2 Environmental Setting and Impacts

2.1 Geology: Environmental Setting

This section provides a general overview of the geology within the Project Area. A low to moderate seismic hazard exists, which will be accounted for during the design of the facility.

2.1.1 Regional Geology and Topography

The Project Area is located in the Northern Lowlands of New York State at the northeastern edge of the Adirondack Highlands. The Adirondack Mountains are located southwest of the site. They occupy a circular region roughly 200 km in diameter and are composed of Proterozoic-aged metamorphic rock that is more resistant to erosion than the surrounding sedimentary rock. In the vicinity of the Project Area, the Potsdam Sandstone overlies the basement rock in a non-conforming formation. The Upper-Cambrian-aged Potsdam Formation slopes away from the Adirondack Mountains and is overlain by Beekmantown Dolomite. The Potsdam and Beekmantown formations are separated by transitional passage beds of alternating sandstone and dolomite.

Thickness of the Potsdam Sandstone is not known but is thought to be at least 550 feet. A well log for a hole drilled at Morrisonville, New York, indicated that the thickness of the Potsdam Sandstone is at least 775 feet (Postel 1952). The Potsdam Formation was deposited on a marine carbonate shelf that extended along the edge of the North American continent from Newfoundland to Alabama. The lower portion of the Potsdam Formation consists of poorly sorted conglomerates and sandstones. The middle portion of the Potsdam Formation is more widespread and is comprised of better-sorted pebble conglomerates that were probably deposited by braided streams. The upper part of the Potsdam Formation is marine, fossiliferous, and much more widespread than the lower and middle portions of the formation. It consists of sandstones with uniform and well-defined bedding (NYSM/GS 1991).

Thickness of the passage beds, while likely variable across the region, is thought to be around 50 feet and records transition of the depth and location of regional inland seas. The thickness of the Beekmantown Dolomite, while also variable

across the region, is around 500 feet and indicates a deeper water marine environment than the underlying sandstone (Postel 1952).

Sometime in the Tertiary Period, the Adirondack metaplutonic rocks began to rise, possibly because of a hot spot near the base of the crust. Erosion worked to remove the Potsdam and Beekmantown formations where uplift occurred. In the Northern Lowlands, where the sedimentary formations remained, Adirondack Mountain uplift resulted in a gradual inclination of the beds away from the mountains (Postel 1952; NYSM/GS 1991).

Glacial deposits of the Pleistocene Epoch were deposited throughout the region. Thickness of the deposited material is quite variable, and ranges from a few feet to 100 feet or more (Postel 1952).

The topography of this region is dominated by the Adirondack Highlands which showcase the highest peaks in New York State including Mt. Marcy at 5,344 feet and Algonquin Peak at 5,114 feet. Beyond the peaks of the Adirondacks, the topography contains undulating features ranging from large tracts of cultivated agricultural areas to isolated lakes and depressional areas.

2.1.2 Project Area Geology and Topography

The Project Area is primarily located in the Towns of Chateaugay and Bellmont, Franklin County, with a relatively small portion of the Project Area extending into the Towns of Clinton and Ellenburg, Clinton County, New York. It is located in the Northern Lowlands of New York State, at the northeastern edge of the Adirondack Highlands. Figure 2-1 shows the Project Site on a United States Geological Survey (USGS) Quadrangle Map. Within the Project Area, elevations range from a low of 898 feet to a high of 1,556 feet above mean sea level. The Project Area is also comprised of large tracts of relatively flat agricultural areas with gradual changes in slope and relief of less than 15 percent.

Unconsolidated glacial till ranging in thickness from 0 feet (where bedrock outcrops are visible at the ground surface) to 100 feet or more overlie Proterozoic sedimentary rocks of sandstone, limestone, and dolomite composition throughout the site. Within the Project Area, streams and tributaries contribute to these features.

Detailed geotechnical investigations are currently in the planning stages and will further characterize geologic conditions at tower sites within the Project Area. The detailed investigations will take place prior to final foundation design and will include the following:

- Sampling and Standard Penetration Testing;
- Split spoon samples to a depth of 16 feet and at 5-foot intervals thereafter or at changes in soil strata;

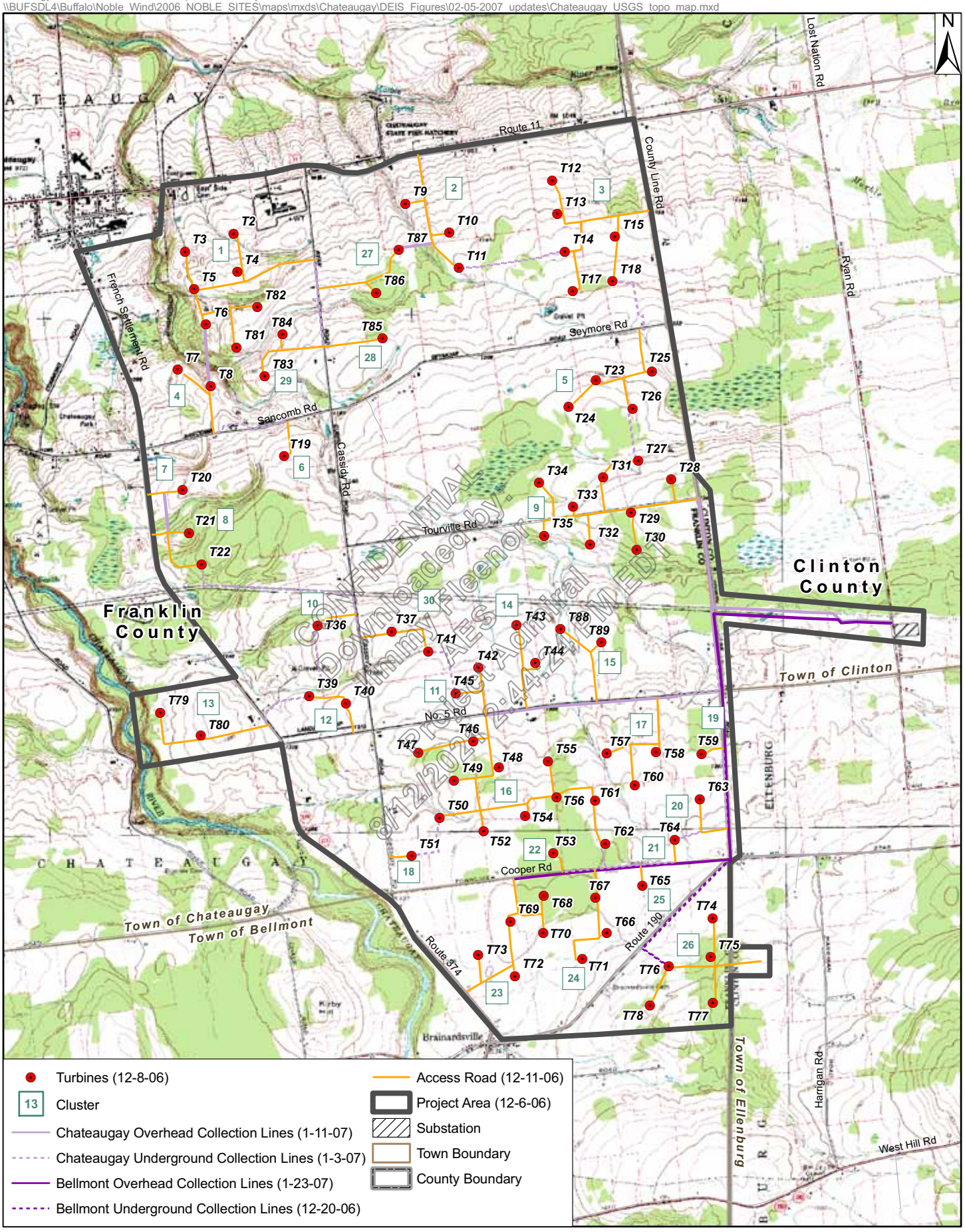
- Seismic Testing Using a multichannel analysis of shear waves (MASW);
- Piezometers to determine groundwater conditions, if or where shallow groundwater conditions are implied by the borings;
- Soil Samples collected from auger cuttings, split spoon sampling, or test pit excavations; and
- Soil Resistivity and Thermal Conductivity Testing.

2.1.3 Seismic Activity

According to the USGS, which maintains records back to 1938, significant earthquake epicenters (magnitude 5.0 or greater) have been recorded in the region. The Project Area is located within a low to moderately active seismic region. One magnitude 5.8 quake occurred in the Massena, New York, area in 1944 and one quake with magnitude between 5.0 and 5.9 occurred south of Montreal, Quebec, in 1877. In addition, more recent earthquakes have also occurred in the Blue Mountain Lake Area of upstate New York in October of 1983 with a magnitude of 5.1 and another occurred in Plattsburgh, New York, in April of 2002 with a magnitude of 5.2. These areas are located between 50 and greater than 100 miles from the Project Area. However, no earthquake epicenters with a magnitude of 6.0 or greater have been recorded within 100 miles of the Project Area (USGS 2006a). The latest earthquake to occur in this region of New York State took place in the center of Lake Ontario on June 1, 2006, and was registered at magnitude 2.4.

In addition, no significant tectonic or quaternary faults have been mapped in Franklin or Clinton Counties, and there are no known active faults (i.e., younger than 1.6 million years) in this region (USGS 2006a).

The USGS provides an Earthquake Hazards Program, which estimates the level of seismic activity probable for any area within the continental United States. The USGS Earthquake Hazards Program indicates an 8-16% chance for the occurrence of the peak ground acceleration in the vicinity of the Project Area. Therefore, a low to moderate potential for significant seismic activity exists (USGS 2006a), which will be accounted for during the design of the facility.



Source: USGS Chateaugay Quad, 1980; USGS Brainardsville Quad, 1980.

Note: Underground collection lines installed in shoulder of access roads are not shown.

Figure 2-1
Noble Chateaugay Windpark and Noble Bellmont Windpark
USGS Topographic Map

2.2 Geology: Impacts and Mitigation

This section provides information on the potential impacts and mitigation related to geologic resources present in the Project Area. Resources evaluated include potential impacts on geology and topography from construction operations and potential Project-related risks from seismic activity in the region once operational.

2.2.1 Construction Impacts

Construction of the Project is not expected to impact regional geology and topography, as the spatial scale of the Project is much smaller than the regional scale. Minor alterations to the turbine sites to level off the area will be required, which will not change the overall topography of the Site. Construction of the Project could impact portions of the Project Site geology and topography where construction occurs in the following situations; however, no significant long-term impacts on topography of the Project Site are expected:

- Surface soils could be compacted during construction of the turbines, crane pads, and support structures (i.e., access roads and underground power lines); and

- Local topography around the turbine sites and roads may be changed to accommodate the requirements to construct and operate the turbines.

Blasting during construction is not anticipated; however, if blasting should become necessary, it will not proceed until full approvals have been obtained from the authority having jurisdiction. Refer to Section 2.27, Description of Proposed Construction Plan, for a more detailed discussion of blasting requirements.

2.2.2 Project Facility Impacts

As described in Section 2.1.3, the USGS states that one significant earthquake epicenter (magnitude 5.2) has been recorded within 50 miles of the Project Site and that the Project Site is not located within an active seismic region (USGS 2006a). No significant quaternary faults have been mapped in Franklin County or Clinton County, and there are no known active faults (i.e., younger than 1.6 million years) in this region (USGS 2006a). The USGS has recently developed an Earthquake Hazards Program, which estimates the level of seismic activity probable for any area within the continental United States. When the Project Site location (latitude and longitude) was entered into the USGS Earthquake Hazards Program, the results indicated the area has an extremely low potential for significant seismic activity, meaning events with a magnitude 6.0 or greater have not occurred in this area (USGS 2006a). Even though the risk of seismic activity adversely affecting the Project Area is relatively low, the potential for a significant seismic event will be accounted for during the design of the facility.

2.2.3 Mitigation

There is no evidence of seismic activity having caused catastrophic failure of any wind facility that meets the standards of the New York code. The potential earth-

quake hazards for the region will be accounted for when designing the anchoring system for the towers; and the tower designs include seismic loading per applicable sections of the Building Code of New York State, namely, Sections 1614 through 1622, and Minimum Design Loads for Buildings and Other Structures (ASCE 7-05), whichever is more stringent.

In addition, the proposed tower locations will be set back from private residences, other structures, and overhead power lines at a distance greater than the maximum height of the tower, which is less than 400 feet. The turbine setback requirements (minimum 600 feet from public roads and neighboring property lines and 1,200 feet from U.S. Route 11 and NYS Route 374) in the Town of Chateaugay Local Law No. 7 of 2006 and (minimum 500 feet from public roads and neighboring property lines) in the Town of Bellmont Local Law No. 2 of 2006 are adequate to protect the public from a tower collapse regardless of its cause, seismic or otherwise.

2.3 Soils: Environmental Setting

This section provides a general description of the soil characteristics based on Natural Resource Conservation Service (NRCS) soil type descriptions for the Project Area.

2.3.1 Project Area Description

In general, these soils are moderately well drained with slow to rapid runoff and moderate permeability. The Empeyville soil series comprises approximately 7,280 acres of the Project Area while the Tunbridge series comprises approximately 1,340 acres of the Project Area. The Empeyville series consists of soils formed in glacial till and are found on nearly level to moderately steep slopes ranging from 8 to 21% within the Project Area. Permeability of these soils is moderate but can be slower as depth increases. Most of the cleared areas of this soil series are used for hay, corn, and oats while wooded areas contain sugar maple, beech, and birch species.

The Tunbridge soil series consists of moderately deep well-drained soils on glaciated upland areas. Permeability of these soils is moderate to rapid with runoff ranging from very low to high. Most areas containing this soil type are wooded but some areas may have been cleared to be used as cultivated fields or pasture land. Slopes of this soil series can range from 13 to 15% within the Project Area.

Table 2.3-1 summarizes major characteristics of soils within the Project Area (USDA – STATSGO 2005). State Soil Geographic Database (STATSGO) data is comprised of general soil information for a given geographic area. There is more detailed data derived by the United States Department of Agriculture (USDA) referred to as Soil Survey Geographic Database (SSURGO) data. However, data with this level of detail is not yet available for the portion of New York State which contains the Project Area. Therefore, STATSGO data provides the best available information to characterize the existing soil conditions.

2.3.2 Turbine Sites

The soils underlying each turbine site were determined using the STATSGO, which contains the general soils data for Franklin County. This data is presented as a map displaying the general soil types in the Project Area (see Figure 2.3-1). It should be noted that prior to construction, Noble will conduct geotechnical studies to determine the site-specific soil makeup at each turbine site. The geotechnical studies will be submitted to the Town for review as part of the Building Permit submittal package for the turbine foundations. See Section 2.1.2 for the components of this study.

Table 2.3-1 Major Characteristics of Soil Types Found in the Project Site

Map Symbol	Soil Series	Prime Farmland Soils/Soils of Statewide Importance	Hydrologic Group[1]	Water Table Depth (Ft.)[2]	Hydric	Drainage[3]	Wind Erodibility Group[4]	Depth To Bedrock (In.)[5]	Acres
NY155	Empeyville	Not available	C	2	No	MW	8	60	7279.65
NY151	Tunbridge	Not available	C	6	No	W	8	20	1339.54

Note: Acreages listed in the table are based on individual parcel data that has been combined for purposes of calculation.

1. Class-C: Slow infiltration rates; soils with layers impeding downward movement of water, or soils with moderately fine or fine textures
2. Maximum value for the range in depth to the seasonally high water table during the months specified, expressed in feet.
3. Soil Drainage Class: MW = Moderately; W = Well
4. Erodibility Group 8: Erosion not a problem.
5. The maximum value for the range in depth to bedrock expressed in inches.

2.3.3 Agricultural Land

Agricultural activity within the Project Area includes pasture land, hay, and row crops. The Project Site includes approximately 5,055 acres of agricultural land, which represents approximately 60% of the Project Site. Agricultural land uses are further described in Section 2.23, Land Use, of this Draft Environmental Impact Statement (DEIS).

Article 25-AA of New York State's Agriculture and Markets Law authorizes the creation of local agricultural districts. These districts are established to protect and encourage the continued use of existing farmland by providing legal protection to farmers using sound agricultural practices. The Project Site lies within a portion of one agricultural district in the Towns of Chateaugay and Bellmont (see Figure 2.3-2). The number of acres of the Project Site within Agricultural District FRA01 is approximately 3,250 acres (2,400 acres in the Town of Chateaugay and 850 acres in the Town of Bellmont).

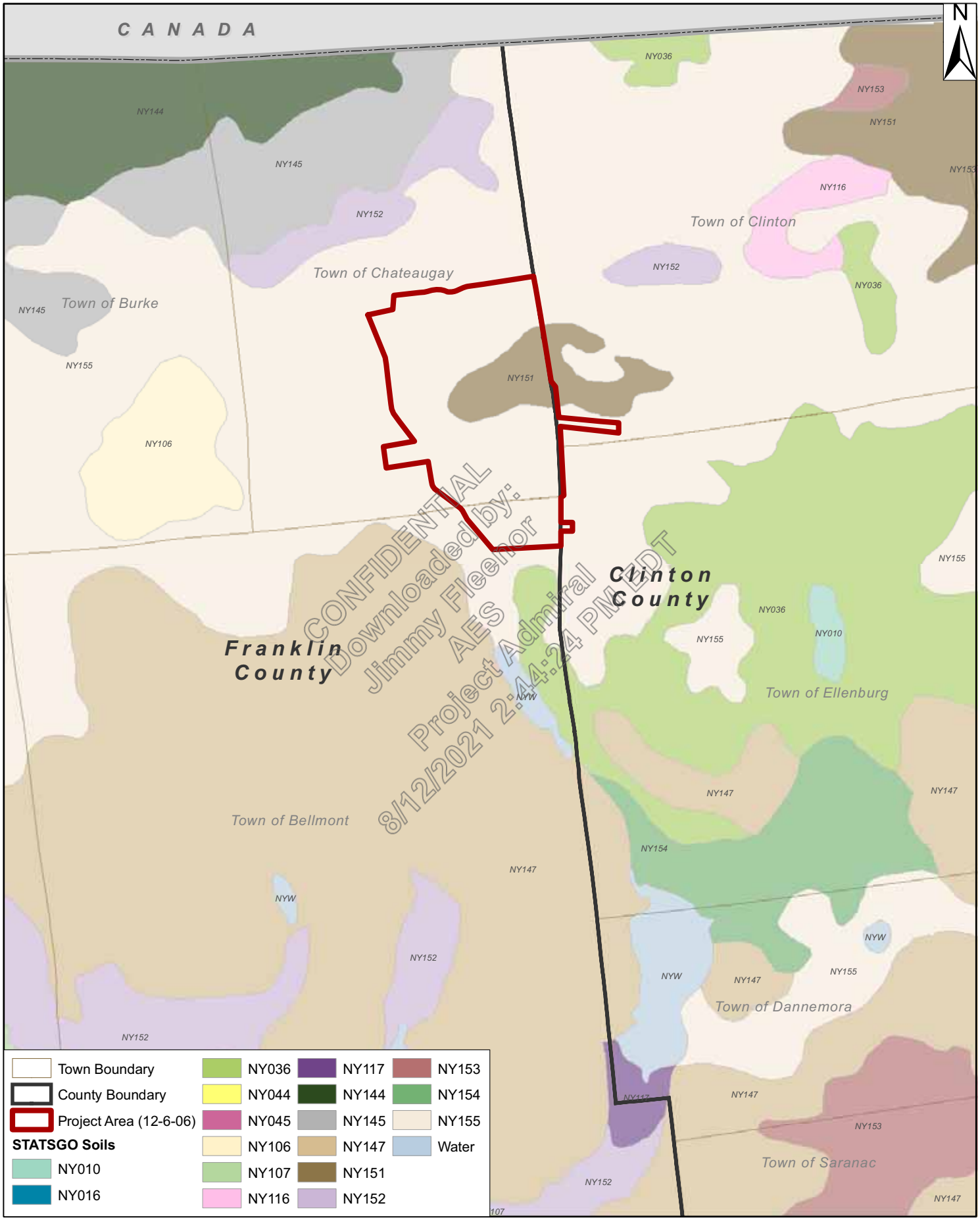
Agricultural districts are often created based on the presence of prime farmland and soils of statewide importance (NYSDAM 2006). Soils identified as prime farmland or soils of statewide importance are recognized as having the greatest productivity for crop growth. According to the National Resource Conservation Service (NRCS), prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is also available for these uses (7 CFR 657). In general, prime farmlands have an adequate and dependable water supply, a favorable temperature and growing season, and other acceptable soil factors such as acidity or alkalinity, salt and sodium content, few or no rocks, and are permeability to water and air. Soils of statewide importance have the soil quality, growing season, and moisture supply needed to produce economically sustained high yields of crops when treated and managed according to acceptable farming practices. Prime farmlands and soils of statewide importance are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. The Project Area falls within Agricultural District FRA01, and likely contains prime farmland and soils of statewide importance. However, STATSGO data does not provide detailed information on these soil attributes.

2.3.4 Steep Slopes and Drainage Characteristics

Areas with steep slopes (usually >15%) are of concern because, when they are cleared of vegetation during construction activities, these areas may be subject to severe erosion during storm events. In addition, steep slopes may affect Project construction activities by limiting the delivery and use of heavy equipment and the rigging and erection of the turbine components. Furthermore, construction activities at these locations may be more involved since topography may need to be altered. The available soils data (STATSGO) indicates two general soils series with slopes ranging from 8 to 21% (Empeyville) and 13 to 15% (Tunbridge). As noted above, the STATSGO data does not provide a very fine level of detail, and the

slopes in the Project Area can fall anywhere within the ranges of 8 to 21%. Based on field observations that were performed during the siting process for the Project, many of the Project components were sited in a given area to avoid steep slopes that can cause potential problems during construction, including difficulty with access and potential increase in erosion. Section 2.4, Soils Impacts and Mitigation, provides additional detail on turbine, access road, and collection line siting, how these potential impacts have been identified, and how they will be mitigated.

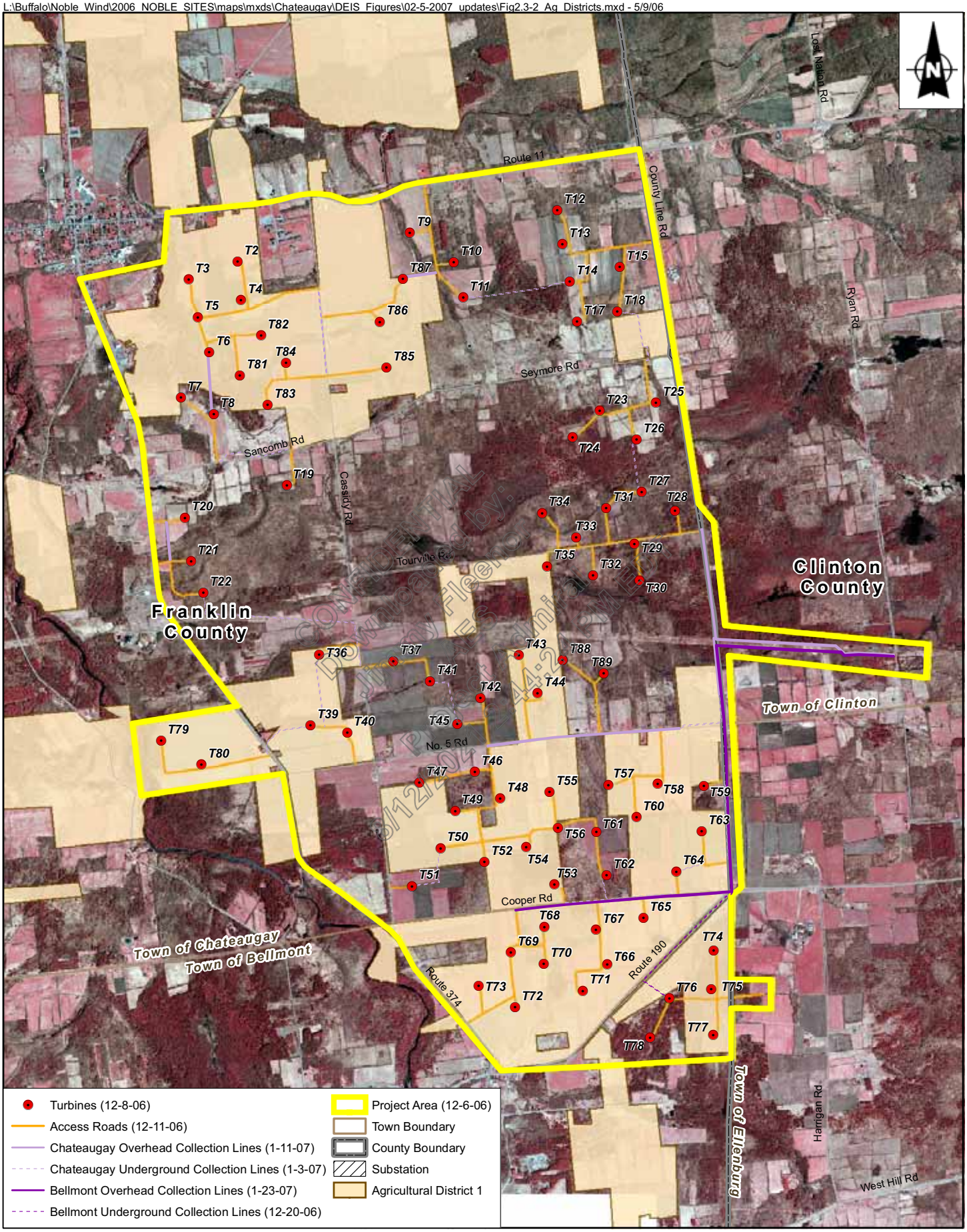
Soil drainage characteristics may also be a concern since soils with poor drainage can result in areas of ponding or significant water buildup during storm events. This can cause problems during construction with equipment access and increased rutting potential in soils that are saturated. As shown in Table 2.3-1, all soils in the Project Area are moderately well to well drained.



U.S. Department of Agriculture, Soil Conservation Service, 1994.

Figure 2.3-1
Noble Chateaugay Windpark and Noble Bellmont Windpark
STATSGO Soils

0 1 2 4
Miles



Source: Cornell Institute for Resource Information Systems (Cornell IRIS), 2006.

Note: Underground collection lines installed in shoulder of access roads are not shown.

Figure 2.3-2
Noble Chateaugay Windpark and Noble Bellmont Windpark
Agricultural Districts

0 0.5 1 2
Miles