protecting and restoring the creek.

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Introduction and Project Background

This characterization report for the Sparkill Creek watershed was created to help the communities that are part of this watershed understand the current conditions of their shared land and water resources. It compiles existing information in one place, describing and illustrating the physical characteristics, lands, waters, and people of the Sparkill Creek watershed.

The report tells the story of the watershed, including what is known and where there may be gaps in available information. It provides a foundation for watershed planning and can serve as a resource for partners to build local interest in the watershed and support for future watershed management.

Watershed Characterization and Planning

Watersheds are made up of all of the lands and waters that flow to a specific body of water. Watersheds are broadly defined by topography and the lay of the land (Figure 1). Precipitation, surface water, and groundwater within a watershed all flow to a common waterbody. Water infrastructure and past development can change the way water flows across the landscape, which can complicate watershed boundaries at a more local scale.

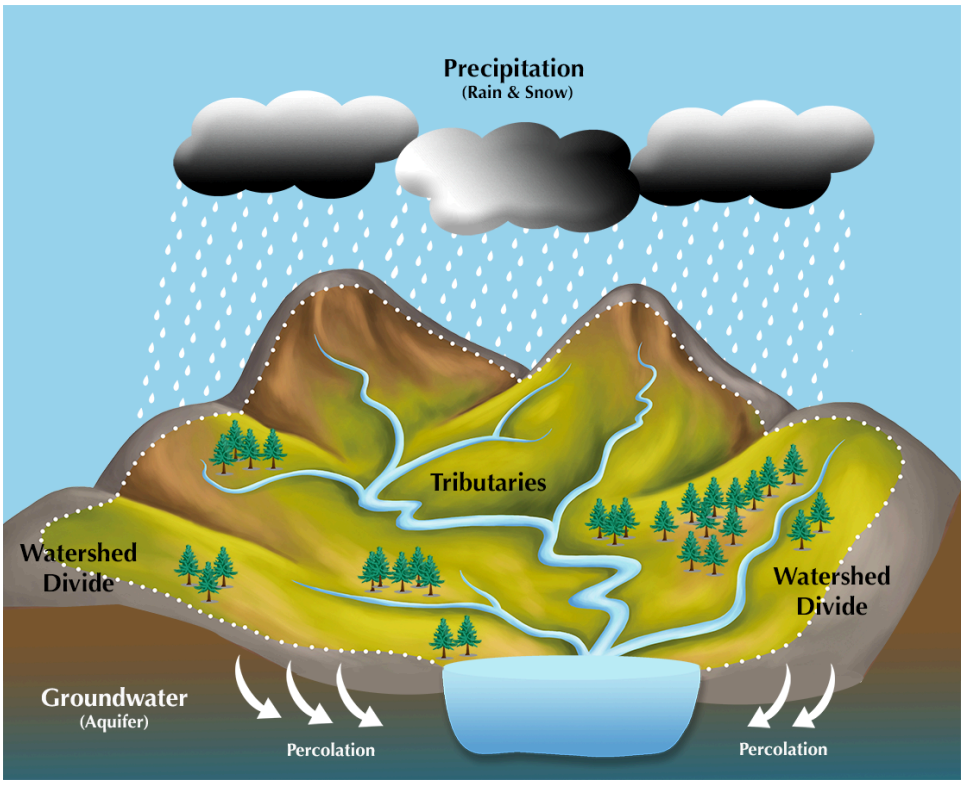

Figure 1. Depiction of a watershed, the lands and waters that flow to a specific body of water. (Hudson River Watershed Alliance)

Watersheds can be large or small. The whole Hudson River watershed is about 13,400 square miles, extending from the Adirondacks to New York City. Many smaller rivers and streams flow into the Hudson River along the way, and each of these tributaries has its own watershed that affects the health of the larger watershed ecosystem.

Watersheds are the geographic unit best-suited to understanding conditions and managing our waters. Many natural resource plans are based on political boundaries, including municipal, county, or state lines. Because water doesn't follow those boundaries, using watersheds allows for a more holistic approach, considering problems and potential solutions up and downstream. It is an opportunity to consider the intersections of environmental and social dynamics and their impacts on water quality, availability, and access. Working across boundaries for collective benefit requires building partnerships across municipalities. It takes time to build new relationships. However, because water issues may require solutions in neighboring communities, taking that time will be better for the water resources and the people who depend on them. Plans developed at the watershed scale are more successful at addressing water quality problems and helping to prevent future problems because they involve stakeholders in both upstream and downstream communities throughout the watershed.

A watershed plan is a non-regulatory document that identifies current or potential issues in your watershed, proposes solutions, and creates a strategy for putting those solutions into action. While many watershed plans in the past have focused specifically on point or nonpoint sources of pollution, watershed plans may also include other issues considered at a watershed scale, such as flooding, climate resilience, terrestrial and aquatic habitats, water quality, recreation, and other priorities for the watershed communities.

Understanding the watershed through a watershed characterization is the first step in a watershed planning process. A watershed characterization compiles existing information together into one report, with maps, charts, and narrative to describe current watershed conditions. As watershed management can be complex and multidisciplinary, the watershed characterization report supports the understanding of local conditions for decision-making and actions.

A watershed plan builds on the foundation of the watershed characterization report. The planning process brings together a broad set of stakeholders from across the watershed to identify shared goals. Using the present-day conditions documented within the watershed characterization as a starting point, and the goals and objectives for the watershed in the future, stakeholders work together through the planning process to prioritize specific, strategic actions to improve their watershed's health. A watershed plan outlines actionable steps that can be taken within a watershed to address identified challenges.

Sparkill Creek Watershed Characterization Process

In June 2022, the Hudson River Watershed Alliance solicited applications to provide technical assistance to develop a watershed characterization, based on the process outlined in the NYS

Department of State and Department of Environmental Conservation *Guidebook on Watershed Plans*. This technical assistance was provided through funding from the Hudson River Estuary Program, New York State Department of Environmental Conservation, with support from the New York State Environmental Protection Fund, in cooperation with NEIWPCC.

The Sparkill Creek Watershed Alliance applied to create a watershed characterization for the Sparkill Creek. The Sparkill Creek watershed includes 11.2 square miles of lands and waters. Communities within the Sparkill Creek watershed include the Town of Orangetown and Village of Piermont in Rockland County, NY and the Boroughs of Northvale, Rockleigh, Norwood and Alpine in Bergen County, NJ. The Sparkill Creek flows south from Clausland Mountain Park and Blauvelt State Park through Orangeburg and Tappan, where it meets the Sparkill Brook, which flows north from New Jersey. From there, the creek flows north through Sparkill to the Village of Piermont, where it empties to the Hudson at Piermont Marsh.

Advisory Committee members included representatives from Village of Piermont, Town of Orangetown, and Rockland County, along with the Sparkill Creek Watershed Alliance, Lamont-Doherty Earth Observatory, St. Thomas Aquinas College, Hudson Valley Regional Council, and New York State Department of Environmental Conservation (NYS DEC) Hudson River Estuary Program. A full list of Advisory Committee members is available in the Acknowledgements section. The project kicked off with an Advisory Committee meeting on September 30, 2022. Additional Advisory Committee meetings were held on December 1, 2022; March 9, 2023; October 26, 2023; and February 27, 2024 to provide feedback on the project process and products. A community presentation about the project was held at St. Thomas Aquinas College in Sparkill, NY on March 25, 2024, and attended by 50 people.

Sparkill Creek Watershed Characterization Project Goals and Context

In their application for technical assistance, the Sparkill Creek Watershed Alliance identified flooding and water quality as the highest priority for the watershed characterization. The Advisory Committee agreed at the project kick off meeting, and emphasized the importance of compiling available information in one place as an important first step for a future watershed plan. The committee's goals for the full watershed plan include incorporating strategies into municipal planning and supporting climate change adaptation work.

Additional project goals include educating partners and community members on watershed conditions, communicating that information in an effective way, and providing a regional model for watershed planning work. Future goals include protecting and restoring existing wetlands within the watershed and improving access to areas along the creek. The Sparkill Creek Watershed Alliance hopes to support other community-based watershed groups in the region as they work through similar projects.

How to Use this Watershed Characterization Report

The *Sparkill Creek Watershed Characterization Report* is organized into four sections:

1. Watershed Physical Characteristics - This section provides the foundation for the report. It includes the watershed delineation, regional context, and physical characteristics like geology and climate.
2. Lands of the Watershed - This section focuses on land use, land cover, forests, wetlands, terrestrial and wetland habitats, and the built environment, all of which influence the watershed in a variety of ways.
3. Waters of the Watershed - This section focuses on the waterbodies and watercourses within the watershed, including floodplains and riparian areas, aquatic habitats, water quality, and water infrastructure.
4. People of the Watershed - This section focuses on the people living in and caring for the watershed.

The watershed characterization report is a non-regulatory summary of current watershed conditions that is intended to be a source of information for a variety of audiences. Some water resources identified in this document are protected by state or federal programs. The report and maps should not be used for jurisdictional or regulatory purposes. We recommend working with NYS DEC's Region 3 Office in New Paltz, the New Jersey Department of Environmental Protection (NJ DEP), and other appropriate agencies on issues involving regulated resources.

Some of these datasets included in the report are available to view on online mapping applications, which allows for interactive viewing of mapped features, more information about individual features (i.e., attribute information), and links to more information. These sources may also include more updated information than this report. In particular, the Hudson Valley Natural Resource Mapper, DECinfo Locator, and the NYS DEC Environmental Resource Mapper compile a number of valuable datasets that are included within this watershed characterization. In New Jersey, many resources are available on the NJ-GeoWeb interactive web map, Land Resources Protection Web Application and NJ DEP Open Data. Other online mapping applications are referenced within the corresponding section of the report.

Watershed Characterization Quality Assurance Project Plan Process

This project compiled and summarized secondary data from within the focus watershed and informs a current understanding of that watershed's conditions. This work was guided by a secondary data Quality Assurance Project Plan (QAPP), approved by NEIWPCC. The Hudson River Watershed Alliance reviewed and documented all information used for this report. All secondary data sources included within the report provided sufficient information on methodology and sources of information. Any limitations in data quality are fully disclosed. The most current available data were used, unless past data provided a valuable baseline or other context to show trends and changes over time. For more details, please see the Watershed Characterization Secondary Data Quality Assurance Project Plan (QAPP).

Information for this project was compiled between December 2022 and August 2024. This included 93 data sources for the report and 66 data sources for the maps and GIS-based

summary statistics. All data were collected, reviewed, and assessed for use within the Watershed Characterization Report, according to the criteria documented in the QAPP. Data were collected from many sources, including local information submitted by the Watershed Characterization Advisory Committee. All sources of data were documented utilizing a tracking spreadsheet format to determine if each met criteria for inclusion in the watershed characterization report.

Data Limitations

This report contains information available at the time of writing, with data sources cited, but many more datasets may exist and new information is always being collected. Datasets contained here could have inaccuracies and/or could change in important ways in the future. This report is limited to existing information and, therefore, is not a substitute for on-the-ground surveys and assessments. It is not intended to be used for site-level planning. Information provided should be verified for legal purposes, including environmental review.

Geographic information systems (GIS) data originate from many different sources, produced at different times and for different purposes. They are often collected or developed from remote-sensed information (i.e., aerial photographs, satellite imagery) or derived from paper maps. For these reasons, GIS data can contain all the inaccuracies of the original data in addition to any errors from converting it to digital GIS information. Therefore, maps created with GIS data are not a substitute for surveys and direct knowledge. However, they provide a starting point for understanding available information, any gaps, and a summary of current watershed conditions.

Watershed Physical Characteristics

This section provides the foundation for the watershed characterization report. It includes the watershed delineation, regional context, and physical characteristics like geology and climate.

Watershed and Waterbodies

The Sparkill Creek watershed includes 11.2 square miles (7,190 acres) of lands and waters in New York and New Jersey (Figure 2). Communities within the Sparkill Creek watershed include the Town of Orangetown and Village of Piermont in Rockland County, NY and the Boroughs of Northvale, Rockleigh, Norwood and Alpine in Bergen County, NJ. The Sparkill Creek watershed includes 35 acres of waterbodies and 22 miles of streams.

The Sparkill Creek is the southernmost tributary to the Hudson River Estuary on the western side of the Hudson River in New York State (Figure 3). The Sparkill Creek flows south from Tackamack Town Park through the hamlets of Orangeburg and Tappan. The Sparkill Brook flows north from Alpine through Norwood and Rockleigh in New Jersey until it meets the Sparkill Creek just north of the state border. From there, the Sparkill flows northeast through the hamlet of Sparkill and the Village of Piermont, where it empties into the Hudson. There is a large tidal salt marsh at the mouth of the Sparkill called Piermont Marsh. The creek is tidal downstream of the dam on Ferdon Pond. The video Hudson River Journeys: The Sparkill Creek - a Tributary to the Hudson (2022) by Jacob Tanenbaum provides an overview of the Sparkill Creek's path.

Municipalities

The Sparkill Creek watershed includes parts of six municipalities. Municipalities in the Sparkill Creek watershed include the Town of Orangetown and Village of Piermont in Rockland County, NY and the Boroughs of Alpine, Northvale, Norwood, and Rockleigh in Bergen County, NJ (Table 1). Lands within the Town of Orangetown make up most of the watershed area (Figure 2).

Table 1. Portion of municipalities in Sparkill Creek watershed

Municipality (County, State)	Percent of the Municipality within the Sparkill Creek Watershed
Borough of Rockleigh (Bergen, NJ)	90.4%
Borough of Northvale (Bergen, NJ)	50.8%
Village of Piermont (Rockland, NY)	31.8%
Town of Orangetown (Rockland, NY)	26.2%
Borough of Alpine (Bergen, NJ)	18.5%
Borough of Norwood (Bergen, NJ)	9.5%

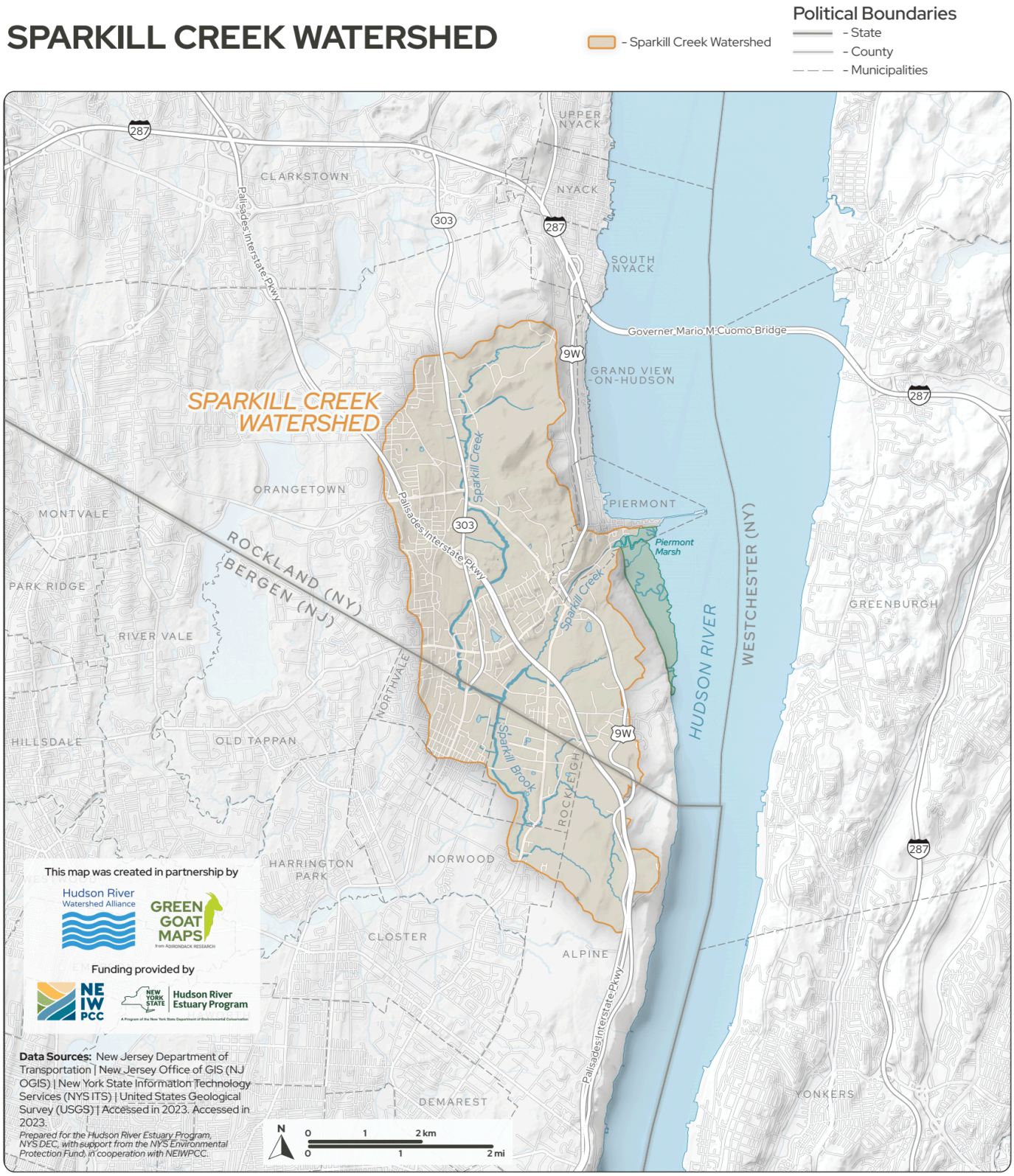

Figure 2. Map of the Sparkill Creek watershed.

Figure 3. The location of the Sparkill Creek watershed within the Hudson River watershed. The watershed is highlighted in dark orange.

Topography

Topography within the Sparkill Creek watershed is unique, due to the steep cliffs of the Palisades Ridge/Sill along the river and the Sparkill Gap through which the Creek flows. Elevation in the watershed ranges from about 677 feet at Clausland Mountain Park to sea level at the creek's mouth at Piermont Marsh (Figure 4).

There are higher elevation areas in the north and the south of the watershed; the Sparkill Creek flows south from Clausland Mountain Park and Blauvelt State Park and the Sparkill Brook flows north from Alpine, NJ. After the two tributaries merge near Tappan, the Sparkill Creek flows east towards Piermont Marsh and the Hudson River.

Geology

Bedrock geology shows the types of solid rock that underlie surface materials and soil (Figure 5). The Sparkill Creek watershed has several unique geological features. Hard volcanic rock formed the steep and dramatic Palisades Cliffs (Palisades Sill, to geologists). The Sparkill flows to the Hudson River through a break in the Palisades called the Sparkill Gap, which was formed by two faults (Averill et al. 1980). Note in Figure 5 that the bedrock has different names in New York and New Jersey, because each state mapped and named its geological features.

As noted in the Biodiversity Assessment Draft Final Report (Turrin et al. 2004):

> "Among the most notable and breathtaking features of the study area are the sheer cliffs and rocky crests that face the Eastern border of our study area, the Palisades. These remarkable geologic features are not only exceptionally beautiful, but also harbor distinctive habitat types. …(T)he diabase (basaltic bedrock) that makes up these Palisades is rich in base cations, necessary and valuable nutrients for plants… As it weathers the calcium can become available for plants with an affinity for calcium."

Surficial geology refers to the loose geologic material that lies on top of bedrock (Figure 6). These materials are not soils; they are the unconsolidated materials that lie between the soil zone and the underlying bedrock. The surficial geology of the watershed is primarily glacial till with some alluvium, except for along the Palisades Sill, where bedrock is close to the surface.

For more detail on bedrock geology, surficial geology, and soils in the Sparkill Creek watershed, see the Rockland County Comprehensive Plan, the Town of Orangetown Comprehensive Plan, and the Bergen County Master Plan.

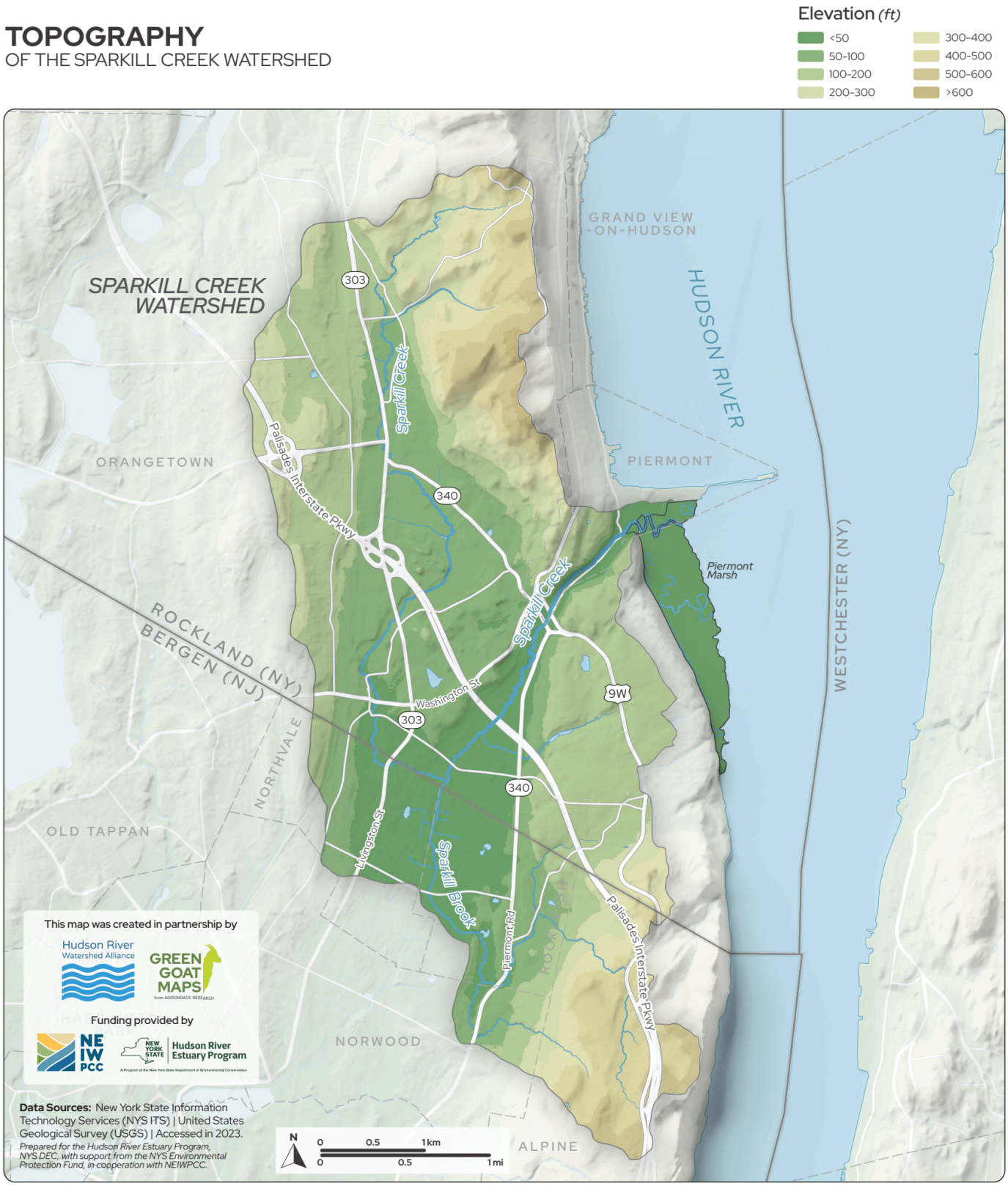

Figure 4. Topography of the Sparkill Creek watershed.

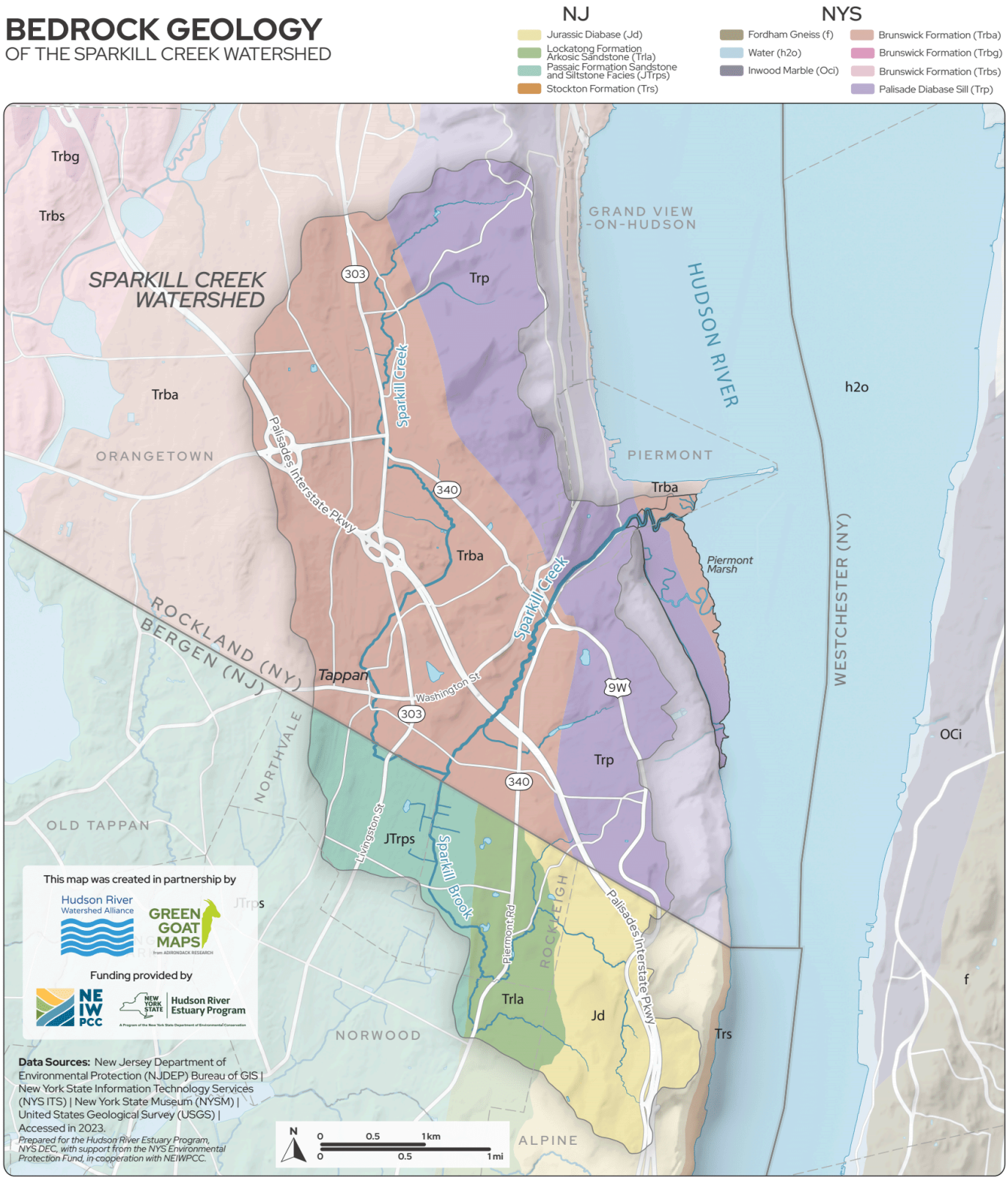

Figure 5. Bedrock geology of the Sparkill Creek watershed.

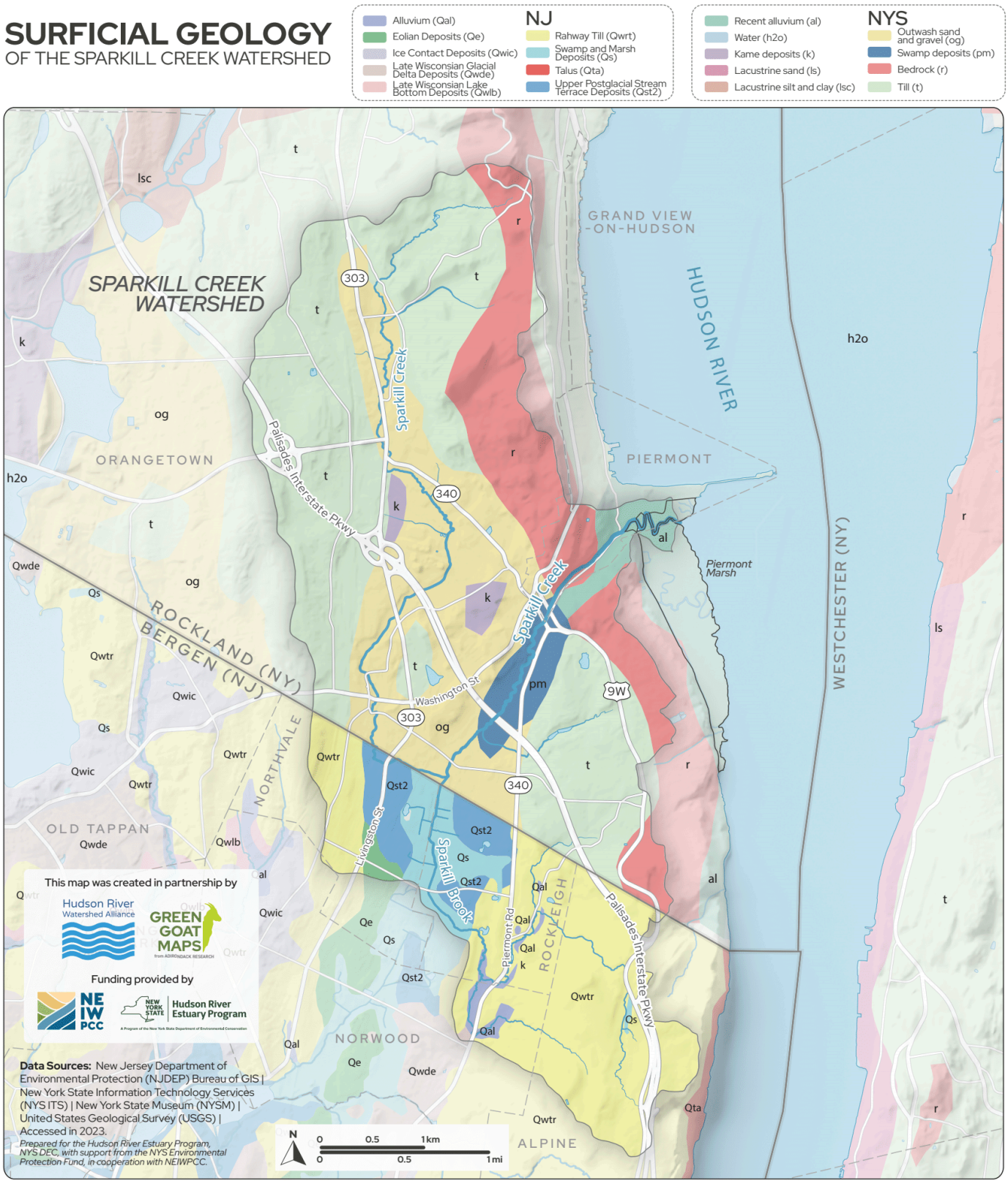

Figure 6. Surficial geology of the Sparkill Creek watershed.

Soils

Soils are largely derived from surficial deposits, and have numerous different types of classifications, based on parent material, particle size, and organic content. Soils are described, classified and mapped by the National Resources Conservation Service (NRCS) in county soil surveys, which are compiled digitally in the Soil Survey Geospatial Layer (SSURGO). A soil survey is the systematic description, classification, and mapping of soils in a particular area.

Figure 7 shows the location of different kinds of soils within the Sparkill Creek watershed, and Appendix A provides a list of all soil types.

Understanding soil drainage, or how quickly water moves through the soil, is valuable for watershed management, providing an understanding of potential land uses and limitations. Figure 7 shows the soil drainage classes across the watershed. See Table 2 for a breakdown of soils by drainage class. For additional information on watershed soils, visit the Web Soil Survey.

Table 2. Percent of Soil by Drainage Class.

Drainage Class	Percent of Total within Watershed	Summary
Excessively well drained	1.1%	1.1%
Well drained	67.0%	68.2%
Moderately well to well drained	0.2%	
Moderately well drained	1.0%	
Somewhat poorly to very poorly drained	0.2%	5.0%
Poorly to very poorly drained	0.8%	
Very poorly drained	4.0%	
N/A	25.7%	25.7%

Source: Soil Survey Geographic Database (SSURGO)
Publisher: United States Department of Agriculture Natural Resources Conservation Service
Publication Year: 2003

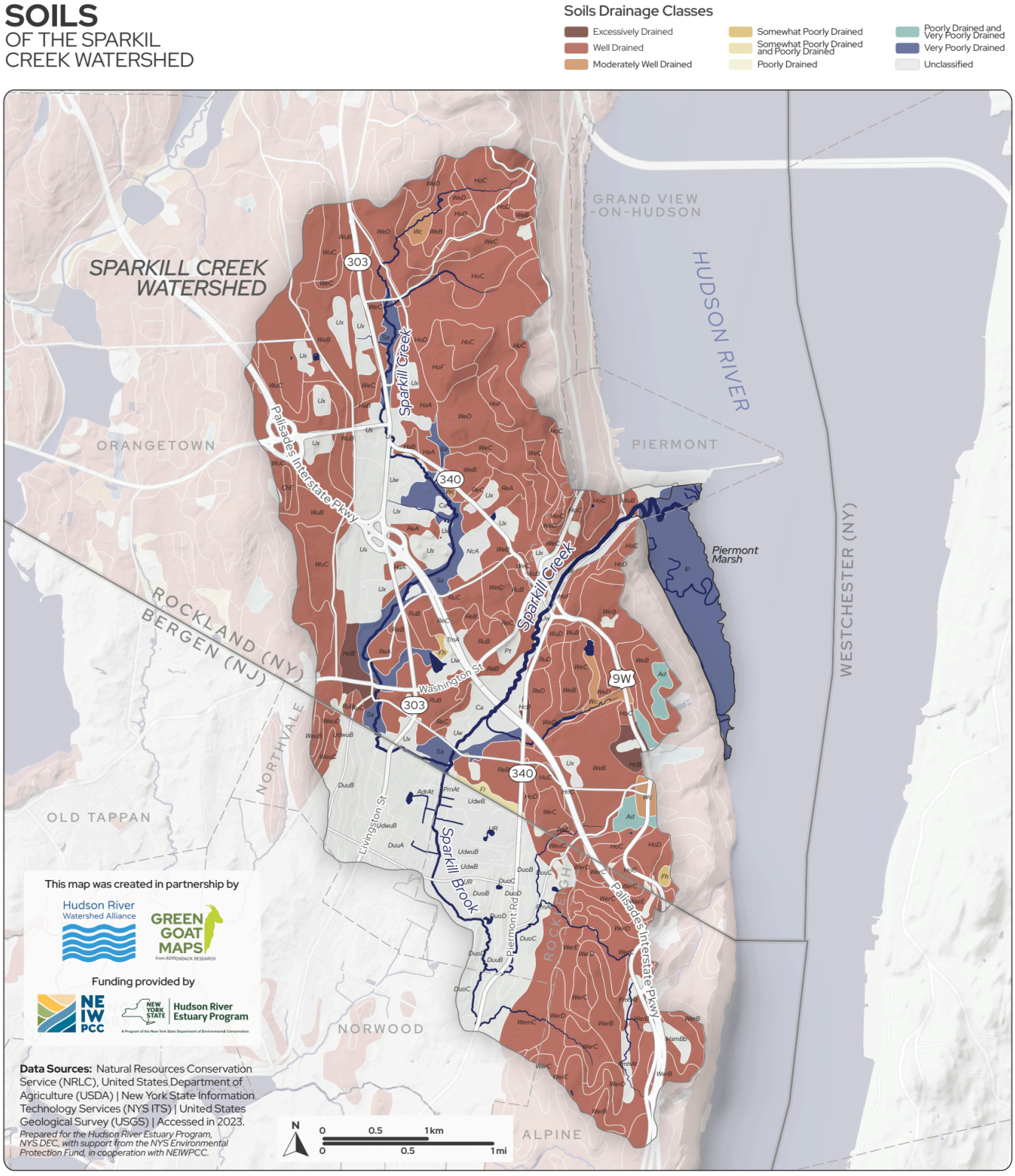

Figure 7. Soils by Drainage Classification.

Some soil features are useful for understanding specific watershed characteristics. Poorly drained soils are good indicators of wetland areas, so the wetlands map (Figure 11) identifies possible or probable wetlands based on the soil drainage class (Kivat and Stevens 2001). Table 3 shows that 33% of the soils of the Sparkill Creek watershed are farmland soils best suited for growing crops and livestock.

Table 3. Farmland soils in the Sparkill watershed.

Soil Type	Percentage in watershed
Prime Farmland	19.1%
Prime Farmland if drained	0.2%
Farmland of Statewide Importance	13.4%
Farmland of Unique Importance	0.2%
Total Farmland Soils	33.0%

Source: Soil Survey Geographic Database (SSURGO)
Publisher: United States Department of Agriculture Natural Resources Conservation Service
Publication Year: 2003

Climate and Climate Change

Climate in the Sparkill Creek watershed is characterized by an average annual temperature of 50.8 degrees Fahrenheit and average annual precipitation of 45.8 inches (Table 4). Climate change is already impacting many aspects of our lands and waters, and these impacts are expected to increase in the future. The *New York State Climate Impacts Assessment* (2024) details the anticipated changes in climate across New York State, including rising temperatures, increased precipitation, rising sea levels, and more frequent and extreme weather events.

The Sparkill Creek watershed is located within the South Hudson Valley region of the *New York State Climate Impacts Assessment*. Average temperatures in this region are projected to increase between 4°F and 6°F by the 2050s and between 5.7°F and 10°F by the 2080s, compared with the 1981–2010 average (Table 4). The *Assessment* predicts that the number of very cold days is expected to decrease, and, compared to the rest of the state, the South Hudson Valley region is among the regions projected to experience some of the greatest increases in the number of extremely hot days per year.

Total precipitation in the South Hudson Valley region is projected to increase between 4% and 11% by the 2050s and between 7% and 17% by the 2080s relative to the 1981–2010 average (Table 4). This precipitation could increasingly come from more extreme storms, which can lead to higher streamflow and flooding, which, in turn, may cause more stream bank erosion.

Table 4. Future projected increases in mean annual temperature and precipitation in the South Hudson Valley Region (Dutchess, Orange, Putnam, Rockland, and Westchester counties) relative to 1981-2010. The 25th to 75th percentiles are shown as a range.

Baseline	Mean Temperature (F)	Mean Precipitation (in)
1981-2010	50.8° F	45.8 inches
Future Decades	**Mean Temperature Increase (F)**	**Mean Precipitation Increase**
2030s	2.8 - 4°	1 - 8%
2040s	3.5 - 5.1°	3 - 9%
2050s	4.1 - 6.1°	4 - 11%
2060s	4.7 - 7.2°	5 - 13%
2070s	5.2 - 8.4°	6 - 14%
2080s	5.7 - 10°	7 - 17%
2100	6.1 - 11.1°	5 - 20%

Source: Bader, D., R. Horton. 2023. New York State Climate Change Projections Methodology Report. Appendix 1. Prepared for the New York State Climate Impacts Assessment.
https://nysclimateimpacts.org/wp-content/uploads/2024/01/Appendix-Projections_Tables-1.pdf This work is licensed under CC BY 4.0.
Publisher: New York State
Publication Year: 2024. Accessed via https://nysclimateimpacts.org

The Sparkill Creek watershed is also vulnerable to sea level rise caused by climate change, particularly within the Village of Piermont. According to analysis conducted as part of the *New York State Climate Impacts Assessment*, sea level along the tidal Hudson is projected to increase by 12 to 17 inches by the 2050s and by 25 to 46 inches by the 2100s, compared to a 1995-2014 baseline.

For more information on local planning for flooding and sea level rise in the Sparkill Creek watershed, see the section on Floodplains and Flooding.

The *New York State Climate Impacts Assessment* includes detailed information on climate impacts within specific sectors relevant to the Sparkill Creek watershed, including Chapter 2: New York State's Changing Climate, Chapter 5: Ecosystems, and Chapter 10: Water Resources.

The NYS Climate Impacts Assessment notes that:

> "Like all projections, these climate projections have uncertainty embedded within them. Sources of uncertainty include data and modeling constraints, the random nature of

some parts of the climate system, and limited understanding of some physical processes. Levels of uncertainty are characterized using state-of-the-art climate models, multiple scenarios of future greenhouse gas concentrations, and recent peer-reviewed literature. Even so, the projections are not true probabilities, so the specific numbers should not be emphasized, and the potential for error should be acknowledged."

Climate Smart Communities is a New York State program that helps local governments take action to reduce greenhouse gas emissions and adapt to a changing climate. Municipalities can register for Climate Smart Communities by adopting a municipal resolution. The certification program uses points and a rating system to recognize registered communities that implement specific actions to mitigate climate change and adapt to climate impacts. Both New York State municipalities within the Sparkill Creek watershed are participating in the Climate Smart Communities program (Table 5).

Table 5. Climate Smart Community Status for Watershed Municipalities

Watershed Municipality	Climate Smart Communities status
Town of Orangetown	Certified Bronze (2024)
Village of Piermont	Certified Bronze (2019)

Source: NYS Climate Smart Communities Participating Communities
Publisher: New York State Climate Smart Communities
Date: Accessed 7/3/24

In New Jersey, municipalities are required to incorporate a climate change-related hazard vulnerability assessment into any Master Plan Land Use Element adopted after February 4, 2021. New Jersey created Resilient NJ to support municipalities in planning for climate change, which includes a toolkit for creating a climate change vulnerability assessment and developing local climate resilience strategies. As of the writing of this report, none of the New Jersey municipalities in the Sparkill Creek watershed has completed this update.

Lands of the Sparkill Creek Watershed

This section focuses on land use, land cover, forests, wetlands, terrestrial habitats, and the built environment, all of which influence the watershed in a variety of ways.

Land Use and Land Cover

Land use describes how people use the landscape, including development and other uses. Land cover indicates the features within the watershed, such as forests, agriculture, wetlands, and other categories. Land use and land cover within a watershed has a direct influence on the health of its waters. Information on land use and land cover comes from the US Geological Survey's National Land Cover Database (2021) and is derived from remote sensing data.

The Sparkill Creek watershed has a mix of land uses, including development, forests, and wetlands (Table 6, Figure 8). The watershed is over 55% developed, including developed open space (25.9%), low intensity development (17.3%), medium intensity development (8.8%), and high intensity development (3.5%). About 35% of the watershed is covered by forests, with 8% covered by wetlands.

Table 6 provides a summary of land use and land cover percentages in the Sparkill Creek watershed. For a more detailed breakdown of land use/land cover and specific descriptions, see Appendix B.

Table 6. Land Cover Classes within the Sparkill Creek watershed

National Land Cover Database Class	Percent Cover (2021)
Open Water	0.1%
Developed	55.5%
Barren Land	0.1%
Forest	35.2%
Shrubland	0.1%
Grassland/Herbaceous	0.1%
Hay/Pasture	0.6%
Wetlands	8.3%

Source: National Land Cover Database (2021)
Publisher: US Geological Survey
Publication Year: 2021

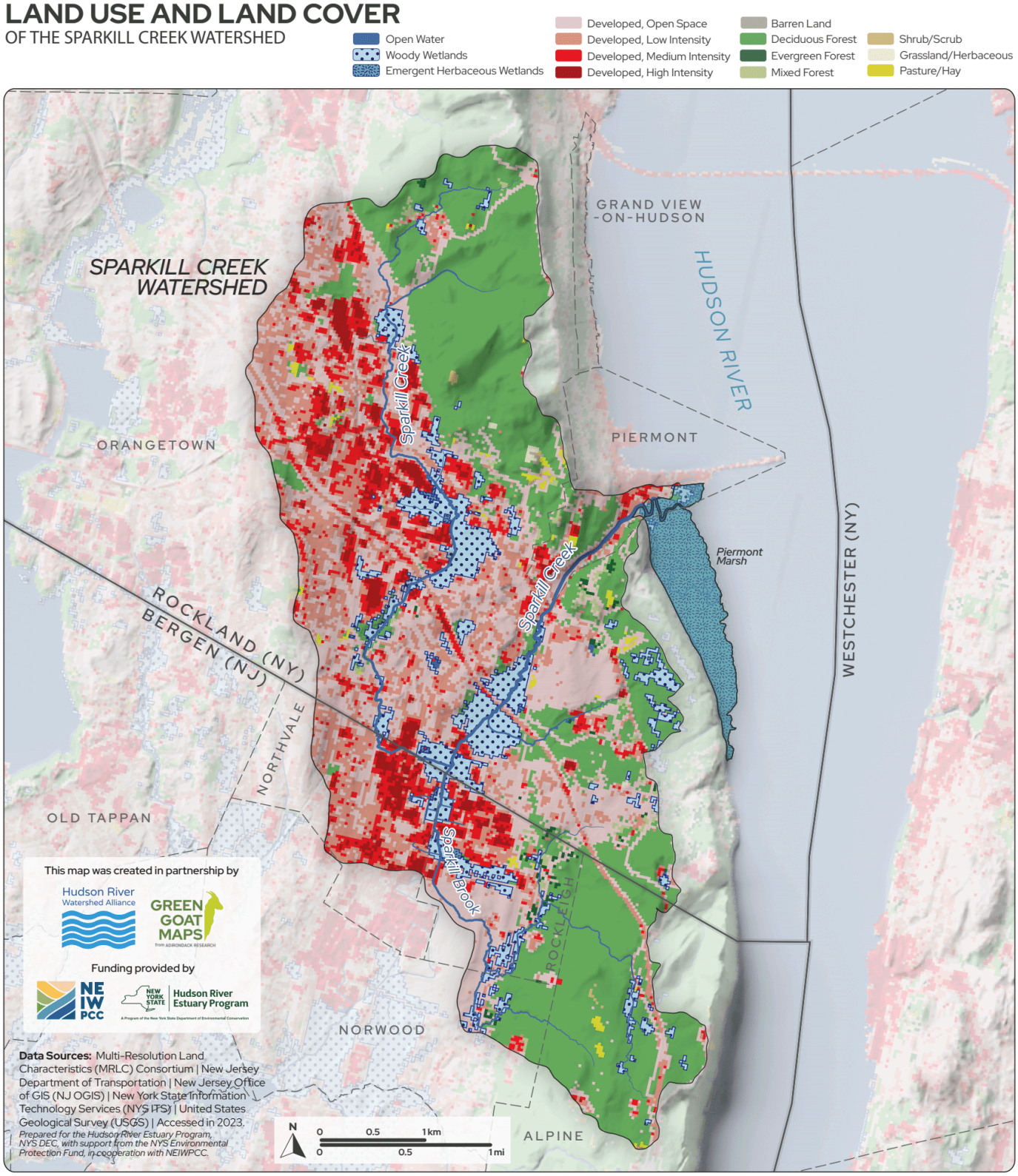

Figure 8. Land Use and Land Cover in the Sparkill Creek watershed.

Watershed and Land Use History

There is a long record of stories and studies to understand the Sparkill Creek and its watershed.

Why a Marsh (Wolff and Peteet 2022) is a summary of the history and conditions of Sparkill Creek and Piermont Marsh. Soil core and archaeological evidence from the Marsh revealed that humans have lived near the marsh for at least 5,000 years, including the Tappan, Lenape people speaking Munsee dialects of Algonquin. The soil cores reveal climatic changes and resulting changes in flora abundance and diversity. Dramatic changes in the cores marked the land use changes caused by European colonization and beyond: "The Piermont cores reveal the beginning of the marsh's industrial era to be around 1822, when there's a jump in lead, copper, and arsenic." A ferry pier and railroads connected the area to New York City and the midwest, leading to a larger population and more land clearing. By the early 1900s, fish and oyster populations were dropping and increasing industrialization was degrading marsh conditions.

From Hudsonia Biodiversity Training (2004) pg. 6: Turrin et al. 2004 provides an overview of post-colonial changes in land uses:

> "Rockland's land use history plays an important part of its current suite of natural habitats. It was first settled in the 1600s, but it wasn't until early in the 1700s that the settlers did extensive clearing of the land, building homes, blocking out farms, and erecting grist and saw mills on the numerous small creeks. There were few roads, so travel was largely confined to river sloops, and the Sparkill Creek became an active transport tributary. Because of the proximity to the Hudson River, fishers and hunters used the Sparkill Creek as a means of shipping out dried fish, pelts and furs that they collected. This heavy use of the Sparkill by mills, the filling in of wetlands, and the extensive clearing of the land leading to increased sedimentation loads running into the Creek, starting a long process of decline for the Creek that appears to continue today. Sparkill Creek continues to be a unique and important feature in our study area."

There were huge changes in the Sparkill Creek watershed's land use during and after World War II. In 1942, the US Army seized 1,365 acres of farmland from 130 families and leased 675 acres from New York State to create Camp Shanks, the largest U.S. Army embarkation camp in the United States. More than 1 million troops were stationed at Camp Shanks before they were sent to Europe (Brown 2020).

After the war, the Camp Shanks barracks were repurposed into more than 1,000 apartments for veterans enrolled in New York area colleges on the GI Bill. Residential and commercial development exploded after the Tappan Zee bridge and Palisades Interstate Parkway opened (1955 and 1958, respectively); the remaining camp property was auctioned off to four developers (Sykes 2014).

> "Next to nothing of Camp Shanks remains, but Rockland County was forever changed…. Orangetown and the rest of the county morphed from a sparsely populated agricultural center to a baby-booming bedroom community. Within the next decade, the Palisades

> Parkway and the Tappan Zee Bridge would obliterate any Shanks leftovers and accelerate the transformation. The village was dismantled in 1956, its remnants subsumed by suburban sprawl" (Levine 2023).

A state report written just after Camp Shanks closed documented the Sparkill's water quality, sewage and industrial discharges, and stream uses (NYS Department of Health 1951). They found that the upper portion of the creek was "relatively undefiled" but there were higher levels of bacteria downstream of a swampy area around Oak Tree Road. The purpose of the study was to determine the Sparkill's best use for New York State stream classification:

> "Future best usage of the Sparkill Creek and its tributaries is considered to include navigation, general recreation (swimming and fishing), industrial water supply and the disposal of treated industrial and sanitary effluents. Residents speak of the former usefulness of the Creek for fishing purposes, and it can be foreseen that fish will return to all portions if the stream is returned to a relatively undefiled state. In addition, development of pond P26b and tributaries of the main stem above the pond for bathing is not beyond the realm of practicality" (NYS Department of Health 1951).

A 1963 report by USGS, the NYS Department of Commerce (now Empire State Development Corporation), and the Rockland County Board of Supervisors predicted water quality and quantity challenges in the region (Ayer and Pauszek 1963). They monitored streamflow, water quality, water temperature, precipitation, monthly and annual runoff throughout the Sparkill Creek Basin. The analysis indicated issues with rapid high and sustained low flows and water quality, including impact of industrial and sewage discharges.

The authors noted the rapid land use change would exacerbate flooding and continue to reduce water quality (Ayer and Pauszek 1963):

> "The relatively large amount of swamp area in the Sparkill Creek Basin provides a natural flood-control feature which may be lost because of urbanization… Stream pollution is already a problem in the County; Sparkill Creek and other streams are used for the transport of domestic and industrial wastes. As urbanization and industrial expansion take place the problem will become worse unless steps are taken to correct the condition."

Local Land Use Plans, Policies, and Practices

Land use and land cover affect how water moves across the landscape and what potential pollutants may be present in stormwater that runs off of land and into streams, lakes, and wetlands. Both New York and New Jersey are home rule states. In both states, individual local municipalities decide how land is used through local plans, policies, and practices that guide new development, which, in turn, affect the future protection of natural resources. Land use plans and inventories for municipalities in the Sparkill Creek watershed are listed in Table 7.

Local Plans

Comprehensive plans (in New York State) and master plans (in New Jersey) establish a community's vision for the future and outline a roadmap for achieving that future by guiding land use patterns and development. Such plans often describe natural resources and include goals and recommendations for those resources. Each municipality in the Sparkill Creek watershed has a comprehensive or master plan (Table 7). County governments create similar plans specific to their limited role in land use. Rockland County's 2011 Comprehensive Plan and Bergen County's 2023 Master Plan both describe natural resources and general goals that can guide municipal land use planning.

Other local plans that are relevant to watersheds include local waterfront revitalization plans (NY) and stormwater management plans (NJ). The Village of Piermont has a Local Waterfront Revitalization Plan, a comprehensive land and water use program that expresses a community vision for the waterfront area and identifies projects and policies that achieve that vision. The plans are funded by the NYS Department of State for coastal waterbodies as well as specific inland waterways designated by the NYS Legislature. The State of New Jersey requires Municipal Separate Storm Sewer (MS4) municipalities to adopt municipal stormwater management plans, so each of the New Jersey boroughs have them. For more information on the MS4 program, see the Stormwater section.

Municipal comprehensive and master plans need to be implemented through zoning and other local policies and practices. Zoning controls the type and intensity of land use within defined districts or zones. Each municipality in the Sparkill Creek watershed has a zoning law (Table 7). Watershed municipalities also have local stormwater plans (NJ), critical environmental areas (NY), stormwater management plans (NY), and waterfront plans (NY).

Table 7. Municipal land use plans and inventories in the Sparkill Creek watershed.

Watershed Municipality	**Comprehensive or Master Plan**	**Zoning**	**Natural Resources Inventory or Summary**	**Other Relevant Local Plan, Policy, or Practice**
Alpine Borough (Bergen, NJ)	2002 Master Plan Reexamination Report (2020) Land Use Amendment (2024)	Zoning Map (2011)	Environmental Commission Open Space and Recreation Plan (2020)	Stormwater Management Plan
Northvale Borough (Bergen, NJ)	Master Plan (2020)	Zoning Map (2020)		Stormwater Management Plan
Norwood Borough (Bergen, NJ)	Master Plan (2018)	Zoning Map (2020)	Environmental Commission	Stormwater Management Plan

Town of Orangetown (Rockland, NY)	Comprehensive Plan (2023)	Zoning Map (2018)	Environmental Committee	Critical Environmental Areas
Village of Piermont (Rockland, NY)	Comprehensive Plan (in progress)	Zoning Code (1977 and amended		Local Waterfront Revitalization Plan (2018)
Rockleigh Borough (Bergen, NJ)	1991 Master Plan Re-examination report (2019)	Zoning Map (2013)	Rockleigh Borough Parks Commission	Stormwater Management Plan
Rockland County	Comprehensive Plan (2011)	N/A		Palisades Scenic Byway Corridor Management Plan (2011)
Bergen County	Master Plan (2023)	N/A		

Local Protection of the Sparkill Creek in New York State

Sparkill Creek is one of 14 streams regulated by Rockland County through the Rockland County Drainage Agency. Rockland County's Stream Control Act established this jurisdiction starting in 1976. A permit from the Rockland County Drainage Agency is required for development and related activities within its 100-year floodplain (Rockland County 2011). The Drainage Agency also inspects county-regulated streams to identify obstructions or damage. Issues related to the Sparkill Creek can be reported through the Rockland County request service form. The Rockland County Drainage Agency has identified that development predating stormwater regulations surrounding the Sparkill Creek is one of the major causes of water pollution.

Sparkill Creek is also regulated by the Town of Orangetown. Chapter 41 of the Orangetown Town Code requires permits for Watercourse Diversion and Pollution, including filling, blocking, damming, bridging or diverting any stream or watercourse. Town Code § 41-10 establishes water quality standards for the Sparkill Creek and its tributaries, including storm drains, to protect the watershed from pollution and requiring a local permit for the discharge of any liquid into a stream, drain, or watercourse, other than from a one- or two-family dwelling:

> "It is the determination of the Town Board of the Town of Orangetown that it is to the public good, health and welfare of the people of the Town of Orangetown that the water quality of the watercourse known as and by Sparkill Creek be established and maintained at the level of water quality specified."

A 2014 code review process for the Town of Orangetown provided recommendations for incorporating green infrastructure standards into town codes to reduce flooding and water quality impacts of stormwater (Denker 2014). For additional lessons learned from that project,

see Adding Green Infrastructure to Local Codes: Lessons Learned from Two Rockland County Projects (2014).

Critical Environmental Areas

Under the New York State State Environmental Quality Review Act, municipalities can designate specific geographic areas within their boundaries as Critical Environmental Areas (CEA). Such areas "must have exceptional or unique characteristics with respect to human health, agriculture, culture, history, archaeology, recreation, education, or it must have inherent ecological, geological or hydrological sensitivity to change." There are three Critical Environmental Areas within the Sparkill Creek watershed, designated by the Village of Piermont (Table 8).

For more information on the CEAs in the Sparkill Creek watershed, see the Orangetown Comprehensive Plan and the DEC InfoLocator. For more information about CEAs in general, see the Critical Environmental Areas Fact Sheet from the Hudson River Estuary Program.

Table 8. Critical Environmental Areas in the Sparkill Creek watershed.

Critical Environmental Area Name	Effective Date of Designation	Designating Agency	Reason for Designation
Sparkill Creek	4/24/85	Village of Piermont	*water quality and protection* Protect open space and aesthetic beauty
Palisades Slope	4/24/85	Village of Piermont	Protect open space and aesthetic beauty
Piermont Pier	4/24/85	Village of Piermont	Protect open space and aesthetic beauty

Source: Critical Environmental Areas (CEA)
Publisher: NYS DEC
Publication Year: As needed, last updated 8/3/22; Information accessed through the DECinfo Locator.

Forests

About 35% of the Sparkill Creek watershed is forested (Figure 8, Table 6). Forests provide numerous benefits for water quality, water quantity, and habitat. Figure 9 shows large forested areas in the Sparkill Creek watershed, based on the Hudson Valley Forest Condition Index from the New York Natural Heritage Program, and Forest Block Linkage Zones, created by the New York Natural Heritage Program and The Nature Conservancy. The largest forest patches in the watershed are associated with state and county parks.

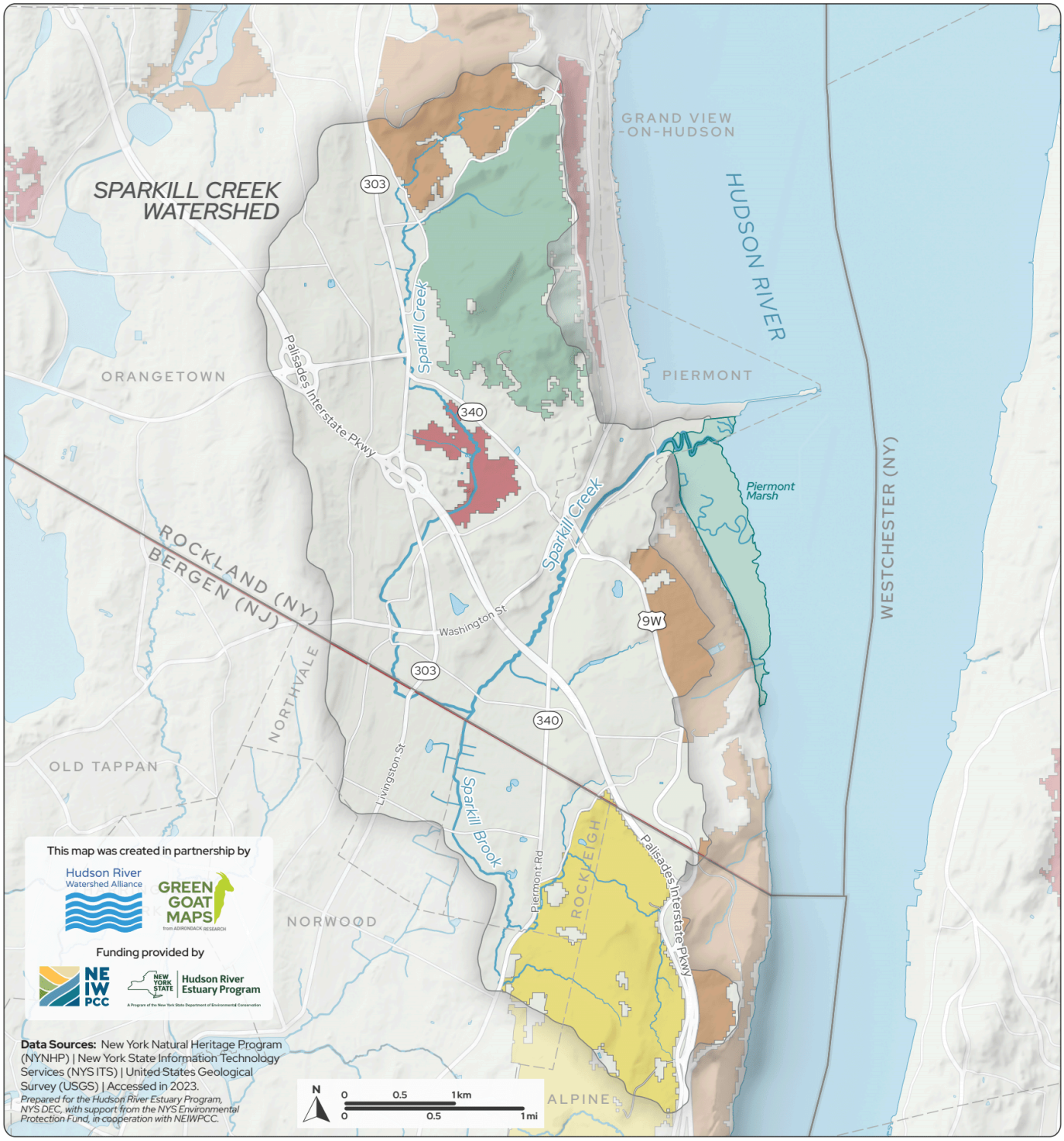

Figure 9. Forests in the Sparkill Creek watershed

Table 9. Forest Patch Details. Patches are listed from North to South, as they are shown on Figure 9.

Patch Size (acres)	County/Location (Color on Map)	FCI* percentile	Description
601	Rockland (on Map: Brown)	20 - 40	This forest patch, which is partially in the watershed, is important for regional habitat connectivity (in the top 5% of all patches). Within the watershed, the patch includes Blauvelt State Park and Tackamack Park.
102	Rockland/barely in watershed (on Map: Red)	0 - 20	This long, skinny forest patch near Grandview-on-Hudson mostly lies outside of the watershed.
818	Rockland (on Map: Green)	60 - 80	This forest patch is in the top 1% for rare species richness and regional connectivity. It is the highest quality patch in the watershed. About 70% of the patch is protected from future development by Clausland Mountain County Park and a conservation easement.
116	Rockland/along Sparkill Creek (on Map: Red)	0 - 20	This forest patch along the Sparkill Creek is in the top 1% for wetlands protected, rare species richness, and riparian habitat protected.
358	Rockland/close to Piermont Marsh (on Map: Brown)	20 - 40	This forest patch is within Tallman Mountain State Park and is in the top 1% for rare species richness.
1,591	Bergen (on Map: Yellow)	40 - 60	This forest patch located west of the Palisades Parkway is in the top 5% for edge area ratio and core area index. It includes municipal parks and a conservation easement.
177	Bergen (on Map: Brown)	20 - 40	This forest patch, separated from the previous patch by the Palisades Parkway, is in the top 1% for low building density, and in the top 5% for low impervious cover.
527	Bergen and Rockland (on Map: Brown)	20 - 40	This long, skinny forest patch that includes Palisades Interstate Park is barely in the watershed, in the top 1% for regional connectivity, and in the top 5% for landform diversity. It is separated from the previous patch by State Line Lookout Road.

*For an explanation of the FCI, or Forest Condition Index, read the Forest Condition Index Fact Sheet

Source: Hudson Valley Forest Condition Index.
Publisher: New York Natural Heritage Program, NYS Department of Environmental Conservation Hudson River Estuary Program, and Cornell University
Publication Year: 2019; Information accessed through the Hudson Valley Natural Resource Mapper.

There are eight forest patches over 100 acres either partially or wholly within the Sparkill Creek watershed, ranging from 102 to 1,591 acres. The Hudson Valley Forest Condition Index estimates the condition of each forest patch relative to others in the Hudson River Estuary watershed using a variety of region-wide data. This assessment shows that the watershed's forest fragments have regional importance for species diversity, regional connectivity, and wetland protection (Table 9). One patch along the Sparkill Creek near the US Army Reserve Center is the only large forested area along the Sparkill Creek outside of its headwaters.

For more information on the individual patches and the core forests within the patches, use the Hudson River Natural Resources Mapper. For more information about the data, see the Forest Condition Index Fact Sheet and the Hudson Valley Forest Patch Update and Assessment Final Report (2019).

Forests were mapped as part of the Biodiversity Assessment Draft Final Report (2004). Most of the forests mapped in the "Rockland Shorelines" study area were Upland Forests. The report notes, "Our region falls within the transition zones between more southern, oak dominated forest types grading into more northern hardwood types." They also found small areas of mixed forest, primarily Hemlock-northern hardwood. Stands of Eastern Hemlock are threatened by Hemlock Wooly Adelgid; several stands in Clausland Mountain State Park were already dead or dying in 2004.

Wetlands

Wetlands are areas saturated by enough surface water or groundwater to support distinctive plants that are adapted for life in saturated soil conditions. Among other watershed benefits, wetlands provide important habitat for many plant and animal species, help manage flooding, improve water quality by reducing sediments and nutrients, and provide opportunities for recreation. For more information on wetlands as habitat within the Sparkill Creek watershed, see the Terrestrial and Wetland Habitats section.

The National Wetlands Inventory includes wetlands of all sizes, along with basic habitat information. These maps, developed by the US Fish and Wildlife Service, are not intended for regulatory purposes. Wetlands were identified based on aerial photo interpretation and some field checking. According to the National Wetlands Inventory, there are 251 wetlands covering about 6% of the Sparkill Creek watershed (Figure 8, Table 6). Most of these wetlands are woody wetlands and small; the average wetland size is 2.3 acres (Table 10). Most of the wetlands in the Sparkill Creek watershed occur along streams (also called riparian wetlands). For more information on riparian areas in the Sparkill Creek watershed, see the section on Riparian Areas and Figure 14.

The two largest freshwater wetland complexes along the Sparkill are a blend of emergent marsh and hardwood swamp, and are described in more detail below. The largest wetland associated with the Sparkill Creek is Piermont Marsh, a large tidal wetland at the mouth of the creek that is described briefly in this section, as well as in the Terrestrial and Wetland Habitats and Protected

Lands sections. For more information on individual wetlands, including their size and other characteristics, use the Hudson River Natural Resources Mapper.

Table 10. Freshwater wetland characteristics based on National Wetland Inventory data

Wetland Type	Count	Total Area (acres)
Estuarine and Marine Deepwater	2	4.2
Estuarine and Marine Wetland	8	32.9
Freshwater Emergent Wetland	16	25.7
Freshwater Forested/Shrub Wetland	107	318.8
Freshwater Pond	26	28.1
Riverine	92	47.5
Total	251	457.3

Source: National Wetlands Inventory
Publisher: US Fish and Wildlife Service
Publication Year: 2023

Soil data is also useful for identifying wetlands. Because the National Wetland Inventory tends to underestimate wetland area, the Biodiversity Assessment Manual for the Hudson River Estuary Corridor (Kiviat and Stevens 2001) recommends using hydric soil information to better understand the extent of wetlands. The National Resources Conservation Service identifies which soils identified in county surveys are “hydric” or “wetland” soils (Hydric Soils List). “Poorly drained” and “very poorly drained” soils indicate probable wetland areas. “Somewhat poorly drained soils” suggest the location of possible wetland areas. Hydric soils may overestimate wetland areas, which is why it is important to verify map data in the field. For more information on the utility of soil maps for estimating wetland areas, see Creating a Natural Resource Inventory (Haeckel and Heady 2014) and the Biodiversity Assessment Manual for the Hudson River Estuary Corridor (Kiviat and Stevens 2001).

Figure 10 shows approximately 378 acres of probable or possible wetlands in the New York portion of the Sparkill Creek watershed. These areas can be viewed on the Hudson Valley Natural Resources Mapper. Probable and possible wetlands are not mapped for the New Jersey portion of the watershed because New Jersey’s soil data does not include hydric status.

Many studies and reports have acknowledged the filling and loss of wetlands over time in the Sparkill Creek watershed. According to the Sparkill Creek Flood Mitigation & Resilience Report (SLR Consulting 2022), it is estimated that approximately 50 to 60 percent of the wetlands in

New York State have been lost through draining, filling, and other types of alteration since colonization.

Wetlands were mapped as part of the Biodiversity Assessment Draft Final Report (2004). The largest freshwater wetlands were found in the Sparkill Creek floodplain. Throughout the study area, hardwood swamp was more common than open, emergent marshes. One site near the American Legion in Sparkill has about 5 acres of emergent marsh surrounded by about 20 acres of hardwood swamp. The report notes: "Although located in the center of a relatively populated area, this marsh is of high quality with the high cattail content providing a valuable native habitat." Two smaller and more disturbed hardwood swamps are separated from the higher quality wetlands by the Palisades Interstate Parkway.

Another wetland complex south of St. Thomas Aquinas College and north of King's Highway includes about 12 acres of emergent marsh surrounded by 35 acres of hardwood swamp. This area also includes a large forest fragment. The report notes:

> "Despite the presence of introduced species and a history of disturbance, this marsh offers a rich wetland habitat in the midst of a suburban environment. It serves as an important area of flood surge protection to the adjacent developed areas and provides a buffer to the two waste treatment facilities on the stream."

The volunteer team found at least six possible intermittent woodland pools and verified two. These isolated, seasonal wetlands provide important habitat for regionally-rare amphibians.

Wetland Protection

New York State wetland maps were created to implement the New York State Freshwater Wetlands Act, and do not show all wetlands that may be present in an area. These maps show wetlands larger than 12.4 acres or smaller wetlands that are designated "of unusual local importance" that require a permit for alteration within the wetland or its 100-foot buffer. Figure 10 shows four of these mapped wetlands, along with a 500 foot "check zone" surrounding each wetland where the actual wetland may occur. Online maps of New York State's freshwater wetlands and Check Zones are available through the NYS DEC's Environmental Resource Mapper. Note: Starting January 1, 2025, any wetlands that meet the applicable wetland definition and criteria will be regulated by NYS DEC, regardless of whether they appear on the informational maps. Contact the regional NYS DEC office for more information about wetland regulations.

New Jersey does not have a size limit for protected wetland protections and does not map wetlands. Rather, it regulates any wetland that meets the federal definition, plus a transition area of 0, 50, or 150 feet, depending on the resource values and landscape context. State wetland jurisdiction is determined on a case by case basis. For more information on how New Jersey regulates wetlands, see the NJ DEP website Wetlands Permitting.

Piermont Marsh

Piermont Marsh is a significant tidal wetland at the mouth of the Sparkill Creek and along the Hudson River. It is the largest brackish tidal marsh on the Hudson River. Located mostly within Tallman Mountain State Park, NYS DEC manages the 278-acre marsh and 1,000 acres of associated mudflats and shallows. Piermont Marsh was designated as part of the Hudson River National Estuarine Research Reserve in 1982.

Because the Sparkill Creek flows into Piermont Marsh, it is possible that the quality of the creek could affect the quality of the marsh; however, the 2019 Hudson River National Estuarine Research Reserve Management Plan concludes it is not a major problem at this time:

> "While water quality, nutrient loading, and fecal contamination issues are a concern within the Sparkill Creek, they do not currently pose a significant threat to the marsh."

To learn more about the habitats of Piermont Marsh, see the Terrestrial and Wetland Habitats section. To learn more about its management, see the Protected Lands section.

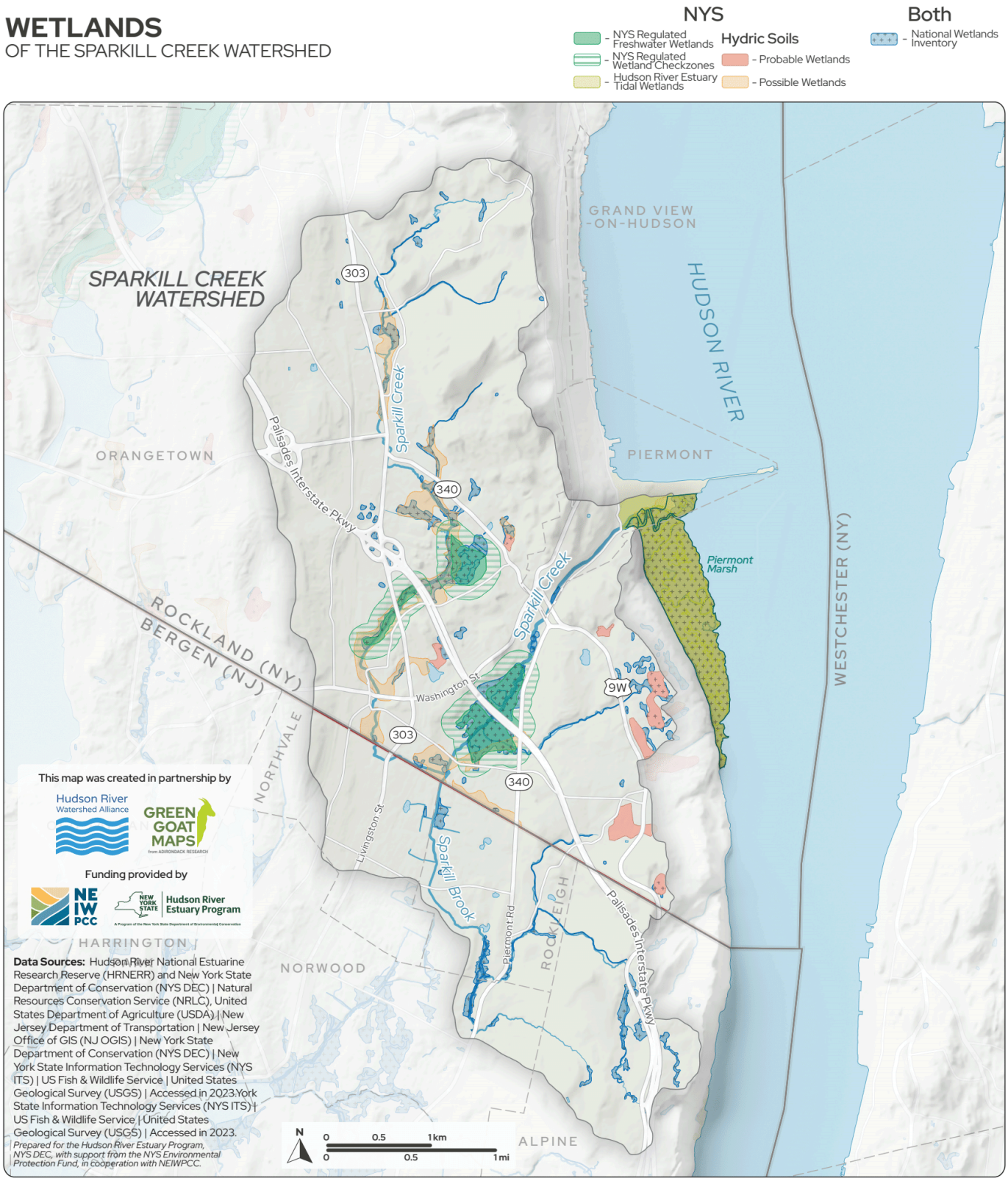

Figure 10. Wetlands of the Sparkill Creek watershed.

Terrestrial and Wetland Habitats

The Sparkill Creek watershed includes significant terrestrial and wetland habitat areas. Figure 11 focuses on significant habitat areas mapped by New York State and New Jersey and available in GIS format. These data are known to be incomplete. Additional information about terrestrial and wetland habitats can be found in the Local Habitat Studies section, along with the Local Land Use Plans, Policies, and Practices section.

Significant Biodiversity Areas in the Hudson River Valley

Significant Biodiversity Areas are regionally significant landscape areas in the Hudson River estuary watershed that contain a high concentration of biodiversity or unique ecological features. They were identified by the NYS Department of Environmental Conservation Hudson River Estuary Program with the New York Cooperative Fish and Wildlife Research Unit at Cornell University and the NY Natural Heritage Program. The Sparkill Creek watershed includes two of the 22 significant biodiversity areas of the Hudson River estuary watershed: the Palisades and the Lower Hudson River Estuary. For more information about significant biodiversity areas, see the Hudson River Estuary Wildlife and Habitat Conservation Framework; maps are available on the Hudson River Natural Resources Mapper.

The Palisades Significant Biodiversity Area, covers 12,149 total acres from Haverstraw, NY to Alpine, NJ, and covers about one-third of the eastern Sparkill Creek watershed area (Figure 11). The Palisades include regionally rare cliff and talus slope communities habitat, and provides habitat for many bird species, including the NYS endangered Peregrine Falcon. It also has New York's only Allegheny wood-rat population noted in recent times, which is also a New York State endangered species (Penhollow et al. 2006).

The tidal portion of Sparkill Creek and Piermont Marsh are part of the Lower Hudson River Estuary Significant Biodiversity Area. This area has the greatest mixing of salt and freshwater in the Hudson River and is influenced by twice daily tides.

Piermont Marsh, a significant tidal wetland complex at the confluence of the Sparkill and the Hudson, is the largest brackish tidal marsh on the Hudson River. The NYS Department of State designated the marsh a Significant Coastal Fish and Wildlife Habitat in 1987. Three New York State-listed species have recently been documented in Piermont Marsh: NYS Threatened Annual Saltmarsh Aster (*Symphyotrichum subulatum*), NYS Threatened Eastern Grasswort (*Lilaeopsis chinensis*), and NYS Threatened Least Bittern (*Ixobrychus exilis*). Many other rare plant and animal species historically occurred at Piermont Marsh, but have not been documented in recent decades. A summary of the known habitats and wildlife of Piermont Marsh is available in pages 19-21 of the Hudson River National Estuarine Research Reserve Management Plan (2019).

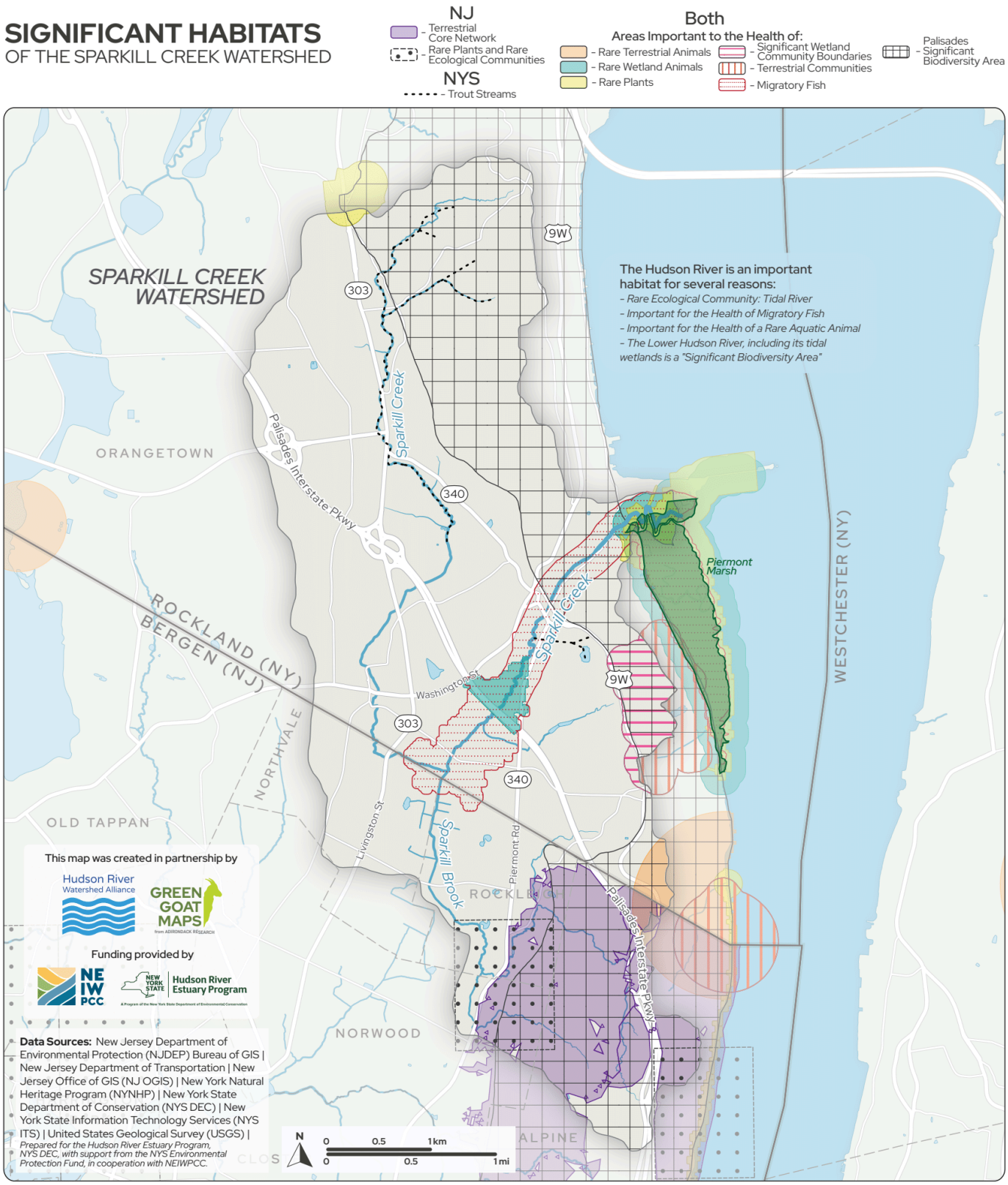

Figure 11. Significant Habitats of the Sparkill Creek watershed.

New York Rare Plants, Rare Animals, and Significant Natural Communities

The New York Natural Heritage Program has generated Important Areas for specific rare animal, rare plant, and significant natural community occurrences within the Hudson River estuary watershed to support inventory and planning. These areas are modeled and mapped based on the life histories and habitats of the species or species group and the community type's size and natural ecological processes, and therefore may include areas in New Jersey, but these are based on New York State occurrences. The Sparkill Creek watershed includes Known Important Areas for Rare Plants, Rare Wetland Animals, and Rare Terrestrial Animals (Figure 11).

For more information about how Important Areas were developed and can be used, see the Natural Heritage Important Areas Fact Sheet. Generalized locations of Rare Plant and Animal Species, as well as Significant Natural Communities, are available on the NYS DEC's Environmental Resource Mapper. For more information on the specific rare plants, rare animals and natural communities in the watershed, request data from the New York Natural Heritage Program. For more information on endangered or threatened species regulations, contact the NYS DEC Regional Office.

Table 11. Significant Natural Communities in the Sparkill Creek watershed.

Community Name	System Subsystem	Acres	Global Rank State Rank	Watershed Location
Brackish intertidal mudflats	Estuarine Estuarine Intertidal	28.00	G3G4 S1	Piermont Marsh
Brackish subtidal aquatic bed	Estuarine Estuarine Subtidal	565.00	G4 S3S4	Piermont Marsh
Brackish tidal marsh	Estuarine Estuarine Intertidal	249.00	G4 S1	Piermont Marsh
Tidal river	Estuarine Estuarine Subtidal	74,248.64	G4 S3	Hudson River and tidal Sparkill Creek
Red maple-sweetgum swamp	Palustrine Forested Mineral Soil Wetlands	55.64	G4G5 S1	Tallman Mountain State Park
Cliff community	Uplands Open Uplands	14.12	G5 S4	Palisades Interstate Park

Source: Significant Natural Communities
Publisher: New York Natural Heritage Program
Publication Year: 2018; Information accessed through the Hudson Valley Natural Resource Mapper

In addition to Important Areas, New York Natural Heritage Program has made mapped Significant Natural Communities data from across New York State available to the public. These areas are considered significant from a statewide perspective because they are rare or high quality based on size, habitat condition, and quality of the surrounding landscape. There are six Significant Natural Communities in the Sparkill Creek watershed (Table 11), most of which are found on land owned by New York State. For more information about significant natural communities, see the Hudson River Natural Resources Mapper and the New York Natural Heritage Program Conservation Guides.

New Jersey Rare Plants, Animals, and Natural Communities

New Jersey has identified important habitat areas of the watershed based on the needs of rare plants and animals. High priority areas for sustaining terrestrial and wetland habitats are shown on Figure 11. These "terrestrial core habitats" are based on regional-scale information about terrestrial and wetland ecosystems and associated focal species. The terrestrial core-connector network is intended to serve as a starting point for a regional conservation network that can be used in combination with other sources of information to direct and prioritize conservation action. Learn more at Nature's Network Conservation Design site on the Northeast Conservation Planning Atlas.

Habitat for threatened and endangered species in New Jersey was mapped in the Sparkill Brook watershed as part of NJDEP Landscape 3.3 Project. These data are not shown in Figure 11, but can be viewed online. The priority areas include documented habitat for the NJ listed species, including the state endangered Bald Eagle (*Haliaeetus leucocephalus*), state threatened species Red-headed Woodpecker (*Melanerpes erythrocephalus*), Wood Turtle (*Glyptemys insculpta*), and Black-crowned Night-heron (*Nycticorax nycticorax*), as well as Species of Special Concern Northern Copperhead (*Agkistrodon contortrix mokasen*) and Wood Thrush (*Hylocichla mustelina*). For more information about the areas that are important for these rare species and other important habitats, see the NJ Land Resource Protection Web Application.

The general location of New Jersey rare plants and rare ecological communities are shared by New Jersey Natural Heritage as a grid. The only New Jersey rare plant documented in the Sparkill Brook watershed is Leatherwood (*Dirca palustris*). For more information, contact the NJ DEP Office of Natural Lands Management, Division of Parks and Forestr.

Local Habitat Studies

The habitat data available from the state is limited and local observations are essential for having a more complete understanding of local habitats. The habitats in part of the Sparkill Creek watershed were documented by local volunteers trained by Hudsonia, Ltd. in 2004. The "Rockland Shorelines" volunteer team mapped habitats on 11,742 acres between NYS Route 303 and the Hudson River, including many smaller, locally significant habitats, including forests, wetlands, riparian areas, and tidal areas. For more information about the habitat mapping

process and more detail about these habitats and more, read Biodiversity Assessment Draft Final Report and view the map.

The team highlighted the unique crest, ledge, and talus habitat of the Palisades:

> "Plant species range from rare species of lichens and ferns, growing on bare rock outcroppings and in crevices to hardwood forests, dominated by oak and tulip trees, to specialized ecological and regionally rare communities, rocky summit grasslands and associated mixed forests."

The report notes that of the study area's streams and riparian areas:

> "The Sparkill Creek has the most significant riparian corridor in our study area, and unfortunately it is significantly impaired. The creek has eroded substantially along most of its length, has been altered in flow and design, has been developed up to its borders in many areas, no longer has the necessary width to handle a significant amount of flood water. Additionally, repeated water quality testing on the Sparkill Creek by the DEC and the County of Rockland demonstrates that the water is not supporting the variety of benthic macroinvertebrates, and fish life that it should."

The team documented a number of intermittent streams, or streams that do not flow all year, often found in headwater areas: "On May 22, we observed intermittent streams in a seepy area in Blauvelt State Park, which fed into the perennial stream known as the Sparkill Creek."

Several of the local habitat studies have lists of plants and animals of the watershed:

- List of Flora in the Preliminary Ecological Assessment of Sparkill Creek, pages 22-26
- Piermont Pier Plant List from the NY/NJ/CT Botany Organization, pages 43-48 in the Biodiversity Assessment Draft Final Report
- Taxa list from the Biodiversity Assessment Team site visits

For more information about terrestrial and wetland habitats included in municipal plans and reports, see the Local Land Use Plans, Policies, and Practices section. For information about fish and aquatic habitats, see the Aquatic Habitats section under Waters of the Sparkill Creek Watershed.

Protected Lands

The Sparkill Creek watershed contains many parcels that are protected in some way. Figure 12 includes lands open to the public for recreation, as well as private lands where landowners have agreed to limit the future development of their properties to protect valuable natural resources. Thus, protected lands on Figure 12 may be public or private and open or closed to public access. Lands in different ownership have different management approaches and levels of public access. Also note that not all lands that are owned by state and local governments are shown on the map; some may be somewhat protected from future development.

There are protected lands throughout the Sparkill Creek watershed, with clusters in the northern headwaters, southern headwaters, and at the creek's confluence with the Hudson River (Figure 12). The protected lands in the northern headwaters have a mix of land ownerships. Publicly accessible lands include state, county, and town-owned lands: Blauvelt State Park, Clausland Mountain Park (Rockland County), Tackamack Park, Elliot Park, and Nike Park (Town of Orangetown Parks). There are also two privately-owned parcels protected by conservation easements held by Scenic Hudson Land Trust. Conservation easements are voluntary preservation agreements where landowners limit the future development of the properties to protect valuable natural resources.

The protected lands in the southern headwaters include the Palisades Interstate Park, the Bergen County-managed Rockleigh Golf Course, Alpine Reserve North (labeled Camp Alpine on the map), Rockleigh Woods, Sneden Ponds and Woods, East Hill Park, and the privately-owned Alpine Scout Camp that is protected by a conservation easement. For more information on the location of Bergen County and Borough Lands, visit New Jersey's Land Resources Protection Web Application; for more information on the lands protected by Bergen County, see the Bergen County Parks Master Plan (2019)

Tallman Mountain State Park is a 1,197 acre park primarily managed by the Palisades Interstate Park Commission, except for the portion of the park within Piermont Marsh, which is managed by the NYS Department of Environmental Conservation as part of the Hudson River National Estuarine Research Reserve.[1] In addition to the state park land, Piermont Marsh also includes 70 acres of DEC lands and Village of Piermont Parks. For more information on how NYS DEC manages these lands, consult the 2019 Hudson River Research Reserve Management Plan.

There are numerous small municipal parks throughout the Sparkill Creek watershed in New York State and New Jersey. There are also longer trails that are not entirely within conserved lands. These include the Joseph B. Clarke Rail Trail, a 3.8 mile paved trail that runs from Tappan to Blauvelt; the Old Erie Path, a spur of the Clarke Trail that goes from Piermont to Nyack; and the Long Path, a 350-mile trail that goes from the George Washington Bridge to Albany County. The trail goes through many of the Sparkill Creek watershed's protected lands.

[1] *Note on Figure 12: On the map, Tallman Mountain State Park looks disconnected from Piermont Marsh. In reality, it is contiguous. It looks disconnected because lands outside the watershed are faded out. The Advisory Committee requested Piermont Marsh show clearly on the maps because of its regional significance. Most of the marsh lies outside the Sparkill Creek watershed.*

Figure 12. Public and Private Conservation Land in the Sparkill Creek watershed.

Built Environment

The Sparkill Creek watershed is largely developed, including developed open space (25.9%), low intensity development (17.3%), medium intensity development (8.8%), and high intensity development (3.5%) (Table 6, Figure 8) For a description of these development types, see Appendix B.

Figure 13 shows the distributed development in the watershed, as well as the more intensive land and water uses. This map may not show newer developments that have taken place more recently; impervious surface cover data in Rockland County is from 2007 and from 2015 in Bergen County. The Sparkill Creek watershed contains one transfer facility, one Hazardous Waste Treatment, Storage and Disposal Facility, four inactive landfills, two petroleum bulk storage facilities, six chemical bulk storage facilities, and ten remediation parcels in the New York State portion of the watershed.

The watershed's solid waste facilities, hazardous substance bulk storage facilities, remediation sites, and Environmental System Management Sites are described in this section. For more information on dams and culverts, see the section on Aquatic Habitats under Waters of the Sparkill Creek watershed. For more information on stormwater, wastewater, and drinking water, see the section on Water Infrastructure under Waters of the Sparkill Creek watershed.

For more information about watershed's transfer facilities, inactive solid waste landfills, petroleum bulk storage, chemical bulk storage, and remediation sites within New York State, use the DECinfo Locator, an interactive tool that maps and provides public access to NYS DEC documents and public data about permits and environmental quality. The most up-to-date information can be accessed through the DECinfo Locator. New Jersey data is available through NJ-GeoWeb. For facilities' enforcement and compliance information, see the EPA's Enforcement and Compliance History Online (ECHO).

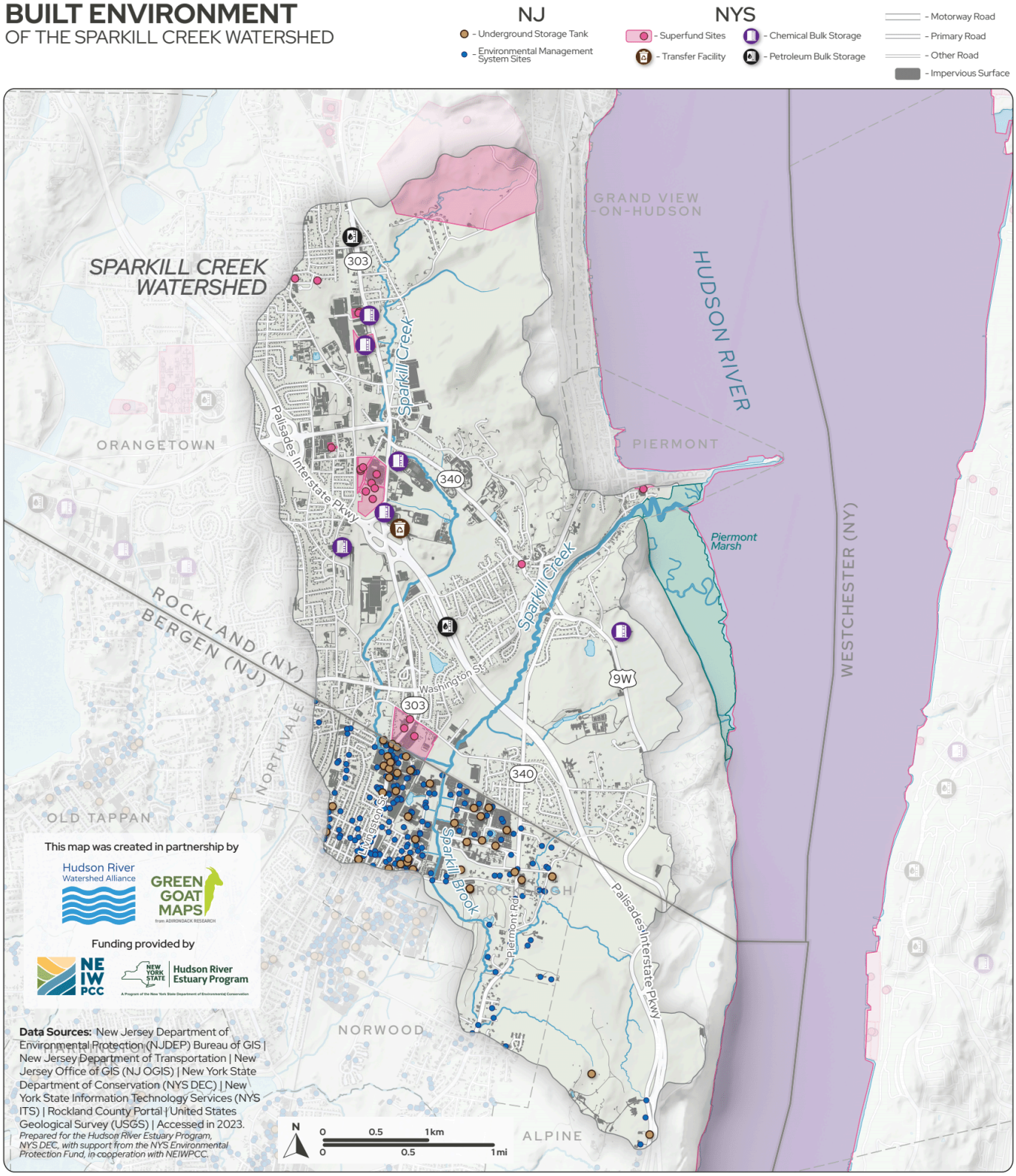

Figure 13. Built Environment of the Sparkill Creek watershed.

Solid Waste Facilities

The Sparkill Creek watershed has one transfer facility. A transfer facility is a facility that receives, consolidates, and transports waste to a subsequent facility for processing, treatment, further transfer, or disposal. The Orangetown Bulk Waste Transfer Station (Authorization Number: 44T10001) is owned by the Town of Orangetown, and located at 119 Route 303, Orangeburg, NY 10962 (Figure 13). The facility receives mixed municipal solid waste (residential, institutional, and commercial).

There is one Hazardous Waste Treatment, Storage and Disposal Facility (TSDF) within the Sparkill Creek watershed. Hazardous Waste Treatment, Storage and Disposal Facility (TSDFs) are facilities with a 6 NYCRR PART 373 permit to receive hazardous waste for treatment, storage, or disposal. The Nice-Pak Professional Disposables facility (EPA ID #: NYD981181910) is listed as a facility type with disposable, sanitary, & medicated wipe manufacturing.

Though there are no active landfills within the Sparkill Creek watershed, there are four inactive solid waste landfills (Table 12). The NYS DEC's *New York State Inactive Landfill Initiative: Comprehensive Plan to Address Priority Solid Waste Sites for Potential Impacts on Drinking Water Quality* (NYS DEC 2022) ranks facilities across New York State to prioritize next steps, with an emphasis on understanding impacts of emerging contaminants, including per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane.

Table 12 includes the rankings and recommendations for facilities in this watershed. Investigations for sites ranked over 45, including the inactive landfill at for US Army Camp Shanks, have already begun. The inactive landfill at Camp Shanks is listed under Priority Group 3: Exceedance in Landfill Groundwater Samples, No Identified Downgradient Receptors, with a recommendation for source monitoring and/or mitigation. For more specific location information, see the DECinfo Locator.

Table 12. Inactive solid waste landfills in the Sparkill Creek watershed.

Facility Name	Location	City, County	Solid Waste ID	Inactive Hazardous Waste Classification	Inactive Hazardous Waste Number	Ranked Score in 2022 DEC Report	Recommendation/Status in 2022 DEC Report
Parseghian	594 Route 303	Blauvelt, Rockland County	Not Provided	N/A	N/A	32	Potential Future Investigation List Site
Former Orangeburg Pipe Landfill DS&HM	Rt 303	Orangetown, Rockland County	44S75	Class N	344013; V00343	-	Potential Future Investigation List Site

Camp Shanks SLF (US Army)	Route 303	Orangetown, Rockland County	44S74	Class N	344010	58	GW Sampling Completed, No Residential Sampling
Piermont	Ferry Rd	Piermont (V), Rockland County	Not Provided	N/A	N/A	33	Potential Future Investigation List Site

Source: Inactive Solid Waste Landfills
Publisher: NYS DEC
Publication Year: updated annually, last updated 1/24/23; Information accessed through the DECinfo Locator.

Hazardous Substance Bulk Storage Facilities

In New York State, NYS DEC manages hazardous substance bulk storage programs for the safe storage and handling of petroleum, hazardous substances/chemicals, and liquefied natural gas, including requirements, inspection, and enforcement procedures. The Petroleum Bulk Storage program applies to properties that have: 1) one or more tank systems designed to store a combined capacity of more than 1,100 gallons or more of petroleum in aboveground and/or underground storage tanks or 2) one or more underground tank systems designed to store 110 or more gallons of petroleum, except for tank systems that are specifically exempted. The Petroleum Bulk Storage facilities within the Sparkill Creek watershed are listed in Table 13 and shown on the map in Figure 13.

All above ground and underground tank systems designed to store used oil, regardless of size, must be registered with NYS DEC and managed with applicable regulations for storage and handling of petroleum.

Table 13. Petroleum Bulk Storage Facilities within the Sparkill Creek watershed.

Site Name	Site Number	Municipality	Facility Type	Number of Tanks
Palisade Fuel	3-601817	Town of Orangetown	Retail Gasoline Sales	1 in service
Palisades Parkway Services, Inc.	3-602437	Town of Orangetown	Retail Gasoline Sales	4 in service

Source: Petroleum Bulk Storage Facilities
Publisher: NYS DEC
Publication Year: updated daily, accessed 2/27/23; Information accessed through the DECinfo Locator.

NYS DEC's Chemical Bulk Storage program applies to properties that store a hazardous substance (a substance listed in 6 NYCRR Part 597) in an aboveground storage tank larger than 185 gallons, any size underground storage tank, or in a container that can store 1,000 kg or more for a period of 90 consecutive days or more.

There are six Chemical Bulk Storage facilities within the Sparkill Creek watershed, listed in Table 14 and shown on the map in Figure 13.

Table 14. Chemical Bulk Storage Facilities within the Sparkill Creek watershed.

Site Name	Site Number	Municipality	Facility Type	Number of Tanks
Materials Research Corp.	3-000231	Town of Orangetown	Manufacturing (Other than Chemical)/ Processing	1 tank converted to non-regulated use
Avery Dennison, Infor & Brand Mgmt	3-000101	Town of Orangetown	Manufacturing (Other than Chemical)/ Processing	14 tanks closed - removed 1 tank converted to non-regulated use 1 tank closed - in place
Rockland County Sewer District No. 1	3-000348	Town of Orangetown	Municipality (Inc. Wastewater Treatment Plants, Utilities, Swimming Pools, etc.)	Tank information withheld
Orangetown STP SD#2	3-000466	Town of Orangetown	Municipality (Inc. Wastewater Treatment Plants, Utilities, Swimming Pools, etc.)	Tank information withheld
En-Tech Corp	3-000486	Town of Orangetown	Manufacturing (Other than Chemical)/ Processing	2 tanks converted to non-regulated use
Tallman Mountain State Park Pool	3-000165	Town of Orangetown	Swimming Pools (Other than Municipal)	1 tank closed - removed

Source: Chemical Bulk Storage Facilities
Publisher: NYS DEC
Publication Year: updated daily, accessed 2/27/23; Information accessed through the DECinfo Locator.

In New Jersey, Underground Storage Tank (UST) Compliance & Enforcement is a component of the New Jersey Department of Environmental Protection's Division of Waste Enforcement, Pesticides and Release Prevention. Underground Storage Tank points are mapped in Figure 13, representing sites with Underground Storage Tanks regulated under N.J.A.C. 7:14B. Information about individual Underground Storage Tanks in the New Jersey portion of the Sparkill Creek watershed is available through the NJDEP NJ-GeoWeb interactive web map.

Remediation Sites in NY

Environmental remediation sites in New York State are managed by NYS DEC's Division of Environmental Remediation, including sites within the State Superfund, Environmental Restoration, Brownfield Cleanup, and Voluntary Cleanup Programs. These programs support the cleanup and redevelopment of contaminated properties. The State Superfund Program is an enforcement program in New York State that identifies and characterizes suspected inactive hazardous waste disposal sites and to make sure that any sites that may pose a significant threat to public health or the environment are properly addressed. Remediation parcels in the Sparkill Creek watershed are listed in Table 15 and shown on the map in Figure 13 (as Superfund Sites). For more details on the specific Active, No-Action, and Closed Superfund Sites, see the DECinfo Locator.

There are a significant number of sites with contaminated groundwater in the Sparkill Creek watershed. This monitoring has been conducted for site assessments as part of New York State's remediation programs. For more information on groundwater in the Sparkill Creek watershed, see the section on Aquifers & Groundwater.

A few sites of particular note for the Sparkill Creek and watershed include the Blauvelt Laundry, Former Materials Research Corporation, Orangeburg Shopping Center, Former Orangeburg Pipe Mfg-Lowe's Site, Orangeburg Commons, Danzig Groundwater, and Piermont Papermills. At these sites, specific contaminants of concern have been detected in groundwater, including instances where levels have exceeded water quality standards. Specific contaminants of concern detected in groundwater at these sites include volatile organic compounds (VOCs), dry cleaning solvents, metals, pesticides, petroleum constituents, per-and poly fluoroalkyl substances (PFAS), 1,4-dioxane, and polychlorinated biphenyls (PCBs).

At the Former Materials Research Corporation site, contaminants of concern include certain chlorinated volatile organic compounds that impacted drinking water supplies. According to the Site Assessment:

> "Sampling of residential wells approximately 1,000 feet from the site in 2005 revealed the presence of TCE and PCE. Due to the presence of contamination in the private drinking water supplies, 24 residences have been connected to public water and two residences have been connected to activated carbon filtration systems… Drinking contaminated groundwater is not expected since residences were either connected to the public water supply, have had granular activated carbon filters installed, or their well water is monitored."

The Blauvelt Laundry site also impacted public drinking water supplies. The site was listed as a Class 2 site in the State Registry of Inactive Hazardous Waste Disposal Sites because it represented a significant threat to public health or the environment and action was required. More information is available in the Site Assessment and Blauvelt Laundry Fact Sheet: State Superfund Program (2014).

Site Assessment reports at other remediation sites within the Sparkill Creek watershed, including the Orangeburg Shopping Center, Orangetown Commerce Center, and Orangeburg Commons, state that: "Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination."

For a summary of specific contaminants of concern and remediation sites, see Appendix C. Links to updated site information are available through the DECinfo Locator.

Contaminants of concern have also been found in the surface water of the Sparkill Creek. The Danzig Flooring Machine Company site is located across the state border in New Jersey, but contamination in the groundwater has the potential to migrate north into New York State. The Danzig Groundwater remediation parcel is located in Tappan, and the Sparkill Creek lies to the west, south, and east of the site. Surface water samples of the Sparkill Creek were taken as part of investigations around the Danzig Groundwater remediation site, reported in the most recent Site Record (accessed 8/7/24) but not dated.

The Danzig Groundwater Site Assessment notes that:

> "Surface water samples of the Sparkfill [sic] Creek were analyzed for volatile organic compounds (VOCs), and the emerging contaminants per-and poly fluoroalkyl substances (PFAS) and 1,4-dioxane… Five surface water samples were taken of the Sparkill Creek with one upstream, one downstream, and three in the middle of a section that runs through the study area. VOCs, PFAS, and 1,4-dioxane were detected in all samples. CVOCs were detected in all samples ranging from parent to breakdown products suggesting the natural degradation of existing 1,1,1-trichloroethylene (1,1,1-TCA) and tetrachloroethylene (PCE) in the Sparkill Creek surface water… PCE was detected in all samples from 4.2-4.5 parts per billion (ppb) vs a guidance value of 1 ppb. Perfluorooctanesulfonic acid (PFOS) was detected in multiple samples marginally exceeding the 10 parts per trillion (ppt) screening levels from 11-13 ppt. There does not appear to be a correlation between the hydraulically upgradient samples and downgradient samples that would suggest an on-site source of contamination contributing to the Sparkill Creek… As information for this site becomes available, it will be reviewed by the NYSDOH to determine if site contamination presents public health exposure concerns."

The Danzig Groundwater site is currently listed as a potential Registry site (Class P). This information is unverified because the DEC's investigation of the site is not yet complete. Due to

the preliminary nature of this information, significant conclusions or decisions should not be based solely upon this summary.

More information about the Danzig Groundwater site is available:

- NYS DEC Document Folder
- Danzig Groundwater Plume Fact Sheet: State Superfund Site (2020)

Table 15. Remediation Parcels within the Sparkill Creek watershed.

Site Name	Site Code	Program	City, County	Classification	Environmental Remediation Databases
Camp Blauvelt[2]	344075	State Superfund Program	Orangetown, Rockland County	P - Potential	Site Record Document Folder
Blauvelt Laundry	344037	State Superfund Program	Orangetown, Rockland County	02 - Registry Site	Site Record
Materials Research Corporation	V00317	Voluntary Cleanup Program	Orangetown, Rockland County	N - No Further Action at this Time	Site Record Document Folder
Avery Dennison - Information and Brand Management	344072	Resource Conservation and Recovery	Orangetown, Rockland County	PR - Potential RCRA Corrective Action	Site Record
Orangeburg (Orangetown) Shopping Center	C344066	Brownfield Cleanup Program	Orangetown, Rockland County	C - Completed	Site Record Document Folder
Orangetown Commerce Center	C344078	Brownfield Cleanup Program	Orangetown, Rockland County	A - Active	Site Record Document Folder
Former Orangeburg Pipe Mfg-Lowe's Site	V00579	Voluntary Cleanup Program	Orangetown, Rockland County	C - Completed	Site Record Document Folder
Orangeburg Commons	C344073	Brownfield Cleanup Program	Orangetown, Rockland County	C - Completed	Site Record Document Folder

[2] Note that while NYS DEC documents refer to this site as Camp Blauvelt, it is actually called Camp Bluefields and located in Blauvelt State Park.

Site Name	Site Code	Program	City, County	Classification	Environmental Remediation Databases
Danzig Groundwater	344082	State Superfund Program	Orangetown, Rockland County	P - Potential	Site Record Document Folder
Piermont Papermills	344034	State Superfund Program	Piermont, Rockland County	04 - site has been properly closed but requires continued site management	Site Record

Source: Remediation Parcels
Publisher: NYS DEC
Publication Year: updated daily, accessed 7/26/24; Information accessed through the DECinfo Locator.

In 1990, an Exxon gas station at a Palisades Interstate Parkway rest stop in the Sparkill Creek watershed spilled gasoline and MTBE (methyl-tert-butyl ether), which impacted groundwater. According to a Hazardous Material Spill Information Request from Toxics Targeting (2017), a public water supply wellfield owned by Veolia Water New York is situated to the east of the site, with the closest well about 300 feet away; the wellfield was contaminated and closed due to the spill. For more information, search the NYS DEC's Spill Incidents Database record for Spill Number: 8909584.

Environmental System Management Sites in NJ

In New Jersey, the Environmental Management Sites shown in Figure 13 are sites regulated by New Jersey Department of Environmental Protection under one or more regulatory permitting or enforcement programs, or sites that are otherwise of some interest to a Department program. For more information about individual sites and permits or enforcement in the Sparkill Creek watershed, see the NJGeoWeb interactive mapper.

The Bergen County Master Plan reports that all 70 Bergen County municipalities have several known or suspected contaminated sites, including the boroughs in the Sparkill Creek watershed. For more information, see the Known Contaminated Site List for New Jersey. Detailed reports on specific sites are available through the New Jersey Department of Environmental Protection Data Miner.

Waters of the Sparkill Creek Watershed

This section focuses on the waterbodies and watercourses within the watershed, including floodplains, aquatic habitats, water quality, and water infrastructure.

The Sparkill Creek flows south from Tackamack Town Park through the hamlets of Orangeburg and Tappan. The Sparkill Brook flows north from Alpine through Norwood and Rockleigh in New Jersey until it meets the Sparkill Creek just north of the state border. From there, the Sparkill flows northeast through the hamlet of Sparkill and the Village of Piermont, where it empties into the Hudson. Piermont Marsh is a large tidal salt marsh at the mouth of the Sparkill (Figure 3). The Sparkill Creek watershed includes 35 acres of waterbodies and 22 miles of streams.

Floodplains and Flooding

Floodplains

Floodplains are defined as any land areas susceptible to being inundated by floodwaters from any source. The Federal Emergency Management Agency (FEMA) has mapped approximate "high risk" floodplains, based on flood frequency according to the extent of land expected to have a 1% or greater chance of being inundated in any given year.

Figure 14 shows the flood hazard areas within the Sparkill Creek watershed created by the Federal Emergency Management Agency (FEMA). The 1% Special Flood Hazard Area is often referred to as the "100-year floodplain," and the 0.2% Special Flood Hazard Area is often referred to as the "500-year floodplain." Flood insurance is mandatory in these zones for people with mortgages. The 1% Special Flood Hazard Area has a 1% annual chance of flooding in any given year and a 26% chance of flooding over the life of a 30-year mortgage.

Mapped floodplains are located along the Sparkill Creek and Sparkill Brook stream corridors (Figure 14). The maps are often outdated and rely on historic flooding data and do not consider the increase in storm intensity or sea level rise due to climate change. Not all known flood-prone areas may be included on floodplain maps, flooding is possible in areas outside of designated floodplains, and floodplain designations may change over time as new information becomes available.

Riparian Areas

Riparian areas are lands along the edges of rivers, streams, lakes, and other waterbodies that have a large influence on water quality, stream dynamics, and ecosystem health. They mark the transition zone between aquatic and terrestrial ecosystems. A riparian buffer, also known as a stream buffer, is the vegetated area between a waterbody and human activity. Healthy buffers with native trees, shrubs, and grasses help reduce water pollution, reduce erosion and flooding damage, and provide habitat for fish and other wildlife.

The New York Natural Heritage Program has mapped riparian areas (also called riparian buffers) as part of the Statewide Riparian Opportunities Assessment (Conley et al. 2018) to highlight important streamside areas that influence stream dynamics and health. Figure 14 also shows mapped riparian buffer areas in the Sparkill Creek watershed. The riparian buffer areas were mapped around streams through modeling based on digital elevation data, known wetlands, and estimates for the 50-year flood height. They vary in their width, taking into account surrounding hydrology. They provide a starting point to inform land use strategies and stream protection, but field visits are necessary to verify conditions. Note that these mapped riparian buffer areas may or may not be vegetated. More information is available in the New York State Riparian Opportunity Assessment Report (2018). Riparian areas are not available for the New Jersey portion of the Sparkill Creek watershed.

As of March 2024, there have been 12 riparian buffer restoration projects on ten public and private properties in the Sparkill Creek watershed through the Hudson Estuary Trees for Tribs Program. Plantings took place between 2009 and 2018, with 116 volunteers planting 784 total trees, shrubs, and live stakes.

Sea Level Rise

Figure 14 shows the area of the Sparkill Creek watershed that is expected to be impacted by six feet of sea level rise, based on analysis from Columbia University's Center for International Earth Science Information Network. According to the *New York State Climate Impacts Assessment* (2024), sea level along the tidal Hudson is projected to increase by 12 to 17 inches by the 2050s and by 25 to 46 inches by the 2100s, compared to a 1995-2014 baseline. For more information, see the Climate and Climate Change section.

In 2014, the Piermont Waterfront Resilience Task Force published their Resilience Roadmap: Planning for Piermont's Future. This roadmap compiled information on flood risk from both the Sparkill Creek and the Hudson River, planning for up to six feet of sea level rise. It included priority resilience measures to improve both current and future flood resilience. The Piermont Waterfront Resilience Commission continues the work of the Task Force in implementing the recommendations from the Resilience Roadmap, with the goal of informing residents and planning for, funding, and building a more resilient future for Piermont.

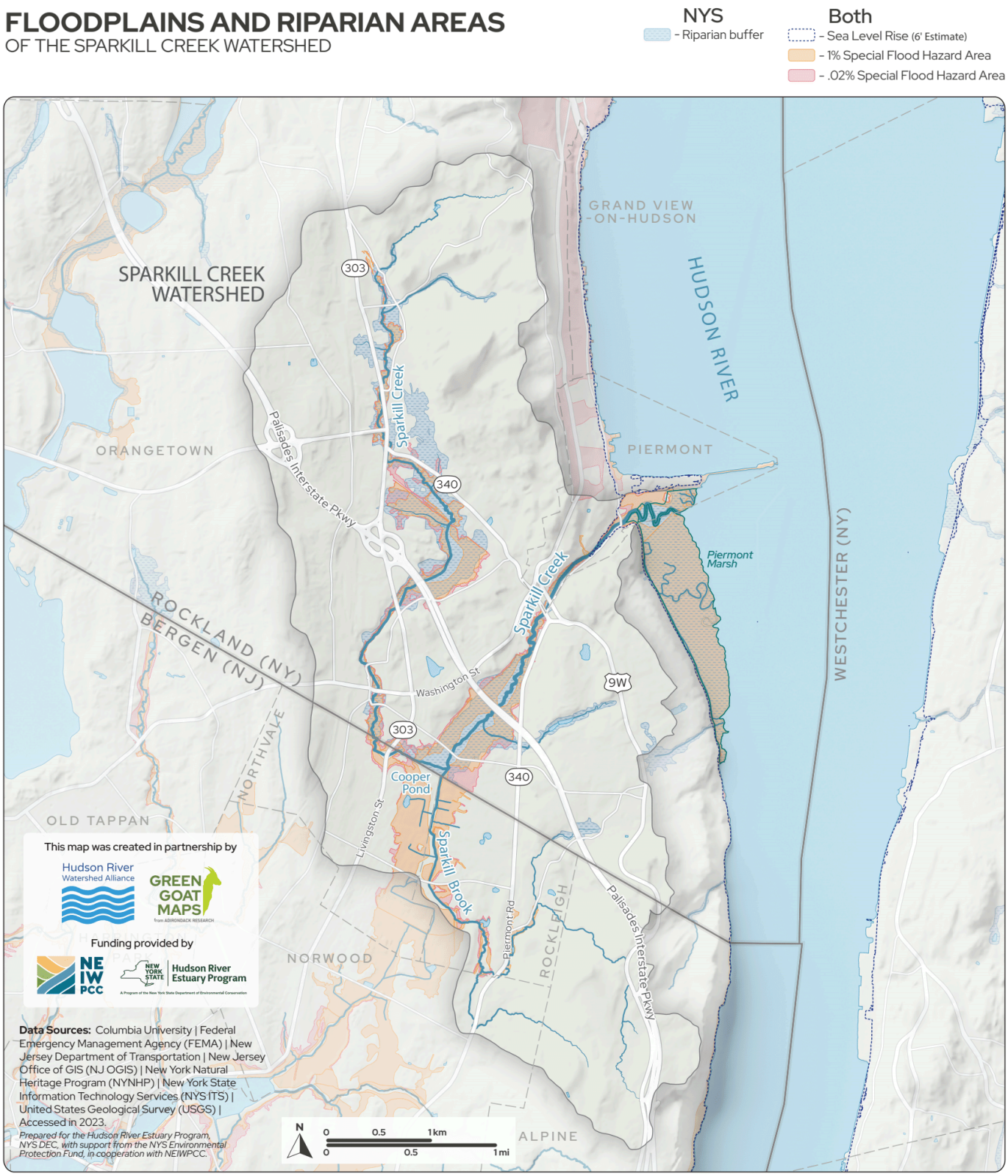

Figure 14. Floodplains and Riparian Areas in the Sparkill Creek watershed.

Flooding

Flooding is an ongoing concern in the Sparkill Creek watershed. Between 1978 and 2016, communities in the Sparkill Creek watershed, including the Town of Orangetown and Village of Piermont, submitted 495 claims to the National Flood Insurance Program for flood-related damages.

The Sparkill Creek Flood Mitigation & Resilience Report (SLR Consulting 2022), developed through New York State's Resilient NY program, is the most recent plan that documents flood conditions and identifies opportunities to reduce flood risk. The report identifies several factors that may contribute to flooding in the Sparkill Creek watershed. These include:

- Vulnerability to hurricanes and tropical storms (including storm surge),
- A high percentage of development in the watershed (for more information, see the section on Land Use and Land Cover),
- Many bridges and culverts that may be undersized for flood events (for more information, see the section on Road-Stream Crossings), and
- A high proportion of hydric soils:

    "Over 65 percent of the mapped soils in the Sparkill Creek watershed are classified as hydrologic soil group C, C/D, or D, indicating a low capacity for infiltration and a high tendency for runoff… This contributes to flash flooding in the watershed as rainfall runoff moves swiftly into streams rather than gradually seeping through the soils." (For more information on soils in the Sparkill Creek watershed, see the section on Soils.)

The Sparkill Creek Flood Mitigation & Resilience Report identifies eight High Risk Areas that are prone to flooding along the Sparkill Creek in New York State, shown in Figure 15. The study found about one High Risk Area per stream mile in the New York State portion of the watershed alone. Information to identify these areas came from stakeholder feedback; conversations with municipal officials, emergency responders, landowners, and business owners; and relevant documents including County Hazard Mitigation Plans and FEMA Flood Insurance Study: Rockland County, NY (2014) and Flood Insurance Rate Maps. The report includes a description of flood conditions, detailed maps, and recommendations to mitigate flood risk at each High Risk Area.

Previous flood studies of the Sparkill Creek watershed include:

- Re: File #10,240 Sparkill Creek Flood Study at Ferdon Pond (2017)
- Sparkill Creek Flood Study at Ferdon Pond (2011)
- Flood Control Feasibility Study: Sparkill Creek (2004)
- Sparkill Creek Flood Control Analysis (1999)

In 2022, the Sparkill Creek Watershed Alliance developed a Sparkill Creek Enhancement and Flood Control Concept Proposal that described gaps and the need for future site-specific flooding studies.

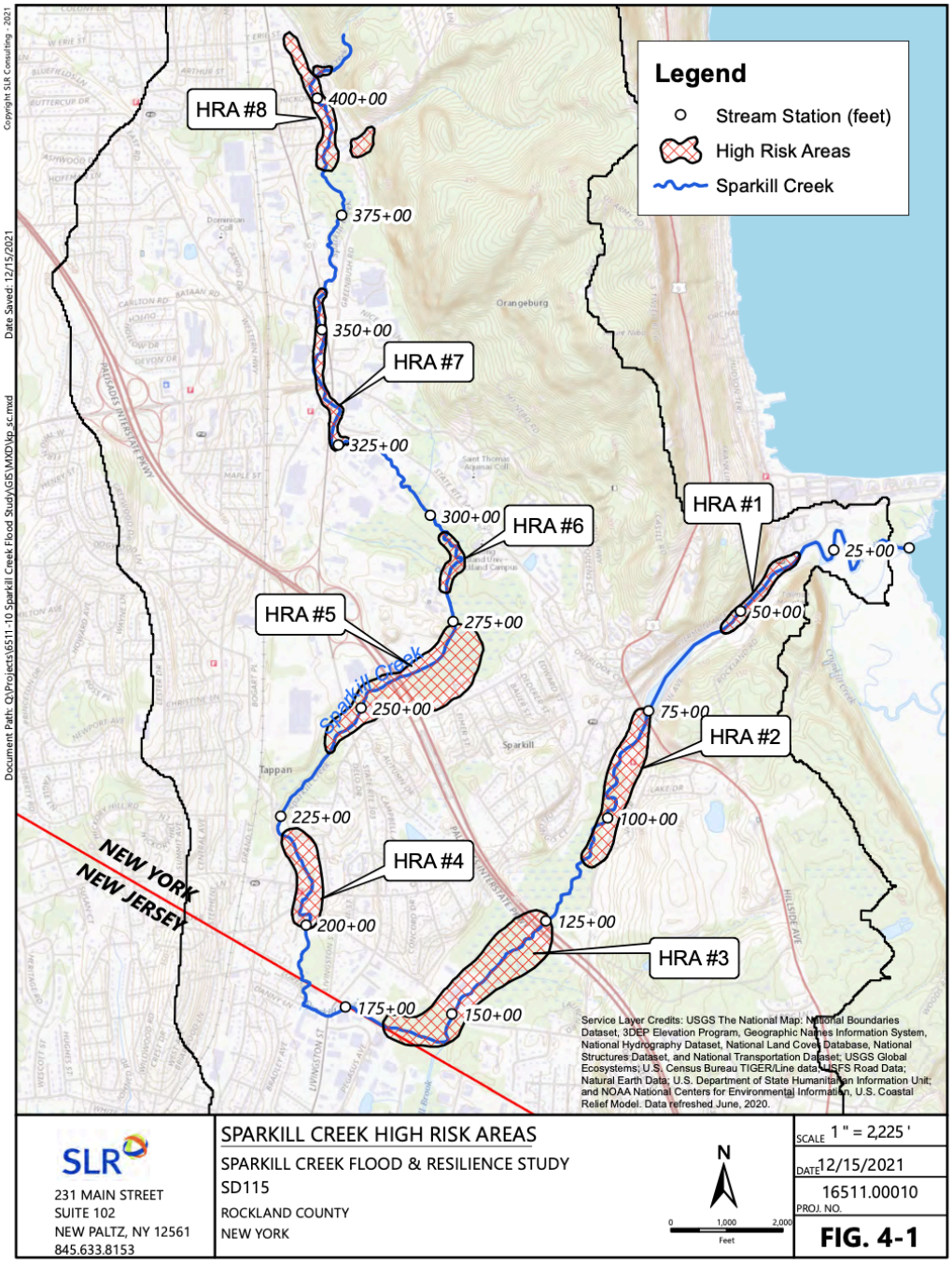

Figure 15. Sparkill Creek High Risk Areas for flooding, from the Sparkill Creek Flood Mitigation & Resilience Report (2022).

The Rockland County Multi-Jurisdictional Hazard Mitigation Plan (2024 draft) is a multi-jurisdictional plan that includes municipalities in the Sparkill Creek watershed, including Rockland County, the Town of Orangetown, and Village of Piermont. This is an update of the 2018 Rockland County Multi-Jurisdictional Hazard Mitigation Plan. Hazards of Concern for the draft 2024 Hazard Mitigation Plan include dam failure, drought, flood, and extreme storms.

The Bergen County Multi-Jurisdictional Hazard Mitigation Plan (2020) included Bergen County, Borough of Alpine, Borough of Northvale, Borough of Norwood, and Borough of Rockleigh. Hazards of Concern in Bergen County include dam and levee failure, drought, flood, hurricane and tropical storms, nor'easter, and severe weather.

Stream Flow

There are currently no active stream gages to monitor discharge in the Sparkill Creek. Three locations on the Sparkill Creek had USGS Gaging Stations between 1959 and 1980, which provide a historical baseline on stream flow.

These sites include:

- USGS 01376270 SPARKILL CREEK AT TAPPAN NY (active 1959-1966)
- USGS 01376275 SPARKILL CREEK AT TAPPAN STATION NY (active 1965-1966)
- USGS 01376280 SPARKILL CREEK AT SPARKILL NY (active 1959-1980)

For more context on stream flow during the 1960s, see Creeks, brooks, and rivers in Rockland County, New York, and their relation to planning for the future (1963) and the section on the Sparkill Creek Basin, pages 41-57.

Aquifers & Water Use

Aquifers & Groundwater

Aquifers are saturated underground areas that can yield usable amounts of water to wells and springs. Groundwater, which includes aquifers and other underground water, is particularly important to maintain flows of water into rivers and streams during drier periods. For a detailed assessment of groundwater resources in Rockland County, see the report "Water Resources of Rockland County, New York, 2005–07, with Emphasis on the Newark Basin Bedrock Aquifer" by Paul M. Heisig, US Geological Survey (2010).

Figure 16 shows unconsolidated aquifers mapped by NYS DEC and New Jersey DEP. Aquifers in New York State were coarsely mapped by the United States Geological Survey in partnership with NYS DEC. Because the scale of the original aquifer maps was 1:250,000, they indicate only the general location of unconsolidated aquifers; they are not intended for detailed site evaluations. Aquifers are directly influenced by surficial and bedrock geology; bedrock and surficial geology in the Sparkill Creek watershed is mapped in Figure 5 and Figure 6, respectively.

There have been numerous studies related to groundwater quality within the Sparkill Creek watershed, particularly due to chemical contamination from past industrial sites. A compilation of files from the Rockland County Department of Health (Leggette et al. 2005) related to groundwater quality in the Route 303 corridor in Orangetown showed that a number of properties in close proximity to the former Materials Research Corporation site (560 NY Route 303 Orangeburg, NY 10962) have released solvents into the environment. This included

detection of solvents in water supply wells in the Route 303 corridor, along with low concentrations of solvents detected in the Sparkill Creek. For more information on groundwater quality studies, see the Remediation Sites section and Appendix C for more details.

Large Water Withdrawals

New York State's Water Resources Law requires all non-agricultural water withdrawal systems with the capacity to withdraw 100,000 gallons per day or more to obtain a Water Withdrawal Permit. There is one Water Withdrawal Permit located within the Sparkill Creek watershed (Figure 16). Rockland Country Club in the Town of Orangetown withdraws both groundwater via wells and surface water for golf course irrigation (Table 16). Based on the 2022 Water Withdrawal Reporting Form, average day withdrawal was 106,622 gallons per day, and maximum day withdrawal was 180,000 gallons per day.

Table 16. Water Withdrawal Permits within the NY portion of the Sparkill Creek watershed.

Facility Name	Facility Reporter ID	Usage Category	Sources	Document Folder
Rockland Country Club	WWR0001314	Recreational - Golf Course	L - Pond or Lake; Max Rate: 1,500 gallons per minute Maintenance well: BW - Bedrock Well; Max Rate: 40 gallons per minute 16 Maintenance well: BW - Bedrock Well; Max Rate: 40 gallons per minute	Document folder

Source: Water Withdrawal Annual Reports
Publisher: NYS Department of Environmental Conservation
Publication Year: updated annually, last updated 1/19/24; Information accessed through the DECinfo Locator.

New Jersey requires permits for large water withdrawals or registration for potential large water withdrawals. For more information, search the NJ DEP Data Miner for Currently Effective Water Allocation Permits by County and Currently Effective Water Allocation Registrations by County. For more information on Veolia Water New Jersey's surface water intake and water withdrawal reports in the Sparkill Creek watershed, see the section on Drinking Water.

Wells

There are five water wells mapped by NYS DEC in the New York State portion of the Sparkill Creek watershed (Figure 16). Three are for domestic purposes, one is for irrigation purposes, and one is for geothermal purposes. NYS DEC requires water well drillers to submit completion reports documenting where wells have been drilled, specifications, and any subsequent work. Mapped well locations are generally accurate to the parcel scale but may not represent the exact location on the property. Not all existing wells are mapped by NYS DEC.

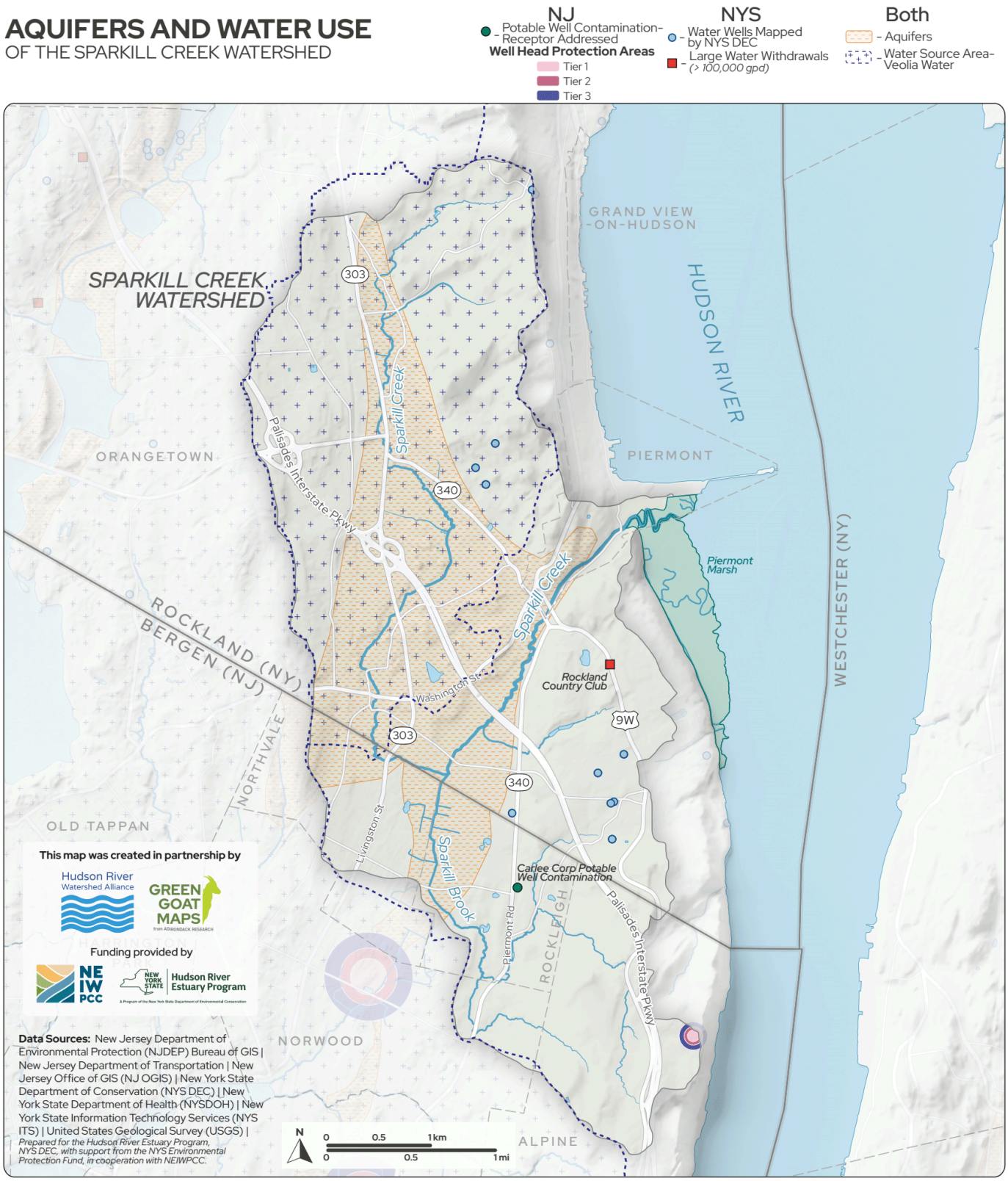

Figure 16. Aquifers and water use in the Sparkill Creek watershed.

New Jersey shares data on potable and non-potable water well permits in the NJ DEP Data Miner. Well Permit Reports can be searched by county. New Jersey mandates the testing of some private wells when properties are sold or leased. Those data are shared with NJ DEP who shares the testing results by grid, county, and municipality. For more information, see the NJ Private Well Testing Act Data Summary. The "potable well contamination - receptor address" site mapped on Figure 16 is a potable well for Carlee Corp, which was contaminated by tetrachloroethene and has been addressed. Additional information on known areas of groundwater contamination can be found at Classification Exception Areas-Well Restriction Areas for New Jersey.

Figure 16 also shows Well Head Protection Areas for Public Non-Community Water Supply Wells in New Jersey. There is one mapped Well Head Protection Area within the Sparkill Creek watershed, in the Sparkill Brook headwaters in the Borough of Alpine.

For more information on wells as drinking water sources, see the section on Drinking Water under Water Infrastructure.

Aquatic Habitats

The aquatic habitats of the Sparkill Creek watershed are significantly degraded due to stormwater, erosion and sedimentation, pollution, sewage contamination, and wetland loss.

The 1993 Preliminary Ecological Assessment of Sparkill Creek by Hudsonia Ltd. reports:

> "We found a stream that was severely degraded due apparently to inadequate erosion and siltation control in the watershed, untreated stormwater runoff, removal of streamside vegetation, and possibly untreated sewage overflow. Massive sediment deposition in the stream has damaged and destroyed essential fish and invertebrate habitats."

Despite this degradation, the Sparkill Creek provides important habitat for fish and other aquatic species, especially in a region with significant development. For more information on aquatic benthic macroinvertebrates, see the section on Biomonitoring under Water Quality Monitoring.

Important Areas for Rare Aquatic Animals and Migratory Fish

"Important areas" are modeled and mapped based on actual locations of state-rare species or ecosystems and the life histories and habitats of the species or species group and the community type's size and natural ecological processes. Based on Important Area data from the New York Natural Heritage Program, the most significant aquatic habitat in the Sparkill Creek watershed is associated with the Hudson River (shown on Figure 11 with significant terrestrial and wetland habitats).

The only known important Areas for Rare Aquatic Animals associated with the Sparkill Creek watershed are the federally endangered Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Shortnose Sturgeon (*Acipenser brevirostrum*), which occur in the Hudson River. The Hudson is also a tidal river, a rare ecological community. Although the Important Areas are based on best available information, they do not represent a comprehensive inventory of all important aquatic species or habitats. For more information about how Important Areas were developed and can be used, see the Natural Heritage Important Areas Fact Sheet. For more information about the location and extent of important areas, see the Hudson Valley Natural Resources Mapper.

Known Important Areas for Migratory Fish mapped in Figure 11 include areas important for sustaining known populations of American Eel (*Anguilla rostrata*), which travel to spawn from the Sparkill Creek to the Sargasso Sea in the Atlantic Ocean via the Hudson River Estuary. These data are based on NYS DEC fish surveys and New York Natural Heritage Program modeling. While the mapped Known Important Area for Migratory Fish extends from the mouth of the Sparkill Creek at the Hudson River to the New York-New Jersey state line, significant dams in this stretch may limit the range of American Eel. The Piermont Paper Company Dam is located 1.5 miles upstream of the Sparkill Creek's confluence with the Hudson River, and represents the first barrier to fish migrating upstream from the Hudson River. From 2017-2021, an eel ladder at the Piermont Paper Company Dam helped American Eel access upstream habitat. For more information, see page 34-36 of the Hudson River Eel Project Summary Report 2008-2022 by the NYSDEC Hudson River Estuary Program and National Estuarine Research Reserve. More information on dams in the Sparkill Creek watershed is in the section on Dams below.

Local Aquatic Habitat Studies

There is limited aquatic data available from state sources, and local studies can fill the gap. The 1993 Preliminary Ecological Assessment of Sparkill Creek by Hudsonia, Ltd. provides an excellent summary of the condition of the bed and bank, habitats, fish, plants, likely threats and possible solutions. They described the condition of the stream bed and aquatic habitat based on a field survey of eight sites:

> "Sparkill Creek was in a severely degraded condition at survey time. Sediment deposition from various sources was the most conspicuous, and probably the most damaging problem. The invertebrate population was sparse with low diversity; these are typical effects of sand buildup in streams. The most abundant and ubiquitous fish were species with broad ecological tolerances that are often found in polluted and otherwise deteriorating streams."

Trout Streams and Fishing

There are 12 stream segments designated as B(T) or C(T) Trout Streams by NYS DEC, which indicate they may support trout populations (Figure 11). For more information on trout stream standards, see the section on Water Quality Standards and Classifications.

The NYS DEC has stocked brown trout in the Sparkill Creek in the reach from Route 9W to Spruce Street, most recently in 2022 and 2023. Stocking takes place during the fourth week of March, with a total number of stocked fish of 400. The NJ DEP does not stock trout in the Sparkill Brook.

The Sparkill Watershed Conservancy participated in NYS DEC's River Herring Volunteer Monitoring Program (Vail 2008), a community science program. They monitored river herring at Piermont Marsh, Ferdon Ave. Bridge, and Rockland Rd. Bridge in April and May 2008; no herring were detected at any of the sites in the 14 days of monitoring.

Shellfish

The tidal portion of the Sparkill Creek, from the dam at Ferdon Pond to its mouth at Piermont Marsh, is subject to the Shellfish Closure of the larger Hudson River. According to the NYS DEC: Shellfish Closures (NYS DEC 2023), shellfish lands "are in such sanitary condition that the shellfish thereon shall not be taken for use as food, and such lands are designated as uncertified areas."

Dams

Dams are in-stream barriers that hold back water, often forming a pond or other waterbody. Dams can limit the habitat and range of aquatic species and other animals that use stream corridors, acting as barriers to their movement up- and downstream. Dams can also impact flooding, stream channel dynamics, and water quality.

There are eight mapped dams within the Sparkill Creek watershed (Figure 17, Table 17), based on the New York State Inventory of Dams. Many existing dams are not mapped in GIS. Assessments done in two Hudson River watershed sub-watersheds indicate that dam inventories may underestimate the true number of dams by 80-96% (Buchanan et al. 2022). Figure 17 may not include every current or historic dam within the Sparkill Creek watershed.

The New York State Inventory of Dams uses size and hazard thresholds to define and track dams. The Hazard Description indicates the downstream hazard potential of a dam failure. Ibm Edcenter Dam A is considered a Medium Hazard Dam, with the rest of the dams in the watershed either Low Hazard or lacking a hazard threshold (Table 17). More information on dam safety is available through the NYS DEC's Dam Safety Section. In New Jersey, information on dams is available through the NJ DEP's Bureau of Dam Safety and Flood Control and the Division of Land Use Regulation.

More information on restoring free-flowing rivers in the Hudson River watershed for habitat connectivity, including the impacts of both dams and road-stream crossings, is available through the NYS DEC Hudson River Estuary Program and the New York State Water Resources Institute at Cornell University.

Table 17. Dams within the Sparkill Creek watershed, within New York State.

Dam Name	Waterbody Impounded	State ID / Federal ID	Municipality	Last Condition Rating*	Dam Height*	Construction Type*	Hazard Description*
Bleauville State Park Dam[3]	Unknown	214-5563 NY16181	Town of Orangetown	Not Rated	8	MS - Masonry	Low Hazard Dam
Wolf & Hoffman Pond Dam	Unknown	214-1587 NY13592	Town of Orangetown				
Ibm Edcenter Dam A	Unknown	214-3045 NY01568	Town of Orangetown	No deficiencies noted	26	RE - Earth	Intermediate Hazard Dam
John J Collins #1 Dam	Unknown	214-3045A NY13595	Town of Orangetown				
Ibm Edcenter Dam B	Unknown	214-4896 NY13611	Town of Orangetown	Not Rated	17	CN - Concrete Gravity	Low Hazard Dam
Ibm Edcenter Dam C	Unknown	214-4897 NY13612	Town of Orangetown	Not Rated	7	CN - Concrete Gravity	Low Hazard Dam
Boss Pond Dam	Sparkill Creek	214-0220 NY13572	Village of Piermont	Not Rated	5	MS - Masonry, CN - Concrete Gravity	Low Hazard Dam
Piermont Paper Company Dam	Sparkill Creek	214-0229 NY13573	Village of Piermont	Not Rated	8	CN - Concrete Gravity	Low Hazard Dam

Source: DEC Dam Inventory
Publisher: NYS Department of Environmental Conservation
Publication Year: 2015; Information accessed through the Hudson Valley Natural Resource Mapper.

**Source: NY Dam Inventory*
Publication Year: updated annually, last updated 3/24/22; Information accessed through the DECinfo Locator.

[3] Note that while NYS DEC documents refer to this dam as Bleauville State Park Dam, it is actually located in Blauvelt State Park.

Road-Stream Crossings

Bridges or culverts that allow roads to cross over rivers and streams have the potential to impact the flow of water or the connectivity of aquatic and streamside habitats. Bridges, open-bottomed arches, and similar structures that span the waterway and its floodplain or riparian area typically have the least impact on streams. Culverts that are undersized or improperly installed can act as barriers for aquatic organisms and increase community flood risk. More information on road-stream crossings is available through the NYS DEC Hudson River Estuary Program's aquatic connectivity fact sheet and NYS DEC's stream crossing guidance.

Figure 17 shows the location and assessment status of road-stream crossings within the Sparkill Creek watershed (see also Table 18 for crossing type). Since 2013, the NYS DEC Hudson River Estuary Program and partners have assessed and prioritized culverts and bridges on local, county, and state roads to identify barriers to aquatic organisms and ability to pass stream flow from large storms. More details on each assessed culvert are available through the North Atlantic Aquatic Connectivity Collaborative (NAACC) and their Data Center Stream Crossing Explorer.

Out of 57 total predicted road-stream crossings within the Sparkill Creek watershed, 45 have been visited in the field to assess aquatic organism passage (Table 19). Of these, 10 were deemed to not be crossings, due to duplicate points. Of the 35 road-stream crossings that were assessed for aquatic organism passage, the majority were culverts, with an additional nine bridges (Table 18).

Table 18. Road-stream crossings in the New York portion of the Sparkill Creek watershed.

Crossing Type	Number
Bridge	9
Culvert	18
Multiple Culverts	6 sites (15 culverts total)
Buried Stream	1
Inaccessible	1
Unassessed	12
Total	47

Source: North Atlantic Aquatic Connectivity Collaborative (NAACC) Data Center
Publisher: North Atlantic Aquatic Connectivity Collaborative (NAACC)
Publication Year: 2016-2018; data accessed in 2024

Table 19. Aquatic organism passability of culverts in the New York portion of Sparkill Creek watershed.

Barrier Descriptor	Number	Percent
No Barrier	1	3%
Insignificant Barrier	21	60%
Minor Barrier	3	9%
Moderate Barrier	4	11%
Significant Barrier	1	3%
Severe Barrier	4	11%
No Score - Missing Data	1	3%
Total Assessed	35	100%

Source: North Atlantic Aquatic Connectivity Collaborative (NAACC) Data Center
Publisher: North Atlantic Aquatic Connectivity Collaborative (NAACC)
Publication Year: 2016-2018; data accessed in 2024

Undersized culverts can also contribute to flooding. During storms, undersized or improperly installed culverts can become clogged with debris or overwhelmed, leading to road flooding, stream bank erosion, or even a washout of the whole road. Within the Sparkill Creek watershed, 33 culverts have been evaluated for their flow capacity using the Cornell Culvert Model (Figure 17). This model uses a culvert's location and dimensions to determine its maximum capacity, which is compared to current and future (2050) peak stream flows. This provides an estimate of the culvert's current and future maximum passable storm event. Of the 33 modeled culverts, 30 are estimated to be unable to pass peak stream flow discharges from storms larger than a 5-year return interval. While the Cornell Culvert Model can be used to help prioritize culverts for replacement projects, it should not be used in place of an engineering assessment.

A 2013 Hydrology and Hydraulics Report for Existing Palisades Parkway Culvert in Sparkill Creek Tappan, NY by the McLaren Engineering Group for the Town of Orangetown Highway Department studied an existing culvert that contributes to flooding, and proposed two design alternatives.

For more information on flooding in the Sparkill Creek watershed, see the Floodplains & Flooding section.

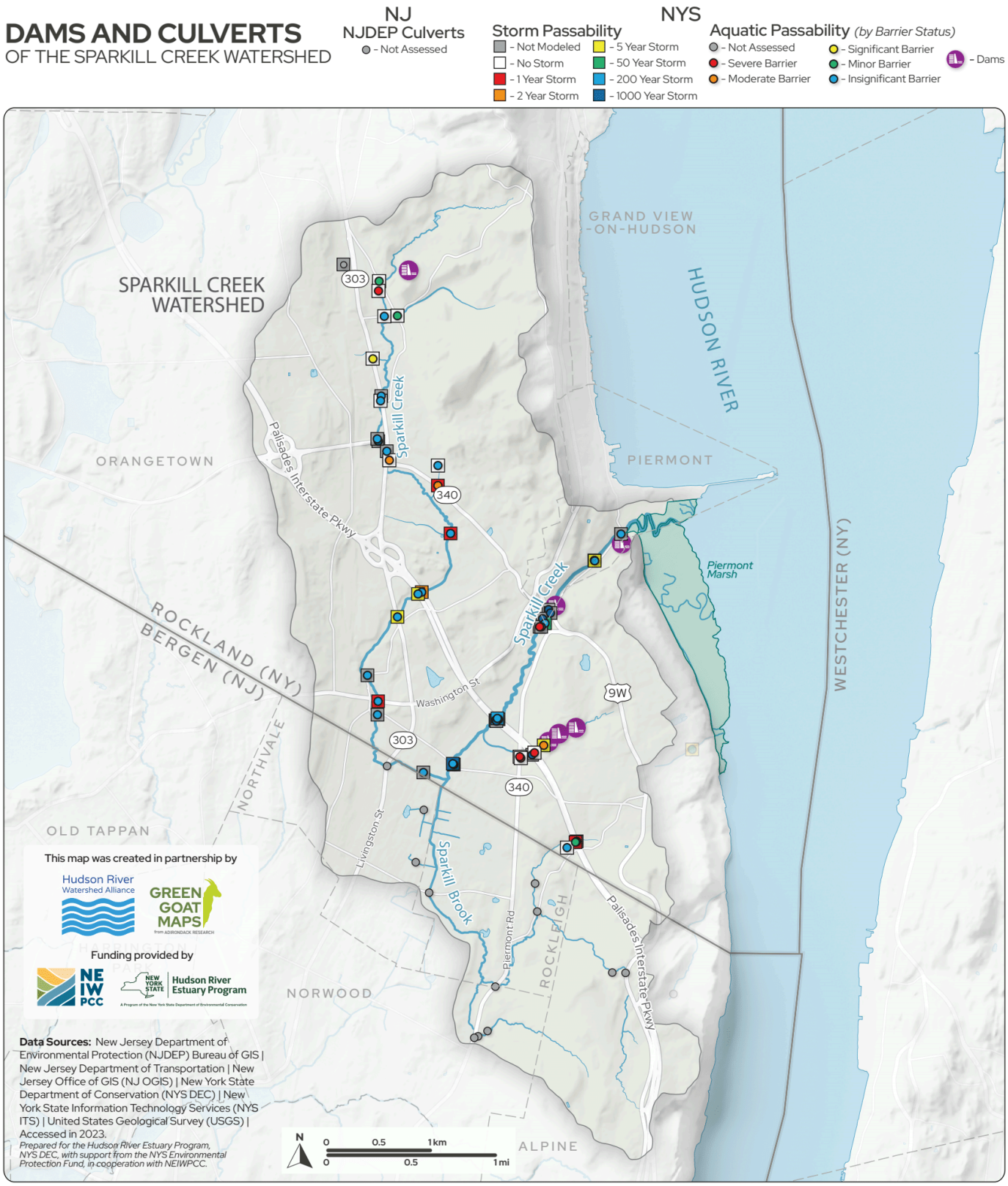

Figure 17. Dams and Culverts in the Sparkill Creek watershed.

Waterbody Classifications and Assessments

Water Quality Standards and Classifications

Surface waters in New York State are assigned an A, B, C, or D classification based on the "best use" of the watercourse or waterbody. These classifications determine how NYS DEC regulates activities in and near the waters.

For each class, the designated best uses are defined as:

- Class A, AA, A-S, or AA-S: water supply, primary and secondary contact recreation, and fishing
- Class B: primary and secondary contact recreation, fishing
- Class C: fishing and wildlife propagation
- Class D: fishing

For more information about the best uses designated for each classification, see the NYS DEC's Water Quality Standards and Classifications website. The letter classifications and their best uses are described in regulation 6 NYCRR Part 701 Classifications--Surface Waters and Groundwaters.

Classifications for individual waterbodies are available in 6 NYCRR Chapter X, Article 10. Lower Hudson River Drainage Basin Series, Part 856 Sparkill Creek Drainage Basin. Classifications are also mapped on the NYS DEC's Environmental Resource Mapper. In situations where streams are not mapped in DEC databases, perennial streams share the classification of the receiving stream, while intermittent streams are Class D.

Waterbodies classified as A, B, or C may also have an associated standard of (T), indicating they may support trout populations, or (TS), indicating that they may support trout spawning. Because trout live in coldwater streams and lakes and depend on clean gravel for spawning, these standards affect how NYS DEC regulates the waters. For more information on fish in the Sparkill Creek watershed, see the Aquatic Habitats section.

Figure 18 shows waterbody classifications and trout standards in the Sparkill Creek watershed, both in New York and New Jersey. Stream classifications within the Sparkill Creek watershed in New York State include B, B(T), C, C(T), and D[4] (Table 20). The largest percentage of streams within the watershed are Class C (Table 20), and one lake/pond is classified as B(T) (Table 21).

Together, the classification and standard determine which waterbodies or watercourses are regulated by New York State. Streams and waterbodies classified as C(T), C(TS), B, or A, as well as waterbodies under 10 acres located in the course of these streams, are collectively referred to as "protected" and are subject to the NYS DEC's Protection of Waters Program. This program

[4] These classifications were determined as part of a 1951 study by the NYS Department of Health. For more information, see Sparkill Creek Drainage Basin: Recommended Classifications and Assignment of Standards of Quality and Purity for Designated Waters of New York State.

requires a permit for disturbances to the bed or banks of protected waters. Streams and waterbodies may also have local protections outside of the state's jurisdiction.

About 38% of streams (based on length) within the Sparkill Creek watershed are considered "protected" by New York State (Table 20). The lake/pond at Rockland Country Club is the one lake/pond within the Sparkill Creek watershed that is Class B(T), which would also be considered "protected" by New York State (Table 21). Questions about waterbody classification and permits in New York State should be directed to the NYS DEC regional office. The Sparkill Creek is also considered a regulated stream by Rockland County; more information is available in the Local Protection of the Sparkill Creek (NY) section.

Table 20. New York State classifications and standards for streams in the Sparkill Creek watershed.

Classification and Standard for Streams	Number of Segments	Total Stream Length (m)	Percent of each classification (based on length)
B(T)	6	2,715.2	9.4%
B	16	8,340.2	28.9%
C(T)	6	4,924.2	17%
C	21	11,877.6	41.1%
D	2	1,031.9	3.6%

Source: DEC Stream Classification and Trout Status
Publisher: NYS Department of Environmental Conservation
Publication Year: 2022

Table 21. New York State classifications and standards for lakes/ponds in the Sparkill Creek watershed.

Classification and Standard for Lakes and Ponds	Number of Waterbodies	Total Waterbody Size (m^2)	Percent of each classification (based on size)
B(T)	1	1,962.6	100%

Source: DEC Stream Classification and Trout Status
Publisher: NYS Department of Environmental Conservation
Publication Year: 2022

New Jersey classifies waterbodies differently than New York State. Surface waters in New Jersey are classified based on the type of waterbody (freshwater, saline estuarine, or saline coastal) and the designated use of the waterbody. Freshwaters may be classified as:

- FW1 waters - nondegradation waters, not subject to any man-made wastewater discharges
- FW2 waters - all other freshwaters, except Pinelands waters

FW2 waters are further classified based on their ability to support trout. These include trout production (FW2-TP), trout maintenance (FW2-TM), or nontrout (FW2-NT).

Streams within the Sparkill Creek watershed in New Jersey are all classified as FW2-NT, which means they are not considered suitable for trout, but may be suitable for many other fish species (Figure 18). (Note that Figure 18 also shows waters that are classified as FW2-NT/SE1, which indicate that the waters change from freshwater to saline water as they drain into the estuary or ocean, but these are located outside of the Sparkill Creek watershed.)

In addition, New Jersey has an antidegradation policy for all surface waters. This requires that all existing and designated uses shall be maintained and protected for all surface waters; impaired waters must be restored to meet Surface Water Quality Standards; and existing water quality shall be maintained. The level of protection to the surface water and the development requirements for surrounding areas is based on the antidegradation designation of the waterway.

There are three tiers of antidegradation:

- Outstanding National Resource Waters (ONRW): "nondegradation waters" due to their unique ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources
- Category One (C1) Waters: exceptional ecological significance, exceptional water supply, exceptional recreation, and exceptional fisheries
- Category Two (C2) Waters: all waters not designated as ONRW or C1 in the Surface Water Quality Standards

Surface waters in the New Jersey portion of the Sparkill Creek watershed are designated as Category 2 (C2) waters. According to the Bergen County Master Plan (2023):

> "For these waterways, existing water quality is maintained, however, the water quality may be lowered if there is an important economic or social justification. C2 waterway riparian zones are required to have a 150-foot buffer around waters related to trout production or trout maintenance, as well as areas containing habitat for a threatened or endangered species. Waterways without these characteristics are required to maintain a 50-foot riparian buffer."

More information on Designated Uses, Surface Water Classifications, and Antidegradation in New Jersey is available on the New Jersey DEP Surface Water Quality Standards (SWQS) website.

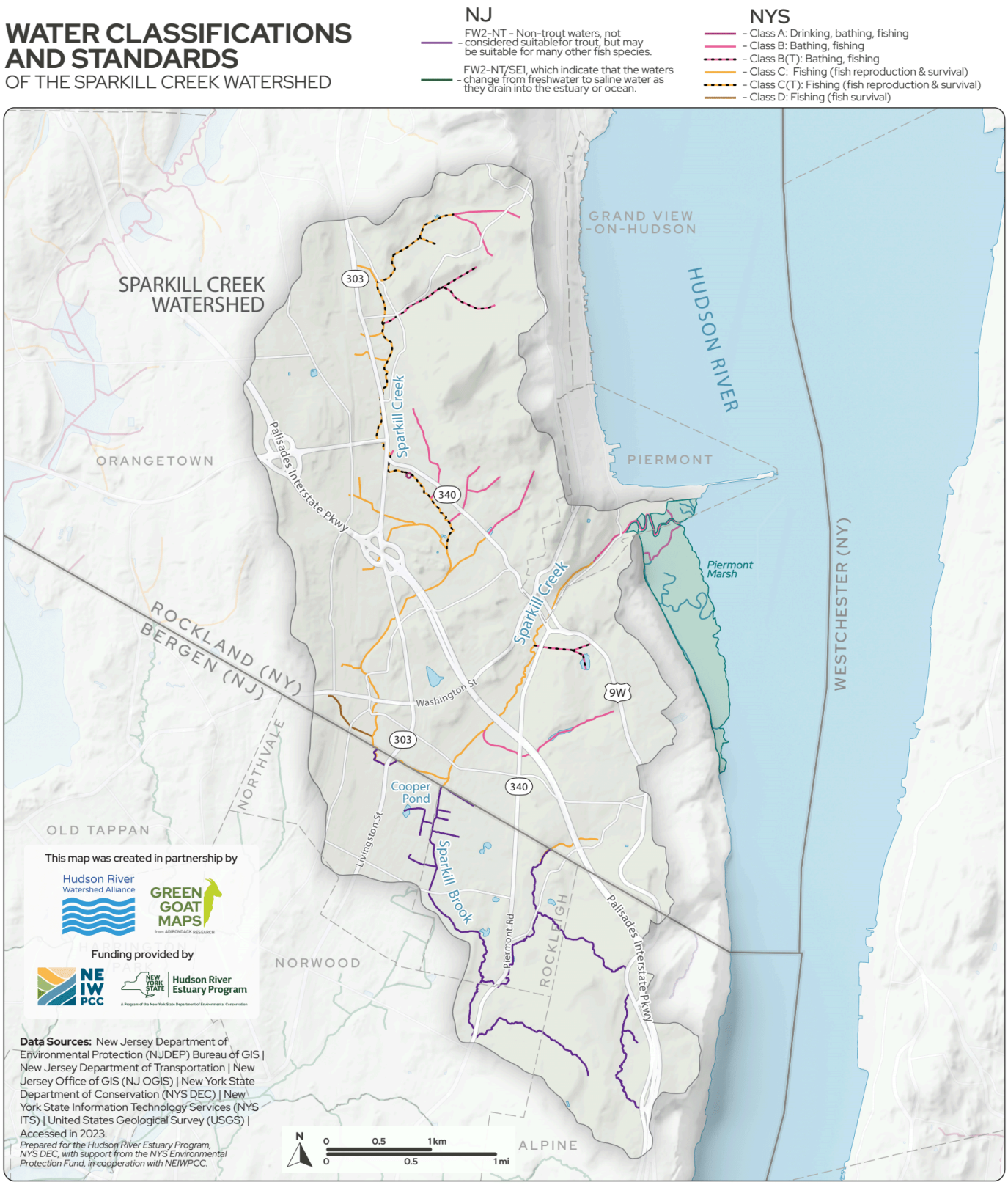

Figure 18. Water Classifications and Standards in the Sparkill Creek watershed.

Waterbody Assessments

In New York State, the Waterbody Inventory/Priority Waterbodies List is an inventory of surface water quality. The Waterbody Inventory/Priority Waterbodies List compiles and interprets information on water quality for surface waters, based on their classification or "best use" (see previous section on Waterbody Classifications and Standards). For each waterbody or stream segment, the Waterbody Inventory/Priority Waterbodies List summarizes water quality conditions, the extent to which it meets designated uses, and progress towards identifying and resolving water quality problems.

To better assess water quality at a regional scale, most waterbodies are grouped into segments based on classification, size, and land use or character. Segments are assessed as:

- Impaired Waters
- Waters with Minor Impacts
- Threatened Waterbodies
- Waterbodies with Impacts Needing Verification
- Waterbodies with No Known Impacts
- Unassessed Waterbodies

The Sparkill Creek watershed includes four stream segments within the Waterbody Inventory/Priority Waterbodies List (Figure 19, Table 22). Sparkill Creek, Upper, and minor tribs is listed as Needs Verification, because dissolved oxygen, nitrite, and pH may be impacting fishing; this is unconfirmed. Sparkill Creek, Lower, is listed as Impaired due to levels of dissolved oxygen and fecal coliform that impair fishing and secondary contact recreation. The segments Minor Tribs to Upper Sparkill Creek and Minor Tribs to Lower Sparkill Creek are both currently Unassessed.

Waterbody impairment is determined using data from NYS DEC's water quality monitoring and other available information. Impaired waters that do not meet applicable water quality standards are considered for inclusion on the state's Clean Water Act Section 303(d) List. The process for conducting assessments of best use(s) is available in NYS DEC's Consolidated Assessment and Listing Methodology. The segment Sparkill Creek, Lower, was added to the 303(d) list in 2010. The most current 303(d) list is available at NYS Section 303(d) List Of Impaired/TMDL Waters.

Waterbody Inventory/Priority Waterbodies List segments and waterbody assessments are available through the DECinfo Locator, under the Environmental Monitoring tab, by clicking on the waterbodies available through the Waterbody Inventory/Priority Waterbodies List map. Waterbody Inventory/Priority Waterbodies List segments are mapped in this report on Figure 19.

Table 22. Waterbody Inventory/Priority Waterbodies List Stream segments and lakes within the NYS portion of the Sparkill Creek watershed.

Type	Waterbody Name	PWL ID	WIN	Size	Description	Assessment	Last Update
River/ Stream	Minor Tribs to Upper Sparkill Creek	1301-0108	H- 13-6 thru 13	2.3 miles	Total length of select tribs to Upper Sparkill Creek	Unassessed Fact Sheet	None
River/ Stream	Sparkill Creek, Upper, and minor tribs	1301-0106	H- 13	4.2 miles	Stream and select tribs, above NY-NJ state line	Needs Verification Fact Sheet	12/7/21
River/ Stream	Sparkill Creek, Lower	1301-0088	H- 13	2.2 miles	Stream, from mouth to NY-NJ state line	Impaired Fact Sheet	12/7/21
River/ Stream	Minor Tribs to Lower Sparkill Creek	1301-0107		Not avail-able	Total length of select tribs to Lower Sparkill Creek	Unassessed	None

Source: Waterbody Inventory/Priority Waterbodies List (Shorelines, Rivers and Streams, Lakes and Reservoirs)
Publisher: NYS Department of Environmental Conservation
Publication Year: As needed, but at least once every two years. Last updated 12/18/21; Information accessed through the DECinfo Locator.

Table 23. Assessment of Best Use for the Sparkill, Upper, and Minor Tribs stream segment. Data sources of dissolved oxygen, nitrite, and pH are from NYS DEC Division of Water's Stream Monitoring and Assessment Section in 2017.

Best Use	Use Impairment	Use Impairment Confirmation	Pollutant(s)	Integrated Reporting Category	303(d) Year
Fishing	Fully Supported	Unconfirmed	Dissolved Oxygen; Nitrite; pH	IR3	N/A for Assessment Category

Source: Waterbody Inventory/Priority Waterbodies List (WI/PWL) Fact Sheet: Sparkill Creek, Upper, and Minor Tribs (Segment ID 1301-0106)
Publisher: NYS Department of Environmental Conservation
Publication Year: 2021; Information accessed through the DECinfo Locator.

Table 24. Assessment of Best Use for the Sparkill, Lower, stream segment. Both dissolved oxygen and fecal coliform are from historical data sources.

Best Use	Use Impairment	Use Impairment Confirmation	Pollutant(s)	Integrated Reporting Category	303(d) Year
Fishing	Impaired	Confirmed	Dissolved Oxygen; Fecal Coliform	IR5	2010
Secondary Contact Recreation	Impaired	Confirmed	Dissolved Oxygen; Fecal Coliform	IR5	2010

Source: Waterbody Inventory/Priority Waterbodies List (WI/PWL) Fact Sheet: Sparkill Creek, Lower (Segment ID 1301-0088)
Publisher: NYS Department of Environmental Conservation
Publication Year: 2021; Information accessed through the DECinfo Locator.

In New Jersey, the Department of Environmental Protection prepares the Integrated Water Quality Monitoring and Assessment Report (Integrated Report) as a biennial assessment of statewide water quality that identifies and prioritizes waters for protection, restoration, and additional monitoring or research. The most recent is the 2022 New Jersey Integrated Water Quality Report.

New Jersey's 303(d) list is called the List of Water Quality Limited Waters. The final 2018-2020 list was signed in 2022 and is available as an online map. Water quality assessments are categorized into three statuses, Fully Supporting, Not Supporting, or Insufficient Data for assessment. Sparkill Brook is on the 303(d) list for Arsenic, E.coli, and Total Phosphorus, which means it does not support water supply, primary recreation, and aquatic life uses (Table 25).

Table 25. Assessment of Best Use for the Sparkill Brook (NJ)

Designated Use	Status	Pollutant(s)	Priority Rating for TMDL	303(d) Year
Water Supply	Non supporting	Arsenic	Low	2012
Primary Recreation	Non supporting	E. Coli	Medium	2012
Aquatic Life General	Non supporting	Total Phosphorus	Medium	2008
Fish Consumption	Insufficient Data	-		

Source: 2018/2020 New Jersey Integrated Water Quality Assessment Report Clean Water Act 303(d) List and 305(b)
Publisher: NJ Department of Environmental Protection
Publication Year: 2022; Information accessed through the 2018-2020 Integrated Report Story Map

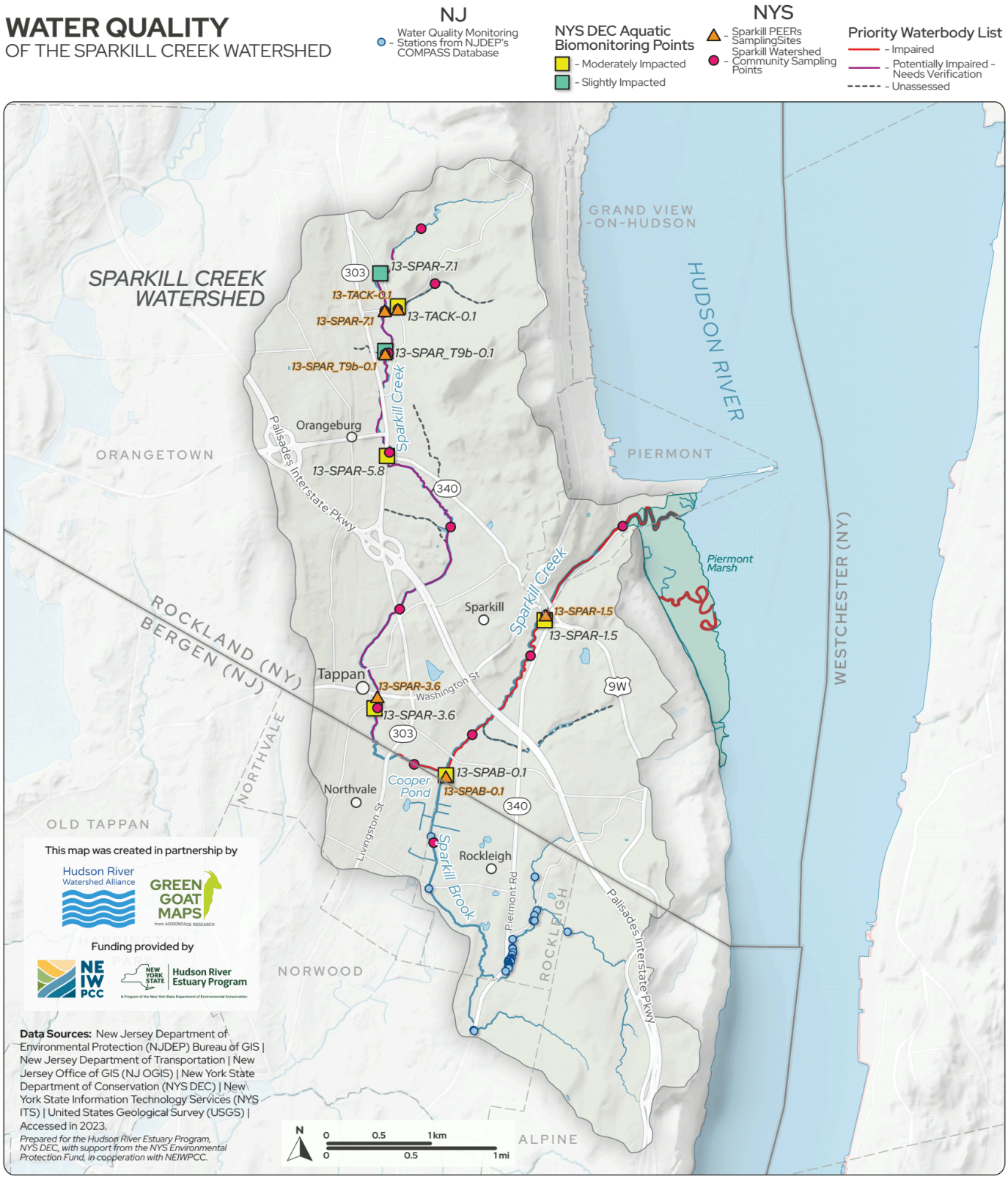

Figure 19. Waterbody assessments and water quality in the Sparkill Creek watershed.

Water Quality Monitoring

The Sparkill Creek watershed has been the focus of numerous water quality studies. These have included a wide range of parameters, including biological or biomonitoring using aquatic organisms, both inorganic and organic stream chemistry, microplastics, bacteria, and more. Studies have been conducted and led by state and county agencies, academic institutions, regional nonprofits, private firms, the Sparkill Creek Watershed Alliance, and many volunteers.

Biomonitoring

Biological monitoring (also called biomonitoring) uses the abundance and kinds of aquatic organisms as a measure of waterbody health. The organisms collected from polluted water differ from those collected in clean water, providing information on relative water quality. NYS DEC's Stream Biomonitoring Unit has conducted biological monitoring since 1972 to assess water quality of rivers and streams. More information on NYS DEC's water quality monitoring programs is available on their website.

There are seven NYS DEC biomonitoring sites in the Sparkill Creek watershed (Figure 19, Table 25). These include samples taken by NYS DEC and by qualified professionals. Additional water quality parameters at each site, including chemistry, habitat, and user perception, along with past years' data, are available through the NYS DEC Division of Water Monitoring Data Portal.

Biological Assessment Profile (BAP) scores are derived based on the diversity of aquatic organisms within the sample, and provide an overall assessment of water quality by integrating the impacts of different stressors. BAP scores and their corresponding impact categories are:

- 0-2.5 - Severe (none in the Sparkill Creek watershed)
- 2.51-5 - Moderate Impact (marked orange in Tables 25 and 26)
- 5.01-7.5 - Slight Impact (marked yellow in Tables 25 and 26)
- 7.51-10 - Non-Impact (marked green in Tables 25 and 26)

Table 25. NYS DEC Biomonitoring sites within the Sparkill Creek watershed, listed from north to south.

Stream Name	Site ID	Most Recent Assessment Category	Most Recent BAP score	Most Recent Assessment Date
Sparkill Creek	13-SPAR-7.1	Moderate impact	4.75	7/18/2022
Tributary to Tackamack[5]	13-TACK-0.1	Slight Impact	6.43	7/18/2022
Unnamed Trib to Sparkill[6]	13-SPAR_T9b-0.1	Slight Impact	5.15	7/18/2022
Sparkill Creek	13-SPAR-5.8	Moderate impact	4.78	7/15/2003

[5] This stream is referred to as the Tackamack Branch by the Sparkill Creek Watershed Alliance.
[6] This stream is referred to Blauvelt Arm by the Sparkill Creek Watershed Alliance.

Sparkill Creek	13-SPAR-3.6	Slight impact	5.09	7/18/2022
Sparkill Brook	13-SPAB-0.1	Moderate impact	3.23	8/9/2021
Sparkill Creek	13-SPAR-1.5	Moderate impact	4.62	7/18/2022

Source: Division of Water Monitoring Data Portal
Publisher: NYS Department of Environmental Conservation
Publication Year: 2023

From 2006-2016, Watershed Assessment Associates conducted professional biomonitoring of waterbodies throughout Rockland County, including the Sparkill Creek. Table 26 shows the Biological Assessment Profile (BAP) scores from the 24 samples taken at six locations in the Sparkill Creek watershed between 2006 and 2016.

Table 26. Watershed Assessment Associates (WAA) Biomonitoring sites within the Sparkill Creek watershed, 2006-2016. Sites are listed from north to south.

Site ID	Biological Assessment Profile (BAP) Score										
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
SPAR-01			6.17			5.9					
SPAR-01a						8.2				7.41	
SPAR-02	4.73	5.46		4.6	4.29	4.1					
SPAR-03			4.57							4.05	
SPAR-05						4.7			4.50		
SPAR-04	5.09	5.89	4.64	4.54	4.29	4.6	4.22	5.09	4.34	3.96	4.71

Source: Sparkill Creek PEERs data 2006-2015; Biological Stream Survey, Rockland County, NY 2016
Publisher: Watershed Assessment Associates
Publication Year: 2015; 2016

For additional information on professional biomonitoring in the Sparkill Creek watershed, see:

- Rockland County Department of Environmental Resources: Protecting Our Streams & Waterways website
- Sparkill Creek Watershed Report Card (2012), by Rockland County Soil & Water Conservation Districts, which includes a map of sites in Table 26
- Sparkill Creek PEERs data 2006-2015 by J. Kelly Nolan, Watershed Assessment Associates
- Biological Stream Survey, Rockland County, NY annual reports 2006-2016 by J. Kelly Nolan, Watershed Assessment Associates
- Modified Rapid Bioassessment of the Sparkill Creek (2002) by J. Kelly Nolan, for Hudson Basin River Watch.

Community scientists have also conducted biomonitoring at 14 sites throughout the Sparkill Creek watershed between 2014 and 2023 through the NYS DEC's Water Assessments by Volunteer Evaluators (WAVE) program (Figure 19). There are three possible WAVE scores, based on the benthic macroinvertebrates present in each sample:

- No known impact: The stream is healthy and there is no observed impact to aquatic life. The assessment is high quality and may be used for state and federal reporting.
- Possibly Impaired: The assessment serves as a red flag for sites that may deserve further investigation at the professional level.
- No Conclusion: Sometimes a sample does not meet either of these criteria: it doesn't have six or more "most wanted" nor four or more "least wanted." If the sampling was done properly, then the site is probably slightly impacted but not impaired. This can also happen, however, when sampling is performed incorrectly, which is why the DEC records this assessment as "No Conclusion."

Most samples in the Sparkill Creek watershed (10 total) yielded "No Conclusion" of water quality. One sample taken in the Sparkill Creek headwaters in 2016 showed "No Known Impact," but when this site was repeated in 2017, it was "No Conclusion." Three samples were considered "Possibly Impaired." These included one sample on the Sparkill Creek off of S Greenbush Rd in 2017 and two samples on the Sparkill Creek near the intersection of Ferdon Ave and Valentine Ave (Route 340) in 2016 and 2014. Full results are available through the WAVE online map.

In New Jersey, the NJ DEP Bureau of Freshwater & Biological Monitoring conducts biological monitoring of fish and aquatic macroinvertebrates to assess the status of a stream's aquatic life designation. Monitoring results are reported in the New Jersey Integrated Water Quality Assessment Report. For more information, see the section on Waterbody Assessments. Aquatic Life Unit Assessments are available by site and by watershed through the Integrated Report StoryMap. The Sparkill Brook watershed contains three General Aquatic Life Station Assessment sites (Table 27), and overall is listed as Non Support for Aquatic Life Designated Use.

Table 27. New Jersey General Aquatic Life Station Assessment sites within the Sparkill Creek watershed, reported in the 2018-2020 Integrated List.

Site Name	Station Number	Aquatic Life Designated Use
Sparkill Bk at Link Drive at Northvale	01376274	Full Support
Sparkill Ck on Piermont Rd in Norwood	01376273	Full Support
Sparkill Ck on Piermont Rd in Norwood	01376223	Non Support

Source: 2018-2020 Integrated Report: State; Aquatic Life General 2018-2020
Publisher: NJ Department of Environmental Protection
Publication Year: 2022

Chemistry

In 2020 and 2021, Riverkeeper and the Sparkill Creek Watershed Alliance collected water chemistry samples in six sites in the Sparkill Creek watershed. Parameters taken at each site included temperature, pH, conductivity, dissolved oxygen, ammonium, Total Kjeldahl Nitrogen, nitrate-nitrite, nitrite, total nitrogen, total phosphorus, turbidity, alkalinity, hardness, chloride, magnesium, and chlorophyll a.

The goal of the project was to provide data to NYS DEC to update information for the Sparkill Creek watershed's four stream segments within the Waterbody inventory/Priority Waterbodies List, and specifically to better understand the segment Sparkill Creek, Upper, and minor tribs, which was listed as Needs Verification. Findings were compiled and interpreted in the Sparkill PEERS Water Quality Monitoring Final Report (2022). According to the report:

> "These results show that the water quality of Sparkill Creek is typical of an urbanized watershed. The most notable of these are:
>
> - High, nutrient and chlorophyll a concentrations, indicating eutrophication;
> - High specific conductance and chloride concentrations; and
> - Especially poor water quality in an area with extensive industrial land use.
>
> All four stream segments meet NYS Water Quality Standards for parameters that have standards, but exceed EPA recommended criteria for total nitrogen, total phosphorus, and chlorophyll."

The report presents the water quality data, summarizes conclusions, and identifies next steps, including the goal of completing a watershed characterization as a step towards a watershed plan (page 2). The report also included a Data Index of relevant past studies (Appendix B, page 65).

NYS DEC collects stream chemistry data along with biomonitoring at their water quality monitoring sites. For more details, see Table 25 for links to each site's data or the NYS DEC Division of Water Monitoring Data Portal. These data also include the Riverkeeper and Sparkill Creek Watershed Alliance monitoring data, as they were participants in the NYS DEC PEERS (Professional External Evaluations of Rivers and Streams) program.

In New Jersey, the Water Quality Data Exchange (WQDE) data maintains the locations of water quality monitoring stations from NJDEP's COMPASS database. The blue dots in Figure 19 indicate a station at which a data collection event takes place, such as collection of a field sample, measurement of field parameters or evaluation of environmental habitats.

For additional details and historical context on stream chemistry in the Sparkill Creek watershed, see:

- Surface water quality at the Hudson River National Estuarine Research Reserve: Determining the influence of land use practices on water quality (Nieder 1995), by the Hudson River National Estuarine Research Reserve. Samples taken in 1991-1992 found high levels of chloride in the Sparkill Creek.

- Preliminary Assessment of Sparkill Creek (1993), by Hudsonia, Ltd. “We suspect nutrient loading and possible pesticide contamination from runoff from lawns and gardens, and from two golf courses. Chloride concentrations were high in water samples taken from the lower Sparkill; road salt is the likely source.”
- SPARKILL CREEK AT SPARKILL NY (USGS-01376280) site data in the Water Quality Portal shares historic stream chemistry data collected by USGS from 1959-1976. Details are also available through the US EPA’s How’s My Waterway monitoring report.

Volatile organic chemicals (VOCs) have also been sampled in the Sparkill Creek. Numerous studies have been conducted on groundwater within the Sparkill Creek watershed. For more information, see the section on Remediation Sites in the Built Environment section of this report, along the Appendix C: Remediation Parcels and Contaminants of Concern.

In 2001, the Rockland County Department of Health sampled the Sparkill Creek for a variety of parameters, including VOCs. Findings are available in the Sparkill Creek Stream Sampling - Rockland County Health Department (2001). Note that methods for sample collection and analysis are not included. The Biodiversity Assessment Draft Final Report (2004) summarized findings from that study, on page 26:

> “Water quality analysis to measure overall health indicators and contaminant loads to the Sparkill has been undertaken. In May 1993, a Tappan Zee High School science class performed creek sampling with Raul Cardenas, the results of which have been incorporated in the Hudson River Estuary Grants Program presentation. And in 2001 the RCDOH collected volatile organic samples of all county streams, including the Sparkill. Sparkill volatile organic analysis results: 11 samples collected at 9 different locations downstream of the Rt. 303 and Mountainview Avenue intersection indicated at least trace levels of petroleum and cleaning solvent constituents such as MTBE (methyl tert butyl ether) and TCE (trichloroethylene). Only the most upstream sample, the crossing of Greenbush Road as the stream leaves the park, was “non-detect” for these compounds. Of five (5) Sparkill RCDOH tributary samples collected in 2003, three were ‘clean’ (Rt. 340 crossing near PIP crossing, Sparkill Fire House, Thorpe Village) and two originating just to the west of our study area were not (former Orangeburg Pipe now Lowe’s, and Glenshaw St).”

Microplastics have also been detected in the Sparkill Creek watershed. A 2018-2019 microplastics study from St. Thomas Aquinas College included samples from the sediment of three wetlands along the Sparkill Creek. Microplastics were identified in each location, with the greatest quantity from the site in Piermont Marsh. Additional findings are available in the research paper Microplastic Accumulation in the Sparkill Creek (2019).

Bacteria

From 2012-2022, members of the Sparkill Creek Watershed Alliance monitored Enterococcus fecal-indicating bacteria, in partnership with Riverkeeper. In 2011, Riverkeeper's science partners conducted exploratory sampling near the mouth of the Sparkill Creek, which indicated possible high levels of fecal contamination

To evaluate water quality for swimming, the US EPA uses two metrics for Enterococcus. The Enterococcus geometric mean threshold is 30 cfu/100 mL, and considers all collected samples. The Beach Action Value is based on the percent of single samples that are over 60 cfu/100 mL. More information is available in the US EPA Recreational Water Quality Criteria (2012).

Sixteen sites within the Sparkill Creek watershed have been sampled for Enterococcus over this 10 year period. Datasets are available through the Riverkeeper: Sparkill Creek website. Samples were collected monthly, May to October. Between 2011 and 2022, Enterococcus counts were acceptable based on Beach Action Values only two times, in 2013 and 2015.

Riverkeeper published a summary of enterococcus data from 2012-2021 in the Sparkill Creek Community Water Quality Monitoring Results (Riverkeeper 2022). Enterococcus levels consistently exceed EPA's geometric mean threshold and Beach Action Value thresholds for swimming (Figure 20, Figure 21).

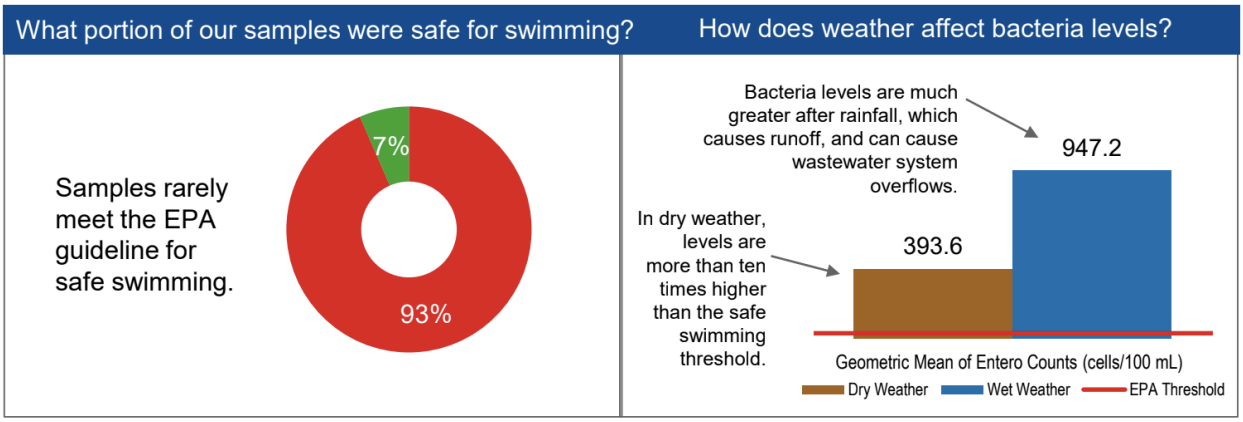

Figure 20. Summary of Enterococcus sampling relative to EPA's safe swimming guidelines in the Sparkill Creek watershed.
The water quality data presented here are based on an analysis of 488 samples collected from 2012-2021 by the Sparkill Creek Watershed Alliance through Riverkeeper's community science program. Figure from Sparkill Creek Community Water Quality Monitoring Results (2022).

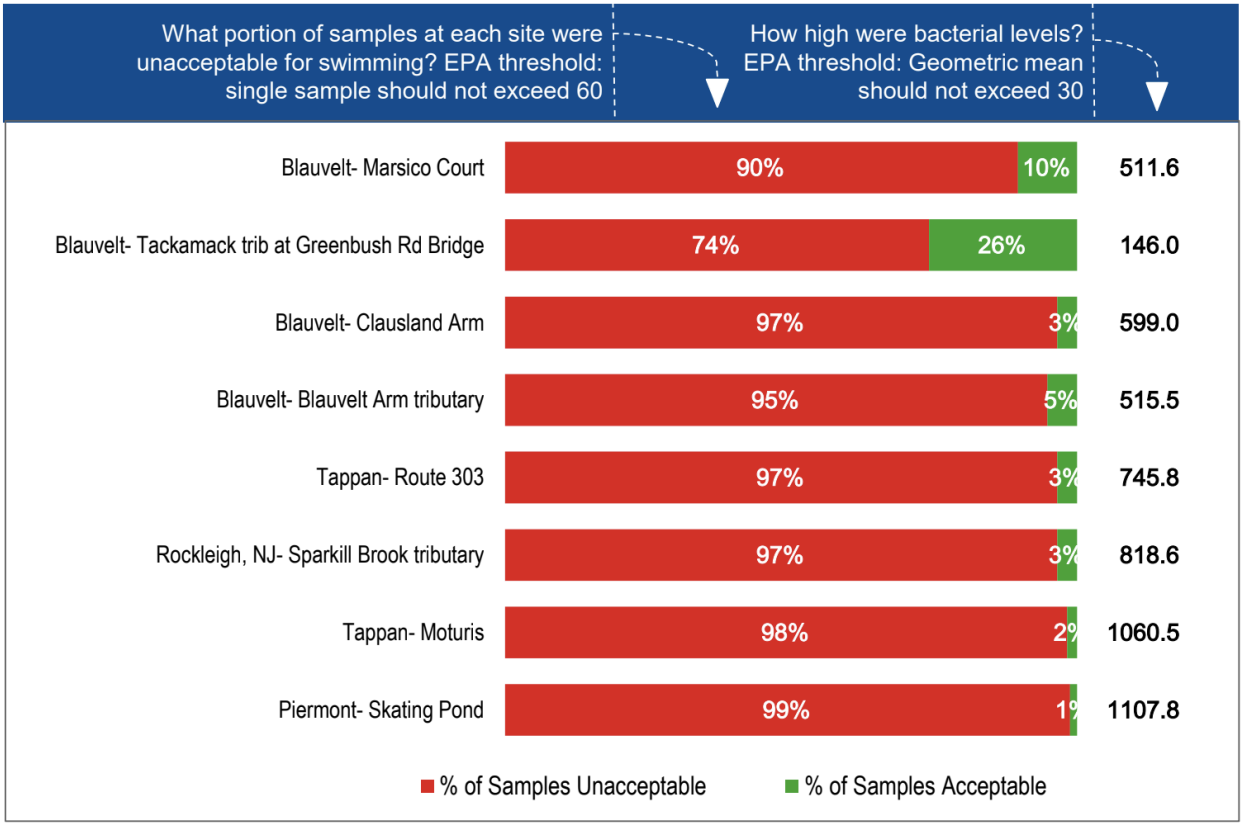

Figure 21. Summary of Enterococcus sampling at six sites in the Sparkill Creek watershed. The water quality data presented here are based on an analysis of 488 samples collected from 2012-2021 by the Sparkill Creek Watershed Alliance through Riverkeeper's community science program. Figure from Sparkill Creek Community Water Quality Monitoring Results (2022).

Of the 19 Hudson River tributaries that Riverkeeper and community scientists have monitored, overall, the Sparkill Creek has had the highest geometric mean of Enterococcus. The geometric mean of Enterococcus across the Sparkill Creek watershed was 779 cfu/100 mL, based on samples taken between 2011 and 2018. More information is available in Riverkeeper's Community Water Quality Monitoring – Tributary Comparison Report (2018).

The Sparkill Creek Watershed Alliance received a citizen science grant from NEIWPCC and the NY-NJ Harbor & Estuary Program to monitor fecal-indicating bacteria and physical characteristics in the summer of 2014. With guidance from the US EPA, and sample processing at the US EPA Region 2 laboratory in Edison, NJ, the study expanded on the previous monitoring efforts and confirmed the monitoring results from Riverkeeper. The Sparkill Creek – Citizen Science Pathogen Indicator Project (2015) report summarizes that study:

> "The project results confirmed these previous findings: that enterococcus bacteria are widespread in the main stem of the Sparkill Creek, at levels significantly above EPA criteria for recreational contact. Further, we found that these bacteria are present at relatively high levels throughout the watershed. During or just after periods of rain,

bacterial levels are increased by several orders of magnitude… as in the previous study, no point sources are clearly evident."

Several additional studies have sought to better understand and identify human sources of bacteria in the Sparkill Creek watershed. In 2020 and 2021, the Sparkill Creek Watershed Alliance and Dr. Gregory O'Mullen from Queens College conducted DNA-based Microbial Source Tracking (MST) studies to determine if human fecal waste specifically is contributing to bacteria levels. In 2020, six sites in the Sparkill Creek were sampled in both dry and wet weather.

The report, Microbial Source Tracking Survey of Sparkill Creek: Confirmation of methods and initial evidence supporting widespread human sewage contamination following rainfall (2020), summarizes that:

> "Human fecal contamination was detected from four of six sites tested during dry weather periods, but near the minimum detection limit of the assay in all cases. Following rainfall, human fecal contamination was found at five of the six sites tested, and in significantly higher concentrations than in dry weather. The only site that showed no evidence of human fecal contamination under any condition tested was within Tackamack Park, the study site least impacted by human development. This initial MST survey suggests that human fecal contamination does contribute to the FIB [fecal-indicating bacteria] signal observed in Sparkill Creek, especially following rainfall, and that additional use of MST tools could help to identify locations within the creek and watershed (e.g. pipes, culverts, drainage areas), with the highest concentration of human fecal contamination, as targets to investigate future mitigation activities."

The 2021 study followed up on these findings. That study's report, Microbial Source Tracking in Sparkill Creek: Increasing evidence supporting contributions of human sewage contamination beyond background levels of fecal indicators in Sparkill Creek (2021), summarized:

> "The main objectives for the 2021 project are: 1) to examine the contaminant level in stormwater runoff from road surfaces into the creek and, 2) to look more closely at an area in the upper watershed where human fecal contamination was found in 2020. Despite the elevated levels of fecal indicators, stormwater samples collected at street level during wet weather did not have detectable levels of human specific fecal bacteria. Five wet weather samples were collected between the Marsico Court site, where previous high human signal was detected, and the upstream reservoir outlet that previously had no human signal. The area mostly had high FIB values and increasing MST readings for samples collected further downstream. However, on one sample date human contamination was detected even at the most upstream reservoir site - complicating the interpretation of these results. Other exploratory work was done on the Blauvelt Arm and some of its stormwater sources. Taken as a whole the data strongly supports the presence of human fecal waste as a component of the FIB signal near Marsico Ct."

For additional details and historical context on understanding bacteria in the Sparkill Creek watershed, see:

- Other bacteria source tracking studies referenced in Appendix B of the Sparkill PEERS Water Quality Monitoring Final Report (2022) by Riverkeeper and the Sparkill Creek Watershed Alliance.
- Analysis of Microbial Biodiversity in the Sparkill Creek Watershed throughout a Course-based Service Learning Research Program for Undergraduates (2015) by Bernadette J. Connors, PhD, from Dominican College. This project developed a course-based research project for students to explore and describe the microbiome of the Sparkill Creek.
- Bacterial and Viral Source Tracking in the Pocantico and Sparkill Creek Watersheds (2018) by Bernadette J. Connors, PhD, from Dominican College. This study monitored 10 sites in the Sparkill Creek watershed for microbial and coliphage loads and diversity. Levels of coliform and E. coli at these sites increased significantly after rainfall.
- The NYS DEC Draft Bacteria Trackdown Desktop GIS Analysis (2017) used the Sparkill Creek as a case study for developing a methodology to use mapping to consider sources of bacteria.

Water Infrastructure

In accordance with the federal Clean Water Act, New York State uses the State Pollution Discharge Elimination System (SPDES) program to control stormwater and wastewater discharges. Additional information on NYS DEC SPDES permits for both stormwater and wastewater is available through the DECinfo Locator. New Jersey uses the New Jersey Pollution Discharge Elimination System (NJPDES) program, and additional information on NJPDES permits is available through the NJ-GeoWeb mapper. SPDES and NJPDES permit compliance status information for both states is available from the US EPA's Enforcement and Compliance History Online (ECHO).

For information on dams and culverts, see the Aquatic Habitats section.

Stormwater

Stormwater management is a challenge in highly developed watersheds, including the Sparkill Creek watershed (Figure 8). Impervious surfaces, such as roads, parking lots, and buildings, prevent water from seeping into the ground (Figure 22). This results in an increased volume of stormwater, which can carry pollution, contribute to flooding, and impact aquatic life in waterways.

New York State and New Jersey each regulate stormwater through both industrial and municipal stormwater permits. More background information on NYS DEC's Stormwater Regulatory Requirements and NJ DEP's Stormwater Permitting is available on their websites. Much of the development in the Sparkill Creek watershed occurred before stormwater management practices were required.

NYS DEC issues a Multi-Sector General Permits for Stormwater Discharge Associated with Industrial Activity, which regulates stormwater discharges to surface waters from a point source with industrial activity. NJ DEP issues similar permits through the Bureau of NJPDES Stormwater Permitting and Water Quality Management New Jersey Industrial Stormwater Program. In the Sparkill Creek watershed, there are two industrial stormwater permits within New York State (mapped on Figure 22 as industrial Stormwater Permit, Table 28) and four within New Jersey (mapped on Figure 22 as Regulated Facilities). For more information on NJPDES Regulated Facilities, see New Jersey's Open Data portal and the NJDEP Data Miner.

Table 28. Multi-Sector General Permits for Stormwater Discharge Associated with Industrial Activity within the Sparkill Creek watershed in New York State.

Facility Name	Location (Municipality)	SPDES / NJPDES Permit	SIC Code: SIC Description	Sector	EPA ECHO Report
Aluf Plastics	Town of Orangetown	NYR00E072	3089: Plastics Products	Y	EPA Echo Report
Werfen	Town of Orangetown	NYR00A661	2835: Diagnostic Substances	C	EPA Echo Report

Source: Multi-Sector General Permits (MSGP)
Publisher: NYS Department of Environmental Conservation
Publication Year: updated quarterly, last updated 9/30/2022; Information accessed through the DECinfo Locator.

A Municipal Separate Storm Sewer System (MS4) is a stormwater collection and conveyance system owned by a state, city, town, village, or other public entity that is not part of a wastewater treatment plant or combined sewer system. The MS4 program provides a regulatory framework for municipalities to better manage stormwater. Regulated MS4 areas are "urbanized areas" (with at least 50,000 people total and 1,000 people per square mile as determined by the U.S. Census) and also include other designated areas.

More information from the EPA about the MS4 regulatory program can be found at Stormwater Discharges from Municipal Sources. information about the state programs can be found on the NYS DEC's Stormwater and Stormwater MS4 Permit and Forms webpage and the NJ DEP's Municipal Stormwater Regulation Program webpage.

Municipalities with regulated MS4 areas are required to implement and report on six Minimum Control Measures:

- Public education and outreach
- Public participation/involvement
- Illicit discharge detection and elimination
- Construction site runoff control
- Post-construction runoff control
- Pollution prevention/good housekeeping

Table 29. Municipal Separate Storm Sewer Systems (MS4s) within the Sparkill Creek watershed.

Municipality	MS4 Permit	Annual Reports / More Information Available
Town of Orangetown	NYR20A471	Department of Environmental Management & Engineering
Village of Piermont	NYR20A045	Public Works
Borough of Alpine	NJG0150932	Municipal Stormwater Management
Borough of Northvale	NJG0149896	Stormwater Management
Borough of Norwood	NJG0151378	Stormwater Management
Borough of Rockleigh	NJGO154563	Stormwater Management

Source: Municipal Separate Storm Sewer System (MS4) Automatically Designated, and MS4 Additionally Designated Area (Criterion 3)
Publisher: NYS Department of Environmental Conservation
Publication Year: last updated 11/23/2022; Information accessed through the DECinfo Locator.

In the New Jersey portion of the watershed, all four municipalities have a Tier A MS4 permit, which authorizes the discharge of stormwater from small municipal separate storm sewers. In 2022, New Jersey Department of Environmental Protection reassigned the Borough of Rockleigh in Bergen County from a Tier B municipality to a Tier A municipality under the NJPDES Permit Program (NJPDES: NJGO154563 / PI ID#: 213713). The change was due to stormwater discharge into high quality classification surface waters, which mandated a higher level of protection. The surface waters include the Sparkill Brook - Stream Classification(s) = FW2-NT,FW2-NTC1, with documented impairments related to E. coli and total phosphorus. For more information, see the section on Waterbody Standards and Classifications.

Stormwater outfalls in the Sparkill Creek watershed were mapped in each MS4 municipality as part of MS4 permit requirements. Outfalls in the Town of Orangetown and New Jersey portion of the Sparkill Creek watershed are mapped in Figure 22. The Village of Piermont's outfalls are available on their Village of Piermont Drainage Map: Outfall Location Maps (2020). New Jersey stormwater and MS4 infrastructure is also available through the New Jersey Watershed Evaluation Tool (NJ-WET) web mapper.

The Stormwater Consortium of Rockland County was formed between Cornell Cooperative Extension and the towns and villages of Rockland County to collaborate and share resources on stormwater management. The Consortium includes all 24 towns and villages within Rockland County who must abide by the NYS DEC MS4 stormwater permit. The Stormwater Coalition of Rockland County hosts a series of Water Quality and Stormwater Education Interactive Maps to share more detailed information related to stormwater.

Several municipal studies have been conducted to improve stormwater management in the Sparkill Creek watershed. These include:

- Town-wide Drainage District Study and Phase II Storm Water Implementation (2012) by Dvirka & Bartilucci Consulting Engineers for the Town of Orangetown. This plan for the implementation of Phase II of the MS4 permit included a drainage district study.
- Map/Plan/Report Orangetown Drainage District (2006) by HDR/LMS Engineering included a proposal for a drainage district, inventory of detention basins, and proposed solutions to problem areas (including storage basins and culverts) to better manage stormwater.

Green infrastructure practices maintain or restore stormwater's natural flow patterns at a site by allowing runoff to infiltrate into the soil. At the site scale, green infrastructure includes practices that capture stormwater runoff, such as rain gardens, vegetated swales, green roofs, pervious pavement, and rain barrels. These practices allow water to soak into the soil, to be used by plants, or to be reused. Notable green infrastructure retrofit projects in the Sparkill Creek watershed include bioretention and stormwater wetlands at Homes for Heroes on Western Highway in Tappan and a series of demonstration projects at Tappan Zee High School. Information about these and other projects are compiled in the Sparkill Creek Watershed: Current Projects storymap by Bridget Childs (no date). For more information on green infrastructure planning in the Sparkill Creek watershed, see the Local Land Use Plans, Policies, and Practices section.

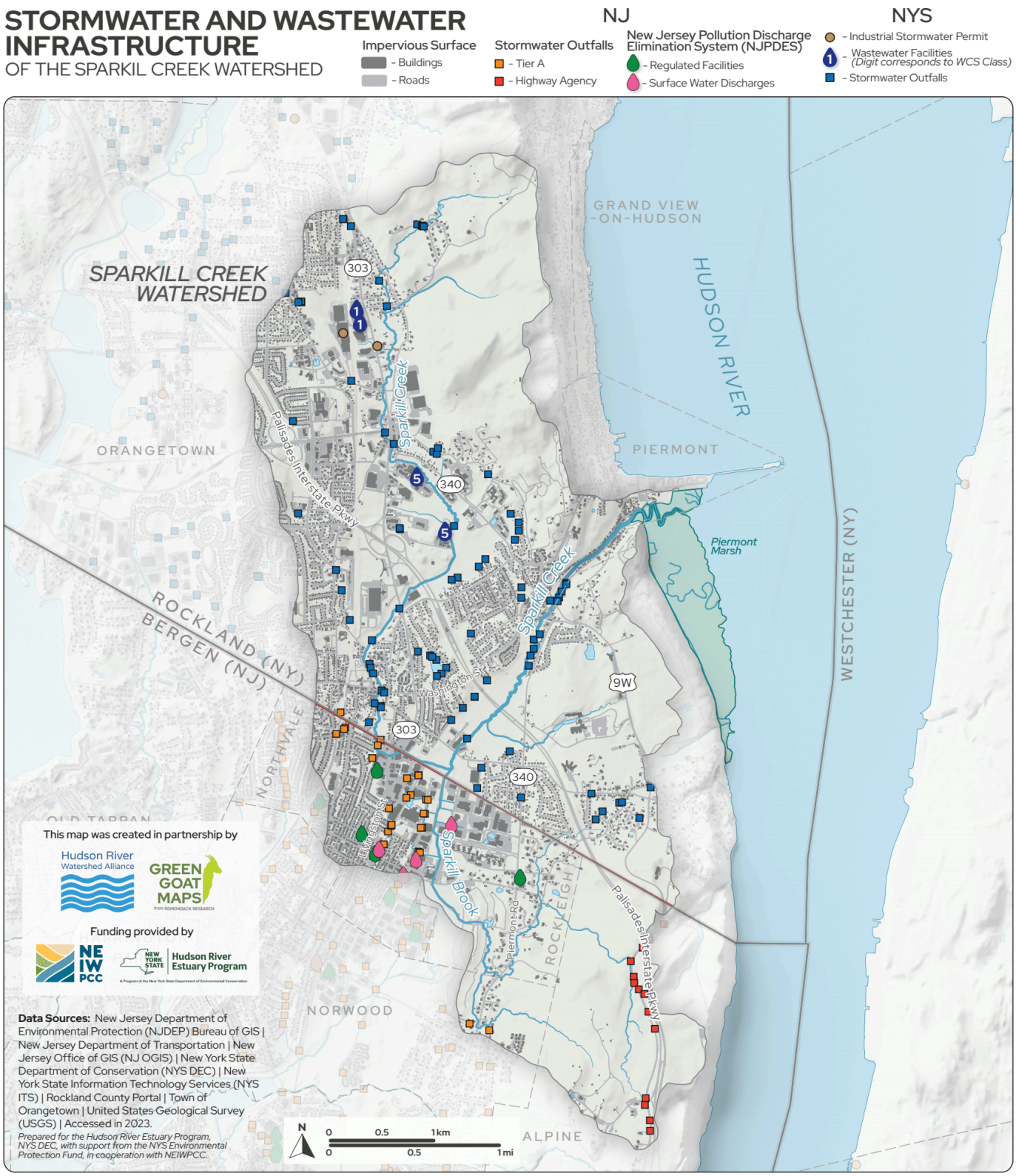

Figure 22. Stormwater and wastewater infrastructure in the Sparkill Creek watershed.

Wastewater

State law requires a permit for constructing or using an outlet or discharge pipe (called a "point source") that discharges wastewater into the surface waters or groundwaters of the state. Permits are also required for constructing or operating a disposal system, such as a sewage treatment plant.

In New York State, the Sparkill Creek watershed includes two municipal wastewater treatment plants and two private wastewater plants in New York State (Figure 22, Table 30). Information on NYS DEC SPDES permits for wastewater is available through the DECinfo Locator.

Wastewater from the Borough of Rockleigh in New Jersey is treated by the Town of Orangetown's wastewater facility (Bergen County Master Plan 2023). The other New Jersey municipalities in the Sparkill Creek watershed are served by the Bergen County Utilities Authority, and the wastewater discharges to the Hackensack River. There are also areas within Bergen County, including Alpine and Rockleigh, that are served by septic systems that pre-date sewer systems or are outside of sewer service areas (Bergen County Master Plan 2023).

Table 30. Wastewater treatment facilities within the Sparkill Creek watershed in New York State.

Facility Name **Permittee Name**	**Location (Municipality)**	**Receiving Waters** **Water Index Number** **Waterbody Classification**	**SPDES Permit** **Discharge Class**	**Outfalls: Wastewater Type**
U&A Construction Corporation U&A Construction Corporation	Town of Orangetown	Unnamed tributary of Sparkill Creek WIN: H-13-9b Class: C	NY0259993 01 Document Folder	004: Once thru non-contact cooling water
Praxair Electronics Praxair Electronics	Town of Orangetown	Unnamed tributary of Sparkill Creek WIN: H-13-9b Class: C	NY0007579 01 Document Folder	001: Non-contact cooling water and stormwater
Rockland County Sewer District #1 Wastewater Treatment Plant Rockland County Sewer District #1	Town of Orangetown	Hudson River WIN: HR Class: SB	NY0031895 05 Document Folder	001: Treated Sanitary 002, 003, 004, 005, 006, 007, 008, 009, 010, 011, 012: Stormwater (Sparkill Creek receiving water)

Orangetown Sewer District #2 Sewage Treatment Plant Town of Orangetown	Town of Orangetown	Hudson River WIN: HR Class: SB	NY0026051 05 Document Folder	001, 001A

Source: Wastewater Facilities (SPDES)
Publisher: NYS Department of Environmental Conservation
Publication Year: updated daily, accessed 12/18/22; Information accessed through the DECinfo Locator.

In New York State, the 2013 Sewage Pollution Right to Know (SPRTK) law requires that publicly owned treatment works (POTWs) and publicly owned sewer systems (POSSs) report untreated and partially treated sewage discharges to NYS DEC within two hours of discovery and to the public and adjoining municipalities within four hours of discovery. Since this law was established, there have been numerous sewage discharges reported from Rockland County Sewer District #1 Wastewater Treatment Plant (SPDES permit: NY0031895) and Orangetown Sewer District #2 Sewage Treatment Plant (SPDES permit: NY0031895). Details are available in the NYS DEC Sewage Pollution Right to Know reports (accessed November 2023). Updated Sewage Discharge Reports are available to download on the Sewage Pollution Right to Know webpage, under Historical Sewage Discharge Data.

New Jersey wastewater permits are handled through the NJPDES program. More information is available through the NJ-GeoWeb mapper and the Data Miner. There are three permitted facilities that discharge to surface waters of the Sparkill Creek watershed in New Jersey (Figure 22, Table 31).

Table 31. NJPDES Surface Water Discharges within the Sparkill Creek watershed.

Facility Name	NJPDES	Receiving Waters	Permit Type	Discharge Type
Aerco International Inc	NJG0132659	Sparkill Creek (NY) via unnamed ditch	General	CG: Non-Contact Cooling Water GP
Carlee Corporation	NJ0050113	Sparkill Brook	Individual	B: Industrial/Commercial/ Thermal Discharge
Rio Vista Homes at Northvale	NJG0164291	Sparkill Brook via storm sewer	General	B4B: Ground Water Petroleum Product Clean Up GP

Source: NJPDES Surface Water Discharges in New Jersey, (1:12,000)
Publisher: NJ Department of Environmental Protection
Publication Year: 6/27/2022

Drinking Water

The majority of people in the Sparkill Creek watershed receive their drinking water through Public Water Systems. A Public Water System is a regulated entity that provides water to the public for human consumption. These systems provide drinking water to at least five service connections or serve an average of at least 25 people for 60 days per year. These systems are categorized and regulated by the New York State Department of Health Drinking Water Protection Program and the New Jersey Department of Environmental Protection Division of Water Supply and Geoscience.

The Sparkill Creek watershed includes a total of five Public Water Systems in both New York State and New Jersey (Table 32). The Public Water System type is based on the number of people served, the water source, and whether or not it serves the same people year-round. Residents that are not located in areas served by a Public Water System rely on individual private wells for their drinking water.

The Sparkill Creek watershed contains two major community water systems: Veolia Water New York and Veolia Water New Jersey (Table 32). Community systems provide drinking water to the same customers year-round. Veolia Water is a private company formerly known as Suez, United Water NY, and Spring Valley Water Works. Water in both Veolia drinking water systems comes from a combination of both surface water and groundwater.

Veolia Water New York (Public Water System ID NY4303673) serves 270,000 customers across Rockland County, including Orangetown and Piermont in the Sparkill Creek watershed. According to the Rockland County Comprehensive Plan (2011), about 33 percent of Veolia Water New York's supply comes from surface water. Lake DeForest Reservoir in the Town of Clarkstown (Hackensack River watershed) is the primary surface water component; the three Letchworth Reservoirs, located in Harriman State Park in the Minisceongo Creek watershed, are used to provide water during high demand periods. Groundwater from the Ramapo Valley Well Field and about 40 bedrock wells in the central and eastern part of Rockland County contribute the remaining 67 percent of the water supply (Rockland County Comprehensive Plan 2011).

There are three Veolia Water New York wells located within the Sparkill Creek watershed (Sparkill 11, Sparkill 8, and Blauvelt 15), according to the 2022 Veolia Water New York Water Withdrawal Report. Water Withdrawal Reports for the Veolia system in other years are available through the Document Folder. For more details on the Veolia Water New York system, including maps of these wells, see the Rockland County Comprehensive Plan (2011), pages 262-266.[7] Additional details on this water system are also available in the Annual Drinking Water Quality Report for 2023: Veolia Water New York - Rockland (2024). Water wells mapped by NYS DEC are shown in Figure 16, Aquifers and Water Use. Not all existing wells are mapped by NYS DEC.

[7] The Rockland County Comprehensive Plan (2011) noted five Veolia Water New York wells located within the Sparkill Creek watershed at that time.

At the time of writing, the Town of Orangetown is currently participating in New York State's Drinking Water Source Protection Program (DWSP2). The Hudson Valley Regional Council is providing technical assistance to develop a source water protection plan, which will include implementation actions to protect drinking water sources. This plan will focus on the Veolia Water New York system that is located within the Town of Orangetown, including the three Veolia Water New York wells in the Sparkill Creek watershed.

Veolia Water New Jersey (Public Water System ID NJ0238001) serves 792,713 people in 58 municipalities in Bergen and Hudson counties. In the Sparkill Creek watershed, this includes 1,849 people in Alpine, 4,640 people in Northvale, 5,711 people in Norwood, and 531 people in Rockleigh. A map of New Jersey Public Community Water Supply Purveyor service areas is available through the New Jersey Department of Environmental Protection Bureau of GIS.

According to the Bergen County Master Plan (2023), Veolia Water New Jersey sources water from a combination of aquifers; reservoirs, including the Oradell Reservoir and Wanaque Reservoir; and surface waters, including the Hirschfeld Brook, Saddle River, and Sparkill Creek[8]. Additional information about the Veolia Water New Jersey intake on the Sparkill Creek in Northvale is available within the NJ DEP Water Allocation Permit 5084x - Renewal (2009) and United Water New Jersey Sparkill Creek Diversion (2009). According to information available through the NJ DEP Data Miner, 66.935 million gallons of water have been diverted from the Sparkill Creek intake between January 2003 and June 2024.

Veolia Water New Jersey also purchases water from the Jersey City Water Department and the Passaic Valley Water Commission. For more information on this system, see the Bergen County Master Plan (2023): Environmental and Natural Resources, pages 16 and 17. Additional information on water supplies in New Jersey is also available through the NJ DEP New Jersey Statewide Water Supply Plan (2024).

Community water systems above a certain size are required to prepare and distribute an annual drinking water quality report to their consumers. Annual drinking water quality reports for Veolia Water New York and Veolia Water New Jersey are available for download through the Veolia website.

For information on aquifers, mapped wells, groundwater quality, and other types of water use, see the Aquifers & Water Use section.

[8] While the Bergen County Master Plan (2023) says that the water is sourced from the Sparkill Brook, the permit for the intake indicates that the intake is actually on the Sparkill Creek in Northvale.

Table 32. Active Public Water Systems (PWS) within the Sparkill Creek watershed.

PWS Name	PWS ID	PWS Type	Primary Source	Sparkill Creek Watershed Municipality Served	Total Population Served
VEOLIA WATER NEW YORK	NY4303673	Community	Surface and Groundwater	Orangetown, Piermont	270,000 (across Rockland County)
VEOLIA WATER NEW JERSEY HACKENSACK	NJ0238001	Community	Surface and Groundwater	Alpine, Northvale Norwood, Rockleigh	792,713 (across Hudson & Bergen counties)
ROCKLAND COUNTRY CLUB	NY4319764	Transient non-community	Groundwater	Orangetown	100
PALISADES INTERSTATE PARK	NJ0202300	Transient non-community	Groundwater	Alpine	510
J&J DODGE	NY4320184	Non-transient non-community	Groundwater	Orangetown	25

Source: Water System Summary
Publisher: US Environmental Protection Agency (EPA) Safe Drinking Water Information System (SDWIS)
Publication Year: 2024

The Sparkill Creek watershed includes three non-community Public Water Systems, which each rely on groundwater (Table 32). There are two transient non-community systems, Rockland Country Club and Palisades Interstate Park, which together serve approximately 610 people (Table 32). These types of systems serve different people for more than six months out of the year. The Sparkill Creek watershed also includes one non-transient non-community system at J&J Dodge in Orangetown, which serves 25 people (Table 32). Non-transient non-community systems serve the same people more than six months of the year. Information about other non-community systems in New Jersey was not available. For more information on system types, see the New York State Department of Health's Drinking Water Program: Frequently Asked Questions.

More information on all Public Water Systems, including violations, is available by searching the public water system name through the US EPA Safe Drinking Water Information System (SDWIS) and the US EPA Enforcement and Compliance History Online (ECHO) website.

People of the Sparkill Creek Watershed

This section focuses on the people living in and caring for the watershed.

Indigenous People

The Sparkill Creek watershed is on Indigenous land that is part of the traditional territory of the Lenni-Lenape, called Lenapehoking. The Lenni-Lenape are the original people of this land and they have a continuing relationship with their territory. During the colonial era and early federal period, many were removed west and north, including the Delaware Tribe and the Delaware Nation, both now in Oklahoma; the Stockbridge Munsee, now living in Wisconsin; and the Munsee Delaware and Delaware Nation of Moraviantown, both now in Ontario, Canada. Some also remain among the continuing historical tribal communities of the region: the Nanticoke Lenni-Lenape Tribal Nation and the Ramapough Lenape Nation, both now in New Jersey. The people who live and work in the Sparkill Creek watershed today bear responsibility to engage meaningfully in relationship with the tribal communities of the Lenni-Lenape people on their homeland.

The Bergen County Historical Society has more information on the history of the Lenni Lenape in the watershed, who speak the Munsee dialect. Today, there are three federally recognized Lenni Lenape Tribal Nations in the United States and two in Canada. There are also two Lenni Lenape Tribes recognized by the State of New Jersey. Click on the tribal websites to learn about the living descendants of the original people of this land:

- Delaware/Lenni Lenape Federally Recognized Tribes
    - Delaware Tribe of Indians (Oklahoma/Kansas)
    - Stockbridge Munsee Band of Mohican Indians, Bowler, Wisconsin
    - Delaware Nation Anadarko, Oklahoma
- Lenni Lenape First Nations in Canada
    - Munsee Delaware First Nation (London, Ontario, Canada)
    - Delaware Nation of Moraviantown (Thamesville, Ontario, Canada)
- New Jersey State-recognized Lenni Lenape Tribes
    - Ramapough Lenape (New York/New Jersey)
    - Nanticoke Lenni-Lenape Tribal Nation (New York/New Jersey)

Demographics

The six municipalities within the Sparkill watershed currently have a combined total population of about 60,950 people (Table 33). The approximate population of the Sparkill watershed is 15,800 people, which is estimated based on the total population of each census tract and the percentage of each census tract in the watershed. See the Rockland County Census Tract Reference Map. According to the 2020 US Census, the population of Orangetown, NY has declined slightly and the population of Bergen County, NJ has increased slightly between 2010 and 2020.

Table 33. Population in the Sparkill Creek watershed.

Census Tracts (County, State)	Percent of Census Tract within the Watershed	2023 Total Population of Tract
Census Tract 21, Bergen County NJ (Alpine)	18.5%	1,740
Census Tract 22, Bergen County NJ (Rockleigh and Northvale)	68.3%	5,103
Census Tract 23, Bergen County NJ (Norwood)	9.5%	5,892
Census Tract 130.01, Rockland County NY (Orangetown between Palisades Interstate Parkway and Tappan Lake)	10.5%	2,518
Census Tract 130.02, Rockland County NY (Orangetown between Rt 303 and Palisades Interstate Parkway)	39.8%	5,415
Census Tract 130.03, Rockland County NY (Orangeburg, Grandview, and Blauvelt)	57.1%	3,546
Census Tract 133, Rockland County NY (Piermont)	52.5%	2,482
Census Tract 134.01, Rockland County NY (Tappan)	69.3%	4,397
Census Tract 134.02, Rockland County NY (Sparkill and Lamont-Doherty)	69.3%	3,797

Source: Esri Updated Demographics Variables, Feature Service
Publisher: ESRI
Publication Year: 2023; Accessed 1/31/24

Table 34. Race and Ethnicity in the Sparkill Creek watershed, based on Census Tracts

Race and Ethnicity	Percent
White non-Hispanic	64.3%
Asian	15.9%
Hispanic	13.6%
Black non-Hispanic	3.0%
Multiple Races	2.9%
Native American	>1%

Source: Esri Updated Demographics Variables, Feature Service
Publisher: ESRI
Publication Year: 2023, Accessed 1/31/24

Table 34 shows the race and ethnicity of the total population of the Sparkill Creek watershed based on census tracts. A majority of the population is White and Non-Hispanic, and there are significant populations of Hispanic and Asian people. The most commonly spoken languages are English, Spanish, and Korean, according to census data available through the NY/NJ Languages Spoken at Home Dashboard, mapped by FEMA.

Vulnerable Populations

Environmental burdens, including polluted water and flood risks, fall disproportionately on marginalized communities. There are a number of tools to help understand the vulnerability of the watershed's populations.

Households under Financial Stress

There are two thresholds of financial stress: 1) the standard federal poverty rate, which was $13,788 for one person and $27,740 for a four-person household in 2021, and 2) the Asset Limited, Income Constrained, Employed (ALICE) rate, which includes households that earn more than the Federal Poverty Level, but less than the basic cost of living for the county. Neither ALICE households nor those living in poverty can afford household essentials: housing, child care, food, transportation, health care, and a basic smartphone plan. For more information, see the United for ALICE websites for New York and New Jersey. One quarter to one-third of the households in the six watershed municipalities are financially stressed, based on the municipality's total population (Table 35).

Table 35. People with Low Incomes in Sparkill Creek watershed municipalities

Watershed Municipality	Household Poverty Rate	Household ALICE rate	Households that can't afford the essentials
Alpine Borough (Bergen, NJ)	5%	10%	15%
Northvale and Rockleigh Boroughs (Bergen, NJ)	5%	29%	34%
Norwood Borough (Bergen, NJ)	6%	10%	16%
Town of Orangetown (Rockland, NY) (including the Village of Piermont)	4%	31%	35%

Source: U.S. Census Bureau's American Community Survey (ACS), 2022; Alice Threshold 2022
Publisher: United for Alice
Publication Year: 2022

NYS Potential Environmental Justice Areas and Disadvantaged Communities

Potential Environmental Justice Areas are US Census block groups of 250 to 500 households that meet or exceed certain statistical thresholds for race or ethnicity and household incomes. The

Sparkill Creek watershed does not include any NYS DEC Potential Environmental Justice Areas. Potential Environmental Justice Areas are available on the DECinfo Locator.

New York's Climate Leadership and Community Protection Act requires the identification of disadvantaged communities, so that climate investments are distributed equitably. The state has identified census tracts that are most vulnerable to the impacts of climate change based on 45 indicators of environmental burdens, climate change risks, population characteristics, and health vulnerabilities. The Sparkill Creek watershed does not include any Disadvantaged Communities. For more information, view the Final Disadvantaged Communities Map (2023).

New Jersey Overburdened Communities

Under the New Jersey Environmental Justice Law, Overburdened Communities have one or more of the following:

- At least 35 percent low-income households; or
- At least 40 percent of the residents identify as minority or as members of a State recognized tribal community; or
- At least 40 percent of the households have limited English proficiency

All of the New Jersey boroughs in the Sparkill Creek watershed are designated as overburdened communities because of the percentage of population that identifies as a minority or state-recognized tribal community: Alpine (45%), Norwood (59%), Northvale 1 (50%), Northvale 2 (53%), Rockleigh (50%). For more information on Overburdened Communities in New Jersey, see the Environmental Justice, Mapping, Assessment, and Protection Tool (EJMAP).

Federal Overburdened and Underserved Areas

The Justice 40 Initiative is a federal effort to ensure the equitable distribution of the federal investments in climate change, clean energy and energy efficiency, clean transit, affordable and sustainable housing, training and workforce development, remediation and reduction of legacy pollution, and the development of critical clean water and wastewater infrastructure. The Climate and Economic Justice Screening Tool identifies overburdened and underserved areas by census tract. The Sparkill Creek watershed does not include disadvantaged census tracts.

For more information about vulnerable populations and how they might be affected by pollution and climate change risk, view EJScreen, EPA's environmental justice mapping and screening tool. The tool may help users identify census block groups with more vulnerable populations and those with potential environmental quality issues.

Watershed Groups

The Sparkill Creek Watershed Alliance is a community action group committed to promoting environmental awareness, partnerships and practices that restore and preserve the health of the Sparkill Creek, from its headwaters on Clausland Mountain to its confluence with the

Hudson River in the Piermont Marsh. The organization was established in 2010 and received 501(c)(3) status in 2015. The Sparkill Creek Watershed Alliance brings together creekside neighbors, family, friends, community organizations, and local businesses to learn how to care for the creek, now and into the future.

The Sparkill Creek watershed has a long history of conservation. According to Designing A Watershed Based Environmental Learning Center: A Preliminary Master Plan for the Sparkill Gap, Sparkill and Piermont, New York (2004) by Greg Mercurio:

> "As far back as 1901, a group of early conservationists and outdoor sportsmen realized intrinsic values of the Sparkill Gap, as a natural place. They joined together to create the first Sparkill Creek conservation association and they called themselves the Brookside Protective Association. They conducted game population studies, and fish and fowl stocking programs within the context of the Sparkill Creek for many years."

In Sparkill Creek Drainage Basin: Recommended Classifications and Assignment of Standards of Quality and Purity for Designated Waters of New York State (1951), the NYS Department of Health Water Pollution Control Board reported that:

> "A local stream conservation group tried, around 1937, to arouse interest in the cleaning up of the Sparkill Creek, but nothing seems to have been accomplished at the time."

That 1951 report went on to acknowledge the challenges of coordination and sharing information about the Sparkill Creek watershed across state lines:

> "Since New York has no compact with New Jersey in regard to purity standards for Sparkill Creek, the New Jersey portion of the drainage basin has been omitted. Reference to defilement from that area is made later in the report."

In their Preliminary Assessment of Sparkill Creek (1993), Hudsonia, Ltd. wrote in response to their assessment that:

> "We recommend that local and state agencies, conservation organizations, and individuals join together to design and implement a model program for restoring a highly degraded stream in a suburban setting."

Starting in 1999, the Sparkill Watershed Conservancy began their work "to preserve and protect open spaces, waters, and the biodiversity of the Sparkill watershed, from its headwaters on Clausland Mountain to its confluence with the Hudson River" (Mercurio 2004).

The current Sparkill Creek Watershed Alliance continues this strong legacy, spearheading numerous projects to better understand, connect with residents, and take actions to protect the Sparkill Creek and its watershed.

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References used for the report, tables, and maps are listed in alphabetical order, by section. If references are included in more than one section, they are included in the first section in which they appear. Secondary data sources used to inform the *Sparkill Creek Watershed Characterization Report* are also available in the GIS Data Spreadsheet and the Report Data Spreadsheet.

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Appendices

Appendix A. Sparkill Creek watershed soils

Soil Code	Soil name	Area (m^2)	Percent of Total
Ad	Alden silt loam	231336	0.8%
AdrAt	Timakwa muck, 0 to 2 percent slopes, frequently flooded	70512	0.2%
Ca	Catden muck, 0 to 2 percent slopes	468948	1.6%
ChE	Charlton fine sandy loam, 15 to 35 percent slopes, very stony	31613	0.1%
DuoB	Dunellen loam, 3 to 8 percent slopes	63146	0.2%
DuoC	Dunellen loam, 8 to 15 percent slopes	577733	2.0%
DuoD	Dunellen loam, 15 to 25 percent slopes	136243	0.5%
DuuA	Dunellen-Urban land complex, 0 to 3 percent slopes	257621	0.9%
DuuB	Dunellen-Urban land complex, 3 to 8 percent slopes	190061	0.7%
DuuC	Dunellen-Urban land complex, 8 to 15 percent slopes	356528	1.2%
DuuD	Dunellen-Urban land complex, 15 to 25 percent slopes	3043	0.0%
Fh	Fluvaquents and Medisaprists, ponded	57815	0.2%
FmhAt	Fluvaquents, loamy, 0 to 3 percent slopes, frequently flooded	94477	0.3%
Fr	Fredon loam	69375	0.2%
HaA	Haven loam, 0 to 3 percent slopes	483082	1.7%
HaB	Haven loam, 3 to 8 percent slopes	132395	0.5%
HamBb	Haledon gravelly loam, 0 to 8 percent slopes, very stony	88451	0.3%
HcB	Hinckley loamy sand, 3 to 8 percent slopes	131554	0.5%
HdB	Hinckley-Urban land complex, 0 to 8 percent slopes	180923	0.6%
HhmBb	Hibernia loam, 0 to 8 percent slopes, very stony	41578	0.1%
HoC	Holyoke-Rock outcrop complex, rolling	1708299	5.9%
HoD	Holyoke-Rock outcrop complex, hilly	1608875	5.5%

Soil Code	Soil name	Area (m^2)	Percent of Total
HoF	Holyoke-Rock outcrop complex, very steep	634205	2.2%
HuC	Holyoke-Urban land-Rock outcrop complex, rolling	307070	1.1%
Ip	Ipswich mucky peat, 0 to 2 percent slopes, very frequently flooded	142065	0.5%
NcA	Natchaug muck, 0 to 2 percent slopes	144570	0.5%
PbuA	Pascack silt loam, 0 to 3 percent slopes	431372	1.5%
PrnAt	Preakness silt loam, 0 to 3 percent slopes, frequently flooded	137594	0.5%
Pt	Pits, gravel	42599	0.1%
ReA	Riverhead fine sandy loam, 0 to 3 percent slopes	337227	1.2%
ReB	Riverhead fine sandy loam, 3 to 8 percent slopes	602269	2.1%
ReC	Riverhead fine sandy loam, 8 to 15 percent slopes	226959	0.8%
ReD	Riverhead fine sandy loam, 15 to 25 percent slopes	118371	0.4%
RuB	Riverhead-Urban land complex, 0 to 8 percent slopes	788163	2.7%
RuC	Riverhead-Urban land complex, 8 to 15 percent slopes	191100	0.7%
RuD	Riverhead-Urban land complex, 15 to 25 percent slopes	41916	0.1%
Sa	Sloan silt loam	1030814	3.5%
TmA	Timakwa muck, 0 to 2 percent slopes	44197	0.2%
UdkttB	Udorthents, loamy, 0 to 8 percent slopes, frequently flooded	9347	0.0%
UdwB	Udorthents, wet substratum, 0 to 8 percent slopes	204507	0.7%
UdwuB	Udorthents, wet substratum-Urban land complex	549412	1.9%
UR	Urban Land	778903	2.7%
Us	Udorthents, smoothed	849185	2.9%
Uw	Udorthents, wet substratum	463088	1.6%
Ux	Urban land	1370508	4.7%
W	W	84922	0.3%
W	Water	11094	0.0%
Wc	Watchaug fine sandy loam	292539	1.0%
WeA	Wethersfield gravelly silt loam, 0 to 3 percent slopes	824	0.0%
WeB	Wethersfield gravelly silt loam, 3 to 8 percent slopes	3227084	11.1%
WeC	Wethersfield gravelly silt loam, 8 to 15 percent slopes	1402430	4.8%
WeD	Wethersfield gravelly silt loam, 15 to 25 percent slope s	1333390	4.6%
WemC	Wethersfield gravelly loam, 8 to 15 percent slopes	519057	1.8%

Soil Code	Soil name	Area (m^2)	Percent of Total
WemD	Wethersfield gravelly loam, 15 to 25 percent slopes	72945	0.3%
WerB	Wethersfield-Rock outcrop complex, 3 to 8 percent slopes	630312	2.2%
WerC	Wethersfield-Rock outcrop complex, 8 to 15 percent slopes	1299501	4.5%
WerD	Wethersfield-Rock outcrop complex, 15 to 25 percent slopes	670306	2.3%
WerE	Wethersfield-Rock outcrop complex, 25 to 45 percent slopes	313532	1.1%
WeuB	Wethersfield-Urban land complex, 3 to 8 percent slopes	28257	0.1%
WeuC	Wethersfield-Urban land complex, 8 to 15 percent slopes	131053	0.5%
WeuD	Wethersfield-Urban land complex, 15 to 25 percent slopes	75673	0.3%
WuB	Wethersfield-Urban land complex, 2 to 8 percent slopes	1451386	5.0%
WuC	Wethersfield-Urban land complex, 8 to 15 percent slopes	1066690	3.7%
WuD	Wethersfield-Urban land complex, 15 to 25 percent slopes	56458	0.2%
Ad	Alden silt loam	231336	0.8%
AdrAt	Timakwa muck, 0 to 2 percent slopes, frequently flooded	70512	0.2%
Ca	Catden muck, 0 to 2 percent slopes	468948	1.6%

Appendix B. Land Cover Classes within the Sparkill Creek watershed

National Land Cover Database Class	Description	Percent Cover (2021)
Open Water	Areas of open water, generally with less than 25% cover of vegetation or soil.	0.1%
Developed, Open Space	Areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20% of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.	25.9%
Developed, Low Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20% to 49% percent of total cover. These areas most commonly include single-family housing units.	17.3%
Developed, Medium Intensity	Areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50% to 79% of the total cover. These areas most commonly include single-family housing units.	8.8%
Developed, High Intensity	Highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80% to 100% of the total cover.	3.5%
Barren Land	Areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover.	0.1%
Deciduous Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.	34%
Evergreen Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.	0.4%
Mixed Forest	Areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.	0.8%

National Land Cover Database Class	Description	Percent Cover (2021)
Shrub/Scrub	Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.	0.1%
Grassland/Herbaceous	Areas dominated by gramanoid or herbaceous vegetation, generally greater than 80% of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.	0.1%
Hay/Pasture	Areas of grasses, legumes, or grass-legume Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20% of total vegetation.	0.6%
Cultivated Crops	Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20% of total vegetation. This class also includes all land being actively tilled.	0.0%
Woody Wetlands	Areas where forest or shrubland vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.	7.7%
Emergent Herbaceous Wetlands	Areas where perennial herbaceous vegetation accounts for greater than 80% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.	0.6%

Source: National Land Cover Database (2021)
Publisher: US Geological Survey
Publication Year: 2021

Appendix C. Remediation Parcels and Contaminants of Concern in the Sparkill Creek Watershed

For more background, see Remediation Sites in the Built Environment section. Links to updated site information are available through the DECinfo Locator. Many remediation reports for parcels within the Sparkill Creek watershed are also available at the Orangeburg Library.

At the Former Materials Research Corporation site, located at 542 Route 303, Orangeburg, NY 10962, contaminants of concern include certain chlorinated volatile organic compounds. A small drainage swale, which is a portion of an unnamed tributary to Sparkill Creek, lies to the west of the property.

According to the Site Assessment: "Specific contaminants detected above groundwater standards include: TCE up to 18,000 parts per billion (ppb) (standard (SCG): 5 ppb), TCA up to 2,900 ppb (SCG:5 ppb), cis-1,2 dichloroethene up to 150 ppb (SCG: 5 ppb), carbon tetrachloride up to 7,700 ppb (SCG: 5 ppb), 1,1, dichloroethane up to 150 ppb (SCG: 5 ppb), PCE up to 26 ppb (SCG: 5 ppb). These values are subsequent to the ISCO IRM or at site locations beyond the IRM area. Thus, while the IRM was effective in reducing the concentration of the contaminants of concern, certain contaminants continue to remain above their respective SCOs within specific zones of the area of treatment. TCE was also detected in off-site monitoring wells approximately 100 feet south of Glenshaw Street, and beyond the limits of the IRM study area, at concentrations up to 950 ppb. Sampling of residential wells approximately 1,000 feet from the site in 2005 revealed the presence of TCE and PCE. Due to the presence of contamination in the private drinking water supplies, 24 residences have been connected to public water and two residences have been connected to activated carbon filtration systems… Drinking contaminated groundwater is not expected since residences were either connected to the public water supply, have had granular activated carbon filters installed, or their well water is monitored."

More information about the Former Materials Research Corporation Site is available:

- NYS DEC Document Folder
- Former Materials Research Corporation Fact Sheet Brownfield Cleanup Program (2016)
- Remedial Action Work Plan: Former Materials Research Corporation (2018)

At the Blauvelt Laundry site, located at 549 Western Highway, Orangetown, NY 10913, the primary contaminant of concern is tetrachloroethene. The Site Assessment notes: "Three dry cleaning businesses have been in operation at the facility since the late 1960s, and in 1978 tetrachloroethene was detected in the public water supply well near the site… Exposure to contaminated groundwater is not expected because a public water supply serves the site and surrounding area. The investigation will assess whether the site is the source of tetrachloroethene found in a nearby public water supply well. Water from that well is treated to remove tetrachloroethene, and routine monitoring ensures that the treated water complies with public water supply standards."

More information about the Orangeburg Shopping Center site is available:

- Blauvelt Laundry Fact Sheet: State Superfund Program (2014)

At the Orangeburg Shopping Center, located at 1-45 Orangetown Shopping Center, Orangetown, NY 10962, primary contaminants of concern are dry cleaning solvents and associated degradation products, including tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE) and vinyl chloride (VC). Remediation has been completed at this site.

The Site Assessment notes that: "Remedial actions have successfully achieved soil cleanup objectives for commercial use. Residual contamination exists in the soil and groundwater. The remaining contamination is being managed under a Site Management Plan… Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination."

More information about the Orangeburg Shopping Center site is available:

- NYS DEC Document Folder

At the Orangetown Commerce Center, located at 5 Greenbush Road, Orangeburg, NY 10962, primary contaminants of concern include semi-volatile organic compounds (SVOCs), metals, and petroleum constituents. Remediation is active at this site.

The Site Assessment notes that: "Volatile organic compounds (VOCs) were detected in groundwater during past investigations; however, recent sampling does not indicate the presence of VOCs at the site currently… Past investigations analyzed groundwater for VOCs, SVOCs, pesticides, PCBs, and metals. Analyses detected VOCs (mainly chlorinated solvents and petroleum constituents), SVOCs (primarily PAHs), and metals above ambient water quality standards. Volatile organic compounds were previously detected in groundwater during sampling events in the late 1980's and early 1990's; however, recent sampling (2009-2016) has indicated that VOCs are no longer impacting groundwater… One pesticide (trans-Chlordane) was detected in two groundwater samples at concentrations of 0.013 ug/L and 0.01 ug/L. PCBs were not detected in groundwater…Contaminated groundwater at the site is not used for drinking or other purposes and the site is served by a public water supply that obtains water from a different source not affected by this contamination."

More information about the Orangetown Commerce Center site is available:

- NYS DEC Document Folder
- Orangetown Commerce Center Fact Sheet: Brownfield Cleanup Program (2019)

At the Former Orangeburg Pipe Mfg-Lowe's Site, located on Route 303, Orangetown, NY 10962, the contaminant of concern is coal tar pitch volatiles. Remediation at this site is complete, and the Site Assessment notes that: "Residual contamination in the soil and groundwater is being managed under a Site Management Plan." More information is available in the site's NYS DEC Document Folder.

At the Orangeburg Commons remediation site, located at 170 Route 303, Orangeburg, NY 10962, contaminants of concern include coal tar pitch volatiles and naphthalene. Remediation at this site is complete. More information is available in the site's NYS DEC Document Folder.

The Site Assessment notes that: "Prior to remediation, the primary contaminants of concern (COCs) were semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs) in waste, soils and groundwater, which were attributable to the coal tar with which the pipe was manufactured. Other COCs included asbestos in waste materials and chlorinated VOCs in soil gas. Remedial actions have successfully achieved soil cleanup objectives for commercial use. Residual contamination exists in the soil and groundwater. The remaining contamination is being managed under a Site Management Plan… Measures are in place to control the potential for direct contact with subsurface soil and groundwater contamination remaining on site. Contaminated groundwater at the site is not used for drinking or other purposes and the area is served by a private water supplier that obtains water from a source not affected by this contamination."

The Danzig Groundwater remediation site is located at 3 Oak Tree Road, Tappan, NY 10983. The Sparkill Creek lies to the west, south, and east of the remediation site. The Danzig Flooring Machine Company site is located across the state border in New Jersey, but contamination in the groundwater has the potential to migrate north into New York State.

The Site Assessment notes that: "Surface water samples of the Sparkfill [sic] Creek were analyzed for volatile organic compounds (VOCs), and the emerging contaminants per-and poly fluoroalkyl substances (PFAS) and 1,4-dioxane. Soil vapor samples were analyzed for VOCs. Groundwater is planned to be sampled for (VOCs), and the emerging contaminants per-and poly fluoroalkyl substances (PFAS) and 1,4-dioxane. Groundwater - A set of shallow and deeper groundwater monitoring wells were installed within the study area to depths similar to those constructed in New Jersey. No chlorinated solvents, breakdown products, or 1,4-dioxane were detected in either groundwater sample. Neither PFOS or PFOA were detected above the drinking water standard of 10 parts per trillion (ppt). Three additional sets of monitoring wells are planned to be constructed, sampled, and gauged to determine the overburden groundwater flow direction. Surface Water - Five surface water samples were taken of the Sparkill Creek with one upstream, one downstream, and three in the middle of a section that runs through the study area. VOCs, PFAS, and 1,4-dioxane were detected in all samples. CVOCs were detected in all samples ranging from parent to breakdown products suggesting the natural degradation of existing 1,1,1-trichloroethylene (1,1,1-TCA) and tetrachloroethylene (PCE) in the Sparkill Creek surface water. The Sparkill Creek is classified as a class C surface water and PCE was detected in all samples from 4.2-4.5 parts per billion (ppb) vs a guidance value of 1 ppb. Perfluorooctanesulfonic acid (PFOS) was detected in multiple samples marginally exceeding the 10 parts per trillion (ppt) screening levels from 11-13 ppt. There does not appear to be a correlation between the hydraulically upgradient samples and downgradient samples that would suggest an on-site source of contamination contributing to the Sparkill Creek… As

information for this site becomes available, it will be reviewed by the NYSDOH to determine if site contamination presents public health exposure concerns."

More information about the Danzig Groundwater site is available:

- NYS DEC Document Folder
- Danzig Groundwater Plume Fact Sheet: State Superfund Site (2020)

At the Piermont Papermills site, located at 100 Paradise Avenue, Piermont, NY 10968, the primary contaminant of concern is polychlorinated biphenyls (PCBs).

The Site Assessment also notes: "Several PFAS compounds were detected in groundwater samples collected on-site. PFOA concentrations were found in excess of the maximum contaminant level (MCL) of 10 parts per trillion (ppt), ranging from 7.14 to 31.7 ppt. PFOS concentrations were also found in excess of the MCL of 10 ppt, ranging from 12.7 to 46.3 ppt. The area surrounding the site is served by public water and sewer… People are not drinking the contaminated groundwater because the area is served by a public water supply that obtains its water from a different source."