Phase 1A Cultural Resources Survey
West Point Transmission Project
Northern Converter Station and Associated Land Components

Town and Village of Athens
Greene County, New York

Prepared for

ESS Group, Inc.
Waltham, Massachusetts

and

West Point Partners, LLC
Fairfield, Connecticut

Prepared by

JMA architects archeologists planners
John Milner Associates, Inc.
Croton-On-Hudson, New York

JUNE 2013

PHASE 1A CULTURAL RESOURCES SURVEY
WEST POINT TRANSMISSION PROJECT
NORTHERN CONVERTER STATION AND ASSOCIATED LAND COMPONENTS

TOWN AND VILLAGE OF ATHENS, GREENE COUNTY, NEW YORK

PREPARED FOR

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JUNE 2013

OPRHP MANAGEMENT SUMMARY

SHPO Review Number:	12PR03054
Involved State and Federal Agencies:	NYS Public Service Commission US Army Corps of Engineers (New York District)
Phase of Survey:	Phase 1A
Location Information	
Location:	Flats Rd. Ext., Leeds-Athens Rd., N. Vernon St., Union St., and N. Washington St.
Minor Civil Division(s):	Town of Athens (MCD 03902) Village of Athens (MCD 03942)
County:	Greene
Survey Area	
Converter Station:	Approximately 11.3 acres
Buried AC Land Cable:	Approximately 0.51 miles (2,695 ft)
Buried DC Land Cable:	Approximately 3.14 miles (16,600 ft)
USGS 7.5 Minute Quadrangle Maps:	*Hudson North, N.Y.*
Recommendations:	Phase 1B for selected areas as described in the report
Report Authors:	T. Arron Kotlensky, RPA Timothy C. Lloyd, Ph.D., RPA Joel I. Klein, Ph.D., RPA
Date of Report:	June 2013

JMA MANAGEMENT SUMMARY

JMA (John Milner Associates, Inc.) conducted a Phase 1A cultural resources survey for the proposed Northern Converter Station and Land Cables associated with the West Point Transmission Project (the Project) in the Town and Village of Athens, Greene County, New York. The Project includes the construction of a 320 kV high voltage direct current 1,000 MW electric transmission facility connecting the existing National Grid Leeds Substation in Athens, Greene County, New York, and the existing Con Edison Buchanan North Substation in the Village of Buchanan, Westchester County, New York. The information and recommendations contained in this report are intended to assist the Public Service Commission (PSC); the US Army Corps of Engineers (USACE); and NYS Office of Parks, Recreation and Historic Preservation (OPRHP) in complying with their regulatory obligations under Section 14.09 of the NYS Parks, Recreation and Historic Preservation Law and Section 106 of the National Historic Preservation Act (NHPA), as appropriate.

The Archeological Study Area discussed in this report consists of the area within 0.25 miles of the approximately 11.3-acre parcel for the proposed converter station in the Town of Athens, approximately 3.14 miles (16,600 ft) of buried DC Land Cable from the northern landfall location to the converter station, and approximately 0.51 miles (2,695 ft) of buried AC cable connecting the converter station to the existing Leeds Substation. The eastern segment of the proposed DC Land Cable is within the Village of Athens. The precise placement of the proposed Northern Converter Station on the 11.3 acre parcel has not been determined. The 11.3-acre area surveyed by JMA is larger than the footprint of the proposed converter station, allowing a degree of flexibility in the final placement of the converter station.

JMA identified a total of seventy-two previously recorded archeological sites within one mile of the Archeological Study Area, and a total of 11 historic properties within the three-mile Viewshed Study Area.

Given the intact nature of the soils found within the proposed location of the Northern Converter Station and the density of Pre-Contact archeological sites in its vicinity, it is JMA's opinion that Phase 1B archeological testing is warranted within the area of the converter station to evaluate the presence of previously unrecorded archeological deposits. Because of the proximity of previously recorded archeological resources and the lack of documentable prior ground disturbance, JMA further recommends Phase 1B archeological testing along the portion of the proposed route of the DC Land Cable that follows the predominantly rural Flats Road Extension and Leeds-Athens Roads (previously undisturbed areas within the construction footprint only), and at the horizontal directional drill entry/exit points for the route of the proposed AC Land Cable between the existing Leeds substation and the converter station location. Additionally, JMA recommends additional field reconnaissance, background research, and non-invasive testing (e.g., ground penetrating radar) to evaluate the potential for the presence of unmarked graves along the portion of the buried DC cable route where it passes in close proximity to the areas denoted as cemeteries on historic cartography.

Comprehensive historic architectural resources surveys were completed in 1998 and 2003 for the Athens Generating Station Project. The five-mile viewshed survey for the Athens Generating Project incorporated all of the three-mile viewshed associated with the proposed Northern Converter Station. For this reason, no additional architectural survey to identify previously unrecorded or unevaluated properties is recommended by JMA.

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1.0 INTRODUCTION

1.1 PURPOSE AND GOALS OF THE INVESTIGATION

JMA (John Milner Associates, Inc.) conducted a Phase 1A cultural resources survey for the proposed Northern Converter Station and associated Land Cables for the West Point Transmission Project (the Project) in the Town and Village of Athens, Greene County, New York. JMA was contracted by ESS Group, Inc. (ESS) on behalf of the developers of the Project, West Point Partners, LLC.

The Project is the construction of a 320 kV high voltage direct current (HVDC) 1,000 MW electric transmission facility connecting the existing National Grid Leeds Substation (Leeds Substation) in the Town of Athens, Greene County, New York, and the existing Con Edison Buchanan North Substation (Buchanan Substation) in the Village of Buchanan, Westchester County, New York (Figure 1).

The Project involves the installation of a new 320/345kV HVDC Cable System routed from Athens, NY to Buchanan, NY. Installation of the approximately an 82.6-mile long Cable System will include the following components:

- A 320kV HVDC In-River Transmission Cable (approximately 77.3 miles).
- Two (2) HVDC Converter Stations, one (1) at each end of the HVDC Cable System.
- Two (2) short lengths of 320kV HVDC Land Cable to connect the In-River Cable to the Converter Stations.
- Two (2) short lengths of 345kV AC Land Cable to connect the Converter Stations with existing land based system interconnections at the Leeds Substation at the northern end of the Project and at the Buchanan Substation at the southern end.
- Two (2) series of Horizontal Directional Drill (HDD) Conduits at the landfalls at each end of the In-River Transmission Cable.
- Two (2) Underground Transition Vaults, one at each end of the In-River Cable to house the connection between the In-River Cable and Land Cable systems.

All Project components, with the exception of the Converter Stations, will be installed underground in ducts and/or conduits.

For most of its length, the Project will be buried in the bed of the Hudson River in submerged lands owned by the State of New York. At either end of the In-River Cable Route, the Land Cables will be located in existing public rights-of-way and/or in rights-of-way secured from private landowners. The Converter Stations will be located on private property proximate to the existing Leeds and Buchanan Substations.

The proposed Northern Converter Station in the Town of Athens and its associated Land Cables are the subject of this report (Figures 2 and 3). Separate cultural resources reports have been prepared for 1) the Southern Converter Station and the associated Land Cables in the Town of Cortlandt, and 2) the In-River Cable in the Hudson River.

The Project will require a Certificate of Environmental Compatibility and Public Need from the New York State Public Service Commission (PSC) in accordance with Article VII of the NYS Public Service Law. The Project will also require a permit from the US Army Corps of Engineers (ACOE). The Project will also be reviewed by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) acting in its capacity as the State Historic Preservation Officer (SHPO).

The information and recommendations contained in this report are intended to assist the PSC, the ACOE, and

OPRHP in complying with their regulatory obligations under Section 14.09 of the NYS Parks, Recreation and Historic Preservation Law, and Section 106 of the National Historic Preservation Act (NHPA), as appropriate.

The purpose of the Phase 1A investigation is to identify previously recorded archaeological and historic sites located within the Project's Area of Potential Effect (APE) (the Study Area). Article VII regulations set forth at 16 NYCRR Part 86.3(a)(1)(iii) require identification of "any known archaeologic, geologic, historical or scenic area, park or untouched wilderness on or within three miles of the right-of-way." However, in July 2012, ESS requested concurrence with their recommendation that for archeological resources, the Study Area associated with land-based Project components be limited to the area within 0.25 miles of the proposed converter stations and the Land Cable routes (Archeological Study Area). In August 2012, OPRHP advised the ACOE and PSC that they had no objection to the proposed APE. For the Phase 1A investigation JMA has limited the Study Area for above-ground historic resources to the area within the three-mile viewshed (Viewshed Study Area) associated with above-ground Project components. It is anticipated that formal waiver requests to modify the Project APE (Archeological Study Area) and the Viewshed Study Area (collectively referred to as "Study Area") for both archeological and above-ground historic properties in the manner described above will be approved by the PSC.

The Phase 1A survey also evaluates the potential for there to be previously unrecorded archaeological or historic resources. All research and report preparation were conducted in accordance with the New York Archaeological Council's *Standards for Cultural Resources Investigations and the Curation of Archaeological Collections* (NYAC 1994), recommended for use by the OPRHP.

1.2 STUDY AREA DESCRIPTION (NORTHERN CONVERTER STATION AND ASSOCIATED LAND CABLE)

The Archeological Study Area discussed in this report consists of the area within 0.25 miles of the approximately 11.3-acre parcel for the proposed converter station in the Town of Athens, approximately 3.14 miles (16,600 ft) of buried DC Land Cable from the landfall location to the converter station, and approximately 0.51 miles (2,695 ft) of buried AC Land Cable connecting the converter station to the existing Leeds Substation (Figures 2 and 3). The eastern segment of the proposed DC Land Cable is within the Village of Athens. The 11.3-acre area surveyed by JMA for the Converter Station is larger than the proposed footprint, allowing a degree of flexibility in the final placement of the converter station.

The Viewshed Study Area for above-ground historic properties consists of the three-mile viewshed associated with the proposed Northern Converter Station. That viewshed includes portions of the Towns of Athens, Coxsackie, and Catskill in Greene County, on the west side of the Hudson River, and a portion of the Town of Greenport in Columbia County, on the east side of the Hudson River.

2.0 BACKGROUND RESEARCH

2.1 GEOLOGY AND SOILS

The Study Area is located on the eastern side of Greene County, which is on the west side of the Hudson River in the east-central part of New York State. The Study Area is within the Hudson Valley section of the Valley and Ridge province, also known as the Hudson-Mohawk Lowlands (USDA 1993; Isachsen et al. 2000). This province is bounded on the west by the Catskill Mountains and on the east by the Taconic Mountains. The Hudson-Mohawk Lowlands are characterized by broad valleys and gently rolling hills. The Study Area is located within the geologic Normanskill Formation, which consists of green and black shale with thin beds of limestone and chert (USDA 1993). “The chert consists of black, red, or green nodules that weather to white” (USDA 1993:3).

Much of northeastern North America was uninhabitable during the late Pleistocene, owing to the presence of continental ice sheets. Late Wisconsin glaciation peaked approximately 21,000 years ago (Dreimanis 1977:72, 74). After this time, the Laurentide Ice Sheet progressed through a series of retreats and advances until approximately 10,000 B.P., which marks the transition from the Pleistocene, or terminal Late Wisconsin, to the Holocene in the Great Lakes region (Dreimanis 1977:85).

The Study Area is located within the portion of New York State that was impacted by the Late Wisconsin glaciation. Approximately 18,000 years ago, this area was capped by the Laurentide Ice Sheet. As the glaciers retreated, a number of glacial lakes formed from the melt water, including Glacial Lake Albany, which filled the mid and upper Hudson Valley for several thousand years (Caldwell et al. 1987; Isachsen et al. 2000). By 14,000 years ago, glacial Lake Albany had dried up, and climatic amelioration had resulted in the expansion of different forest types, characterized by Parkland-Conifers and grass (Delcourt and Delcourt 1981:147; Dreimanis 1977).

By 10,000 years ago, the ice sheet had retreated to the northern Great Lakes region, and the Study Area was positioned within the Jack Pine-Spruce portion of the boreal forest (Delcourt and Delcourt 1981; Whitehead 1979). Pollen isopoll maps for this time period indicate that the forests consisted of approximately 30 percent spruce trees, 40 percent pine trees, and less than 10 percent oak trees (Bernabo and Webb 1977:Fig. 7). By 5,000 B.P. warming conditions resulted in expansion of deciduous forests. The Study Area was situated within a large belt of Mixed Conifer-Northern Hardwood forests (Delcourt and Delcourt 1981:Fig. 8; Whitehead 1979). By 4,000 B.P., pollen isopoll maps indicate that the Project Area was characterized by 30 percent oak pollen and 20 percent pine pollen (Bernabo and Webb 1977:Fig. 15).

The majority of the area of the proposed converter station is characterized as Covington and Madalin soils (*Co*; 8.8 acres), but also includes the hilly Valois-Nassau complex (*VdD*; 4 acres), and the rolling Nassau channery silt loam (*NaC*; 2 acres), while the proposed routes of the buried AC and DC cables are characterized by a variety of soil types. A detailed soils report for the Archeological Study Area was generated from the USDA Web Soil Survey (NRCS 2013), and is included as Appendix A.

2.2 PREVIOUSLY RECORDED ARCHITECTURAL RESOURCES

In order to determine the potential visibility within three miles of the proposed above ground facilities associated with the Northern Converter Station, a viewshed analysis map was prepared by ESS. The viewshed analysis considers the highest point of the proposed Northern Converter Station, the lightning masts at a height of 80 ft (24.4 m) above ground level. The masts have a very narrow profile and most of the facility’s more substantial structures are below this elevation. For example, the converter hall structure is approximately 49 ft tall. It is assumed that the 80-ft lightning mast constitutes the worst case visibility scenario.

To create the viewshed map, a 10-meter USGS Digital Elevation Model (DEM) was imported into a Geographic Information System (GIS) for the three-mile Viewshed Study Area. The center of the proposed converter station is used as a control point set at 80 ft above ground level. The GIS software then analyzed each of the 10-meter cells within the 3-mile Viewshed Study Area scans; the scan assumes a 5.1-ft receiver elevation to simulate the viewer eye height to determine whether an uninterrupted line of sight to the converter station is available. If the cell is determined to have potential visibility, each of those cells is coded as visible. The resulting data layer includes a combination of those cells with project visibility. This result represents the geographic area in which the Project *might* be visible in the absence of all vegetation and structures. This viewshed represents a worst case visibility scenario, since the screening effects of intervening vegetation and structures are not considered. The geographic extent of the three-mile viewshed is shown in Appendix B. The viewshed includes portions of the Towns of Athens, Coxsackie, and Catskill in Greene County, and a portion of the Town of Greenport in Columbia County.

JMA reviewed the State and National Registers of Historic Places (S/NRHP) for properties within the Viewshed Study Area, including above-ground properties within the three mile viewshed. JMA also reviewed the OPRHP Building-Structure Inventory to identify properties that have not been listed on the S/NRHP, but which have been determined eligible for listing by OPRHP and/or are in the process of being nominated to the S/NRHP.

Table 1 summarizes the properties identified by JMA that are listed in, or determined eligible for, the S/NRHP that are within the three-mile viewshed. JMA identified one property that is listed in the S/NRHP, and ten that are not listed but have been determined by the SHPO to be eligible for listing in the S/NRHP. In addition to these 11 structures falling within the viewshed, the proposed route of the DC Land Cable passes through the Second Street area of the Athens Lower Village Historic District along Leeds-Athens Road and Second and North Vernon Streets.

2.3 PREVIOUSLY RECORDED ARCHEOLOGICAL RESOURCES AND PRIOR SURVEYS

JMA personnel reviewed the consolidated site files of the OPRHP and the New York State Museum (NYSM) to identify previously recorded archeological sites and historic properties located within the boundaries of the Project Area and those within one mile of the Project Area. Reported archeological resources in Greene and Columbia Counties include sites that were documented by archeologists in the early twentieth-century (e.g., Beauchamp 1900; Parker 1920), sites identified during research programs sponsored by the NYSM (e.g., Ritchie 1980; Ritchie and Funk 1973), and sites identified during cultural resource surveys undertaken in the vicinity of the Project Area (e.g., Black Drake 1999; Collamer 1985, 1998, 1999; Curtin 1991; Garrow 1990; Hartgen 1995, 1996, 1997, 1998; JMA 1998; Ocean Surveys 1998; Pan American 2002). The surveys undertaken for the Athens Generating Project (Collamer 1998, JMA 1998) are the surveys undertaken in closest proximity to the Project Area.

JMA identified no previously-recorded archeological sites within the footprint of the Project Area and identified seventy-two previously-recorded archeological sites within one mile of the Project Area, seven (7) of which are listed on (or have been determined eligible for listing on) the S/NRHP (Table 2). Of these seventy-two sites, at least fifty-seven are recorded as Pre-Contact only or contain Pre-Contact evidence. Seventeen of the seventy-two fall within the one-quarter mile APE/Study Area (less than 1,320 feet in distance on Table 2), one of which is listed (or is eligible for listing on) on the S/NRHP.

2.4 HISTORY OF THE STUDY AREA

JMA reviewed both written and cartographic documents relating to past and present environmental conditions and historical settlement to construct an historic context for the Study Area region, and to assist in developing the archeological sensitivity assessment. Sources examined included the 1884 Beers *History of Greene County*, the 1900 Hudson Gazette *Columbia County at the End of the Century*, the 1927 Vedder *History of Green County*, the 1976 Brunner *Athens: It's People and Industry*. Historic maps examined by JMA included the Pelletreau map of the seventeenth and eighteenth century land patents (Figure 4), the 1776 Sauthier map (Figure 5), the 1796 Reid map (Figure 6), the 1829 Burr map (Figure 7), the 1856 Geil map, the maps by Beers map in 1867 (Figure 8) and 1891 (Figure 9), the USGS 15-minute topographical maps in 1893 (Figure 10) and 1929 (Figure 11), the NETR 1952 aerial imagery (Figure 12), and the USGS 7.5-minute topographical maps in 1953 (Figure 13) and 1980 (Figure 2). JMA also reviewed Sanborn Insurance maps and found portions of the Study Area in the Village of Athens (i.e., eastern end of the DC Land Cable route) depicted on maps in 1895, 1905, 1912, 1923 and 1943.

Prior to the arrival of Europeans in the seventeenth century, the region including the Study Area was probably occupied either by a branch of the Mahican Tribe, which controlled the upper Hudson Valley, or the Catskill Indians, a branch of the Delaware Tribe (Vedder 1927:21-23). A north-south Indian trail is reported to have been located west of the Study Area, along the Hans Vosen Kill (Pelletreau 1884). The Hudson River is named after Henry Hudson, who explored the river in 1609 on behalf of the Dutch East India Company, and the Dutch were the first Europeans to establish settlements in the region.

Greene County

The first patent for land in what is now the Town of Athens was granted to Johannis Clute, Jan Hendrick Bruyn, and Jureaen Theunessen on May 25, 1667 (Pelletreau 1884). These men purchased a large parcel from representatives of five groups of Native Americans. The Native American signatories included Sachamoes, Mawinata, Keesie Wey, Papeuna, and Masseha (Brunner et al. 1976:8). In 1684 Clute sold his land to Jan Van Loon, who then owned the largest tract of land, and the area became known as Loonenburgh. Throughout the seventeenth and eighteenth centuries, settlement within Loonenburgh was limited, confined primarily to the flats along the western banks of the Hudson River.

The Old Kings Road (present day Route 9W) was opened in 1703 (Vedder 1927:11), running north-south along the western side of the Athens Flats, west of the Study Area. English settlers began moving into the region during the eighteenth century, and by 1772 municipalities were being organized (Beers 1884:25). The region was part of Albany County during the American Revolution, but no battles from that war are documented for the area (Beers 1884:29).

Greene County was created on March 25, 1800, formed from Albany and Ulster Counties. At that time the major towns of the county included Catskill, Coxsackie, Freehold, and Windham (Beers 1884:30; Vedder 1927:5-6). Across the river, the town of Hudson was thriving. A town called Esperanza was planned for the west bank, to take advantage of trade opportunities along the river. However, speculations failed and it never evolved beyond the Upper Village. On April 2, 1805 the Upper Village was combined with the Lower Village, resulting in a settlement called the Village of Athens (Vedder 1927:26). The Town of Athens was formed on February 25, 1815, carved from sections of Coxsackie and Catskill (Beers 1884:151-152).

The geography in the Athens area fostered a variety of economic pursuits. The lowlands were highly fertile and areas such as the Athens Flats were cultivated, with hay and fruit the principal products. The upland areas contained a variety of mineral resources, and limestone, flagging stones, and other rocks were quarried and shipped from Catskill to New York City and elsewhere along the eastern seaboard (Beers 1884:59). Slavery is a subject that receives little overt attention in the historical texts, but a review of the Beers 1884 *History of Greene County* indicates that slaves were part of the local economy, going back to the early Dutch settlers of the region. Census records confirm that slaves were members of the communities well into the nineteenth century.

The first tannery in the area was established by Nicholas Perry in 1750. The abundance of hemlock trees, the bark of which is used in the tanning process, was instrumental in Greene County becoming the leading producer of leather in the country by 1830. Raw hides were sent from as far away as South America to be treated at one of the numerous villages serving this industry (Beers 1884:58). Over-exploitation of hemlock trees resulted in the collapse of the local tanning industry.

Other enterprises in the area centered on the Hudson River. Prior to the establishment of rail lines, rivers were the major transportation routes. Steamboats carried goods and people between New York City and Albany. Shipbuilding catered to the thriving river traffic on the Hudson River. The Town of Athens maintained a dock and was home to a shipbuilding industry. The Athens shipyard was established in 1843 by William Coffin (Brunner et al. 1976:29). The largest steamboat constructed for the Hudson-New York route was the Berkshire, which was built in Athens. The New York, Catskill, and Athens Steamboat Company began operating on April 25, 1877, with two steamers traveling between the central Hudson Valley and New York City.

The harvesting, storage, and shipment of river ice were significant economic endeavors during the nineteenth and early-twentieth century. This industry was a major employer for Greene County. The ice was collected, broken, and eventually loaded onto ships and barges. Along the Hudson River, there were forty large icehouses belonging to companies such as the Knickerbocker, the New York, the New Jersey, and the Consumers (Beers 1884). The Knickerbocker Ice Company owned most of the river frontage. Four large icehouses were located on the Hudson River in Athens, with smaller houses situated along some of the larger tributaries in the Athens area.

Cattle, sheep, swine, and poultry were raised on hundreds of farms in the area during the nineteenth century. The production of food and clothing provided additional household income. Lumber for local markets was produced from saw mills established along the streams. Brickmaking, cooperage wares, ice tools, and metal working products were additional local industries during the late nineteenth century (Beers 1884:59).

By the late-nineteenth century numerous residences were established outside of the Village of Athens, and the density of roads in the area increased, reflecting dramatic demographic surges across the southeastern New York landscape, especially between Albany and New York City. The growth during the late-nineteenth and early twentieth century had little effect on the Study Area until the construction of the New York State Thruway (Interstate 87) in late 1960s.

Columbia County

The first documented Euroamerican occupation of Columbia County, on the east side of the Hudson River, was by Abraham Staats in 1642 at the mouth of Stockport Creek (Hudson Gazette 1900:20). A successful fur trader, it is recorded that he sent 4,200 beaver skins to Amsterdam in 1657. Among the early settlers were two van Beuren brothers in 1660, both of whom became farmers. Early industries in the area included grist and saw mills. The first recorded mill, located in Kinderhook, was constructed in 1665. By the early eighteenth century, leather tanning had become an important local industry.

Columbia County was created in 1786, formed from Albany County. As with Greene County, much of the industry in Columbia County revolved around the Hudson River. Goods were shipped to and from many locations along the Hudson River between Albany and New York City (Hudson Gazette 1900:224). Fishing was a major economic pursuit in the nineteenth century, and dried, smoked, and pickled herring were exported on a large-scale basis. Agriculture was also a significant part of the local economy, and Columbia County farms produced winter wheat, hay, potatoes, corn, barley, pigs, cattle, and dairy products. Iron mining was another important industry in Columbia County beginning in the early nineteenth century. Forges were established to refine pig iron, which was then fabricated into bars, rods, and other industrial items. Other important local nineteenth century industries included milk bottling and shipping facilities, vineyards and other fruit farms, and woolen mills (Hudson Gazette 1900:240-242).

The Town of Hudson, positioned directly across the river from Athens, was established by seamen who moved to the area from Massachusetts and Rhode Island. In addition to shipping, ship building developed into a significant local industry. In addition to shipyards, ancillary industries developed, such as cordage makers, oil and candle makers, sail makers, and nail factories. Important shipping companies included the New York and Hudson Steamboat Company (established 1818) and the Hudson Tow-Boat Company (established 1830) (Hudson Gazette 1900:226-230).

The Town of Greenport, originally part of Claverack, was established in May 1837. This area was fist settled by Euroamericans in the early nineteenth century. Marble quarrying was an important early industry in Greenport. A railroad was built to transfer marble to the river, where it was loaded onto barges bound for Albany or New York City. Sheep husbandry was another important nineteenth century economic pursuit. Merino sheep were established in the area, from which Mt. Merino was named (Hudson Gazette 1900:659-666).

Cartographic Analysis

Figure 4 shows the approximate location of proposed Project components on a map of the original seventeenth and eighteenth century land patents. The Archeological Study Area falls within the Loonenberg Patent. The western end of the Study Area is near the Corlears Kill, and the eastern end is near Murders Creek.

Figures 5 and 6 show the approximate location of the proposed Project components on late eighteenth century maps. These maps do not depict individual structures, but historical accounts indicate that there was no settlement within the Archeological Study Area during the seventeenth and eighteenth century, with the exception of settlement within the Village of Athens. Figure 7 shows the Project components on an 1829 map. This map shows the growing community of Athens, and the community of Hudson on the opposite bank of the Hudson River.

Figure 8 shows the approximate location of the proposed Project components on an 1867 map, which shows the expansion of settlement and industry in the area. The map shows docks, shipyards, and ice houses along the bank of the Hudson River, and the continued expansion of the Village of Athens. The map shows structures along the path of the proposed DC Land Cable, along what are now the Leeds-Athens Road (one structure associated with name M. Clark and two structures associated with the name W. L. King) and the Flats Road Extension (one structure associated with the name John Van Hoesen). This map shows two “Grave Yards” near the eastern side of the proposed Converter Station, within or near the proposed route of the DC Land Cable as it exits the Converter Station.

The graveyards are also shown on the 1891 map (Figure 9), but at that time they were labeled as “Old Slave Burying Ground.” JMA did not locate any references to this “Old Slave Burying Ground” in the historic texts consulted. JMA also contacted the Greene County Historian, who had no information to add regarding this cemetery. The structure associated with the name Van Hoesen on the Flats Road Extension on the 1867 map is not shown on the 1891 map. The structure associated with the name M. Clark on the Leeds-Athens Road on the 1867 map is also not shown on the 1891 map. The 1891 map shows the continued growth of industries along the shore of the Hudson River, and several structures in proximity to the eastern end of the proposed DC Land Cable route.

Figure 10 shows the approximate location of the proposed Project components on an 1893 USGS topographic map. The structure that was shown on the Flats Road Extension on the 1867 map (Figure 8) associated with the name Van Hoesen, which is not shown on the 1891 map (Figure 9), appears to be present on the 1893 map. It appears that this structure was mistakenly omitted on the 1891 map. The western most of the two structures associated with the name

W. L. King on the 1867 map (both of which are shown on the 1891 map) is not shown. The structure associated with Van Hoesen on Flats Road Extension and the structure associated with the name W. L. King on the Leeds-Athens Road are shown on the 1929 USGS topographical map (Figure 11). In addition to these two structures, two additional structures are depicted on the north side of Leeds-Athens Road, within the boundary of the Village of Athens (Figure 11). No additional structures are depicted along the course of the DC Land Cable route except in the vicinity of the intersections of North Vernon and Union Streets and Union and North Washington Streets.

Figure 12 features aerial imagery that depicts conditions in the area of the proposed Northern Converter Station in 1952. At that time, the site of the proposed Northern Converter Station appears to be predominantly agricultural field, except for an elongated bedrock outcrop area that can be seen running north-south through the converter station area. In addition to the bedrock outcrop, planted trees are visible in the northwestern extension of the converter station area. The route of the DC Land Cable passes over a ridge to the east of the converter station, passing through predominantly open, unimproved land that is marked by a small cluster of trees. This cluster may mark the location of the cemetery plots depicted in Figures 8 and 9, but may also be a small orchard or other tree stand. The aerial imagery also clearly depicts at least three structures along Flats Extension Road in the land parcel encompassing the converter station location that are most likely the same domestic and agricultural buildings found in this location in the present. The USGS *North Hudson, N.Y.* 7.5-minute quadrangle map for 1953 (Figure 13) also depicts these structures, while also depicting the location of a cemetery in the approximate location of the small tree cluster just west of Flats Extension Road noted on Figure 12. The quadrangle further depicts the modest amount of development that has taken place along the remainder of the DC Land Cable route since 1929 (Figure 11), with the most notable changes in the built landscape occurring along North Vernon and Union Streets. In addition to domestic growth within the Village of Athens, the quadrangle depicts a small tank farm in the vicinity of the northern landfall location, which remains in use in the present.

3.0 ARCHEOLOGICAL SENSITIVITY ASSESSMENT

3.1 EXISTING CONDITIONS

JMA conducted field reconnaissance of the Archeological Study Area on April 2 and April 12, 2013. The location and direction of referenced photographs taken during the taken during the reconnaissance are shown on Figure 14.

The first approximately 6,700 feet of the proposed DC Land Cable route following the northern landfall location passes through the Village of Athens, following streets within predominantly residential neighborhoods. From the landfall location adjacent to a liquid calcium chloride products depot (Photograph 1), the route of the proposed DC Land Cable route follows to the southwest along North Washington Street (Photograph 2), before turning to the northwest to follow Union Street (Photographs 3 and 4). From Union Street, the DC Land Cable route turns again to the southeast and follows North Vernon Street for approximately 3,500 feet (Photographs 5-10). At the intersection of North Vernon and Second Streets, the cable route turns briefly to the northwest before turning to the west to follow Leeds-Athens Road (Photograph 11). The Land Cable route continues to follow west along Leeds-Athens Road for approximately 5,925 feet, passing through rural residential and agricultural settings (Photographs 12-17). At the intersection of Leeds-Athens Road and Flats Extension Road, the cable route follows Flats Extension Road to the north-northwest for approximately 2,880 feet (Photographs 18-20). JMA observed no historic structural features, such as foundations or shaft features, along the DC Land Cable route.

In near proximity to the proposed Northern Converter Station location along Flats Extension Road is an active livestock farm, with an adjoining residence (Photographs 21, 22). The route of the DC Land Cable route passes by the farm and residence. Located within the same parcel occupied by the farm is a grave marker/monument, listing the names and birth–death dates of “William Mackey/1792 – 1830,” Elizabeth Lampman/His Wife/1791 – 1851,” and “Casper Mackey/1829 – 1864” (Photograph 23). As the monument displays certain characteristics typical of late nineteenth century/early twentieth century-era grave markers, the monument may not be original to any of the three grave sites or mark the exact location of those graves (no clear indications of graves were observed in proximity to the monument). Additionally, the grave marker does not lie within the proposed route of the DC Land Cable or any other project component.

After making a right-angle turn west in respect to its course along Flats Extension Road, the proposed route of the Land Cable route parallels an gravel-surfaced access road (Photograph 24), before following an unimproved road/pathway down a west-facing slope, leading into the proposed site of the converter station (Photograph 25). The proposed site of the converter station includes no built improvements and is predominantly a mix of immature wooded areas and unimproved open field (Photographs 26-29). JMA observed no historic structural features, such as foundations or shaft features, within the proposed site of the converter station. At the time of field reconnaissance, much of the proposed site of the converter station was inundated, as can be seen in Photograph 30. The proposed site of the converter station is predominantly level, with a gradual, wooded slope along its eastern margin (Photograph 31). In addition to the sloped area to the east, a north-south oriented outcrop of bedrock protrudes roughly through the center of the proposed site of the converter station (Photographs 32-34).

The proposed route of the AC Land Cable follows a short north-south course between the existing Leeds substation and the site of the converter station (Photograph 35). Similar to the proposed site of the converter station, much of the course of the AC Land Cable was inundated at the time of field reconnaissance (Photograph 36) and follows an existing tree-line along a fenced pasture (Photograph 37). A proposed access road may follow a course through the fenced pasture (Photograph 38), connecting Flats Extension Road (Photograph 39) with the site of the converter station (Photograph 40).

3.2 PRE-CONTACT PERIOD ARCHEOLOGICAL SENSITIVITY

Due to proximity to high-quality and plentiful chert sources, high density of recorded Pre-Contact archeological sites in the Study Area, and the intact nature of the soils observed in the area of the proposed Northern Converter Station, it is JMA's opinion that the proposed converter station location possesses a high probability for the presence of intact Pre-Contact Period Native American archeological deposits. In particular, the long span of activity associated with the regionally-significant Flint Mine Hill archeological district (Paleoindian through Late Woodland) and adjacent areas also further suggests a higher likelihood for the presence of previously unrecorded archeological deposits within the site of the converter station (Ritchie and Funk 1973; Ritchie 1980; Snow 1980). Within the remaining portions of the Archeological Study Area, including the route of the AC Land Cable, Flats Extension Road, Leeds-Athens Road, Second Street, North Vernon Street, Union Street, North Washington Street, and the northern landfall location, it is JMA's opinion that there is a moderate sensitivity for Pre-Contact Period archeological deposits to be found along any of these routes. However, intensive ground disturbance and redevelopment along streets within the Village of Athens since the nineteenth century reduces the likelihood that such archeological deposits remain intact, except along the route of the AC Land Cable and the portion of the route of the DC Land Cable along the predominantly-rural Flats Road Extension and Leeds-Athens Road.

3.3 HISTORIC PERIOD ARCHEOLOGICAL SENSITIVITY

It is JMA's opinion that the area of the proposed Northern Converter Station possesses a low probability for the presence of Historic Period archeological deposits due to consistent agricultural usage since settlement and a lack of structural, foundation, or shaft feature evidence. Review of historic cartography revealed no map-documented structures within the area of the proposed converter station, which further suggests consistent agricultural or wood-lot usage. As discussed through cartography analysis above, the approximate east-west segment of the DC Land Cable route closest to the proposed location of the converter station may pass through an area that contains unmarked cemetery plots, and consequently possesses high Historic Period archeological sensitivity (Figures 8 and 9).

Within the remaining portions of the Archeological Study Area, including the route of the AC Land Cable, Flats Road Extension, Leeds-Athens Road, Second Street, North Vernon Street, Union Street, North Washington Street, and the northern landfall location, it is JMA's opinion that there is a moderate to high sensitivity for Historic Period archeological deposits to be found along any of these routes. However, intensive ground disturbance and redevelopment along streets within the Village of Athens since the nineteenth century reduces the likelihood that such archeological deposits remain intact, except along the route of the AC Land Cable and the portion of the route of the DC Land Cable along the predominantly rural Flats Road Extension and Leeds-Athens Road. The proposed route of the DC Land Cable also passes through the northwestern end of Second Street within the Athens Lower Village Historic District, following along Leeds-Athens Road and Second and North Vernon Streets. Although no archeological sites have been identified in this immediate area, the area does possess a higher probability for Historic Period archeological deposits related to domestic and commercial activities.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Given the intact nature of the soils found within the proposed location of the Northern Converter Station and the density of Pre-Contact archeological sites in its vicinity, it is JMA's opinion that Phase 1B archeological testing is warranted within the area of the converter station to evaluate the presence of previously unrecorded archeological deposits. Because of the proximity of previously recorded archeological resources and the lack of documentable prior ground disturbance, JMA further recommends Phase 1B archeological testing along the portion of the proposed route of the DC Land Cable that follows the predominantly rural Flats Road Extension and Leeds-Athens Roads (previously undisturbed areas within the construction footprint only), and at the horizontal directional drill entry/exit points for the proposed AC Land Cable between the existing Leeds substation and the converter station location. Additionally, JMA recommends additional field reconnaissance, background research, and non-invasive testing (e.g., ground penetrating radar) to evaluate the potential for the presence of unmarked graves along the portion of the buried DC Land Cable route where it passes in close proximity to the areas denoted as cemeteries on Figures 1, 8, 9, and 13.

Comprehensive historic architectural resources surveys were completed in 1998 and 2003 for the Athens Generating Station Project. The five-mile viewshed survey for the Athens Generating Project incorporated all of the three-mile viewshed associated with the proposed Northern Converter Station. For this reason, no additional architectural survey to identify previously unrecorded or unevaluated properties is recommended by JMA. JMA does recommend additional evaluation of the 11 above-ground historic properties discussed in this report to determine if they are in the true Project viewshed, or if they will be screened by intervening structures and/or vegetation.

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TABLES

Table 1. Historic properties located within the three-mile viewshed of above-ground Project components.

JMA[i]	USN[ii]	Name	Address	Municipality	SRHP[iii]	NRHP[iv]	NRE[v]
N-1	03202.000035	Rushmore Residence – Structure 7	Route 9W/Kings Road	Town of Athens	-	-	X[vi]
N-2	03902.000003	Structure 12	154 Route 9W	Town of Athens	-	-	X[vii]
N-3	03902.000004	Structure 13	9567 Route 9W	Town of Athens	-	-	X
N-4	03902.000092	Van Loon House – Structure 46	Schoharie Turnpike/Route 28	Town of Athens	-	-	X
N-5	03902.000095	Structure 49	335 Flats Road/Route 53	Town of Athens	-	-	X[VI]
N-6	03902.000019	Dennis Residence – Structure 52	Box 325 Flats Road/Route 53	Town of Athens	-	-	X[VI]
N-7	03905.000057	Palmer Farm – Structure 73	Flats Road/Route 53	Town of Coxsackie	-	-	X
N-8	02111.000110	Structure 78	Mount Merino Road	Town of Greenport	-	-	X[VI]
N-9	02111.000111	Structure 79	358 Mount Merino Road	Town of Greenport	-	-	X[VI]
N-10	03904.000185	Moore-Howland Estate	4 Route 385	Town of Catskill	X	X	-

i Unique identifier assigned by JMA.

ii Unique Site Number (USN) assigned by OPRHP.

iii Properties listed on the State Register of Historic Places.

iv Properties listed on the National Register of Historic Places.

v Unlisted properties that have been determined eligible for listing in the National Register of Historic Places by the State Historic Preservation Officer.

vi Unlisted properties that have been determined eligible for listing in the National Register of Historic Places by the State Historic Preservation Officer during review of visual impacts to historic properties for Project 97PR1049 (correspondence from John Bonafide dated 07/10/98). These properties are not identified as S/NRHP-eligible properties in OPRHP's SPHINX inventory.

vii Unlisted properties that have been determined eligible for listing in the National Register of Historic Places by the State Historic Preservation Officer during review of visual impacts to historic properties for Project 97PR1049 (correspondence from Commissioner Bernadette Castro dated 02/09/99). These properties are not identified as S/NRHP-eligible properties in OPRHP's SPHINX inventory.

Table 2. Archeological sites located within one mile of the proposed Northern Converter Station

OPRHP or NYSM Site #	Site Name	Time Period	Site Type	Approximate Distance (ft/m)/Direction from Project Components		
03942.000601 [i]	Tel/Alb 40	19th c.	barn	130 *feet*	40 *m*	N
03942.000586	IGTS 196-1-1	pre-contact	camp (?)	280	85	N
03902.000265	Tel/Alb 34	-	-	430	131	SW
03942.000600	Tel/Alb 35	pre-contact	camp (?)	490	149	NE
03942.000595	IGTS 197A-1-2	pre-contact	camp	650	198	S
451	P.G. Hallenbeck Farm	Late Woodland	no info	820	250	SE
03942.000587	IGTS 196-2-1	late 19th c.	historic sheet midden	830	253	N
434	-	no info	no info	860	262	NW
03902.000270	J. Mayone Brickyard Shed/Bldg Site	historic period	-	870	265	NE
03942.000596	IGTS 197A-1-1	pre-contact	camp	920	280	S
03942.000607	Slattery Farm	late 19th/early 20th c.	domestic/farm site	950	290	SE
03902.000232	Prehistoric Site 3 (P-3)	pre-contact	camp (?)	1,035	315	W
03942.000594	IGTS 197-2-1	pre-contact	-	1,140	347	S
03942.000588	IGTS 196-3-1	pre-contact	camp (?)	1,250	381	N
8320	Van Loan	Late Archaic - Middle/Late Woodland (?)	no info	1,260	384	SE
03942.000603	Van Loan/NYSM 8320	Late Archaic - Middle/Late Woodland (?)	no info	1,260	384	SE
433	-	no info	shell midden	1,280	390	NW
03902.000059	IGTS 196-10-1	pre-contact	camp	1,440	439	N
03902.000238 [i]	Prehistoric Site 9 (P-9)	pre-contact	-	1,440	439	NW
03902.000058	IGTS 196-9-1	pre-contact	camp	1,470	448	NE
03942.000604	Athens Firehouse Site	mid-19th c.	dairy	1,480	451	SE
03902.000056	IGTS 196-8-1	pre-contact	camp (?)	1,555	474	NE
03942.000593	IGTS 197-1-1	pre-contact	camp	1,600	488	S
3385	-	Early Woodland (?)	burial	1,630	497	NE
03942.000589	IGTS 196-3-2	Late Archaic/late 19th-early 20th	Lamoka pp/k; historic sheet midden	1,680	512	N
8779	-	no info	sites (?)	1,720	524	NE
03902.000057	IGTS 196-8-2	pre-contact	-	1,760	536	NE
03902.000271	Athens Compressor - Athens Airstrip - Loci 12	pre-contact	multiple	1,780	543	NW
03902.000255	JMA Site 15	pre-contact	workshop	1,985	605	W
03902.000258	JMA Site 18	pre-contact	-	2,110	643	NW
03902.000054	IGTS 196-4-1	pre-contact	camp (?)	2,200	671	NE
03942.000592 [i]	IGTS 196-7-3	pre-contact	camp (?)	2,250	686	N
03902.000229	H-1 Clow Residence Foundations/ Tel/Alb 39	historic period	domestic foundations	2,350	716	W
03902.000256	JMA Site 16	pre-contact	workshop/camp	2,350	716	SW

[i] Properties listed or eligible for listing on the State or National Register of Historic Places (S/NRHP)

OPRHP or NYSM Site #	Site Name	Time Period	Site Type	Approximate Distance (ft/m)/Direction from Project Components		
03902.000259	JMA Site 19	pre-contact	-	2,350	716	NW
03942.000070A	The Black Rock Site (Cox 14)	pre-contact	multiple	2,350	716	SE
03902.000237	Prehistoric Site 8 (P-8)	pre-contact	camp (?)	2,370	722	W
03902.000228	H-2 Midden Scatter 19th-20th	19th/20th c.	sheet midden	2,390	728	W
03942.000597	IGTS 196-6-1	pre-contact	camp (?)	2,410	735	NE
03942.000591	IGTS 196-7-2	pre-contact	-	2,420	738	N
5930	Railroad/Railroad #1	Archaic (?)	no info	2,425	739	SE
411	Black Rock/Mackawaic	Late Archaic - Late Woodland	village	2,520	768	SE
03902.000253	JMA Site 13	pre-contact	-	2,590	789	W
03902.000240	Prehistoric Site 11 (P-11)	pre-contact	untyped pp/k	2,600	792	W
03942.000590 [i]	IGTS 196-7-1	pre-contact	-	2,600	792	N
03902.000254	JMA Site 14	pre-contact	-	2,605	794	W
03942.000606 [i]	JVL Site	18th-20th c.	domestic site	2,705	824	SE
03902.000215	Athens Compressor - Locus 1	Late Archaic	camp	2,735	834	NE
3384	Black Rock/Mackawaic	no info	village	2,750	838	SE
459	-	no info	no info	2,875	876	NE
03902.000257	JMA Site 17	pre-contact	-	2,900	884	W
03902.000249	JMA Site 9	pre-contact	-	3,010	917	SW
03902.000252	JMA Site 12	pre-contact	-	3,100	945	W
03902.000226	Manwaring Site, Locus 2	Middle Archaic - Middle Woodland	multiple	3,160	963	NW
03902.000251	JMA Site 11	pre-contact	workshop	3,350	1021	W
8780	-	no info	precontact	3,450	1052	NE
03902.000276	Lankenau Isolates	pre-contact	-	3,530	1076	N
03902.000225	Manwaring Locus 2	pre-contact	workshop	3,595	1096	NW
03902.000223	Manwaring Barn Foundation	-	barn foundation	3,630	1106	NW
03902.000250	JMA Site 10	pre-contact	workshop	3,680	1122	W
412	-	no info	no info	3,940	1201	N
3383	-	no info	multiple burial	4,000	1219	NE
03902.000264	Tel/Alb 33	-	-	4,010	1222	NW
03902.000224 [i]	Manwaring Locus 1	pre-contact	workshop	4,040	1231	NW
03902.000248	JMA Site 8	pre-contact	-	4,270	1301	SW
460	-	Woodland	burial	4,560	1390	NE
02140.000013	Hogeboom Wharf	prior to 1783	wharf	4,740	1445	SE
03902.000222 [i]	Athens Compressor - Athens Airstrip - Loci 1 - 16	Paleo - Late Woodland	multiple	4,800	1463	NW
02140.000012	Titus Morgan Shipyard	1784 - ?	boatyard	4,905	1495	SE
8778	-	no info	village sites	4,920	1500	NE
468	Railroad #1	no info	no info	5,145	1568	SW
03902.000247	JMA Site 7	pre-contact	workshop	5,210	1588	SW

FIGURES

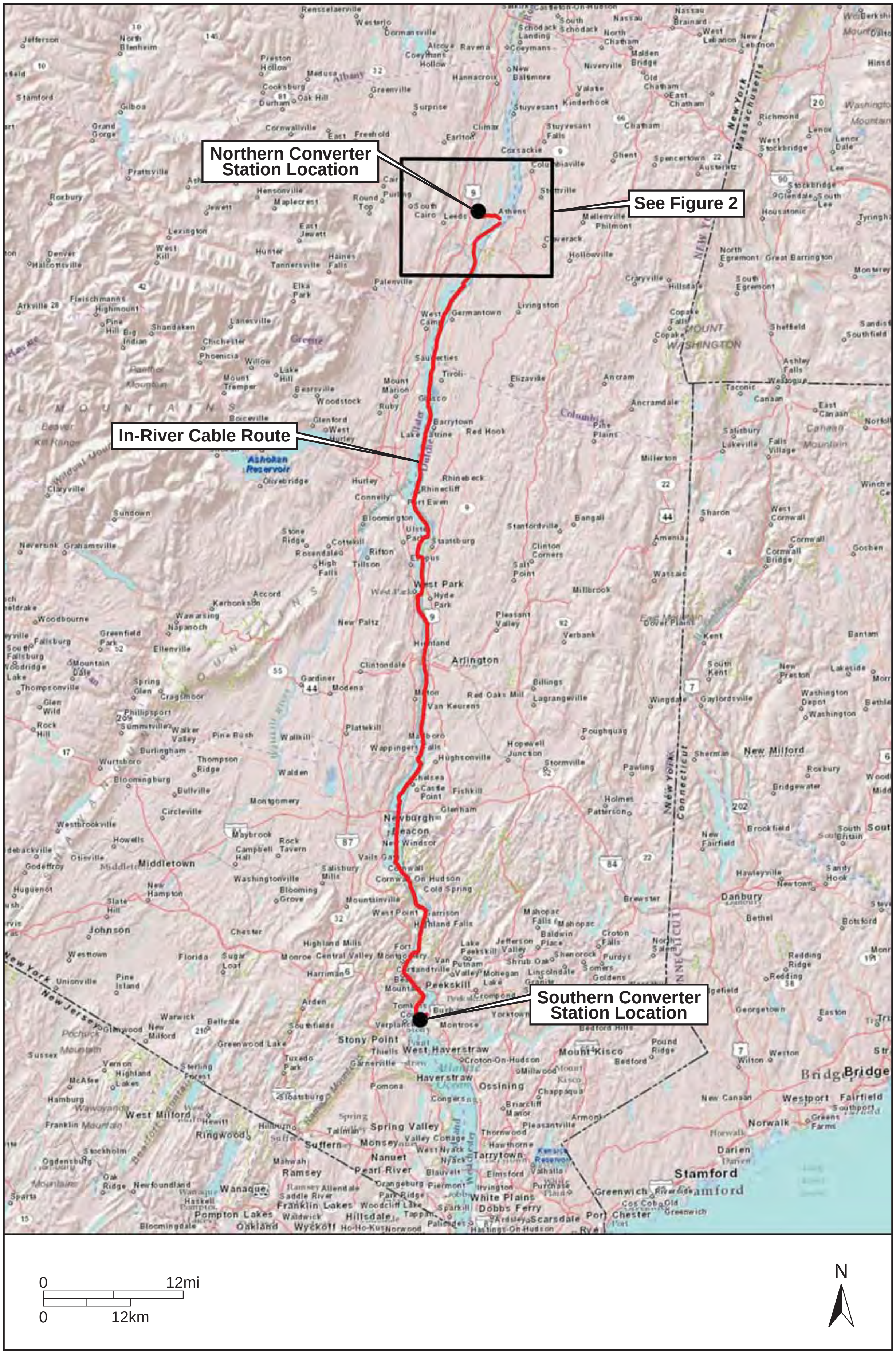

Figure 1. Location of the West Point Transmission Project.

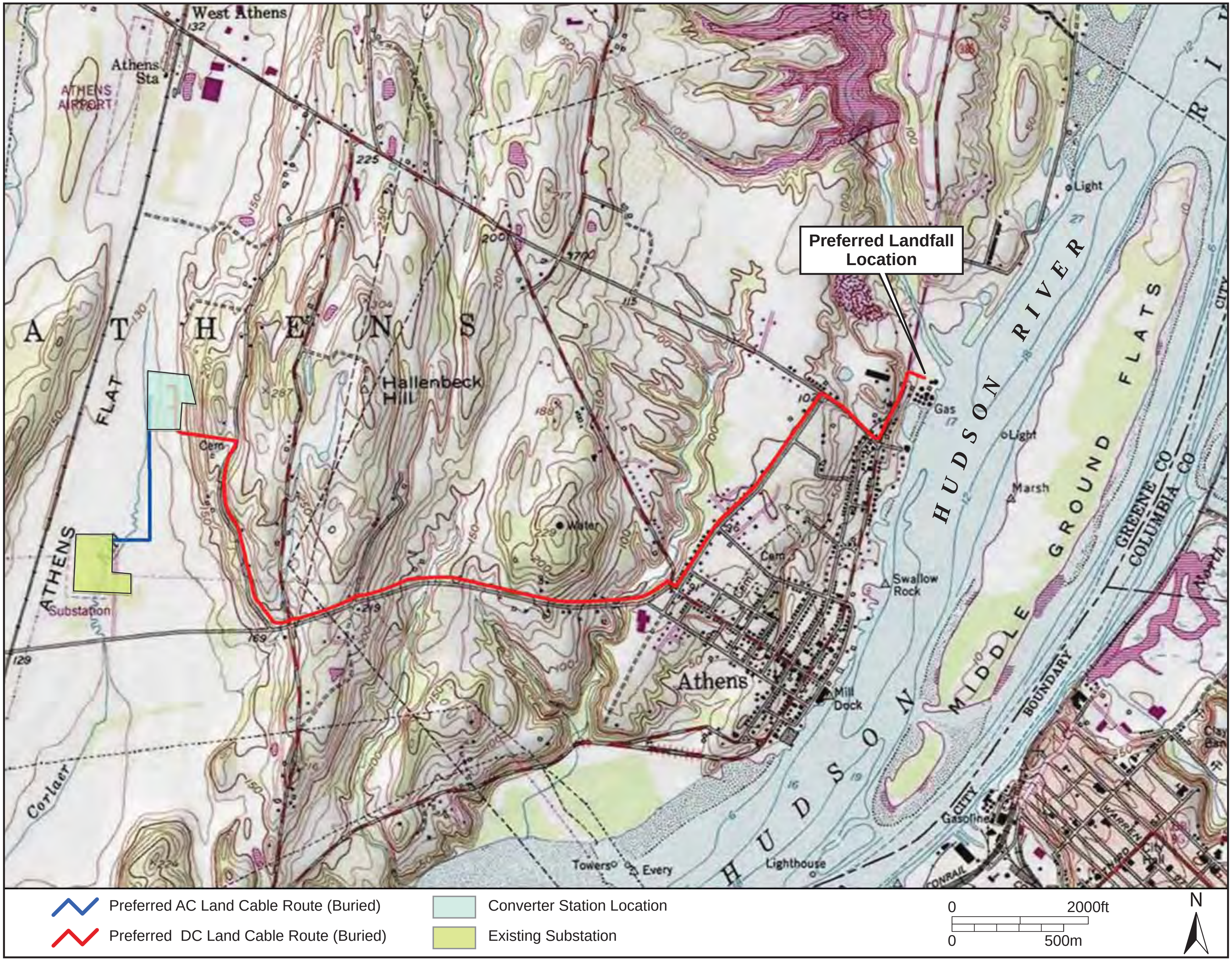

Figure 2. Detail of the *Hudson North, N.Y.* (1980) and *Hudson South, N.Y.* (1980) 7.5-minute topographic quadrangles showing the area of the proposed Northern Converter Station and associated upland Project components.

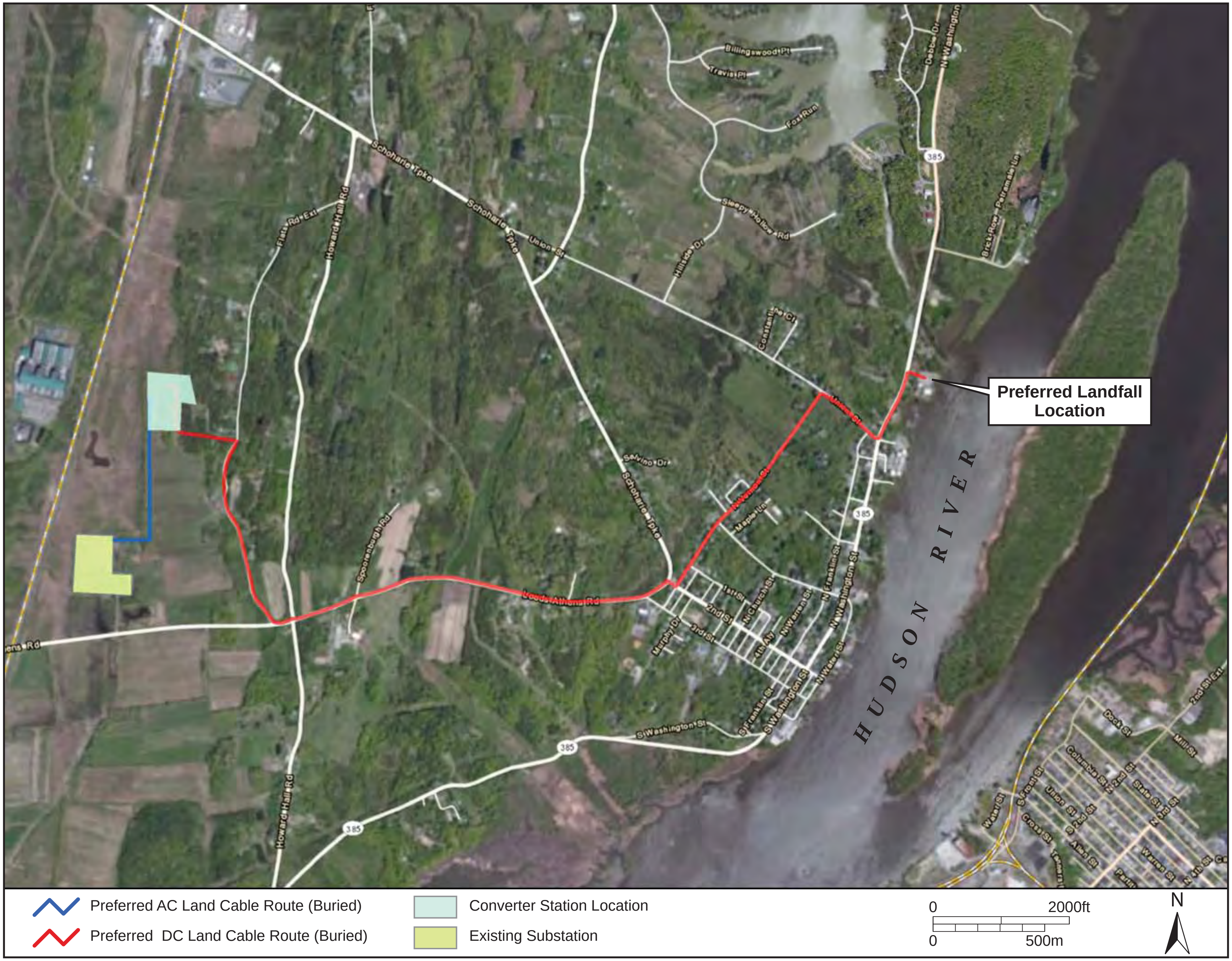

Figure 3. ESRI-derived aerial imagery showing the area of the proposed Northern Converter Station and associated upland Project components.

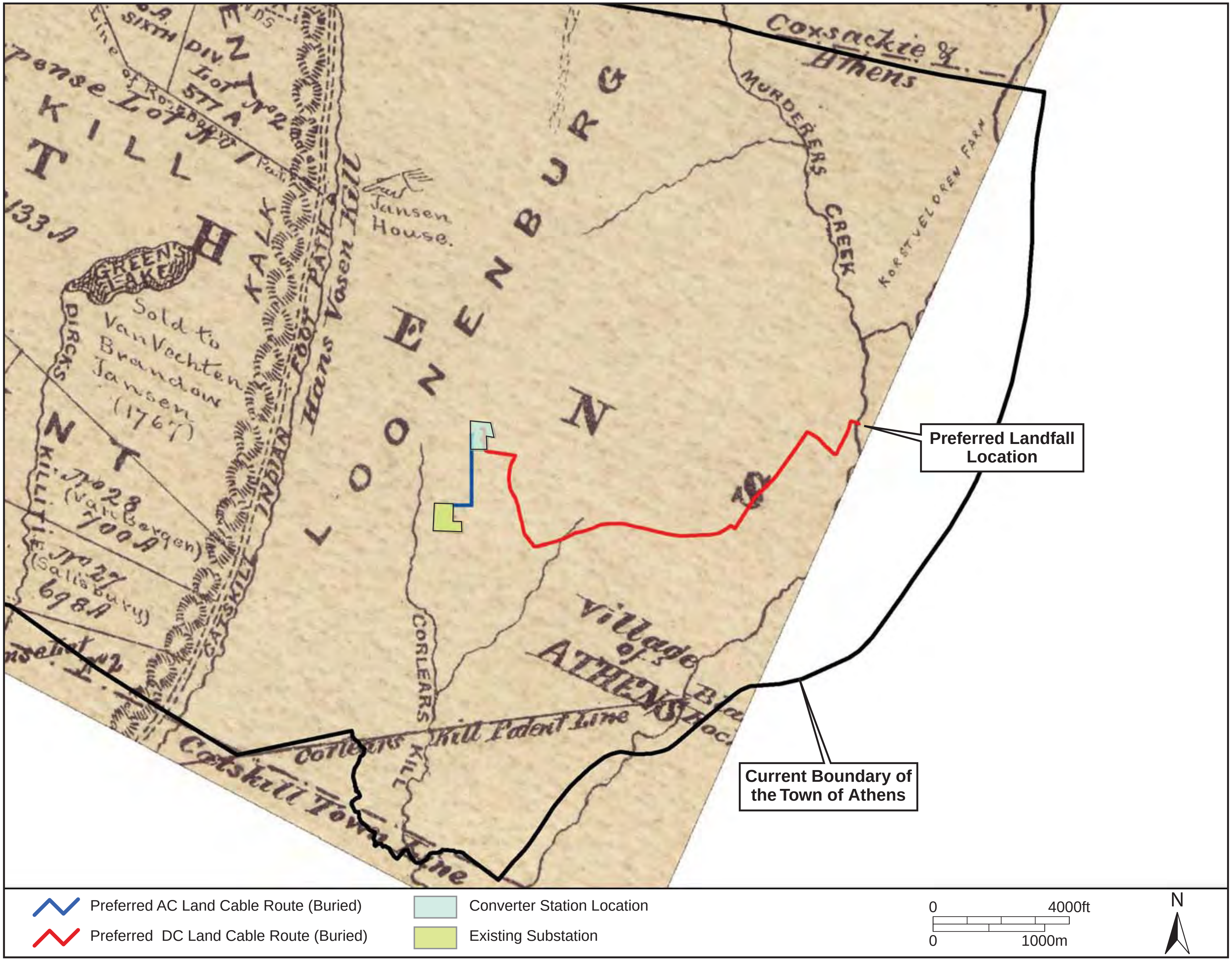

Figure 4. The approximate locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of a map (Pelletreau 1884b) reconstructing the original seventeenth and eighteenth century land patents of Greene County.

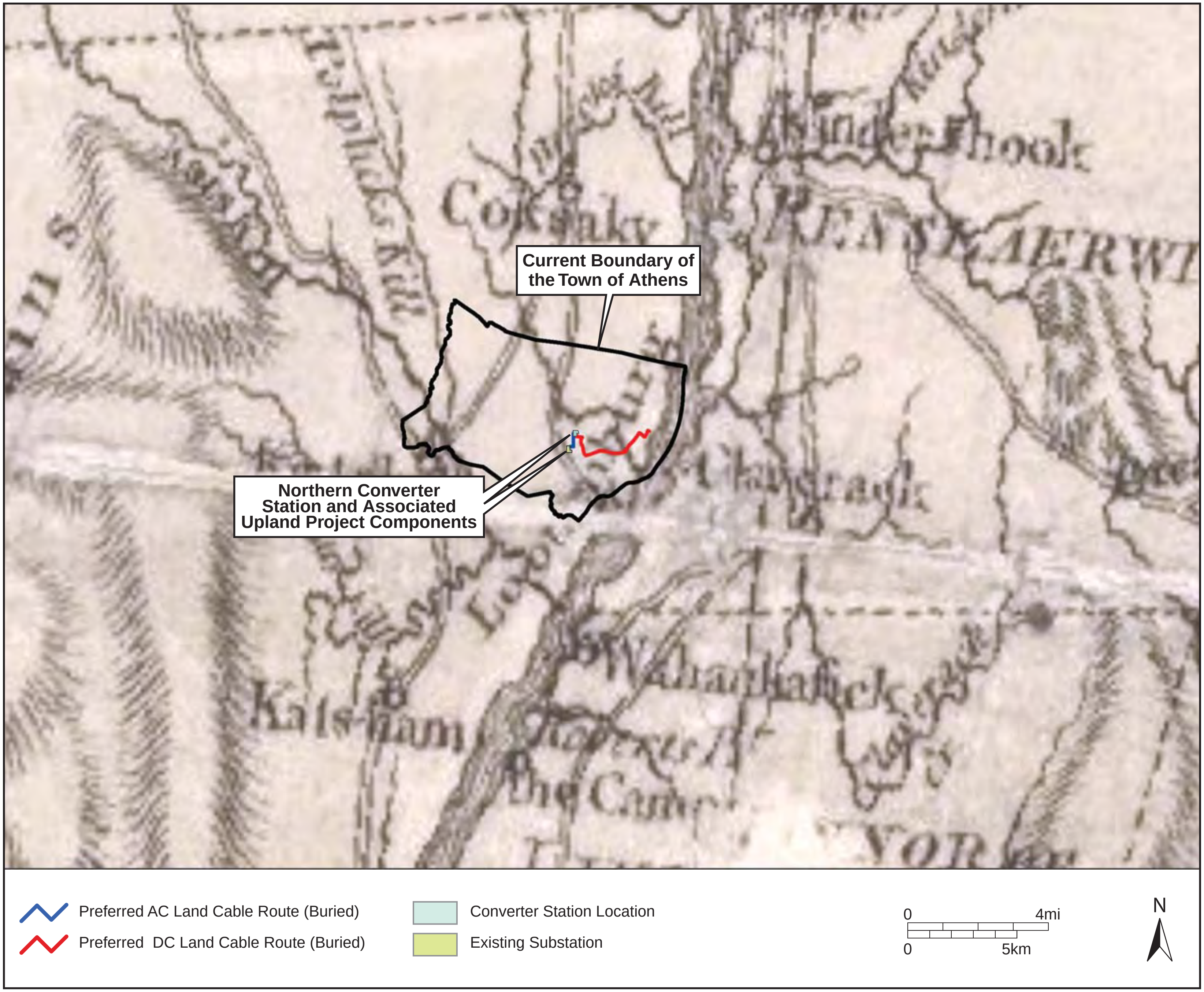

Figure 5. The approximate locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of Sauthier's *Map of the Province of New-York* (1776).

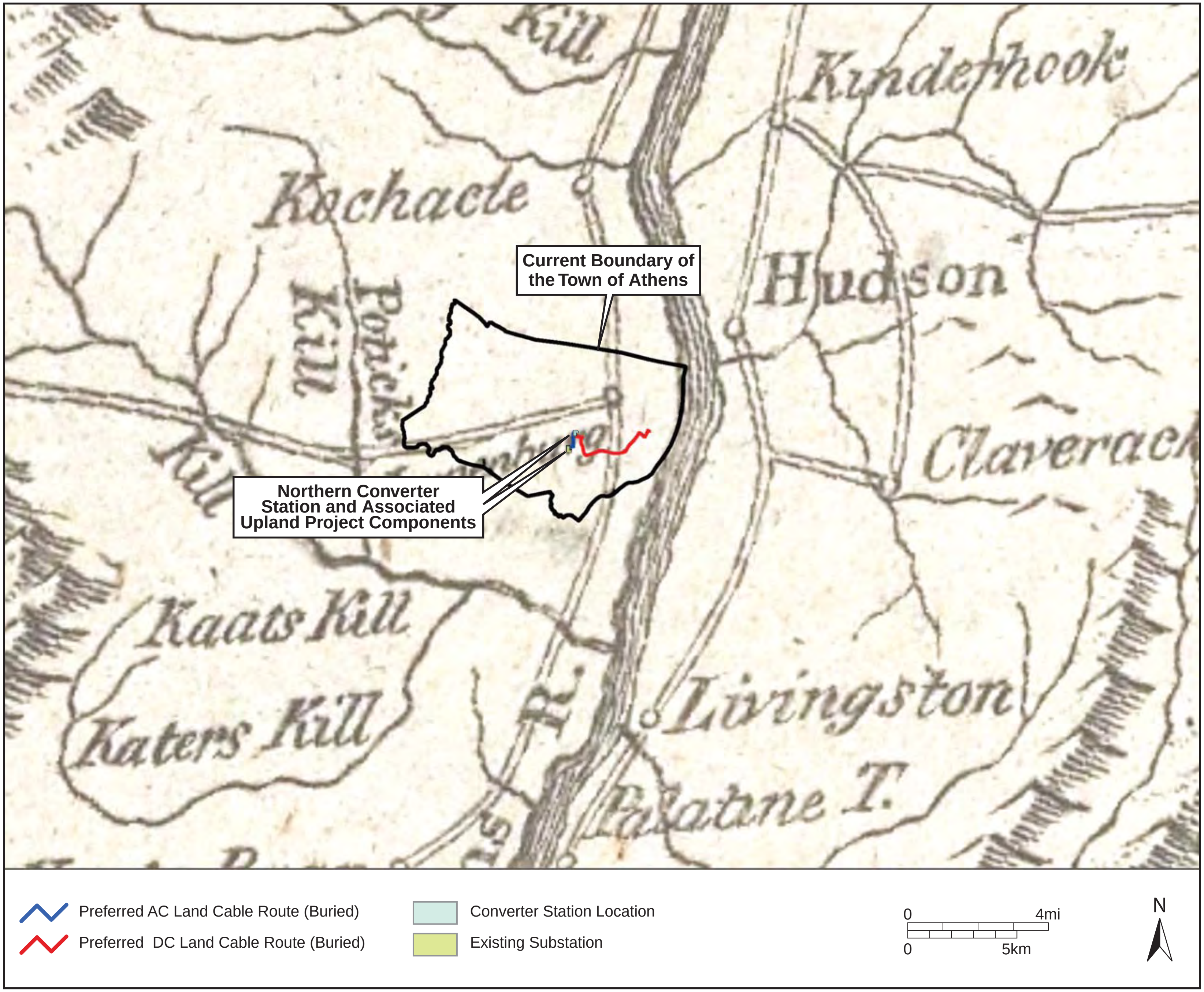

Figure 6. The approximate locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of Reid's *The State of New York* (1796).

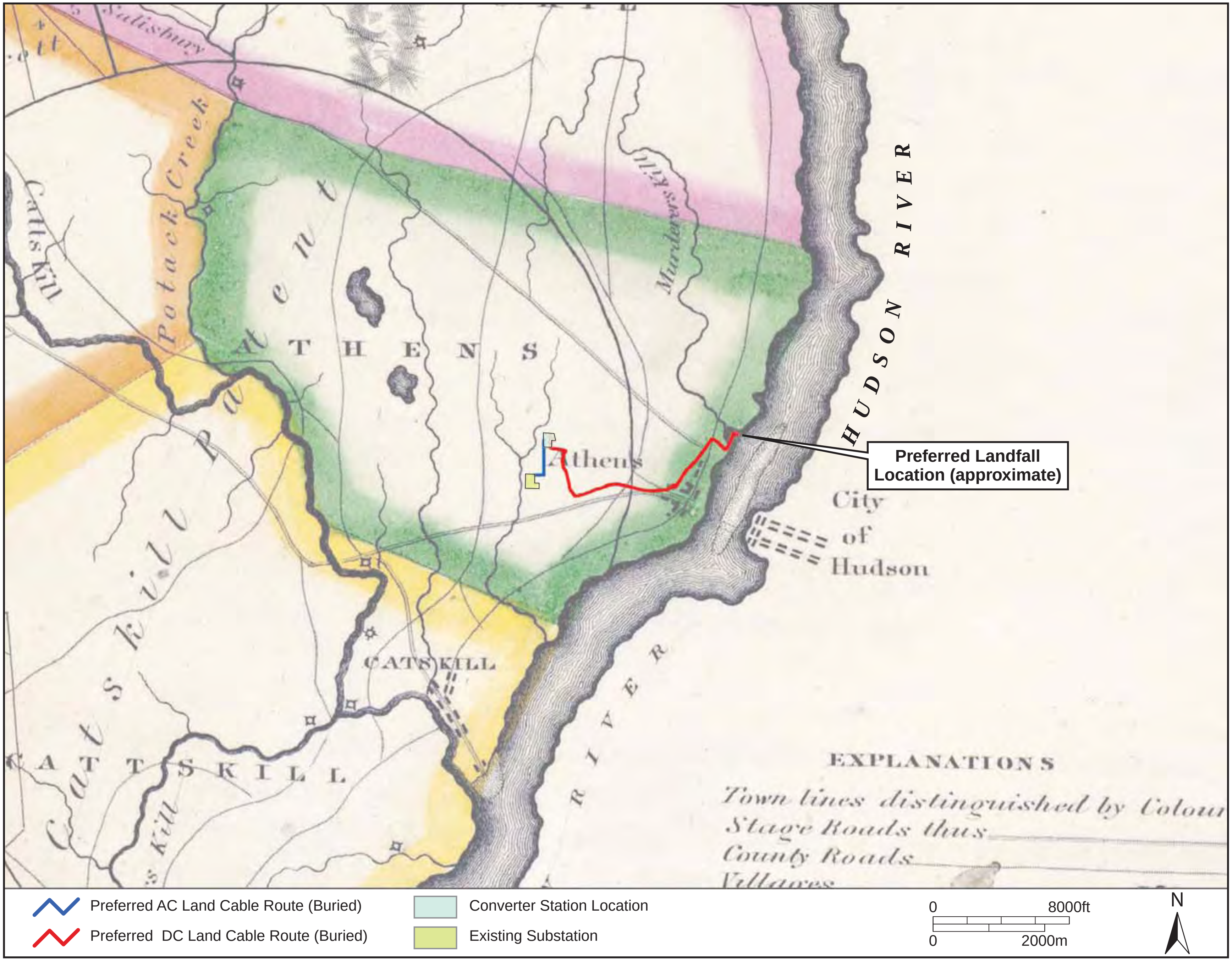

Figure 7. The approximate locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of Burr's *Map of the County of Greene* (1829).

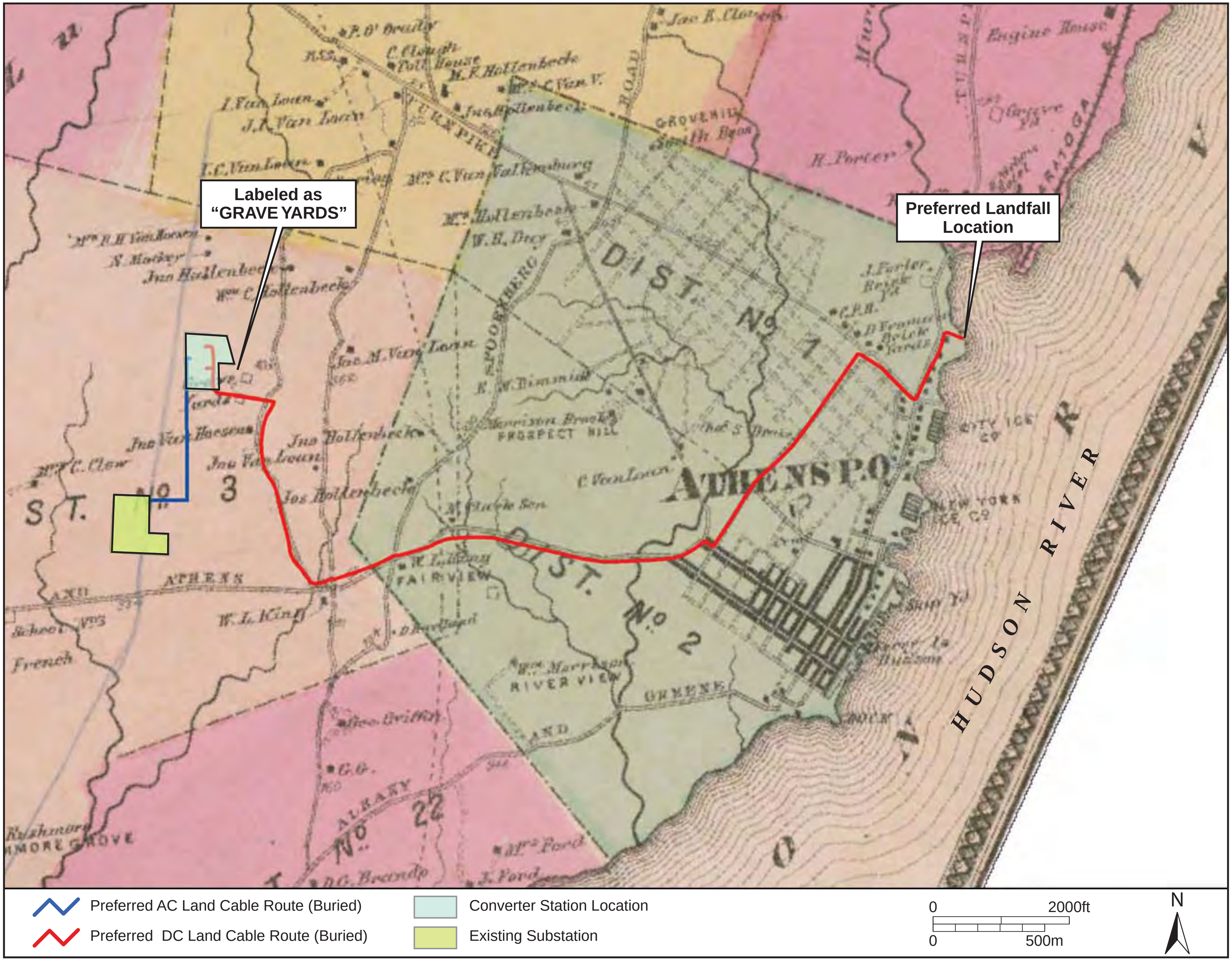

Figure 8. The locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of F. W. Beers's *Map of the Town of Athens* (1867).

Figure 9. The locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of F. W. Beers's *Portion of Greene County* (1891).

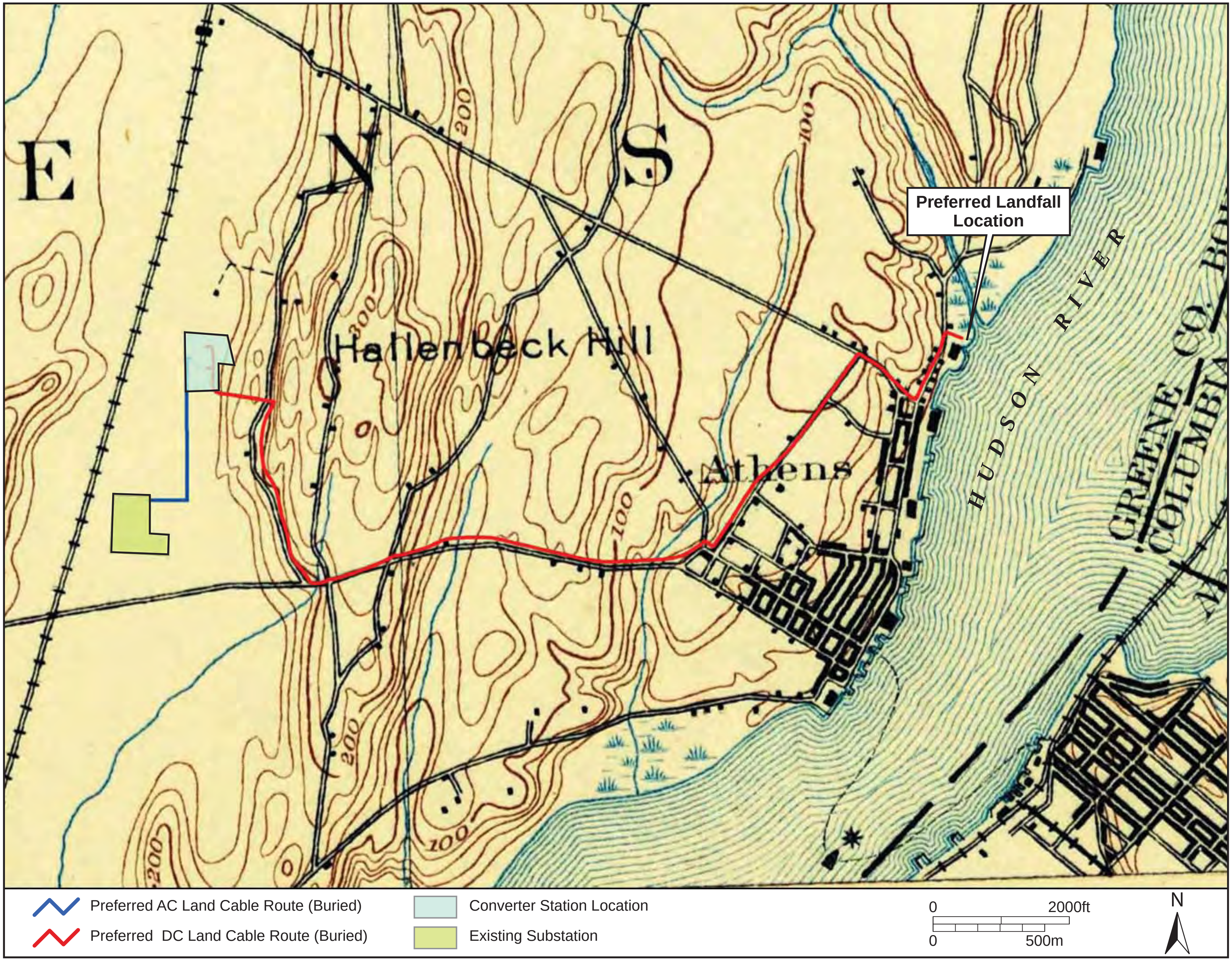

Figure 10. The locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of the USGS *Coxsackie, N.Y.* 15-minute topographic quadrangle (1893).

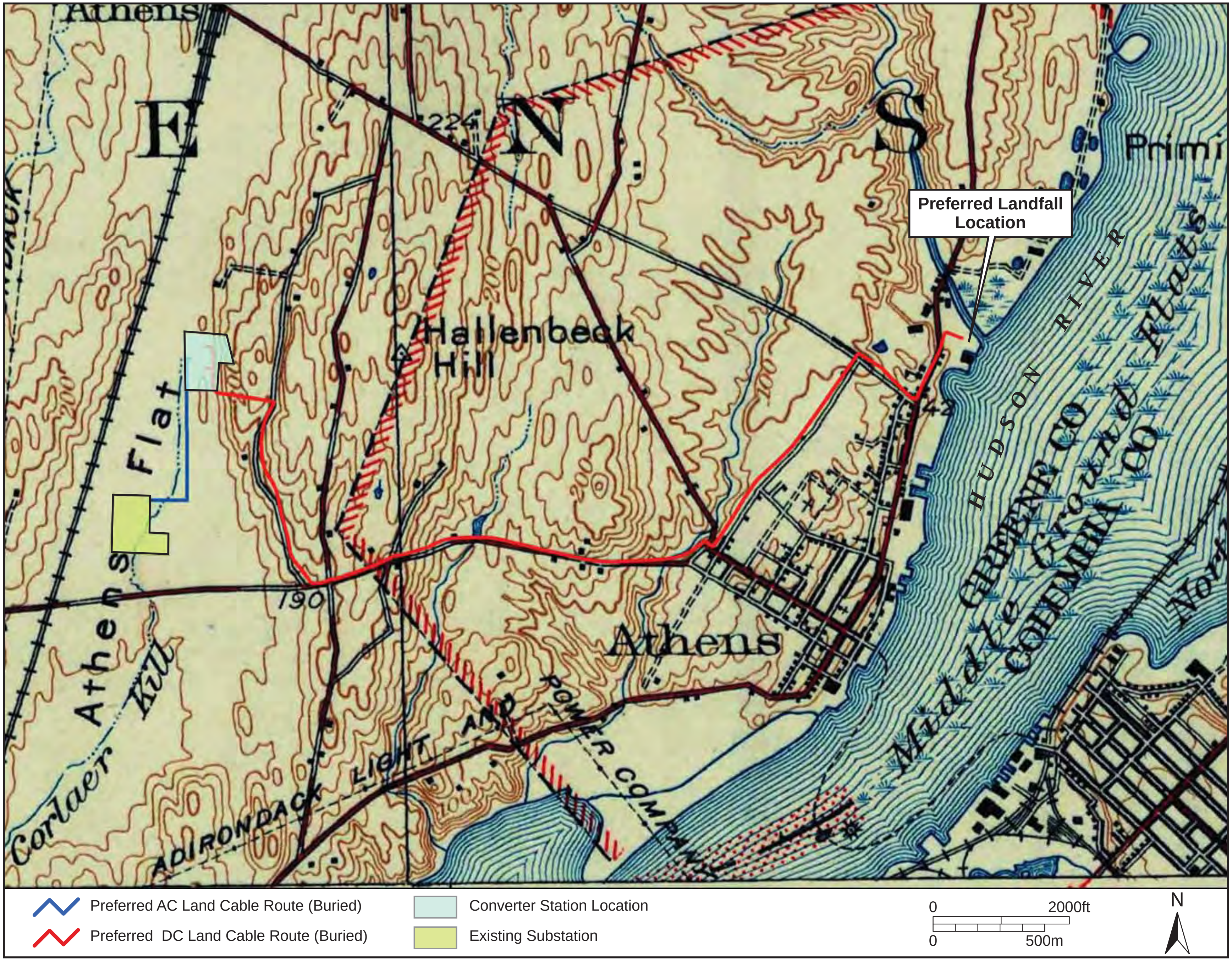

Figure 11. The locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of the USGS *Coxsackie, N.Y.* 15-minute topographic quadrangle (1929).

Figure 12. The locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of historic aerial imagery of the Town of Athens (NETR 1952).

Figure 13. The locations of the proposed Northern Converter Station and associated upland Project components depicted within a detail of the USGS *Hudson North, N.Y.* 7.5-minute topographic quadrangle (1953).

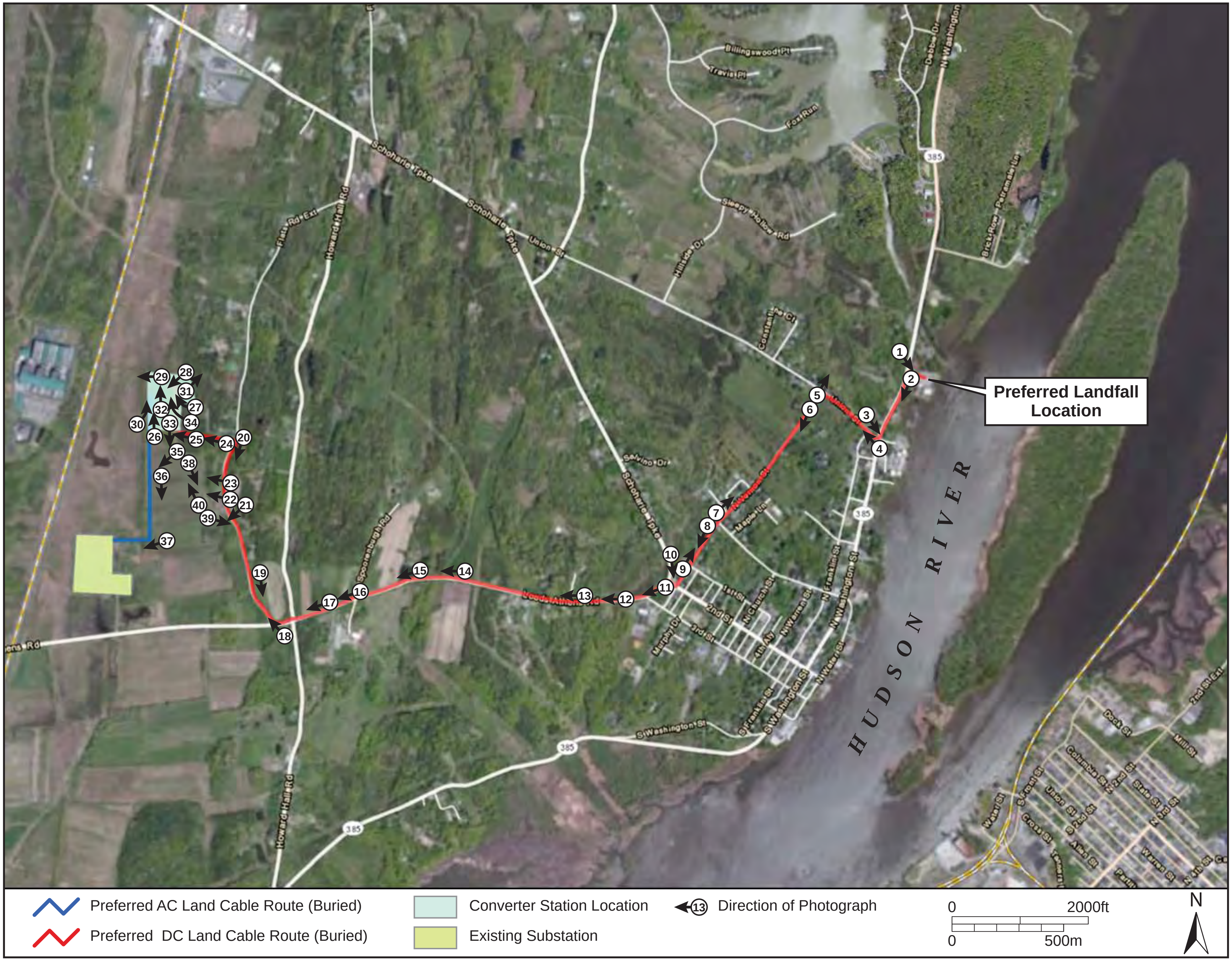

Figure 14. Photograph key showing the location and direction of photographs in relation to the proposed locations of the Northern Converter Station and associated upland Project components (ESRI-derived aerial imagery background).

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APPENDIX A
SOIL REPORT FROM THE USDA
WEB SOIL SURVEY

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Greene County, New York

Athens converter station and interconnects - April 2013

March 27, 2013

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

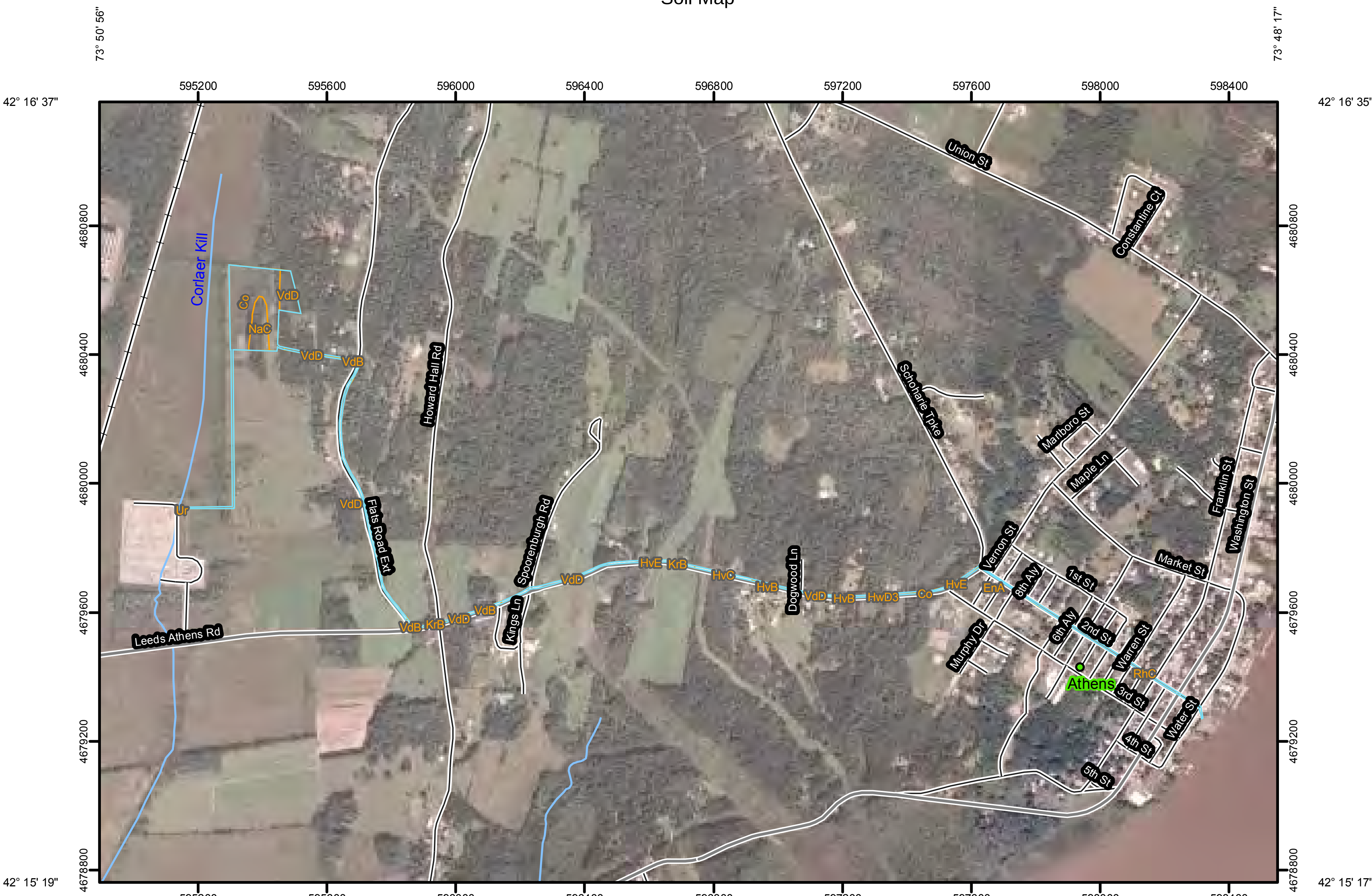
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:17,300 if printed on A size (8.5" x 11") sheet.

N

Meters: 0, 200, 400, 800, 1,200

Feet: 0, 500, 1,000, 2,000, 3,000

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:17,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 18N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Greene County, New York
Survey Area Data: Version 11, Dec 19, 2011

Date(s) aerial images were photographed: 9/11/2006; 7/31/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Greene County, New York (NY039)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
Co	Covington and Madalin soils	8.8	48.8%
EnA	Elmridge very fine sandy loam, 0 to 3 percent slopes	0.3	1.9%
HvB	Hudson and Vergennes soils, 3 to 8 percent slopes	0.2	1.3%
HvC	Hudson and Vergennes soils, 8 to 15 percent slopes	0.3	1.5%
HvE	Hudson and Vergennes soils, 25 to 50 percent slopes	0.3	1.8%
HwD3	Hudson and Vergennes silty clay loams, 15 to 25 percent slopes, severely eroded	0.3	1.7%
KrB	Kingsbury and Rhinebeck soils, 3 to 8 percent slopes	0.3	1.5%
NaC	Nassau channery silt loam, rolling	2.0	11.3%
RhC	Riverhead loam, rolling	0.9	5.2%
Ur	Udorthents, loamy	0.0	0.1%
VdB	Valois-Nassau complex, undulating	0.4	2.5%
VdD	Valois-Nassau complex, hilly	4.1	22.4%
Totals for Area of Interest		**18.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Greene County, New York

Co—Covington and Madalin soils

Map Unit Setting

Elevation: 50 to 1,000 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Covington and similar soils: 45 percent
Madalin and similar soils: 30 percent
Minor components: 25 percent

Description of Covington

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Calcareous clayey glaciolacustrine deposits or glaciomarine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 5.9 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 5w
Hydrologic Soil Group: D

Typical profile

0 to 7 inches: Silty clay
7 to 28 inches: Clay
28 to 60 inches: Silty clay

Description of Madalin

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Parent material: Clayey and silty glaciolacustrine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 8.3 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 4w
Hydrologic Soil Group: C/D

Typical profile

0 to 9 inches: Silt loam
9 to 30 inches: Silty clay
30 to 60 inches: Silty clay

Minor Components

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions

Hudson

Percent of map unit: 5 percent
Landform: Depressions

Kingsbury

Percent of map unit: 5 percent

Rhinebeck

Percent of map unit: 5 percent

Vergennes

Percent of map unit: 5 percent
Landform: Depressions

EnA—Elmridge very fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Elmridge and similar soils: 75 percent
Minor components: 25 percent

Description of Elmridge

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Loamy over clayey glaciolacustrine or marine deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 40 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 16 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Available water capacity: Low (about 4.8 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2w
Hydrologic Soil Group: C/D

Typical profile

0 to 9 inches: Very fine sandy loam
9 to 28 inches: Fine sandy loam
28 to 60 inches: Silty clay

Minor Components

Shaker

Percent of map unit: 5 percent
Landform: Depressions

Rhinebeck

Percent of map unit: 5 percent

Madalin

Percent of map unit: 5 percent
Landform: Depressions

Covington

Percent of map unit: 5 percent
Landform: Depressions

Nassau

Percent of map unit: 5 percent

HvB—Hudson and Vergennes soils, 3 to 8 percent slopes

Map Unit Setting

Elevation: 50 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Hudson and similar soils: 40 percent
Vergennes and similar soils: 35 percent
Minor components: 25 percent

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.4 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: C/D

Typical profile

0 to 4 inches: Silt loam
4 to 13 inches: Silt loam
13 to 30 inches: Silty clay loam
30 to 60 inches: Silty clay

Description of Vergennes

Setting

Landform: Lake plains

Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey calcareous glaciolacustrine, glaciomarine, or estuarine deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: D

Typical profile

0 to 10 inches: Loam
10 to 17 inches: Clay loam
17 to 34 inches: Clay
34 to 60 inches: Stratified silty clay to silty clay loam to silt loam to very fine sandy loam

Minor Components

Kingsbury

Percent of map unit: 5 percent

Nunda

Percent of map unit: 5 percent

Rhinebeck

Percent of map unit: 5 percent

Elmridge

Percent of map unit: 5 percent

Madalin

Percent of map unit: 5 percent
Landform: Depressions

HvC—Hudson and Vergennes soils, 8 to 15 percent slopes

Map Unit Setting

Elevation: 50 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Hudson and similar soils: 40 percent
Vergennes and similar soils: 35 percent
Minor components: 25 percent

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.4 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: C/D

Typical profile

0 to 4 inches: Silt loam
4 to 13 inches: Silt loam
13 to 30 inches: Silty clay loam
30 to 60 inches: Silty clay

Description of Vergennes

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey calcareous glaciolacustrine, glaciomarine, or estuarine deposits

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: D

Typical profile

0 to 10 inches: Loam
10 to 17 inches: Clay loam
17 to 34 inches: Clay
34 to 60 inches: Stratified silty clay to silty clay loam to silt loam to very fine sandy loam

Minor Components

Kingsbury

Percent of map unit: 5 percent

Nunda

Percent of map unit: 5 percent

Rhinebeck

Percent of map unit: 5 percent

Madalin

Percent of map unit: 5 percent
Landform: Depressions

Elmridge

Percent of map unit: 5 percent

HvE—Hudson and Vergennes soils, 25 to 50 percent slopes

Map Unit Setting

Elevation: 50 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Hudson and similar soils: 45 percent
Vergennes and similar soils: 30 percent
Minor components: 25 percent

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: C/D

Typical profile

0 to 4 inches: Silt loam
4 to 13 inches: Silt loam
13 to 30 inches: Silty clay loam
30 to 60 inches: Silty clay

Description of Vergennes

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey calcareous glaciolacustrine, glaciomarine, or estuarine deposits

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Moderate (about 7.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: D

Typical profile

0 to 10 inches: Loam
10 to 17 inches: Clay loam
17 to 34 inches: Clay
34 to 60 inches: Stratified silty clay to silty clay loam to silt loam to very fine sandy loam

Minor Components

Shaker

Percent of map unit: 5 percent
Landform: Depressions

Kingsbury

Percent of map unit: 5 percent

Nunda

Percent of map unit: 5 percent

Rhinebeck

Percent of map unit: 5 percent

Elmridge

Percent of map unit: 5 percent

HwD3—Hudson and Vergennes silty clay loams, 15 to 25 percent slopes, severely eroded

Map Unit Setting

Elevation: 50 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Hudson and similar soils: 50 percent
Vergennes and similar soils: 30 percent
Minor components: 20 percent

Description of Hudson

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey and silty glaciolacustrine deposits

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 20 percent
Available water capacity: High (about 9.3 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: C/D

Typical profile

0 to 7 inches: Silty clay loam
7 to 30 inches: Silty clay loam
30 to 60 inches: Silty clay

Description of Vergennes

Setting

Landform: Lake plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Clayey calcareous glaciolacustrine, glaciomarine, or estuarine deposits

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 5.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: D

Typical profile

0 to 6 inches: Silty clay loam
6 to 34 inches: Clay
34 to 60 inches: Stratified silty clay to silty clay loam to silt loam to very fine sandy loam

Minor Components

Burdett

Percent of map unit: 5 percent

Kingsbury

Percent of map unit: 5 percent

Rhinebeck

Percent of map unit: 5 percent

Elmridge

Percent of map unit: 5 percent

KrB—Kingsbury and Rhinebeck soils, 3 to 8 percent slopes

Map Unit Setting

Elevation: 80 to 1,000 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Kingsbury and similar soils: 45 percent
Rhinebeck and similar soils: 30 percent
Minor components: 25 percent

Description of Kingsbury

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Calcareous, clayey glaciomarine deposits or glaciolacustrine deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water capacity: Moderate (about 8.5 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3w
Hydrologic Soil Group: D

Typical profile

0 to 7 inches: Clay loam
7 to 14 inches: Silty clay loam
14 to 36 inches: Clay
36 to 70 inches: Stratified silty clay loam to silt loam to very fine sandy loam

Description of Rhinebeck

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey and silty glaciolacustrine deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water capacity: Moderate (about 8.2 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3w
Hydrologic Soil Group: C/D

Typical profile

0 to 7 inches: Silt loam
7 to 19 inches: Silty clay loam
19 to 32 inches: Silty clay
32 to 60 inches: Silty clay

Minor Components

Elmridge

Percent of map unit: 5 percent

Covington

Percent of map unit: 5 percent
Landform: Depressions

Hudson

Percent of map unit: 5 percent

Madalin

Percent of map unit: 5 percent
Landform: Depressions

Vergennes

Percent of map unit: 5 percent

NaC—Nassau channery silt loam, rolling

Map Unit Setting

Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Nassau and similar soils: 80 percent
Minor components: 20 percent

Description of Nassau

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: D

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 4 inches: Channery silt loam
4 to 19 inches: Extremely channery silt loam
19 to 23 inches: Unweathered bedrock

Minor Components

Arnot

Percent of map unit: 5 percent

Lordstown

Percent of map unit: 5 percent

Oquaga

Percent of map unit: 5 percent

Tuller

Percent of map unit: 5 percent

RhC—Riverhead loam, rolling

Map Unit Setting

Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Riverhead and similar soils: 75 percent
Minor components: 25 percent

Description of Riverhead

Setting

Landform: Deltas, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits overlying stratified sand and gravel

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: A

Typical profile

0 to 8 inches: Loam
8 to 24 inches: Sandy loam
24 to 60 inches: Loamy sand

Minor Components

Chenango

Percent of map unit: 5 percent

Elmridge

Percent of map unit: 5 percent

Valois

Percent of map unit: 5 percent

Udifluvents

Percent of map unit: 5 percent

Hudson

Percent of map unit: 5 percent

Ur—Udorthents, loamy

Map Unit Setting

Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Udorthents and similar soils: 80 percent
Minor components: 20 percent

Description of Udorthents

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6s
Hydrologic Soil Group: A

Typical profile

0 to 4 inches: Gravelly silt loam
4 to 70 inches: Gravelly silt loam

Minor Components

Tunkhannock

Percent of map unit: 5 percent

Valois

Percent of map unit: 5 percent

Volusia

Percent of map unit: 5 percent

Wellsboro

Percent of map unit: 5 percent

VdB—Valois-Nassau complex, undulating

Map Unit Setting

Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Valois and similar soils: 50 percent
Nassau and similar soils: 30 percent
Minor components: 20 percent

Description of Valois

Setting

Landform: Valley sides, lateral moraines, end moraines
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from sandstone, siltstone, and shale

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance

Land capability (nonirrigated): 2e
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Gravelly loam
8 to 34 inches: Gravelly loam
34 to 60 inches: Gravelly silt loam

Description of Nassau

Setting

Landform: Benches, ridges, till plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.2 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3s
Hydrologic Soil Group: D

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 4 inches: Channery silt loam
4 to 19 inches: Extremely channery silt loam
19 to 23 inches: Unweathered bedrock

Minor Components

Chenango

Percent of map unit: 5 percent

Manlius

Percent of map unit: 5 percent

Mardin

Percent of map unit: 5 percent

Wellsboro

Percent of map unit: 5 percent

VdD—Valois-Nassau complex, hilly

Map Unit Setting

Elevation: 600 to 1,800 feet
Mean annual precipitation: 36 to 44 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Nassau and similar soils: 40 percent
Valois and similar soils: 40 percent
Minor components: 20 percent

Description of Valois

Setting

Landform: Valley sides, lateral moraines, end moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy till derived mainly from sandstone, siltstone, and shale

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B

Typical profile

0 to 8 inches: Gravelly loam
8 to 34 inches: Gravelly loam
34 to 60 inches: Gravelly silt loam

Description of Nassau

Setting

Landform: Benches, ridges, till plains

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Channery loamy till derived mainly from local slate or shale

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.2 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: D

Typical profile

0 to 1 inches: Slightly decomposed plant material
1 to 4 inches: Channery silt loam
4 to 19 inches: Extremely channery silt loam
19 to 23 inches: Unweathered bedrock

Minor Components

Chenango

Percent of map unit: 5 percent

Lordstown

Percent of map unit: 5 percent

Mardin

Percent of map unit: 5 percent

Rock outcrop

Percent of map unit: 5 percent

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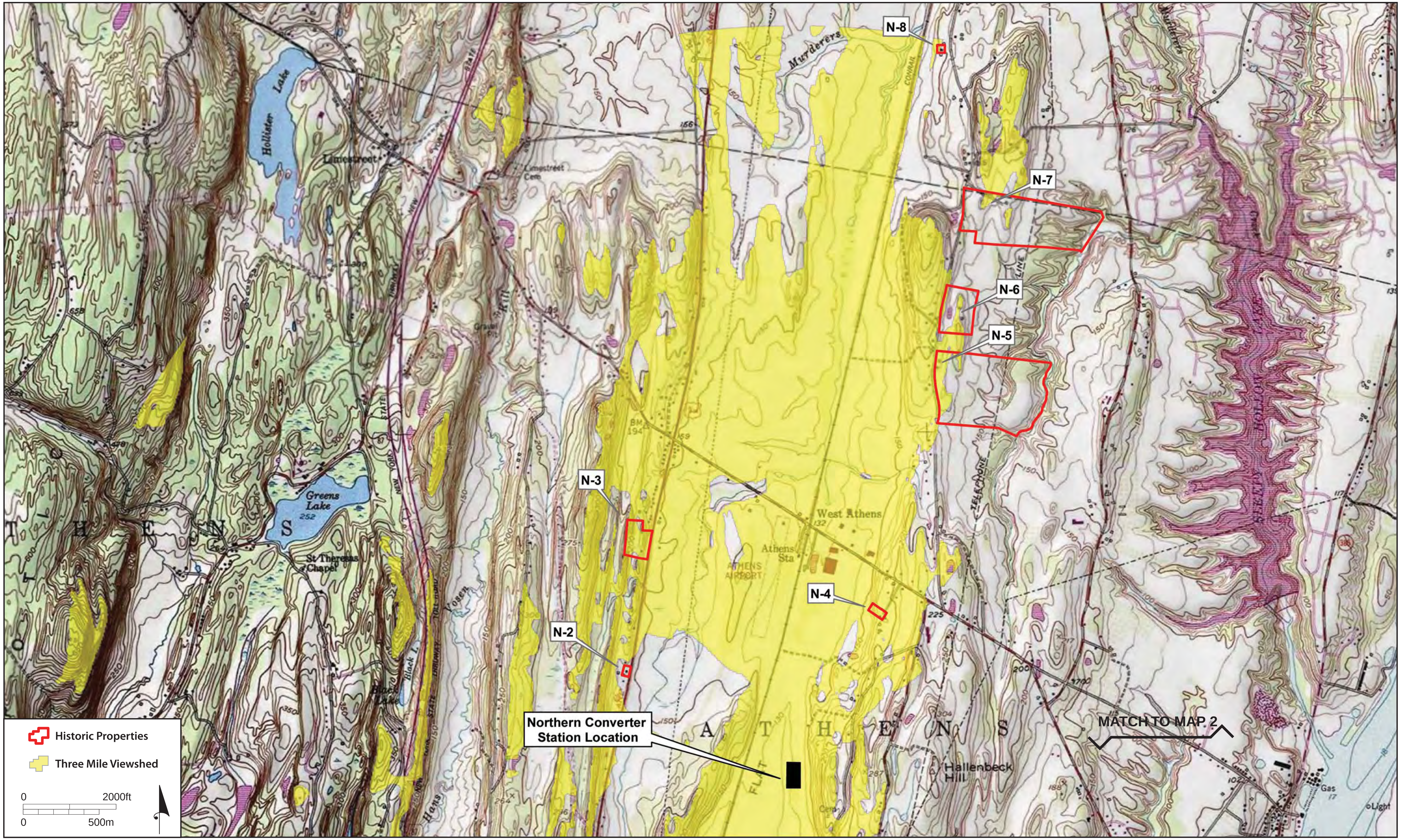
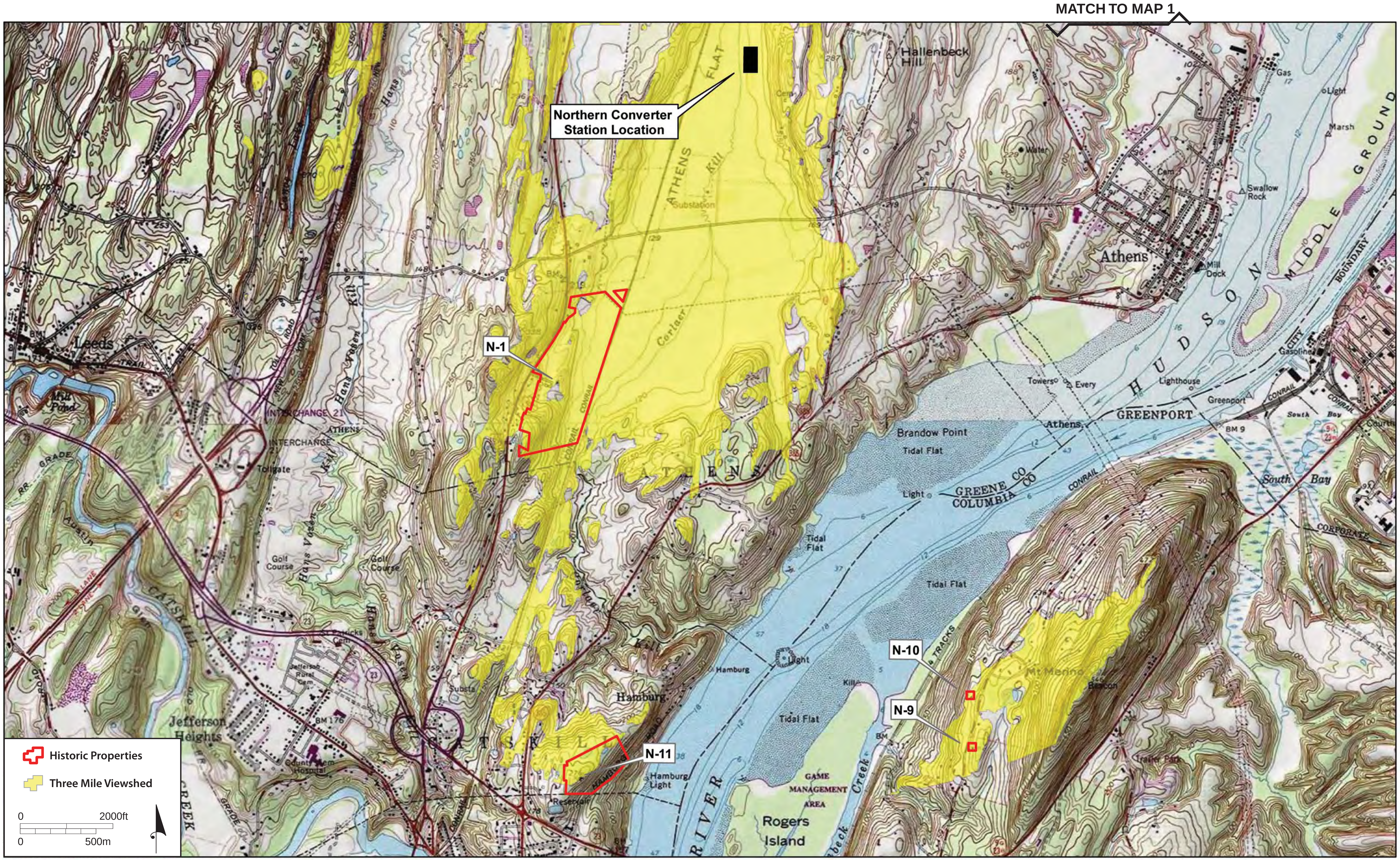
APPENDIX B
LOCATIONS OF HISTORIC PROPERTIES WITHIN THE THREE-MILE VIEWSHED



Historic properties in three-mile viewshed: Map 1 of 2.



Historic properties in three-mile viewshed: Map 2 of 2.