



Town of Stanford Natural Resources Inventory 2025



In Memory of Gary Lovett (1953-2022)

This Natural Resources Inventory is dedicated to Gary Lovett, who, through his vision and leadership, launched this project shortly before his passing in December 2022. Gary was a distinguished forest ecologist at the Cary Institute of Ecosystem Studies and a passionate advocate for science-based policies to protect natural resources. He believed deeply in the value of understanding and caring for Stanford's natural environment. We are honored to carry his legacy forward.

Cover photo: Buttercup Farm Audubon Sanctuary (Josh Nathanson)

v. 9-10-2025

Contributors

A. Core Team

- Amanda Bevan Zientek, Hudsonia Ltd.
- Sean Carroll, Dutchess Land Conservancy and formerly with Cornell Cooperative Extension Dutchess County
- Curtis DeVito, Stanford Conservation Advisory Commission
- Carolyn Klocker, formerly with Cornell Cooperative Extension Dutchess County
- Natalie O'Malley, Stanford Conservation Advisory Commission
- Gretchen Stevens, Hudsonia Ltd.
- Christine Vanderlan, NYS Department of Environmental Conservation Hudson River Estuary Program
- Gregory Williams, former member, Stanford Conservation Advisory Commission

B. Maps

- Sean Carroll

C. Narrative Authors and Content Providers

- Amanda Bevan Zientek (Habitats)
- Charles Canham, Cary Institute of Ecosystem Studies (Habitats)
- Sean Carroll (Land Use)
- Margaret Fallon, Stanford Conservation Advisory Commission (Introduction)
- Michael Fargione, Cary Institute of Ecosystem Studies (Wildlife)
- Stuart Findlay, Cary Institute of Ecosystem Studies (Water Resources)
- Vicky Kelly, Cary Institute of Ecosystem Studies (Climate)
- Gretchen Stevens (Habitats and Critical Environmental Areas)
- Lynn Tondrick, Stanford Conservation Advisory Commission (Glossary)
- Christine Vanderlan (Species Lists, Water Quality Information)
- Alex Wolf (Physical Setting)

D. Reviewers and Editors

- Janet Allison, Stanford Conservation Advisory Commission
- Curtis DeVito
- Julie Hart, Dutchess Land Conservancy
- Christine Vanderlan

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Much of the narrative in the NRI was based on material taken from the NRIs of the neighboring towns of Washington and Clinton, and we thank the authors of those documents for giving us permission to do so.

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Finally, we are grateful to the members of the Town Board, Planning Board, Zoning Commission, and Zoning Board of Appeals for their comments, and to the residents of Stanford for their support and for the photographs they shared of the landscapes and wildlife they love.



Curtis DeVito
CAC Chairperson

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Department of
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Conservation

Hudson River
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Cornell Cooperative Extension
Dutchess County



Hudsonia Ltd.
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Executive Summary

The Town of Stanford Natural Resources Inventory (NRI) is a comprehensive overview of the town's natural features and ecosystems, created to support sustainable land use, informed planning, and environmental stewardship. This document brings together detailed maps, scientific data, and historical context to help protect the landscapes that define Stanford's rural character and ecological richness.

Developed by the Stanford Conservation Advisory Commission (CAC) with the support of local experts, state agencies, and residents, the NRI is both a planning tool and an educational resource. It aligns with the goals of the Town's 2023 Comprehensive Plan and supports participation in the NYS Climate Smart Communities program.

What the NRI Includes:

The NRI identifies and describes Stanford's major natural features, including:

- **Climate and Climate Change:** Local weather patterns and projected increases in heat, precipitation, and extreme weather events.
- **Topography and Geology:** Hills, slopes, soils, and underlying bedrock that shape land use and groundwater.
- **Water Resources:** Streams, wetlands, aquifers, and drinking water supply.
- **Habitats and Wildlife:** Forests, open uplands, wetlands, streams, and biodiversity areas, with emphasis on rare species and climate resilience.
- **Land Use and Agriculture:** Zoning, farmland classification, forest resources, and conservation lands.

Each section is supported by a series of high-quality maps, created by Cornell Cooperative Extension Dutchess County and Sean Carroll, to visualize conditions across the town.

Highlights & Key Findings:

- Forests cover much of Stanford, playing a vital role in biodiversity, carbon storage, and climate resilience.
- Wetlands make up approximately 11% of the town, with many vernal pools and sensitive habitats identified by Hudsonia.
- Prime and important farmland soils occupy over 50% of Stanford, supporting its agricultural heritage.
- 33% of the land has slopes of 15% or greater, posing erosion control challenges and constraints on development.
- Climate projections show an increase in extreme heat, precipitation variability, and flood risk in the coming decades.
- Critical habitats for rare species and pollinators are vulnerable to fragmentation, invasive species, and land-use change.

Chapter 1: Introduction

The Town of Stanford completed a Comprehensive Plan in 2023.¹ That plan emphasized the community's commitment to retaining the town's rural nature. The Comprehensive Plan's primary vision is to encourage the town's economic growth while "maintaining and enhancing its natural resources and rural agricultural heritage".² As part of this vision, the Town of Stanford Town Board tasked the Conservation Advisory Commission with completing a Natural Resources Inventory to update vital information about the town and its environment.

The Town of Stanford's forests, meadows, wetlands, streams, and shorelines are not only habitat for abundant wildlife and fish, but also provide many vital benefits to people, especially in this era of rapid climate change. These ecosystems help to keep water and air clean, moderate temperature, filter pollutants, absorb floodwaters, and provide for pollination of agricultural crops. They also present opportunities for outdoor recreation and education and create the scenery and sense of place that is unique to this community.

This Natural Resources Inventory (NRI) identifies and describes the naturally occurring resources located in the Town of Stanford, including climate, topography, geology and soils, water resources, and habitat, as well as farmland and conserved and publicly owned land. By bringing this information together in one place, the NRI can cultivate a better understanding and appreciation of the community's natural resources. It helps identify critical environmental areas and climate adaptation strategies and can inform local land stewardship and conservation. It serves as the foundation for comprehensive and open space planning, zoning updates, and other municipal plans and policies. Completing this NRI also demonstrates the Town's commitment to climate action, as it is considered a Priority Action worth ten points in the state's Climate Smart Communities program.

A. How to Use the NRI

As a document of the town's environment, the NRI is a valuable land-use planning tool as well as an educational resource. The inventory provides an essential tool for local building, planning, and zoning by identifying sensitive land as well as biological and water resources. The NRI provides property owners, developers, and their consultants with information they may need when considering the impacts their projects may have on natural resources. It can be used to address natural resources during project planning and design and help expedite the review and approval of their endeavors. It can also be used as a general reference for landowners who wish to know about resources on their property for management and stewardship.

Although the NRI and the sources cited are valuable in assessing the natural features of a given parcel, site visits are highly recommended to verify resources present, including features that may not

¹ Town of Stanford. *Stanford Comprehensive Plan*. Dec. 2023, stanfordny.gov/wp-content/uploads/2024/02/Stanford-Comp-Plan-Book.pdf

² *Stanford Comprehensive Plan*, 2023, p. 13.

have previously been mapped. Certain projects may warrant further assessment by an expert.

Examples of NRI uses for municipal officials and community groups include:

- Referencing the NRI during environmental reviews, including the state environmental quality review (SEQR) process.
 - Use the NRI and sources cited to evaluate natural resources on and near the site.
 - Reference the NRI during SEQR and site plan reviews and evaluate potential impacts on resources extending beyond site boundaries.
 - Use the NRI to enforce existing natural resource protections in the town code.
- Updating the town's Comprehensive Plan.
 - Inventory existing conditions for natural resources.
 - Identify conservation priorities.
 - Inform vision statement and key issues, as well as goals and policies to protect important natural resources.
- Creating an open space plan.
 - Identify priority areas for open space conservation.
- Designating Critical Environmental Areas to bring attention to sensitive areas during the SEQR process.
- Revising zoning and subdivision regulations.
 - Integrate the NRI into purpose, definitions, and delineation of natural features referenced in the town code.
 - Use the NRI for conservation analysis in open space subdivisions.
 - Require protection of sensitive resources identified in the NRI.

For landowners, residents, farmers, and developers, the NRI can be used to:

- Identify some of the natural resources on their land.
- Understand the role of their land in the larger landscape.
- Plan for land management or uses to avoid or minimize impacts to natural resources.

For more examples of how to integrate the NRI into municipal comprehensive plans, zoning, and land-use decision making, refer to *Best Practices for Adopting Conservation Inventories and Plans*.³

The NRI provides information about the value of natural resources to the community and is best suited for municipal scale planning. It can aid in understanding the context of individual sites and may be used as a screening tool to raise questions or identify the need for additional resource

³ New York State Department of Environmental Conservation, Hudson River Estuary Program. *Best Practices for Adopting Conservation Inventories and Plans: A Guide for Communities in the Hudson River Estuary Watershed*. New York State Department of Environmental Conservation's Hudson River Estuary Program, Cornell University, and Pace Land Use Law Center, 2023, https://extapps.dec.ny.gov/docs/remediation_hudson_pdf/nriospadoption.pdf

assessment at individual parcels, but the maps are not intended to provide site-specific accuracy and should not be used as a primary source for land-use decision making. Site visits are highly recommended to verify resources present, including features that may not have previously been mapped.

The Stanford Conservation Advisory Commission presented the NRI maps to the Stanford Town Board at the February 2025 Town Board meeting, making them accessible for public comment and input from all community members. The final NRI maps are available as PDFs on the town website, and physical copies are available at the Stanford Town Hall upon request made to the CAC. The online PDF maps allow for ease of navigation with the ability to zoom in to an area of interest, and the physical copies allow access for those in the community without access to computers.

B. Dutchess County NRI

The Dutchess County Natural Resources Inventory is an excellent companion tool and is available on the Dutchess County Planning website.⁴ The County NRI includes an online, interactive map hosting most of the data layers shown on maps in this NRI. The Dutchess County NRI catalogs the natural resources of the county and interprets the findings and includes a mapping application, called the Dutchess County Environmental Mapper,⁵ which can be used in conjunction with this NRI.

C. Online Interactive Maps

Many of the data sets shown in the NRI maps are available for more detailed viewing through online interactive maps, including:

- Dutchess County Environmental Mapper - gis.dutchessny.gov/nri/
- Dutchess County Parcel Access - gis.dutchessny.gov/parcelaccess/
- Dutchess County Aerial Access - gis.dutchessny.gov/aerialaccess/
- Hudson Valley Natural Resource Mapper - www.dec.ny.gov/lands/112137.html
- DECinfo Locator - dec.ny.gov/maps/interactive-maps/decinfo-locator
- Discover GIS Data NY - orthos.dhSES.ny.gov/
- USGS National Map - www.usgs.gov/programs/national-geospatial-program/national-map
- Web Soil Survey - websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

⁴ Dutchess County Department of Planning and Development. *Dutchess County Natural Resources Inventory*, nri.dutchessenvironment.com

⁵ Dutchess County Department of Planning and Development. *Dutchess County Natural Resource Inventory Environmental Mapper*, gis.dutchessny.gov/nri

D. Partners for Conservation and Land Use Planning

The following agencies and organizations are potential partners in assisting the town with advancing natural resource planning, management, and conservation:

- New York State Department of Agriculture and Markets
- New York State Department of Environmental Conservation (NYSDEC)
- New York State Department of State
- Hudson River Valley Greenway
- Cornell Cooperative Extension Dutchess County
- Natural Resources Conservation Service
- Lower Hudson Partnership for Regional Invasive Species Management
- Dutchess County Soil and Water Conservation District
- Dutchess County Department of Planning and Development
- Dutchess County Department of Health
- Wappinger Creek Intermunicipal Council
- Dutchess Land Conservancy
- Scenic Hudson
- Hudsonia Ltd.

E. Data and Methods

The NRI was completed with the assistance of Christine Vanderlan of the NYSDEC Hudson River Estuary Program (Estuary Program) and with Sean Carroll and Carolyn Klocker of Cornell Cooperative Extension Dutchess County (CCEDC). Project meetings were held with volunteers from the community and Stanford's Conservation Advisory Commission. The report is based in part on templates developed by Estuary Program staff. Mapping was carried out by Sean Carroll of CCEDC.

The NRI incorporates information from Stanford's 2023 Comprehensive Plan and the Dutchess County Natural Resources Inventory, among other plans and studies.

The NRI maps display data from federal, state, and county agencies, as well as local habitat and stream mapping from the Significant Habitats Report completed by Hudsonia in 2004 and updated in 2024. The original source and publication year of data sets are included on each map and are described in the report. All maps were produced using ESRI Geographic Information Systems (GIS) software and data in the NAD 1983 State Plane New York East FIPS 3101 Feet coordinate system.

Note that information on the maps comes from different sources, produced at different times, at different scales, and for different purposes. Most of the GIS data were collected or developed from remote sensing data (i.e., aerial photographs, satellite imagery) or derived from paper maps. For these reasons, GIS data often contain inaccuracies from the original data, plus any errors from converting them. Therefore, maps created in GIS are approximate and best used for planning purposes. They should not be substituted for site surveys. Any resource shown on a map should be verified for legal

purposes, including environmental review. The NRI is not a substitute for the collection of site-specific data or more detailed local knowledge. Information provided by the maps can be enhanced by local knowledge, and the NRI should be updated every 10 years and as new data become available.

During the NRI process, the CAC reached out regularly to town leaders and citizens for their input and review. It updated the community members at Town Board meetings and at public events open to all at the Town Hall including the NRI kick off meeting in November of 2023 and public updates in June of 2024 and June of 2025. The Town of Stanford Community Day in September of 2024 also provided an excellent opportunity to display NRI draft maps and answer any questions from members of the community. Notices for these events were included in the Town Supervisor's weekly newsletter, the announcement board at the base of Town Hall and on the CAC Instagram account.

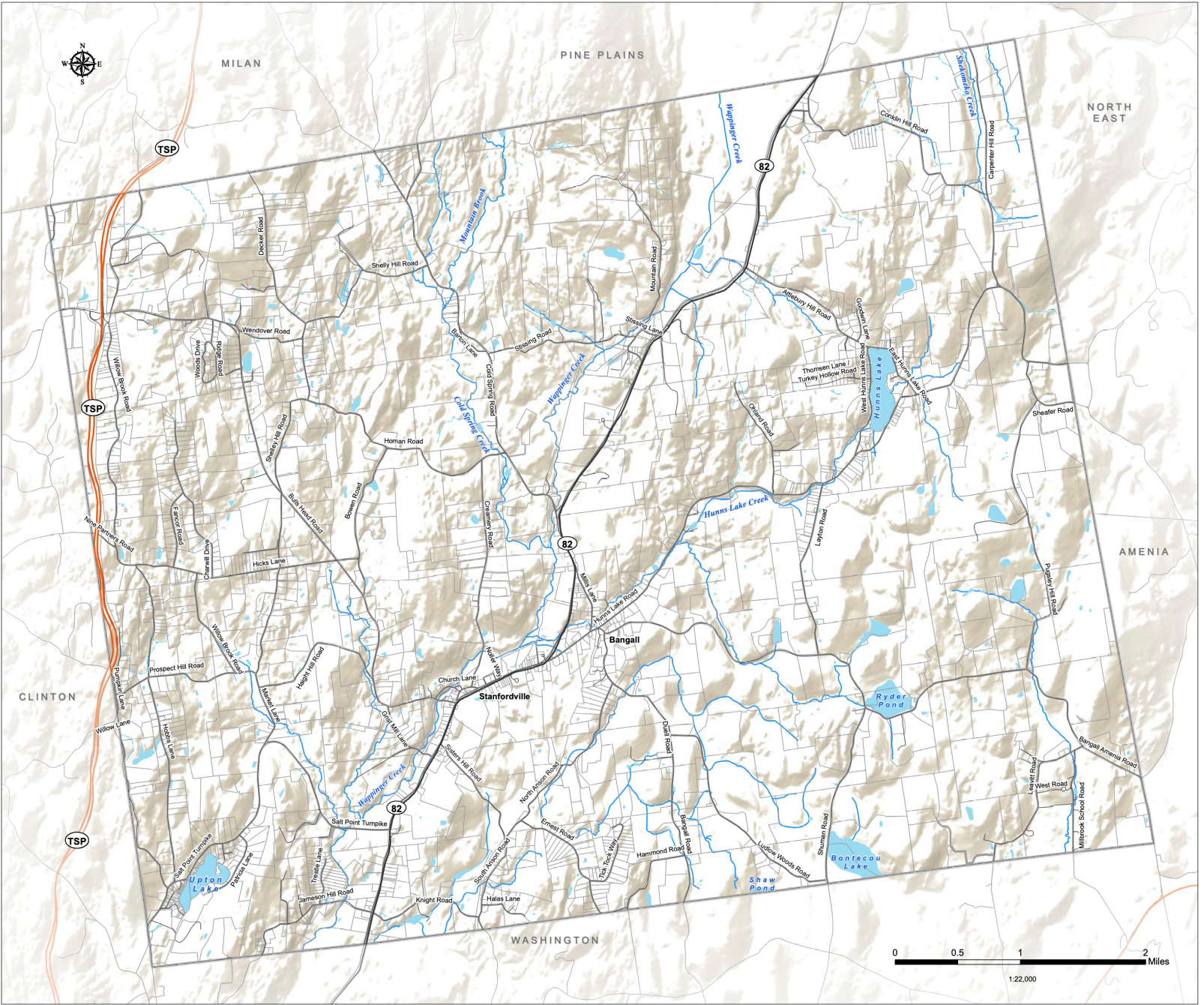
The final NRI draft was circulated to the public and selected reviewers during the summer of 2025. After addressing comments, the final NRI was adopted by a resolution of the Town Board on September 11, 2025.

F. Base Map and Aerial Imagery Map (Maps 1 and 2)

Map 1 (Base Map) is the foundation for the NRI map series. It shows municipal boundaries and transportation infrastructure, as well as topographic relief and surface water features. Tax parcel data shown in the map series were published in 2024 by Dutchess County.

Map 2 (Aerial Imagery) gives a bird's-eye view of the Town of Stanford, showing 0.5-foot resolution aerial imagery taken in 2024 for Dutchess County. The aerial imagery was taken in early spring prior to the leaf out of deciduous trees, resulting in a detailed view of vegetation types, land uses, and development. It can serve as a reference for comparison with features shown on other maps in the NRI. For more detailed, interactive viewing of aerial imagery dating back to 1936, users can visit the Dutchess County AerialAccess.⁶

⁶ Dutchess County Government. *AerialAccess – Dutchess County, NY*. gis.dutchessny.gov/aerialaccess



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Base Map

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

DATA SOURCES
Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents.
No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Map 1: Base Map



G. Community Setting

The Town of Stanford is a rural community located in the northeastern part of Dutchess County, New York. The town spans 50.10 square miles and has a population of 3,682 as of the 2020 census. It is bordered on the north by Milan and Pine Plains, on the east by the towns of North East and Amenia, on the south by Washington, and on the west by Clinton.

Most of the Stanford's water drains into the Hudson River, primarily through tributaries of the Wappinger Creek. The Wappinger Creek and its tributaries drain approximately 807 square miles, roughly 67 percent, of Dutchess County.⁷ The Wappinger Creek runs through the heart of the town. Watersheds are described in Chapter 4 (Water Resources).

Stanford's transportation network consists primarily of local and county roads. The Taconic State Parkway runs north to south near the western border of Stanford, with exits in nearby communities. County Route 82 traverses the Town of Stanford from roughly south to north, providing connections to the Town of Washington and the Town of Pine Plains. Local roads are also shown and labeled on the maps.

H. Settlement History

The Hudson Valley was settled by Native Americans at least 10,000 years ago following the last ice age.⁸ They lived along the tributaries and banks of the Hudson River and were rapidly displaced from their homeland in the decades following European arrival in the 17th century.

European settlement in the Town of Stanford began in the 17th century, with early Dutch settlers followed by the English. In 1697, a group of settlers known as the Nine Partners received a patent from the Crown of England for 146,000 acres. Stretching from the Hudson River to the eastern border of New York State, it became known as the Nine Partners Patent. A portion of the patent became known as the Town of Stanford. In the subsequent centuries, settlers included many farmers who cut down native trees to expand farmland and to use as fuel. Over time, local farmers began to focus on growing crops to sell to urban areas, especially New York City.⁹

I. Land Use History

Hudson Valley ecosystems have been profoundly influenced by human land uses for millennia. Native Americans cleared fertile river valleys for agriculture and practiced widespread managed burning to promote an open forest understory conducive for hunting. Fire management practices were used intentionally to promote the reproduction of valuable wild crops such as blueberries and are thought to have promoted the expansion of southern oaks-hickory forest communities and other

⁷ Dutchess County Department of Planning and Development. "Water Resources." *Dutchess County Natural Resources Inventory*, nri.dutchessenvironment.com/water-resources/#toggle2

⁸ New York State Museum. "First Peoples." <https://www.nysm.nysed.gov/exhibitions/ongoing/first-peoples#>

⁹ Turton, M. "A Short History of Hudson Valley Farming." *The Highland Current*, 2 November 2018, <https://highlandscurrent.org/2018/11/02/a-short-history-of-hudson-valley-farming>

fire-tolerant species.¹⁰

European settlement from the 16th to the early 19th centuries led to widespread forest clearing for agriculture. Even areas that lacked high quality soils were cleared for pasture. By 1835, 75-80 percent of the land in neighboring Columbia County was cleared for agriculture.¹¹ In 1825, the completion of the Erie Canal transformed New York State and encouraged westward movement of Hudson Valley residents, who began abandoning marginal lands in favor of rich farmland in the west. Expansion of railroads and industry throughout the 19th century led to the growth of urban population centers. By the early 20th century, the trend in farmland abandonment was well underway. Between 1910 and 1992, farms in Dutchess County plummeted from 90 to 20 percent of the land area.¹²

As marginal farmlands went out of agricultural production, forests and other natural ecosystems made a remarkable recovery, but land-use history continues to exert strong influences on ecosystems and biodiversity. A study conducted at the Cary Institute of Ecosystems Studies in the nearby Town of Washington found significant variations in vegetation consistent with prior land uses such as selective timber harvesting, cultivation, and pasture.¹³ Other research in Dutchess County and Columbia County has found higher diversity of native understory plants and lower prevalence of invasive species in older forests that were likely never fully cleared for agriculture.¹⁴ Land-use history is an important factor in the composition, structure, and quality of habitats seen today. Historical aerial photos and descriptions provided in old deeds, as well as information gleaned from stone walls and soils can provide insights into land-use history.

¹⁰ Kudish, Michael. *The Catskill Forest: A History*. Purple Mountain Press in conjunction with ColorPage, 2000, pp. 47-48.

¹¹ Vispo, Conrad. *The Nature of the Place: A History of Living with the Land in Columbia County, NY*. Adonis Press, 2014.

¹² Stanton, Bernard, and Nelson Bills. *The Return of Agricultural Land to Forest: Changing Land Use in the Twentieth Century*. Department of Agricultural, Resource, and Managerial Economics, College of Agriculture and Life Sciences, Cornell University, 1992, p. 38, publications.dyson.cornell.edu/outreach/extensionpdf/1996/Cornell_AEM_eb9603.pdf.

¹³ Glitzenstein, Jeff S., Charles D. Canham, Mark J. McDonnell, and Donna R. Streng. "Effects of Environment and Land-Use History on Upland Forests of the Cary Arboretum, Hudson Valley, New York." *Bulletin of the Torrey Botanical Club*, vol. 117, no. 2, Apr.–June 1990, pp. 106–122, doi.org/10.2307/2997050

¹⁴ Knab-Vispo, Claudia, and Conrad Vispo. *Floodplain Forests of Columbia and Dutchess Counties, NY: Distribution, Biodiversity, Classification, and Conservation*. Hawthorne Valley Farmscape Ecology Program in cooperation with Hudsonia Ltd., 2010, hvfarmscape.org/wp-content/uploads/2014/01/fep_floodplain_forest_report_nov_2010-f75.pdf

Chapter 2: Climate

A. Introduction

It is important to recognize that climate change is a global phenomenon. Effects of climate change are felt locally, but the evidence for change comes from a compilation of data from many sources. Individual weather stations contribute to overall averages and may or may not exactly reflect those averages. Together, the data from many stations unequivocally reveal that the globe is getting warmer, and the cause is past and present emissions of greenhouse gases. Data from individual weather stations can be used to understand changes on a local level, but it is important to understand that weather and climate are large, regional phenomena that reflect changes in those broad geographical areas. What is happening to the globe will affect what happens in our backyard. For example, extreme rainfall events associated with tropical storms are caused by changes in the tropics. Similarly, polar vortexes that bring prolonged cold snaps to our region are caused by changes in the Arctic. To understand climate change locally, it's important to look at what is happening around the globe. While data from local weather stations provide a snapshot of local changes, they may not reflect the big picture gotten when combining data from many stations, which is so important to understanding climate change.



Photo 1: Lightning over Stanford's rural landscape (Brian Underhill)

The Town of Stanford is a rural community consisting largely of open space that includes but is not limited to agricultural lands and natural preserves. Rural communities face unique challenges due to climate change and have unique opportunities to address climate change. By adopting agroecological practices, agriculture can reduce emissions of greenhouse gases.¹⁵ Preserves and other open spaces can help mitigate the effects of extreme weather events. For example, maintenance of wetlands can reduce flooding by providing space for flood waters to spread out. Rural communities often lack infrastructure and resources to respond to extreme events brought on by climate change, which can result in economic hardship for residents. Taking measures to assess the potential threats of climate change and to adapt and be prepared to recover from disruption or disaster should be part of planning in any rural community, including the Town of Stanford.

¹⁵ Bolster, Catherine H., et al. "Ch. 11. Agriculture, Food Systems, and Rural Communities." *Fifth National Climate Assessment*. Edited by Allison R. Crimmins et al., U.S. Global Change Research Program, 2023, <https://doi.org/10.7930/NCA5.2023.CH11>

B. Local Climate Information

Local weather station data provides an understanding of our average temperature, total precipitation, the start and end dates of our growing season and the average conditions of our seasons. The Town of Stanford is situated in the South Hudson climate region of New York. The climate is humid continental with a normal annual average temperature of 46-49 degrees F, normal total annual precipitation of 45-50 inches, and normal annual total snowfall of 40-60 inches. Normal estimates are based on 1981-2010 averages. Data for these estimates come from weather stations in Poughkeepsie and Dobbs Ferry, NY, which have enough data for historical analyses. The region can be affected by different types of extreme events including hot days, cold days, heat waves, cold snaps, droughts and extreme precipitation events, including those caused by the remnants of tropical or extratropical cyclones and nor'easters, which are storms that move along the Atlantic coast and are so named because of the prevailing wind direction.

Climate change has brought and will continue to bring an increase in temperature, precipitation, the number of extreme events of all kinds, and an increase in the year-to-year variability in all of these. Historical analysis of data from the South Hudson climate region indicates that the temperature increased 0.34 degrees F per decade (Dobbs Ferry) and 0.42 degrees F per decade (Poughkeepsie) from 1901-2020. Precipitation increased by 0.39 inches per decade (Dobbs Ferry) and 0.32 inches per decade (Poughkeepsie) during the same period.

C. Climate Change Predictions

1. Temperature

By all measures, temperatures are expected to continue to increase, and the warming will increase for all seasons. The number of extreme heat events is projected to increase while the number of extreme cool events is projected to decrease (Table 1). This includes an increase in the number of hot days, the number and duration of heat waves and the number of cooling degree days, which is a measure of cumulative heat and an indication of an increased need for air conditioning. The projected decrease in the number and duration of cold events could be offset by an increase in polar vortex events, which are on the rise and some research shows are linked to climate change.

Table 1. Projected Ranges of Increase/Decrease in Extreme Heat/Cool Events¹⁶

Extreme Event	Baseline (Average 1981-2010)	2030s	2050s	2080s
Days per year with maximum temperature at or above:				
90°F	18	29 to 48	41 to 64	48 to 87
95°F	4	10 to 18	13 to 29	18 to 57
Days of heat waves per year	2	4 to 6	6 to 9	6 to 10

¹⁶ Bader, Daniel, and Radley Horton. *New York State Climate Change Projections Methodology Report*. Prepared for the New York State Climate Impacts Assessment, 2023, pp. 30-31, nysclimateimpacts.org/wp-content/uploads/2023/09/Climate-Methodology-Report-09-21-23-final.pdf

Extreme Event	Baseline (Average 1981-2010)	2030s	2050s	2080s
Average length of heat waves (in days)	4	5 to 5	5 to 6	5 to 8
Days per year with heat index at or above:				
85°F	33	56 to 68	68 to 86	83 to 113
95°F	5	17 to 25	26 to 40	34 to 72
Maximum heat index	100°F	107°F to 111°F	112°F to 118°F	115°F to 130°F
Cooling degree days	903	1199 to 1463	1411 to 1800	1627 to 2399
Days per year with minimum temperature at or below 32°F	105	74 to 90	54 to 82	25 to 67
Days per year with minimum temperature at or below 0°F	0.6	0 to 0	0 to 0	0 to 0
Heating degree days	5181	4232 to 4536	3834 to 4234	3133 to 3883

2. Precipitation

Precipitation is projected to increase overall, including a modest increase in the number of days with more than 1-2 inches of rain (Table 2).

Table 2. Projected Ranges of Increase in Extreme Precipitation Events¹⁷

Days per year with precipitation exceeding:	Baseline (Average 1981-2010)	2030s	2050s	2080s
1 inch	15	15 to 15	15 to 17	16 to 18
2 inches	3	4 to 4	4 to 5	4 to 6
4 inches	0.2	0.2 to 0.2	0.2 to 0.2	0.2 to 0.5

Projecting the future of extreme precipitation is challenging. There is evidence that changes in dynamics during convective events could lead to extreme increases in precipitation during thunderstorms. Mid-latitude cyclones are expected to contain more moisture in the future, resulting in the possibility of greater total amounts of precipitation per storm. The temperature at the time of such a storm determines the type of precipitation. While the predictions are for warmer winters with less snow overall, if temperatures are cool enough during an extreme event such as a nor'easter, extremely high snowfall levels are possible. The number of tropical storms is projected to continue to increase, bringing the possibility of extreme precipitation during the hurricane season. The timing of extreme precipitation is critical. Should extreme rainfall events occur sequentially, the ground may become too saturated to retain additional moisture, causing flooding. Because of the potential for substantial and costly infrastructure damage, it is important to plan for increases in extreme precipitation events, even if projections for total precipitation amounts are modest.

Climate change has resulted in an increase in intra- and inter-annual variability in precipitation and

¹⁷ Ibid.

temperature. Within a year, intense precipitation events may be interspersed by long periods with little or no precipitation. Increasing seasonal droughts followed by intense precipitation may become more common. Long periods without precipitation may be exacerbated by intense heat, which causes increased evaporation from soil surfaces and evapotranspiration by trees and agricultural crops. While the increased total precipitation per year may be good for large water supply systems, the increases in dry, hot periods could affect smaller municipal water supplies and individual wells. In addition, these increases in dry spells will have an effect on agriculture.

D. Local Climate Action

Climate change must be addressed by reducing emissions (mitigation) and increasing resiliency to the effects of climate change (adaptation). The Town of Stanford has adopted the NYSDEC Climate Smart Communities (CSC) Program as a framework for taking steps to reduce emissions and prepare for the consequences of climate change. In December 2022, it passed a resolution adopting the ten-element CSC Pledge.¹⁸ It appointed a CSC Coordinator and formed a CSC Task Force. It has identified steps previously taken that fulfill certain pledge elements and is implementing additional actions with the goal of eventually achieving Bronze Certification. This will provide, among other benefits, a boost in the town's scoring on related grant applications.

¹⁸ The CSC Pledge consists of the following elements: (1) Build a climate-smart community; (2) inventory emissions, set goals, and plan for climate action; (3) decrease energy use; (4) shift to clean, renewable energy; (5) use climate-smart materials management; (6) implement climate-smart land use; (7) enhance community resilience to climate change; (8) support a green innovation economy; (9) inform and inspire the public; and (10) engage in an evolving process of climate action.

Chapter 3: Physical Setting



Photo 2: View from Wethersfield Estate and Garden (Wethersfield Foundation, Inc.). The highest point in Stanford (1,220 feet above sea level) is at Wethersfield.

Stanford's physical setting is determined by the geologic history of the region, a story stretching back millions of years and covering multiple episodes of mountain-building, continents coming together and drifting apart, and shallow seas being formed and disappearing. More recently, but still thousands of years ago, glaciers scoured the town during the last ice age, forming many features still seen on the landscape. Higher areas were often worn down by glaciers, filling lower areas with glacial debris such as rocks, gravel, and sand.¹⁹ Since the glaciers retreated, the perennial forces of erosion, as well as human activities, continue to shape Stanford's rolling hills and varied rural landscape.

A. Topography

Map 3 (Topography and Elevation) depicts the topography and elevation of Stanford and is derived from U.S. Geological Survey 3D digital elevation data.

Stanford is essentially bisected by Wappinger Creek, roughly paralleling State Route 82 as it winds its way northeast-to-southwest from Pine Plains to the Town of Washington. The creek is named after the Wappinger people who were living in the area when European colonists arrived. Stanford has several low valleys with major tributaries to Wappinger Creek. To the north and west of Wappinger Creek, there are low areas along tributaries, including Willow Brook and Cold Spring creeks, away from which the land increases in elevation, with many hilltops above 500 feet and culminating with "Old Round Top" at 880 feet above sea level in the northwest corner of the town.

¹⁹ Dutchess County Department of Planning and Development. "Physical Resources." *Dutchess County Natural Resources Inventory*, <http://nri.dutchessenvironment.com/physical-resources>

To the south and east of Wappinger Creek, there are fewer lowlands, and the hills gain height more rapidly towards the eastern border of the town and the Taconic Mountains, with many areas over 1,000 feet. The highest point in Stanford is at 1,220 feet above sea level at the Wethersfield Estate and Garden at the top of Old Wethersfield Road.

Topography is the collective description of landforms in an area including hills, valleys, waterways, and wetlands. Stanford's hills often consist of the oldest rocks, and those most resistant to erosion.²⁰ The underlying geology that led to the current lay of the land is discussed further below, but Stanford's topography is of great importance today. Topography determines how water moves across, or is retained on, the landscape; where erosion occurs; where different habitats and wildlife occur; and more and less suitable places for development and economic endeavors.

²⁰ Ibid.

Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Topography & Elevation

-  Stanford Boundary
-  Municipal Boundary
-  Parcel Boundary
-  Taconic State Parkway
-  Major Road
-  Local Road
-  Waterbody
-  Perennial Stream
-  Intermittent Stream

X - Town High Point

Elevation (ft)

-  201-400
-  401-600
-  601-800
-  801-1000
-  1001-1200
-  1201-1400

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
 Elevation (DEM): USGS National Map 3D Elevation, 2017

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents.
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This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.

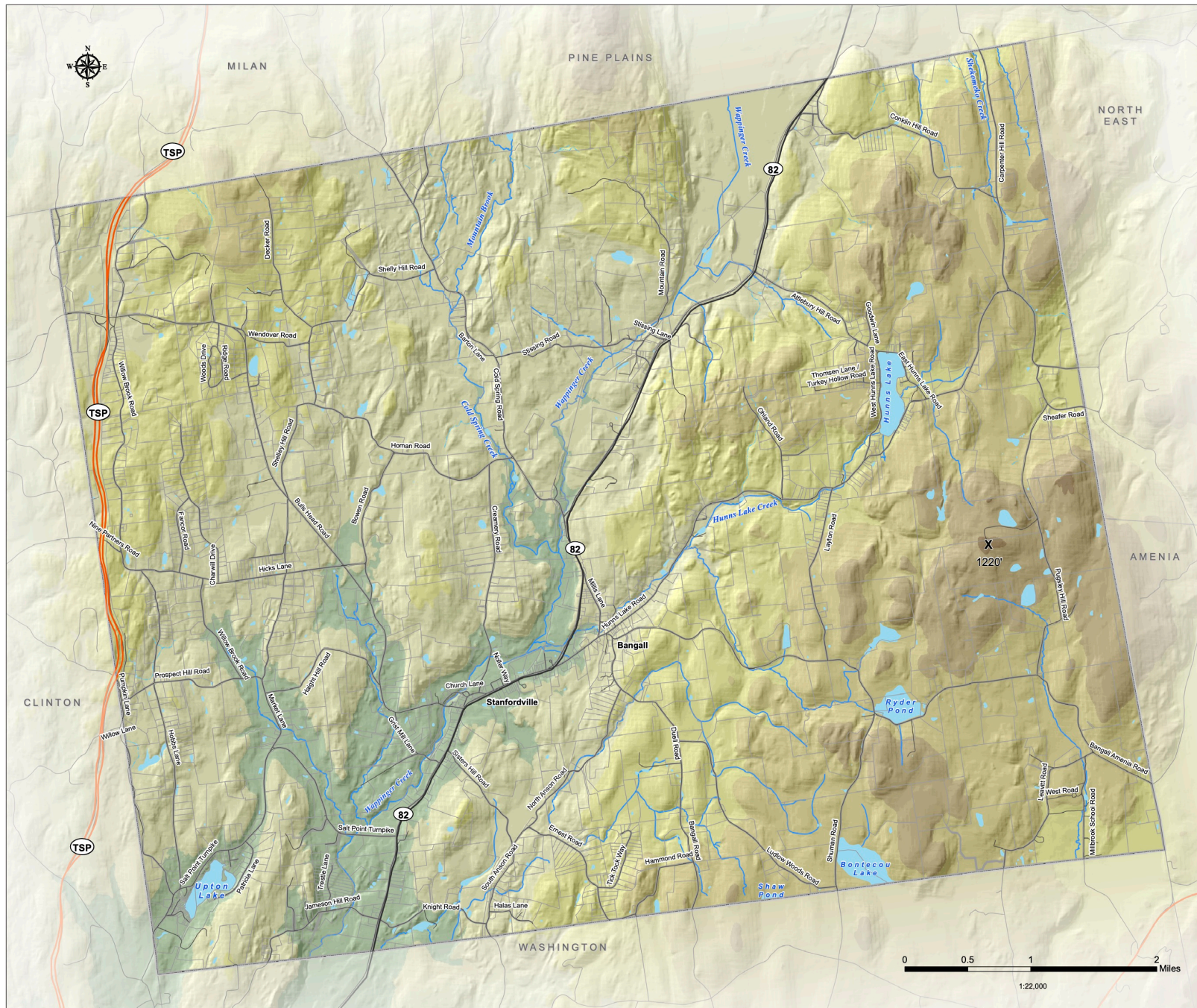


Department of
Environmental
Conservation

Hudson River
Estuary Program



Cornell Cooperative Extension
Dutchess County



Map 3: Topography and Elevation

B. Steep Slopes

Topography also describes the steepness of landscape features like the slopes of hillsides and valleys. Slope is defined by how much land rises in a given horizontal distance, often stated as “rise over run.” Slopes are often expressed in percentages, with the vertical distance gained between two points on the land divided by the horizontal distance between those two points. For example, if you climb 15 feet in elevation while walking 100 feet horizontally, the slope of that path is 15/100, or 15 percent.

Slopes are relevant for human development, the natural world, and all the interactions between the two. Slopes of 15 percent or more are considered to be steep slopes. Steep slopes are often associated with unique and sensitive habitat types and species, but they can cause problems for human development and for natural habitats related to water flows and erosion. Because water flows faster down steeper areas, soil can be eroded leaving bare rock. This makes it difficult to install septic tanks and building foundations. To minimize erosion and hazardous driving conditions, roads traversing steep slopes must be long and winding to achieve a shallower slope, thus taking up more land and disrupting the area more. Runoff from driveways and roads on steep slopes can also cause more runoff onto adjacent roadways, impacting drivers and taxpayers further.

Steep slopes also impact scenic views. Because the land (and trees) drop away faster from the top of a steep slope, views can be expansive, and similarly the high point can be seen from more places in the landscape below. While this can be ideal for recreational areas, buildings on top of steep slopes are highly visible from many areas and can have an outsized impact on the scenery of an area. Because of the scenic impacts and technical difficulties associated with steep slopes, many municipalities have limited building on steep slopes.

Steep slopes are found throughout Stanford, but the steepest are predominantly found in the north central part of the town. Stanford’s 2023 Comprehensive Plan recommends the town consider precluding development on slopes greater than 25 percent (except where disturbance would be minimal) and regulating development on slopes between 15 and 25 percent.²¹ According to the county’s most recent digital elevation model, and as shown on Map 4 (Steep Slopes) and in Table 3, 12.9 percent of the town (4,156 acres) has slopes greater than 25 percent and 20 percent of the town (6,406 acres) has slopes ranging from 15 to 25 percent.

Table 3: Steep Slopes by Area in the Town of Stanford

Slope Range	Acreage	Percent of Town
15 - 20%	4,014	12.5%
20 - 25%	2,392	7.5%
25 - 40%	3,035	9.4%
Over 40%	1,121	3.5%
Total	10,562	32.9%

²¹ *Stanford Comprehensive Plan*, 2023, p. 101.

Interactive online maps showing steep slopes are available at the Dutchess County Environmental Mapper²² and the USGS National Map Viewer.²³

²² Dutchess County Department of Planning and Development. *Dutchess County Natural Resource Inventory Environmental Mapper*, gis.dutchessny.gov/nri

²³ U.S. Geological Survey. *The National Map*, apps.nationalmap.gov/viewer

Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Steep Slopes

-  Stanford Boundary
-  Municipal Boundary
-  Parcel Boundary
-  Taconic State Parkway
-  Major Road
-  Local Road
-  Waterbody
-  Perennial Stream
-  Intermittent Stream

Slope Interval

-  0-15%
-  15-20%
-  20-25%
-  25-40%
-  >40%

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007
Steep Slopes: Dutchess County OCIS, 2022

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

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Map 4: Steep Slopes

C. Bedrock Geology

The solid mass of rock underlying soil is called bedrock, and this geologic foundation affects the soil and everything else above it. Bedrock's physical and chemical characteristics affect how the rock erodes and forms soils, as well as how water and pollutants move underground. The practical implications of bedrock are discussed at the end of this subsection, after some background and geologic history to explain how Stanford's bedrock, shown on Map 5 (Bedrock Geology) came to its current status. The Physical Resources section of the Dutchess County Natural Resource Inventory²⁴ includes more detail on bedrock geology of the region.

There are three main types of bedrock: igneous, sedimentary, and metamorphic. Stanford primarily features the last two. Igneous rocks are formed deep underground when rocks literally melt under pressure and incredible heat. Metamorphic rocks also form under intense heat and pressure but have not melted like igneous rocks. Sedimentary rocks are formed at the surface by sediments that are slowly laid down by erosion and then compressed under the weight of subsequent layers.

Bedrock moves, over millions of years, because of the movement of tectonic plates. When two plates come together, they may push some rocks upwards (often forming mountains) and other rocks deep underground, where they can become igneous or metamorphic. For example, sandstone is a sedimentary rock made up of compressed sand. If sandstone is crushed and heated, it becomes the metamorphic rock quartzite – both are found in Stanford. Bedrock that has stayed put after formation is autochthonous; rocks that have been moved over geologic history are allochthonous.

In Dutchess County, many metamorphic rocks formed during collisions of continental tectonic plates, for example when what is now Europe collided with what is now North America and created the Taconic Mountains. In areas of Dutchess County where sedimentary limestone was crushed between plates, it formed marble. However, this did not happen in Stanford; instead, some areas experienced a mixing of sedimentary and metamorphic rocks, forming what's now the Taconic *mélange* (*mélange* being the French for “a mix”).

Limestone and shale underlie much of the town, with limestone running along Route 82 from Bangall north, as well as sections along the eastern border with Amenia. Both limestone and shale are sedimentary rocks, formed in their current location (i.e. autochthonous) by layers of sediment being laid down and then compressed over time.

Understanding how sediments move in water helps explain how these rocks are formed. Fast flowing water, such as in streams during major floods, is capable of moving larger rocks. Slow the water down a little, and larger rocks drop out of the flow; slower still and gravel settles, then sand. Silt and clay, the finest particles, are moved most easily and flow with even slow-flowing water. This is why the sluggish Hudson River is generally cloudy (or “turbid”) – it's slowly carrying many fine particles of silt and clay towards the sea. When silt finally reaches the sea, it tends to settle on the sea bottom offshore, forming deep beds of fine sediment. Shale is formed from fine clays and silts, and can occur with greywacke, a type of sedimentary sandstone, as well as limestone. The ancient shallow sea that occurred in Stanford helped form the shale bedrock found across much of the town. Limestone,

²⁴ “Physical Resources.” *Dutchess County Natural Resources Inventory*.

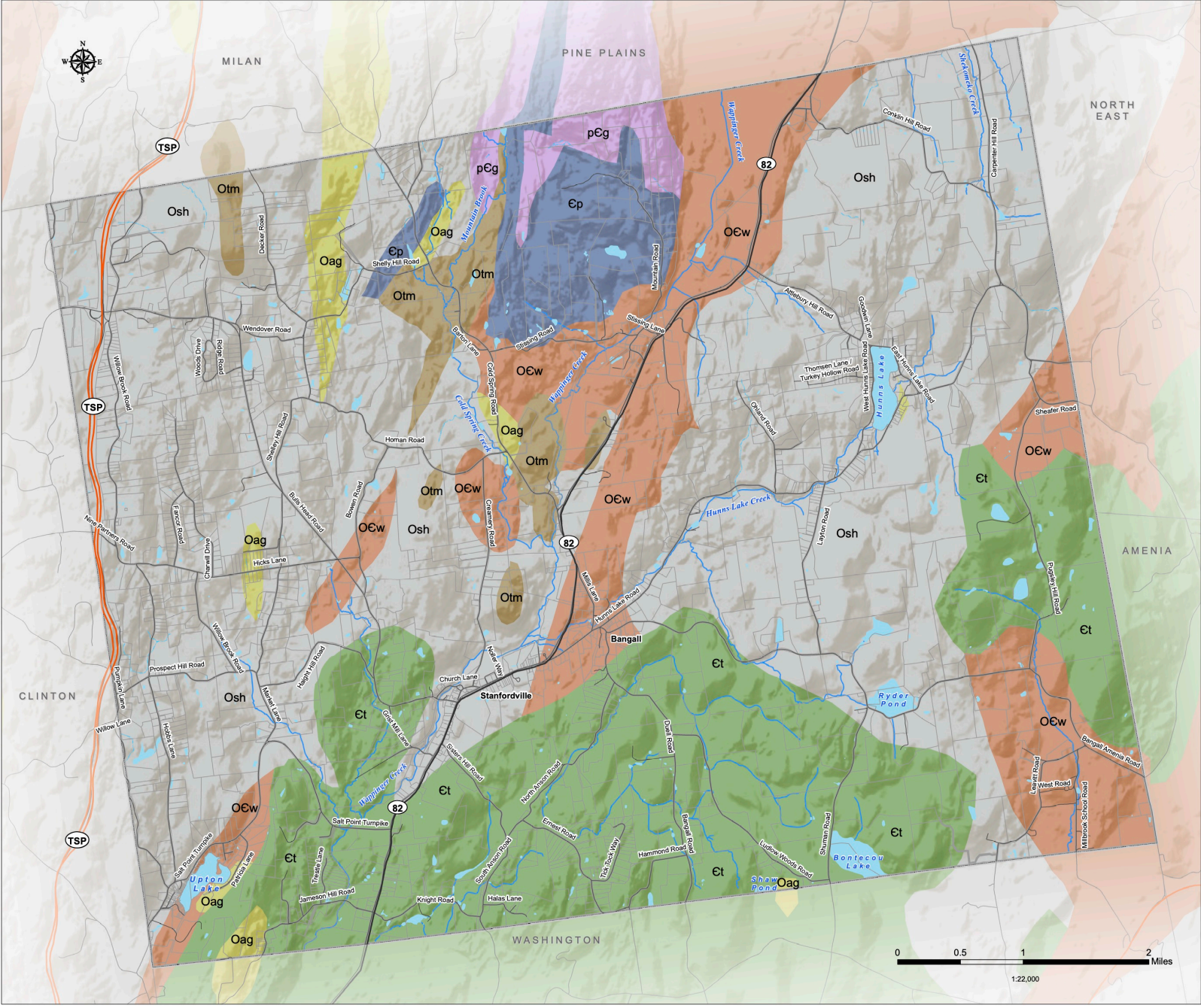
consisting primarily of calcium carbonate from corals and other shelled creatures, also formed when Stanford was covered by an ancient shallow sea.

In contrast to the sedimentary limestones, shales, and sandstones, some of the hardest rocks are metamorphic and occur around Stissing Mountain at the northern border of Stanford. The mountain is composed of quartzite as well as gneiss and granite, all formed by heat and pressure. Stissing Mountain and the shales and limestone around it were all thrust upward during a mountain-building period. But because the Stissing Mountain rocks are harder, they have eroded slower and retained higher elevations compared to the shales and limestones around it in Stanford.²⁵

Bedrock affects life in Stanford today, impacting both water and soils. Groundwater is stored and flows through cavities and cracks in bedrock. Limestone bedrock is easily dissolved by water and tends to have many such cracks and cavities. This allows for good water filtration and flow, creating valuable aquifers and good settings for wells. However, because limestone is so porous, pollutants can also more easily spread and flow through these areas. Shale, on the other hand, has very low permeability and does not provide for good aquifers or wells. Further discussion of aquifers can be found in Chapter 4 (Water Resources). Another quality of limestone is that its carbonate foundation makes it very alkaline – this creates alkaline growing conditions for certain species of plants, creating unique habitats and natural communities. This is discussed further in the Hudsonia Ltd. report *Significant Habitats in the Town of Stanford*.²⁶

²⁵ American Museum of Natural History. “Geological History and Structure.” www.amnh.org/exhibitions/permanent/nys-environment/geological-history

²⁶ Bell, Kristen, Catherine Dickert, Jenny Tollefson, and Gretchen Stevens. *Significant Habitats in the Town of Stanford, Dutchess County, New York*. Hudsonia Ltd., 2005, www.hudsonia.org/maps-reports#Significant-Habitat-Reports



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Bedrock Geology

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream
- Bedrock Formation**
 - Oag Austin Glen Formation (Sedimentary: shale, graywacke)
 - Osh Autochthonous Shale (Sedimentary)
 - OEw Autochthonous Limestone (Sedimentary: carbonate/calcareous)
 - Ep Poughquag Quartzite (Metamorphic: quartzite)
 - pEg Precambrian Granite & Gneiss (Metamorphic: granite and gneiss)
 - Otm Taconic Melange (Sedimentary/Metamorphic: tectonite, melange)
 - Ct Taconic Sequence (Sedimentary/Metamorphic: slate, graywacke, quartzite, and limestone)

DATA SOURCES
Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007
Geology: New York State Museum 1970

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Map 5: Bedrock Geology

D. Surficial Geology

While the bedrock of Stanford can be traced back deep into geologic history, millions and millions of years ago, the town's surficial geology is a product of a much more recent (relatively speaking) event – the glaciation of the last ice age. The mile-deep mass of ice that scraped its way south to what is now Long Island Sound before receding far north again was a major influence on the rocks, sediments, and soils currently on the surface, i.e., the surficial geology of Stanford.

As shown on Map 6 (Surficial Geology), surficial geology in Stanford consists of three types: glacial till, glacial outwash, and sediments. The entire Northeast was scoured by glaciation, and as the ice sheet receded, the valleys and low areas were filled with glacial outwash: sand and gravel that washed out of melting glaciers.²⁷ The valley along Wappinger Creek, along with parts of Hunns Lake Creek and Cold Spring Creek, are among the places in Stanford that contain these glacial outwash deposits.

Glacial outwash deposits are valuable as filtration and storage areas for groundwater, and are also valuable for sand and gravel mining, an economically important industry for Dutchess County.²⁸

Additionally, the generally flat areas of glacial outwash deposits can be valuable for farmland and development. These last two uses are potentially at odds with the importance of glacial outwash for groundwater, because pollution such as septic, automotive, and farm run-off can easily infiltrate water supplies.

Much of the rest of Stanford has glacial till – material pushed ahead of glaciers as they advanced. While glacial outwash only has medium-sized particles of gravel and sand (see discussion of particles in moving water in the Bedrock Geology section), glacial till has a jumble of particles of all sizes. This is because in addition to sand and gravel, the immense hardness and weight of the glaciers was capable of breaking off large rocks and boulders from rocky outcrops and depositing this debris at the front of the glacier in valleys, along with silt.

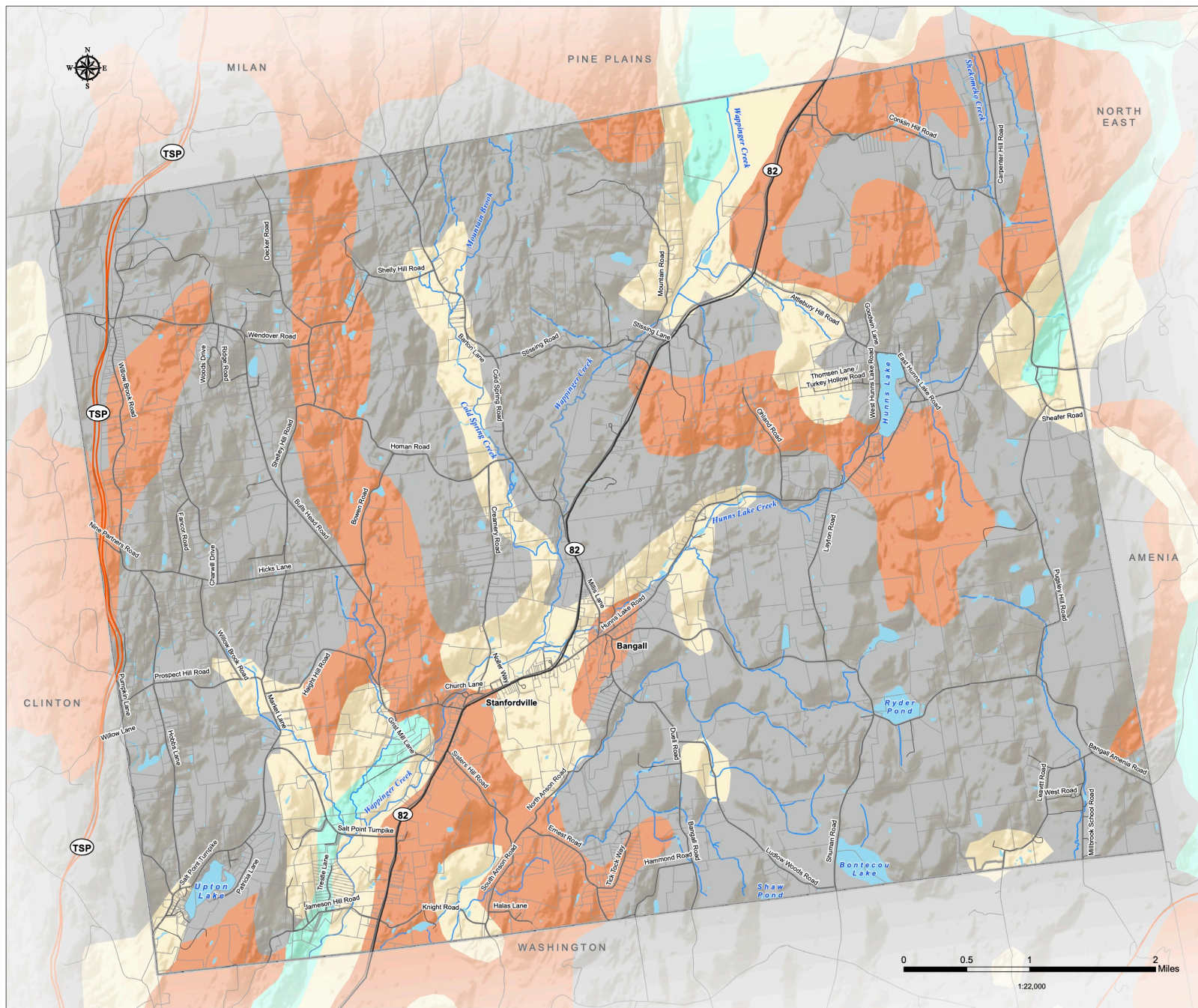
Areas of thin glacial till deposits occur in limited bands across town, but a majority (62 percent) of the town has thick glacial till. Where glacial till is thick and drainage is good, the surficial geology can be suitable for farming.²⁹ Many areas of Dutchess County have glacial till with high amounts of clay, which reduces drainage and can be problematic for both groundwater wells and septic systems, but the soil type “Dutchess Cardigan Complex” is predominant in Stanford and provides deep, well-drained till.

The final type of surface deposits found in Stanford are lake and stream sediments. Unlike the above glacial artifacts, these sediments are from more modern processes. In the case of stream sediments, rain causes eroded soil particles to run into streams. In areas where the streams slow down, sediments are deposited, resulting in sedimentation in stream beds, as seen along Wappinger Creek in the southwest corner of Stanford. Lake sediments are the result of the accumulation of fine sediments and partially decomposed plant material which settle on the bottom of the town's lakes and ponds.

²⁷ “Physical Resources.” *Dutchess County Natural Resources Inventory*.

²⁸ Ibid.

²⁹ *Stanford Comprehensive Plan*, 2023, p. 54.



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Surficial Geology

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

Surficial Material

- Thin glacial till over bedrock
- Thick glacial till over bedrock
- Glacial Outwash (water laid sand, gravel, and silt or clay)
- Stream Sediments

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
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Map 6: Surficial Geology

E. Soils

Soils are vital for sustaining life. Different soil types influence what plants occur in an area, which in turn influence what habitats and wildlife occur in an area, as well as what agricultural or forest products an area can produce. Soil properties significantly influence many factors important to human life and habitat quality, such as water flows that can cause flooding and erosion, carbon storage that is critical to mitigating the levels of carbon dioxide in the atmosphere currently causing rapid climate change, and drinking water quality for both humans and wildlife.

Soils have a number of different characteristics, discussed below. The USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, available online,³⁰ allows users to identify an “Area of Interest” (AOI) on an interactive map and then view the layout of soils by characteristic within that AOI. Each soil characteristic is shown as a layer of data, and users can toggle through these data layers to explore the soil characteristics for their area.

Depth to bedrock is an indication of how much glacial till and soils may be layered on top of the bedrock for an area. Shallow soils (<20 inches to bedrock) are often found on and around steep slopes because the soil more easily erodes away from such areas more quickly. Depth to bedrock influences how easily septic water and pollutants seep into the water table, as well as how easily it is to grade (flatten) an area for building roads and buildings without having to blast or chip through bedrock.

Soil drainage class indicates how easily water can drain through the soil, which influences where wetlands tend to form. Areas with finer soil particle sizes like clay and silt will retain more water at the surface and are more likely to form wetlands; larger particles like sand and gravel allow water to permeate the ground faster and are therefore better drained. “Somewhat poorly drained” soils are indications of possible wetland areas; poorly and very poorly drained soils are indicators of probable wetlands.³¹

Hydric soils, often called wetland soils, form when soils are under water (such as in a pond) for long enough that they lack oxygen, which slows decomposition. Hydric soils tend to form very fine silt and are therefore poorly drained.

Hydrologic soil group (HSG) are rated A through D, reflecting both particle size and the potential for water to run along the soil surface (“run-off”) instead of infiltrating the soil. HSG A soils are least likely to cause run-off due to larger particle size like sand; HSG B soils are a mix of sand and silt; HSG C soils are mostly silt; and HSG D soils are mostly clay or occur in areas with the water table near the surface.

Soil reaction expresses how alkaline or acidic the soil is on the pH scale. This greatly affects what plants may grow in the soil. In natural areas, specialized plants occur in both highly acidic places like bogs and highly alkaline habitats like calcareous wet meadows and fens. Alkaline habitats and

³⁰ U.S. Department of Agriculture, Natural Resources Conservation Service. *Web Soil Survey*. U.S. Department of Agriculture, websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

³¹ Kiviat, Eric, and Gretchen Stevens. *Biodiversity Assessment Manual for the Hudson River Estuary Corridor*. Hudsonia Ltd. and New York State Department of Environmental Conservation, 2001, pp.56, 73, www.hudsonia.org/conservationplanningmaterials

soils are often called “calcareous” in reference to high levels of calcium carbonate, also known as chalk or lime. Soil reactions can also affect which crops grow in a certain soil, and farmers sometimes add lime to soil to achieve a less acidic soil balance.

Farmland classification^{32,33} identifies the areas best suited to farming. Prime farmland is defined by the U.S. Department of Agriculture (USDA) as the land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. In New York, there are also Prime If Drained soils and soils of Statewide Importance, with the last category being established by the NYS Department of Agriculture and Markets. Soils of Statewide Importance are valuable for agriculture and often have characteristics that are similar to Prime Soils, but they are limited by factors such as slope or erodibility. Prime If Drained soils are those that would otherwise meet the criteria as Prime soils, but where the water table is very high and the land cannot be farmed without draining it first. As shown on Map 18 (Agricultural Resources), in Stanford, approximately 12% of the town is Prime soil, about 4% Prime If Drained, and about 35% soils of Statewide Importance. For further information, see the Agricultural Resources section of Chapter 6 (Land Use).

³² U.S. Department of Agriculture, Natural Resources Conservation Service. “Prime and Important Farmlands in New York.” *Field Office Technical Guide*, 2018, efotg.sc.egov.usda.gov/references/public/NY/Farmland_Class_NY_Information_si.pdf

³³ “7 CFR § 657.5 - Identification of Important Farmlands.” *Electronic Code of Federal Regulations*, U.S. Government Publishing Office, www.ecfr.gov/current/title-7/part-657/section-657.5

Chapter 4: Water Resources

A. Introduction

This Water Resources chapter presents an overview of local water components (surface waters, groundwater, and wetlands), water use, water quality, and flooding. The goal is to provide a foundational understanding of the town's water resources to support informed planning and conservation.

To gain a deeper understanding of the concepts and data presented here, readers are encouraged to consult the Dutchess County Natural Resources Inventory, particularly the Water Resources section.³⁴ This county-level document offers broader scientific context, detailed background, and technical explanations that complement the local information. For example, the Dutchess County NRI includes:

- **Hydrologic Cycle and Watershed Dynamics:** Detailed explanations of the hydrologic cycle and how watersheds function, including the movement of water through the atmosphere, surface streams, lakes, and aquifers.
- **Groundwater and Aquifers:** In-depth discussions on groundwater recharge, aquifer characteristics, and the role of groundwater in the hydrologic cycle.
- **Water Quality and Pollution:** Comprehensive information on water quality issues, including the impact of pollutants.
- **Land Use Impacts:** Analysis of how land-cover changes, such as the conversion of vegetated areas to impervious surfaces, affect water infiltration, runoff, and overall watershed health.

By reading the two documents together, readers can place Stanford's water resources within the larger hydrological and ecological context of Dutchess County and beyond and better understand both local and regional water-related challenges and opportunities.

B. Components of Water Resources

1. Surface Water

Streams and lakes are probably the most familiar type of water resource for most people, and it is useful to recognize that these are both embedded in their watersheds. A watershed is defined as the area that contributes water to a specific point in a stream or an individual lake and is almost always defined as the drainage area delimited by a ridge line such that a drop of rain falling on the inside of the ridgeline eventually reaches the stream or lake. Watersheds are nested in that small watersheds contribute to larger watersheds as streams join together to form larger and larger rivers. Watersheds are a useful concept not just to understand how water moves from precipitation to the sea, but also because anything that happens in a watershed, whether a natural disturbance such as fire or human

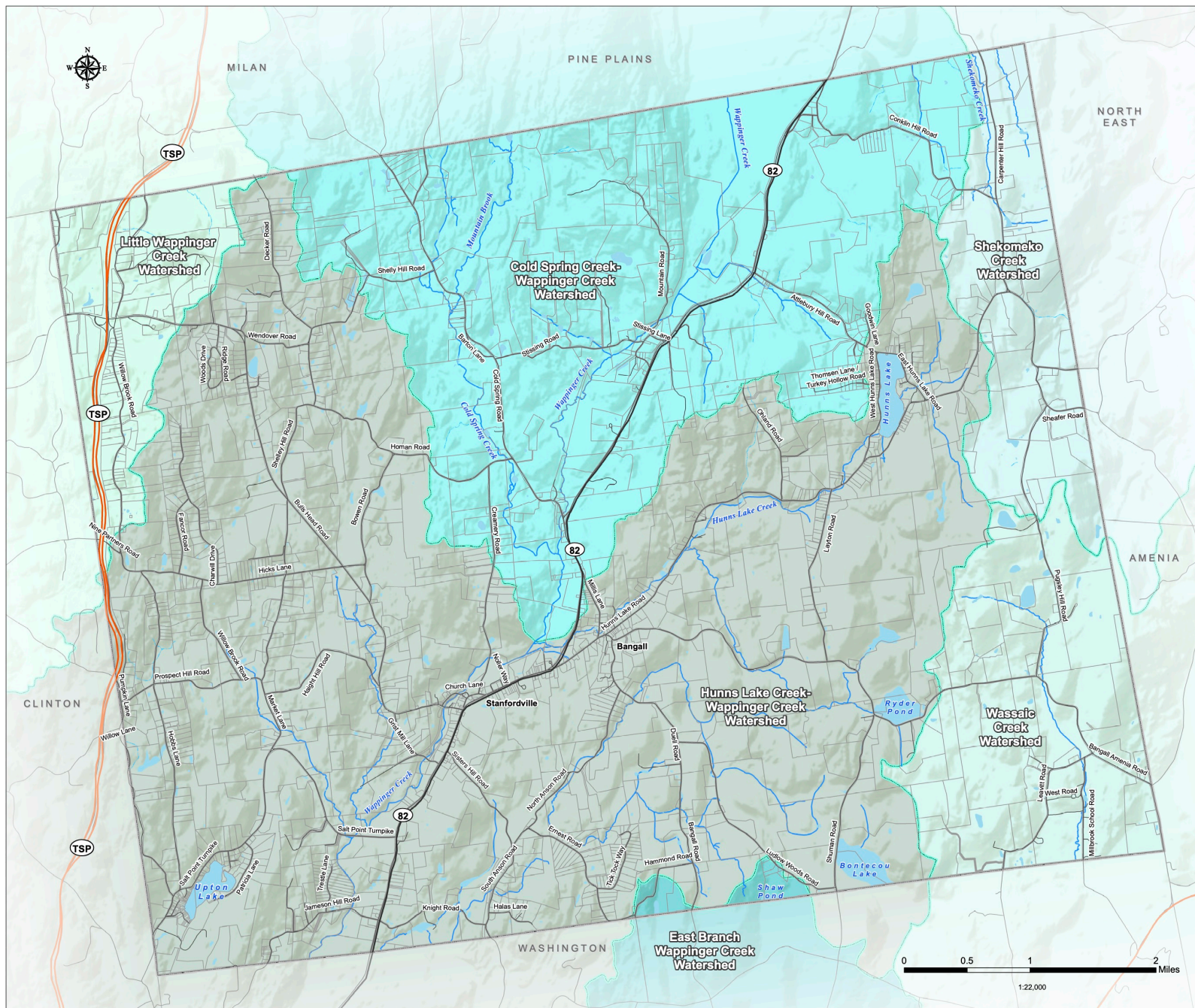
³⁴ Dutchess County Department of Planning and Development. "Water Resources." *Dutchess County Natural Resources Inventory*, nri.dutchessenvironment.com/water-resources/#toggle2

activities, will have some effect or signal farther down the flowpath. Lakes and ponds also have watersheds and, in most cases, the nature of the water in a lake will be affected by the nature of water delivered by recognizable streams and also by water moving below ground from the lakeshore and associated housing directly into the lake.

As shown on Map 7 (Streams and Watersheds), the major watershed in the Town of Stanford is the Wappinger Creek, which originates at the base of Stissing Mountain and flows southwest before the stream crosses into the Town of Washington. Cold Spring Creek and Hunns Lake Creek are major tributaries to the Wappinger Creek within town boundaries. This upper portion of the Wappinger Creek watershed covers approximately 80 percent of the Town of Stanford, spanning the northeast to southwest of the town. Other watersheds in Stanford include those of Shekomeko Creek, a tributary of the Roeliff Jansen Kill beginning near the eastern border of town, and a tributary of Wassaic Creek, which drains the southeast corner of Stanford. There are several sizable lakes in the town (Hunns Lake, Upton Lake and Bontecou Lake).

2. Groundwater

The area around the Wappinger Creek is a primary recharge area for the underlying aquifer and provides a reliable source of groundwater. This unconfined aquifer (i.e., does not have an overlying cap of rock) underlies the valley of the Wappinger Creek from Pine Plains to the Hudson River. See Drinking Water below.



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Streams & Watersheds

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream
- Watershed Boundary (HUC-12)

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
 Watersheds: National Hydrography Dataset, 2012

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents.
 No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Map 7: Streams and Watersheds

3. Wetlands

Wetlands are now recognized as valuable natural resources providing numerous benefits and human uses. They are habitat for a diversity of wildlife, remove pollutants such as nitrogen from surface water and can be important areas for storage of floodwaters.

Wetlands comprise approximately 11% of the town. A detailed description of the town's wetlands is contained in Significant Habitats in the Town of Stanford, a report prepared by Hudsonia in 2005.³⁵ The extent and recent change in wetland coverage is described in a 2024 update.³⁶ (Appendix 1). The habitat value of these wetlands is covered in Chapter 5 (Habitats and Wildlife).

a. Wetlands Map

Map 8 (Wetlands) presents the best available information about wetlands in Stanford. It is common for maps to have limitations or inaccuracies, particularly when it comes to complex and dynamic natural ecosystems such as wetlands. It is important to recognize these limitations when using maps for decision-making purposes and to supplement them with additional data and information whenever possible. Note that habitat boundaries can change over time and there is no substitute for site visits and on-the-ground field observations.

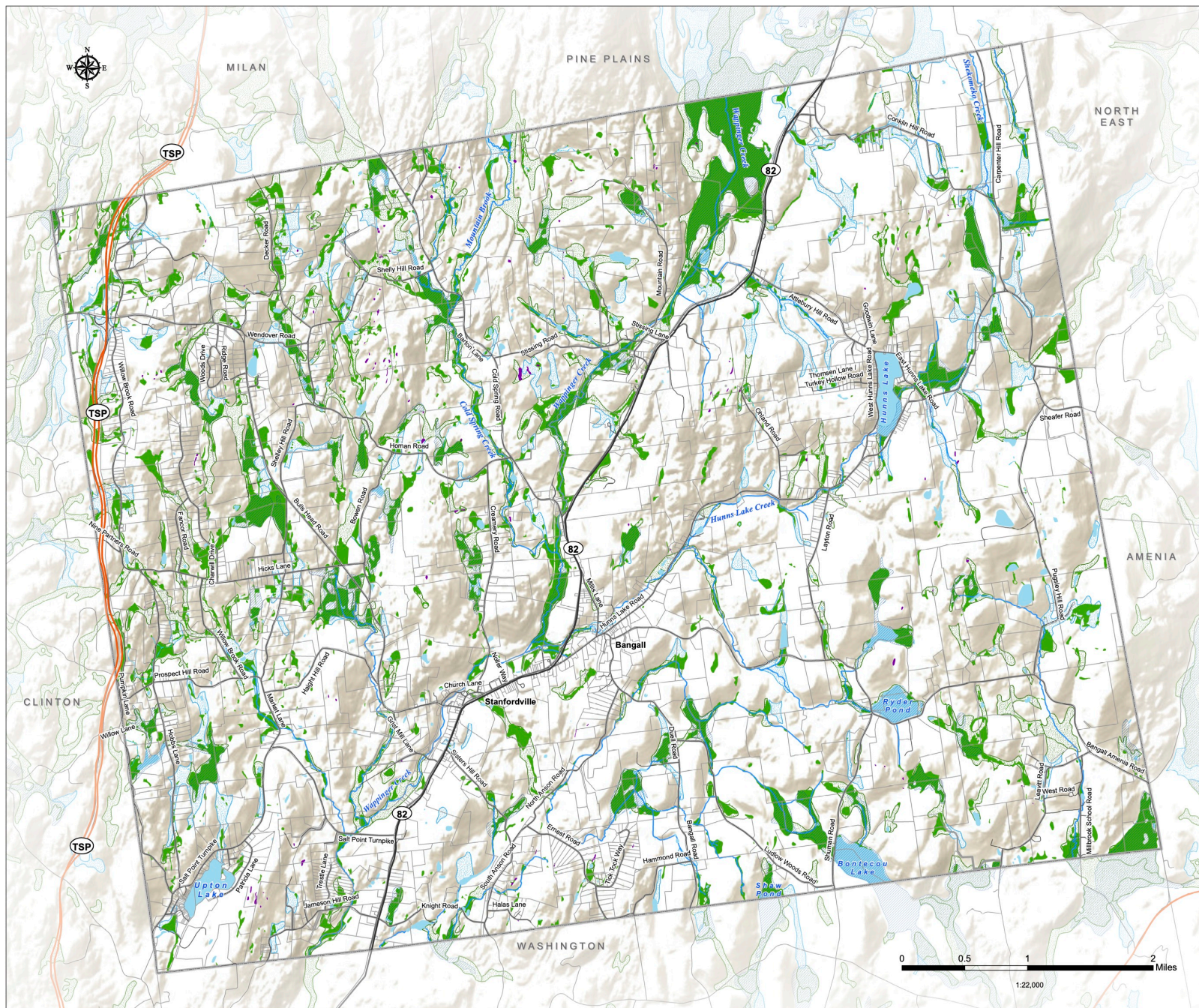
Map 8 can be used for predicting the location of potential wetlands. The individual layers included on the map are described below:

- Known Vernal Pools identified in the Significant Habitats Report are represented in solid purple. Vernal pools are essential breeding habitats for amphibians. Approximately 125 vernal pools have been mapped by Hudsonia in the town.
- Previously Mapped DEC Freshwater Wetlands – This layer, shown with hashed blue lines, depicts the former extent of NYSDEC Regulatory Freshwater Wetlands under pre-2022 state law. (See Wetland Protection below for updates on DEC wetland jurisdiction.) New York State's *former* jurisdictional wetland maps underestimate wetland areas and omit smaller and drier wetlands, not accurately reflecting the full extent of wetland habitats. In particular, vernal pools, wet meadows, and swamps are often under-represented on maps.
- Wetland (Hudsonia) - The bright green layer combines the fourteen wetland habitat types identified in the Significant Habitats Report. The study concluded that wetlands make up approximately 11% of the town. For more detailed information about each of these habitat types and the species that depend on them, refer to Chapter 5 (Habitats and Wildlife).
- Probable Wetland Areas & Possible Wetland Areas – “Probable wetlands” are those classified in the USDA Natural Resources Conservation Service soil survey as very poorly drained or poorly drained, and “possible wetlands” are those classified as somewhat poorly drained soils. Soil drainage classes are the most reliable predictors of wetlands. See *Soils* in

³⁵ Bell, Kristen, Catherine Dickert, Jenny Tollefson, and Gretchen Stevens. *Significant Habitats in the Town of Stanford, Dutchess County, New York*. Hudsonia Ltd., 2005, www.hudsonia.org/maps-reports#Significant-Habitat-Reports

³⁶ Bevan Zientek, Amanda, Chris Graham, and Lea Stickle. *Significant Habitats in the Town of Stanford, Dutchess County, New York*. Hudsonia Ltd., 2024. Update of 2005 report by Kristen Bell, Catherine Dickert, Jenny Tollefson, and Gretchen Stevens.

Chapter 3 (Physical Setting) for further discussion about soil property and the NRCS soil survey.



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Wetlands

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream
- Known Vernal Pool
- Previously Mapped DEC Freshwater Wetlands
- Wetland (Hudonia)
- Probable wetland area
- Possible wetland area

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Vernal Pools, Streams & Waterbodies: Hudonia, Ltd. 2007
Wetlands: NYSDEC Regulatory Freshwater Wetlands, 2002 & Hudonia, Ltd. 2007
Probable & Possible Wetlands: USDA Soil Conservation Service 1979

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents. No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Cornell Cooperative Extension
Dutchess County

Map 8: Wetlands

b. Wetlands Protection

Wetlands are protected by various federal, state, county and town laws:

Federal Law. Federal wetlands protection is primarily governed by Section 404 of the Clean Water Act,³⁷ administered by the U.S. Army Corps of Engineers with oversight from the Environmental Protection Agency. It regulates the discharge of fill or dredged material into wetlands that have a continuous surface-water connection to navigable waters or their tributaries.

State Law. Wetlands protection is provided by the Freshwater Wetlands Act (Environmental Conservation Law, Article 24). In 2022, New York State enacted significant amendments to the Freshwater Wetlands Act, aiming to enhance the protection of wetlands across the state. These changes are being implemented in phases, with key provisions taking effect in 2025 and 2028.³⁸

Before the 2022 amendments, the Freshwater Wetlands Act regulated only mapped wetlands shown on official NYSDEC Freshwater Wetlands Maps. It applied primarily to wetlands 12.4 acres or larger. The map-based system meant many wetlands—especially smaller or unmapped ones—were not protected, even if ecologically valuable. NYSDEC had to go through a lengthy administrative process to add new wetlands to its maps before regulating them.

Effective January 1, 2025, NYSDEC no longer limits regulatory protections to wetlands depicted on its Freshwater Wetlands Maps (now referred to as Previously Mapped Freshwater Wetlands). Instead, any wetland meeting the state's definition and jurisdictional criteria will be subject to regulation, regardless of its presence on existing maps. Smaller wetlands, previously unregulated due to size, will now be protected if they meet at least one of eleven newly established criteria indicating unusual importance. These criteria include factors such as:

- Providing habitat for rare or endangered species
- Serving as critical flood mitigation areas
- Being located in urban or flood-prone regions
- Playing a significant role in maintaining water quality
- Functioning as vernal pools essential for amphibian life cycles.

Effective January 1, 2028, the default size threshold for state-regulated wetlands will decrease from 12.4 acres to 7.4 acres. This change will extend protections to numerous smaller wetlands that were previously unregulated due to size constraints.

NYSDEC is replacing official regulatory maps with informational maps accessible through tools like the Environmental Resource Mapper.³⁹ These maps will serve as guidance, but landowners and developers must request formal jurisdictional determinations from NYSDEC to ascertain regulatory

³⁷ 33 U.S.C. § 1344

³⁸ New York State Department of Environmental Conservation. “Freshwater Wetlands Program.” dec.ny.gov/nature/waterbodies/wetlands/freshwater-wetlands-program

³⁹ New York State Department of Environmental Conservation. “Environmental Resource Mapper.” dec.ny.gov/nature/animals-fish-plants/biodiversity-species-conservation/biodiversity-mapping/environmental-resource-mapper

status.⁴⁰

The amendments to New York's Freshwater Wetlands Act represent a significant shift in the state's approach to wetland conservation, emphasizing ecological protection and climate adaptability. While the enhanced regulations aim to safeguard vital natural resources, they also introduce new considerations for land use planning and development. Stakeholders are encouraged to engage with NYSDEC and consult the updated informational resources to navigate the evolving regulatory landscape.

County Law. A new layer of protection for wetlands and groundwater in Dutchess County was established in 2024 with the adoption of Local Law 2 of 2024 (Aquifer Law), which prohibits certain contamination sources—such as dry-cleaning establishments, petroleum storage tanks, car washes, and others—within specified separation distances to public water supply wells, wetlands, and aquifers. This law will be implemented and enforced by the Dutchess County Department of Health upon the finalization of regulations (expected early 2026).⁴¹ It adds an important local safeguard beyond state and federal protections.

Town Law. Stanford has a Freshwater Wetlands Law, adopted in 1976, under which the town assumes local jurisdiction over state-designated freshwater wetlands.⁴² As written, the ordinance applies only to wetlands shown on the NYSDEC Freshwater Wetlands Maps and 100-foot buffers around them. This may limit its scope under the updated 2022 state law, which now regulates many unmapped or smaller wetlands. Unless the ordinance is updated, the town might not have regulation authority over these additional wetlands.

C. Aquifers and Drinking Water

All drinking water for town residents comes from individual wells, mostly privately owned. Water supplies are adequate for the relatively low population density. Lack of a municipal or utility-owned water supply system means any problems fall on the individual well owner even if the source of contamination is elsewhere.

There are no wastewater treatment or known pollutant discharges in the town. Residences and businesses rely on individual septic systems which have been adequate at low population density. However, septic systems in some higher density settings (for instance, Upton Lake and the hamlets of Stanfordville and Bangall) may be contributing to water quality problems. This has been indicated in assessments of waterbodies by NYSDEC. See Surface Water Quality below. It was also reported in a Groundwater Resources Study done by the town in 2000. The study tested the water of 48 private

⁴⁰ New York State Department of Environmental Conservation. “Freshwater Wetland Jurisdictional Determination.” dec.ny.gov/nature/waterbodies/wetlands/freshwater-wetlands-program/freshwater-wetland-jurisdictional-determination

⁴¹ Dutchess County Department of Health, *Local Law No. 2 of 2024 (Aquifer Law)*, www.dutchessny.gov/Departments/DBCH/Aquifer-Drinking-Supply-Protection-Law.htm

⁴² Town of Stanford. *Code of the Town of Stanford, Dutchess County, NY. Part II: General Legislation, Chapter 103: Freshwater Wetlands*. eCode360, ecode360.com/12907805-12907805

wells.⁴³ Approximately 10% of wells sampled for the study had elevated levels of either bacteria or nitrate, with one well showing chloride above the 250 mg/L secondary standard. In 2025, Stanford launched an effort to reassess the condition of the town's private wells.

As shown on Map 9 (Drinking Water Resources), in the central portions of the town stretching along the Wappinger Creek/Route 82 corridor, wells (including in Stanfordville and Bangall) are supplied from a sand and gravel unconfined aquifer, while other parts of the town rely on wells penetrating bedrock. The aquifers are protected by the 2024 county Aquifer Law discussed in the Wetlands Protection section above.

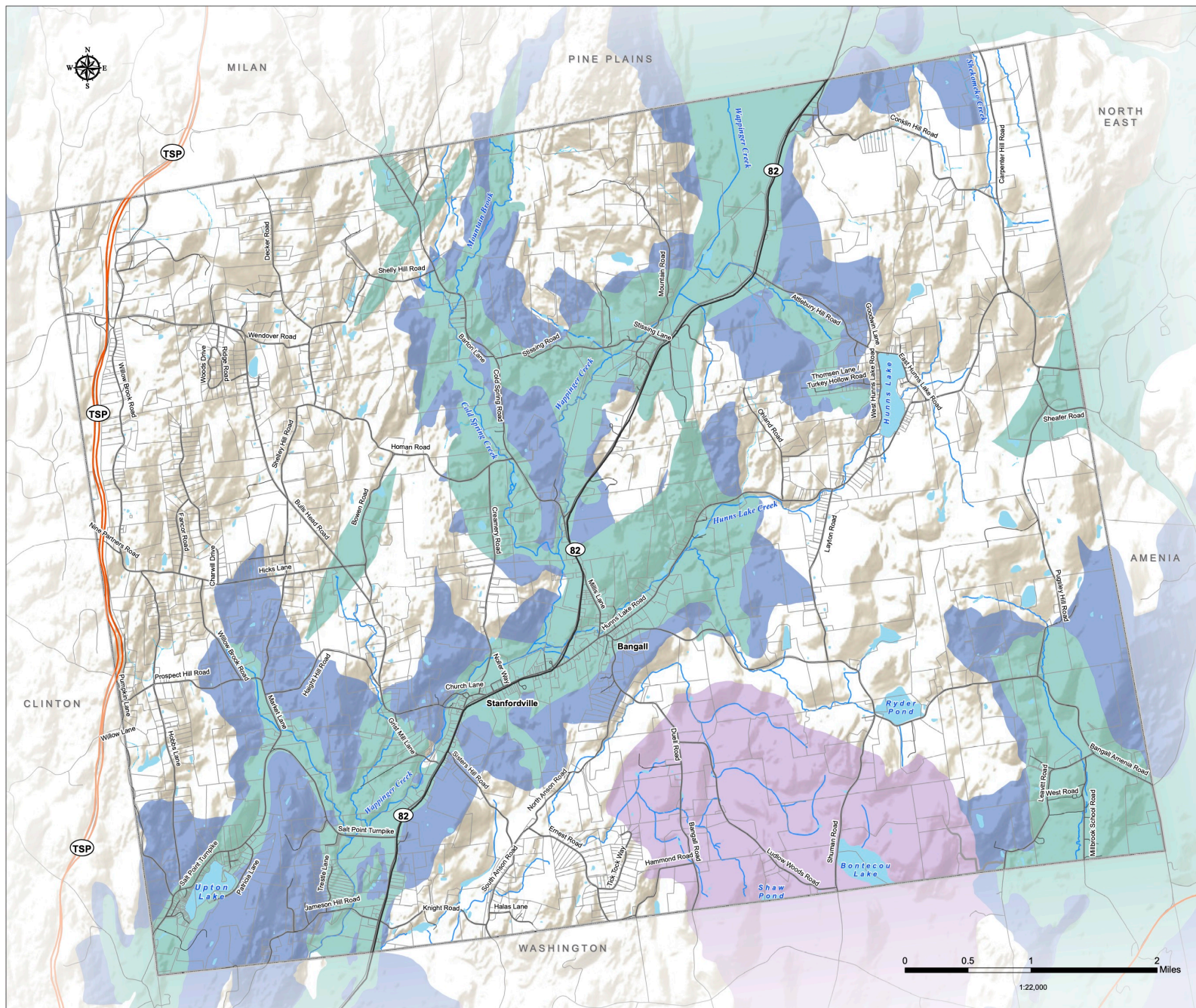
Shown on Map 9 are aquifer recharge areas, which are taken from a 1992 Dutchess County-funded aquifer protection program that mapped the town's aquifer recharge areas, as follows:⁴⁴

- 1-Primary Recharge – permeable deposits, directly overlying aquifer.
- 2-Secondary Recharge – less permeable deposits, up gradient from the Primary Recharge area aquifers, contributing to recharge through infiltration and groundwater flow.
- 3-Tertiary Recharge – contributing area around streams that will subsequently seep into aquifer through infiltration.

The importance of these areas to planning objectives in Stanford relate to levels of proposed future groundwater use. If significant development is to be proposed in the Primary Recharge areas, then land use protection measures are particularly appropriate to manage their use and protect their quality.

⁴³ Horsley & Witten, Inc. *Groundwater Resources Study Final Report, Town of Stanford, New York*. Prepared for the Town of Stanford, New York, and the Dutchess County Water & Wastewater Authority, 2000. This report is discussed and excerpted in the town's Water Supply Protection Plan (Town of Stanford Groundwater Resources Committee. *Water Supply Protection Plan*. 2000). Both documents are discussed in the town's 2023 Comprehensive Plan (*Stanford Comprehensive Plan*. Town of Stanford, Dec. 2023, pp. 114-16) and are available upon request made to the Stanford Conservation Advisory Commission.

⁴⁴ Horsley & Witten Hegemann, Inc. "Task 1 – Delineation of Aquifer Protection Areas." *Water Supply Protection Program for Dutchess County, New York*. Prepared for the Dutchess County Water & Wastewater Authority, 1992, pp. 1-2 to 1-3. This document is available upon request made to the Stanford Conservation Advisory Commission.



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Drinking Water Resources

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

Aquifer Recharge Areas

- 1- Primary Recharge— permeable deposits, directly overlying aquifer
- 2- Secondary Recharge— less permeable deposits, up gradient from aquifer, contributes to recharge through infiltration and groundwater flow
- 3- Tertiary Recharge - contributing area around streams that will subsequently seep into aquifer through infiltration

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007
Aquifer Recharge Areas: Water Supply Protection Program for Dutchess County, 1992

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

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Map 9: Drinking Water Resources

D. Surface Water Quality

Surface water quality is measured in several different ways by NYSDEC, USEPA and local health departments. In some instances, there are numerical standards that define a limit on what is considered safe drinking water (nitrate and bacteria, for instance, in the Groundwater Resources Study discussed above). USEPA and NYSDEC apply a different approach, assessing whether a particular water body is meeting its best use for fishing, recreation, etc.

Map 10 (Water Quality Classifications) shows the water quality classification of streams in Stanford under the NYSDEC Protection of Waters Program.⁴⁵ Under this Program, NYSDEC formulates and enforces regulations to preserve and protect the state’s surface water resources. Regulatory decisions are based on a letter-based classification system, which assigns each waterbody a *class* and, where applicable, a *standard* designation. These designations reflect the best intended use of the waterbody—such as drinking, recreation, or aquatic life support—and determine what activities may be permitted.

The water quality classifications are:

- Class AA and A – Suitable for drinking water supply, primary and secondary contact recreation (e.g., swimming and boating), and fishing. There are no streams with this classification in Stanford.
- Class B – Suitable for primary and secondary contact recreation and fishing. (59.6 miles of streams in Stanford have this classification.)
- Class C – Suitable for fishing and fish propagation. (47.7 miles in Stanford.)
- Class D – Suitable for fishing. (1.3 miles in Stanford.)

Additionally, waterbodies may carry a (T) designation (16.9 miles in Stanford), indicating the water supports trout populations, or (TS) (39.5 miles in Stanford), indicating it supports trout spawning. Streams classified AA, A, B, and C(T) or C(TS) are considered *protected streams* under Article 15 of the Environmental Conservation Law, and physical disturbances to these streams may require a NYSDEC Protection of Waters Permit.

Waterbodies known, or suspected, of being “impaired” are put on a NYSDEC Priority Waterbody List (PWL)⁴⁶ and may need outside assistance and funding to correct a problem. At present there are no confirmed impairments in the town, although Hunns Lake and Upton Lake may be showing excessive plant growth due to high nutrient loads. (Hunns Lake and Upton Lake’s PWL factsheets indicate they are currently unassessed,^{47,48} but prior factsheets indicated suspected but unverified

⁴⁵ New York State Department of Environmental Conservation. “Protection of Waters Program.” *New York State Department of Environmental Conservation*, <https://www.dec.ny.gov/permits/6042.html>

⁴⁶ New York State Department of Environmental Conservation. “Water Quality Assessment.” *New York State Department of Environmental Conservation*, <https://dec.ny.gov/nature/waterbodies/watersheds/management/assessment>

⁴⁷ New York State Department of Environmental Conservation. “Ryder Pond, Hunns Lake, Segment ID 1305-0004, Waterbody Segment Assessment Factsheet.” Mar. 2025, extapps.dec.ny.gov/data/WQP/PWL/1305-0004.html

⁴⁸ New York State Department of Environmental Conservation. “Upton Lake, Segment ID 1305-0005, Waterbody Segment Assessment Factsheet.” Mar. 2025, extapps.dec.ny.gov/data/WQP/PWL/1305-0005.html

algal/weed growth due to septic systems.⁴⁹⁾ Portions of the Wassaic⁵⁰ and Wappinger^{51,52,53} creeks may be showing stress due to pH outside what is considered a normal range.

Aside from contaminants measured by NYSDEC and other agencies, it is clear that lead in drinking water is a serious problem, particularly for children. While large water suppliers can act to minimize the likelihood of water causing lead to leach from supply lines, individual well owners are advised to test their own water at the tap. Additionally, it is established that some wells in parts of Dutchess County with higher population density may contain sodium and/or chloride derived from road salt in concentrations exceeding some health guidelines.⁵⁴ Compounds known as “Forever Chemicals” have received a lot of attention lately due to their widespread detection and known harmful properties. New standards will apply to public water supplies but not to private wells.

⁴⁹ Copies of the prior factsheets are available from the Stanford Conservation Advisory Commission.

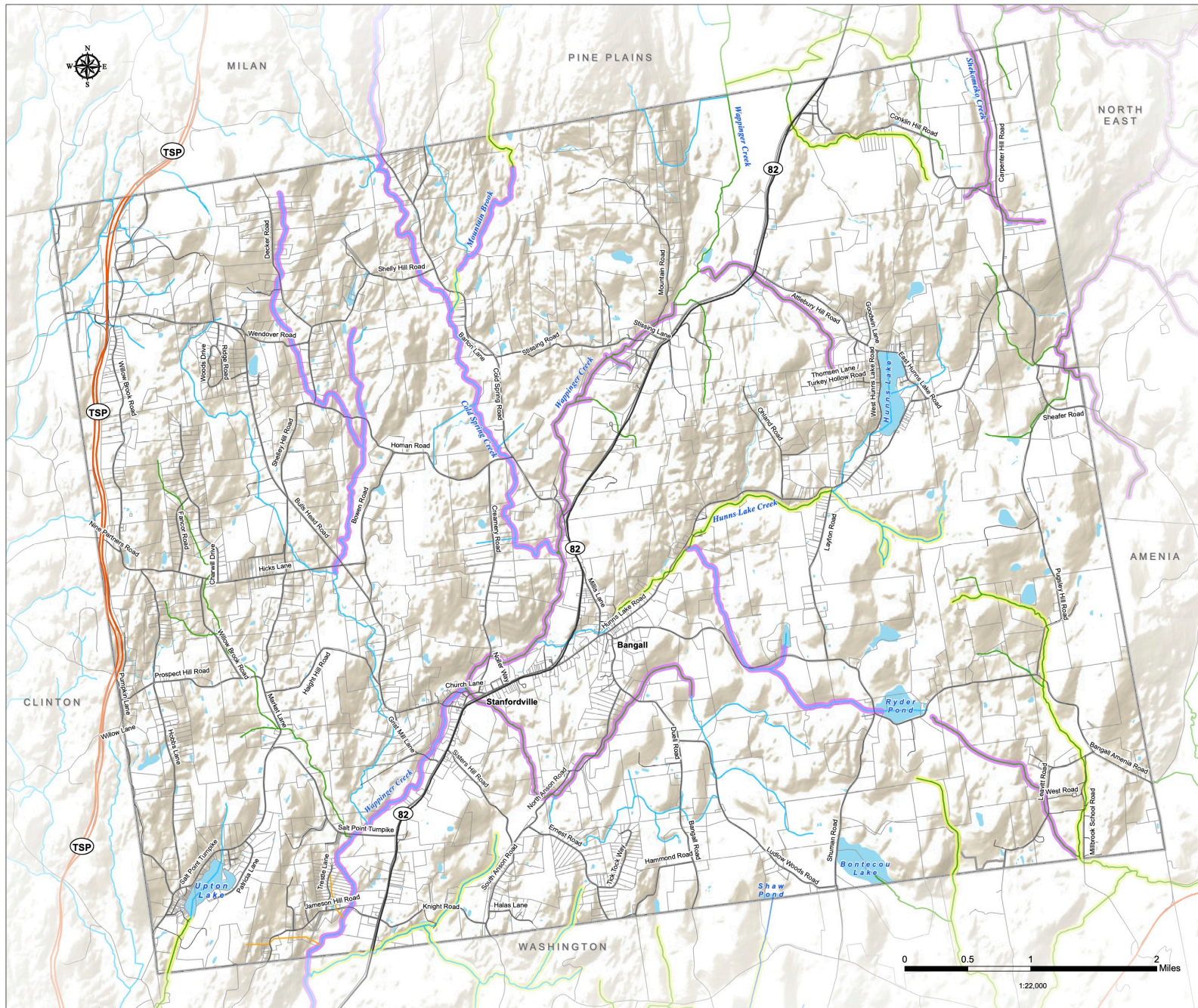
⁵⁰ New York State Department of Environmental Conservation. “Wassaic Creek and Tribs, Segment ID 1601-0024, Waterbody Segment Assessment Factsheet.” Mar. 2025, extapps.dec.ny.gov/data/WQP/PWL/1601-0024.html

⁵¹ New York State Department of Environmental Conservation. “Little Wappingers Cr, Upper and Tribs, Segment ID 1305-0020, Waterbody Segment Assessment Factsheet.” Mar. 2025, <https://extapps.dec.ny.gov/data/WQP/PWL/1305-0020.html>

⁵² New York State Department of Environmental Conservation. “Wappinger Cr, Middle, and Minor Tribs, Segment ID 1305-0014, Waterbody Segment Assessment Factsheet.” Mar. 2025, <https://extapps.dec.ny.gov/data/WQP/PWL/1305-0014.html>

⁵³ New York State Department of Environmental Conservation. “Wappingers Cr, Upper, and Tribs, Segment ID 1305-0011, Waterbody Segment Assessment Factsheet.” Mar. 2025, <https://extapps.dec.ny.gov/data/WQP/PWL/1305-0011.html>

⁵⁴ Kelly, Victoria R., and Elizabeth Stasick. *Road Salt: Moving Toward the Solution*. Cary Institute of Ecosystem Studies, 2010, dutchessemc.org/wp-content/uploads/2012/09/road-salt-special-report-2010.pdf



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Water Quality Classifications

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Intermittent Stream

Stream Classification

- A - water supply, primary and secondary contact recreation and fishing
- B - primary and secondary contact recreation and fishing
- C - fishing, suitable for fish propagation and survival
- D - fishing
- Trout Waters
- Trout Spawning Waters

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
 Water Quality Classification: NYSDEC 2010

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

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Cornell Cooperative Extension
 Dutchess County

Map 10: Water Quality Classifications

E. Flooding

Flooding is a natural process in all stream systems, but major floods can also be extremely destructive. Many streams have associated floodplains that are inundated periodically, often every few years. The likelihood of flooding is described by the recurrence interval: for example, a flood with a recurrence interval of one year (a “1-year flood”) has a high probability of occurring in any given year. Of greatest concern to most residents is the 100-year floodplain—areas with at least a one percent chance of flooding in any given year. The Federal Emergency Management Agency (FEMA) maps these areas, known as Special Flood Hazard Areas, and development within them is restricted or discouraged. In Stanford, approximately 3.4% of the land area lies within the 100-year floodplain as shown in Map 11 (Floodplains and Riparian Areas). Homeowners should be aware of whether their property is located in or near such a zone, since this has implications for both safety and flood insurance requirements.

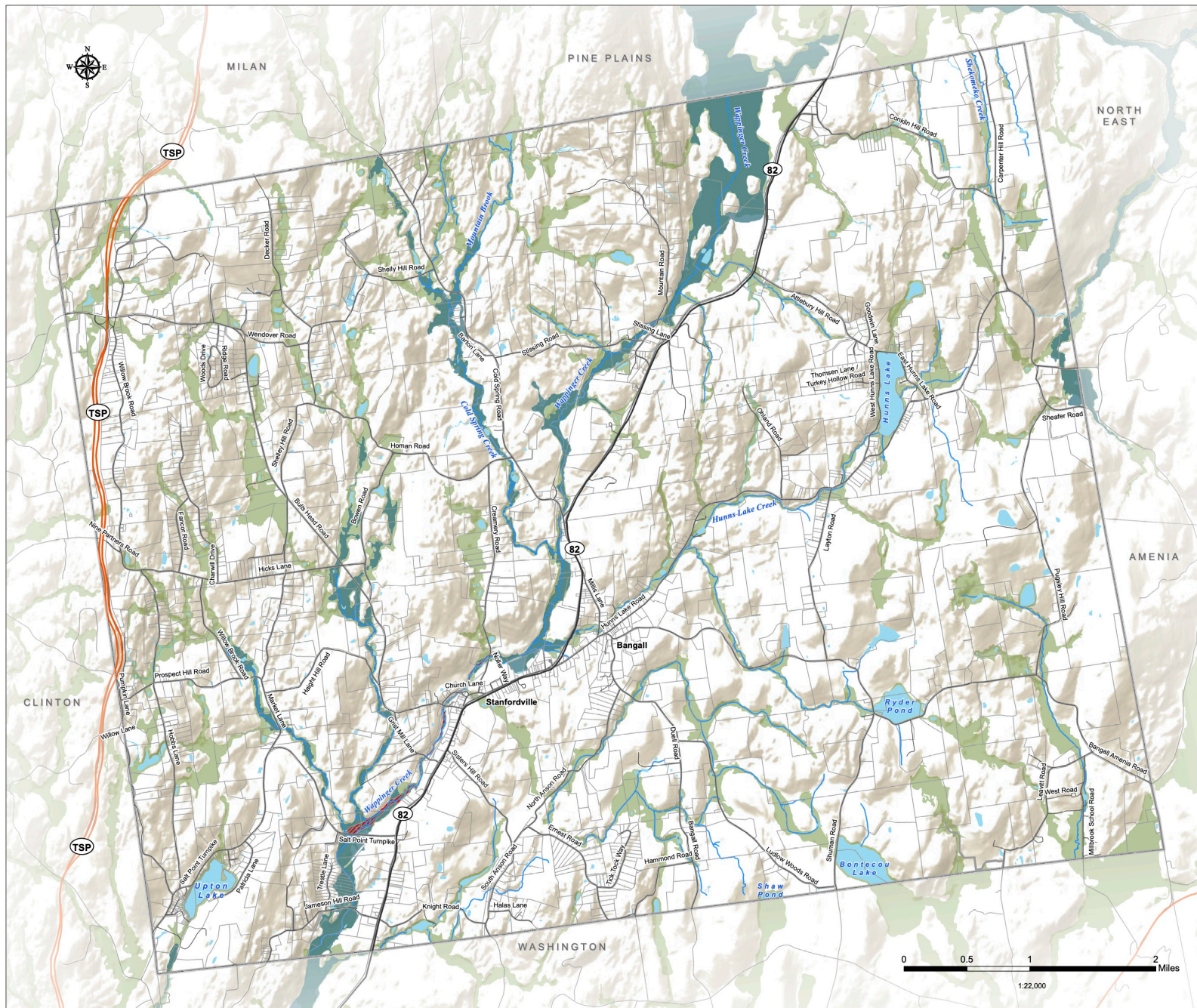
Map 11 also shows floodways, which is the part of a 100-year floodplain that must remain open and free of obstructions to allow the conveyance of floodwaters. Generally, development is much more strictly regulated in the floodway than in the rest of the floodplain, because even small obstructions can raise flood levels and increase risk elsewhere.

Also shown on Map 11 are riparian areas, which are areas adjacent to perennial streams, ponds, wetlands, and other waterbodies and include streambanks and floodplains. See Riparian Areas in Chapter 5 (Habitats and Wildlife) for more information. Riparian areas are included on the map because they may indicate additional flood-prone areas along smaller tributaries/streams not included in the FEME mapping.

The flood frequency expectations are changing due to two aspects of climate change. See Chapter 2 (Climate). Greater likelihood of rain versus snow in the winter means the anticipated spring flood will be smaller than in the past since water leaves the watershed throughout the winter rather than being stored as snowpack for release in a fairly brief time period. Moreover, the greater likelihood of intense rain events means flooding may be spread throughout the year when the rate of rainfall exceeds the capacity for water to soak into the ground.

Land use/land cover can also strongly affect flood risk, particularly the amount of the land surface with impermeable cover such as roads, roofs and parking lots. For watersheds where impervious cover is above about 10% of the area, there may be evidence of changes in the shape of the streams and more rapid runoff that doesn’t have a chance to infiltrate. Most municipalities in the northeastern U.S. recognize the increased risk of flooding and have adopted new regulations and practices to mitigate the risk. In particular, new development projects must provide for storage and/or infiltration of floodwater on their site, rather than simply providing a route for rapid downstream flow. This requirement can be expensive and occupies a portion of the parcel being developed, but it does minimize damage to downstream areas.

Additionally, most transportation agencies in the Northeast recognize that culverts and other infrastructure designed to allow streams to pass under roads may be too small given the larger floods expected, resulting in higher flood risk upstream of the constriction. For additional information on culverts in Stanford, see Dams and Culverts in Chapter 5 (Habitats and Wildlife).



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Floodplains & Riparian Areas

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

FEMA Flood Hazard Zones

- Floodway
- 1% annual chance (100-year flood)
- Riparian Area (not FEMA)

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007
Flood Areas: FEMA DFIRM (Effective May 2012)
Riparian Areas: New York Natural Heritage Program, 2018

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

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Map 11: Floodplains and Riparian Areas

Chapter 5: Habitats and Wildlife

A. Introduction

Hudsonia Ltd. conducted detailed mapping of habitats in the Town of Stanford in 2004 – 2005⁵⁵ and updated that analysis in 2024.⁵⁶ Their report contains detailed descriptions of the habitat types in Table 4, along with their use by wildlife and their sensitivity to human impacts. The material in this chapter is designed to provide additional context, particularly focusing on the historical factors and natural ecological processes that drive changes in habitats over time.

An excellent companion guide for this chapter is *From the Hudson to the Taconics: An Ecological and Cultural Field Guide to the Habitats of Columbia County, New York*.⁵⁷ Although this book specifically covers neighboring Columbia County, it provides a wealth of information about the types of habitats and wildlife found in Stanford.

B. Historical Legacies and the Distribution of Habitats

The modern-day distribution of habitat types in the Town of Stanford (Table 4) reflects the legacies of both dramatic transformations of the landscape over the past three centuries, and the nature of the landscape prior to European settlement. Lands within the town were included as part of the Great Nine Partners Patent of 1697 that transferred title of approximately 145,000 acres of Dutchess County to a group of nine New York businessmen. After several decades in which their primary economic activity appears to have been trapping beaver, the Nine Partners began subdividing the land for sale to farmers moving in from both the Hudson River and the Housatonic Valley. Little is known of the extent of agriculture by previous Native American communities in the town, but it is assumed that because of the generally thin, rocky soils, clearing for agriculture would have been limited to floodplains and pockets of the best soils.

Thus, prior to the wave of settlement in the mid-1700's, it is reasonable to assume that other than the roughly 10% of the town occupied by wetlands,⁵⁸ the remaining landscape was largely covered by unbroken forest throughout the 12,000 years since the retreat of the Pleistocene glaciers. It's worth noting that those glaciers, and particularly the uneven distribution of till left during their retreat, played an important role in creating the depressions that gave rise to many of the town's wetlands

⁵⁵ Bell, Kristen, Catherine Dickert, Jenny Tollefson, and Gretchen Stevens. *Significant Habitats in the Town of Stanford, Dutchess County, New York*. Hudsonia Ltd., 2005, www.hudsonia.org/maps-reports#Significant-Habitat-Reports

⁵⁶ Bevan Zientek, Amanda, Chris Graham, and Lea Stickle. *Significant Habitats in the Town of Stanford, Dutchess County, New York*. Hudsonia Ltd., 2024. Update of 2005 report by Kristen Bell, Catherine Dickert, Jenny Tollefson, and Gretchen Stevens.

⁵⁷ Duhon, Anna, Gretchen Stevens, Claudia Knab-Vispo, and Conrad Vispo. *From the Hudson to the Taconics: An Ecological and Cultural Field Guide to the Habitats of Columbia County, New York*. Black Dome Press, 2024, hudsonia.org/from-the-hudson-to-the-taconics

⁵⁸ It is likely that a slightly higher proportion of the town was in wetlands prior to European settlement, and that wetlands were lost due to draining and conversion to agricultural fields.

and the small fraction of current open water habitat not in constructed ponds.

What is known about the nature of forests following the retreat of the glaciers comes primarily from records of tree pollen preserved in lake sediments. The nearest studied lake is Sutherland Pond in the Hudson Highlands.⁵⁹ After an initial period of roughly 2,000 years with forests dominated by species of spruce, fir, and pine, forests around the pond have been dominated by species of oaks for the last 10,000 years. Fragments of charcoal occur in the lake sediments throughout that period, and it is widely assumed that relatively frequent but light ground fires contributed to the maintenance of oak forests throughout the eastern U.S. There is a long-standing debate about whether Native American communities were deliberately using fire as a form of habitat management, but there is little debate that fires were frequent and widespread, and that fires favored thick-barked oaks over more fire sensitive species like maples.

Our most quantitative record of forest composition at the time of European settlement comes from “witness trees” recorded at the corners of surveys as the land was subdivided and sold to settlers. The witness trees recorded in the earliest surveys of the lands that have become the present-day Cary Institute of Ecosystem Studies in the neighboring Town of Washington bear out this history.⁶⁰ Oaks made up 74% of the witness trees recorded by surveyors prior to 1760, while maples made up less than 4%. Species of oaks currently make up just 30% of the biomass of modern-day forests of the Institute, and the two upland species of maples – red maple and sugar maple – make up just under 30% of the forest.⁶¹ It is reasonable to assume that the past century of active fire suppression has been one factor in the emergence of modern forests in which oaks and maples are co-dominant.⁶²

It is important to note that a century of fire suppression in eastern oak forests has had far different consequences than the century of fire suppression in western conifer forests. Oak leaves barely decompose over winter and provide fuel for ground fires in the spring. Maple leaves, in contrast, decompose much more thoroughly over winter. As a result, in contrast to western forests where decades of fuel accumulation, particularly under climate change, results in massive fires, the switch from dominance by oaks to shared dominance by oaks and maples appears to have reduced the flammability of eastern forests. It is also important to note that the pollen record suggests that the modern mixture of tree species, particularly the rise in abundance of maples, in Stanford forests is unique in the 12,000-year post-glacial history of the town.

While changes in fire regimes have undoubtedly played a part in structuring the modern-day forests

⁵⁹ Maenza-Gmelch, Terryanne E. “Late-Glacial – Early Holocene Vegetation, Climate, and Fire at Sutherland Pond, Hudson Highlands, Southeastern New York, U.S.A.” *Canadian Journal of Botany*, vol. 75, no. 3, 1997, pp. 431–439. doi.org/10.1139/b97-045

⁶⁰ Glitzenstein, Jeffery S., Charles D. Canham, Mark J. McDonnell, and Donna R. Streng. “Interactions between Land-Use History and Environment in Upland Forests of the Cary Arboretum, Hudson Valley, New York.” *Bulletin of the Torrey Botanical Club*, vol. 117, no. 2, 1990, pp. 106–122. www.jstor.org/stable/2997050

⁶¹ Katz, Daniel S. W., Gary M. Lovett, Charles D. Canham, and Christine M. O’Reilly. “Legacies of Land Use History Diminish over 22 Years in a Forest in Southeastern New York.” *The Journal of the Torrey Botanical Society*, vol. 137, no. 3, 2010, pp. 236–251. doi.org/10.3159/09-RA-038R1.1

⁶² Abrams, Marc D. “Fire and the Development of Oak Forests.” *BioScience*, vol. 42, no. 5, 1992, pp. 346–353. doi.org/10.2307/1311781

of the Town of Stanford, by far the most significant factor in structuring the upland habitats of the town has been the waxing and waning of agriculture over the past 250 years and the intensive early use of residual woodlots for firewood and timber. There are no detailed records of the timing of clearing forests for agriculture in the town. For Dutchess County as a whole, however, as much as 80% of the original forest cover was cleared for agriculture during the period from 1750 to 1920. The population of the town began declining following the opening of the Erie Canal in 1825 as many farm families moved west, and by 1930 had been reduced by 50% from the population recorded in the 1820 census. Farmers who remained consolidated lands into larger farms with gradually decreasing intensity of use of more marginal soils and the abandonment of the least productive sites. The forests that remained at the low-water mark were largely restricted to steep slopes but were still subject to repeated logging for firewood and timber. It is unlikely that there are any forests in the town that could be considered “old growth,” and in many stands the majority of trees are less than 60-80 years old.

Forests and forested wetlands currently make up close to 50% of the town (Table 4). This remarkable pattern of recovery of forest cover following abandonment from agriculture has played out throughout the eastern U.S., with different timing and intensities in different regions. The reestablishment of forest cover has happened almost entirely through natural regeneration, rather than through deliberate tree planting. Colonization of abandoned farm fields by trees often only happened after decades of “old-field succession” in which a site was first dominated by sequences of grasses, herbaceous species, and shrubs. These abundant “old fields” have no obvious antecedent prior to European settlement⁶³ but have been a distinctive and ecologically significant habitat for plants and wildlife over the past century.

C. Current Upland Forests

1. Classification into Conifer, Mixed, and Hardwood Forests

Forest type classification into conifer, mixed, and hardwood-dominated stands (Table 4) is more generally a function of land-use and disturbance history than a reflection of site conditions and underlying ecology. **Conifer forests** are dominated by cone-bearing, needle-leaved trees such as pine, spruce, fir, and hemlock, which generally remain evergreen year-round. **Hardwood forests** are composed primarily of broad-leaved deciduous trees such as oak, maple, beech, and birch, which typically shed their leaves each autumn. In **mixed forests**, coniferous and deciduous (hardwood) trees grow together in significant proportions, creating a blend of evergreen and broad-leaved species that provides diverse habitats and seasonal variation.

The two most common conifer species in forests of the Town of Stanford are white pine (*Pinus strobus*) and eastern hemlock (*Tsuga canadensis*). Largely pure conifer stands prior to European

⁶³ The extent of historical clearing of land for agriculture by Native American communities in the Town of Stanford (and indeed in Dutchess County as a whole) is unknown. Bill Cronon proposed many years ago in his book *Changes in the Land* that early European settlements along the coast in Connecticut took advantage of agricultural clearings abandoned by Native Americans after their communities were decimated by disease and conflict with European settlers. (Cronon, William. *Changes in the Land: Indians, Colonists, and the Ecology of New England*. Hill and Wang, 1983.)

colonization would have likely been restricted to stands of white pine established following a stand-replacing fire on sandy soils and narrow bands of eastern hemlock along streams. White pine was also a common early colonist of abandoned agricultural fields.

Many of the relatively few current stands of conifers in the town (less than one percent of current upland forests, Table 4) are plantations of native or introduced tree species. Red pine (*Pinus resinosa*), a native but uncommon species in the Hudson Valley, was planted in abandoned pastures in the mid-1900's, but many of those stands have succumbed to decline, particularly when planted on poorly drained soils. This is likely a contributor to the reduction in stands mapped as "upland conifer forest" in the town between 2005 and 2024 (Table 4).

Both white pine and hemlock would have been common and even co-dominant in stands otherwise dominated by hardwoods. Thus, prior to European settlement, almost all of the forests in the town would have been mapped as "mixed." Both conifers, however, were routinely logged for timber, firewood, and tanbark, and, unlike the hardwoods, neither of the conifers is capable of sprouting after cutting. As a result, the history of repeated logging has depleted the conifers from most forests in the town, with hardwood-dominated forests currently making up 94% of upland forest area (Table 4).

Table 4. Significant Habitats in the Town of Stanford. Identified by Hudsonia Ltd. in surveys done in 2004-2005 and repeated in 2024. The analyses combined map and aerial photograph interpretation with field observations.⁶⁴

Habitat Type	Habitat Group	Acreage 2005	Acreage 2024	% Acreage 2024	Acreage Change
Upland Meadow	Agriculture	9,199.4	9,433.5	29.4%	234.2
Orchard/Plantation	Agriculture	46.3	25.5	0.1%	-20.8
		9,245.7	9,459.0	29.5%	213.4
Developed	Developed	3,116.7	3,596.6	11.2%	479.9
Waste Ground	Developed	139.5	120.7	0.4%	-18.8
Cultural	Developed	246.3	519.6	1.6%	273.4
		3,502.5	4,236.9	13.2%	734.5
Oak-Heath Barren	Shrub/Woodland	21.3	14.2	<0.1%	-7.1
Red Cedar Woodland	Shrub/Woodland	313.0	15.7	<0.1%	-297.3
Upland Shrubland	Shrub/Woodland	795.1	947.6	3.0%	152.5
		1,129.4	977.6	3.0%	-151.8

⁶⁴ Bell, et al., 2005; Bevan Zientek, et al., 2024.

Habitat Type	Habitat Group	Acreage 2005	Acreage 2024	% Acreage 2024	Acreage Change
Upland Conifer Forest	Upland Forest	366.9	130.0	0.4%	-236.9
Upland Hardwood Forest	Upland Forest	12,515.9	13,093.3	40.8%	577.4
Upland Mixed Forest	Upland Forest	2,075.1	709.2	2.2%	-1365.9
		14,957.9	13,932.5	43.4%	-1025.4
Conifer Swamp	Swamp	3.6	0.6	<0.1%	-3.0
Hardwood Swamp	Swamp	2,114.1	2,027.6	6.3%	-86.6
Intermittent Woodland Pool	Swamp	19.5	19.5	0.1%	-0.1
Mixed Swamp	Swamp	14.3	11.4	<0.1%	-2.9
		2,151.5	2,059.0	6.4%	-92.5
Calcareous Wet Meadow	Marsh	61.7	56.0	0.2%	-5.7
Fen	Marsh	15.7	13.7	0.0%	-2.0
Marsh	Marsh	173.3	410.2	1.3%	237.0
Wet Meadow	Marsh	332.8	352.1	1.1%	19.3
		583.5	832.0	2.6%	248.5
Circumneutral Bog Lake	Open Water	46.9	43.0	0.1%	-3.8
Constructed Pond	Open Water	428.5	468.2	1.5%	39.7
Open Water	Open Water	22.6	60.3	0.2%	37.7
Buttonbush Pool	Open Water	16.1	16.0	<0.1%	-0.1
		514.1	587.5	1.8%	73.4

2. Composition of Mid-Hudson Valley Upland Forests

There are no quantitative data on the composition of upland forests specifically for the Town of Stanford, but the U.S. Forest Service regularly censuses forest plots throughout the U.S. as part of the Forest Inventory and Analysis (FIA) program.⁶⁵ The information below is based on data from 801 plots censused between 2002 and 2020 in six Mid-Hudson Valley counties (Dutchess, Ulster, Columbia, Greene, Rensselaer, and Albany counties). The censuses identified 78 tree species in the 801 plots, but only 16 species represented greater than 1% of the total tree biomass in the plots and made up 87% of the tree biomass in the region's forests (Table 5). Sugar maple is the most abundant tree in the region, present in 57% of the plots, and makes up 16% of total tree biomass. Red maple is the most frequently present species, found in 59% of plots but making up only 11% of total biomass.

⁶⁵ U.S. Department of Agriculture, Forest Service. "Forest Inventory and Analysis Program." *USDA Forest Service Research and Development*, research.fs.usda.gov/programs/fia

Red oak is the second most abundant species, making up 14% of biomass but present in only 36% of plots. White ash is the third most frequently present species, in 40% of plots, but makes up less than 6% of total biomass. American elm was notably present in 17% of the plots, although making up less than 1% of total tree biomass. While this species was presumably more abundant in floodplain forests of the town prior to the introduction of Dutch elm disease almost 100 years ago, the tree survives now most commonly as isolated upland trees where the beetle that spreads the fungal pathogen is less likely to find them.

Table 5. Tree Species That Make Up At Least 1% of Total Tree Biomass. From 801 plots in six Mid-Hudson Valley counties, censused between 2002 and 2020 by the U.S. Forest Service as part of the national Forest Inventory and Analysis (FIA) program.

Common Name	Scientific Name	% plots present	% of total biomass
Sugar maple	<i>Acer saccharum</i>	57%	16.4%
Red oak	<i>Quercus rubra</i>	36%	13.5%
Red maple	<i>Acer rubrum</i>	59%	11.4%
White pine	<i>Pinus strobus</i>	27%	7.3%
Eastern hemlock	<i>Tsuga canadensis</i>	27%	6.4%
White ash	<i>Fraxinus americana</i>	40%	5.5%
Chestnut oak	<i>Quercus prinus</i>	16%	4.1%
Black birch	<i>Betula lenta</i>	27%	3.7%
Black oak	<i>Quercus velutina</i>	13%	3.5%
American beech	<i>Fagus grandifolia</i>	29%	3.3%
White oak	<i>Quercus alba</i>	13%	3.0%
Black cherry	<i>Prunus serotina</i>	26%	2.9%
Yellow birch	<i>Betula alleghaniensis</i>	20%	2.6%
Shagbark hickory	<i>Carya ovata</i>	12%	1.4%
Pignut hickory	<i>Carya glabra</i>	12%	1.2%
Ironwood	<i>Ostrya virginiana</i>	23%	1.0%

3. Structure and Carbon Sequestration of Mid-Hudson Valley Forests

Again, there are no specific analyses of the structure of forests for the Town of Stanford, but the FIA plots from the six Mid-Hudson Valley counties are likely representative of conditions within the town's forests. Those plots also provide a useful comparison of forests in the Hudson Valley to the rest of New York State. Soils, climate, land-use history and particularly rates of logging vary widely across the state. The average total tree biomass (above and below ground, both saplings and adults) in Mid-Hudson Valley forests during the period from 2002 to 2022 was approximately 18% higher than forests in the rest of the state (199 metric tons/hectare, compared to 169 metric tons/hectare). This likely reflects the earlier timing of abandonment of land from agriculture and the beginning of forest regrowth in the Hudson Valley than farther west and north in the state. Numerically, it also reflects lower rates of logging and mortality from all other causes in the Hudson Valley relative to other parts

of New York. Specifically, harvests during the period from 2002 to 2022 removed on average less than 0.5 metric tons/hectare annually in Hudson Valley forests, compared to 0.75 metric tons/hectare annually in the rest of New York State. All other forms of mortality reduced live tree biomass on average by 1.6 metric tons/hectare annually in the Mid-Hudson Valley, compared to 1.7 metric tons/hectare/year in the rest of the state.

Accumulation of carbon (i.e., “sequestration”) in U.S. forests represents a significant offset to the country’s CO₂ emissions. Nationwide, FIA data estimate that forests offset approximately 11% of total U.S. greenhouse gas emissions annually (2019 data).⁶⁶ Forests in the eastern 31 states represent 51% of all forestland in the U.S. but contributed 83% of net carbon sequestration. The disproportionate contribution from eastern forests reflects the significant emissions from western forests due to wildfire. Over the period from 2005 to 2020, carbon in the FIA plots in the Hudson Valley counties increased by an average of 0.39 metric tons of carbon per acre per year. This is equivalent to sequestration of 1.43 metric tons of CO₂ per acre per year. At that rate, the just under 14,000 acres of upland forests in the Town of Stanford sequester 19,923 metric tons of CO₂ annually. New York State’s per capita CO₂ emissions in 2020 were estimated to be 13.2 metric tons annually.⁶⁷ With a 2020 population of 3,682, the town’s upland forests therefore offset approximately 41% of the 2020 CO₂ emissions of the town’s permanent residents.

4. Status and Threats to Upland Forests

The New York Natural Heritage Program has developed a Forest Condition Index⁶⁸ that uses a variety of landscape metrics to rate the condition of patches of contiguous forest larger than 100 acres (ignoring roads and railroads). The index is based on remote sensing rather than field surveys and is primarily designed to evaluate forest patches based on connectivity and lack of fragmentation. Results for the Town of Stanford are displayed on Map 12 (Large Forests). The highest rated large forest block is located in the north central portion of the town, but the majority of the town’s large forest blocks rate highly using the Forest Condition Index.

Total upland forest cover in the Town of Stanford declined by almost 7% during the period from 2005 to 2024, an average annual loss of approximately 54 acres (Table 4). Most of this forest loss appears to have come from conversion to developed and “cultural” (e.g., lawns) land uses. Only a small fraction of forestland in the town is legally protected from clearing, so the future trends in forest cover in the town will likely depend on future development pressure balanced by landowner decisions to value and maintain forest cover. As shown on Map 12, many forested parcels in the town are enrolled in the New York State Forest Tax Law (480a) Program. While most conservation

⁶⁶ Domke, Grant M., et al. “Greenhouse Gas Emissions and Removals from Forest Land, Woodlands, and Urban Trees in the United States, 1990–2018.” *Resource Update FS-227*. U.S. Department of Agriculture, Forest Service, Northern Research Station, 2020. doi.org/10.2737/FS-RU-227

⁶⁷ New York State Energy Research and Development Authority (NYSERDA). *Energy Sector Greenhouse Gas Emissions under the New York State Climate Act: 1990–2020*. Prepared by Eastern Research Group. NYSERDA Report 23-02, Dec. 2022, www.nyserdanyc.gov/-/media/Project/Nyserda/Files/Publications/Energy-Analysis/23-02-Energy-Sector-GHG-Report-acc.pdf

⁶⁸ New York State Department of Environmental Conservation, Hudson River Estuary Program. *Hudson Valley Forest Condition Index Fact Sheet*. www.nynhp.org/documents/98/forest_condition_index_hshj131.pdf

easements in the town focus on farmland protection, they can also be designed to preserve forestland.

The most pervasive threat to the ecological integrity of Stanford forests is the litany of introduced forest pests and pathogens that have decimated native tree species over the past century.^{69,70} The list of those insects and diseases is long and growing. Emerald ash borer (*Agrilus planipennis*) has been present in Dutchess County for over a decade and has caused the death of most adult white ash trees (*Fraxinus americana*). The impacts of earlier introductions have already reduced the abundance of other important local tree species: chestnut blight and the chestnut (*Castanea dentata*), Dutch elm disease and both of our local species of elms, American elm (*Ulmus americana*) and slippery elm (*Ulmus rubra*), beech bark disease and beech (*Fagus grandifolia*), and hemlock woolly adelgid and the eastern hemlock (*Tsuga canadensis*). Dogwood anthracnose significantly reduced the abundance of flowering dogwood (*Cornus florida*) in the forest understory, although dogwoods survived along forest edges and in open habitats.

5. Regional Forests

As shown on Map 13 (Regional Forests), forests in the northwest quadrant of the Town of Stanford are part of a “forest linkage zone,” a natural corridor that connects the largest intact forests of eastern North America. The largest forests, called “matrix forests,” are sufficiently intact to withstand major natural disturbances, maintain important ecological processes, and support populations of forest-interior wildlife and plants.⁷¹ The matrix forests are some of the largest intact areas of forest in New York and are considered globally significant. Although Stanford does not have any matrix forests, it does contain a forest linkage zone that connects matrix forests. The forest linkage zone extends through parts of neighboring towns (Clinton, Hyde Park, Rhinebeck, Milan, and Pine Plains) and is a linkage between a matrix forest west of the Hudson River in Esopus and another surrounding Mount Washington in Massachusetts. The forest linkage zone is shown on Map 13 in light green, and the matrix forests are shown in forest green. Map 13 shows only matrix forests and linkages; it omits many other forests in Stanford.

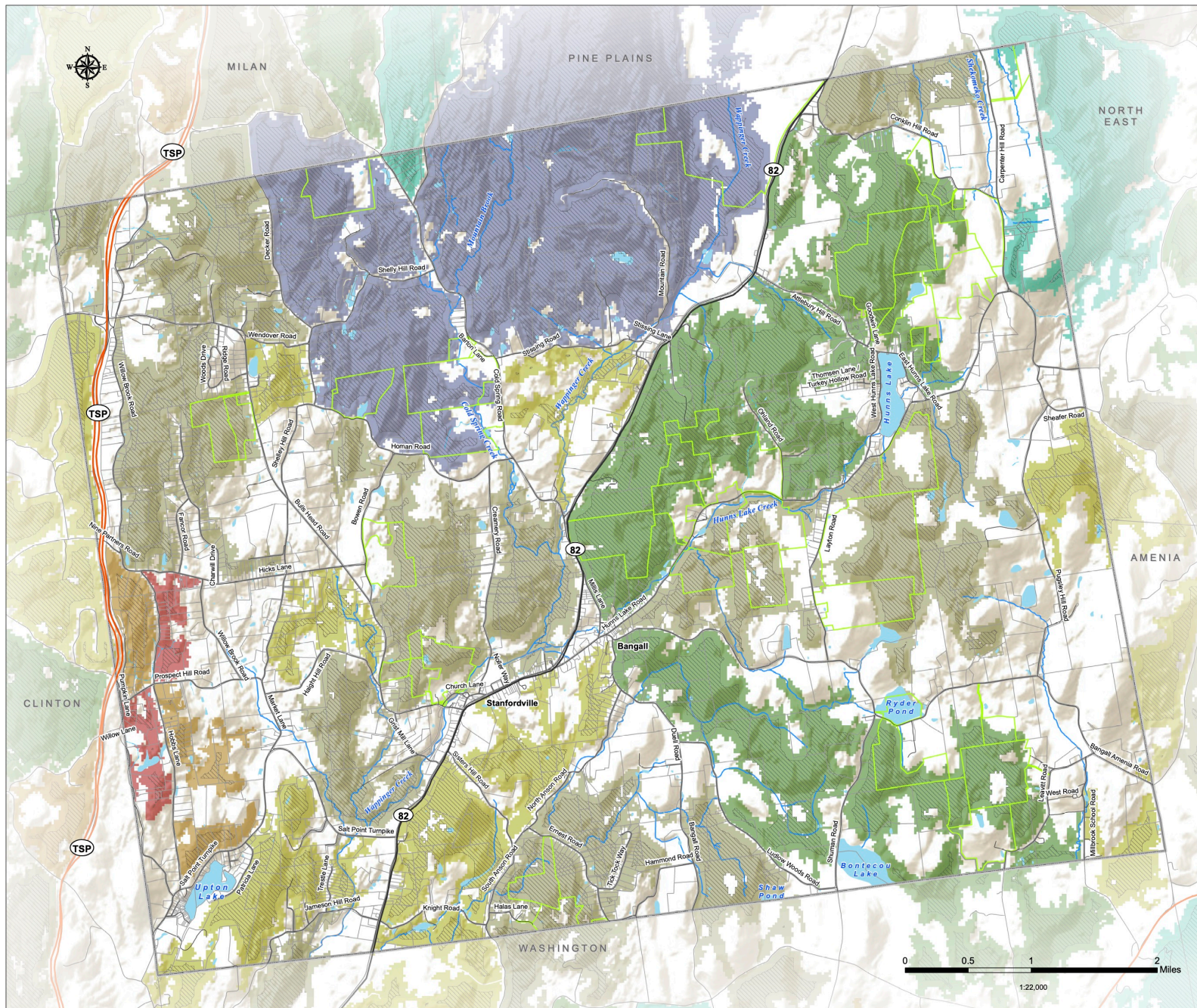
The forest linkage zone in Stanford allows a wide range of wildlife to move safely to find mates and the resources they need. Forest linkages such as these may be vital to the ability of many species to migrate as climate changes. A few forested properties in Stanford in the forest linkage zone are restricted from development by conservation easements. Those easements were not reviewed for this project to understand the resources they protect. In addition, the Stissing Mountain Multiple Use Area (which straddles the border with Pine Plains) and Winnakee Land Trust Dutchess Gables Preserve (on Homan Road) are inside the forest linkage zone, as are portions of the Snake Hill and

⁶⁹ Lovett, Gary M., et al. “Forest Ecosystem Responses to Exotic Pests and Pathogens in Eastern North America.” *BioScience*, vol. 56, no. 5, May 2006, pp. 395–405. [doi.org/10.1641/0006-3568\(2006\)056\[0395:FERTEP\]2.0.CO;2](https://doi.org/10.1641/0006-3568(2006)056[0395:FERTEP]2.0.CO;2)

⁷⁰ Lovett, Gary M., et al. “Nonnative Forest Insects and Pathogens in the United States: Impacts and Policy Options.” *Ecological Applications*, vol. 26, no. 5, May 2016, pp. 1437–1455. doi.org/10.1890/15-1176

⁷¹ Anderson, M. G., and S. L. Bernstein, editors. *Planning Methods for Ecoregional Targets: Matrix-Forming Ecosystems*. The Nature Conservancy, Conservation Science Support, Northeast & Caribbean Division, 2003. www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/EcoregionalPlans/LNE/Matrix-methods.pdf

Upper Wappinger Critical Environmental Areas.



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Large Forests

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

- NYS 480a Forest Tax Law Parcel
- Core Forest

Forest Condition Index (Percentile)

- 95-99 (Top 5%)
- 90-95
- 80-90
- 60-80
- 40-60
- 20-40
- 0-20

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 NYS 480a Tax Parcel Boundaries: Dutchess County RPS, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
 Forest Condition Index & Core Forests: NY Natural Heritage Program, NYSDEC Hudson River Estuary Program, & Cornell University, 2019

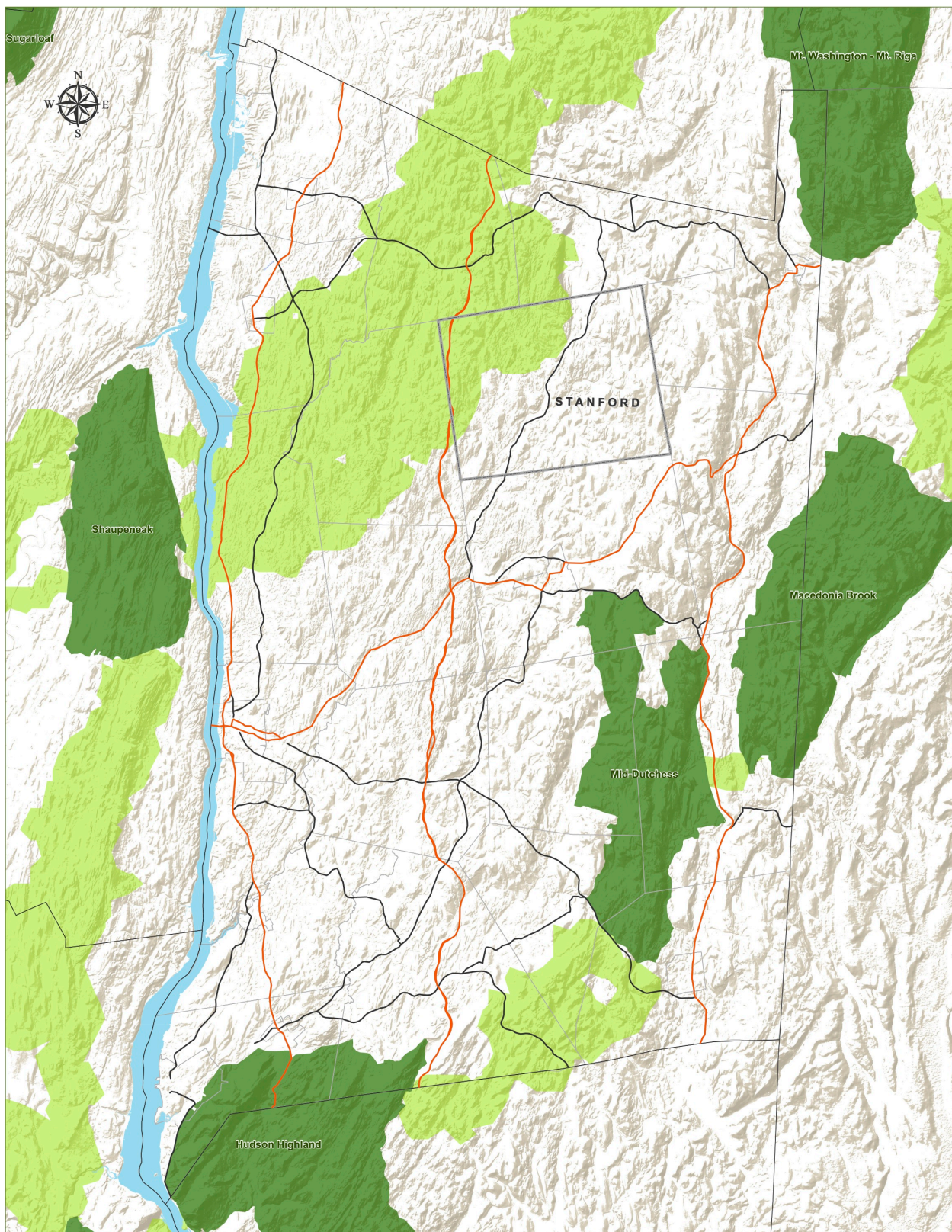
Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents. No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Map 12: Large Forests



- | | |
|---------------------|---------------------|
| Stanford Boundary | Waterbody |
| Municipal Boundary | Stream |
| Matrix Forest Block | Forest Linkage Zone |

0 2.5 5 10
Mile
1:100,000

The Dutchess County Natural Resources Inventory (NRI) Technical Assistance Project is a partnership among the Town of Clinton, the Town of Washington, the Village of Millbrook, Cornell Cooperative Extension of Dutchess County, and Cornell University Department of Natural Resources, with funding from the Environmental Protection Fund through the New York State Department of Environmental Conservation Hudson River Estuary Program.

Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Regional Forests

Prepared by: CCEDC GIS Lab, 2024, updated 2025

WARNING: This map is not a substitute for land surveys or legal documents.
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DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2022
Streams and Waterbodies: National Hydrography Dataset
Matrix Forest Blocks & Linkages: The Nature Conservancy & NY Natural Heritage Program, 2006



Department of
Environmental
Conservation

Hudson River
Estuary Program



Cornell Cooperative Extension
Dutchess County

D. Agriculture and Open Upland Habitats

The Hudsonia Significant Habitats Report identifies a diversity of open upland habitats (Table 4). With the exception of the oak-heath barrens on rocky hilltops, essentially all of the current open upland habitat is a product of the history of early clearing for agriculture and subsequent land abandonment. Omitting developed areas and waste ground but including agriculture, the various open upland habitats in the Town of Stanford occupied 34% (10,956 acres) of the land area in the town in 2024. This represents a very slight net increase of 335 acres since 2005, with an increase in areas of upland meadows, upland shrubland and cultural habitats, offset by a decline in cover of red cedar woodlands (Table 4). Eastern red cedar (*Juniperus virginiana*) is one of the first tree species to colonize abandoned agricultural lands in this region but is eventually overtopped by hardwood trees as the field undergoes old-field succession to forest. Red cedars have traditionally been used for fence posts, so it is possible that some of the loss of red cedar woodland also occurred because the cedars were harvested.

By far the dominant open upland habitat in the town is classified as “upland meadow” (9,434 acres, 29% of the town). According to the Significant Habitats Report, “This broad category includes active cropland, hayfields, pastures, equestrian fields, mowed ornamental fields, and abandoned fields. Upland meadows are typically dominated by grasses and forbs; cover by shrubs is generally less than 20 percent.”⁷² This category thus lumps both active agriculture (row crops, pastures, and active hayfields) and lands abandoned from agriculture. The lands abandoned from agriculture but still dominated by grasses and forbs contain some of the most diverse plant communities in the region but represent an artifact of the history of land abandonment over the past century. Most of those grasses and forbs are shaded out as shrub and tree cover is eventually reestablished through the process of old-field succession. That process can take decades to scores of years, and during that period the open old fields provide important habitat for many species of wildlife (Table 6, below). Examination of historical aerial photographs of Dutchess County⁷³ from the 1940’s to the present illustrates the transient nature of these grass and herbaceous-dominated old fields. Colonization of those sites by shrubs and eventually trees is inexorable in the absence of very intensive and deliberate management to maintain grass or forb dominance. In the absence of such management, this important habitat can be expected to decline.

E. Wetlands

To a wetlands biologist, a swamp is a wetland dominated by woody plants, while a marsh is dominated by grasses or herbaceous species. The U.S. National Wetlands Inventory (NWI) maintained by the U.S. Fish and Wildlife Service has a detailed and standardized classification system for wetlands that takes into account both vegetation and hydrology.⁷⁴ An NWI Wetlands Mapper with high resolution coverage of the town is available online.⁷⁵ The Hudsonia Significant

⁷² Bell, et al. 2005, p. 27.

⁷³ Dutchess County Government. “AerialAccess – Dutchess County, NY.” gis.dutchessny.gov/aerialaccess

⁷⁴ U.S. Fish and Wildlife Service. “National Wetlands Inventory.” www.fws.gov/program/national-wetlands-inventory

⁷⁵ U.S. Fish and Wildlife Service. “Wetlands Mapper.” fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper

Habitats Report uses a slightly broader wetland classification tailored to critical habitat and biodiversity issues in the town, particularly for species of special concern (discussed below).

Marshes and swamps currently occupy 9% of the land area of the Town of Stanford (Table 4). While a small fraction of the town, wetlands represent a disproportionately important habitat for



Photo 3: Great blue heron in Stanford (Gregg Smith). Great blue herons forage in wetland and stream habitats.

biodiversity. The Hudsonia Significant Habitats Report contains detailed descriptions of all of the wetland types in Table 4, along with their habitat values and sensitivities to human impacts.

The current acreage of wetlands represents a slight reduction in the area of hardwood swamps and a larger gain in the area of marshes. The modest net gain of 156 acres of wetlands between 2005 and 2024 is promising, since nationwide wetlands continue to be lost.⁷⁶ Raising the water level in a wetland, either due to the activity of beavers or human impoundment, can

result in the loss of the tree canopy and convert a swamp to a marsh. The causes of the larger net increase in mapped area of marshes are not clear but presumably reflect the same factors—increases in water level due to beaver activity or deliberate human changes in impoundment. Nationwide, the majority of loss of freshwater wetlands is attributable to declines in forested wetlands, and the primary driver of wetland loss continues to be drainage and conversion to upland habitat and agriculture.⁷⁷

While it is likely that wetland habitat in the town was lost over the past 200 years due to drainage of fields for agriculture, the trends in Table 4 suggest that the most critical current threats to Stanford wetlands are not the loss of wetland area but changes in ecological function due to occupation by invasive species, including the Eurasian lineage of common reed (*Phragmites australis*).

Floodplain forests are a subset of floodplain habitats that host a unique assemblage of plants and animals adapted to regular disturbance. The Hawthorne Valley Farmscape Ecology Program mapped and described these locally rare habitats.⁷⁸ Notable examples of these natural floodplain forests in the town can be found along the Wappinger, Cold Spring, and Hunns Lake creeks and some of their

⁷⁶ Lang, M.W., J.C. Ingebritsen, R.K. Griffin. *Status and Trends of Wetlands in the Conterminous United States 2009 to 2019*. U.S. Dept. of the Interior, U.S. Fish and Wildlife Service, Mar. 2024.

www.fws.gov/sites/default/files/documents/2024-03/wetlands-status-and-trends-2009-2019-signed.pdf

⁷⁷ Ibid.

⁷⁸ Knab-Vispo, Claudia, and Conrad Vispo. *Floodplain Forests of Columbia and Dutchess Counties, NY: Distribution, Biodiversity, Classification, and Conservation*. Hawthorne Valley Farmscape Ecology Program, in cooperation with Hudsonia Ltd., 2010. hvfarmscape.org/wp-content/uploads/2014/01/fep_floodplain_forest_report_nov_2010-f75.pdf

tributaries. Floodplain forests are shown in dark purple on Map 14 (Stream Habitats).

The Hawthorne Valley Farmscape Ecology Program report indicates that even though the floodplain forests in the town are relatively small and disconnected from each other, “the sheer length of Wappinger Creek makes it a potential ecological corridor crossing much of the county, and every bit of ancient or recently reforested floodplain forest currently present in this corridor might be particularly valuable because of its role in facilitating the connectedness of a large area.”⁷⁹

F. Streams and Open Water

Streams, their floodplains, adjacent wetlands, and other “riparian” or streamside habitats provide important ecosystem services including clean water, flood management, and recreational opportunities like fishing and kayaking. In addition, they provide productive habitat for wildlife. Map 14 (Stream Habitats) shows the best available mapping for perennial and intermittent streams and riparian areas. All streams are important for biodiversity. This report highlights some streams or parts of streams that are known to be important for species of conservation concern. However, other streams are also important for biodiversity and are part of the interconnected freshwater system.

The beginnings of streams, referred to as headwaters, are often intermittent or ephemeral. Intermittent streams only flow during certain times of the year, fed by groundwater and runoff from rainfall and snowmelt. Some headwaters are ephemeral, only flowing after rainfall. Perennial streams and rivers flow year-round, with most water fed by smaller upstream intermittent and ephemeral streams or groundwater. The vast network of intermittent streams in the landscape provides many of the same functions and values as larger perennial streams. Intermittent streams provide seasonal refuge and spawning habitat for small fish and provide habitat for aquatic insects and other macroinvertebrates that drift downstream to feed larger fish and organisms. They also support nutrient cycling and flood control processes.

Map 14 includes many intermittent streams, but some likely remain unmapped. Significant aquatic habitat areas in Stanford include trout and trout spawning waters, and streams important to migratory fish. Classification of New York waters is based on existing or expected best use. Classifications of individual streams in Stanford are available at the NYS Environmental Resource Mapper.⁸⁰

1. Trout Habitat and Trout Spawning Waters

Trout are indicators of healthy aquatic ecosystems because of their high water quality and habitat requirements. They typically inhabit clear, cool, well-oxygenated streams and lakes and depend on clean gravel areas for spawning. The Wappinger Creek and portions of its headwaters (Cold Spring Creek, Hunns Lake Creek, and some unnamed tributaries) in the town are documented trout habitat

⁷⁹ Ibid., p. 16.

⁸⁰ New York State Department of Environmental Conservation. “Environmental Resource Mapper: Waterbody Classifications for Rivers/Streams.” dec.ny.gov/nature/animals-fish-plants/biodiversity-species-conservation/biodiversity-mapping/environmental-resource-mapper

and trout spawning areas.⁸¹ The Wappinger Creek is also an important area for migratory fish. Map 14 (Stream Habitats) shows some of its headwater streams are likely suitable for cold-water fish like brook trout (NY Species of Greatest Conservation Need). Although Map 14 does not indicate areas with public fishing rights and many areas may be unsuitable for recreational trout fishing, it is permitted on the Wappinger Creek at the Stanford Rec Park and Gary M. Lovett Wildlife Preserve.

2. Important Areas for American Eel

The American eel is in decline throughout much of its range, and though eels can bypass certain dams, culverts, and other aquatic barriers, they rely on connected, free-flowing streams to complete their life cycle and return to the Atlantic Ocean to spawn.

The New York Natural Heritage Program identifies Wappinger Creek as important for migratory fish (based on NYSDEC Bureau of Fisheries surveys and other studies completed in New York since 1980). This stream may provide important passage for American eels traveling between ocean and freshwater habitats. Routes were modeled from tributary stream reaches with documented eel presence to the Atlantic Ocean, where this species spawns. Important areas near the mouth of Hudson River tributaries also support other migratory fish species.

3. Dams and Culverts

The quality of stream habitats is reduced due to the presence of barriers such as dams and poorly designed or installed culverts.⁸² There are 31 dams recorded within the town.⁸³ Information about most listed dams is available on the DECinfo Locator including hazard descriptions and other select attributes.⁸⁴ The Hudson River Estuary Program has funded the planning, engineering, and implementation of dam removal and culvert replacement projects in the Hudson River Estuary watershed to restore habitat connectivity and stream restoration. Dam locations on Map 14 (Stream Habitats) are illustrated by gray squares and provided by the New York State Inventory of Dams.⁸⁵ Map locations are approximate and should not be relied upon for emergency-response decision making. Assessments by the NYSDEC Hudson River Estuary Program in trial watersheds indicate that two to three times as many barriers exist than are logged in the NYS Inventory of Dams.

⁸¹ New York State Department of Environmental Conservation. “Hudson Valley Natural Resource Mapper: Stream and Watershed Layers – DEC Stream Classification and Trout Status.” giservices.dec.ny.gov/gis/hvnrm

⁸² New York State Department of Environmental Conservation, Hudson River Estuary Program. *Aquatic Connectivity, Identifying Barriers to Organisms and Hazards to Communities*. extapps.dec.ny.gov/docs/remediation_hudson_pdf/culvertfactsheet19.pdf

⁸³ New York State Department of Environmental Conservation. “Hudson Valley Natural Resource Mapper: Stream and Watershed Layers – DEC Dam Inventory.” <https://giservices.dec.ny.gov/gis/hvnrm/>.

⁸⁴ New York State Department of Environmental Conservation. “DECinfo Locator: DEC Information Layers – Environmental Quality – Permits and Registrations – Dams.” dec.ny.gov/maps/interactive-maps/decinfo-locator

⁸⁵ While NYSDEC tries to maintain an accurate inventory, mistakes are possible. The Hudson Valley Natural Resource Mapper and the DECinfo Locator maps show different numbers of dams in the Town of Stanford at the time this was written.

Poorly designed and undersized culverts are barriers to aquatic organisms and hazards to communities during storms. Streams are linear habitats for aquatic and semi-aquatic species such as American eel, herring, stream salamanders, turtles, and crayfish. Road crossings can fragment streams into small pieces, preventing organisms from accessing critical habitats. Culverts also may be infrastructure liabilities and flooding hazards for communities. During storms, undersized or improperly installed culverts can become clogged with debris or overwhelmed, leading to road flooding, stream bank erosion, or even washout of the whole road. The town has at least 99 documented culverts according to the data provided by the North Atlantic Aquatic Connectivity Collaborative (NAACC), a network focused on improving aquatic habitat connectivity across the Northeast region.⁸⁶ Culverts were assigned a passability score that describes how much of a barrier the structure is to aquatic organisms, ranging from severe barrier to no barrier. Map 14 displays the culvert scores as small colored circles, with red indicating severe barriers, and blue indicating no barrier.

The Hudson River Estuary Watershed Program and its partners are working towards restoring free-flowing tributaries to the Hudson River and more information is available on their website.⁸⁷

4. Riparian Areas

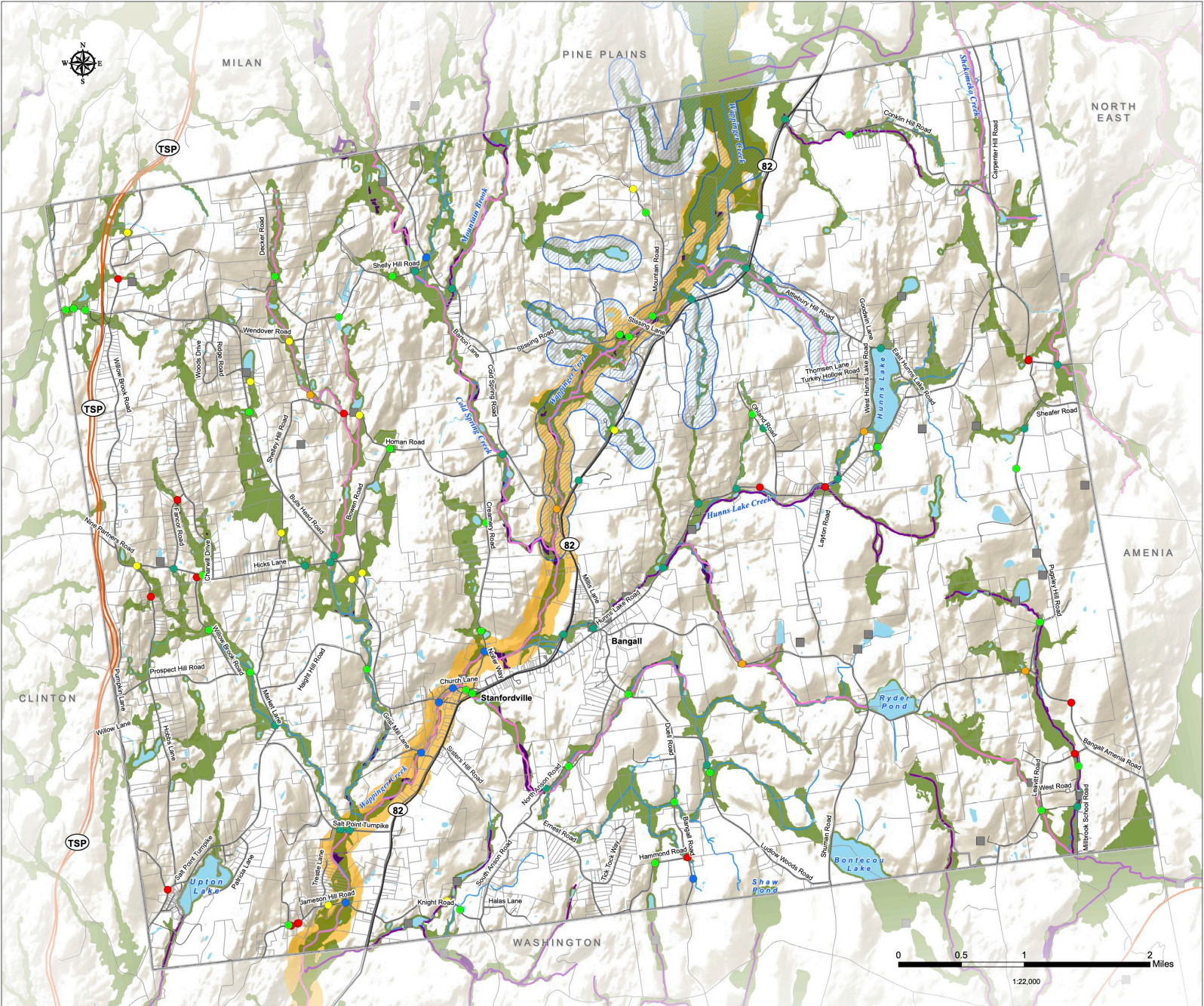
Riparian areas are areas adjacent to perennial streams, ponds, wetlands, and other waterbodies and include streambanks and floodplains, shown in dark green on Map 14 (Stream Habitats).

Riparian corridors support unique, diverse habitats and serve as wildlife corridors. Forested riparian buffers provide organic matter that support the in-stream food web and shade that keeps water cool. Riparian areas are important travel ways for animals that move throughout our landscape; undeveloped riparian areas offer paths in areas otherwise unfavorable to their movement. Beyond the stream channel and banks, riparian areas and floodplains support unique soil and vegetation that are strongly influenced by proximity to water and frequent flooding.

Riparian trees are especially important for providing shade, bank stabilization, woody debris, and nutrients that benefit fish and other aquatic life. When inundated, floodplains also provide important fish breeding and nursery habitat areas. Many other wildlife species also depend on riparian and floodplain habitats and use them as travel corridors.

⁸⁶ North Atlantic Aquatic Connectivity Collaborative. <https://streamcontinuity.org/naacc>

⁸⁷ New York State Department of Environmental Conservation. "Aquatic Connectivity and Barrier Removal." *Aquatic Habitats of the Hudson River Estuary, Hudson River Estuary Management Program*, <https://dec.ny.gov/nature/waterbodies/oceans-estuaries/hudson-river-estuary-program/aquatic-habitats/aquatic-connectivity-and-barrier-removal>



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Stream Habitats

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream
- Culvert Passability Score
 - Severe barrier
 - Significant barrier
 - Moderate barrier
 - Minor barrier
 - Insignificant barrier
 - No barrier
 - Dam
- Stream Classification Standard
 - Trout Habitat
 - Trout Spawning
 - Floodplain Forest
 - Riparian Area
 - Important Area for American Eel
 - Important Area for Coldwater Fish

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Culverts: NAACC, 2020
Dams: NYSDEC, 2015
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd., 2007
Stream Classification Standard: NYSDEC, 2010
Floodplain Forests: Farmscape Ecology Program, 2010
Riparian Areas & Important Areas: New York Natural Heritage Program, 2018

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents.
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Map 14: Stream Habitats

G. Important Biodiversity Areas

1. Core and Connected Forests

With more than 43% of the town forested, Stanford has a number of large forest blocks—see Map 12 (Large Forests)—that score highly on the Natural Heritage Program Forest Condition Index. These large core forests provide protection, food and reproductive habitat for many animals. They are particularly important for wildlife species which use forested habitat for all or part of their life cycles, have large home ranges, or are sensitive to disturbance. Examples include some mammals (bobcat, fisher, and gray fox), birds of prey (red-shouldered hawk, Cooper’s hawk and several owls) and songbirds (some woodland warblers, vireos, forest flycatchers and thrushes; also see Table 6). Human activities that break up large forest blocks cause the loss of the original habitat and increase isolation between similar habitats. Fragmentation of large forests magnifies the importance of wooded corridors that connect large forest tracts and provide dispersal paths for wildlife between suitable patches. Wooded corridors linking forest patches increase species diversity and enhance resilience of otherwise isolated wildlife populations by facilitating genetic exchange. Many of the forested corridors in the town are also riparian areas, which support the movement and survival of fish, amphibian, and reptile populations that may not use upland forests.

2. Old Fields and Open Habitats

An unknown fraction of the upland meadows that make up almost 30% of the town are no longer in active agriculture. Those grass and herbaceous dominated “old fields” typically contain some of the highest plant species diversity of any upland habitats in the town. They also serve as important habitat for invertebrates, reptiles, birds and mammals, some of which are of conservation concern (Table 6). Many native pollinators (primarily bees, butterflies, moths and skippers) use such habitats for foraging and reproduction sites. Old fields also provide nesting sites for local reptiles, including many turtle species. Sparrows, goldfinches, bluebirds and other songbirds nest and feed in or on the edges of open areas. Other bird species whose populations have severely declined, like bobolinks and eastern meadowlarks, require large tracts of open habitat to breed. Many predators (coyotes, foxes, northern harriers, American kestrels and others) depend on the abundant insect and vertebrate prey found in such habitats. These habitats are an artifact of the historical pattern of abandonment from agriculture over the past century, and, in the absence of very targeted management to control woody invasion, will gradually disappear through old-field succession to forest. The wildlife populations that depend on those habitats will decline along with them.

3. Important Areas for Rare Animals and Plants

The New York Natural Heritage Program (NYNHP) has identified Important Areas for sustaining populations of rare animals and rare plants based on existing records and the species’ habitat requirements.⁸⁸ These Important Areas, shown on Map 14 (Stream Habitats) and Map 15 (Known Important Biodiversity Areas), include the specific locations where species have been observed, as

⁸⁸ New York State Department of Environmental Conservation, Hudson River Estuary Program, *Natural Heritage Important Areas, Conservation Data for the Hudson Valley Fact Sheet*. <https://dec.ny.gov/sites/default/files/2024-02/nynhpiafs.pdf>

well as areas critical to maintaining the species' habitat. Considering these areas in proactive planning may aid the long-term survival and persistence of rare species.⁸⁹

Important Areas are based on the best available information but do not represent a comprehensive inventory of all resources or habitats. NYNHP is continually adding new information to its databases. Lands outside of the mapped Important Areas may also support rare animals and plants, contain significant ecosystems, or provide ecological benefits.

NYNHP has documented the following important areas in Stanford:⁹⁰

a. Important Areas for Rare Plants

Plants are considered rare if there are only 20-25 known sites or 3,000-5,000 individuals statewide. Plants may be rare because they are limited to a rare habitat, near the edge of their geographic range, or are impacted by human activities or invasive species. Eleven plant species are included in Table 6 based on historical records that they have previously been identified in the town. Their current status in Stanford is unknown. Information on New York rare plants is available from the NYNHP.⁹¹

b. Important Areas for Rare (Wetland and Terrestrial) Animals

Sites are identified based on occurrence records from the NYNHP database and include specific locations where rare animals have been observed as well as additional habitat needed to support animal populations. These include areas that might be used for breeding, nesting, roosting, or overwintering and areas that support ecological processes critical to maintaining the habitats of these rare animals.

c. Important Areas for Migratory Fish

These areas are important for sustaining populations of migratory fish, based on NYSDEC Bureau of Fisheries surveys and other studies completed since 1980. They highlight stream reaches that provide important passage for fish traveling between ocean and freshwater habitats. American eels are the primary species of consideration in the town streams.

d. Important Areas for Cold-Water Stream Habitats

These areas have been identified as important for sustaining cold-water habitats based on NYSDEC fish survey records and NYNHP habitat modeling. Coldwater streams are important to maintaining native brook trout and other cold-water fishes in region-wide decline due to habitat loss,

⁸⁹ Penhollow, Mark E., Paul G. Jensen, and Leslie A. Zucker. *Hudson River Estuary Wildlife and Habitat Conservation Framework: An Approach for Conserving Biodiversity in the Hudson River Estuary Corridor*. New York Cooperative Fish and Wildlife Research Unit, Cornell University, and New York State Department of Environmental Conservation, Hudson River Estuary Program, 2006. extapps.dec.ny.gov/docs/remediation_hudson_pdf/hrebcf.pdf

⁹⁰ New York State Department of Environmental Conservation. "Information about the Layers in the Hudson Valley Natural Resource Mapper." *Hudson Valley Natural Resource Mapper*. <https://gisservices.dec.ny.gov/gis/hvnrm/layerInfo.html#ira>

⁹¹ Ring, Richard M. *New York Rare Plant Status Lists*. New York Natural Heritage Program, State University of New York College of Environmental Science and Forestry, Dec. 2023. <https://www.nynhp.org/documents/5/rare-plant-status-lists-2023.pdf>

fragmentation, and degradation.

4. Significant Natural Communities

A natural community is an assemblage of interacting plant and animal populations that share a common environment. Significant Natural Communities may provide habitat for rare plants and animals, support intact ecological processes, and contribute other ecological benefits.⁹² There is a small area in Stanford identified as a Significant Natural Community that is contiguous with a larger area of Stissing Mountain Critical Environmental Area to the north in the Town of Pine Plains.

5. Priority Habitats and Priority Conservation Areas Identified by Hudsonia

In 2005, Hudsonia Ltd. completed a habitat identification and mapping project for the Town of Stanford.⁹³ It identified 25 different habitats in the town. The habitats are shown on Map 16 (Habitats Identified by Hudsonia Ltd.) as updated by Hudsonia in 2024.⁹⁴ These include widespread habitats, as well as unusual or uncommon ones that may support species of concern including rare plants, invertebrates, amphibians, reptiles, breeding birds, and mammals. Nine priority habitats were identified for conservation in the town: large forests, large meadow and shrubland complexes, oak-heath barren, fen and calcareous wet meadow, intermittent (vernal) woodland pool, buttonbush pool, circumneutral bog lake, large perennial streams, and riparian areas.

In addition to identifying priority habitats, Hudsonia Ltd. identified seven “Priority Conservation Areas,” (PCAs) which are locations they felt deserved special attention because they contained several priority habitats. The PCAs are the Stissing Mountain Area, Homan-Bowen Road Area, Millbrook Marsh, Shaw Pond Area, Ryder Pond Area, Bloodstock Farm Area and the Wappinger Creek Corridor. In 2025, Hudsonia Ltd. completed a review of several of the PCAs as part of its review of, and recommendations for, the town’s “Critical Environmental Areas,” discussed below in the Zoning – Critical Environmental Areas section of Chapter 6 (Land Use).

6. Significant Biodiversity Areas in the Hudson Valley

These are landscapes within the Hudson River watershed that contain high concentrations of biodiversity or unique ecological features. Designated areas in the Town of Stanford are part of the Dutchess County Wetlands and include wetlands and their watersheds and buffer zones. They provide significant habitat for rare plants, amphibians, reptiles, and breeding birds. Such wetlands are considered to have the highest diversity of turtles in New York.⁹⁵

⁹² New York State Department of Environmental Conservation. “Information about the Layers in the Hudson Valley Natural Resource Mapper.” *Hudson Valley Natural Resource Mapper*. <https://gisservices.dec.ny.gov/gis/hvnrm/layerInfo.html#ira>

⁹³ Bell, et al. 2005.

⁹⁴ Bevan Zientek, et al. 2024.

⁹⁵ Penhollow, et al. 2006, p. 67.

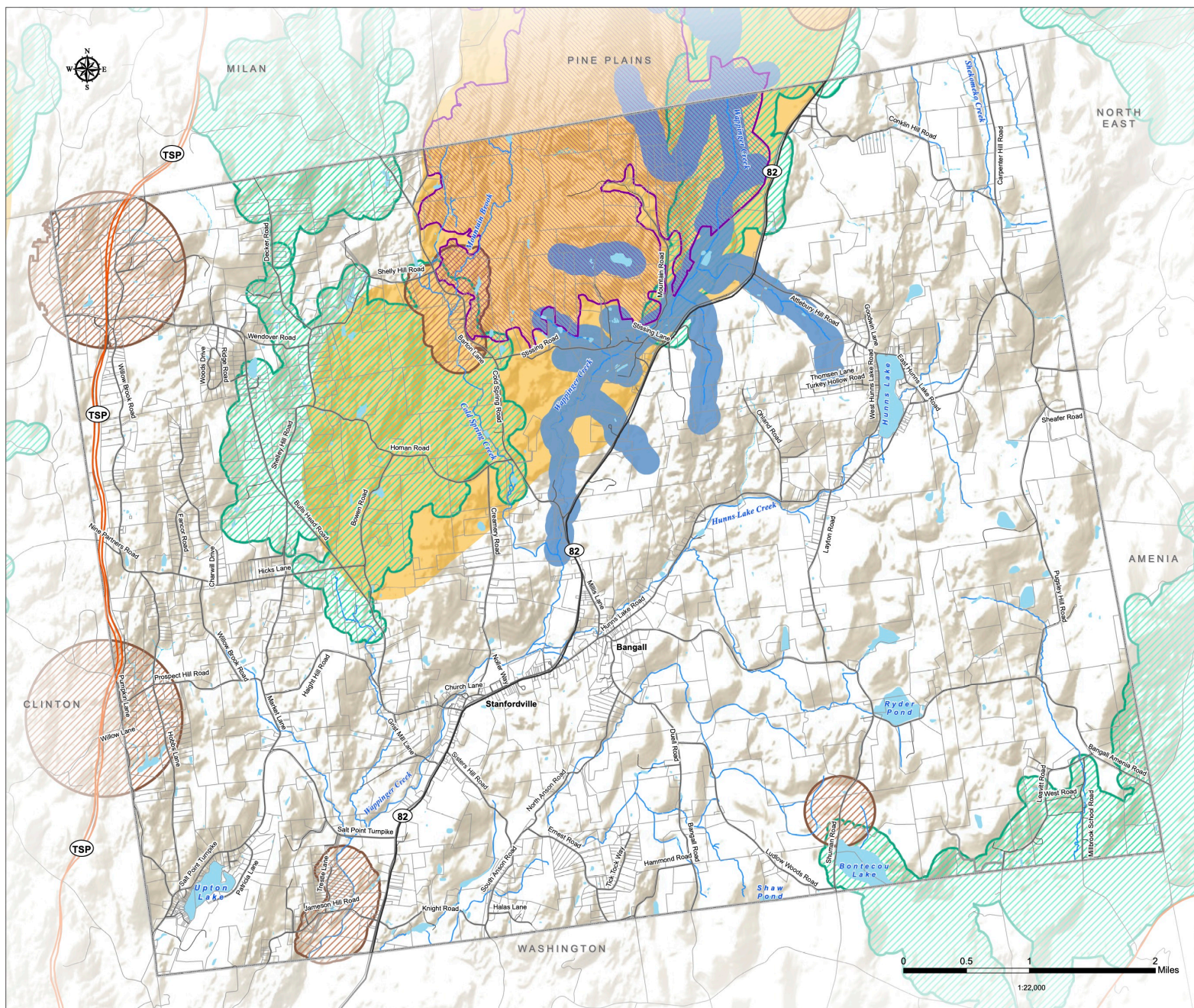
7. Audubon Important Bird Areas

Audubon New York has identified sites as Important Bird Areas if they meet at least one of three criteria: a place where birds congregate in large numbers at one time, a place for at-risk species, or a place that supports groups of birds representing certain habitats such as forests, wetlands, grasslands and shrublands.^{96,97} Portions of the Stissing Ridge Important Bird Area extend into the Town of Stanford.⁹⁸ The site supports numerous Hudson Valley Priority Bird Species, as well as Species of Greatest Conservation Need (see next section).

⁹⁶ New York State Department of Environmental Conservation. “Information about the Layers in the Hudson Valley Natural Resource Mapper.” *Hudson Valley Natural Resource Mapper*.
<https://giservices.dec.ny.gov/gis/hvnrm/layerInfo.html#ira>

⁹⁷ National Audubon Society. “Important Bird Areas (IBAs) in NY.” www.audubon.org/new-york/projects/important-bird-areas-ibas-ny

⁹⁸ The Stissing Ridge Important Bird Area (IBA) can be found using the IBA Explorer, which can be accessed from Audubon’s main IBA webpage (National Audubon Society. “Important Bird Areas.” www.audubon.org/important-bird-areas).



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Known Important Biodiversity Areas

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream
- Dutchess County Wetlands Significant Biodiversity Area (SBA)
- Important Coldwater Stream Habitat
- Important Area for Rare Terrestrial Animals
- Important Area for Rare Wetland Animals
- Audubon Important Bird Area (Stissing Ridge)

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
 Significant Biodiversity Areas: NYSDCE, 2006
 Important Areas: NY Natural Heritage Program, 2018, Audubon, 2024

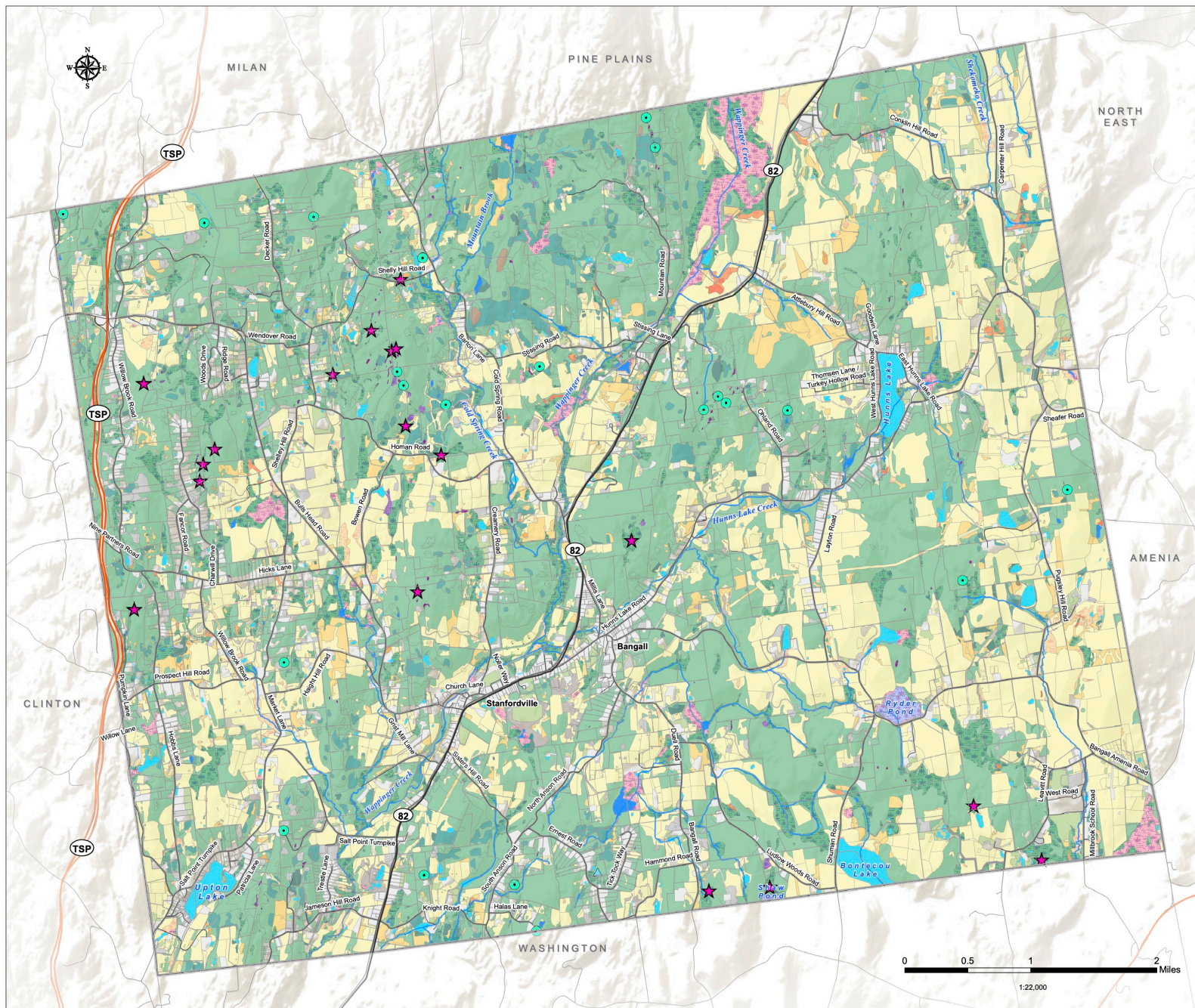
Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents. No accuracy or completeness guarantee is implied or intended.

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Map 15: Known Important Biodiversity Areas



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Habitats

	Stanford Boundary		Waterbody
	Municipal Boundary		Perennial Stream
	Parcel Boundary		Intermittent Stream
	Taconic State Parkway		Heath Swamp
	Major Road		Pool-like Swamp
	Local Road		Spring/Seep

Upland Habitats

	Upland Hardwood Forest
	Upland Mixed Forest
	Upland Conifer Forest
	Red Cedar Woodland
	Upland Shrubland
	Upland Meadow
	Oak-heath Barren
	Orchard/Plantation
	Cultural
	Sandbar
	Waste Ground (e.g. gravel mine)
	Developed

Wetland Habitats

	Hardwood & Shrub Swamp
	Mixed Forest Swamp
	Conifer Swamp
	Intermittent Woodland Pool
	Buttonbush Pool
	Kettle Shrub Pool
	Marsh
	Wet Meadow
	Calcareous Wet Meadow
	Fen
	Circumneutral Bog Lake
	Constructed Pond
	Open Water

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2024
Habitats: Hudsonia, Ltd. 2024

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Map 16: Habitats Identified by Hudsonia Ltd.

H. Species of Conservation Concern

Table 6 lists species of conservation concern that have been recorded in the Town of Stanford. The information comes from the New York Natural Heritage Program (NYNHP) biodiversity databases, the 1990-1999 New York Amphibian and Reptile Atlas (NYARA), and the 2000-2005 New York State Breeding Bird Atlas (NYBBA). Species from the NYBBA are included in the table if they were documented in Atlas blocks that are approximately 50% or more in Stanford.

The table is not a full list of all species occurring in Stanford. It includes species listed in New York as endangered at the state and/or federal level, threatened, special concern, rare, Species of Greatest Conservation Need, or a Hudson River Valley Priority Bird species recognized by Audubon New York. Historical records are provided from the NYNHP biodiversity databases. It also provides generalized primary habitat descriptions for each species.

For conservation and planning purposes, it is important to recognize that many species utilize more than one kind of habitat and additional rare species and habitats may occur in the Town of Stanford. More information on rare animals, plants, and ecological communities can be found on the New York Natural Heritage Program's Conservation Guides website.⁹⁹

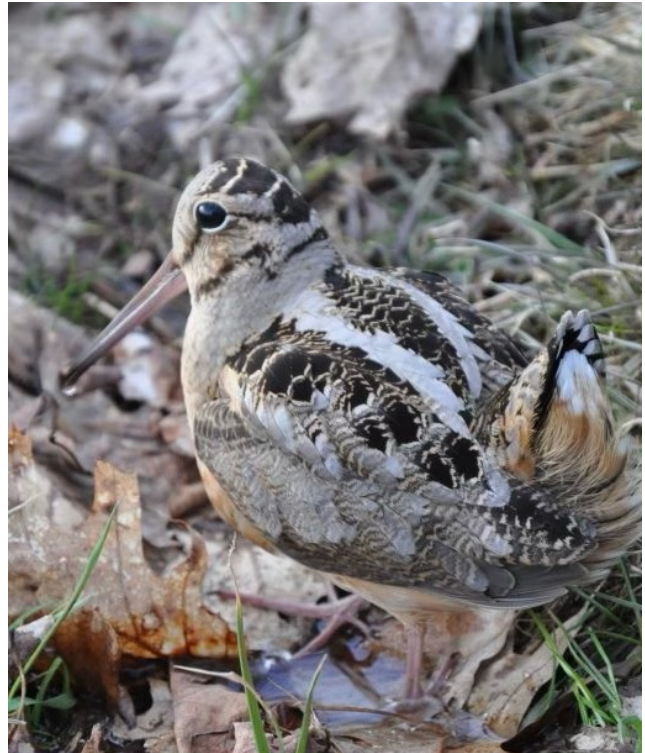


Photo 4: American woodcock in Stanford (Frank Sellerberg). The American woodcock is identified in the NYS Wildlife Action Plan as a Species of Greatest Conservation Need.

In Table 6, conservation status is scored in five categories:

- Endangered (END) at the New York State and/or federal level: Any native species in imminent danger of extirpation or extinction in New York State.
- Threatened (THR): Any native species likely to become an endangered species within the foreseeable future in New York State.
- Special concern (SC): Species of special concern warrant attention and consideration but current information, collected by NYSDEC, does not justify listing these species as either endangered or threatened.
- Species of Greatest Conservation Need (SGCN): SGCN are species identified in the State Wildlife Action Plan that are experiencing some level of population decline, have identified threats that may put them in jeopardy, and need conservation actions to maintain stable

⁹⁹ New York Natural Heritage Program. "NY Natural Heritage Conservation Guides." guides.nynhp.org

population levels or sustain recovery.¹⁰⁰ “High priority” SGCN are designated with “XX”.

- High Priority Bird (PB): Species found in the Hudson Valley and identified by Audubon New York as priority species of conservation concern where the actions and decisions of landowners, managers and planners can make a difference in conserving them.¹⁰¹

Table 6. Species of Conservation Concern and Conservation Status in the Town of Stanford

Common Name	Scientific Name	General Habitat	PB	SGCN	SC	THR	END	Source
Mammals								
New England Cottontail	<i>Sylvilagus transitionalis</i>	shrubland		xx	x			NYNHP
Eastern Small-footed Bat	<i>Myotis leibii</i>	cave, forest		x	x			NYSDEC
Eastern Red Bat	<i>Lasiurus borealis</i>	forest		x				NYSDEC
Hoary Bat	<i>Lasiurus cinereus</i>	forest		x				NYSDEC
Little Brown Bat	<i>Myotis lucifugus</i>	cave, forest, wetland		xx				NYSDEC
Tri-colored Bat	<i>Perimyotis subflavus</i>	cave, forest, stream		xx				NYSDEC
Amphibians								
Seven species have been documented in Stanford, but no Species of Conservation Concern based on the criteria used for constructing this table. Additional rare species may occur.								
Reptiles								
Blanding's Turtle	<i>Emydoidea blandingii</i>	forest, wetland		xx		NY		NYNHP
Bog Turtle	<i>Glyptemys muhlenbergii</i>	wetland		xx		U.S.	NY	NYNHP
Eastern Box Turtle	<i>Terrapene c. carolina</i>	forest, young forest		xx	x			NYNHP
Wood Turtle	<i>Clemmys insculpta</i>	stream		xx	x			NYNHP
Birds								
American Black Duck	<i>Anas rubripes</i>	wetland	x	xx				NYBBA
American Goldfinch	<i>Spinus tristis</i>	young forest, shrubland	x					NYBBA

¹⁰⁰ New York State Department of Environmental Conservation. *New York State Wildlife Action Plan*, 2015. https://extapps.dec.ny.gov/docs/wildlife_pdf/swapfinaldraft2015.pdf

¹⁰¹ National Audubon Society. “Important Bird Areas (IBAs) in NY.” www.audubon.org/new-york/projects/important-bird-areas-ibas-ny

Common Name	Scientific Name	General Habitat	PB	SGCN	SC	THR	END	Source
American Kestrel	<i>Falco sparverius</i>	meadow	x	x				NYBBA
American Redstart	<i>Setophaga ruticilla</i>	forest	x					NYBBA
American Woodcock	<i>Scolopax minor</i>	young forest, shrubland	x	x				NYBBA
Bald Eagle	<i>Haliaeetus leucocephalus</i>	lake, stream, forest	x	x		NY		NYNHP
Baltimore Oriole	<i>Icterus galbula</i>	forest	x					NYBBA
Black-and-white Warbler	<i>Mniotilta varia</i>	forest	x					NYBBA
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	young forest, shrubland	x	x				NYBBA
Black-throated Green Warbler	<i>Dendroica virens</i>	forest	x					NYBBA
Blue-Winged Warbler	<i>Vermivora pinus</i>	young forest, shrubland	x	x				NYBBA
Bobolink	<i>Dolichonyx oryzivorus</i>	grassland	x	xx				NYBBA
Broad-winged Hawk	<i>Buteo platypterus</i>	forest	x					NYBBA
Brown Thrasher	<i>Toxostoma rufum</i>	young forest, shrubland	x	xx				NYBBA
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	young forest, shrubland	x					NYBBA
Chimney Swift	<i>Chaetura pelagica</i>	urban	x					NYBBA
Cooper's Hawk	<i>Accipiter cooperii</i>	forest	x		x			NYBBA
Eastern Kingbird	<i>Tyrannus tyrannus</i>	young forest, shrubland	x					NYBBA
Eastern Meadowlark	<i>Sturnella magna</i>	grassland	x	xx				NYBBA
Eastern Towhee	<i>Pipilo erythrophthalmus</i>	young forest, shrubland	x					NYBBA
Eastern Wood-Pewee	<i>Contopus virens</i>	forest	x					NYBBA
Field Sparrow	<i>Spizella pusilla</i>	young forest, shrubland	x					NYBBA
Great Blue Heron	<i>Ardea herodias</i>	wetland						Hudsonia Ltd. ¹⁰²

¹⁰² Although the great blue heron is not a rare species, Hudsonia Ltd. considers it to be of conservation concern in

Common Name	Scientific Name	General Habitat	PB	SGCN	SC	THR	END	Source
Least Bittern	<i>Ixobrychus exilis</i>	wetland	x	x		NY		NYNHP
Least Flycatcher	<i>Empidonax minimus</i>	forest	x					NYBBA
Louisiana Waterthrush	<i>Seiurus motacilla</i>	forest	x	x				NYBBA
Northern Flicker	<i>Colaptes auratus</i>	forest	x					NYBBA
Osprey	<i>Pandion haliaetus</i>	open water, wetland	x		x			NYBBA
Pied-billed Grebe	<i>Podilymbus podiceps</i>	wetland	x	x		NY		NYBBA
Prairie Warbler	<i>Dendroica discolor</i>	young forest, shrubland	x	x				NYBBA
Purple Finch	<i>Carpodacus purpureus</i>	forest	x					NYBBA
Purple Martin	<i>Progne subis</i>	wetland	x					NYBBA
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	forest	x	xx	x			NYBBA
Red-shouldered Hawk	<i>Buteo lineatus</i>	forest	x	x	x			NYBBA
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	forest	x					NYBBA
Ruffed Grouse	<i>Bonasa umbellus</i>	young forest, shrubland	x	x				NYBBA
Savannah Sparrow	<i>Passerculus sandwichensis</i>	grassland	x					NYBBA
Scarlet Tanager	<i>Piranga olivacea</i>	forest	x	x				NYBBA
Veery	<i>Catharus fuscescens</i>	forest	x					NYBBA
Willow Flycatcher	<i>Empidonax traillii</i>	young forest, shrubland	x					NYBBA
Wood Thrush	<i>Hylocichla mustelina</i>	forest	x	x				NYBBA
Worm-eating Warbler	<i>Helmitheros vermivorum</i>	forest	x	x				NYBBA
Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	young forest, shrubland	x					NYBBA
Yellow-throated Vireo	<i>Vireo flavifrons</i>	forest	x					NYBBA

the region. Large, active rookeries are not all that common in the area and worthy of attention in conservation efforts.

Common Name	Scientific Name	General Habitat	PB	SGCN	SC	THR	END	Source
Fish								
American Eel	<i>Anguilla rostrata</i>	stream		xx				NYSDEC
Brook Trout	<i>Salvelinus fontinalis</i>	stream		x				NYSDEC
Rare Plants from Historical Records						Threatened	Endangered	Source
Black sedge	<i>Carex nigra</i>	wetland, meadow					NY	NYNHP
Brown Bog Sedge	<i>Carex buxbaumii</i>	wetland				NY		NYNHP
Clustered Sedge	<i>Carex cumulata</i>	rocky summit, wetland				NY		NYNHP
Fairywand	<i>Chamaelirium luteum</i>	forest, meadow					NY	NYNHP
Glaucous Sedge	<i>Carex glaucoidea</i>	forest				NY		NYNHP
Handsome Sedge	<i>Carex formosa</i>	forest, meadow, wetland				NY		NYNHP
Hill's Pondweed	<i>Potamogeton hillii</i>	wetland, lake				NY		NYNHP
Lily-leaved or Large Twayblade	<i>Liparis liliifolia</i>	wetland, forest					NY	NYNHP
Marsh Arrow Grass	<i>Triglochin palustris</i>	wetland				NY		NYNHP
Northern Adder's Tongue	<i>Ophioglossum pusillum</i>	wetland					NY	NYNHP
Schweinitz's Sedge	<i>Carex schweinitzii</i>	forest, wetland				NY		NYNHP

I. Threats to Biodiversity

1. Habitat Loss and Fragmentation

Loss of habitat is the greatest threat to biodiversity. Some areas of the region are becoming more forested following the abandonment of agricultural lands, and consequently, open habitats such as meadows and species that depend on meadows are on the decline. Clearing natural areas for new development removes habitat. Most habitats are unprotected and thus at risk for conversion.¹⁰³

Habitats are also at risk of fragmentation into smaller, less connected pieces by new roads, utility corridors, trails, and other types of development. Species that require large, unbroken habitats, such as birds that require the deep interiors of forests or large grasslands, are particularly vulnerable when their habitats are fragmented. Streams and other aquatic habitats can be divided by culverts and dams, which restrict the movement of materials and organisms like fish and turtles.¹⁰⁴

2. Pollinators at Risk

New York State is home to more than 450 wild pollinator species that contribute to the pollination of commercial crops and the state's biodiversity.¹⁰⁵ Together with managed bees (typically honeybees and bumblebees kept by agriculturalists and beekeepers), they are critically important to the health of the environment and the agricultural economy. Stresses on pollinators may be the result of single factors or the complex interaction of several such as:

- Parasites and pathogens
- Pesticide exposure
- Nutrient deficiencies



Photo 5: Barred owl (Frank Sellerberg). Many wide-ranging species with large spatial requirements, such as barred owl, require large, unbroken blocks of habitat.

¹⁰³ Penhollow, et al. 2006.

¹⁰⁴ Cornell University College of Agriculture and Life Sciences, Department of Natural Resources and the Environment. "Threats to Biodiversity in the Watershed." *Conservation Planning in the Hudson River Estuary Watershed, Natural Areas & Biodiversity*, <https://hudson.dnr.cals.cornell.edu/natural-areas-biodiversity/threats-biodiversity-watershed>

¹⁰⁵ New York State Department of Environmental Conservation and New York State Department of Agriculture and Markets, *New York State Pollinator Protection Plan*. 2016, https://www.dec.ny.gov/docs/administration_pdf/nyspollinatorplan.pdf

- Habitat loss and fragmentation
- Poor management practices
- Lack of genetic diversity
- Climate change.

An inventory of local native pollinators in Stanford does not exist, but a variety of native bumblebees, butterflies, and beetles that carry out pollination certainly inhabit the town. A variety of activities can benefit both native and managed pollinators, including:

- Avoiding habitat loss and fragmentation
- Promoting landscape connectivity through buffer strips and natural habitat corridors
- Diversifying agricultural practices
- Implementing integrated pest management and avoiding pesticide and herbicide use where possible
- Managing rights-of-way to encourage native flora
- Encouraging landscaping with native plants.

3. Invasive Species

Invasive species are non-native species that can cause harm to the environment, the economy, or human health. Invasive species are one of the greatest threats to New York's biodiversity. They cause or contribute to:

- Habitat degradation and loss
- Loss of native fish, wildlife, and plants
- Loss of recreational opportunities and income
- Crop damage
- Diseases in humans and livestock
- Risks to public safety.

The Lower Hudson Partnership for Invasive Species Management (Lower Hudson PRISM) provides information about invasive species in the Hudson Valley, their identification, and management.¹⁰⁶ Individual invasive species pose different levels and types of threats and vary greatly in their distribution and abundance. Invasive species likely to be encountered in the Lower Hudson Valley have been categorized into five tiers based on their abundance: 1=threat (nearby but not yet found in the region), 2=emerging, 3=established, 4=widespread, and M=monitor species (formerly Tier 5).¹⁰⁷ The permanent removal of abundant and widespread invasive species (Tiers 4 and M) may be impractical. Effective management focus is often directed at suppressing populations to levels below

¹⁰⁶ Lower Hudson Partnership for Invasive Species Management. Hosted by The New York-New Jersey Trail Conference. www.lhprism.org

¹⁰⁷ Lower Hudson Partnership for Invasive Species Management. *Invasive Species Tier Chart*, www.nynhp.org/documents/175/invasives_tiers_chart.pdf

where they cause unacceptable effects¹⁰⁸ or eliminating them from critical habitats of rare native species or highly vulnerable sites.

Early detection and rapid response to emerging invasive threats are critical steps to prevent the establishment of new pests and their spread to other areas. Lower Hudson PRISM requests that people notify them of sightings of Tier 1 and Tier 2 species.

There are numerous pathways by which new invasive species may enter our region. Invasive forest pests are the number one threat to U.S. trees and arrive primarily as stowaways in international cargo hidden in solid wood shipping pallets and woody plants bound for sale in the nursery trade.¹⁰⁹ The best defense against new invasive species is to prevent them from entering the country.¹¹⁰

4. Overabundant Species

Overabundant native species such as white-tailed deer alter ecosystems and affect biodiversity. Over time, excessive deer browsing on the forest understory (the shrubs and plants growing beneath the mature trees) leads to major and potentially long-lasting ecological change, including:

- Disappearance of the understory, eliminating habitat for other wildlife species
- Opportunities for invasive plants to proliferate in the understory, crowding out native species
- Lower biodiversity of both animals and plants
- Low survival of tree seedlings, reducing the next generation of mature trees.¹¹¹

Forest regeneration of native canopy trees and desirable timber tree species is poorest in the southeastern part of New York State, where many sites have fair to poor tree regeneration.¹¹²

Overabundant deer likely contribute to the inadequate regeneration of native trees directly (deer consuming plants) and indirectly (causing some plants to form dense understories that inhibit seedling survival).

5. Wildlife Interactions with Other Wildlife

Native animals can also threaten biodiversity, particularly when they affect sensitive locations or rare species. Gulls, cowbirds, raccoons, minks, foxes, and coyotes may reduce local biodiversity by preying on the eggs and juveniles of other species.

¹⁰⁸ Green, Stephanie and Edwin Grosholz. “Functional Eradication as a Framework for Invasive Species Control.” *Frontiers in Ecology and the Environment*, 2020. doi.org/10.1002/fec.2277

¹⁰⁹ Cary Institute of Ecosystem Studies. “Invasive Forest Pests.” www.caryinstitute.org/our-expertise/forests/invasive-forest-pests

¹¹⁰ Ibid.

¹¹¹ New York State Department of Environmental Conservation, Division of Fish and Wildlife, Bureau of Wildlife. *Deer and Ecosystem Health*, https://extapps.dec.ny.gov/docs/wildlife_pdf/forestimpactshandout.pdf

¹¹² Shirer, Rebecca and Chris Zimmerman. “Forest Regeneration in New York State.” *The Nature Conservancy*, 2010. forestadaptation.org/sites/default/files/NYS_Regen_091410_0.pdf

6. Interactions Between Wildlife and People

Threats to biodiversity also result from direct interactions between humans and wildlife. Particularly susceptible species are those that migrate, like some birds and bats, and species that move between foraging/overwintering and egg-laying habitats, like frogs, salamanders, and turtles.¹¹³ In addition to the threats already mentioned, other human-related factors that could impact the town's biodiversity include:

- Vehicle collisions (for example spring amphibian migrations across roads)
- Structure collisions (impact of birds and bats with buildings, bridges, wind turbines)
- Human intrusions and disturbance (particularly bat foraging areas and bat and snake hibernation sites; also, off-road use of motorized and non-motorized vehicles)
- Collection for pets and the pet trade
- Direct conflicts with humans due to property/agricultural damage (deer, coyotes, beaver, bear and others) and fear or misunderstanding leading to unnecessary killing of wildlife (particularly snakes)
- Predation on wildlife by domestic pets, particularly free-ranging cats.



Photo 6: Spring peeper and red eft (juvenile eastern newt) (Anne Bernstein). Road mortality of migrating amphibians and reptiles can result in decreased density.

More information on threats and efforts to protect and conserve wildlife can be obtained from the New York State Wildlife Action Plan.¹¹⁴

J. Climate Resilience for Biodiversity

Climate change is bringing profound changes to natural communities in Stanford and across the Northeast. Warming temperatures and changing precipitation patterns will make conditions less hospitable for some of our local flora and fauna – and more hospitable to other species, including newcomers. This process is shifting species ranges and rearranging habitats in ways that are difficult to predict. The locations of rare species or important natural communities may change. Common habitats providing important ecosystem benefits to Stanford will also be affected. These include large, intact forests, wetlands, and stream corridors that support stormwater management, flood

¹¹³ New York State Department of Environmental Conservation. “Statewide Threats.” Draft Comprehensive Wildlife Conservation Strategy for New York, Sept. 2005, pp. 64-65, https://extapps.dec.ny.gov/docs/wildlife_pdf/cwcs2005.pdf

¹¹⁴ New York State Department of Environmental Conservation. “State Wildlife Action Plan.” Biodiversity & Species Conservation, dec.ny.gov/nature/animals-fish-plants/biodiversity-species-conservation/state-wildlife-action-plan

control, aquifer recharge, climate moderation, and carbon sequestration.

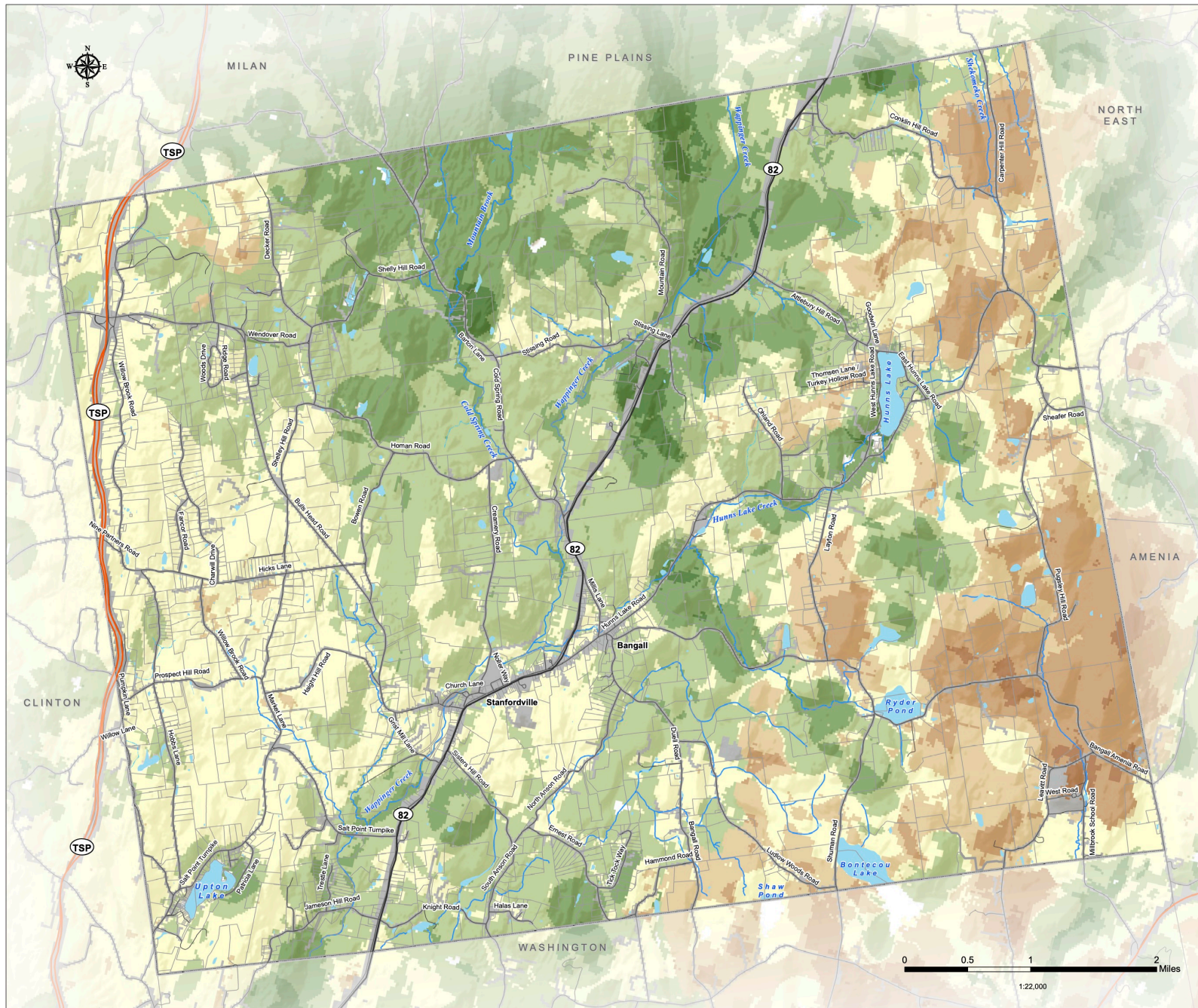
In a dynamic, changing environment, it is important to identify the natural areas most likely to support biodiversity and ecosystem benefits into the future. Conserving these strongholds for nature will ensure that plants and animals have opportunities to move and adapt as local climate conditions change.

Map 17 (Climate Resilience for Biodiversity) shows the results of a model that generated climate resilience values for biodiversity. This modeling was produced by The Nature Conservancy.¹¹⁵ Sites that have diverse physical environments (geodiversity), complex topography, and connected habitats (connectedness) are places most likely to support a diversity of plants, animals, and habitats today and in the future.

- **Geodiversity** reflects unique combinations of geology, elevation, and landforms. Ecosystem and species diversity relate strongly to their associated geophysical settings. Conserving a range of physical environments will in turn protect a diversity of plants and animals under both current and future climates.
- **Complex topography** is important because it creates a range of temperature and moisture options for the species, providing a variety of local microclimates that support species diversity. Factors that create microclimates include slope, aspect (i.e., north or south-facing), shade, and proximity to waterbodies.
- **Connected landscapes** are places that allow species to move and disperse, and do not impede natural processes such as the flow of water. These places are relatively free of roads, urbanized areas, and intensively managed farmlands that may inhibit the movement of wildlife in response to changing climate.

On Map 17, dark green indicates high estimated resilience. These areas are expected, if protected from conversion to land uses that are incompatible with wildlife, to host a high number of species in the future, despite considerable change in the climate. Brown indicates areas that are relatively more vulnerable to climate change compared to other areas in the same large ecoregion. Brown areas are not expected to host a high number of species. This information may be used to set priorities for long-term protection of areas to support biodiversity.

¹¹⁵ Anderson, Mark G., Melissa Clark, and Arlene Olivero Sheldon. *Resilient Sites for Terrestrial Conservation in the Northeast and Mid-Atlantic Region*. The Nature Conservancy, Eastern Conservation Science, 2012. conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/Pages/library.asp



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Climate Resilience Score

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

Climate Resilience Score

- Far Above Average
- Above Average
- Slightly Above Average
- Average
- Slightly Below Average
- Below Average
- Far Below Average
- Developed

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007
Climate Resilience Data: The Nature Conservancy, 2016

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents.
No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Map 17: Climate Resilience for Biodiversity

Chapter 6: Land Use

This chapter is divided into four parts:

- Zoning
- Regulated Facilities
- Agricultural Resources
- Conservation and Public Lands

A. Zoning

Cities, towns, and villages in New York State are authorized by state statutes to regulate land use by enacting what is commonly referred to as zoning. Zoning governs the way land in a municipality is used and developed, with the goal of carrying out the municipality's long-range land use objectives. Zoning regulates property uses and the siting and density of development.

1. Zoning Districts

Typically, zoning laws divide the community into land use districts and establish building restrictions regarding building height, lot area coverage, the dimension of structures, and other aspects of building and land use. The Town of Stanford zoning map is available online.¹¹⁶ Town zoning districts are listed in Table 7.

Examining the zoning map in relation to the NRI resource maps can provide insight into potential development scenarios that could affect the existing natural resource base, ecology, and other significant features.

Table 7. Zoning Districts in the Town of Stanford

Code	Description
AR	Agricultural Residential
CR	Conservation Residential
LR	Lake Recreation District
RC	Rural Center District
RR	Rural Residential District

2. Critical Environmental Areas

In addition to zoning districts, the Town of Stanford has five designated Critical Environmental Areas. Critical Environmental Areas (CEAs) are areas in the state which have been designated by a local or state agency to recognize a specific geographical area with one or more of the following

¹¹⁶ Dutchess County Department of Planning and Development. *Town of Stanford Zoning Map*, 2016, www.dutchessny.gov/Departments/Planning/Docs/stanford.pdf

characteristics:

- A feature that is a benefit or threat to human health
- An exceptional or unique natural setting
- An exceptional or unique social, historic, archaeological, recreational, or educational value
- An inherent ecological, geological, or hydrological sensitivity to change that may be adversely affected by any physical disturbance.

A CEA designation serves to alert project sponsors to the agency's concern for the resources or dangers contained within the CEA. Once a CEA has been designated, potential impacts on the characteristics of that CEA become relevant areas of concern that warrant specific, articulated consideration in determining the significance of any actions that may affect the CEA.¹¹⁷

The Critical Environmental Areas within the Town of Stanford are:¹¹⁸

- **Upper Wappinger CEA:** Designated on October 16, 1992, this CEA is located at the south end of Stissing Mountain, near the headwaters of the Wappinger Creek, between Cold Spring Road to the west and NYS Route 82 to the east. It was designated to protect hydrology and water quality, biological and geological uniqueness, and scenic views.
- **Buttercup Farm Sanctuary CEA:** Designated on April 8, 1987, this CEA is located east of NYS Route 82 and south of Attlebury Hill Road as part of the Buttercup Farm Audubon Sanctuary. It was designated to preserve farmland, wetland, and mountain habitat.
- **Snake Hill CEA:** Designated on April 8, 1987, this CEA is located north of Bulls Head Road and west of Bowen Road. It was designated to protect rare plants and animal communities.
- **Bontecou Lake CEA:** Designated on April 8, 1987, this CEA is located on the west and east sides of Shuman Road, including Bontecou Lake, just north of the boundary with the Town of Washington. It was designated to protect migratory and nesting birds.
- **Ryder Pond and Cagney Marsh CEA:** Designated on April 8, 1987, this CEA is located just north of Bangall-Amenia Road near the intersection with Shuman Road, encompassing Ryder Pond and Cagney Marsh to the north. It was designated for the protection of waterfowl.
- **Millbrook Meadow CEA:** Designated on April 8, 1987, this CEA is located between Millbrook School Road and Bangall-Amenia Road, just north of the boundary with the Town of Washington. It was designated for wetland protection.

Stanford's 2023 Comprehensive Plan recommends the following measures be implemented by the

¹¹⁷ New York State Department of Environmental Conservation, Hudson River Estuary Program. *Critical Environmental Areas – Tools for Conservation in Your Community Fact Sheet*, dec.ny.gov/sites/default/files/2025-02/ceafactsheet.pdf

¹¹⁸ New York State Department of Environmental Conservation. "Critical Environmental Areas." *State Environmental Quality Review (SEQR)*, www.dec.ny.gov/regulatory/permits-licenses/seqr/critical-environmental-areas

Town Board through a coordinated effort with the Conservation Advisory Commission (CAC):¹¹⁹

- Consider expanding several existing CEAs, including Snake Hill and Millbrook Meadow, to include the surrounding Priority Conservation Areas identified by Hudsonia Ltd.
- Consider designating additional CEAs, including Shaw Pond, Stanford Wildlife Preserve, Whitlock Preserve, the Town Landfill area, and once determined, the potential wellhead protection area.

In 2025, Hudsonia Ltd. completed a review¹²⁰ of three of Stanford's existing CEAs and five of the Priority Conservation Areas (PCAs) that were delineated and described in its report *Significant Habitats in the Town of Stanford, Dutchess County, New York*.¹²¹ It reviewed the CEA and PCA boundaries and habitats, changes in the landscape, and new information about species, habitats, and conservation status of the land. It recommended maintaining the existing configuration of one CEA (Ryder Pond/Cagney Marsh), expanding two others (Millbrook Meadow, Snake Hill), and creating one new CEA (Lower Wappinger Creek). The report is found in Appendix 2.

3. Dutchess County Centers and Greenspaces Guide

In 2015, Dutchess County developed the Centers and Greenspaces Guide¹²² as part of a county-wide initiative to promote smart growth principles and avoid strip-and-sprawl development patterns. Some of the main concepts of this guide focus on recommendations including:

- Reinforce existing centers and main streets.
- Mix uses to promote walking and biking.
- Connect major centers with transit services.
- Locally identify priority growth areas for close-in expansion and conversion of strip districts or subdivisions into new centers.
- Employ a range of protection measures for farmland and natural wildlife areas.
- Adopt policies that support agriculture.
- Plan for continuous greenspace systems.
- Locally identify priority greenspaces for future public or private conservation.

The Town of Stanford, though not part of the county's "Greenway Compact," can benefit from the

¹¹⁹ *Stanford Comprehensive Plan*, 2023, p. 90.

¹²⁰ Stevens, Gretchen. *Recommendations for Possible Revisions to Critical Environmental Areas, Town of Stanford*. Hudsonia Ltd., 2025.

¹²¹ Bell, Kristen, Catherine Dickert, Jenny Tollefson, and Gretchen Stevens. *Significant Habitats in the Town of Stanford, Dutchess County, New York*. Hudsonia Ltd., 2005, www.hudsonia.org/maps-reports#Significant-Habitat-Reports

¹²² Dutchess County Department of Planning and Development. "Greenway Connections and Guides - Centers & Greenspaces." www.dutchessny.gov/Departments/Planning/Greenway-Connections-Guides.htm

guiding principles as the town implements recommendations contained in Stanford's 2023 Comprehensive Plan.

The Dutchess County Centers and Greenspaces Guide and related map has identified 10 areas of continuous greenspaces over 1,000 acres in size within the town, including large blocks of prime agricultural land, particularly in its eastern half. Agriculture and protected open space in the Town of Stanford are discussed further on in this chapter.

B. Regulated Facilities

State and federal agencies regulate many types of facilities to maintain environmental quality and public health. NYSDEC has created an online web map, the DECinfo Locator,¹²³ which provides digital access to regularly updated NYSDEC documents and public data about the environmental quality of specific sites. Refer to the DECinfo Locator to view locations of these regulated facilities in Stanford. Understanding the sites of potential contamination in relation to other maps in the Natural Resource Inventory can provide insight into possible impacts on natural resources and other significant features in the town. The types of regulated facilities for which there are documented active locations in Stanford are as follows:

- **Transfer Station** – A transfer facility is a facility where waste is received, consolidated, and then transported to a subsequent facility for processing, treatment, further transfer, or disposal. Often, residents or local haulers bring waste to transfer facilities, where the waste is consolidated and then transferred to larger facilities. The Town of Stanford Transfer Station is located at 181 Bangall-Amenia Road. The station's annual report may be viewed using the DECinfo Locator.
- **Inactive Landfill** – An inactive landfill, of about five acres in size, is located at the Town of Stanford Transfer Station, mentioned above.
- **Petroleum Bulk Storage (PBS) Facilities** – DECinfo Locator lists PBS facilities within the town. The PBS program applies to properties which have, except for tank systems that are specifically exempted:
 - One or more tank systems that are designed to store a combined capacity of more than 1,100 gallons or more of petroleum in aboveground and/or underground storage tanks; or
 - One or more underground tank systems that are designed to store 110 or more gallons of petroleum.
- **Active and Reclaimed Mines** – As documented on DECinfo Locator, there is only one active sand and gravel mine in the Stanford at the time of writing. Five additional reclaimed sand and gravel mines are documented in the town.

There are other types of regulated facilities that could potentially have a negative impact on the environment, such as Chemical Bulk Storage Facilities and Vehicle Dismantling Facilities, but none are documented in Stanford.

¹²³ New York State Department of Environmental Conservation. "DECinfo Locator: DEC Information Layers – Environmental Quality – Permits and Registrations." dec.ny.gov/maps/interactive-maps/decinfo-locator

C. Agricultural Resources

Understanding the distribution of agricultural resources and working farms should be an important consideration in local planning and development processes. Growing food locally can benefit the economy, the environment, and the health and welfare of the community. In addition, farms often support valuable wildlife habitats and water resources. Local farms are also important contributors to scenic beauty and open space in the community.



Map 18 (Agricultural Resources) shows agricultural district parcels and the distribution of farmland soils in the Town of Stanford.

Photo 7: Early morning mowing (Brian Underhill)

1. Agricultural Soils

Farming often relies on the availability of high-quality soils, which in turn require smaller inputs of fertilizer and nutrients, leading to lower costs, higher production rates, and less environmental impact. High quality agricultural soils are often broken into three groups: Prime Farmland Soils, Prime Farmland Soils if Drained, and Farmland Soils of Statewide Importance.^{124,125} These categories of soils are present throughout the town but are most common in valleys and at lower elevations.

Prime Farmland Soils are defined by the U.S. Department of Agriculture and New York State as the most productive soils for farming. Prime Farmland Soils are relatively limited in extent and scattered throughout the Town of Stanford, without any noteworthy concentrations. As shown on Map 18, there are 3,749 acres of Prime Farmland Soils in Stanford, representing approximately 12% of all soils. An additional 1,254 acres are classified as Prime Farmland Soils if Drained, which may include wetland areas. Some examples of Prime Farmland Soils in the Town of Stanford are Dutchess-Cardigan complex (DwB), Georgia silt loam (GsB), and Stockbridge silt loam (SkB), among others.

Farmland Soils of Statewide Importance are soils that do not meet all criteria for Prime Farmland. Though not as productive as Prime Farmland, if managed properly, these soils can produce fair to

¹²⁴ U.S. Department of Agriculture, Natural Resources Conservation Service, “Prime and Important Farmlands in New York.” *Field Office Technical Guide*, 2018, efotg.sc.egov.usda.gov/references/public/NY/Farmland_Class_NY_Information_si.pdf

¹²⁵ “7 CFR § 657.5 - Identification of Important Farmlands.” *Electronic Code of Federal Regulations*, U.S. Government Publishing Office, www.ecfr.gov/current/title-7/part-657/section-657.5

good yields. Statewide important farmland soils occur throughout the town. There are 11,337 acres of Farmland Soils of Statewide Importance in Stanford, representing approximately 35% of all soils. Some examples of Farmland Soils of Statewide Importance in the Town of Stanford are Dutchess-Cardigan complex (DwC), Stockbridge silt loam (SkC), Sun silt loam (Su), and Hoosic gravelly loam (HsB), among others.

2. Agricultural District

New York State enacted the Agricultural Districts Law in 1971 to provide basic “right to farm” protections to keep agricultural land in production. Participation in agricultural districts is voluntary and benefits landowners by protecting farmers against overly restrictive local laws and private nuisance suits involving agricultural practices.

One Agricultural District (Ag District 21) covers all of Dutchess County. Of the thirty Dutchess County municipalities in the district, the Town of Stanford has the second-most Agricultural District acreage (second only to the Town of Washington), totaling 21,896 acres, or 68% of the town’s total land area. This statistic comes from the 2024 Dutchess County 8-Year Agricultural District Review¹²⁶ and shows a 3% increase in total Agricultural District acreage from 2016, when the previous 8-Year Review was conducted. Agricultural District Parcels within Ag District 21 are shown on Map 18 and can also be found using the county’s Agricultural District Viewer.¹²⁷

3. Agricultural Assessment

New York State Agricultural Districts Law provides for a reduction in property taxes for land in agricultural production. The agricultural assessment is based on the following qualifications:¹²⁸

- Minimum of seven acres farmed by a single operation. Total acreage of less than seven acres may still qualify if gross sales are at least \$50,000 per year.
- Lands have been in production for the preceding two years.
- Farm operation grosses an average of \$10,000 or more in sales per year.

At the time of writing, there are 10,540 acres of land in Stanford receiving an agricultural assessment, which is approximately 33% of the town.

4. Farming in the Town of Stanford

As of 2022, nearly 40% of the town’s agricultural area was dedicated to production agriculture, 15% to horses and horse-boarding, and 13% to beef and livestock. Table 8 provides a summary of these

¹²⁶ Dutchess County Department of Planning and Development. *Dutchess County Agricultural District Certification Process 2023 (Without Appendices)*, 27 Nov. 2023, www.dutchessny.gov/Departments/Planning/Docs/DutchessCounty_AgDistrict_CertificationProcess_2023_without_appendices.pdf

¹²⁷ Dutchess County Government. *Agricultural District Viewer*. gis.dutchessny.gov/ag-districts/

¹²⁸ New York State Department of Taxation and Finance. “Agricultural Assessment Overview.” https://www.tax.ny.gov/research/property/assess/valuation/ag_overview.htm

farm enterprises in Stanford.

Table 8. Farm Enterprises by Area in the Town of Stanford¹²⁹

Farm Enterprise Category	Acres	Percentage of Total Agriculture
Production Agriculture (hay, corn, and field crops)	8,213	39%
Beef and Livestock	2,803	13%
Horses	3,156	15%
Buffer (vacant, residential, or open space parcels that border farm property and could be developed for farming operations)	3,164	15%
Specialty Crops (e.g., Christmas trees, orchards, vegetable farms, flowers)	1,093	5%
Dairy	955	4%
Other	1,824	9%

5. Forestry in the Town of Stanford

Approximately 43% of Stanford is forested. The ability of private forest landowners to periodically harvest timber or other forest products provides an important source of income that can help landowners avoid subdivision of land or conversion to non-forest uses. Working forests also contribute to the local economy and demand very little in the way of community services in return for the property taxes their owners pay. NYSDEC's Municipal Guide to Forestry in New York State¹³⁰ offers guidance to encourage local governments to actively support and promote multiple forest uses and stewardship of the land.

To encourage the long-term management of woodlands for forest products, New York State enacted the 480a Forest Tax Law in 1974. Under this law, owners of forest land may receive a property tax exemption if they meet certain requirements. Eligible land must include at least 50 contiguous acres devoted exclusively to forest production. Landowners who enroll in the program must commit to managing their forest for timber production and follow a 10-year management plan prepared by a qualified forester and approved by NYSDEC. The plan must be maintained and updated for each year that the exemption is received.¹³¹

Approximately 4,125 acres (13%) of the Town of Stanford land area was enrolled in the 480a program in 2024. These parcels are outlined on Map 12 (Large Forests). Additional properties may be managed for forestry without enrollment in 480a. All private, non-industrial, forest landowners who are looking for introductory management and technical advice are eligible for a free visit with a

¹²⁹ Cornell Cooperative Extension Dutchess County. "2022 Town Agricultural Profiles." ccedutchess.org/agriculture/2022-town-agricultural-profiles

¹³⁰ Daniels, Katherine H. *A Municipal Official's Guide to Forestry in New York State*. New York Planning Federation, New York State Department of Environmental Conservation and Empire State Forest Products Association, 2005. https://extapps.dec.ny.gov/docs/lands_forests_pdf/guidetoforestry.pdf

¹³¹ New York State Department of Environmental Conservation. "480a Forest Tax Law." dec.ny.gov/nature/forests-trees/private-forest-management/480a-forest-tax-law

NYSDEC forester. More information about NYSDEC's Forest Stewardship Program is available at its Private Forest Management webpage.¹³²

¹³² New York State Department of Environmental Conservation. "Private Forest Management."
www.dec.ny.gov/lands/4972.html

Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Agricultural Resources

-  Stanford Boundary
-  Municipal Boundary
-  Parcel Boundary
-  Taconic State Parkway
-  Major Road
-  Local Road
-  Waterbody
-  Perennial Stream
-  Intermittent Stream
-  Dutchess County Agricultural District Parcel
- Farmland Soil Class**
 -  Prime farmland
 -  Farmland of statewide importance
 -  Prime farmland if drained

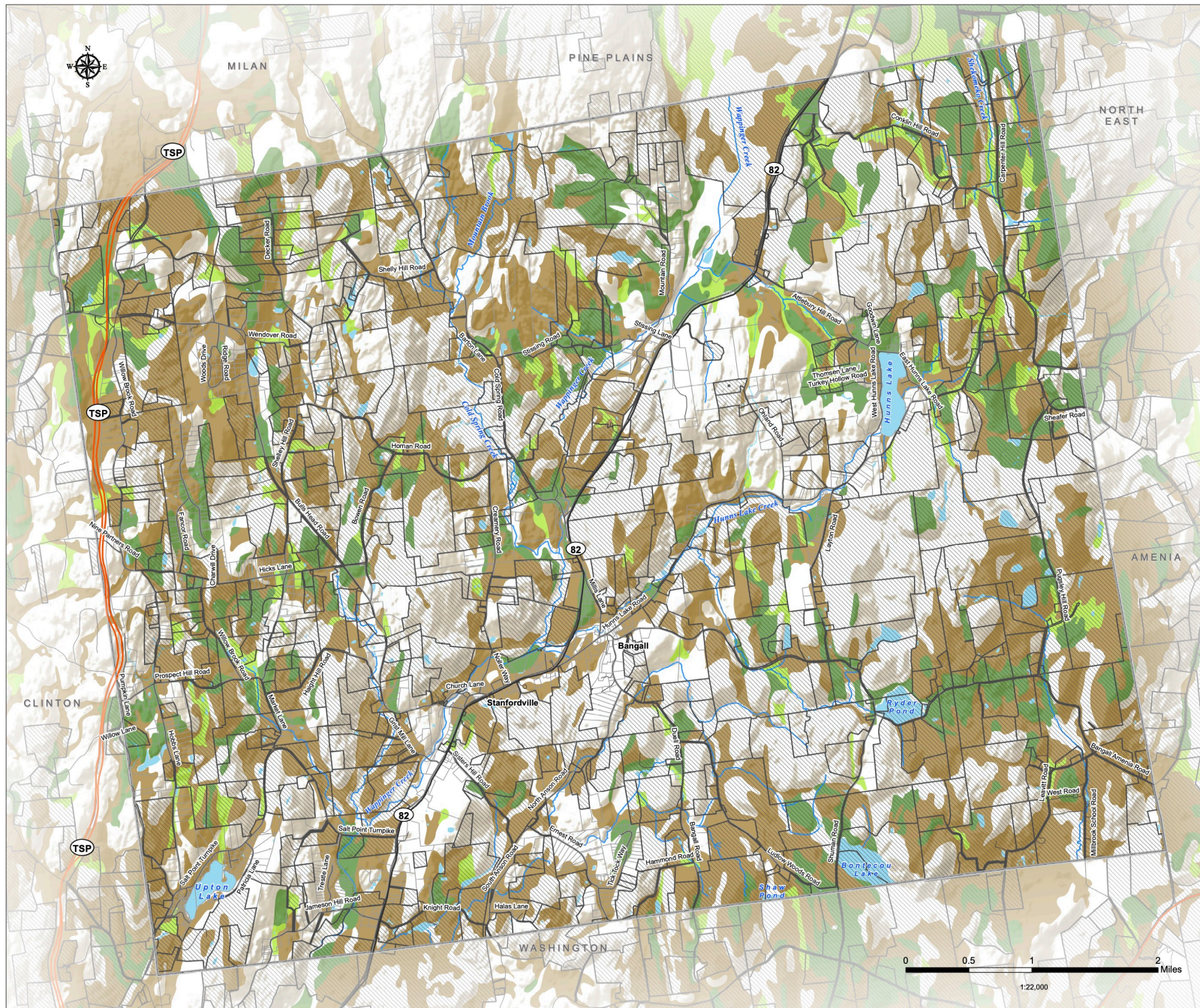
DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
 Parcel Boundaries: Dutchess County Real Property, 2024
 Agricultural Value Assessment: Dutchess County Real Property, 2024
 Roads: Dutchess County OCIS, 2024
 Streams & Waterbodies: Hudsonia, Ltd. 2007
 Farmland Soils: USDA Web Soil Survey

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents.
 No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Map 18: Agricultural Resources

D. Conservation Land

Conserved lands provide substantial environmental, social, economic, and health benefits. They offer long-term habitat protection, help manage water and air quality, and support community resilience to climate change. In response to global climate and biodiversity crises, nations around the world have signed an agreement to conserve 30% of land and water by 2030. New York has also committed to the 30 by 30 goal to promote biodiversity and preserve land and water. Currently, about 32% of the Town of Stanford is preserved under conservation easement or otherwise protected.

A total of 10,317 acres of conservation easements and other protected lands were mapped in the Town of Stanford as shown on Map 19 (Conservation and Protected Land). These properties were identified from parcel data and information provided by local land trusts, namely the Dutchess Land Conservancy and Winnakee Land Trust. The NY Protected Areas Database (NYPAD) was also used as a reference. NYPAD is a spatial database of lands protected, designated, or functioning as open space, natural areas, conservation lands, or recreational areas created by the New York Natural Heritage Program. Conservation and other protected lands are classified based on ownership and summarized in Table 9.

Table 9. Conservation and Other Protected Lands in the Town of Stanford by Ownership Type

Ownership Type	Acreage	Percent of Town
Conservation Easement (private)	6,878	21.5%
Conservation Organization (public)	3,160	9.9%
Town of Stanford	71	0.2%
New York State	208	0.6%
Total	10,317	32.2%

E. Publicly Accessible Open Spaces

Stanford is fortunate to have a diverse network of parks, preserves, and other publicly accessible open spaces that provide opportunities for recreation, scenic enjoyment, and connection with nature. These lands are owned and managed by the town, land trusts, nonprofit organizations, and state agencies. Collectively, they help protect biodiversity, conserve critical habitats, and support the community's rural character and quality of life. The properties are shown on Map 19 (Conservation and Protected Land) and listed below from largest to smallest in acreage:

- **Jesse and Gayle Bontecou Wildlife Conservation Preserve:**¹³³ Owned by Dutchess Land Conservancy, this 1,258-acre preserve features meadows, woodlands, and wetlands with trails overlooking Bontecou Lake. It provides critical habitat within a vast network of more than 11,000 acres of contiguous conserved private land.
- **Wethersfield Estate & Garden (Seasonal / Fee-Based):**¹³⁴ Founded in 1938 by Chauncey Stillman, Wethersfield spans 1,000 acres with sweeping views of the Berkshires, Catskills, and Taconic Hills. A nonprofit on the National Register of Historic Places, Wethersfield features a Georgian-style house, renowned Italian Renaissance gardens, 20 miles of trails, and diverse programs in horticulture and conservation, culture, and the arts. Open May–October, it welcomes visitors for tours, events, and year-round trail access.
- **Buttercup Farm Audubon Sanctuary:**¹³⁵ Buttercup is a premier birdwatching destination that spans 641 acres of grassland, wetland, and wooded habitats. It has six miles of trails that provide exceptional opportunities to observe wildlife and enjoy sweeping views of the countryside.
- **Stissing Mountain Multiple Use Area:**¹³⁶ This property consists of 590 acres of NYS DEC-managed lands for hiking, hunting, fishing, and wildlife observation. It has several trails, including one to the Stissing Mountain fire tower in Pine Plains.
- **Dutchess Gables Preserve (Winnakee Land Trust):**¹³⁷ Dutchess Gables is a 207-acre preserve with 3.3 miles of hiking trails through meadows, wetlands, and woodland habitats. The preserve supports critical habitats for several species of conservation concern.
- **Orchard Hill Preserve (Winnakee Land Trust; not yet open to public):** This property with 153 acres of meadows, forest, and wetlands was recently acquired by Winnakee Land Trust and is not yet (as of June 2025) open to the public.
- **Sisters Hill Woods (Winnakee Land Trust):**¹³⁸ This 75-acre preserve has hardwood forest, wetlands, streams and 1.3 miles of hiking trails, including sections along old woods roads

¹³³ dutchessland.org/get-involved/places-to-visit/the-jesse-and-gayle-bontecou-wildlife-conservation-preserve

¹³⁴ wethersfield.org

¹³⁵ audubon.org/buttercup-farm

¹³⁶ dec.ny.gov/places/stissing-mountain-multiple-use-area

¹³⁷ winnakee.org/visit-our-parks-preserves/dutchess-gables-preserve

¹³⁸ winnakee.org/visit-our-parks-preserves/sisters-hill-woods

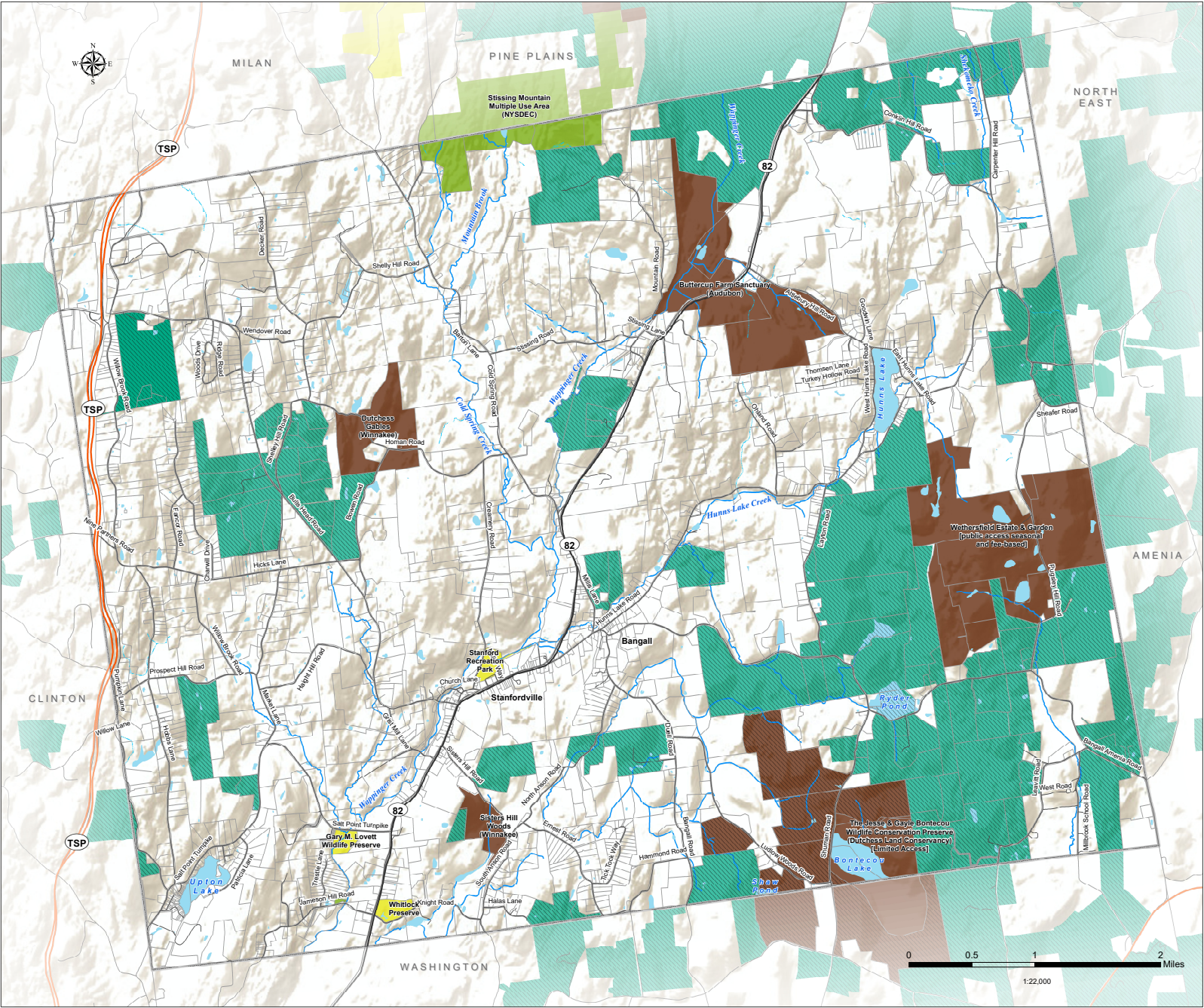
and a historic rail bed.

- **Whitlock Wildlife Preserve:**¹³⁹ 26-acre, town-owned wildlife preserve with approximately one mile of wooded trails.
- **Gary M. Lovett Wildlife Preserve** (formerly Stanford Wildlife Preserve):¹⁴⁰ Town-owned preserve with 20 acres of rich wildlife habitat along the Wappinger Creek. It has public fishing access and approximately one mile of trails through open meadows.
- **Stanford Recreation Park:**¹⁴¹ A hub for community activities, with Wappinger Creek fishing access, ball fields, a playground, and facilities for active recreation and events.
- **Dot and Irv Burdick Park** (future): A new town park in development, with plans for trails and recreational amenities.

¹³⁹ gis.dutchessny.gov/parks-and-trails/map/?park=PRK_130#PRK_130

¹⁴⁰ gis.dutchessny.gov/parks-and-trails/map/?park=PRK_212#PRK_212

¹⁴¹ stanfordny.myrec.com



Town of Stanford

Dutchess County, NY

Natural Resources Inventory - 2025

Conserved & Protected Land

- Stanford Boundary
- Municipal Boundary
- Parcel Boundary
- Taconic State Parkway
- Major Road
- Local Road
- Waterbody
- Perennial Stream
- Intermittent Stream

Public and Protected Land

- Nonprofit Organization
- NYS Property
- Town Property
- Conservation Easement
- No Public Access

DATA SOURCES

Municipal Boundaries: Dutchess County Real Property, 2024
Parcel Boundaries: Dutchess County Real Property, 2024
Roads: Dutchess County OCIS, 2024
Streams & Waterbodies: Hudsonia, Ltd. 2007
Protected Areas: NYPAD 2017, Scenic Hudson 2020, Winnakee Land Trust 2020, & Dutchess Land Conservancy 2024

Prepared by: CCEDC GIS Lab, 2024, updated 2025.

WARNING: This map is not a substitute for land surveys or legal documents. No accuracy or completeness guarantee is implied or intended.

This map was developed as part of the Town of Stanford's Natural Resources Inventory. Funding for this project came from the New York State Department of Environmental Conservation Hudson River Estuary Program's Local Stewardship Planning Grant.



Map 19: Conservation and Protected Land

Glossary

Alkaline: Having a pH greater than 7.

Allochthonous rock: Rock that has been moved over time and geologic history.

Alluvial deposit: Material deposited by a river or stream, consisting of clay, silt, sand, and/or gravel.

Aquifer: An underground layer of water-bearing material, consisting of permeable or fractured rock, or of unconsolidated materials.

Autochthonous rock: Bedrock that has stayed put after formation.

Bedrock: The solid mass of rock underlying soil.

Biodiversity: The variety and variability of life on Earth.

Buttonbush Pool: A seasonally or permanently flooded, shrub-dominated pool, with buttonbush normally the dominant plant.

Calcareous: Rich in calcium, as in wet meadows and fens with high levels of calcium carbonate, also known as chalk or lime.

Carbon Sequestration: The removal of carbon from the atmosphere by biological (stored in living material such as wood), chemical (captured by weathering of certain types of rocks) or physical (conversion of formerly living material into oil deposits) processes. These processes can be natural or technological.

CCEDC: Cornell Cooperative Extension Dutchess County.

Circumneutral: Having a pH at or near 7.0 (approximately 6.6 – 7.3).

Circumneutral bog lake: A spring fed calcareous water body.

Conifer forest: A forest community dominated by cone-bearing, needle-leaved trees such as pine, spruce, fir, and hemlock, which generally remain evergreen year-round.

Convective events: Meteorological events that impact the water cycle in a different manner than other precipitation mechanisms, with spikes in rain rates.

Culvert: A structure that allows water to pass under a roadway or other obstacle.

Diadromous (of a fish): Migrating between salt water and fresh water in its life cycle.

Easement: A right to cross or otherwise use someone else's land for a specified purpose.

Ecosystem: A community of living organisms and the physical environment with which they interact.

Ecosystem services: Benefits provided to humans by the environment, such as pollination of food crops by insects, reduced flooding by wetlands, reduced air conditioning costs by tree shading, etc.

Effluent: A liquid discharged as waste.

Ephemeral waters: Only flowing after rainfall or snow melt.

Eutrophication: Excessive plant growth in a water body (usually a pond or small lake) in response to excess nutrient availability (usually from human or animal waste or fertilizer).

Evapotranspiration: The amount of water that evaporates from the surface and is transpired by plants.

FEMA: Federal Emergency Management Agency.

Floodplain: Low-lying areas next to rivers or streams subject to flooding.

Forever chemicals: PFAS (Per- and polyfluorinated alkyl substances), also known as the *Forever Chemicals*, are a large chemical family of over 10,000 highly persistent chemicals that do not occur in nature.

Greenhouse gas: A gas (such as carbon dioxide or methane) in the atmosphere that absorbs heat resulting from sunlight radiated off the earth's surface. This is called the greenhouse effect.

Habitat Fragmentation: Dividing large, continuous habitat areas into smaller, more isolated remnants.

Hardwood forest: A forest community composed primarily of broad-leaved deciduous trees such as oak, maple, beech, and birch, which typically shed their leaves each autumn.

Headwaters: The upper reaches of a stream, near its origin.

Hudsonia: A not-for-profit organization which protects the natural heritage of the Hudson Valley and beyond by making accurate conservation science accessible to those deciding the future of our landscape.

Hydric soils: Formed when soils are underwater (such as in a pond) for long enough that they lack oxygen, which slows decomposition.

Igneous rock: Rock that is formed deep underground when rock literally melts under pressure and incredible heat.

Invasive species: Organisms (plants, animals, and pathogens) that are not native to the ecosystem and whose introduction causes, or is likely to cause, economic or environmental harm, or harm to human health.

Marsh: A wetland dominated by grasses or herbaceous species.

Metamorphic rock: Rock that forms under intense heat and pressure but has not melted like igneous rock.

Mitigation (of climate change): Actions taken to reduce emissions of greenhouse gases or to increase their capture, reducing the degree of global climate change.

Mixed forest: A forest community where coniferous and deciduous (hardwood) trees grow together in significant proportions, creating a blend of evergreen and broad-leaved species that provides diverse habitats and seasonal variation.

Natural community: An assemblage of interacting plant and animal populations that share a common environment.

Net zero: A state in which human-caused greenhouse gas emissions are balanced by human-

caused greenhouse gas removals over a specified time period.

Nitrates: A form of nitrogen. Nitrogen is an essential nutrient for all life; however, in excess amounts can cause major water quality problems.

NYSDEC: New York State Department of Environmental Conservation.

Oldfield succession: A farm field site which transitions by sequences of grasses, herbaceous species, and shrubs.

Perennial streams: Flowing year-round.

Permeable: Allowing the passage of fluids.

Phosphorus: An element that is essential to all life. Usually, the available amount of phosphorus in a waterbody controls the pace of the production of algae and aquatic plants. Excess phosphorous in a waterbody can degrade water quality and lead to eutrophication and the growth of harmful algae.

Pollination: The transfer of pollen to a stigma, ovule, flower, or plant to allow fertilization.

Resiliency: The capacity to withstand or to recover quickly from difficulties.

Riparian: Of or relating to the bank of a stream or river.

Sedimentary rock: Rock that is formed at the surface by sediments that are slowly laid down by erosion and then compressed under the weight of subsequent layers.

Siltation: The deposition or accumulation of fine sediments in a water body.

Soil profile: A cross-section of soil layers, whose physical, chemical, and biological characteristics differ from one another.

Strip development and sprawl: Both terms are used to describe the rapid spread of low-density development.

Swamp: A wetland dominated by woody plants.

Tectonic plates: Large pieces of the earth's crust and upper mantle that move slowly over time.

Till: Unstratified glacial deposit, consisting of a mixture of clay, sand, gravel, and boulders.

Topography: The collective description of landforms in an area including hills, valleys, waterways, and wetlands.

Tributary: A stream that flows into a larger stream, river, or lake.

Watershed: The area of land from which water drains into a stream, river, lake, or other water body.

USEPA: United States Environmental Protection Agency.

Vernal pool: A wetland—usually small—that is isolated from other wetlands or streams, and that typically holds water in winter and spring, but dries up at some time during the growing season.

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Appendices

Appendix 1: Significant Habitats in the Town of Stanford (2024 Update)

Appendix 2: Hudsonia's Recommendations for Possible Revisions to Critical Environmental Areas, Town of Stanford

Appendix 1:

**Significant Habitats in the Town of Stanford
(2024 Update)**

Appendix 2:

Hudsonia's Recommendations for Possible Revisions to Critical Environmental Areas, Town of Stanford