



Moodna Creek WATERSHED ATLAS



Edward A. Diana
County Executive

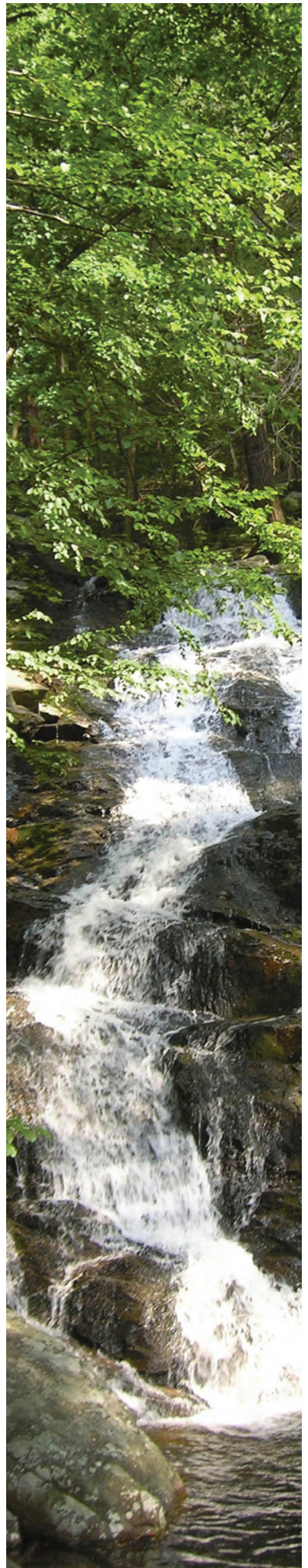


NYS DEC



Hudson River Estuary

The Atlas of the Moodna Creek Watershed



Introduction

The **Atlas of the Moodna Creek Watershed** is a project of the **Orange County Water Authority** and was produced with funding from the New York State Department of Environmental Conservation Hudson River Estuary Program.

The Moodna Creek is one of the largest rivers in Orange County, NY, and drains about 180 square miles, which is 21% of the County's land area. An important tributary of the Hudson River, the Moodna is identified in the County's Open Space Plan as a Selected Priority Watershed, and the Creek is designated by NY State as "irreplaceable" Significant Coastal Fish and Wildlife Habitat.

The Nature Conservancy, the Highlands Coalition and other organizations have recognized the critical importance of conserving water quality, habitat and open space in the Moodna watershed, which is designated by NY State as a Scenic Area of Statewide Significance. The Moodna is the only major watershed located entirely within Orange County (other large watersheds, such as the Wallkill and Ramapo, extend into adjoining counties and states). The watershed includes parts of 22 towns and villages in Orange County.



A watershed plan for the Moodna Creek Watershed will be published in 2008 by the Orange County Water Authority with support from the Orange County Planning Department, watershed municipalities, the Moodna Watershed Coalition, and other partners. **The Moodna Creek Watershed Management Plan** will include a detailed assessment of the watershed's natural resources as well as key issues affecting local municipalities, organizations, property owners and other stakeholders in the watershed. The plan will recommend actions that can be taken by these stakeholders, and by county, state and Federal governments to protect and enhance the watershed.

Purpose

The **purpose of the Atlas** is to allow community leaders and interested citizens to see the geographic and spatial relationships between human development and the natural features of the Moodna Watershed. The Atlas includes:

- Base Map at 1:118,000 scale: divided by grid into tiles
- 18 Map Tiles at 1:24,000 scale, which constitute the body of the Atlas: Tiles show areas of the Watershed in the same scale as US Geological Survey (USGS) 7.5 minute Quad maps, to make comparison and cross-referencing easier.

Description of Map Data

Natural Resources, Political Boundaries and Infrastructure

The Atlas Tiles are symbolized with Interstate highways, State and local roads, railroads and stations, as well as municipal boundaries, derived from the NYS Department of Transportation database. These features are projected onto a base map which includes a representation of the natural topography of the watershed.

- Data source: Orange County Geographic Information Systems Division

Basin Boundaries

The boundaries of the individual watersheds, or basins of each stream which flows into the Moodna Creek were calculated and symbolized on the map as colored "subbasins" which, taken together, constitute the whole Moodna Watershed basin.

- Data source: USGS Hydrological Unit Code (HUC) database; Moodna Creek Watershed sub-region; United States. Close analysis of the USGS HUC data reveals several inconsistencies, probably the result of large-scale scanning errors. Please see "Notes" for the location and description of these inconsistencies.

Streams and Waterbodies

- Data sources: USGS, edited by the Orange County Geographic Information Systems division, and further improved by Atticus Lanigan, Orange County Planning Department
- Orthophotos produced by Orange County Water Authority in 2004

Floodplains

- Data source: The Federal Emergency Management Agency (FEMA). The official FEMA floodplain mapping is the source of the floodplain data symbolized here. At this writing (May 2008) FEMA has released updated floodplain mapping, which is in draft form and subject to comment and revision, and is therefore not included here.

(Continued on next page)

The Atlas of the Moodna Creek Watershed Team - Orange County, New York

Dave Church, Commissioner of Planning, - Kelly Dobbins, Senior Planner - Simon Gruber, Project Consultant - Ed Helbig, Atlas Consultant and Cartographer - Rebecca Lust, Orange County Division of Tourism, Layout Design, - Daniel Muñoz and Bill Parco, Orange County GIS Division, Cartography - Eenika Cruz, OCWA Administrator

Marcia Jacobowitz, Chair, Orange County Water Authority - Edward Diana, County Executive—William Lahey, Chair, Orange County Legislature

For more information please contact the Orange County Water Authority at (845) 615-3868 or visit the website: waterauthority.orangecountygov.com

All photos provided by Simon Gruber.



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Wetlands

- Data source: NY State Dept of Environmental Conservation (NYS DEC). The NYS DEC in most cases regulates activities affecting wetlands only if they are 12.4 acres or larger. NYS DEC maps therefore do not include smaller wetlands, which are also important natural resources.

Important Groundwater Resources

Important groundwater resources, symbolized in the atlas, are the result of analysis of geological data locating sand and gravel deposits and other glacial geology features in relation to the water table.

Four categories are shown:

- “areas of stratified sand and gravel at the land surface and above the water table”
- “areas of stratified sand and gravel at the land surface and below the water table”
- “areas of stratified clay and silt with thin or no layers of sand at land surface and below the water table”
- “areas of stratified sand and gravel below clay or silt and the water table”

Stream Biomonitoring Sites

- Water quality was assessed at these sites between 2004-2007 using stream biomonitoring methods developed by NYSDEC. This data was collected as part of a county-wide stream monitoring project sponsored by the Orange County Water Authority with funding from the US EPA. Water quality data and other findings for each site are available at the OCWA website.

Protected Lands

These map layers include:

- Federally owned lands such as the Appalachian Trail corridor
- State parkland
- County parkland
- Local municipal parkland.
- Also symbolized in this category is the West Point Military Academy, which while it is Federal land, is not protected by an easement or other legal mechanism
- Privately protected open space lands: this includes land owned by non-profit organizations and protected by conservation easement, and land owned by other private owners that has been protected by easement, including active farmland. These areas are symbolized with a similar color pattern, but are not identified with labels on the map.
- County owned lands, such as the County Airport and Glenmere Lake that are not parks are symbolized in a different pattern.
- Lands shown as Open Space Projects have received partial funding from Orange County's Open Space Fund either to be purchased for public use or to be protected by a conservation easement. Therefore these lands may or may not be open to the public.

Wastewater Discharges and Spills

Several types of man-made feature related to the Moodna watershed are symbolized on the map.

- State Pollution Discharge Elimination System (SPDES) major permit locations. These are the locations of permitted discharges of wastewater. Smaller wastewater discharges are not included here. Note: while SPDES permits are now required for many new stormwater discharges from development sites (under the Phase 2 stormwater program) these permits are only in force temporarily, and are terminated after the development is completed. These stormwater SPDES locations are not included here.

Data source: NYS DEC

- Spill sites shown are groundwater contamination sites with known contamination from MTBE, gasoline and/or other volatile organic compounds. They have been determined by the DEC to contain greater than 10 parts per billion of MTBE contamination, and to require remediation by installation of on-site filtration systems to remove contaminants.

Data Source: Orange County Department of Health

Hiking Trails

Hiking trails within the Moodna Creek Watershed are symbolized in the Atlas, including the Appalachian Trail, the Highlands Trail, the Long Path, the Heritage Trail, and the Schunnemunk trails.

- Data Source: Copyright 2008 by the New York-New Jersey Trail Conference, all rights reserved. No part of this GIS Data may be copied, reproduced or transmitted in any form or by any means whatsoever whether graphic, electronic or mechanical, including photocopying, posting on the internet, recording, or through the use of an information storage retrieval system, without prior written permission of the New York-New Jersey Trail Conference.

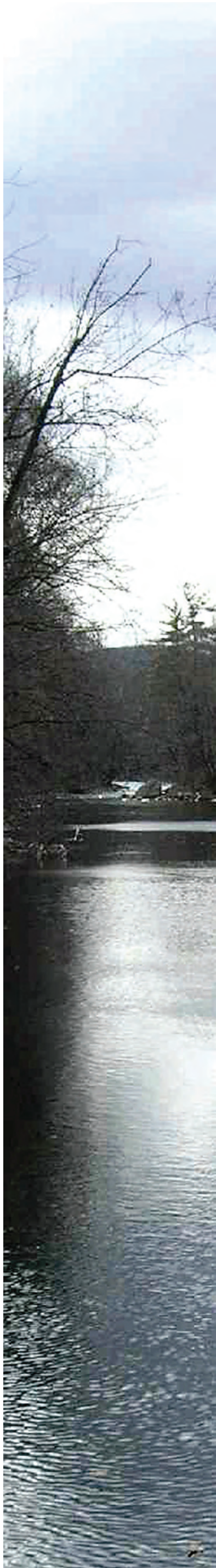
Boundary errors

Three areas on the boundary of the Moodna Watershed are unclear. These are noted on the Atlas base map and on Atlas Tiles 2A, 2C and 2D. As symbolized, they show stream connections which cross the watershed boundaries, which of course cannot be the case, as a *watershed* is defined as a distinct drainage basin.

- Error #1 (note #1 on Tile 1C) lies south of I84 and west of Crest View Lake in New Windsor. This large area of flat wetlands is the source both of Tin Brook, which flows north into the Wallkill River, and the unnamed brook which flows south into Beaver Dam Lake. It is clear from topographic analysis that the true boundary of the Beaver Dam Lake Subbasin is about one mile south-southeast of the one shown, which is derived from USGS HUC data. More precise elevation and flow analysis will be necessary to draw the true boundary of the watershed in this location.
- Error #2 (note #2 on Tile 1D) lies northeast of Crest View Lake, where a stream which flows north into Orange Lake, part of the Wallkill River watershed, is connected to a stream which flows south into Beaver Dam Lake, which is part of the Moodna Watershed. The stream segments which cause this confusion pass beneath I 84, and further south under the runways of Stewart International Airport through culverts. There are many ways errors could be introduced into the map in this circumstance. More analysis is necessary to draw the true boundary in this location.
- Error #3 (note #3 on Tile 2A) is adjacent to Stony Ford Road where it intersects with NYS Rt207 in Hamptonburgh. The indistinct area is a very flat stretch of wetlands and filled acreage, and is one which has been recently subject to extensive construction and development. Flow patterns may have changed since data was collected here. Field survey of the area may be necessary to draw the true watershed boundary.

Notes on Data Sources and Interpretation

- All data symbolized within this Atlas was the most current available at the time of publication. Any exceptions, such as the draft FEMA floodplain maps, are discussed above. The quality of geographic data is constantly being improved by continuing analysis, comparison with orthophoto data, remote sensing, distance imaging, ground surveys and other scientific methods. New data that may become available after publication will be included as it becomes available in future revisions of the Atlas of the Moodna Creek Watershed.
- The data which forms the basis of these maps is gathered from numerous sources and created in various projections and scales. Geographic Information Systems enable us to create maps combining these various kinds of data. By layering geographical data, we see new relationships which can tell us essential news of our environment. Sometimes the data is incomplete or distorted. In that case, we transfer those errors into our maps. As new data becomes available, as larger scale and finer-grained data comes to us, the shapes of streams, basins and human artifacts may change as our representation becomes closer to reality in future versions of this Atlas. But in the end, the map is a tool for exploration and direct experience. As the ecologist Alfred Korzybski wrote, the map is not the territory, the name is not the thing named.
- The digital cartography was completed from January to April 2008 by Ed Helbig.
- Published May, 2008



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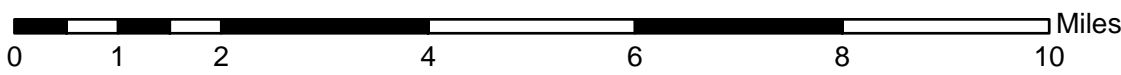
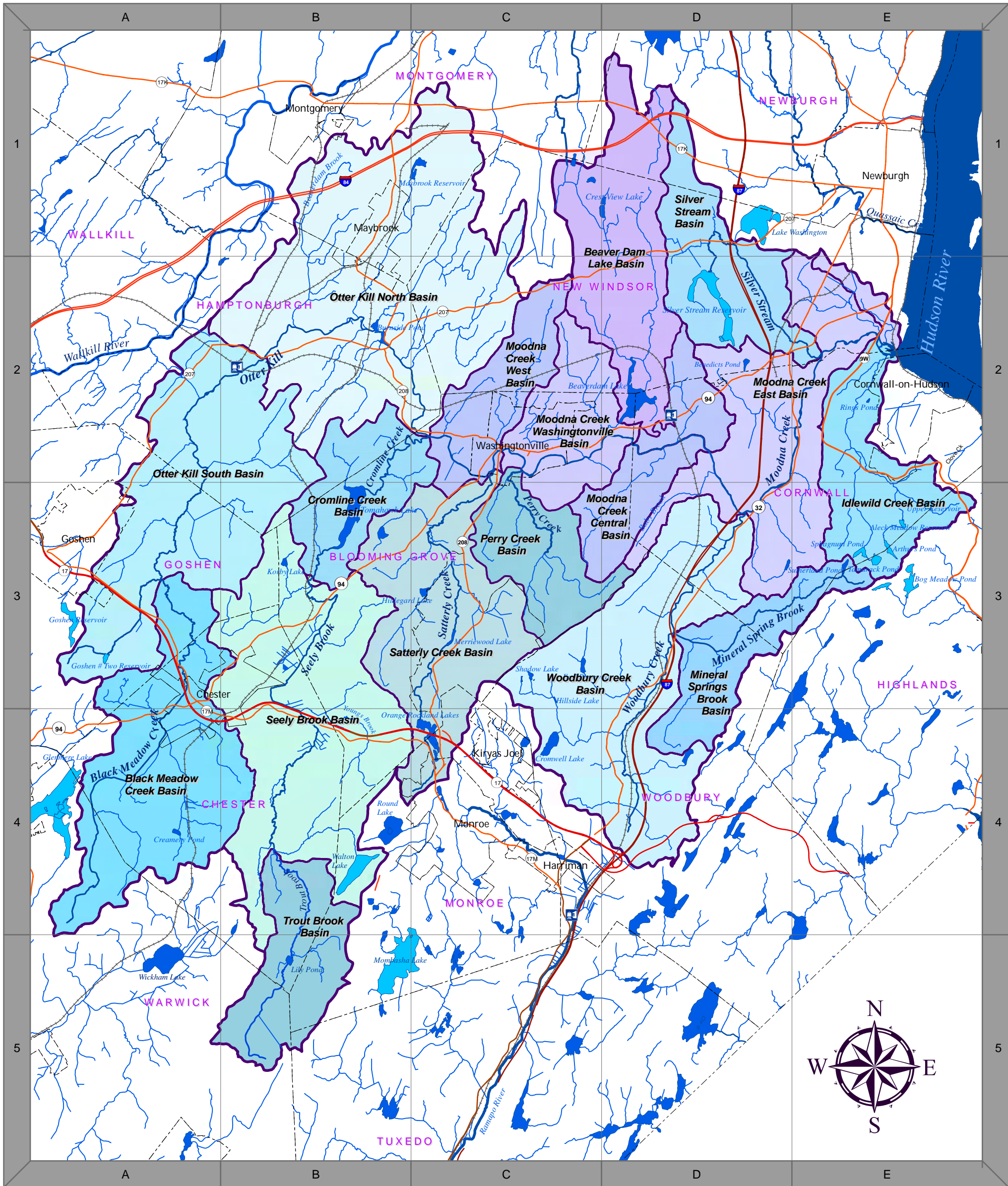
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Moodna Creek WATERSHED ATLAS Reference Base Map

Grid rectangles refer to map tiles



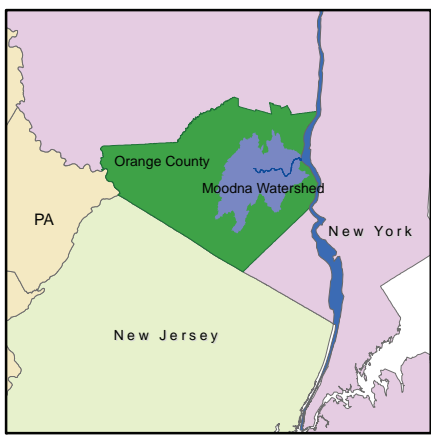
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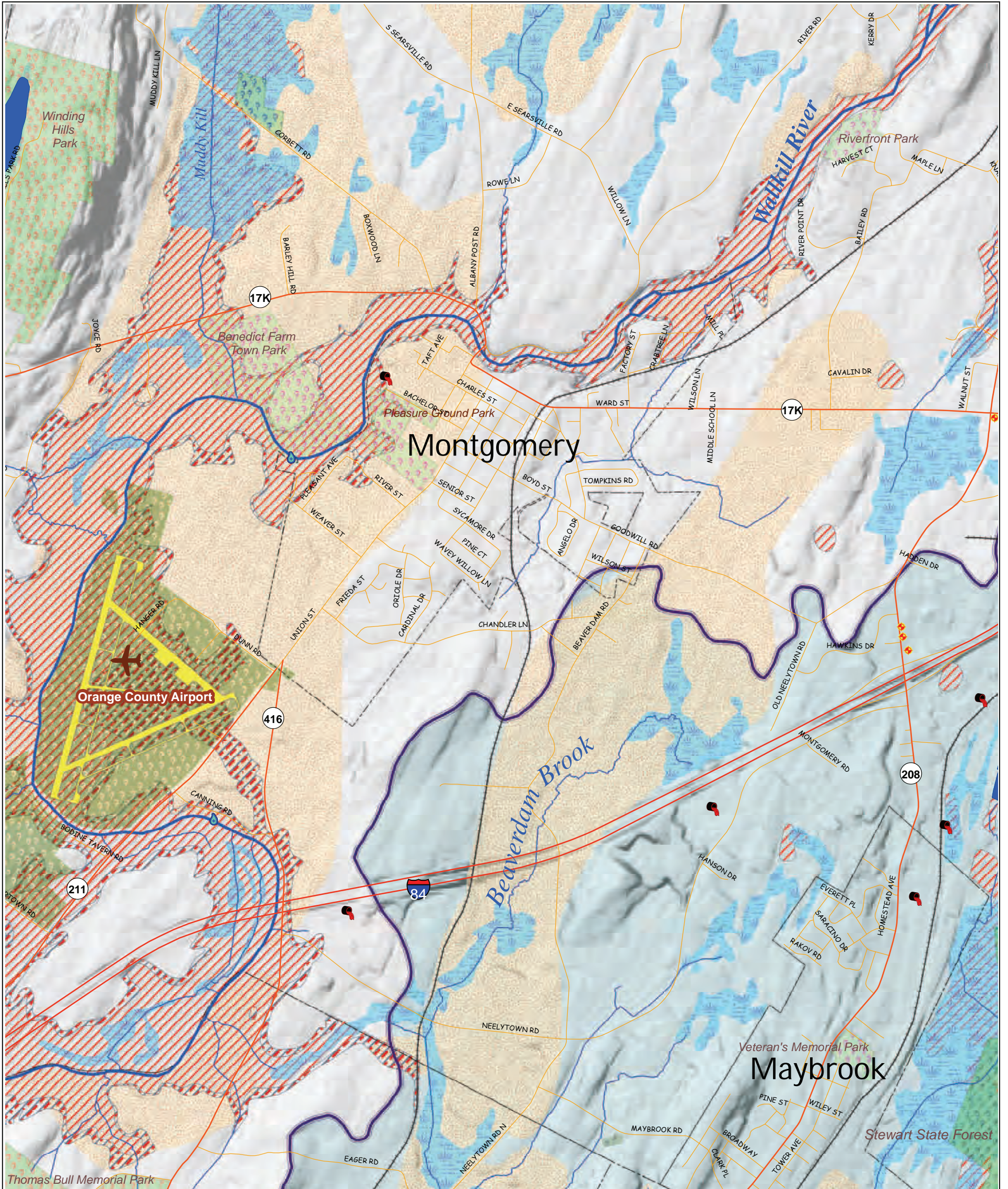


Hudson River Estuary



Protected Lands

-  DEC wetlands
-  County Water Supply Lands
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See tile 1C
















See tile 2B

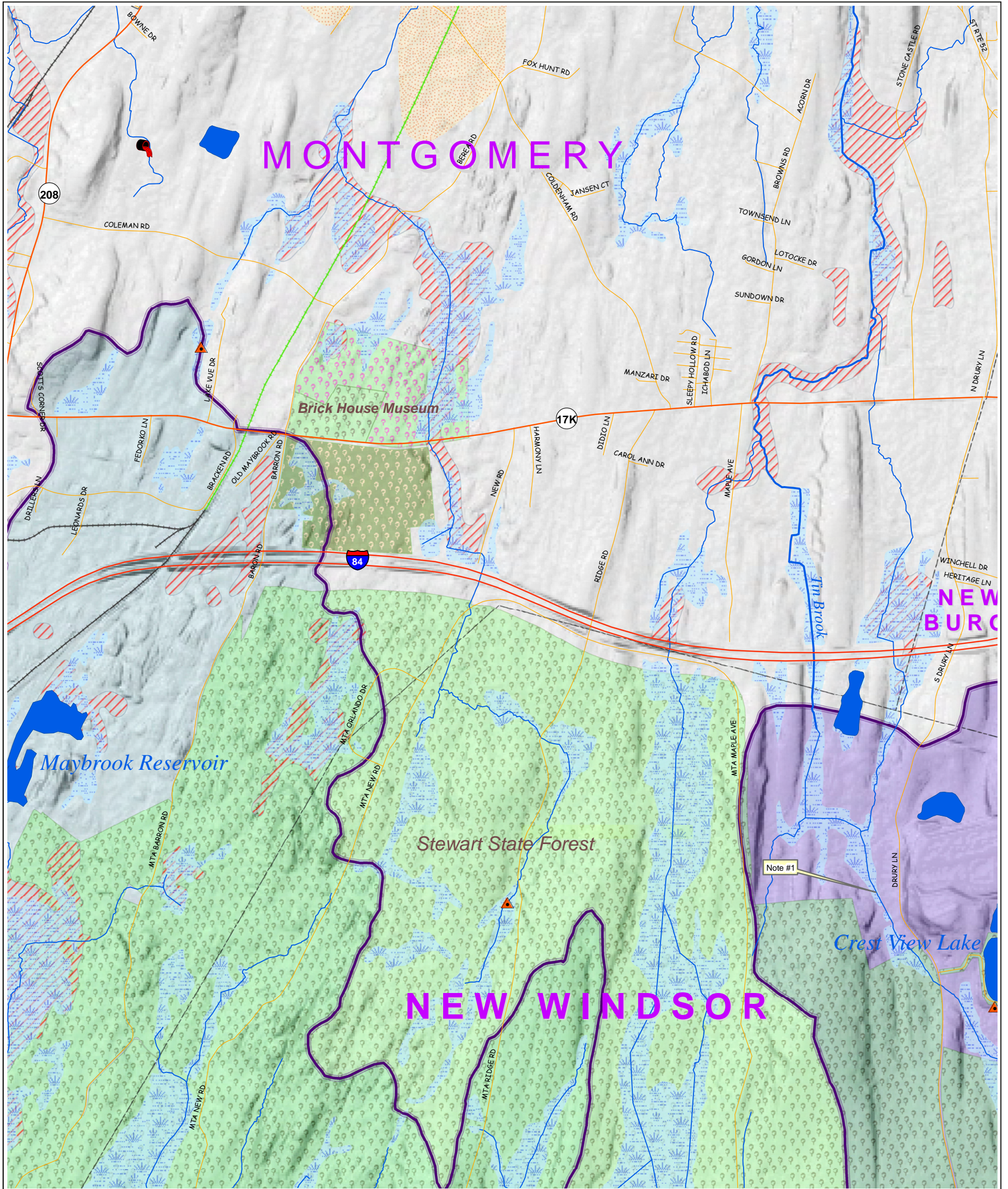
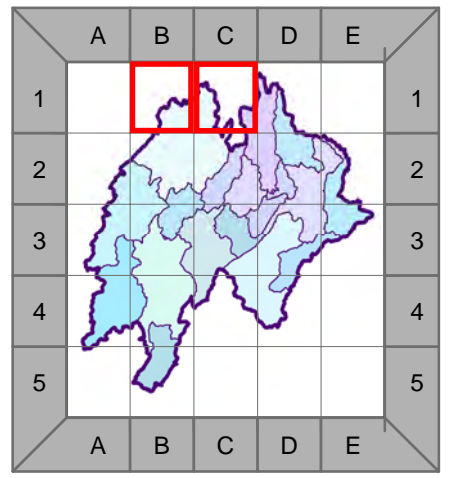


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Tile 1B

Floodplains

-  100 Year
-  500 Year
-  Lake
-  Reservoir
-  Important Groundwater Resources
-  Stream biomonitoring sites
-  spill sites
-  Commuter RR Stations
-  SPDES discharge locations
-  Interstate Routes
-  NY State Routes
-  County Roads
-  Hiking Trails
-  Railroads: active
-  Railroads: inactive



See tile 1B

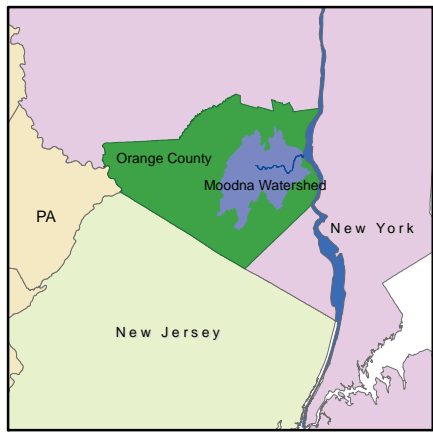
See tile 1D

See tile 2C











Tile 1C



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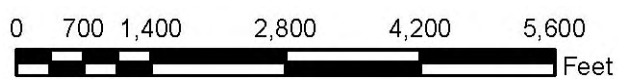
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See tile 1C

See tile 1E
















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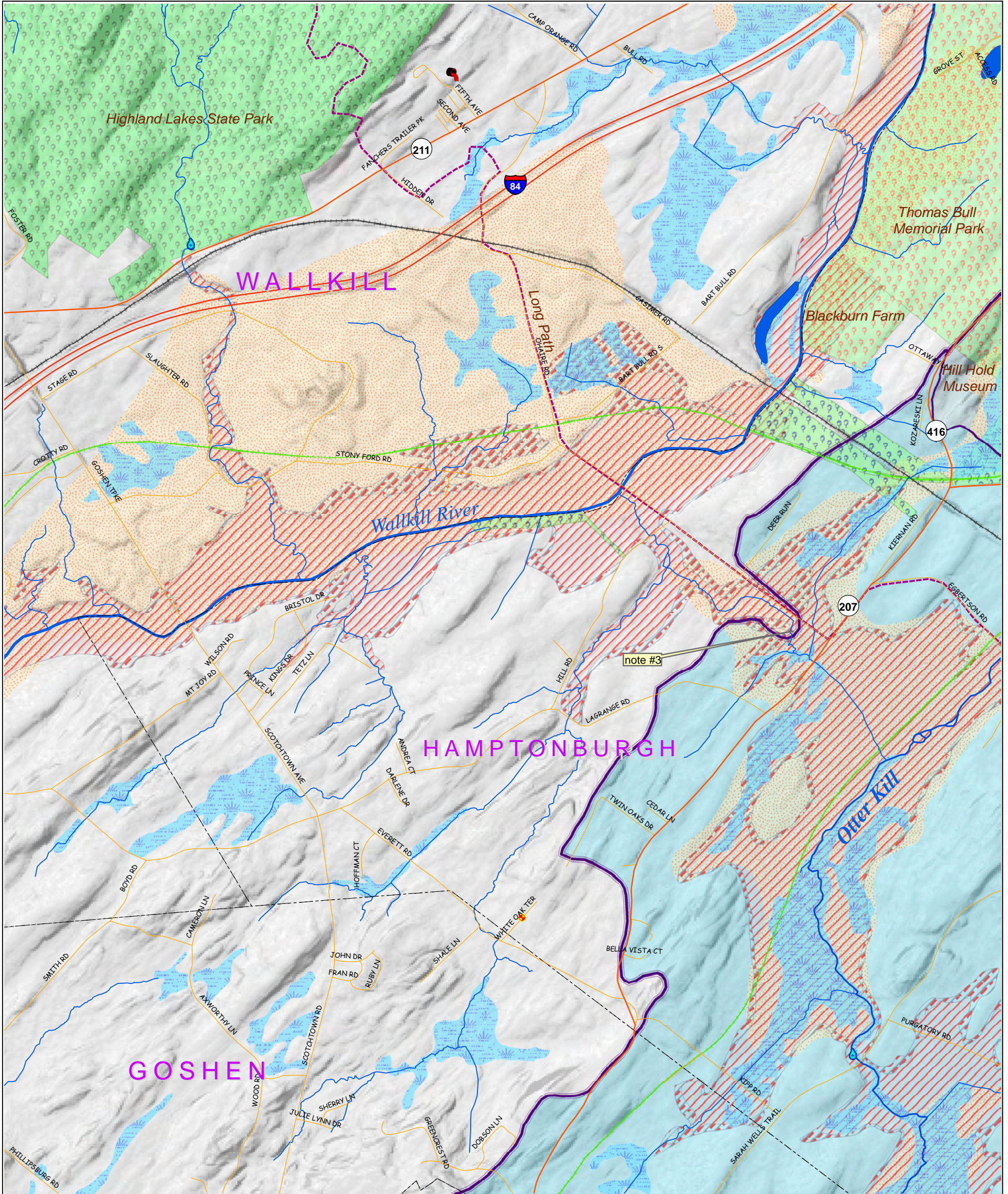
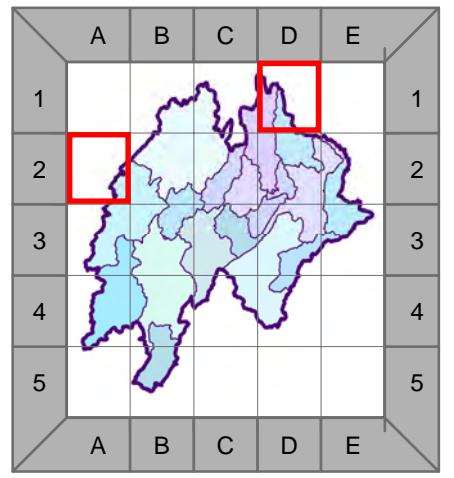


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Tile 1D

Floodplains

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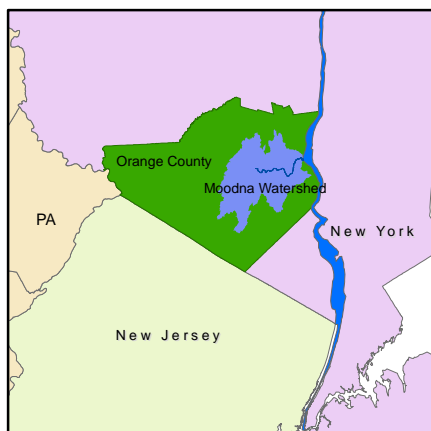
See tile 2B

See tile 3A


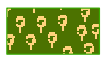

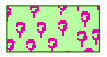






Tile 2A



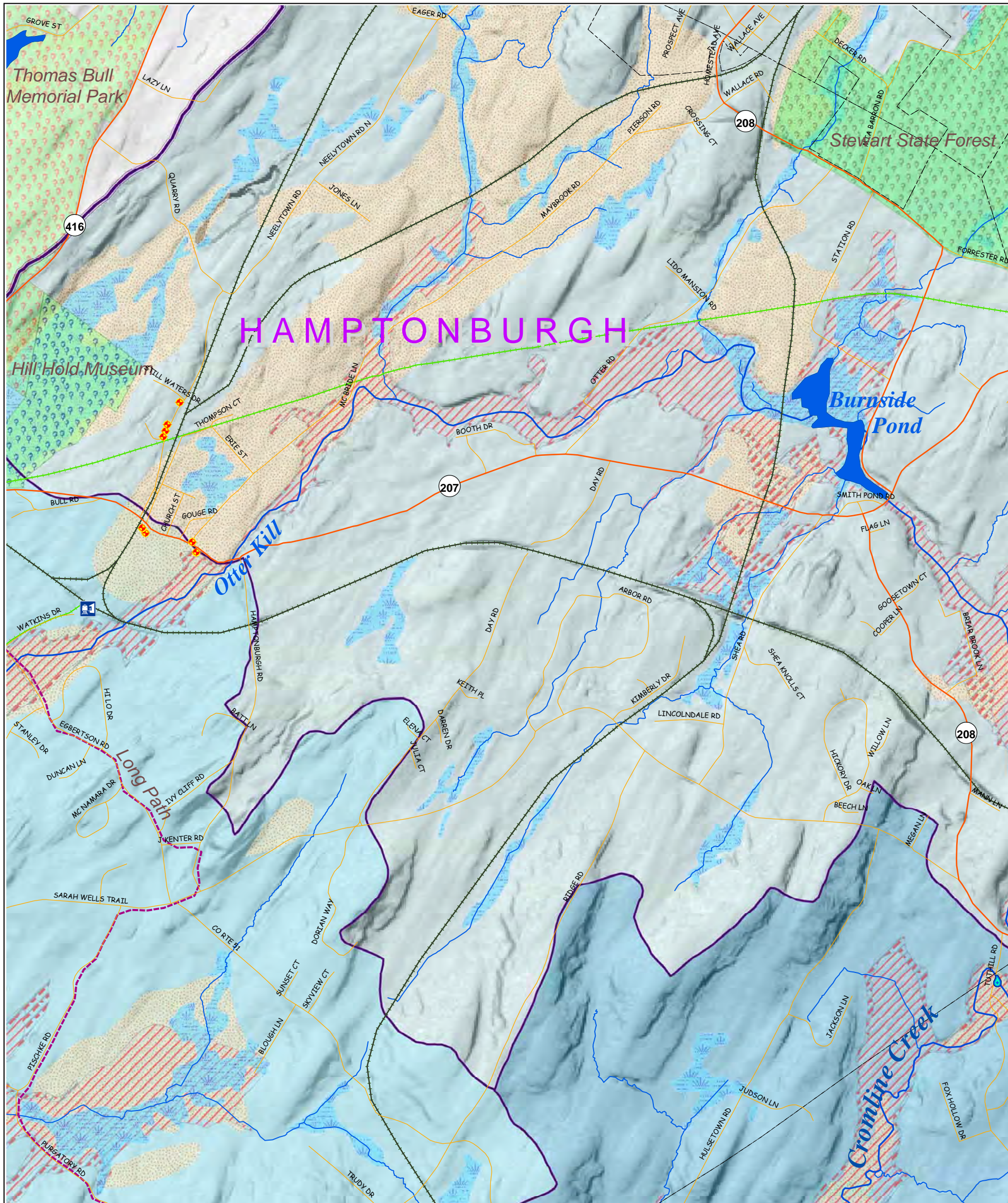
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See tile 1B



See tile 2A

See tile 2C
















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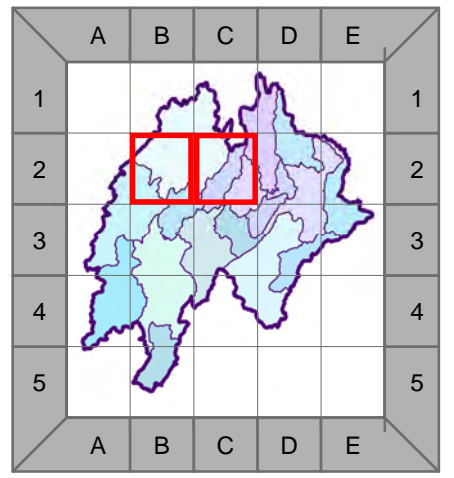


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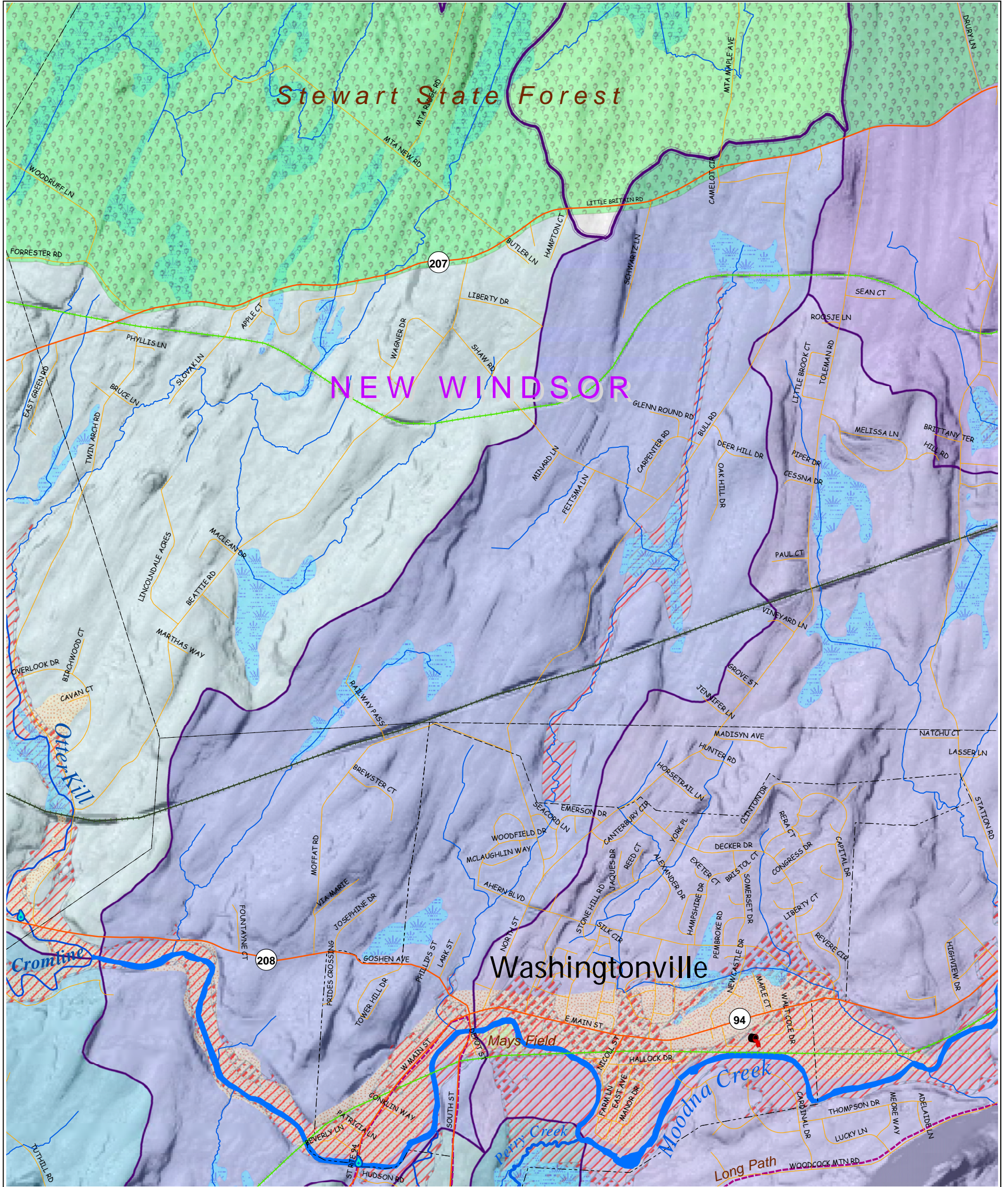
Tile 2B

Floodplains

-  100 Year
-  500 Year
-  Lake
-  Reservoir
-  Important Groundwater Resources
-  Stream biomonitoring sites
-  spill sites
-  Commuter RR Stations
-  SPDES discharge locations
-  Interstate Routes
-  NY State Routes
-  County Roads
-  Hiking Trails
-  Railroads: active
-  Railroads: inactive



See tile 1C



See tile 2B

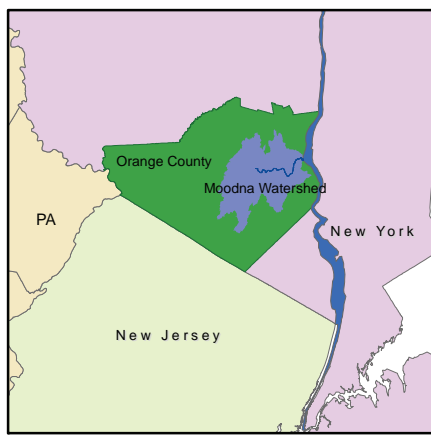
See tile 2D

See tile 3C











Tile 2C



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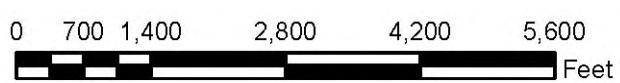
See tile 1D



See tile 2C

See tile 2E
















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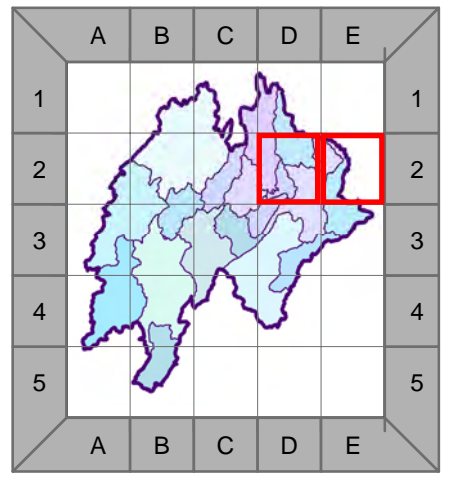


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Tile 2D

Floodplains

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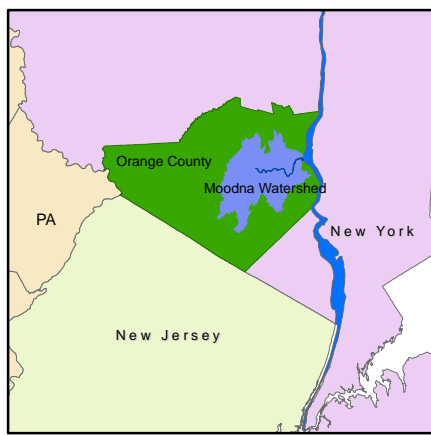
See tile 2D

See tile 3E






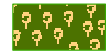



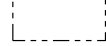
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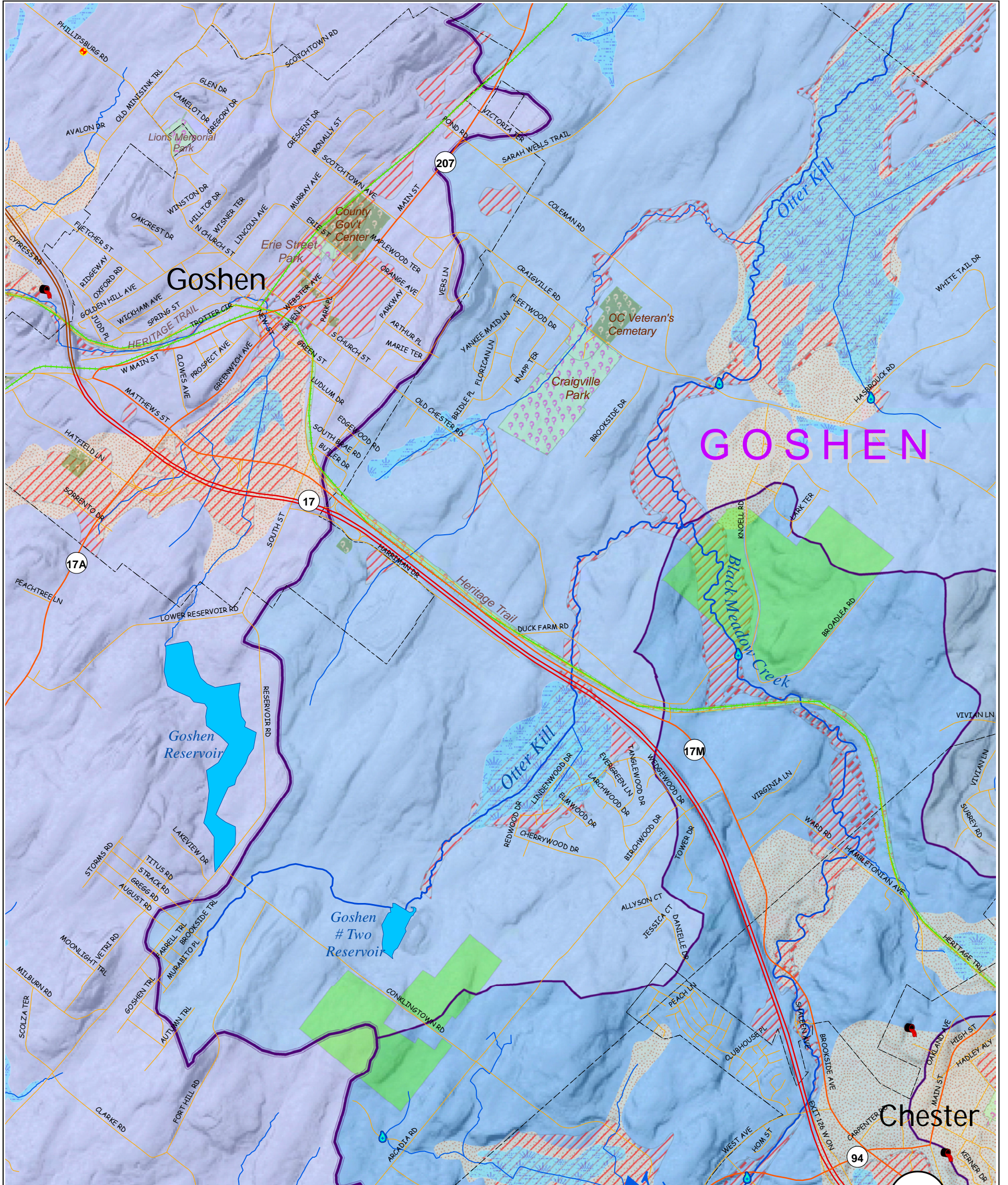
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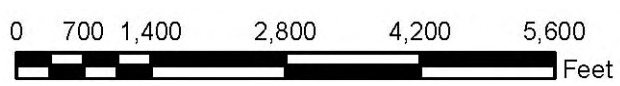
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See tile 2A



See tile 3B
















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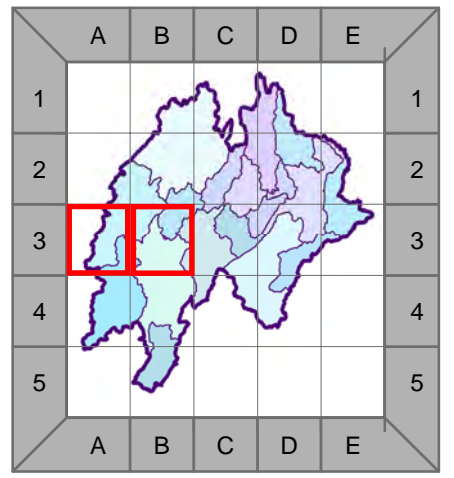


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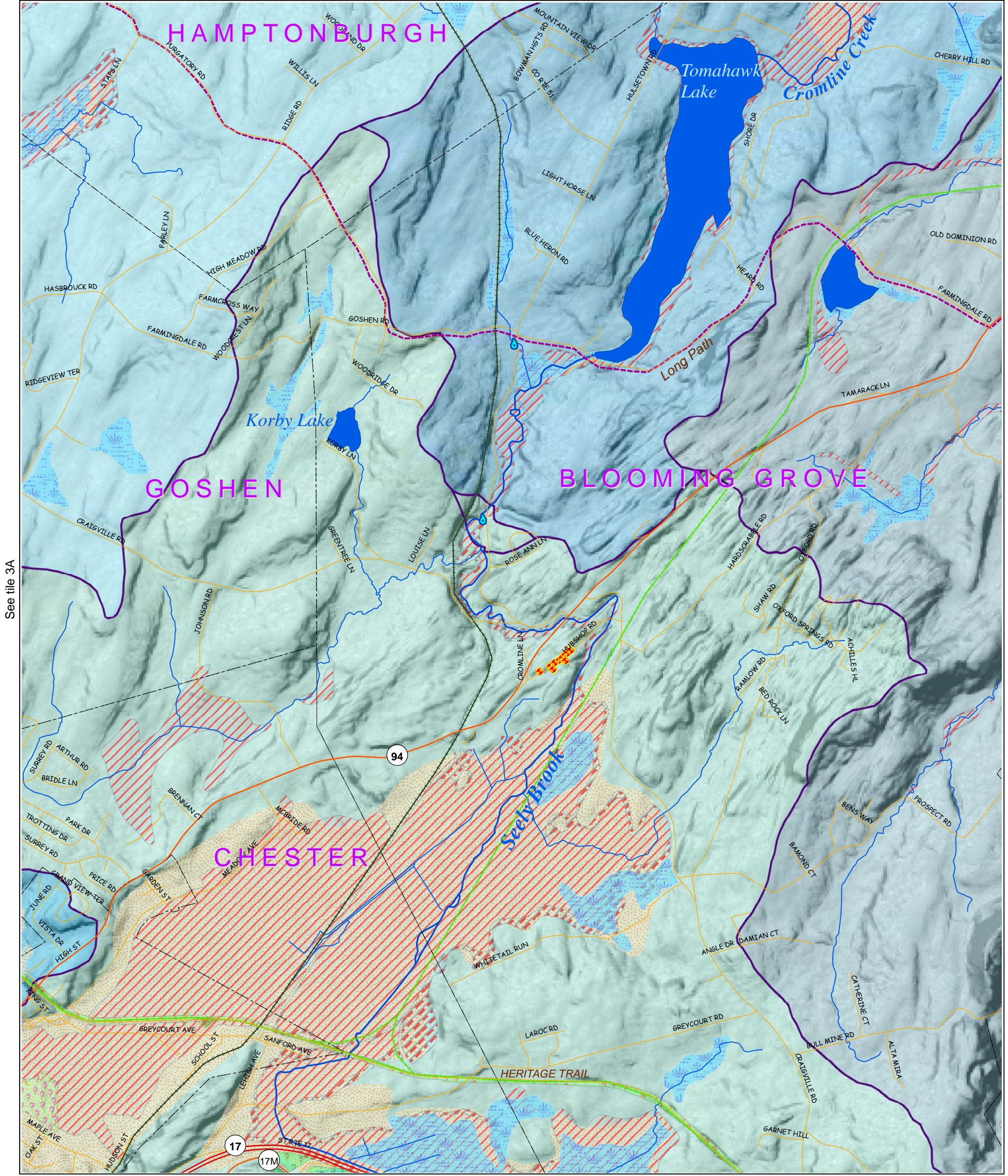
Tile 3A

Floodplains

-  100 Year
-  500 Year
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See tile 2B

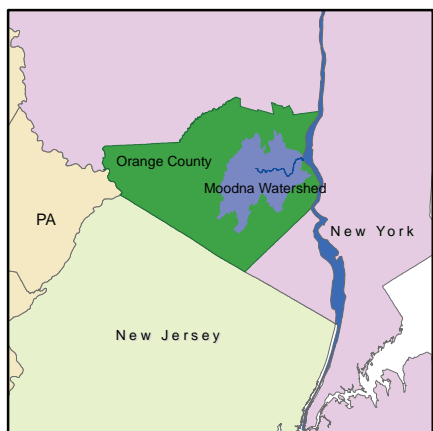


See tile 4B











Tile 3B



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See tile 2C



See tile 3B

See tile 3D
















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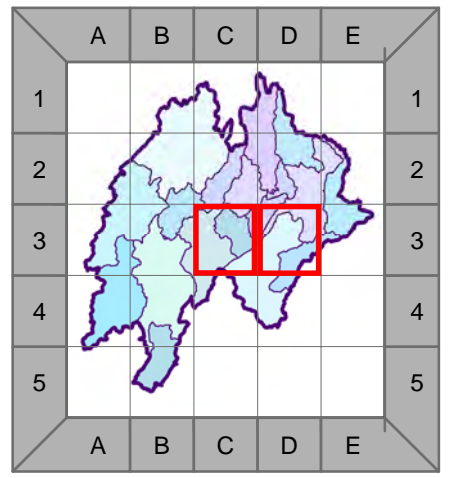


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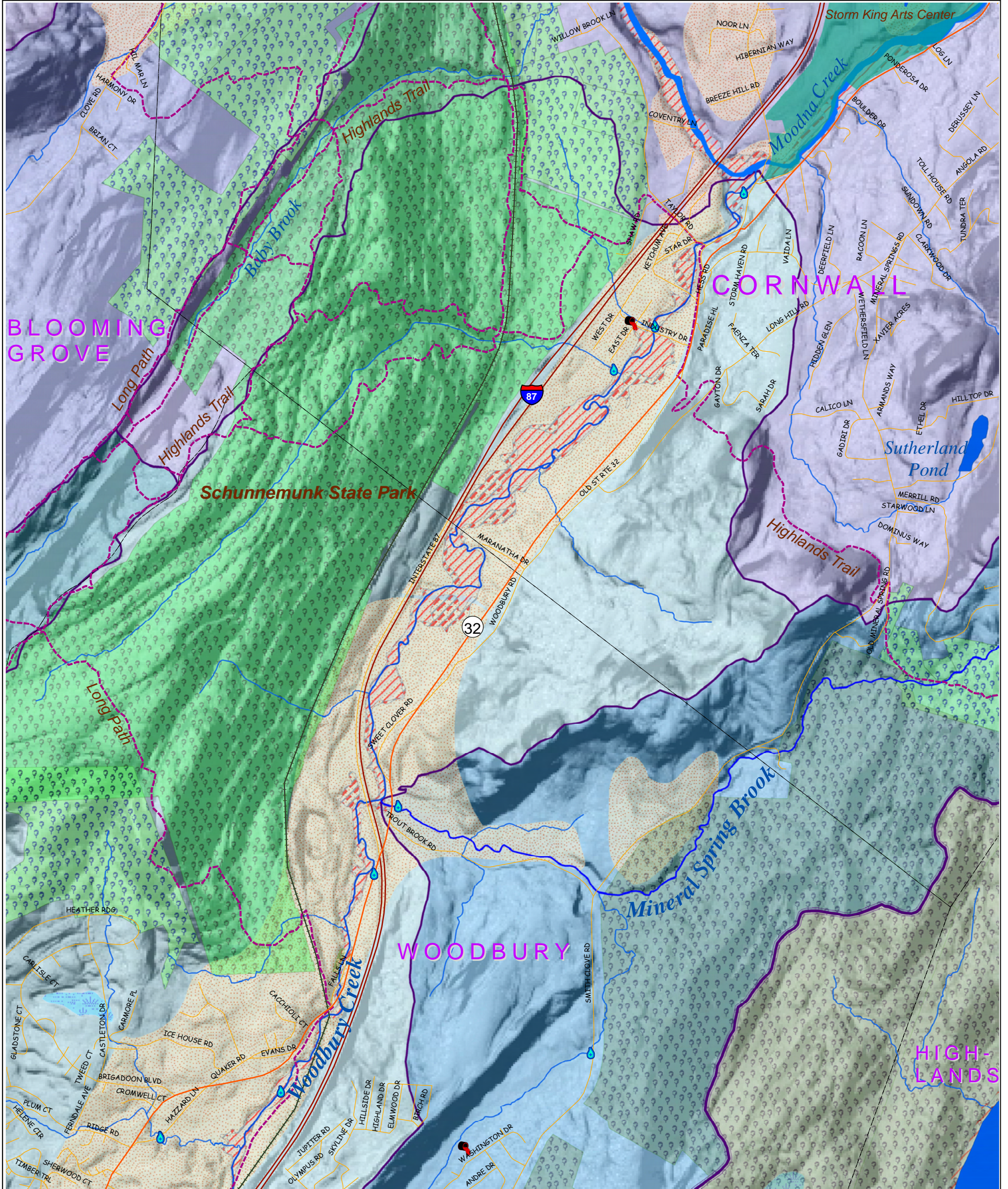
Tile 3C

Floodplains

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See tile 2D



See tile 3C

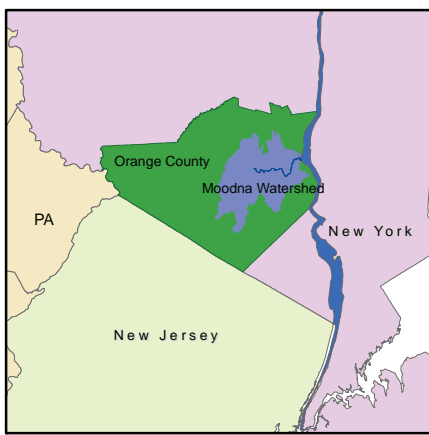
See tile 3E

See tile 4D











Tile 3D



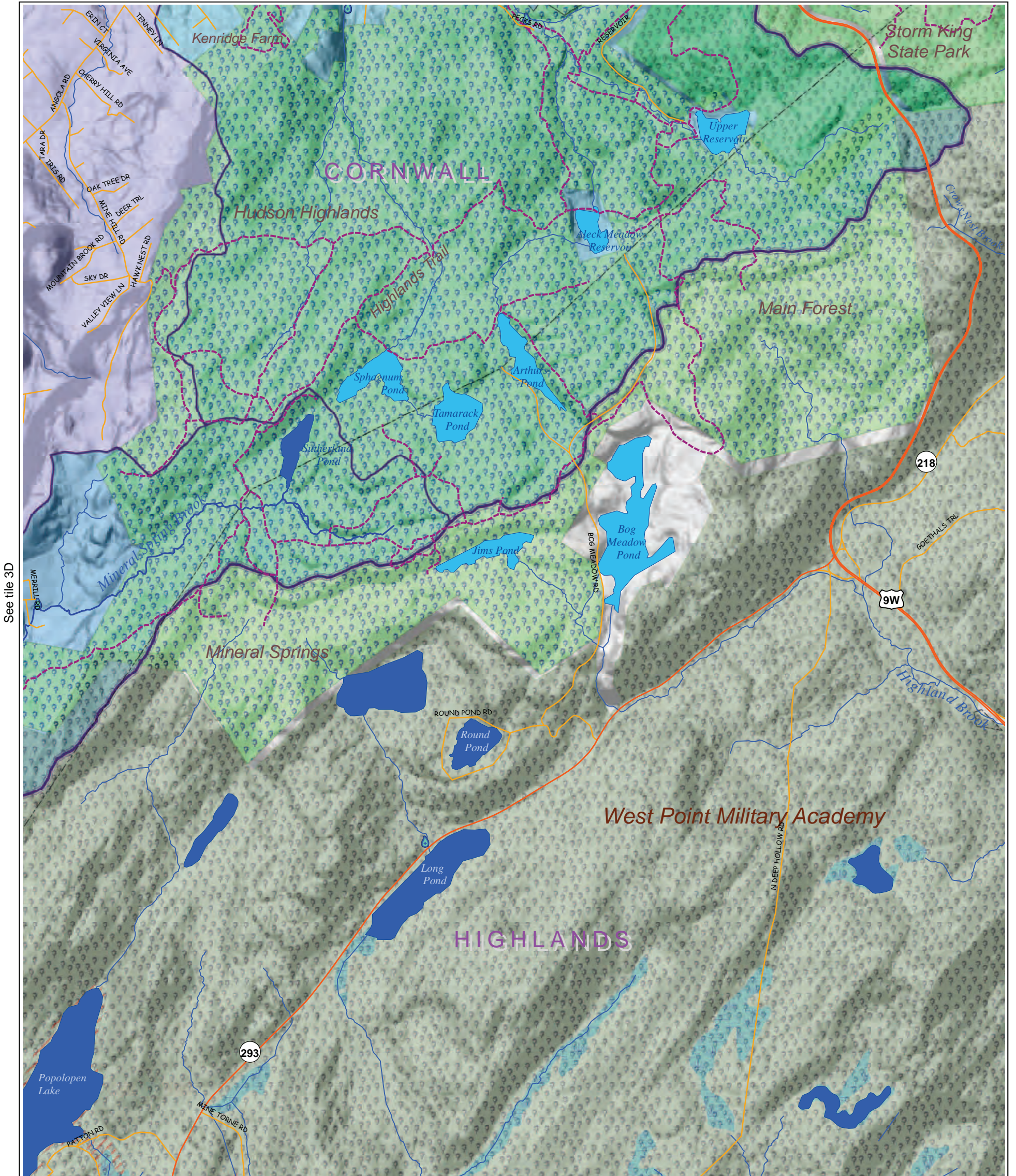
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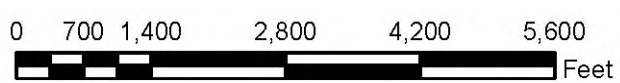
Protected Lands

- | | | | |
|---|--------------------------------|---|--------------------------------|
|  | DEC wetlands |  | County Water Supply Lands |
|  | Federal Preserve & Trail land |  | Municipal parkland |
|  | US Military Academy West Point |  | Privately Protected Open Space |
|  | State Land |  | Open Space Projects |
|  | County Parkland |  | Municipal Boundaries |

See tile 2E


















See tile 3D

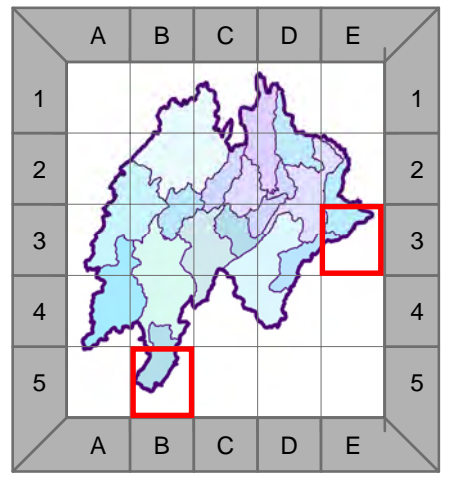


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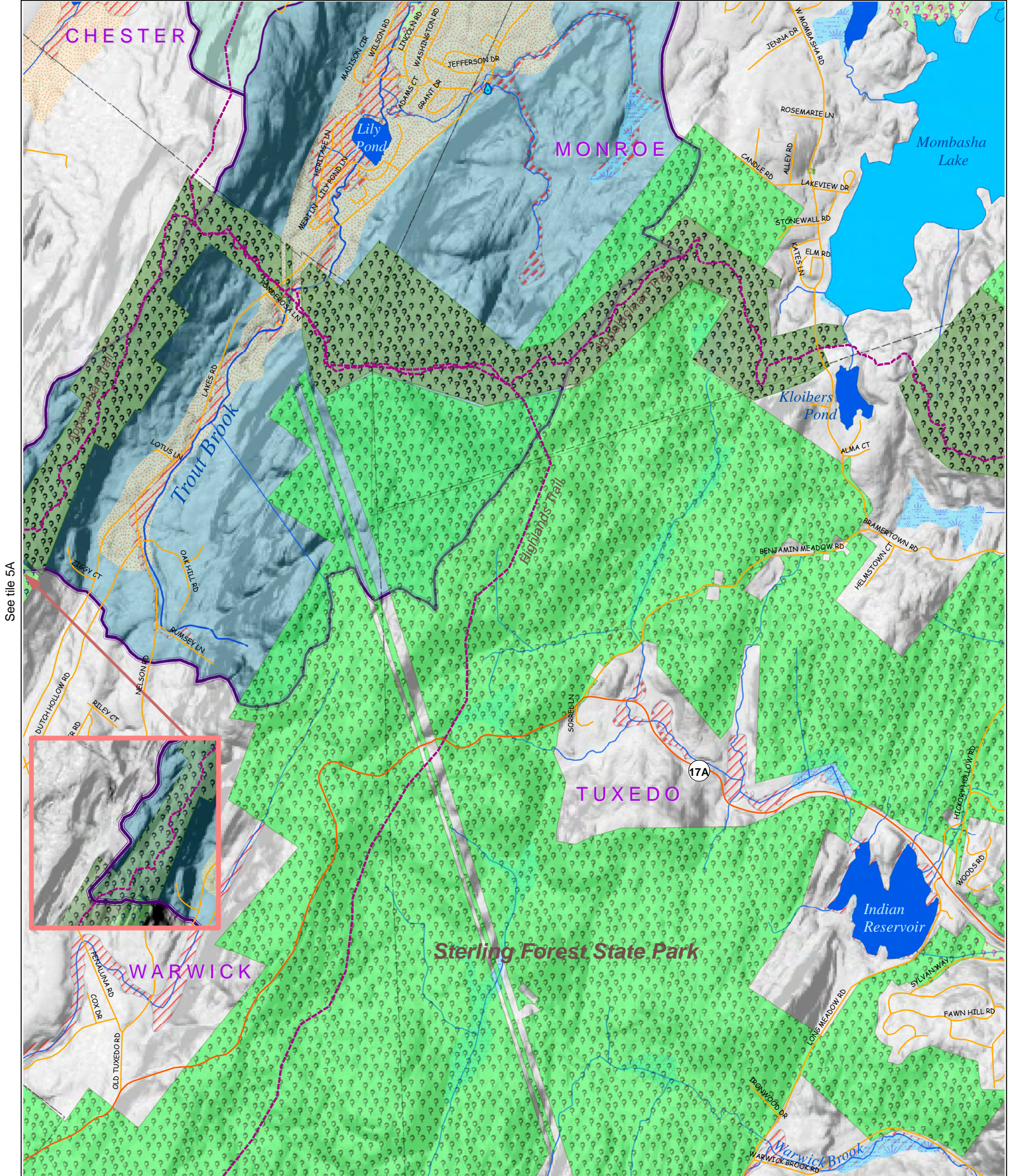
Tile 3E

Floodplains

-  100 Year
-  500 Year
-  Lake
-  Reservoir
-  Important Groundwater Resources
-  Stream biomonitoring sites
-  spill sites
-  Commuter RR Stations
-  SPDES discharge locations
-  Interstate Routes
-  NY State Routes
-  County Roads
-  Hiking Trails
-  Railroads: active
-  Railroads: inactive



See tile 4B

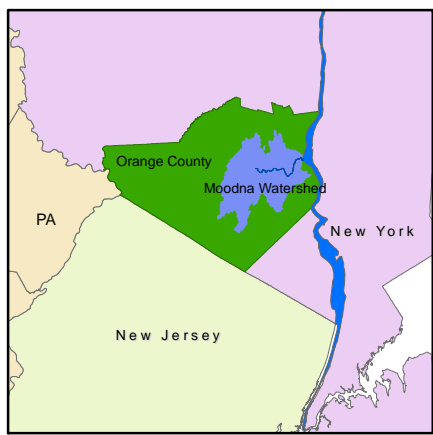


See tile 5A











Tile 5B



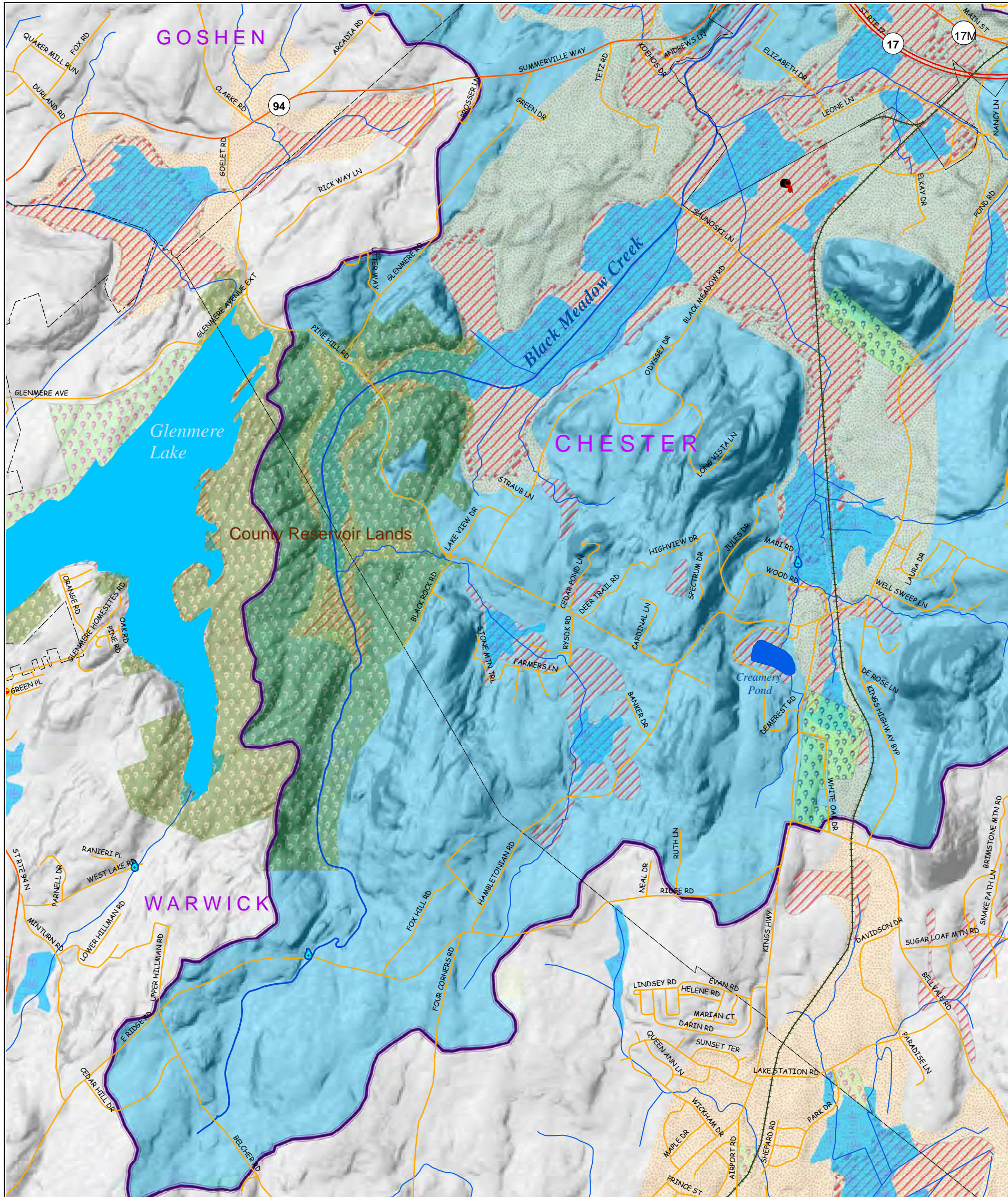
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Protected Lands

-  DEC wetlands
-  Federal Preserve & Trail land
-  US Military Academy West Point
-  State Land
-  County Parkland
-  County Water Supply Lands
-  Municipal parkland
-  Privately Protected Open Space
-  Open Space Projects
-  Municipal Boundaries

See tile 3A



See tile 4B
















See tile 5A

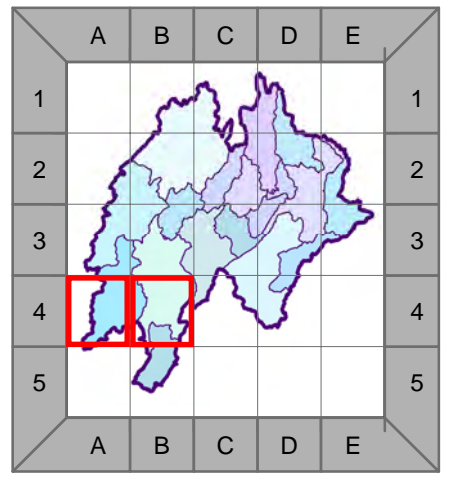


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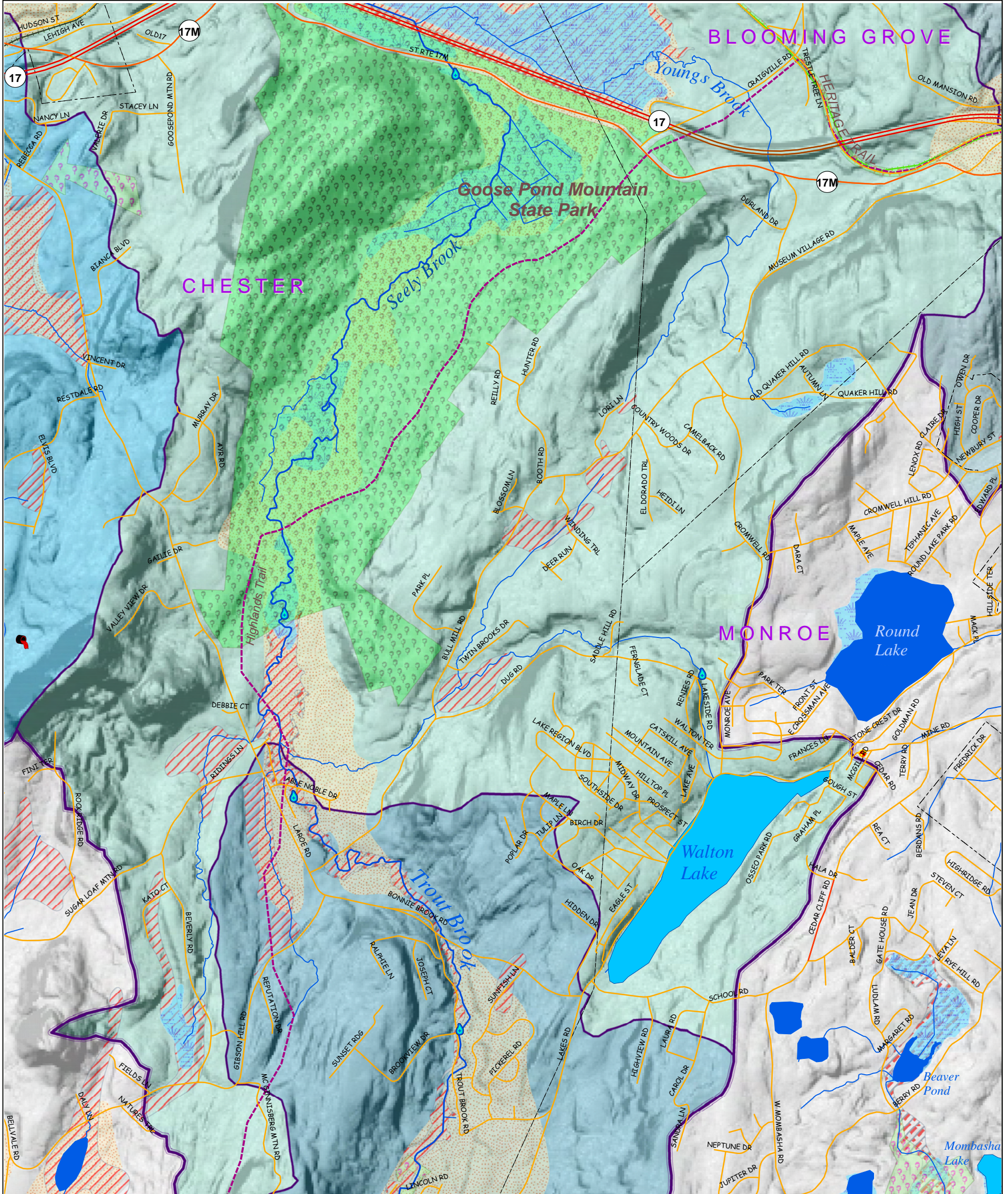
Tile 4A

Floodplains

-  100 Year
-  500 Year
-  Lake
-  Reservoir
-  Important Groundwater Resources
-  Stream biomonitoring sites
-  spill sites
-  Commuter RR Stations
-  SPDES discharge locations
-  Interstate Routes
-  NY State Routes
-  County Roads
-  Hiking Trails
-  Railroads: active
-  Railroads: inactive



See tile 3B



See tile 5B






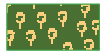



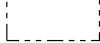
Tile 4B



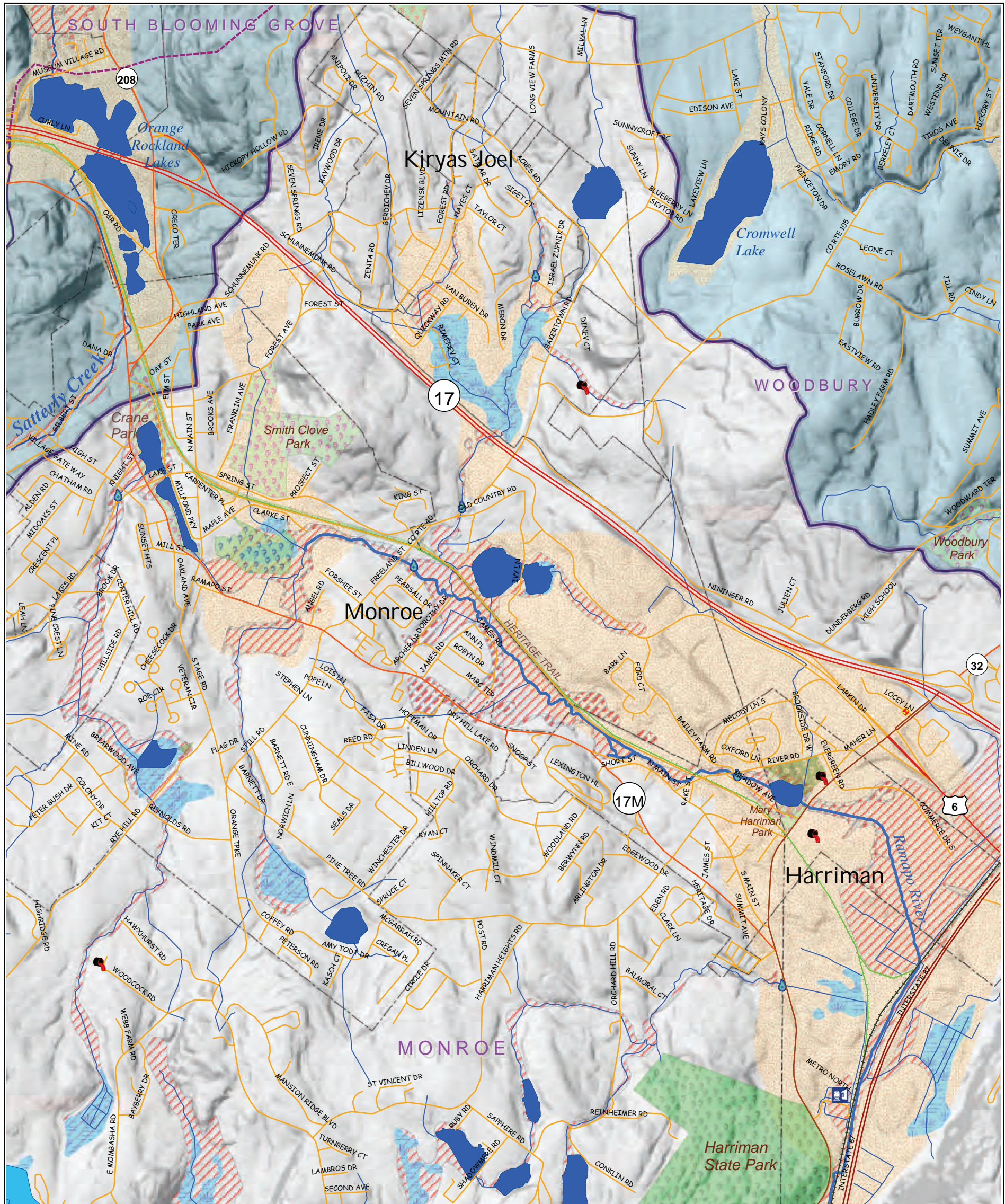
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Protected Lands

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-  US Military Academy West Point
-  State Land
-  County Parkland
-  County Water Supply Lands
-  Municipal parkland
-  Privately Protected Open Space
-  Open Space Projects
-  Municipal Boundaries

See tile 3C



See tile 4B

See tile 4D


















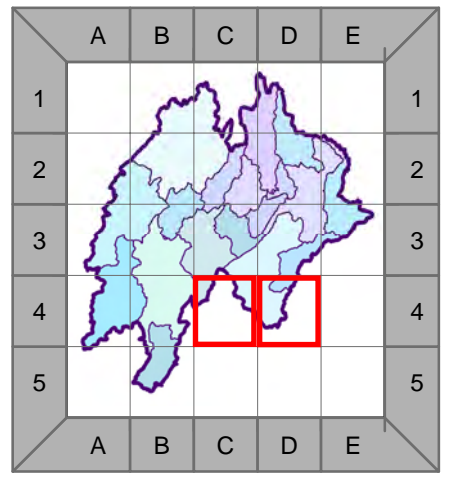
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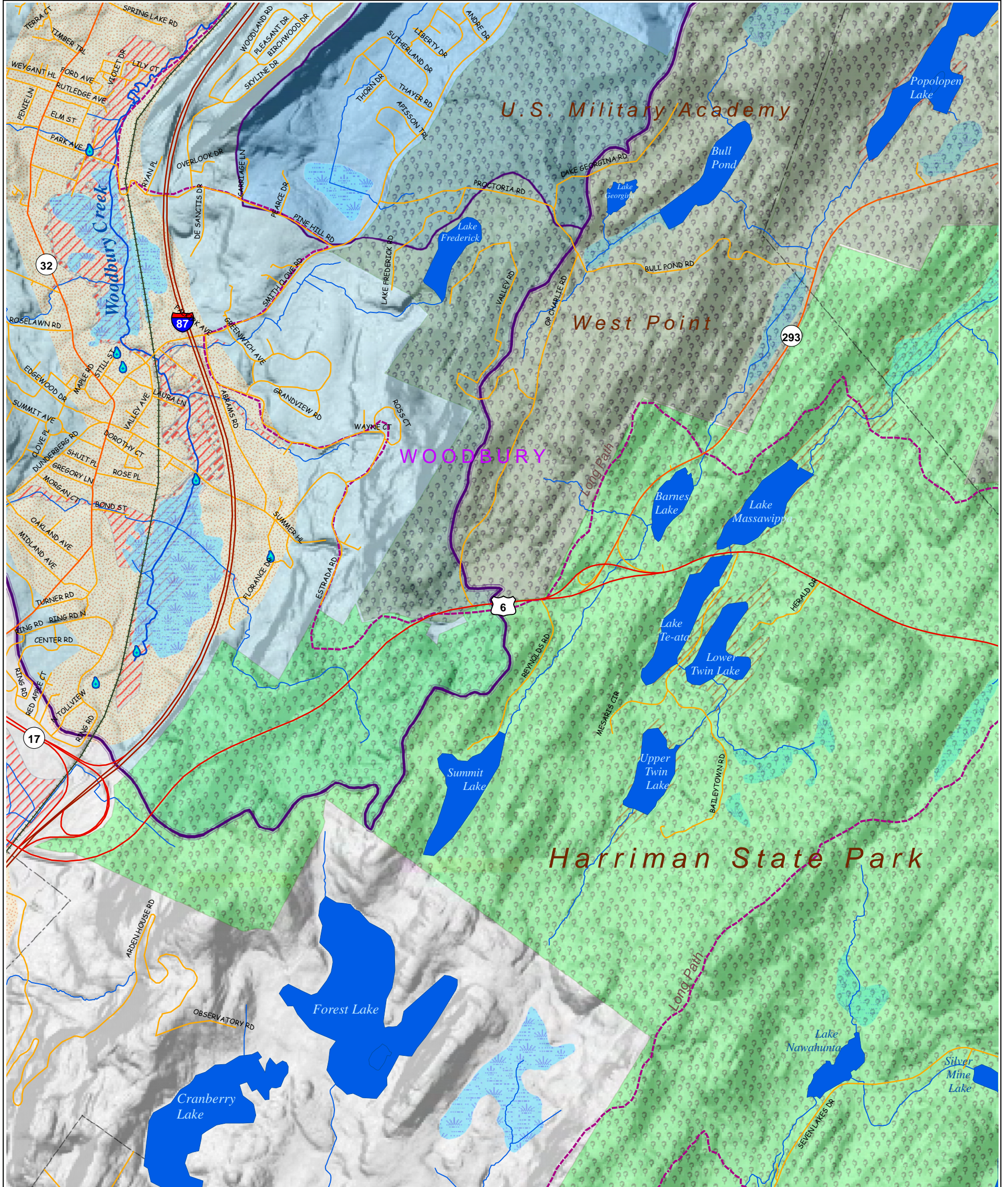
Tile 4C

Floodplains

-  100 Year
-  500 Year
-  Lake
-  Reservoir
-  Important Groundwater Resources
-  Stream biomonitoring sites
-  spill sites
-  Commuter RR Stations
-  SPDES discharge locations
-  Interstate Routes
-  NY State Routes
-  County Roads
-  Hiking Trails
-  Railroads: active
-  Railroads: inactive



See tile 3D



See tile 4C

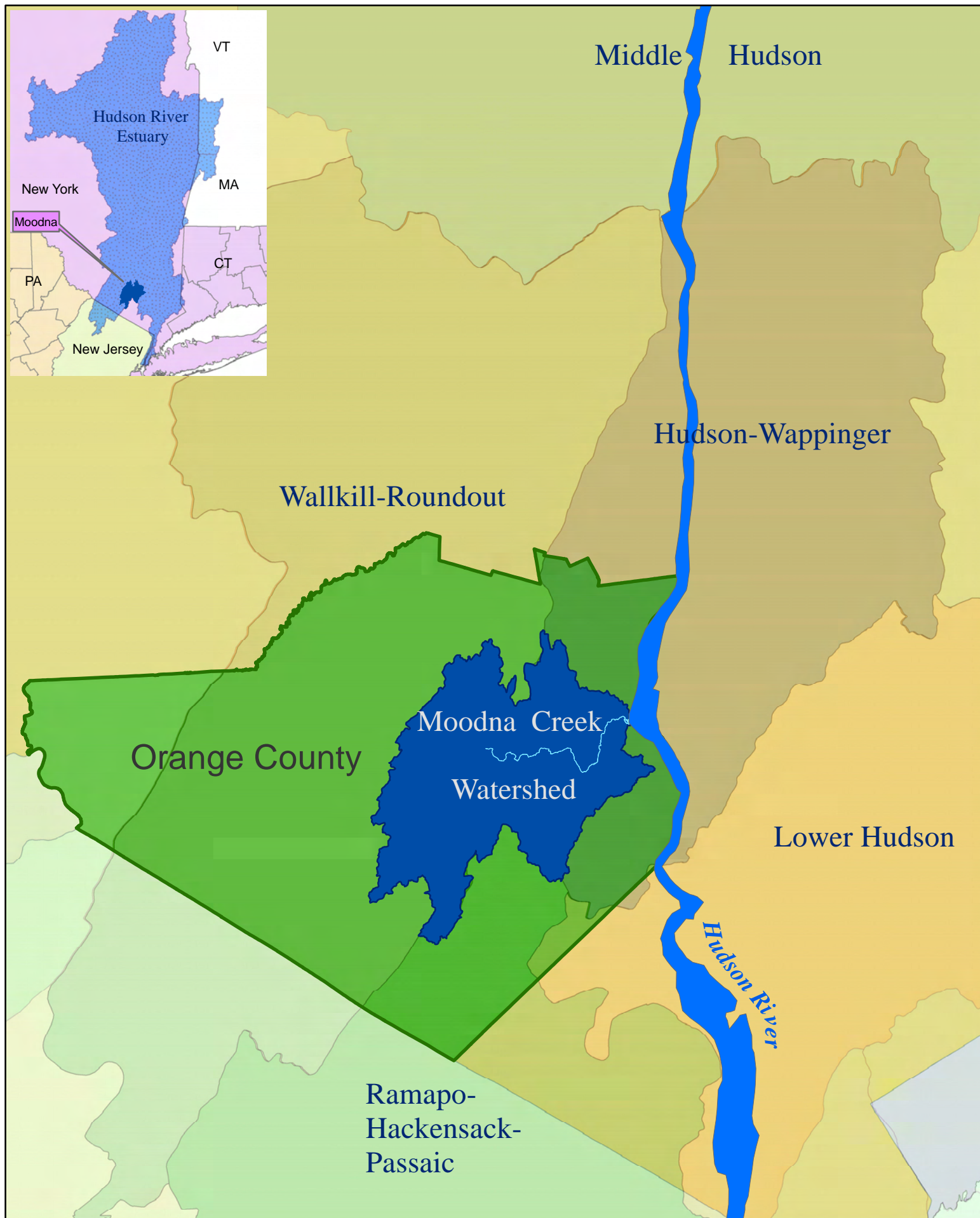
Tile 4D



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Moodna Creek Watershed Atlas

Nearby Watersheds & Location within the Hudson River Estuary



ORANGE COUNTY EXECUTIVE: **Edward A. Diana**
ORANGE COUNTY LEGISLATURE CHAIRMAN: **M. William Lahey**

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Publication date: May 2008



Edward A. Diana
County Executive



NYS DEC



Hudson River Estuary