Grassland Birds Cumulative Impacts Assessment

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Trelina Solar Energy Center

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1.0 Introduction

1.1 Project Description

Trelina Energy Center, LLC, (Applicant) a wholly-owned indirect subsidiary of NextEra Energy Resources, LLC (NEER), is submitting an application to construct a major electric generating facility, the Trelina Solar Energy Center (Project), under Article 10 of the Public Service Law (PSL) (Case No. 19F-0366).

The Project will have a generating capacity of approximately 79.5 to 80 megawatts (MW) of power and will be located on privately owned lands leased or purchased in the Town of Waterloo, Seneca County, New York (Project Area), shown on Figure 1. Project facilities will include commercial-scale solar arrays, access roads, inverters, fencing, buried electric collection lines, and electrical interconnection facilities.

The proposed facility will consist of ground-mounted solar arrays and associated infrastructure located within an anticipated footprint of 474 acres within the overall 1,067-acre Project Area.

1.2 Purpose and Objectives

This cumulative impact analysis was requested by the New York State Department of Environmental Conservation (NYSDEC). Its purpose and objective is to evaluate the expected construction, operation, and maintenance impacts of the Project on federally and state-listed threatened or endangered grassland bird species, in combination with the actual and expected cumulative impact of proposed and operating solar energy projects with a generating capacity greater than or equal to 5 MW, occupying grassland habitat within 100 miles of the Project Area (Study Projects). This analysis uses data provided to the Applicant by the NYSDEC provided to the Applicant, and any publicly available information the Applicant, in its sole judgement, chooses to employ, to identify Study Projects located within 100 miles of the Project in New York State (NYS) (Grassland Study Area). The Applicant was not required to make Freedom of Information requests, nor perform any field studies at the Study Projects. This analysis includes, at a minimum:

- Examination of publicly available open and grassland habitat data on the Study Projects within the Grassland Study Area using the NYSDEC data, and the publicly available information the Applicant obtained;
- Estimated take of state-listed T&E bird species and their habitats at the Project, if any, and a description of methods used, and sources consulted to estimate take;
- Estimates of available open and grassland habitat within the Grassland Study Area;
- Estimates of acres of grassland breeding bird habitat lost directly through installation of panels and other project components at the Study Projects, using best available information or typical industry solar land use metrics;
- Estimates of acres of grassland habitat indirectly affected by the Study Projects due to functional loss/degradation of habitat; and
- Estimates of cumulative potential impacts to state-listed grassland bird species within the Project Area.

2.0 Literature Review

2.1 Solar Energy Impacts to Grassland Breeding Birds

2.1.1 Direct Impacts

There are few studies quantifying the effects of utility-scale solar projects on biodiversity, including birds. Available peer-reviewed publications on renewable energy, including solar, are insufficient to thoroughly assess the impact of utility-scale solar projects on wildlife populations (Lovich and Ennen, 2011). What literature exists indicates two types of direct impacts to birds from utility-scale solar projects. These occur in the form of burning and collisions (Walston Jr. et al., 2016). Burning impacts may result from the use of solar thermal technology, which is not applicable to the Trelina Solar Energy Center, as that facility shall instead use photovoltaic (PV) solar module technology. Estimates of annual avian mortality from direct impacts attributable to utility scale solar energy developments, including both thermal and PV solar, in the US range from 37,800 to 138,600 (Walston Jr. et al., 2016), which taken in context accounts for an insignificant portion of annual avian mortality from anthropogenic sources (Loss et al., 2015). For example, cats (feral and owned) cause over 2.4 billion bird deaths annually, and building collisions kill over 599,000,000 birds each year (Loss et al. 2015).

Walston Jr. et al. (2015) reviewed and synthesized data from seven utility-scale solar facilities in California and Nevada, including data from some of the studies noted above, to evaluate avian mortality. Data was collected through both systematic and incidental monitoring from 2011-2014. Over 1,300 mortality events were documented. Unfortunately, cause of death could not be determined for 50 percent of the observations. The authors conclude that data were too sparse to make definitive statements regarding the rate of avian mortality caused by solar facilities. Mortality is expected to vary seasonally, influenced by influx of migrants and departure of residents, as well as local avian abundance, and non-facility related causes of mortality. Numerous design factors may influence mortality, however given the complexity of determining facility-related mortality events, the current understanding of these factors is exceedingly limited. Factors influencing detectability of mortality events also exist and include predation and scavenging.

2.1.2 Indirect Impacts

To date, there has been very few peer-reviewed studies of the indirect effects of ground-mounted solar systems and birds (DeVault et al., 2014). Although the topic is understudied, what research has been conducted suggests that indirect effects are site- and species-specific (Hernandez et al., 2014, DeVault et al., 2014, Smith & Dwyer 2016). The DeVault study represents the only peer-reviewed study to date to evaluate indirect impacts from utility-scale solar facilities to birds. The study compared bird use at ground-mounted solar facilities and managed grasslands at airfields, concluding that although bird diversity was lower than adjacent grasslands, bird density was greater at solar facilities. The same study found several grassland birds using solar systems including eastern meadowlark, grasshopper sparrow and savannah sparrow (DeVault et al., 2014). Careful siting of solar facilities with respect to land use, overall footprint and site hydrology is likely to reduce the effect if indirect impacts (Smith & Dwyer 2016, Hernandez et al., 2014). Further, solar systems provide an opportunity for co-location of energy generation and grassland habitat conservation which may ultimately benefit grassland breeding birds and pollinators (Hernandez et al., 2014, Walston Jr., et al., 2018).

Grassland birds are declining in NYS due largely to the loss of grassland habitat, resulting from afforestation and conversion to agriculture (Brennan & Kuvlesky Jr., 2012). Unfortunately, compared to natural grasslands, agricultural operations provide reduced foraging opportunities, lower vertical structure and horizontal cover, are often monotypic in floristic diversity, and generally experience increased physical and biological disturbance associated with human activity. Most utility-scale solar facilities in the United States are sited in agricultural areas, and construction of facilities often results in conversion of land use out of row crop production. While species-specific requirements for grassland birds vary, the habitat provided by today's farmland, and in particular row crop cover is generally considered marginal (Morgan and Burger, 2008).

Following construction, solar energy facilities typically use a grass seed mix to establish a stabilized vegetative ground cover. These grass seed mixes are comprised of grasses that are native and/or indigenous to the area and are considered favorable for wildlife habitat and sustainable growth. For this reason, solar farms have been observed to improve plant and insect diversity which likely provides benefit to grassland birds (Parker and McQueen 2013, Walston Jr. et al., 2018).

Additionally, the effects of climate change have been identified as a preeminent threat to continental bird populations (National Audubon Society, 2014). As noted by Audubon in their endorsement of solar energy, increasing the capacity to generate energy from renewable sources will indirectly benefit birds through climate change mitigation.

2.2 Summary of Previous Site-Specific Studies

2.2.1 Grassland Breeding Bird Study

TRC conducted a preconstruction monitoring survey of grassland bird species during the 2019 breeding (TRC, 2020a). The survey methodology followed the *NYSDEC Draft Survey Protocol for State-listed Breeding Grassland Bird Species* (NYSDEC, 2015a) and incorporated comments provided by NYSDEC on the site-specific protocol. The objective of the grassland breeding bird survey was to determine the presence and site use of federally and State-listed threatened/endangered, rare, and special concern grassland bird species within the proposed Project Area including:

- northern harrier (*Circus hudsonius*);
- upland sandpiper (*Bartramia longicauda*);
- short-eared owl (*Asio flammeus*);
- Henslow's sparrow (*Ammodramus henslowii*);
- sedge wren (*Cistothorus platensis*);
- grasshopper sparrow (*Ammodramus savannarum*);
- vesper sparrow (*Pooecetes gramineus*), first observed on May 24, 2019; and
- horned lark (*Eremophila alpestris*), first observed on May 24, 2019.

Additional target grassland bird species the subject of the survey included:

- American kestrel (*Falco sparverius*);
- bobolink (*Dolichonyx oryzivorus*), first observed on May 24, 2019;
- eastern meadowlark (*Sturnella magna*);
- golden-winged warbler (*Vermivora chrysoptera*); and
- savannah sparrow (*Passerculus sandwichensis*), first observed on May 24, 2019.

Biologists recorded 608 observations representing 55 species. This included four grassland bird species observed from the survey points, both inside and outside of these 100-meter radius

circular plots, as well as birds observed during the meander surveys. Target grassland breeding bird species observed included bobolink, horned lark, savannah sparrow, and vesper sparrow. No state-listed threatened or endangered species were observed. Savannah sparrow the most numerous target species observed (n = 21 observations), representing 6% of all observations. Bobolinks were the second most numerous target species observed (n = 11). Both species can be expected where there is suitable grassland habitat. Twelve raptor observations from three species (bald eagle, red-tailed hawk, and turkey vulture), were recorded during the breeding bird survey. All observations were incidental to the survey.

The bald eagle is a state-listed threatened species and an adult of this species was observed flying over the open fields of the Project Area early on June 11 and June 26, 2019. There is a known active eagle nest within the Project Area, and it is believed that this individual is associated with the nest. The vesper sparrow is a state-listed species of special concern (SSC); a single vesper sparrow was observed at the Project Area. No breeding or nesting activity was observed. Horned lark, also an SSC, were observed on several occasions between May 24 and June 6, 2019. Seven individuals were recorded indicating probable breeding behavior. For any target species, regardless of listed status, no behavior consistent with confirmed breeding or nesting was documented. For a detailed description of the 2018 Grassland Breeding Bird Survey, including figures showing locations, methods, and results, refer to Appendix 22-3.

2.2.2 Winter Grassland Raptor Surveys

TRC conducted a preconstruction monitoring survey of wintering grassland raptors (TRC, 2020b). The objective of the wintering grassland raptor survey was to determine the presence and site use of state-listed threatened/endangered grassland raptors within the proposed Project Area. Target species were short-eared owl and northern harrier. The survey methodology followed the NYSDEC Draft Survey Protocol for State-listed Wintering Raptor Species (NYSDEC, 2015b), and incorporated comments provided by NYSDEC on the site-specific protocol.

Stationary and driving surveys were conducted between November 18, 2019, and April 1, 2020. Driving surveys and stationary surveys were conducted weekly, with each survey point or driving stop visited once every two weeks. Stationary surveys were conducted for a total of 94.7 hours, and 22.7 total hours were spent conducting daytime driving surveys.

Thirty-five observations of seven identified raptor species and four observations of unidentified raptors were recorded during stationary surveys. Overall, a total of 446 use minutes were recorded during stationary surveys. Overall mean use of the Project Area by raptors was 0.087 minutes/plot/survey. Twenty-seven observations of five species and three observations of unidentified raptors, including two species not observed during stationary surveys, were recorded during driving route surveys in the Project Area. Red-tailed hawk (*Buteo jamaicensis*) was the most commonly observed raptor species, accounting for 56 and 63 percent of stationary and driving route survey observations respectively.

No short-eared owls were observed during winter raptor surveys at the Project Area. Two state-listed species were documented on the surveys. Two state-listed species including the northern harrier (*Circus cyaneus*) and bald eagle (*Haliaeetus leucocephalus*) were documented during the study. Northern harriers were observed on two occasions. Observations primarily indicated hunting or migratory behavior. No roosts were confirmed for this species. Bald eagles were observed on 10 occasions un the vicinity of a known active nest. Three state-listed SSC, the Cooper's hawk (*Accipiter cooperii*; observed on one occasion), osprey (*Pandion haliaetus*; one observation), and sharp-shinned hawk (*Accipiter striatus*; two observations) were documented within the Project Area. No short-eared owls were observed during the study. Horned larks, which were a target species in the grassland breeding bird survey, were observed incidentally in the Project Area, first on November 28, 2019, during the wintering grassland raptor survey. For a more detailed description of the wintering grassland raptor survey, including a list of incidental bird observations, refer to Appendix 22-4.

3.0 Methods

3.1 Desktop Review

3.1.1 Grassland Species Use

TRC conducted a review of publicly available information to determine grassland bird species with potential to occur within the Project Area and those which may be impacted by solar energy development within the 100-mile Grassland Study Area. This review focused on state- and federally listed Threatened (THR) and Endangered (END) species, and grassland SSC, as designated in the NYSDEC grassland breeding bird survey protocol (NYSDEC, 2015a). This review included:

- Route-level data from the United States Geological Survey (USGS) North American Breeding Bird Survey for survey routes within the Project Area,
- Block-level data from the 2nd NYS Breeding Bird Atlas (BBA) (2000-2005) for survey blocks within the Project Area,
- Christmas Bird Count data from counts located closest to the Project Area,
- County-level eBird data for Seneca County and other counties with Study Projects in the Grassland Study Area, and
- County-level data from the New York Natural Heritage Program (NYNHP) for Seneca County and counties with Study Projects in the Grassland Study Area.

While additional species in New York may use grassland habitat during some portion of the annual life-cycle, and have potential to occur within the Project Area, analyses were restricted to those species considered “Grassland Breeding Birds” in the NYSDEC protocol (NYSDEC, 2015a) and the North American Breeding Bird Survey (USGS, 2019). Species with potential to occur in the Project Area based on habitat requirements and species’ range are described in Table 1.

3.1.2 Study Project Identification

TRC analyzed the data provided by the NYSDEC for Study Projects with a proposed generating capacity of 5MW or greater within the 100-mile Grassland Study Area and within the NYS boundaries. Projects were cross-referenced with the New York Interconnection System Operator (NYISO) Interconnection Queue to obtain additional project-specific information. Few projects reported MW capacity; therefore, a conservative approach was used to identify Study Projects which met the criteria to be included in further analysis. Any projects with a size of less than 25

acres reported in the database were eliminated from the Study, based on the minimum capacity-weighted average land use for PV solar technologies of approximately 5 acres/MWac[1].

A literature search was conducted for each Study Project in order to obtain any additional publicly and electronically available pertinent information, including Project location, generating capacity, area of impact, and avian studies completed to date.

3.2 Spatial Analysis

TRC used the USGS National Land Cover Database (NLCD) for the conterminous United States, updated 2016, to determine the presence and extent of grassland habitat within the Grassland Study area, and the Study Project boundaries, and to characterize habitat available within the proposed Project Area.

The NLCD categorizes each 30x30-meter pixel into one of 20 cover classes. As a conservative approach, for the purposes of this analysis, grassland habitat was defined as including both the "Grassland/Herbaceous" category and pixels classified as "Pasture/Hay," which are consistent with the definition of grassland communities of New York described in Edinger et al. 2014[2].

NLCD provides the following definition for each of these categories:

- Grassland/Herbaceous - areas dominated by graminoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling but can be used for grazing.
- Pasture/Hay - areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.

Grassland habitat was extracted from the NLCD dataset using a Geographic Information System (GIS) to determine percent area in grassland cover. Acreages and percent cover values were

[1] Ong, S., Campbell, C., Denholm, P., Margolis, R., & Heath, G. 2013. Land-use requirements for solar power plants in the United States (No. NREL/TP-6A20-56290). National Renewable Energy Lab. (NREL), Golden, CO (United States).
[2] From Edinger et al. 2014: Grasslands include communities that are dominated by grasses and sedges; they may include scattered shrubs (never more than 50% cover of shrubs), and scattered trees (usually less than one tree per acre, or 3 trees per hectare).

compared between the Project Area, Study Projects (collectively), and the Grassland Study Area. This approach was used to highlight the overall indirect impact posed to grassland breeding birds resulting from habitat conversion/loss associated with Project construction. This methodology conservatively assumes that although the total footprint of the Project is limited to approximately 450 acres, indirect impacts to grassland birds have the potential to occur on all grassland habitat acres within the Project Area.

4.0 Results

4.1 Grassland Species Use

4.1.1 Project Area

Several target grassland species were identified on site during the grassland breeding bird and winter raptor surveys. Species observed included bobolink, horned lark, savannah sparrow, vesper sparrow, and northern harrier. Savannah sparrow (n = 21) were the most commonly observed grassland bird species and comprised 6.3 percent of all grassland birds observed.

Two northern harrier (ST) were observed during the winter raptor surveys, and two to three bald eagle individuals (SE) were observed during the winter grassland raptor survey. Cooper's hawk (SSC), sharp-shinned hawk (SSC), and horned lark (SSC) were also observed during winter raptor surveys conducted within the Project Area.

4.1.2 Study Project Counties

TRC reviewed the NYNHP and eBird databases to determine the most recent occurrence of grassland birds within each of the 31 counties where Study Projects were identified (Tables 2 and 3). Numerous species were widely distributed and had recent records among the counties, and all have been recently observed (within last 10 years) in Seneca County except for barn owl. Few species were less recently recorded or limited in distribution, including:

- Barn Owl, observed in 13 counties, no record in Seneca County; and
- Henslow's Sparrow, observed in 28 counties, last observed in Seneca County in 2002.

Recent records for the remaining species indicate widespread distribution within the Grassland Study Area. Although only the most recent record is reported, many of these species (with the exception of those listed above) were also documented in each of these counties during the most recent BBA, conducted from 2000-2005, indicating a persisting population over the previous 15-20 years (NYS BBA, 2008).

4.2 Summary of Study Projects Evaluated

An initial review of the NYSDEC-provided data yielded multiple projects identified as duplicate records, with duplicates containing slightly modified project areas. Polygons were merged to

retain the full extent of the project area, resulting in 232 unique projects within the Grassland Study Area.

Many of the records contained missing data. Of 232 records, only 51 included the proposed or actual MW capacity. Records missing MW capacity data were filtered based on acreage to retain only those projects greater than 25 acres in size, resulting in the identification of 132 Study Projects considered in the evaluation of impacts. The full list of Study Projects evaluated is provided as Table 4.

Study Projects were identified in 30 of the 31 counties within the Grassland Study Area. Monroe County contained the highest concentration of Study Projects with 19 projects identified, followed by Onondaga County (12) and Oneida and Ontario counties (10). The remaining counties had fewer than 7 Study Projects. No Study Projects were identified in Delaware county (Table 1; Figure 2). Study Project locations are depicted on Figure 2. Only one Study Project in addition to the proposed Project was identified in Seneca County.

Study Projects, including the Project, encompass a total of 172,797 acres within the Grassland Study Area, and an additional 3,378.1 acres outside the Grassland Study Area. Of the 132 Study Projects, 20 have already been constructed and account for 1,108 acres of development. It should be noted that none of the proposed Study Projects in the database provided information regarding the total impact resulting from construction within their respective project area boundaries, therefore the total area reported is likely an overestimation as additional land area could be included within each project's boundary beyond what is needed to achieve the project's proposed generating capacity.

Study Projects within Oneida County comprised the largest amount of acreage among Study Projects, with total area of 33,351 acres across 10 projects. Study Projects in Wayne county have a total area of 24,500 acres across 5 projects, and Niagara County with 4 projects, has a total potential area of development of 20,738 acres. Seneca County, where the Project is located, has a proposed development area of 1,118 acres (including the Project), accounting for 0.6 percent of the total area of development within the Grassland Study Area[3].

[3] Approximately 3,378 acres among Study Projects is located outside of the Grassland Study Area, therefore the amount of acreage impacted within the Grassland Study Area may be slightly overstated.

The results of pre-construction studies of grassland bird use are not publicly available for the majority of Study Projects. Only five Study Projects have progressed in the process of filing for an Article 10 certificate, so as to make the results of such studies publicly available. This information is summarized below and considered in the evaluation of cumulative impacts. Project narratives were obtained from publicly filed Article 10 application exhibits or other publicly available documents.

Cypress Creek Renewables – Bear Ridge Solar, Niagara County

Bear Ridge Solar is a proposed 100-MW solar energy generating facility to be sited on approximately 750 acres in Niagara County. Consultation with the NYSDEC presented in the Public Scoping Statement for the project indicated that two bird species, the state-listed endangered short-eared owl (*Asio flammeus*) and the state-listed threatened northern harrier (*Circus cyaneus*), have been documented at various locations at or near the facility area.

Cypress Creek Renewables – Sky High Solar, Onondaga County

The Sky High Solar Project consists of approximately 121.5 acres and is sited within two tax parcels totaling approximately 555.3 acres in the town of Tully, Onondaga County. TRC was contracted to conduct breeding bird surveys during 2019. A total of four point count surveys at each of five survey locations were conducted over the course of the survey period.

A total of 249 observations of grassland birds from 19 species were observed within the Project Area during the entire survey period. A total of 99 individuals were observed during regular surveys. Bobolink (28% of total individuals observed), red-winged blackbird (13% of total individuals observed), common yellowthroat (10% of total individuals observed), song sparrow (9% of all total individuals observed), and field sparrow (8% of total individuals observed) were the most common grassland bird species observed during the study. No federally or state-listed species were observed during the survey period, either during surveys or incidentally outside the prescribed survey window.

TRC was contracted by the developer to perform winter grassland raptor surveys for the proposed Sky High Solar Project in the winter of 2019-2020.

Stationary surveys were conducted at two survey locations within the Project Area between November 26, 2019 and March 30, 2020. A total of ten stationary surveys per site (twenty stationary surveys) were conducted over the course of the study period, for a total of 34.2 survey hours. No state-listed species were observed on the Sky High Solar Project Area during or incidentally to surveys

EDF Renewables – Morris Ridge Solar Energy Center, Livingston County

Morris Ridge is a proposed 177-MW solar energy generating facility located on approximately 1,350 acres of leased private lands in Livingston County. In the Preliminary Scoping Statement (PSS) for the project, consultation with NYNHP indicated occurrences of breeding upland sandpiper and Henslow's sparrow, as well as records of wintering northern harrier within the project area.

EDF Renewables – Genesee Road Solar Energy Center, Erie County

The Genesee Road solar facility is proposed to have a maximum generating capacity of 350 MW with facilities and infrastructure located on a portion of the 2,500-acre project area and is located approximately 88 miles from the Trelina Solar Energy Center. EDF Renewables conducted wintering grassland surveys within the Facility Area during the winter of 2019/2020. The results of that survey are not available; however, the PSS notes that consultation with the NYNHP did not indicate known occurrences of any listed species in the vicinity of the project. Additionally, eBird records also did not indicate observations of northern harrier or short-eared owl within the project area in the last 10 years.

NYSDEC provided a comment response to the PSS filing indicating records of occupied habitat for several State-listed species within three miles of the project, including breeding black tern, short-eared owl, and Henslow's sparrow. Records from the BBA blocks overlapping with and adjacent to the Project indicate two additional State-listed species, upland sandpiper and pied-billed grebe, may also nest in the vicinity. Observations of several species of grassland birds, including northern harrier, upland sandpiper, Henslow's sparrow and grasshopper sparrow have been made within and near the project and reported on eBird.

EDF Renewables – Homer Road Solar Energy Center, Cortland County

The Homer Solar Energy Center is a proposed 90-MW solar PV energy-generating project with facility and infrastructure located on portions of an approximately 1,900-acre project area. This project is approximately 45 miles from the Trelina Solar Energy Center. The publicly filed PSS indicates that wintering grassland raptor studies were conducted during winter of 2019-2020, however results are not available. Comments on the PSS provided by the NYSDEC indicate there are no records of state-listed species within the project area.

Invenergy – Horseshoe Solar, Livingston and Monroe Counties

The Horseshoe Solar project facility will have a maximum generating capacity of 180 MW to be sited within a 3,800-acre project area in the towns of Rush and Caledonia in Livingston and Monroe counties. The PSS filed in March 2019 provides little information regarding the project area, however comments provided from the NYSDEC on this filing indicate no known occurrences of listed grassland bird species within the vicinity of the project.

Watkins Glen Solar Energy Center, LLC – Watkins Glen Solar Energy Center, Schuyler County

The Watkins Glen facility will consist of ground-mounted solar arrays and associated infrastructure within the 774-acre project area, with a proposed 50-MW generating capacity.

A preconstruction monitoring survey of grassland bird species during the 2018 breeding season required by the NYSDEC was conducted by Tetra Tech, an engineering services company. Biologists recorded a total of 297 observations, including individuals representing three grassland bird species (i.e., bobolink, savannah sparrow, and grasshopper sparrow) at the project area. The grasshopper sparrow is a state-listed SSC and a total of three grasshopper sparrows were observed at the project area. No other state or federally listed threatened or endangered species were documented.

Bobolinks (n = 189) were the most commonly observed grassland bird species and comprised 63.6 percent of all grassland birds observed. Mean use was highest for bobolinks (3.42 birds/100-meter radius plot/5 minutes), followed by savannah sparrows (1.21 birds/100-meter radius plot/5 minutes), and grasshopper sparrows (0.09 birds/100-meter radius plot/5 minutes).

TRC conducted a preconstruction monitoring survey of wintering grassland raptors during the winter of 2018-2019. A total of 16 stationary surveys and 13 driving route surveys were conducted during the study totaling 23.9 and 9.87 survey hours, respectively.

No short-eared owls or northern harriers were observed during winter raptor surveys at the project area. A total of 24 birds of four species were observed during the course of the surveys. No state-listed threatened or endangered species were observed. Five individuals were observed during stationary counts, including three red-tailed hawk, two Cooper's Hawk and one rough-legged hawk. Nineteen individuals were observed during daytime driving surveys, including 18 red-tailed hawk and one turkey vulture.

4.3 Facility Impacts to Grassland Habitat

Land cover within the Project Area is predominantly characterized as cultivated crops (710.7 acres) and woody wetlands (171.4 acres), together comprising ~83% of land cover within the Project Area (Table 5; Figure 3). Grassland habitat collectively comprises 43.9 acres (4.1%) of the Project Area (Figure 4). This consists of hay/pasture (35.6 acres), with grassland herbaceous cover accounting for only 8.2 acres. When compared with the Grassland Study area, which contains approximately 2.4 million acres of grassland habitat (Figure 5), impacts from the Project will affect 0.003% of available habitat within 100 miles in the state of New York.

4.4 Cumulative Impacts of Grassland Habitat Use

The Grassland Study Area encompasses 12,996,498.9 acres. Together, the 132 Study Projects comprise 172,797.1 acres of proposed development (0.3% of total acreage within the Grassland Study Area; Table 6). Grassland habitat covers 2,395,074 acres and accounts for 18.4% of land within the Grassland Study Area. Grassland habitat within the boundaries of the 132 Study Projects totals 38,456 acres, which covers 22.3% of the proposed area of development among the projects and accounts for only 1.6% of available grassland habitat within the Grassland Study Area (Table 6).

The proposed Project is anticipated to impact (directly and indirectly) approximately 44 acres of grassland habitat in the 1,067-acre Project Area. The actual limits of disturbance to grassland habitat within each of the Study Projects is unknown and impact studies from the Study Projects

are not available. Therefore, to estimate cumulative impacts, a conservative approach was employed and assumed that all grassland habitat within the 132 Study Projects (38,456 acres) would be developed. Even with this conservative assumption, only 1.6% of available grassland habitat within the Grassland Study Area would be impacted.

5.0 Discussion

Mortality studies are inherently lacking for utility-scale ground-mounted solar. As such, providing an accurate or reliable estimate of take of listed species for this or other Projects is infeasible and was therefore not accomplished. To date, few studies within North America have been published on the subject, both from projects located in the western United States. From these limited studies, estimates of annual avian mortality events attributable to solar facilities are insignificant relative to other anthropogenic sources of mortality, ranging from 37,800 to 138,600 individuals for all utility-scale solar sites operational in the US (Walston Jr. et al., 2016, Loss et al., 2015). These estimates indicate that at the scale of development proposed within the Grassland Study Area, direct impacts to listed species are unlikely to have measurable impact at the population level.

The total limits of disturbance were unavailable for most of the Study Projects. As a result, the extent of permanent impacts to grassland habitat within the Grassland Study Area could not be quantified, therefore these results likely reflect an overestimation. Moreover, the estimates are speculative in nature based on the uncertainty that all proposed projects included in this analysis will ultimately be developed.

Based upon the overly conservative assumptions used in this analysis, the analysis estimates that approximately 1.6% of grassland habitat within the nearly 13-million-acre Grassland Study Area would be impacted in the unlikely event that all 132 Study Projects and the proposed Project are ultimately developed. Considering that the amount of grassland habitat that would be impacted within each Study Project accounts for only a portion of the proposed project boundaries, this is a highly conservative estimate and the actual impact will be substantially lower.

The suite of species identified, and those with the potential to occur, are primarily widely distributed throughout the Grassland Study Area, with recent and multiple records in counties where grassland habitat exists. A review of the literature surrounding these species indicates that while populations of many grassland-associated species are declining state-wide (NYS BBA, 2008, Brennan & Kuvlesky Jr., 2005), these species are also adapting to changing habitat at the landscape scale (Walston Jr., et al., 2018). Many grassland bird species in fact may benefit from the conversion of agriculture to more structurally diverse vegetation, as is typically seeded beneath and between solar panels. While the conversion of grassland habitat types to solar development has the potential to impact individuals among grassland species, adverse

population-level impacts are not likely from this Project, or cumulatively from the 132 Study Projects identified.

6.0 References

A. 8083, 2017-2018 General Assembly. (New York 2018)

Brennan, L. A., & W. P. Kuvlesky Jr. 2005. North American grassland birds: an unfolding conservation crisis? The Journal of Wildlife Management, 69(1), 1-13.

Cypress Creek Renewables. 2019. Preliminary Scoping Statement (PSS) Bear Ridge Solar Project, LLC Case 18-F-0338. 155 pp.

DeVault, T. L. et al. 2014. Bird use of solar photovoltaic installations at US airports. Implication for aviation safety. Landscape and Urban Planning 122: 122-128 pp.

Edinger, G. J., D. J. Evans, S. Gebauer, T. G. Howard, D. M. Hunt, and A. M. Olivero (editors). 2014. Ecological Communities of New York State. Second Edition. A revised and expanded edition of Carol Reschke's Ecological Communities of New York State. New York Natural Heritage Program (NYNHP), New York State Department of Environmental Conservation (NYSDEC), Albany, New York.

Environmental Design & Research. 2020. PSS Case 19-F-0588: Homer Road Solar Energy Center. 276 pp.

Environmental Design & Research. 2020. PSS Case 19-F-0602: Genesee Road Solar Energy Center. 271 p.

Environmental Design & Research. 2019. PSS Case 18-F-0440: Morris Ridge Solar Energy Center. 174 p.

Invenergy. 2019. PSS Horseshoe Solar, Livingston and Monroe Counties, Case 18-F-0633. 16 p.

Loss, S. R., T. Will, and P. P. Marra. 2015. Direct mortality of birds from anthropogenic causes. Annual Review of Ecology, Evolution, and Systematics, 46: 99-120 pp.

Lovich, J.E. and Ennen, J.R. 2011. Wildlife Conservation and Solar Energy Development in the Desert Southwest, United States. Bioscience, 61: 982-992 pp.

McCrary, Michael D., R. L. McKernan, R. W. Schreiber, W. D. Wagner, and T. C. Sciarrotta. 1986. Avian Mortality at a Solar Energy Power Plant. Journal of Field Ornithology, 57(2): 135-141 pp.

Morgan, M. and Burger, M. 2008. A plan for conserving grassland birds in New York: Final report to the NYSDEC under contract # C005137. New York Audubon.

National Audubon Society. 2014. Audubon's Birds and Climate Change Report: A Primer for Practitioners. National Audubon Society, New York. 35 p.

New York State Breeding Bird Atlas (NYS BBA). 2008. NYSDEC. Available at https://www.dec.ny.gov/animals/7312.html.

NYSDEC. 2015a. NYSDEC Draft Survey Protocol for State-listed Breeding Grassland Bird Species.

NYSDEC. 2015b. NYSDEC Draft Survey Protocol for State-listed Wintering Raptor Species.

Parker, G. E., & C. McQueen. 2013. Can solar farms deliver significant benefits for biodiversity. Winchwood Biodiversity/Rowsell & McQueen.

Smith, J. A., & J. F. Dwyer. 2016. Avian interactions with renewable energy infrastructure: An update. The Condor: Ornithological Applications, 118(2), 411-423 pp.

TRC. 2020a. Trelina Solar Energy Center Project Grassland Breeding Bird Survey Report. (unpublished).

TRC. 2020b. State-listed Wintering Grassland Raptor Survey Report for the Trelina Solar Energy Center. (unpublished).

United States Geological Survey (USGS). 2019. Breeding Species List for New York, United States. North American Breeding Bird Survey. USGS Patuxent Wildlife Research Center, Laurel, MD. Available at: https://www.pwrc.usgs.gov/BBS/PublicDataInterface/index.cfm.

Walston Jr., L. J., K. E. Rollins, K. P. Smith, K. E. LaGory, K. Sinclair, C. Turchi, and H. Souder. 2015. A review of avian monitoring and mitigation information at existing utility-scale solar facilities (No. ANL/EVS-15/2). Argonne National Lab. (ANL), Argonne, IL (United States).

Walston Jr, Leroy J., K. E. Rollins, K. E. LaGory, K. P. Smith, and S. A. Meyers. 2016. A Preliminary Assessment of Avian Mortality at Utility-Scale Solar Energy Facilities in The United States. Renewable Energy (92): 405-414 pp.

Walston, L. J., S.i K. Mishra, H. M. Hartmann, I. Hlohowskyj, J. McCall, and J. Macknick. 2018. Examining the Potential for Agricultural Benefits from Pollinator Habitat at Solar Facilities in the United States. Environmental Science & Technology, 52(13): 7566-7576 pp.

Tables

Table 1. Summary of Grassland Species with Potential to Occur Within the Project Area.

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference[4]	Source of Potential Presence[5]	Observed On site
American Kestrel (*Falco sparverius*)	-	-	SGCN	This species prefers open areas, such as successional old fields, forest edges, scrublands, pastures and hay fields. Suitable habitat for this species occurs within the Project Area.	C, D, E, F	No
Barn Owl (*Tyto alba*)	-	-	SGCN-HP	This species prefers open habitats which include grasslands, marshes, brushy fields, and agriculture. They typically nest in tree cavities, caves, but often in human structures. Suitable habitat for this species occurs within the Project Area.	None	No
Bobolink (*Dolichonyx oryzivorus*)	-	-	SGCN-HP	This species prefers grasslands, including pastures, successional old fields, and meadows. Suitable habitat for this species occurs within the Project Area.	C, D, F	Yes
Eastern Meadowlark (*Sturnella magna*)	-	-	SGCN-HP	This species prefers farm fields, pastures, grasslands, and wet fields. Suitable habitat for this species occurs within the Project Area.	C, D, F	No
Golden-winged Warbler (*Vermivora chrysoptera*)	-	SSC	SGCN-HP	This species prefers open woodlands, wet thickets, and successional shrublands. A mosaic of shrubby, open areas and mature forests are important for this species. Suitable habitat for this species occurs within the Project Area.	F	No
Grasshopper Sparrow (*Ammodramus savannarum*)	-	SSC	SGCN-HP	This species prefers open fields and prairie including active hay fields, successional old field, and minimally in successional shrublands. Suitable habitat for this species occurs within the Project Area.	C, F	No
Henslow's Sparrow (*Ammodramus henslowii*)	-	-	SGCN-HP	This species prefers moist fallow fields and meadows. Breeding occurs in a variety of habitats with tall, dense grass and herbaceous vegetation. Suitable habitat for this species occurs within the Project Area.	C, F	No
Horned Lark (*Eremophila alpestris*)	-	SSC	SGCN-HP	This species prefers open habitats with sparse vegetation such as prairies and heavily grazed pastures. Suitable habitat for this species does not occurs within the Project Area.	C, D, E, F	Yes

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference[4]	Source of Potential Presence[5]	Observed On site
Northern Harrier (*Circus cyaneus*)	-	THR	SGCN	This species prefers freshwater marshes, wet grasslands, lightly grazed pastures, successional old field, and croplands. Suitable habitat for this species occurs within the Project Area.	C, D, E, F	Yes
Prairie Warbler (*Setophaga discolor*)	-	-	SGCN	This species prefers successional shrubland, successional old-field, brush piles, and pastures. Breeds in dry old field and clearing, edges of forest, and sandy pine barrens. Suitable habitat for this species occurs within the Project Area.	F	No
Ring-necked Pheasant (*Phasianus colchicus*)	-	-	-	This species prefers agricultural land and old fields, especially fields that are interspersed with grass ditches, hedges, marshes, woodland borders, and brushy groves. Pheasant may also be found in pasture/hay, particularly alfalfa. Suitable habitat for this species occurs within the Project Area.	C, D, F	No
Savannah Sparrow (*Passerculus sandwichensis*)	-	-	-	The species prefers patches of bare ground or short vegetation interspersed among taller dense grasses, pastures, hayfields, native prairies, the grassy edges of marshes, and reclaimed strip mines. Suitable habitat for this species occurs within the Project Area.	C, D, F	Yes
Sedge Wren (*Cistothorus platensis*)	-	THR	SGCN	This species prefers shallow marshes, wet meadows, grasslands, and hayfields. Suitable habitat for this species occurs within the Project Area.	F	No
Short-eared Owl (*Asio flammeus*)	-	THR	SGCN-HP	This species prefers open areas grasslands, prairies, marshes, and meadows. Suitable habitat for this species occurs within the Project Area.	E, F	No
Upland Sandpiper (*Bartramia longicauda*)	-	THR	SGCN-HP	This species prefers prairies, grasslands, and successional old field. Suitable habitat for this species occurs within the Project Area.	C, F	No
Vesper Sparrow (*Pooecetes gramineus*)	-	SSC	SGCN	This species responds quickly to changes in habitat and often occupies abandoned old farm fields and successional shrub lands as they return to forest. Suitable habitat for this species occurs within the Project Area.	C, F	Yes

1 "Federal Status" refers to the species listing as federally endangered (END) OR threatened (THR).

2 "NYS Status" refers to the species listing as a state-listed END, THR, or SSC.

3 'SGCN Listing' refers to is the species state listed as a Species of Greatest Conservation Need – High Priority (SGCN-HP), Species of Greatest Conservation Need (SGCN), or a Species of Potential Conservation Need (SPCN).

Species Name	Federal Status[1]	NYS Status[2]	SGCN Listing[3]	Habitat Preference[4]	Source of Potential Presence[5]	Observed On site

4 References for habitat preference were Audubon.org, Allaboutbirds.org, and NYSDEC SWAP.

5 "Source of Potential Presence" refers to the source of information indication the potential presence of the species at the Project Area:

A: Species identified by NYNHP as occurring within 10 miles of the Project Area.

B: Species identified by United States Fish and Wildlife Services (USFWS) online database, Information for Planning and Consulting (IPaC).

C: Species identified in the USGS Breeding Bird Survey.

D: Species identified in the NYS BBA.

E: Species identified in the Audubon Christmas Bird Count (CBC).

F: Species identified in eBird.

Table 2. Grassland Bird Species Occurrence Records for Study Project Counties (A-M)

Species	Last Year Observed in County[4]															
	Allegany	Broome	Cattaraugus	Cayuga	Chemung	Chenango	Cortland	Delaware	Erie	Genesee	Herkimer	Jefferson	Lewis	Livingston	Madison	Monroe
American Kestrel[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2019	2020	2020	2020
Bald Eagle[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Bobolink[1]	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
Common Barn Owl[2]		1966	1992		No Date			2002	No Date		1964					No Date
Eastern Meadowlark[1]	2019	2020	2020	2020	2020	2019	2020	2019	2020	2020	2020	2020	2019	2020	2019	2020
Golden-winged Warbler[1]	2019	2016	2017	2015	2015	2019	2019	2016	2019	2016		2019	2016	2018	2013	2019
Grasshopper Sparrow[1]	2019	2018	2018	2019	2018	2016	2015	2019	2019	2019	2019	2019	2017	2019	2019	2019
Henslow's Sparrow[2]	2003	1982	2000	2001	2001	2000	Recent	2014	2006	2001	2010	2019	Recent	2018	Recent	2018
Horned Lark[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Northern Harrier[1]	2020	2020	2020	2020	2020	2020	2019	2020	2020	2020	2020	2020	2019	2020	2020	2020
Prairie Warbler[1]	2019	2019	2019	2019	2019	2019	2019	2019	2019		2018	2019	2014	2019	2019	2019
Ring-necked Pheasant[1]	2020	2020	2020	2020	2020	2019	2019	2019	2019	2020	2020	2020	2017	2020	2020	2020
Savannah Sparrow[1]	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2020	2019	2020
Sedge Wren[2]			2019	2019		Historic			2016	2018	2000-2005	2019	2000-2005	2000-2005	1985	2019
Short-eared Owl[1]	2019	2009	2020	2020	2019	2003	2014	Recent	2019	2020	2020	2020	2019	2020	2019	2020
Upland Sandpiper[2]	2002	2018	2000	2018	2015		2014	2016	2019	2017	2018	2019	2017	2019	2013	2019
Vesper Sparrow[1]	2018	2019	2019	2019	2018	2019	2019	2019	2019	2019	2019	2019	2008	2019	2019	2019

1 Most recent record from eBird database.

2 Most recent record taken from either NYNHP or eBird.

3 Most recent record from NYNHP.

4 A date range of 2000-2005 indicates data retrieved from NYS BBA.

Table 3. Grassland Bird Species Occurrence Records for Study Project Counties (N-Z)

Species	Last Year Observed in County[4]														
	Niagara	Oneida	Onondaga	Ontario	Orleans	Oswego	Otsego	Schuyler	Seneca	Steuben	Tioga	Tompkins	Wayne	Wyoming	Yates
American Kestrel[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Bald Eagle[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Bobolink[1]	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019
Common Barn Owl[2]	1995		1971		2019	2012				2018		2013			
Eastern Meadowlark[1]	2020	2019	2020	2020	2020	2020	2020	2020	2020	2020	2019	2020	2020	2019	2019
Golden-winged Warbler[2]	2018	2019	2019	2010	2017	2019	2011		2019		2018	2019	2018	2017	
Grasshopper Sparrow[1]	2019	2019	2019	2019	2019	2019	2018	2019	2019	2019	2019	2019	2019	2019	2019
Henslow's Sparrow[2]	2000-2005	Recent	2017	Recent	2009	2000	2007	2000-2005	2002	2015	Recent	2016	2000-2005	2002	2002
Horned Lark[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Northern Harrier[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Prairie Warbler[1]	2014	2019	2018	2019	2019	2019	2019	2019	2019	2019	2019	2019	2019	2018	2018
Ring-necked Pheasant[1]	2020	2020	2020	2020	2020	2020	2020	2020	2020	2019	2020	2020	2020	2020	2020
Savannah Sparrow[1]	2019	2019	2019	2019	2019	2019	2019	2019	2020	2019	2019	2020	2019	2019	2019
Sedge Wren[2]	2018	Historic	2019	2019	2018	2019			2019	2014		2011	2019	Historic	1998
Short-eared Owl[1]	2018	2018	2018	2020	2020	2019		2020	2020	2019	2020	2019	2020	2017	2018
Upland Sandpiper[2]	2017	2019	2014	2005	2016	2019	2015	2016	2019	2018		2019	2010	2016	
Vesper Sparrow[1]	2018	2019	2019	2019	2019	2019	2016	2019	2019	2016	2019	2019	2019	2019	2017

1 Most recent record from eBird database

2 Most recent record taken from either NYNHP or eBird

3 Most recent record from NYNHP

4 A date range of 2000-2005 indicates data retrieved from NY BBA

Table 4. Summary of Study Projects Evaluated

NHP Project Number	Project Name	Applicant	Municipality	County	NYSDEC Region	MW	Acres	Status
20161227	Allegany County Solar Project		Amity	Allegany	9		28.8	Proposed
2013687	Houghton College Solar Array Project	Shumaker	Caneadea	Allegany	9		47.2	Constructed
2018647	Swift Hill Solar Facility	Environmental Design and Research	Rushford	Allegany	9		35.0	Proposed
2018630	Moraine Solar (EDR No. 18037)	EDF Renewables	Burns, Dansville, Ossian	Allegany, Steuben, Livingston	89	75	9804.8	Proposed
2016105	Broome County solar project	TRC	Conklin	Broome	7		47.7	Constructed
2018963	1414 Rowe Ave	Borrego Solar Systems	Portville	Cattaraugus	9	7	68.5	Proposed
2018390	4959.15 Yorkshire-Fisher PV	Crawford & Associates Engineering	Yorkshire	Cattaraugus	9		38.3	Proposed
20171266	ASP CNY WL1 – Ledyard PV Plant	LaBella Associates, DPC	Ledyard	Cayuga	7		39.3	Proposed
20171267	ASP CNY WL2 – Aurora PV Plant	2017 October 13	Ledyard	Cayuga	7		50.8	Proposed
20181439	Scipio Solar Facility at 2909 Center Road	ERM	Scipio	Cayuga	7		162.5	Proposed
	Dog Corners Solar Project	Suneast Development LLC	Ledyard	Cayuga	7		230.2	Proposed
	Garnet Solar	NEER	Conquest	Cayuga	7	200	1595.7	Proposed
2016832	Turner Solar Array	Delaware River Solar	Baldwin	Chemung	8		27.2	Constructed
20161266	Solar farm installation, 68 Callahan Road, Beaver Dams	Town of Catlin	Catlin	Chemung	8	5.3	37.9	Constructed
20161015	Delaware Snell Road	The Chazen Companies	Chemung	Chemung	8		41.5	Proposed
20161265	Solar farm installation, Breesport Road	Renovus Solar	Erin	Chemung	8		30.6	Proposed
	Erin Solar Array	Abundant Solar Power	Erin	Chemung	8	5	100.4	Proposed
20171559	Evans Property	LaBella Associates	Norwich	Chenango	7		96.3	Proposed
20181419	Bellasario Solar Project	Distributed Sun LLC	Lapeer	Cortland	7		310.5	Proposed
	Homer Solar Energy Center	EDF Renewables	Homer, Cortlandville, Solon	Cortland	7	90	8062.0	Proposed
	Wales Landfill	TM Montante Solar Developments LLC	Tonawanda	Erie	9		35.5	Proposed
	Genesee Road Solar Energy Center	EDF Renewables	East Concord, Sardinia	Erie	9	350	20520.4	Proposed
20181215	Solar array at 3235 West Main Street Road	Borrego Solar Systems, Inc.	Batavia	Genesee	8		51.5	Proposed
20181216	Solar array at 3232 West Main Street Road	Borrego Solar Systems, Inc.	Batavia	Genesee	8		94.0	Proposed

NHP Project Number	Project Name	Applicant	Municipality	County	NYSDEC Region	MW	Acres	Status
20181217	Batavia Solar Array	Borrego Solar Systems Inc.	Batavia	Genesee	8		55.5	Proposed
20161509	Seven Springs Solar, LLC - solar energy facility		Stafford	Genesee	8		128.3	Proposed
	Excelsior Energy Center	Excelsior Energy Center LLC	Byron	Genesee	8	280	3416.1	Proposed
20161154	Sugar Maple Solar	OneEnergy Renewables	Russia	Herkimer	6		160.5	Proposed
	Columbia Solar Energy Center	EDF Renewables Development Inc	Columbia, Litchfield	Herkimer	6	350	16945.7	Proposed
2017560	Solar project at 14834 Co. Rte. 59 (#16968)	LAM Development	Brownville	Jefferson	6		87.1	Proposed
2018388	4959.14 LeRay-Eddy PV	Crawford & Associates Engineering	Le Ray	Jefferson	6		42.1	Proposed
20181238	Solar farm at Evan Mills	Ingalls & Associates, LLP	Le Ray	Jefferson	6		58.5	Proposed
	Tracy Solar Energy Center	EDF Renewables	Orleans, Clayton	Jefferson	6	119	4193.1	Proposed
		ReneSola Power Holdings LLC	Clayton	Jefferson	6		138.3	Proposed
	Riverside Solar Project	Geronimo Energy	Lyme, Brownville	Jefferson	6	100	2567.6	Proposed
2018876	Solitude Solar -- Denmark -- solar development project		Denmark	Lewis	6		71.2	Proposed
2018877	Solitude Solar -- Turin -- solar development project		Turin	Lewis	6		148.3	Proposed
	VIRKLER & SON NYR ROUTE 12 SOLAR ARRAY		Martinsburg	Lewis	6		58.9	Proposed
	New Bremen Solar	Geronimo Energy	New Bremen	Lewis	6	100	5617.1	Proposed
20181230	York solar project	Geronimo Energy	York	Livingston	8		133.2	Proposed
2018633	Morris Ridge Solar (EDR No. 18037)	Environmental Design & Research	Mount Morris	Livingston	8	175	1408.5	Proposed
	White Creek Solar	Community Solar	Byron	Livingston	8	135	2598.7	Proposed
2018724	Rush and Caledonia Solar Project	Invenergy Solar Development	Caledonia, Rush	Livingston, Monroe	8	180	2818.8	Proposed
2015625	(groSolar) solar site	Twin Lantern Solar Partners LLC & Global Resource Options Inc.	Oneida	Madison	7		35.1	Proposed
	Helios-Lenox Solar Project	Helios Energy LLC, Solarpark Energy LLC	Lenox	Madison	7		79.9	Proposed
	Lenox Solar Array	Town of Lenox	Lenox	Madison	7		151.5	Proposed
20181193	Proposed solar arrays at 2668 Redman Road	Borrego Solar Systems, Inc.	Clarkson	Monroe	8		83.6	Proposed
2018226	Solar array at 3254 Roosevelt Highway	Borrego Solar Systems, Inc.	Hamlin	Monroe	8		59.1	Proposed
20161321	Flotilla 3 Solar project	OneEnergy Renewables	Hamlin	Monroe	8		97.3	Proposed

NHP Project Number	Project Name	Applicant	Municipality	County	NYSDEC Region	MW	Acres	Status
20161322	Flotilla 4 Solar project	OneEnergy Renewables	Hamlin	Monroe	8		75.1	Proposed
20171590	Solar arrays at 2645 Union Street	Borrego Solar Systems Inc,	Ogden	Monroe	8		70.5	Proposed
20171591	Solar arrays at at 2648 Union Street	Borrego Solar Systems, Inc.	Ogden	Monroe	8		87.2	Proposed
20171592	Solar arrays at 2675 Union Street	Borrego Solar Systems, Inc.	Ogden	Monroe	8		63.9	Proposed
201685	Proposed Genesee Solar PV project, 392 Curtis Road	Cypress Creek Renewables	Parma	Monroe	8		37.7	Proposed
20161192	Parma Delaware Solar	The Chazen Companies	Parma	Monroe	8		43.1	Proposed
2018594	Mumford Project	Borrego Solar Systems, Inc.	Wheatland	Monroe	8		75.0	Proposed
20161152	Oatka Solar	OneEnergy Renewables	Wheatland	Monroe	8		55.2	Proposed
2018132	Brokenstraw Solar, LLC	Cypress Creek Renewables	Rush	Monroe	8		59.8	Proposed
2016777	Swillburg 2 Solar	Richland Resources LLC	Rush	Monroe	8		100.9	Proposed
2016544	Caspian 2 Solar Project	OneEnergy Renewables	Riga	Monroe	8		46.9	Proposed
2016304	Caprock Solar Project	Helios Energy New York 3 LLC	Sweden	Monroe	8		114.5	Proposed
	Monroe Payne Beach Array D and E Site	Brydges Environmental Engineering & Energy	Greece	Monroe	8		274.8	Proposed
	Parma Community Solar	Suncommon NY Commercial Solar Assets LLC	Parma	Monroe	8		38.7	Proposed
	Monroe County Solar Project	Brydges Environmental Engineering and Energy	Penfield	Monroe	8		89.5	Constructed
	Delaware River Solar LLC Solar Energy Facility	Town of Ogden	Ogden	Monroe	8	8	85.7	Proposed
2018961	6707 Bear Ridge Road	Borrego Solar Systems Inc	Pendleton	Niagara	9		71.6	Proposed
2018225	Solar array at 2469 Lockport Road	Borrego Solar Systems Inc	Wheatfield	Niagara	9		83.2	Proposed
2018500	Bear Ridge Solar Facility	Cypress Creek Renewables	Cambria, Pendleton	Niagara	9	100	5129.7	Proposed
	Ridge View Solar Energy Center	EDF Renewables Development Inc	Hartland	Niagara	9	350	15453.5	Proposed
2014179	Proposed construction of a ground-mounted solar photvoltaic system		Whitestown	Oneida	6		69.9	Proposed
2014574	Tannery Road Landfill Solar Project	Tannery Road Solar LLC	Rome	Oneida	6		70.9	Constructed
2014575	Rome Steel Solar Project	Shumaker Consulting Engineering & Land Surveying, D.P.C.	Rome	Oneida	6		51.7	Proposed
2014946	City of Rome Lamphear Road Solar Project	Shumaker Consulting Engineering & Land Surveying, D.P.C.	Rome	Oneida	6		42.8	Constructed

NHP Project Number	Project Name	Applicant	Municipality	County	NYSDEC Region	MW	Acres	Status
2015485	Revere Copper Products Site and MVCC Site Solar Projects		Rome	Oneida	6		78.7	Constructed
	ONEIDA COUNTY SOLAR PROJECT	Oneida DG Solar LLC	Whitestown	Oneida	6		196.5	Constructed
	CAMDEN SOLAR ARRAY		Camden	Oneida	6		51.6	Constructed
			Whitestown	Oneida	6		27.2	Constructed
	Alder Creek Solar Project	Apex Clean Energy	Boonville, Forestport	Oneida	6	200	7382.3	Proposed
	Verona Solar	Invenergy LLC	Verona	Oneida	6	250	25379.8	Proposed
20171271	ASP CNY OC2 – Baldwinsville PV Plant	LaBella Associates, DPC	Lysander	Onondaga	7		45.6	Constructed
20161151	Archimedes West Solar	OneEnergy Renewables	Lysander	Onondaga	7		98.7	Proposed
20161150	Archimedes East Solar	OneEnergy Renewables	Lysander	Onondaga	7		56.2	Proposed
20161149	Sundew Solar	OneEnergy Renewables	Lysander	Onondaga	7		49.2	Proposed
2014787	5-MW solar array	NEER	Otisco	Onondaga	7		53.9	Proposed
20181045	Sky High Solar, LLC	TRC	Tully	Onondaga	7		274.9	Proposed
2016643	Potter Solar Project	TRC	Tully	Onondaga	7		54.1	Proposed
20171269	ASP CNY W4 – Van Buren PV Plant	LaBella Associates, DPC	Van Buren	Onondaga	7		60.0	Proposed
20171270	ASP CNY OC1 – Brewerton PV Plant	LaBella Associates, DPC	Cicero	Onondaga	7		32.1	Proposed
20161214	Carley Farm Solar, LLC Site (Cypress Creek Renewables)	TRC	La Fayette	Onondaga	7		82.6	Proposed
	OAK ORCHARD Wastewater Treatment Plant (WWTP)		Clay	Onondaga	7		76.7	Constructed
	Dewitt Landfill Solar Project	RER Energy Group LLC	Dewitt	Onondaga	7		48.5	Proposed
2018192	North Road Community Solar Garden	YSG Solar	Canandaigua	Ontario	8		36.1	Proposed
2015635	Wallace Farms Solar Project	United States Department of Agriculture (USDA) Rural Development	Geneva	Ontario	8		33.6	Constructed
2018161	Proposed Ground Mount Solar System		Hopewell	Ontario	8		125.8	Proposed
2016518	Driscoll Solar Project	TRC Solutions	Phelps	Ontario	8		43.8	Proposed
2014834	Proposed utility-scale solar farm at 4380 State Route 14A	OneEnergy Renewables	Seneca	Ontario	8		46.6	Constructed
2018595	Hemlock Solar Arrays	Borrego Solar Systems, Inc.	Richmond	Ontario	8		46.5	Proposed
	Canandaigua County Rd 46 Solar Design		Canadaigua	Ontario	8		26.3	Constructed
	Canandaigua Westbrook Solar Array		Canadaigua	Ontario	8		29.5	Constructed

NHP Project Number	Project Name	Applicant	Municipality	County	NYSDEC Region	MW	Acres	Status
	Large Scale Solar Array Bennet Farms Inc	T East Bloomfield	East Bloomfield	Ontario	8		194.8	Proposed
	Delaware River Solar LLC	T Farmington	Farmington	Ontario	8	7	135.4	Proposed
2018850	Solar arrays at 3962 Allis Road, Medina	MRB Group - Rochester	Ridgeway	Orleans	8	6.8	42.0	Proposed
	Orleans Solar	Community Energy Solar LLC	Barre, Shelby	Orleans	8	200	2154.1	Proposed
201846	Route 57 Solar - Schroeppel, NY	CITE Development, Engineering & Landscape Architecture, PLLC	Schroeppel	Oswego	7		90.2	Proposed
20161633	Crofoot Solar, LLC Site - ground-mounted solar system		Volney	Oswego	7		70.9	Proposed
	HOWLAND SOLAR, LLC		Sandy Creek	Oswego	7		44.1	Proposed
	SolarCity Onondaga County Clearwater Solar Site		Oswego	Oswego	7		44.7	Constructed
	SOURCE RENEWABLES RICHLAND SOLAR	Source Renewables LLC	Richland	Oswego	7		29.2	Proposed
2016761	Laurens Solar Array	NY Laurens I LLC	Laurens	Otsego	4		75.1	Proposed
	Watkins Gen Solar Energy Center	Watkins Glen Solar Energy Center LLC	Dix	Schuyler	8	50	774.7	Proposed
2018632	Suffragette Solar	EDF Renewables	Seneca Falls	Seneca	8	20	219.3	Proposed
	Trelina Solar Energy Center	Trelina Solar Energy LLC	Waterloo	Seneca	8	80	898.6	Proposed
20141222	Proposed Slingshot Solar solar PV project	OneEnergy Renewables	Wayne	Steuben	8		46.0	Proposed
20161118	Proposed solar farm installation, Spencer Road	Renovus Solar	Candor	Tioga	7		30.5	Proposed
2018794	Gaskill Road Solar Farm	Bergmann Associates	Owego	Tioga	7		160.3	Proposed
2017176	sun8 Gillis Property Solar Array Project	LaBella Associates, D.P.C.	Spencer	Tioga	7		220.1	Proposed
2017186	sun8 2150 Dryden Road Solar Array Project	Dryden-Tompkins Solar II LLC	Dryden	Tompkins	7		140.2	Proposed
2017185	sun8 Ellis Tract Solar Array Project	LaBella Associates, D.P.C.	Dryden	Tompkins	7		143.2	Proposed
20161566	Podunk Road Solar Site	NY Enfield I LLC	Enfield	Tompkins	7		25.3	Proposed
2016829	Newfield Solar Array	The Chazen Companies	Newfield	Tompkins	7		94.8	Proposed
20161503	Ground-mounted PV solar array at intersection of Millard Hill Road and Burdge Hill Road	The Chazen Companies	Newfield	Tompkins	7		30.7	Proposed
20161533	Solar array near intersection of Trumbull Corners Road and Blovsky Hill Road	The Chazen Companies	Newfield	Tompkins	7		40.0	Proposed
	Science Center Project		Ulysses	Tompkins	7		62.7	Constructed

NHP Project Number	Project Name	Applicant	Municipality	County	NYSDEC Region	MW	Acres	Status
20161510	Laidlaw Solar, LLC - solar energy facility, 4031 W. Walworth Road	Tetra Tech, Inc.	Walworth	Wayne	8		44.7	Proposed
20161511	Brickchurch Solar, LLC - solar energy facility, 8593 York Settlement Road	Sodus Town Planning Board	Sodus	Wayne	8		27.2	Proposed
	Town of Williamson Ground Mounted Solar Panels	Town of Williamson	Williamson	Wayne	8		25.6	Constructed
	Wang Community Solar Project	US Dept of Interior	Sodus	Wayne	8		139.5	Proposed
	Rosalen Solar Energy Center	EDF Renewables Development Inc.	Rose, Glaen	Wayne	8	350	24262.8	Proposed
20181395	Niagara Solar Project	Duke Energy Renewables	Bennington	Wyoming	9	20	158.8	Proposed
20181420	Silver Lake Solar Project	Tetra Tech	Castile	Wyoming	9		452.1	Proposed
	Big Tree Solar Project	ConnectGen LLC	Bennington, Sheldon	Wyoming	9	175	5830.5	Proposed
2017448	Middlesex Solar Array	LaBella Associates, D.P.C.	Middlesex	Yates	8		28.0	Proposed

Table 5. NLCD Land Cover Data for Project Area and relative to Grassland Study Area

NLCD Land Cover Class	Project Area	Grassland Study Area	Relative Percent of Project Area to GSA[1]
Barren Land (Rock/Sand/Clay)	-	27,472.5	0.00000
Cultivated Crops	710.7	2,012,929.9	0.03531
Deciduous Forest	83.0	4,182,190.6	0.00198
Developed, High Intensity	-	49,745.7	0.00000
Developed, Low Intensity	2.2	304,543.3	0.00072
Developed, Medium Intensity	-	121,736.2	0.00000
Developed, Open Space	25.3	720,936.5	0.00351
Emergent Herbaceous Wetlands	23.2	97,931.2	0.02369
Evergreen Forest	-	540,129.0	0.00000
Grassland/Herbaceous	8.2	73,011.5	0.01123
Hay/Pasture	35.6	2,322,062.9	0.00153
Mixed Forest	1.8	1,215,879.8	0.00015
Open Water	3.3	305,217.3	0.00108
Shrub/Scrub	2.5	107,241.6	0.00233
Woody Wetlands	171.4	915,470.1	0.01872
Grand Total	**1,067.2**	**12,996,498**	**0.00821**

1 Overall contribution of Project Area acres to habitat class within the Grassland Study Area

Table 6. Percent of Grassland Habitat Among Study Projects Relative to Proposed Project and Available Habitat Within Grassland Study Area

	Acres of Grassland Habitat	Total Acres	Percent of Grassland Habitat Relative to Project Area(s)	Percent of Grassland Habitat Relative to Grassland Habitat in Study Area	Percent of Grassland Habitat Relative to Total Acreage in Study Area
Project Area	43.9	1,067.3	4.1%	0.0%	0.0%
Study Projects	38,456.0	172,797.1	22.3%	1.6%	0.3%
Grassland Study Area	2,395,074.3	12,996,497.9	N/A	N/A	18.4%

Figures

Figure 1. Regional Project Location, Trelina Solar Energy Center

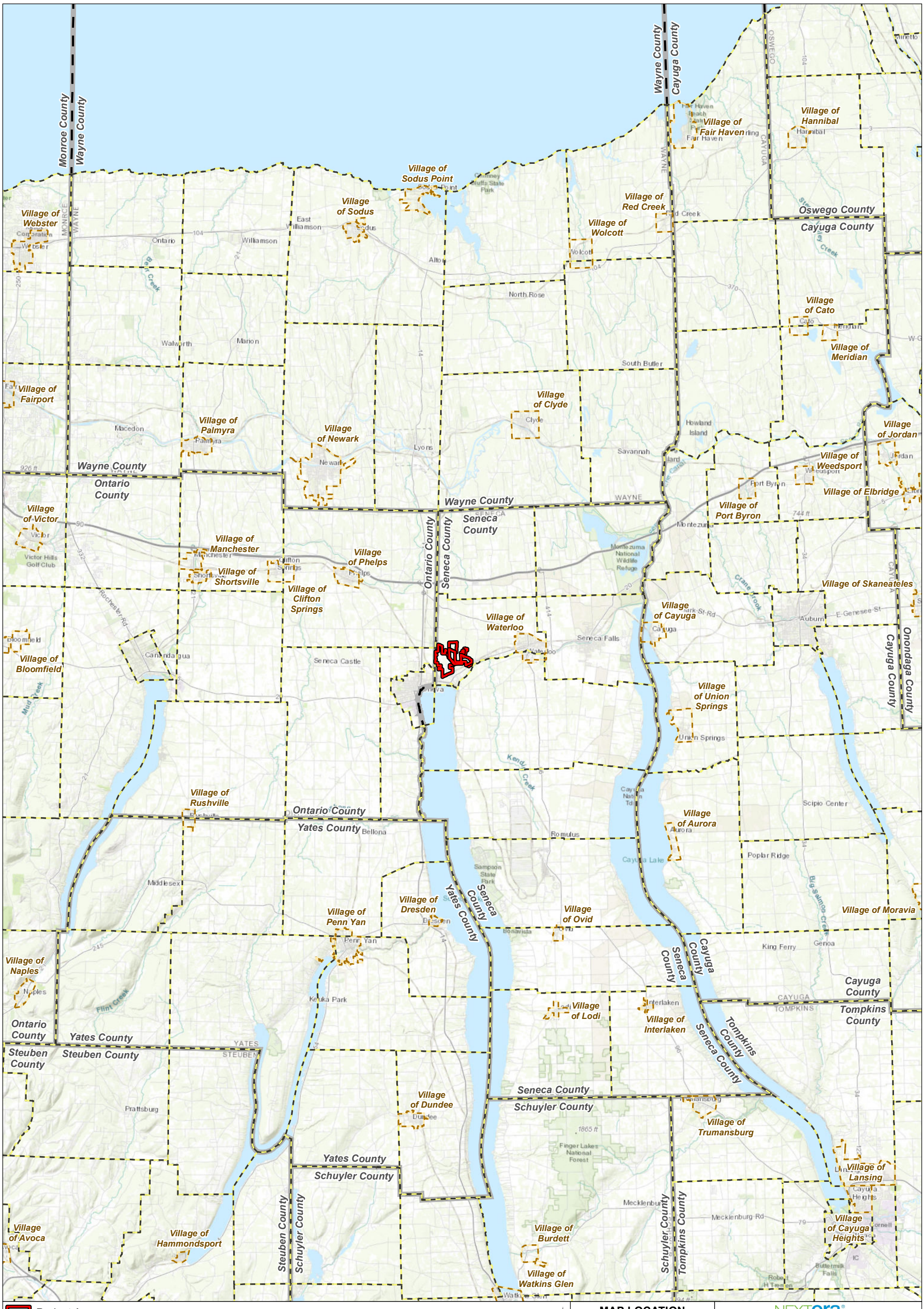

Monroe County
Wayne County
Wayne County
Cayuga County
Village of Sodus Point
Village of Sodus
Village of Webster
Village of Fair Haven
Village of Hannibal
Village of Red Creek
Village of Wolcott
Oswego County
Cayuga County
Village of Cato
Village of Meridian
Village of Fairport
Village of Clyde
Village of Palmyra
Village of Newark
Village of Jordan
Village of Weedsport
Village of Elbridge
Village of Port Byron
Wayne County
Ontario County
Seneca County
Village of Victor
Village of Manchester
Village of Shortsville
Village of Phelps
Village of Clifton Springs
Village of Skaneateles
Village of Cayuga
Village of Waterloo
Village of Bloomfield
Village of Union Springs
Village of Rushville
Ontario County
Yates County
Seneca County
Village of Aurora
Village of Dresden
Village of Penn Yan
Village of Ovid
Village of Moravia
Village of Naples
Cayuga County
Tompkins County
Village of Lodi
Village of Interlaken
Ontario County
Yates County
Steuben County
Steuben County
Seneca County
Schuyler County
Village of Dundee
Village of Trumansburg
Village of Lansing
Village of Avoca
Village of Hammondsport
Yates County
Schuyler County
Steuben County
Schuyler County
Village of Burdett
Village of Watkins Glen
Village of Cayuga Heights
Schuyler County
Tompkins County
Project Area
Village Boundary
Municipal Boundary
County Boundary
N
0
2.5
5
Miles
MAP LOCATION
New York
Data: NYS Office of Information Technology Services, GIS Program Office, 2020
Base Map: USGS/The National Map; Esri and its contributors
NEXTera ENERGY RESOURCES
REGIONAL PROJECT LOCATION
TRELINA SOLAR ENERGY CENTER
TOWN OF WATERLOO, NY
FIGURE 1-1
JULY 2020
Map Produced by TRC

Figure 2. Grassland Study Area (Mapbook with county detail)

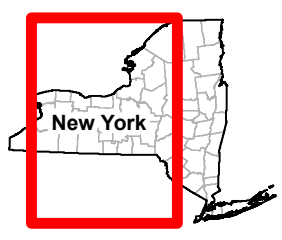
Project Area
Solar Project
County Boundary
Grassland Study Area

N

0 20 40 Miles

Data: NYS Office of Information Technology Services, GIS Program Office, 2018
Base Map: USGS/The National Map

MAP LOCATION



NEXTera ENERGY RESOURCES

GRASSLAND STUDY AREA

TRELINA
SOLAR ENERGY CENTER, LLC
TOWN OF WATERLOO, NY

FIGURE 2	MAY 2020

Map Produced by TRC

Figure 3. NLCD Project Area

Project Area
County Boundary

Land Cover Classification

Cultivated Crops
Deciduous Forest
Developed, Low Intensity
Developed, Medium Intensity
Developed, Open Space
Emergent Herbaceuous Wetlands
Hay/Pasture
Herbaceuous
Mixed Forest
Open Water
Shrub/Scrub
Woody Wetlands

N

Data: USGS National Land Cover Dataset, 2016
Base Map: NYS Office of Information Technology Services, GIS Program Office, 2018; Esri and its contributors

0 1,250 2,500 Feet

MAP LOCATION

NEXTera ENERGY RESOURCES

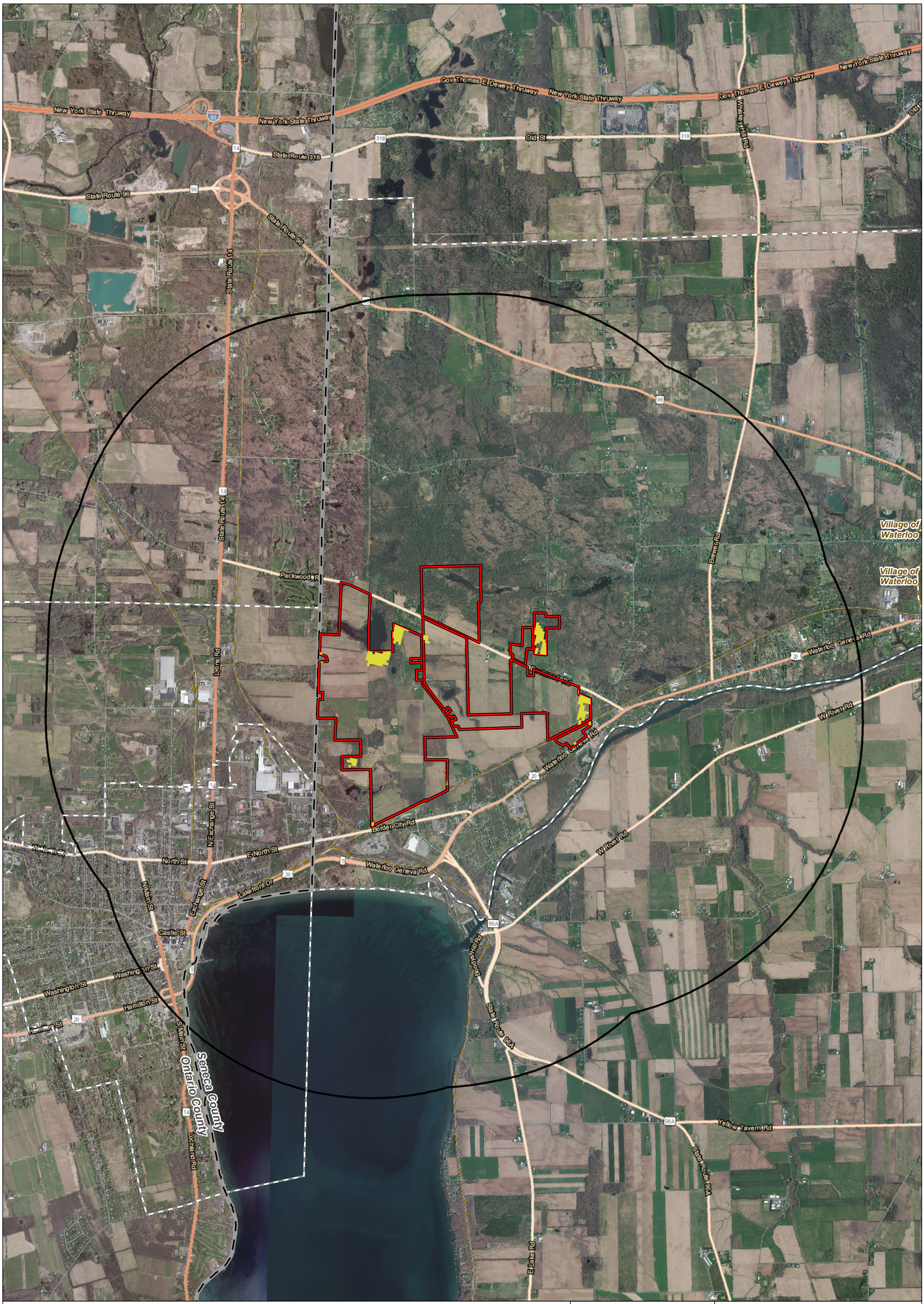
NLCD PROJECT AREA
TRELINA
SOLAR ENERGY CENTER, LLC
TOWN OF WATERLOO, NY

FIGURE 3 | MAY 2020

Map Produced by TRC

S:\1-PROJECTS\NEXTERA\NEER\5-MXD\Figures\Grassland\Trelina_Fig3_Grassland_NLCD_11x17P.mxd

Figure 4. NLCD Grassland Habitat in Project Area



Data: USGS National Land Cover Dataset, 2016
Base Map: NYS Office of Information Technology Services, GIS Program Office, 2018; Esri and its contributors

NEXTera ENERGY RESOURCES

NLCD - GRASSLAND/HERBACEOUS AND HAY/PASTURE

TRELINA SOLAR ENERGY CENTER, LLC
TOWN OF WATERLOO, NY

FIGURE 4	MAY 2020

Map Produced by TRC

S:\1-PROJECTS\NEXTERA\NEER\5-MXD\Figures\Grassland\Trelina_Fig4_Grassland_NLCD_11x17P.mxd

Figure 5. NLCD Grassland Habitat, Grassland Study Area

Project Area
County Boundary
Grassland Study Area

Land Cover Classification

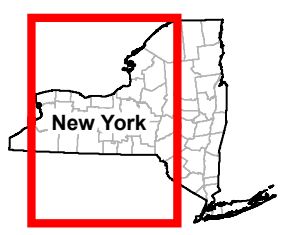
Grassland/Herbaceuous
Hay/Pasture

Data: NYS Office of Information Technology Services, GIS Program Office, 2018
Base Map: USGS/The National Map

0 20 40 Miles

N

MAP LOCATION



NEXTera ENERGY RESOURCES

NLCD - GRASSLAND/HERBACEOUS AND HAY/PASTURE

TRELINA
SOLAR ENERGY CENTER, LLC
TOWN OF WATERLOO, NY

FIGURE 5	MAY 2020

Map Produced by TRC