State-Listed Wintering Grassland Raptor

2021-2022 Survey Report

for

SunEast Flat Creek Solar

Towns of Root and Canajoharie

Montgomery County,

New York

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EXECUTIVE SUMMARY

SunEast Flat Creek Solar LLC (Applicant), a subsidiary of SunEast Development LLC (SunEast), is proposing the construction of SunEast Flat Creek Solar (Project), a 300-megawatt (MW) photovoltaic (PV) solar energy generation facility in the Towns of Root and Canajoharie, Montgomery County, New York. The Project Area at the time of the survey consisted of 4,601.2 acres, of which only a portion is anticipated to be required to construct and operate the facility.

In accordance with recommendations by the Office of Renewable Energy Siting (ORES), the New York State Department of Environmental Conservation (NYSDEC), which were provided on November 19, 2021, and on behalf of the Applicant, TRC Environmental Corporation (TRC) conducted a winter raptor survey at the proposed Project Area from November 15, 2021 through April 13, 2022 following the *NYSDEC Survey Protocol for State-listed Wintering Grassland Raptor Species* (August 2021, *Protocol*). The objective of the winter raptor surveys was to determine the presence and Project Area use of state-listed wintering grassland raptor species and particularly to assess potentially suitable habitat for the [redacted] and [redacted]

Winter raptor surveys were previously conducted within the Project Area during the 2020-2021 season in accordance with NYDEC protocol applicable at the time of survey (TRC 2021). A complete summary of the findings of the Flat Creek 2020-2021 winter raptor survey can be found in the SunEast Flat Creek Solar 2020-2021 WRS Report submitted to ORES on November 5, 2021, with associated shapefiles and flight path data submitted on November 9 and 10, 2021, respectively. Since the completion of that survey, additional land has been identified to potentially host project components.

This report only includes the results for the 2021-2022 winter raptor survey period which focused on the additional land not surveyed during the 2020-2021 survey. The current year's survey included both stationary and driving surveys throughout the Project Area in areas of potential habitat for state-listed wintering grassland raptors and was consistent with guidelines set forth in the *Protocol*. A study plan for the current year's survey was provided to ORES on November 5, 2021 with feedback received on November 19, 2021.

A total of seven stationary survey points were identified in areas of potential habitat, and a driving route consisting of 11 driving survey stops were established along public roads traversing the Project Area. A total of 136 stationary surveys and 193 driving route stops were completed over 20 survey events, amounting to a total survey effort of 213.5 stationary survey hours (12,810 minutes) and 111.75 driving survey hours (6,705 minutes) during the survey.

Throughout the current year's survey, 282 observations of 13 raptor species, unidentified *Buteo sp.*, and an unidentifiable raptor were recorded during stationary surveys, comprising a total of 1,563 use minutes. Additionally, 61 incidental raptor observations of seven species were also observed. Overall mean use of the Project Area by raptors during stationary surveys was 0.1220.

[redacted]

During the driving surveys, 116 observations of seven species, and three unidentified *Buteo sp.* were recorded. Thirty-nine incidental raptor observations of six species were also recorded during the driving surveys. [redacted] were observed most frequently during stationary surveys, accounting for 41.7% of all stationary observations. Red-tailed hawk (*Buteo jamaicensis*) was observed most frequently during driving surveys, accounting for 41.3% of all driving survey observations.

[redacted] raptor species were observed during the survey. [redacted] observations, [redacted] observations, and [redacted] observations were recorded. [redacted] were observed exhibiting both essential and non-essential behaviors, including [redacted] and fly-through. No [redacted] nests have been observed on the Project. At certain locations, both [redacted] and [redacted] were observed exhibiting essential behaviors including [redacted], and non-essential behaviors such as circling, fly-through, and perching. [redacted] r exhibited essential behaviors at [redacted] and [redacted] exhibited essential behaviors at [redacted].

Additionally, three state-listed species of special concern, [redacted] and [redacted] were observed. Other raptor species observed during the survey (e.g., red-tailed hawk) are common and widely distributed across their respective ranges. Overall, raptor use was variable throughout the survey period, with a dip in observations and use occurring between Survey Events 9 and 13. [redacted]) and [redacted] Surveys conducted to date have [redacted] and additional surveys are not recommended. The Project has sufficient data [redacted]

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ATTACHMENTS

Attachment A – State-Listed Wintering Grassland Raptor 2020-2021 Survey Report for the Flat Creek Solar Project

DIGITAL ATTACHMENTS

Attachment B – Survey Location Photographs (*provided as zipped file)*
Attachment C – Survey Data Forms (*provided as zipped file*)
Attachment D – GIS Shapefile Package (*provided as zipped file*) including:

- *Current Project Area Boundaries*
- *Stationary and Driving Survey Locations*
- *Viewshed Analysis by Survey Location*
- *T&E Observation Locations, Flight Paths, and Corresponding Behaviors*

1.0 INTRODUCTION

SunEast Flat Creek LLC (Applicant) a subsidiary of SunEast Development LLC, is proposing the construction of the SunEast Flat Creek Solar Project (Project), a 300-megawatt (MW) photovoltaic (PV) solar energy generation facility in the Towns of Root and Canajoharie, Montgomery County, New York (Figure 1). On behalf of the Applicant, TRC has prepared this State-Listed Wintering Grassland Raptor Survey Report supporting the development of this Project. This report focuses on the results of the 2021-2022 survey effort, which is supplementary to a survey performed the earlier year (2020-2021).

1.1 Project Description

The Project is located in a rural agricultural community in the Towns of Root and Canajoharie, Montgomery County, New York. Lands surrounding the Project Area are predominantly comprised of cropland (active and fallow) interspersed with successional old fields and isolated patches of northern hardwood forest. The Project Area at the time of the survey consisted of 4,601.2 acres, of which only a portion will be used for Project components. Project components may consist of tracker technology PV panels, inverters, access roads, buried electric collection lines, a collection substation, and electrical interconnection facilities.

1.2 Background Information

Multiple locations within the Project Area contain potential habitat for [redacted] known to occur in New York State, including the [redacted] and [redacted]. Potential habitat for [redacted] is located throughout the Project Area and consists of successional old fields and agricultural areas. The Project Area contains artificial perching locations (e.g., telephone poles, power line structures) and natural perches along forest edges.

Winter raptor surveys were previously conducted within the Flat Creek Project Area during the 2020-2021 season. Both [redacted] and [redacted] were observed within the Project Area. Ninety-one raptor observations were recorded during stationary surveys, with red-tailed hawks (*Buteo jamaicensis*) making up 45.1% of observations. Twenty-one raptors were observed during daytime driving surveys, with red-tailed hawks making up 38.1% of observations. A total of eleven raptor species and two unidentifiable raptors were observed during the survey period. Both stationary and driving wintering grassland raptor surveys indicated that raptor activity within Project Area was dominated by red-tailed hawks.

1.3 Purpose and Objectives

The primary purpose of the winter raptor survey was to determine the presence and Project Area use by [redacted] during the winter season, including recording particular areas used by the target species, such as roost sites or foraging areas. Based on the *New York State Department of Environmental Conservation*

(NYSDEC) Survey Protocol for State-listed Wintering Grassland Raptor Species, August 2021 (*Protocol*), target species for the survey were the [redacted]. Data was used to develop a qualitative assessment of general patterns of use by those species and other raptors identified within the vicinity of the proposed Project. Other objectives of this winter raptor survey were to document and map presence and use of the Project Area by state-listed grassland raptor species and/or any other state-listed species.

Survey protocols were consistent with the *Protocol*. TRC provided a winter raptor survey study plan to the Office of Renewable Energy Siting (ORES) and NYSDEC for review on November 5, 2021. Comments were received on the survey study plan on November 15, 2021 and are summarized Table 1 along with Applicant's responses.

Table 1. ORES Comments to the Applicant's 2021/2022 Survey Study Plan

ORES Comment	Applicant Response
…the work study plan submitted by the Applicant only proposes surveying parcels that were added to the project area boundary after completing the 2020-2021 winter raptor survey. Please be aware that 2020-2021 winter raptor survey was conducted in manner that did not adhere to recommendations provided to the Applicant after review of the work study plan by NYSDEC – e.g. sites were not surveyed every week. The Applicant may choose to expand the scope of the 2021-2022 winter raptor survey study work plan beyond that of the newly added fields in order to provide this Office with data for the entire project area that is obtained in conformance with the above noted protocol by resurveying all 2019-2020 survey locations weekly.	The Applicant performed the 2020/2021 study in accordance with the NYSDEC Protocol available at the time of that survey.
An additional evening stationary point should be added to cover the field south of stationary survey location S-1, north of Carlisle Road/Route 92. This field was not visible from stationary survey point S-1	The field in between Carlisle Road/Route 92 and S-1 is widely visible from S-1, as shown in the photographs on page 3 of this Report.
An additional evening stationary point may be warranted to cover the fields adjacent to stationary survey location S-14. Due to tree lines surrounding the field in which stationary survey location S-14 is currently proposed, it is unclear if these adjacent fields are visible from that location.	Hindered visibility was confirmed on the first survey event and Station S-14 was shifted westward to the neighboring field for all subsequent surveys. Station S-13 otherwise offered sufficient visibility of the eastern field Figure 2 shows the revised placement of S-14 and Figure 3 displays flight observations generated throughout these fields from these two locations.

ORES Comment	Applicant Response
An additional evening stationary point should be added to cover fields north of stationary survey point S-4, east and west of Hilltop Road. These fields were not visible from stationary survey point S-4.	Coverage of the fields north and east of the 2021/2022 stationary survey points S-4 and S-5 were adequately covered by stationary points S-4 and S-5 and driving points D-17 and D-18 from the previous year's (2020/2021) survey, which was performed in accordance with NYDEC protocol applicable at the time of that survey. A copy of the 2020/2021 WRS is provided as Attachment A.
An additional evening stationary point should be added to cover fields north of stationary survey point S-5, east and west of Rappa Road. These fields were not visible from stationary survey point S-5	

Information obtained from these surveys will be used to evaluate the potential for state-listed species to occur within the Project Area. During the regulatory review process, this information will be used to inform potential avoidance, minimization, and/or mitigation strategies pursuant as required by the Section 94-c regulations.

View facing North from Carlisle Road/Route 92 with a clear line of sight to stationary point S-1 (from the 2020-2021 WRS). Surveyors at this station had a broad view of the field from which this photograph was taken.

SURVEY PROTOCOL

2.1 Survey Protocol

The protocol for state-listed wintering grassland raptor surveys at the SunEast Flat Creek Solar followed the *Protocol*, supplemented with input received from ORES on November 15, 2021. Surveys included stationary survey points and a driving route survey along public roads in areas of potential habitat (Figure 2). Surveys included approximately weekly visits to each stationary and driving survey location within the November 15, 2021 to March 31, 2022 timeframe (survey period) as defined within the *Protocol*. Due to observations of [redacted] and [redacted] during late March (Survey Events 17 and 18), an additional two survey events were performed during early April (Survey Events 19 and 20). Surveys within the Project Area concluded on April 13, 2022. Each stationary survey was completed by at least a single observer. Each driving survey was completed by a least two observers.

2.1.1 Number and Timing of Surveys

Surveys were performed in the winter of 2021-2022 and were conducted during the *Protocol* recommended survey period between November 15, 2021 and March 31, 2022, with extensions to April 13, 2022 (herein considered survey period). One complete survey event encompassed stationary surveys at all stationary locations and one daytime driving survey along the driving route, conducted approximately weekly. A total of 20 survey events occurred during the survey period.

Survey dates were selected to take advantage of optimal weather during each survey event, where practicable. Whenever possible, surveys were not conducted during inclement weather that would significantly interfere with either visibility or use of sites by raptors. Inclement weather events included heavy precipitation, dense fog, or strong winds (i.e., wind speed 4 or above on Beaufort Scale).

Stationary surveys were initiated one hour before sunset and concluded when it was too dark to see flying birds, typically one-half hour after sunset, or up to one hour after sunset if conditions such as snow cover or a full moon allowed for observing flying birds after dark. This timing targeted the temporal window when overwintering raptors foraged and/or left or returned to their roosts.

The driving route survey was initiated prior to stationary surveys scheduled for the day, providing for ample time to complete the driving route and mobilize to stationary survey locations within the required timeframe.

Driving surveys followed a set route along public roads within the Project Area and completed five-minute point counts at each established point count location along the route. Where raptors were noted between intended point count locations, the driver pulled over as needed to confirm identification.

2.1.1.1 Weather Observations

Weather conditions known to influence detectability of raptor species were noted at the beginning of each survey and as conditions changed significantly throughout the survey. Other events that could disturb raptor activity (e.g., snowmobiles) were also recorded, with such occurrences summarized in Table 3. Weather parameters that were recorded included:

- wind speed (Beaufort scale);
- wind direction (compass direction from which the wind is coming);
- temperature (Fahrenheit [°F]);
- relative humidity (Percent [%]);
- barometric pressure (in Hg);
- cloud cover (%);
- visibility (miles [mi]);
- precipitation; and
- snow depth (inches [in]) and condition (i.e., powder, crust, slush).

2.1.2 Surveyor Preparedness

Biologists performing the surveys were trained and experienced with bird observation and species identification. In addition, surveyors familiarized themselves with the Project-specific study plan and the *Protocol*, survey location, and the Project Area as a whole to facilitate identification of Site-specific features that raptors may use (i.e., stacked hay bales, tree stumps, fence posts). Training also highlighted the importance of surveyor concealment next to surrounding features (i.e., a transmission tower) to lessen behavioral avoidance by wintering raptors during the stationary surveys. Biologists were outfitted with high quality binoculars with a magnification of 10x42 or better and received training on proper use and techniques.

2.1.3 Data Collection

Detailed weather and bird observation data was collected during each survey. All data was entered onto digital data forms accessed by smartphone or tablet. Any observed roost sites, foraging paths, or flight paths were recorded digitally, and appended to the digital data sheet. Data was collected for any raptor or owl species observed at the Project Area. Additionally, observations of listed non-raptor species, arctic songbirds, and winter resident grassland birds (i.e., snow buntings (*Plectrophenax nivalis*), horned larks (*Eremophila alpestris;* state-listed special concern [SC]), and Lapland longspurs (*Calcarius lapponicus*), and incidental observations were documented, if sighted. Incidental observations included species documented within the Project Area yet outside of the scheduled survey window (e.g., when walking to or from a survey location).

A viewshed analysis was conducted at all survey locations to determine which areas of open habitat were visible. Polygons depicting visible areas of open habitat are included in the shapefile package (Digital Attachment D).

A data form was completed for each survey, regardless of whether anything was observed. General information recorded on the forms included:

- client
- project name
- survey type (driving or stationary)
- survey location
- visit number
- date
- observer name(s)
- survey start and end time
- duration of survey (minutes)
- sunset time
- approximate viewshed visibility.

2.1.3.1 Individual Raptor Observations

Observations of any raptors were recorded continuously throughout each survey. When collecting data, surveyors performed continuous scanning of the habitat, both with the naked eye and with binoculars. The following data was recorded for each individual bird observed:

- species (if possible) or genera
- whether the raptor observation was an incidental sighting or not
- count of individuals
- first and last time observed
- duration of observation (rounded to the nearest minute)
- age class (if possible)
- gender (if possible)
- behavior (such as circling, fly-through, foraging, interaction, perching, and roosting)
- general compass bearing flight direction (S, SSW, NE, etc.)
- approximate flight height (in feet)
- digital map of flight path(s)/roost site(s)/etc.
- any additional notes about the observation.

In the event that a bird could not be identified to the species level, the bird was described to the greatest extent possible. For example, unidentifiable raptors were further described as "*Buteo*" versus "*Accipiter*", or "large" versus "small."

If [redacted] or [redacted] were observed, detailed behavior was documented, particularly when behavior could be indicative of roosting, in an attempt to identify potential roost locations. Potential roost sites of [redacted] and [redacted] were documented where roosting behavior was observed. Roosting behavior was identified by observing [redacted] dropping down to the ground and not taking flight again past dark, or observation of [redacted] taking flight from the ground in the evening. Additionally, any concentrated activity in an area

at or near dusk, interactions between [redacted] and [redacted], and individuals coming and going or appearing from a hedgerow, swale, tall grasses, or other protected locations were noted as potential roost locations. Locations of these sites, as well as number of individuals using a potential roost, were recorded in addition to the standard information recorded for all observations, if applicable. Additionally, perching locations and substrate were recorded for [redacted] and [redacted]. Any observed potential roost sites, foraging paths, or flight paths were documented digitally, overlain on photos of the Project Area, and then attached to the digital data form. Flight paths and potential roost locations for listed species are shown on Figure 5.

2.1.3.2 Additional and Incidental Observations

When it did not detract from the detection of target species, observations of non-raptor species and/or other animals were recorded as “Additional Observations” on the digital data form. The time of the observation and a description of the observation were recorded.

Target species (i.e., raptors) where observed outside of a regular survey period were recorded as incidental observations and appended to the stationary survey data form for the survey being conducted on the evening of the observation. During driving route surveys, individuals observed between driving stops were not considered incidental. These observations were appended to the survey data form at the next driving route stop.

A full list of documented avian species, including non-target species and those observed incidentally, is included as Appendix C.

2.1.3.3 Field Quality Assurance and Quality Control

Data forms were reviewed for completeness and accuracy prior to leaving the survey location. Any errors or inconsistencies noted were rectified at that time. Data was further reviewed and verified by quality assurance staff following each survey event. Data was analyzed concurrently with on-going field work to ensure the study plan objectives were being met by the data being collected.

2.2 Survey Site Selection

Stationary survey locations were selected based on habitat and visibility in order to effectively survey potential habitat for state-listed grassland raptors (Figure 2). Review of aerial imagery and the US Department of Agriculture (USDA) Cropland Data Layer (CDL) for potential habitat within the Project Area was used to pre-determine locations for stationary points and driving routes with consideration of site-specific topographical conditions and visual obstructions. Survey locations were established within potential habitat (e.g., grasslands and open fields; Table 2) at vantage points with clear visibility of the habitat area. Locations were situated along public rights-of-way or in participating parcels within the Project Area. Locations were established along hedgerows or forest edges or were conducted within or next to vehicles to conceal surveyors from raptors flying overhead. Locations were spaced approximately 1,000 meters apart where multiple sites were required to survey a contiguous area of unobstructed grassland habitat. Several locations

also provided views of presumed reference areas (e.g., grassland or open field habitat) not located within the proposed Project Area or area to be developed.

A total of seven stationary survey locations were selected within the Project Area in areas of potential habitat for [redacted] and/or [redacted] (Figure 2). A driving survey route was established along public roads traversing the Project Area. Short-duration point counts were conducted at pre-determined locations along the route which provided visibility of potential habitat for grassland raptors from the public road. Point-count locations were established approximately every 0.5 mile along the driving route where habitat was visible. One driving survey route consisting of 11 stops was selected along the above roadways. Routes and survey stops are depicted in Figure 2. GIS shapefiles of the survey points and driving routes/stops are included as a digital supplement via a zipped package as Digital Attachment D.

Table 2. Habitat Summary by Stationary Survey Location

Survey Location	Habitat Type
[redacted]	Corn fields, hay fields, fallow fields, shrubland, and forested hedgerows
[redacted]	Deciduous forest, fallow field, hay field
[redacted]	Hay fields, fallow fields, hedgerows
[redacted]	Deciduous forest, forested hedgerows, hay fields
[redacted]	Corn fields, hay fields, fallow fields, shrubland, deciduous forest patches, forested hedgerows
[redacted]	Deciduous forest, corn field, hay field
[redacted]	Deciduous forest, hay field

2.3 Data Entry and Analysis

2.3.1 Data Entry

Data was uploaded to the survey database after every survey was completed. Flight paths and locations for listed and target species were digitized over aerial maps of the Project and appended to data forms. Survey Data Forms are provided as Digital Attachment C in a zipped file.

2.3.2 Data Analysis

The following summaries and statistics were generated in map, table, or shapefile form as appropriate to address the objectives and goals of this survey:

- species composition
- raptor use patterns and behaviors throughout the Project Area
- suspected roost locations, if identified
- flight paths of state-listed species observed
- viewshed analyses from each survey location.

Standard statistical parameters were computed where appropriate to support the basis for any determinations.

3.0 RESULTS

3.1 Survey Effort

A total of 136 stationary surveys and 193 driving survey stops were completed over 20 survey events (Appendix A). Over the course of the survey period, a total of 13 species, plus an unidentified *Buteo sp.*, and several unidentifiable raptors were observed during stationary and driving surveys. High wind (Beaufort Scale of 4 or higher) and/or precipitation (primarily snow) were recorded during surveys on November 30, December 6, December 8, December 22, January 10, January 18, February 8, February 14, March 21 and March 29. [redacted], and [redacted], and [redacted], were recorded. Additionally, [redacted] and [redacted] were also recorded. Observations of state-listed raptor species are further described in Section 3.4. A list of all avian species documented at the Project is included as Appendix C.

Table 3. Summary of Survey Effort

Survey Event	Survey Dates	Number of Stationary Surveys Completed	Number of Stationary Survey Hours	Number of Driving Route Stops Completed	Condition(s) Affecting Detectability[1]	Raptors Observed
1	11/15/2021–11/23/2021	7	10.9	11		Yes
2	11/22/2021–11/30/2021	7	11.0	11	Snowfall during survey	Yes
3	12/6/2021–12/6/2021	7	11.1	11	Wind speed of 4 on Beaufort Scale	Yes
4	12/13/2021–12/15/2021	6	9.9	11		Yes
5	12/20/2021–12/22/2021	7	11.3	11	Wind speed of 4 on Beaufort Scale; various precipitation throughout survey	Yes
6	12/27/2021–12/29/2021	7	11.0	11	Haze/fog	Yes
7	1/3/2022–1/5/2022	7	11.1	11		Yes
8	1/10/2022–1/13/2022	7	10.8	11	Wind speed of 4 on Beaufort Scale	Yes

Survey Event	Survey Dates	Number of Stationary Surveys Completed	Number of Stationary Survey Hours	Number of Driving Route Stops Completed	Condition(s) Affecting Detectability[1]	Raptors Observed
9	1/18/2022–1/20/2022	7	11.2	7	Snowmobile; Wind speed of 4 on Beaufort Scale	Yes
10	1/24/2022–1/26/2022	7	10.7	7	Snowmobile	Yes
11	2/1/2022	4	6.3	7	Snowmobile	Yes
12	2/7/2022–2/14/2022	7	11.2	7	Snowmobile; Snowfall during survey	Yes
13	2/14/2022–2/15/2022	7	11.0	7	Wind speed of 4 on Beaufort Scale	Yes
14	2/21/2022–2/28/2022	7	10.8	10	Snowmobile	Yes
15	3/2/2022–3/11/2022	7	10.8	9	Snowmobile	Yes
16	3/8/2022–3/17/2022	7	10.8	9	Wind speed of 4 on Beaufort Scale	Yes
17	3/15/2022–3/23/2022	7	10.9	10	Wind speed of 4 on Beaufort Scale	Yes
18	3/21/2022–3/29/2022	7	10.7	10	Wind speed of 4 on Beaufort Scale	Yes
19	4/4/2022–4/5/2022	7	11.15	11		Yes
20	4/11/2022–4/13/2022	7	10.9	11		Yes
	Total	**136**	**213.6**	**193**		

[1] For further weather detail, see Appendix B

3.2 Stationary Surveys

A total of 282 observations of 13 raptor species, an unidentified *Buteo sp.,* and an unidentifiable raptor were recorded over the 213.5 hours (12,810 minutes) of surveys completed at stationary locations. Sixty-one raptor observations were also recorded incidentally to regular stationary surveys. The most observed species was the [redacted], which was recorded [redacted] during regular stationary surveys, with an additional [redacted] recorded incidentally to stationary surveys, comprising a total of [redacted] of stationary survey observations. Overall, [redacted] use minutes were recorded throughout the survey for a mean use of [redacted]. Raptor use was highest by the red-tailed hawk, which had a mean overall use of 0.0415. Table 4 summarizes the frequency and use of raptor species observed during stationary surveys. Section 3.4 summarizes observations of listed raptor species. Observations of non-raptor species and species observed incidentally to surveys are discussed in Section 3.5.

Table 4. Frequency of Raptor Observations During Stationary Surveys by Species

Species	Number of Observations[1]	Number of Incidental Observations	Percent of Total Observations[2]	Use Minutes[3]	Mean Overall Use[4]
American Kestrel	5	1	1.7	110	0.0086
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Barred Owl	1	0	0.3	1	0.0001
Black Vulture	5	6	3.2	4	0.0003
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Great Horned Owl	6	0	1.7	25	0.0020
Merlin	3	0	0.9	5	0.0004
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
Red-tailed Hawk	56	24	23.3	532	0.0415
Rough-legged Hawk	4	2	1.7	20	0.0016
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Species	Number of Observations[1]	Number of Incidental Observations	Percent of Total Observations[2]	Use Minutes[3]	Mean Overall Use[4]
Turkey Vulture	9	5	4.1	9	0.0007
Unidentified *Buteo*	5	0	1.5	38	0.0030
Unidentified Raptor	1	0	0.3	2	0.0002
Grand Total	**282**	**61**	**100.0**	**1,562**	**0.1220**

[1] Includes only observations recorded during stationary surveys

[2] Includes observations during and incidentally to stationary surveys

[3] Raptor use minutes are defined as the number of minutes raptors were observed during surveys.

[4] Mean overall use is calculated by dividing the number of use minutes by the total number of survey minutes conducted to determine a use rate.

[5] Indicates state-listed (Threatened or Endangered) species

3.2.1 Spatial and Temporal Patterns of Raptor Use

Raptors were documented from all seven stationary survey locations. Table 5 summarizes the spatial and temporal distribution of observations recorded during stationary surveys. The highest number of observations were recorded at stationary location [redacted]. Three observations of American kestrel (*Falco sparverius*), one observation of Merlin (*Falco columbarius*), [redacted] observations of [redacted], 16 observations of red-tailed hawk, [redacted] observations of [redacted], and one observation of an unidentified *Buteo sp*. were recorded at [redacted], representing [redacted] of stationary survey observations.

Observations occurred at all survey locations with raptor use most concentrated along the [redacted] boundary of the Project Area. Station [redacted] accounted for the highest number of use minutes observed with [redacted] raptor use minutes. Species richness was greatest at location [redacted], with eight species observed. Species richness was lowest at [redacted], with five species observed (Table 5).

Table 5. Raptor Observations During Stationary Surveys by Survey Location

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
[redacted]	1,926	American Kestrel	4/4/2022; 4/11/2022	Fly-through, Perching	3	1.1	80	0.0415
		Merlin	12/13/2021	Foraging, Perching	1	0.4	3	0.0016
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	12/13/2021; 1/3/2022; 2/1/2022; 2/7/2022; 2/14/2022; 3/2/2022; 3/11/2022; 3/18/2022; 3/23/2022; 4/4/2022	Calling, Fly-through, Interaction, Nesting, Perching	16	5.7	266	0.1381

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Unidentified *Buteo*	1/18/2022	Circling	1	0.4	6	0.0031
					72	**25.5**	**493**	**0.2560**
[redacted]	1,918	Great Horned Owl	1/24/2022	Perching	1	0.4	2	0.0010
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	1/3/2022; 3/11/2022	Fly-through, Perching	2	0.7	8	0.0042
		Rough-legged Hawk	3/23/2022	Fly-through, Perching	1	0.4	2	0.0010

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
					50	**17.7**	**227**	**0.1184**
[redacted]	1,810	Merlin	12/13/2021; 3/2/2022	Fly-through	2	0.7	2	0.0011
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	12/13/2021; 2/7/2022; 3/2/2022; 3/8/2022; 3/23/2022	Fly-through, Perching	5	1.8	139	0.0768

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Unidentified *Buteo*	11/17/2021; 3/17/2022	Fly-through, Perching	2	0.7	30	0.0166
					62	**22.0**	**529**	**0.2923**
[redacted]	1,765	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Barred Owl	12/29/2021	Calling	1	0.4	1	0.0006
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	12/15/2021; 12/29/2021; 1/12/2022; 1/19/2022; 3/21/2022; 3/29/2022	Circling, Fly-through, Perching	9	3.2	17	0.0096
		Rough-legged Hawk	2/15/2022	Fly-through	1	0.4	1	0.0006

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Turkey Vulture	4/5/2022	Fly-through	1	0.4	1	0.0006
		Unidentified *Buteo*	4/5/2022	Fly-through	2	0.7	2	0.0011
		Unknown Raptor	3/29/2022	Fly-through	1	0.4	2	0.0011
					35	**12.4**	**80**	**0.0453**
[redacted]	1,779	American Kestrel	4/13/2022	Fly-through; Perching	1	0.4	28	0.0157
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	11/23/2021; 12/21/2021; 1/4/2022; 2/28/2022; 3/21/2022; 3/29/2022	Calling, Fly-through, Foraging, Interaction, Perching	8	2.8	55	0.0309
		Rough-legged Hawk	1/25/2022; 3/8/2022	Circling, Fly-through, Interaction, Perching	2	0.7	17	0.0096
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
		Turkey Vulture	3/21/2022; 3/29/2022; 4/5/2022	Circling, Fly-through	4	1.4	4	0.0022
					27	**9.6**	**124**	**0.0697**
S15	1,692	Cooper's Hawk	1/26/2022	Fly-through; Perching	1	0.4	1	0.0006
		Great Horned Owl	2/28/2022	Calling, Perching	1	0.4	7	0.0041
		Red-tailed Hawk	3/11/2022	Fly-through; Perching	1	0.4	1	0.0006
		Turkey Vulture	4/4/2022	Fly-through	1	0.4	1	0.0006
					4	**1.4**	**10**	**0.0059**
[redacted]	1,920	American Kestrel	2/1/2022	Fly-through; Perching	1	0.4	2	0.0010
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Black Vulture	2/1/2022	Circling, Fly-through	5	1.8	4	0.0021
		Great Horned Owl	2/21/2022	Calling, Perching, Interaction	4	1.4	16	0.0083
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Survey Location	Observation Minutes	Species	Date(s) Observed	Behavior(s) Observed	No. Observations[2]	% Total Observations[2]	Use Minutes	Mean Overall Use
		Red-tailed Hawk	11/23/2021; 12/7/2021; 12/28/2021; 1/4/2022; 1/13/2022; 1/25/2022; 2/14/2022; 2/21/2022; 3/21/2022; 4/12/2022	Circling, Fly-through, Foraging, Hovering, Perching	15	5.3	46	0.0240
		Sharp-shinned Hawk	2/21/2022; 3/8/2022	Fly-through, Perching	2	0.7	3	0.0016
		Turkey Vulture	4/5/2022; 4/12/2022	Circling, Fly-through	3	1.1	3	0.0016
					32	**11.3**	**100**	**0.0521**
Total	**12,810**				**282**	**100.0**	**1,563**	**0.1220**

[1] [redacted]

[2] Includes only observations recorded during regular surveys

Observations were recorded during each of the 20 survey events. Raptor use documented on stationary surveys was highest during Survey Event 4 with a total of 268 use minutes across 23 observations (Figure 3). Raptor use was inconsistent throughout the survey period, with three peaks during Survey Events 1-5 and 14-16 (Figure 3). The number of observations fluctuated as well, with the greatest number of observations (n=23) recorded during Survey Event 4. Species richness peaked during Survey Event 15 with a total of six species recorded.

3.3 Daytime Driving Surveys

Driving route surveys were conducted during every survey event throughout the survey, with total observation time totaling 111.8 hours (6,705 minutes). A total of 116 raptor observations of seven species were documented during driving route surveys. Thirty-nine raptor observations were recorded incidentally to driving route surveys. Table 6 summarizes the frequency of raptor species observed during daytime driving surveys. [redacted], [redacted], [redacted], and [redacted] and [redacted], were observed during daytime driving surveys. No state species of special concern were observed during the driving surveys. Six species that were documented during stationary surveys were not recorded during daytime driving surveys, including: Barred owl (*Strix varia*), black vulture (*Coragyps atratus*), [redacted] great horned owl (*Bubo virginianus*), merlin, and sharp-shinned hawk (SC). Section 3.4 summarizes observations of state and/or federally listed species. Red-tailed hawk (41.3% of observations) and [redacted] were the most frequently observed raptors during daytime driving surveys (Table 6).

Table 6. Frequency of Raptor Observations During Daytime Driving Surveys by Species

Species	No. Observations	No. Incidental Observations	Percent of Total Observations[2]
American Kestrel	12	5	11.0
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
Red-tailed Hawk	46	18	41.3
Rough-legged Hawk	9	1	6.5
[redacted]	[redacted]	[redacted]	[redacted]
Turkey Vulture	6	5	7.1
Unknown *Buteo*	3	3	3.9
Total	**116**	**39**	**100.0**

[1] [redacted]

[2] Includes all observations recorded during daytime driving surveys

3.3.1 Spatial and Temporal Patterns of Raptor Use

Similar to patterns observed during stationary surveys, raptor observations were concentrated within the western portion of the Project Area. Figure 4 summarizes the spatial distribution of observations recorded along the driving route. Raptors were observed from all 11 driving route locations. The greatest number of observations (n=24) was recorded at driving survey location D28. Raptor observations were recorded at all driving survey locations (Figure 4). Table 7 summarizes the temporal distribution of observations recorded during driving route surveys. Raptor activity was relatively evenly distributed throughout the season, with spikes in activity recorded during Survey Events 16 (n=17) and 19 (n=15). Survey Events 9 (n=2), 14 (n=2) and 15 (n=3) were outliers with the fewest raptors observed. The highest number of raptor observations was recorded during Survey Event 16, which accounted for 11 percent of total observations during the survey period. Species richness was greatest during Survey Event 6, with five raptor species observed.

Table 7. Raptor Observations During Driving Surveys by Survey Event

Survey Event	Survey Date	Species	No. Total Observations	Location(s) Observed	Behavior(s) Observed	% Total Observations[2]
[redacted]	11/15/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	5	D24, D28	Circling	3.2
		Turkey Vulture	1	D18	Circling	0.6
			8			**5.2**
[redacted]	11/22/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	5	D18, D20, D24	Circling, Fly-through, Foraging, Perching, Interaction	3.2
		Unknown Raptor	1	D26	Fly-through	0.6
			7			**4.5**
[redacted]	12/6/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	1	D21	Circling, Perching	0.6
		Turkey Vulture	1	D21	Circling	0.6
			7			**4.5**
[redacted]	12/13/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	5	D23, D25, D26, D28	Circling, Interaction, Foraging, Interaction, Perching	3.2
		Unknown Raptor	2	D21	Fly-through	1.3
			12			**7.7**
[redacted]	12/20/2021	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	4	D24, D27, D28	Fly-through, Perching	2.6
			6			**3.9**

Survey Event	Survey Date	Species	No. Total Observations	Location(s) Observed	Behavior(s) Observed	% Total Observations[2]
[redacted]	12/28/2021	American Kestrel	1	D23	Perching	0.6
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	3	D20, D22	Fly-through, Perching	1.9
		Turkey Vulture	1	D19	Fly-through	0.6
			11			**7.1**
[redacted]	1/3/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	4	D19. D20, D24	Circling, Fly-through, Foraging, Perching	2.6
			9			**5.8**
[redacted]	1/10/2022	American Kestrel	1	D28	Fly-through	0.6
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	2	D27, D28	Circling	1.3
		Rough-legged Hawk	2	D28	Circling, Foraging, Interaction	1.3
			7			**4.5**
9	1/18/2022	Red-tailed Hawk	2	D23, D27	Fly-through, Perching	1.3
			2			**1.3**
[redacted]	1/25/2022	American Kestrel	2	D23	Fly-through, Perching	1.3
		Red-tailed Hawk	4	D21, D27, D28	Circling, Fly-through, Foraging, Perching	2.6
		Rough-legged Hawk	1	D23	Circling	0.6
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
			8			**5.2**
[redacted]	2/1/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	3	D21, D28	Fly-through, Perching	1.9

Survey Event	Survey Date	Species	No. Total Observations	Location(s) Observed	Behavior(s) Observed	% Total Observations[2]
		Rough-legged Hawk	2	D21, D22	Fly-through, Foraging, Perching	1.3
			6			**3.9**
[redacted]	2/8/2022	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	7	D20, D23, D26, D28	Circling, Fly-through, Foraging, Perching	4.5
			8			**5.2**
13	2/15/2022	Red-tailed Hawk	7	D20, D26, D28	Circling, Fly-through, Perching	4.5
		Rough-legged Hawk	1	D23	Foraging, Perching	0.6
			8			**5.2**
14	2/22/2022	Red-tailed Hawk	1	D23	Fly-through	0.6
		Turkey Vulture	1	D19	Circling	0.6
			2			**1.3**
15	3/2/2022	Red-tailed Hawk	2	D28	Perching	1.3
		Unknown *Buteo*	1	D24	Perching	0.6
			3			**1.9**
[redacted]	3/8/2022	American Kestrel	3	D26, D27	Fly-through, Perching	1.9
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	4	D20, D21, D23, D24	Fly-through, Perching	2.6
		Rough-legged Hawk	4	D21, D24, D25	Circling, Fly-through, Perching	2.6
		Unknown *Buteo*	2	D26	Circling	1.3
			17			**11.0**
[redacted]	3/15/2022	American Kestrel	1	D27	Fly-through, Perching	0.6
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	3	D19, D20	Fly-through, Perching	1.9
			6			**3.9**
[redacted]	3/23/2022	American Kestrel	2	D24, D25, D27	Fly-through, Foraging, Perching	1.3

Survey Event	Survey Date	Species	No. Total Observations	Location(s) Observed	Behavior(s) Observed	% Total Observations[2]
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
			6			**3.9**
[redacted]	4/5/2022	American Kestrel	6	D24, D25, D27	Circling, Perching, Fly-through, Foraging	3.9
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Red-tailed Hawk	2	D21, D23	Circling	1.3
		Turkey Vulture	3	D23, D27	Circling	1.9
			15			**9.7**
[redacted]	4/12/2022	American Kestrel	1	D21	Foraging	0.6
		[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
		Turkey Vulture	4	D23, D28	Circling, Fly-through	2.6
			7			**4.5**
		Grand Total	**155**			**100**

[1] [redacted]

[2] Includes all observations during and incidentally to driving surveys

3.4 Project Area Use by State-Listed Species

A total of [redacted] observations of [redacted] and [redacted] were recorded during the current year's survey period, for a total of [redacted] use minutes. Observations were [redacted] the Project Area but were concentrated at [redacted]

A total of [redacted] observations occurred during winter raptor surveys at the Project Area with an additional [redacted] recorded incidentally to surveys. [redacted] was observed for a total of [redacted] use minutes at [redacted]. [redacted] were observed at [redacted] daytime driving survey locations. This species was recorded [redacted] within the Project Area. [redacted] were observed for a total of [redacted] use minutes at [redacted] stationary locations and [redacted] daytime driving survey location. [redacted] were observed for a total of [redacted] use minutes at [redacted] stationary survey locations and [redacted] driving survey locations. [redacted] were only observed at [redacted] stationary location for [redacted] use minute, and [redacted] were observed [redacted] at [redacted] stationary survey location for [redacted] use minutes. Additionally, [redacted] observations of [redacted] were recorded [redacted] stationary locations [redacted] and [redacted]. Table 8 summarizes observations of state-listed species. Activity for [redacted] was observed throughout the Project Area. [redacted] activity was concentrated in the [redacted] portion of the Project Area around locations [redacted] and [redacted]. [redacted] activity, in contrast, was concentrated in the [redacted] portion of the Project around locations [redacted], and [redacted]. Activity for [redacted], [redacted], and [redacted] did not exhibit any locational concentrations as they were only observed [redacted]

[redacted] observation included behaviors that potentially indicate a [redacted] in the vicinity of [redacted] and [redacted] for [redacted]. Multiple individuals were recorded coming to and from this area approaching last light. [redacted] were observed [redacted] throughout a field before [redacted] together. After [redacted], [redacted] – [redacted]. [redacted] was recorded for [redacted] at locations [redacted] and [redacted]. At [redacted], a [redacted] was observed [redacted] and [redacted]. At [redacted], [redacted] were observed [redacted] were observed [redacted] during the survey. Figure 5 depicts the [redacted] and [redacted]. No breeding behavior was observed within the Project Area for state-listed winter raptors.

Flight paths documented for listed species observed during surveys are shown in Figure 5. No [redacted] were documented, however [redacted], as described above, was observed at survey location [redacted] for [redacted] as well as [redacted] and [redacted] for [redacted]. GIS shapefiles of winter raptor survey stationary points and driving routes/stops, state-listed and special concern species observations, and the Project Area are included as Digital Attachment D, a compressed file.

[redacted] *Observations*

A total of [redacted] observations of [redacted] were recorded throughout the survey period. [redacted] incidental observations of [redacted] were reported. Survey location [redacted] had [redacted] observations, [redacted] had [redacted] observations, [redacted] had [redacted] observations, [redacted] had [redacted] observations, [redacted] had [redacted] observations, and [redacted] had [redacted] observation. [redacted] observations spanned the entire survey season with the first observation (location [redacted]) occurring during Survey Event 1 (November 15, 2021), and the last observation (location [redacted]) occurring during Survey Event 20 (April 11, 2022). Observations of [redacted] were also ubiquitous throughout the Project area with [redacted] recorded at [redacted] stationary locations and [redacted] daytime driving survey locations. Observed behaviors included [redacted].

[redacted] observation of [redacted] at [redacted] was categorized as [redacted] (Figure 5). [redacted] were observed [redacted]. [redacted] – [redacted]. Habitat adjacent to [redacted] is comprised of a mix of hayfields, fallow fields, and hedgerows. The landscape contains large areas of contiguous open habitat bordered by shrubby or wooded hedgerows, as well as a large forest patch to the southeast.

[redacted] *Observations*

A total of [redacted] observations of [redacted] were recorded between stationary surveys daytime driving surveys. [redacted] incidental observations of [redacted] were reported. Observations occurred at survey locations [redacted] and [redacted] (Figure 5). Survey location [redacted] had [redacted] observations, [redacted] and [redacted] had [redacted] observations each, [redacted] had [redacted] observations, [redacted] and [redacted] had [redacted] observation each. [redacted] observations spanned the entire survey season with the first observation (location [redacted] occurring during Survey Event 2 (November 22, 2021) and the last observation (location [redacted] and [redacted]) occurring during Survey Event 20 (April 11, 2022).

[redacted] observations of [redacted] were categorized as [redacted] (Figure 5). These observations occurred at [redacted] and [redacted]. At [redacted], [redacted] [redacted] were observed [redacted]; [redacted] were observed [redacted] during the survey. The [redacted] was [redacted]. Habitat adjacent to [redacted] is comprised of a mix of deciduous forest, fallow field, and hay field. Habitat adjacent to [redacted] is comprised of a mix of hay fields, fallow fields, and hedgerows.

[redacted] *Observations*

A total of [redacted] observations of [redacted] were recorded during stationary surveys and [redacted] observation was recorded during driving surveys. Observations were concentrated in the [redacted] of the Project Area around locations [redacted], and [redacted] (Figure 5). The first observation (location [redacted]) occurred on December 13, 2021, with the last observations (location [redacted]) occurring on February 14, 2022. [redacted] observations were recorded from December

through February. [redacted] observations were classified as [redacted] or [redacted] behavior. The [redacted] observed at [redacted] involved the [redacted] being [redacted] a red-tailed hawk and the [redacted] observed at [redacted] involved the [redacted] being mobbed by a group of crows. No observations involved more than [redacted] No [redacted] nests were identified during the surveys.

[redacted] *Observations*

[redacted] [redacted] was recorded during the stationary surveys at location [redacted], and [redacted] observations were made during the daytime driving survey. The observation occurred on January 26, 2022. The observation from [redacted] involved [redacted] and [redacted] [redacted].

[redacted] *Observations*

[redacted] [redacted] were recorded at [redacted] on February 21, 2022 and March 8, 2022. The individuals were observed [redacted] and [redacted] around [redacted].

[redacted] *Observations*

[redacted] observations were recorded throughout the survey season. [redacted] observations were observed at [redacted] on December 14, 2021 and March 29, 2022; [redacted] observation was made at [redacted] on February 15, 2022. The surveyor reported observing [redacted] in each observation. [redacted].

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Table 8. Observations of State-listed Species

Species	Listing Status[1]	No. Observations[2]	No. Incidental Observations[3]	Survey Location(s) Observed	No. Use Minutes[4]	Potential Roosting Behavior Recorded (Locations)	Potential Breeding Behavior Recorded (Locations)
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

1 [redacted]

2 Includes only non-incidental observations to all surveys.

3 Includes only observations recorded incidentally to all surveys.

4 Calculated using only observations recorded during stationary surveys.

3.5 Incidental Observations

Incidental observations of raptor species included six American kestrel, [redacted], six black vulture, [redacted], 42 red tailed hawk, three rough-legged hawk, [redacted], five turkey vulture, and three unidentifiable buteo observations. Incidental observations of raptor and non-raptor species are not included in reported results of use minutes or mean overall use.

Non-raptor species recorded during surveys included common species such as the American tree sparrow (*Spizella arborea*), mourning dove (*Zenaida macroura*), ring-necked pheasant (*Phasianus colchicus*), and wild turkey (*Meleagris gallopavo*). Snow bunting were observed within the Project Area at survey location S15 on February 15, 2022. Observations include both those documented during scheduled surveys and incidentally while observers were present within the Project Area. A list of all avian species observed is provided as Appendix C.

4.0 CONCLUSIONS

A total of 213.5 hours of stationary surveys and 111.8 hours of driving surveys were completed over 20 survey events during the winter raptor survey implemented at the Project. During stationary surveys, 282 observations of 13 species, 61 incidental raptor observations, five unidentified *Buteo sp.*, and an unidentifiable raptor were recorded. An additional 116 observations of seven raptor species, 39 incidental raptor observations, and an unidentifiable *Buteo sp.* were recorded during daytime driving surveys. Both stationary and driving wintering grassland raptor surveys indicated that the Project Area is commonly used during winter months by [redacted] with observations [redacted] the Project Area, and with the highest concentrations at [redacted] in the [redacted] of the Project Area.

[redacted] were observed during the survey period, including [redacted]. Additionally, [redacted] and [redacted] were observed. [redacted] were observed throughout the Project Area and observed during each Survey Event. [redacted]. The other locations where [redacted] was observed [redacted] were associated with [redacted] and [redacted] behaviors. [redacted] were observed at [redacted], [redacted] in the [redacted] portion of the Project Area with all activity recorded from December to February. No [redacted] nests were observed. [redacted] were observed [redacted] at locations [redacted] and [redacted]. Although a [redacted] was [redacted] located, [redacted] observations of [redacted] were recorded at [redacted] and [redacted]. Otherwise, the behaviors observed were [redacted] and [redacted].

5.0 REFERENCES

NYSDEC. 2021. New York State Department of Environmental Conservation Survey Protocol for State -listed Wintering Grassland Raptor Species August 2021.

TRC. 2021. State-listed Wintering Grassland Raptor Survey Report for the Flat Creek Solar Project 2020-2021

FIGURES

FIGURE 1

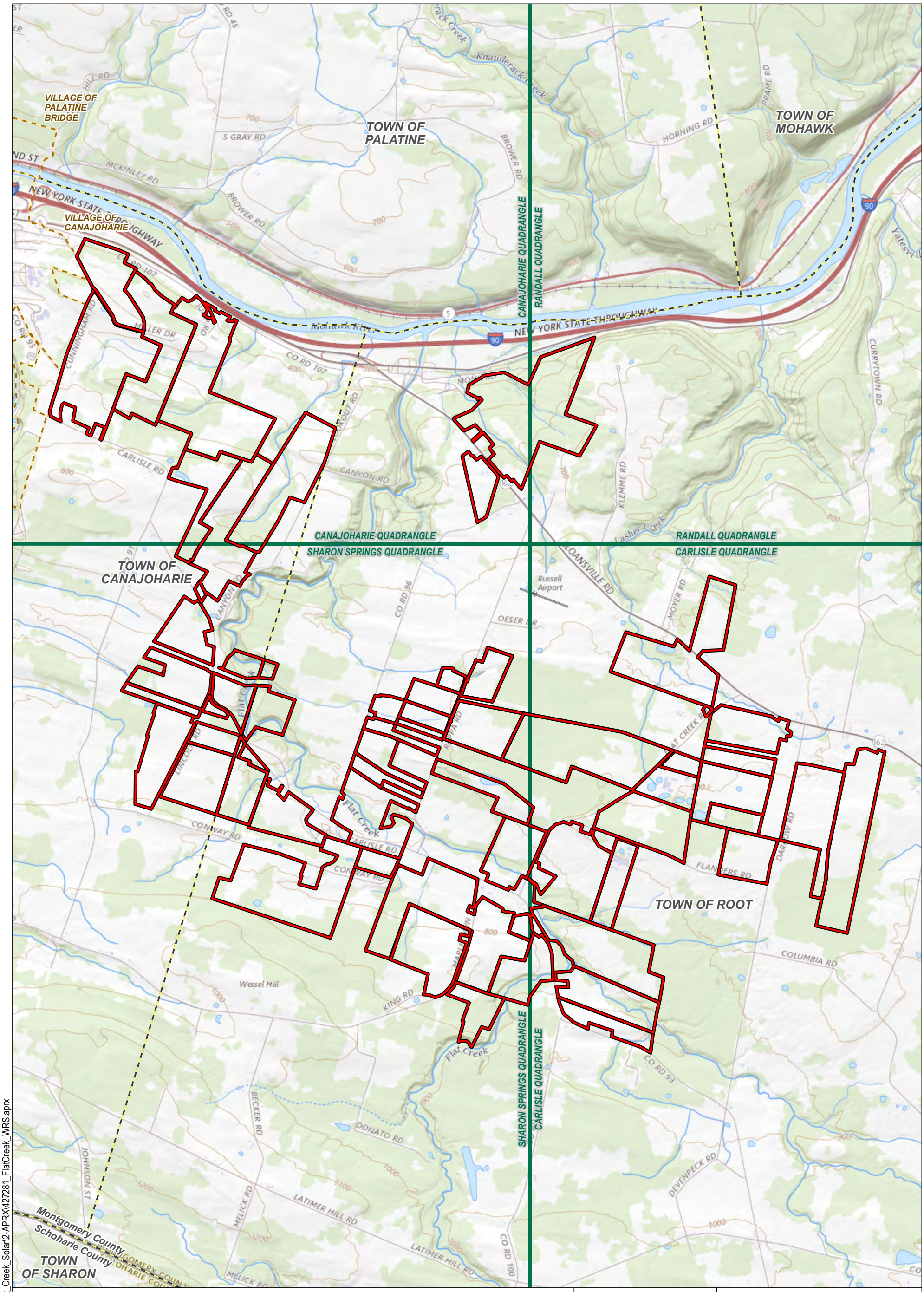
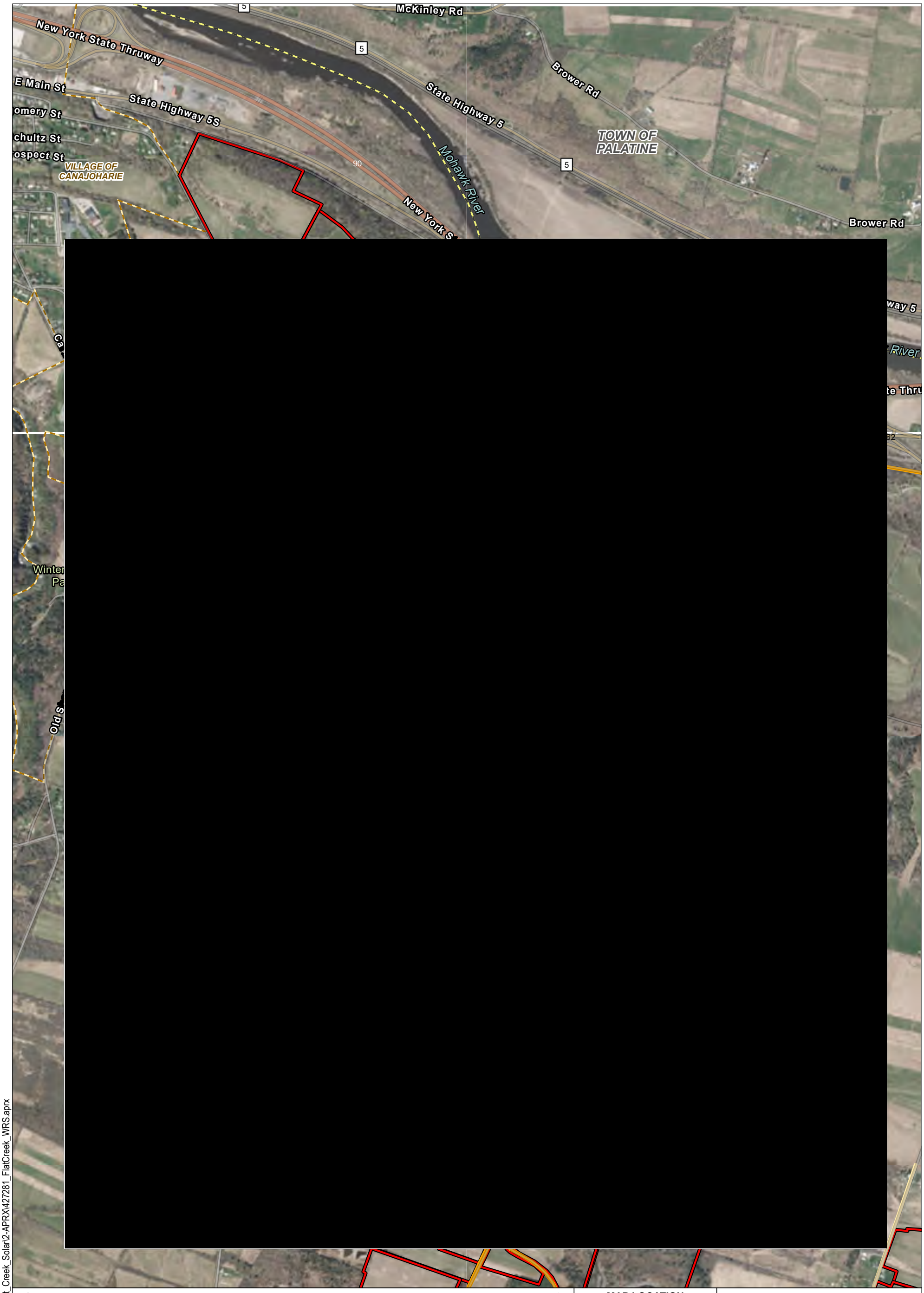

VILLAGE OF PALATINE BRIDGE
TOWN OF PALATINE
TOWN OF MOHAWK
VILLAGE OF CANAJOHARIE
CANAJOHARIE QUADRANGLE
RANDALL QUADRANGLE
SHARON SPRINGS QUADRANGLE
CARLISLE QUADRANGLE
TOWN OF CANAJOHARIE
TOWN OF ROOT
TOWN OF SHARON
Montgomery County
Schoharie County
NEW YORK STATE THROUGHWAY
Mohawk River
Flat Creek
Knauderack Creek
Lasher Creek
Russell Airport
Wessel Hill
MCKINLEY RD
S GRAY RD
BROWER RD
HORNING RD
PRAME RD
CO RD 107
MILLER DR
CUNNINGHAM RD
CARLISLE RD
CANYON RD
CO RD 96
OESER DR
SLOANSVILLE RD
MOYER RD
CURRYTOWN RD
KLEMME RD
CONWAY RD
FLANDERS RD
DARROW RD
COLUMBIA RD
KING RD
BECKER RD
DONATO RD
LATIMER HILL RD
MELICK RD
JOHNSON ST
DEVENPECK RD
CO RD 100
CO RD 93
PROJECT SURVEY AREA
USGS 24K QUAD BOUNDARY
VILLAGE BOUNDARY
MUNICIPAL BOUNDARY
COUNTY BOUNDARY
N
0
3,000
6,000
FEET
MAP LOCATION
NEW YORK
PROJECT LOCATION
SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY
FIGURE 1
MAY 2022
MAP PRODUCED BY TRC
DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021
T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

FIGURE 2



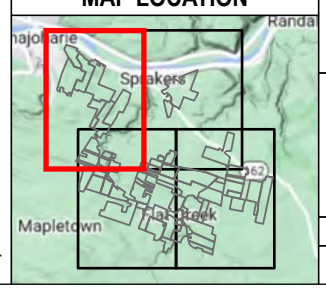
2021-2022 DRIVING SURVEY LOCATIONS
2021-2022 STATIONARY SURVEY LOCATIONS
2021-2022 DRIVING ROUTE
2020-2021 DRIVING ROUTE
PROJECT SURVEY AREA
VILLAGE BOUNDARY
MUNICIPAL BOUNDARY
COUNTY BOUNDARY

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



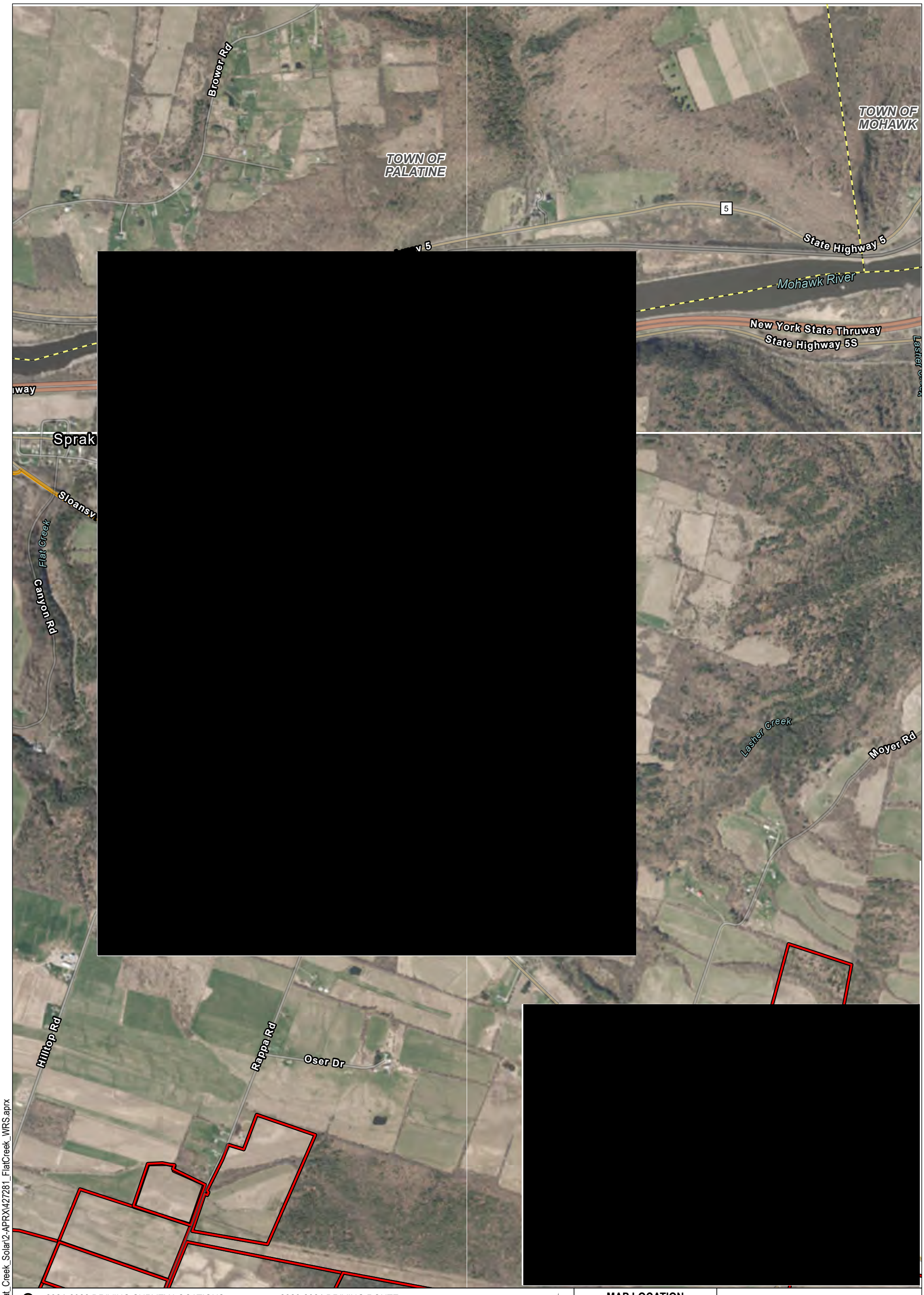
WINTER RAPTOR SURVEY LOCATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 2 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

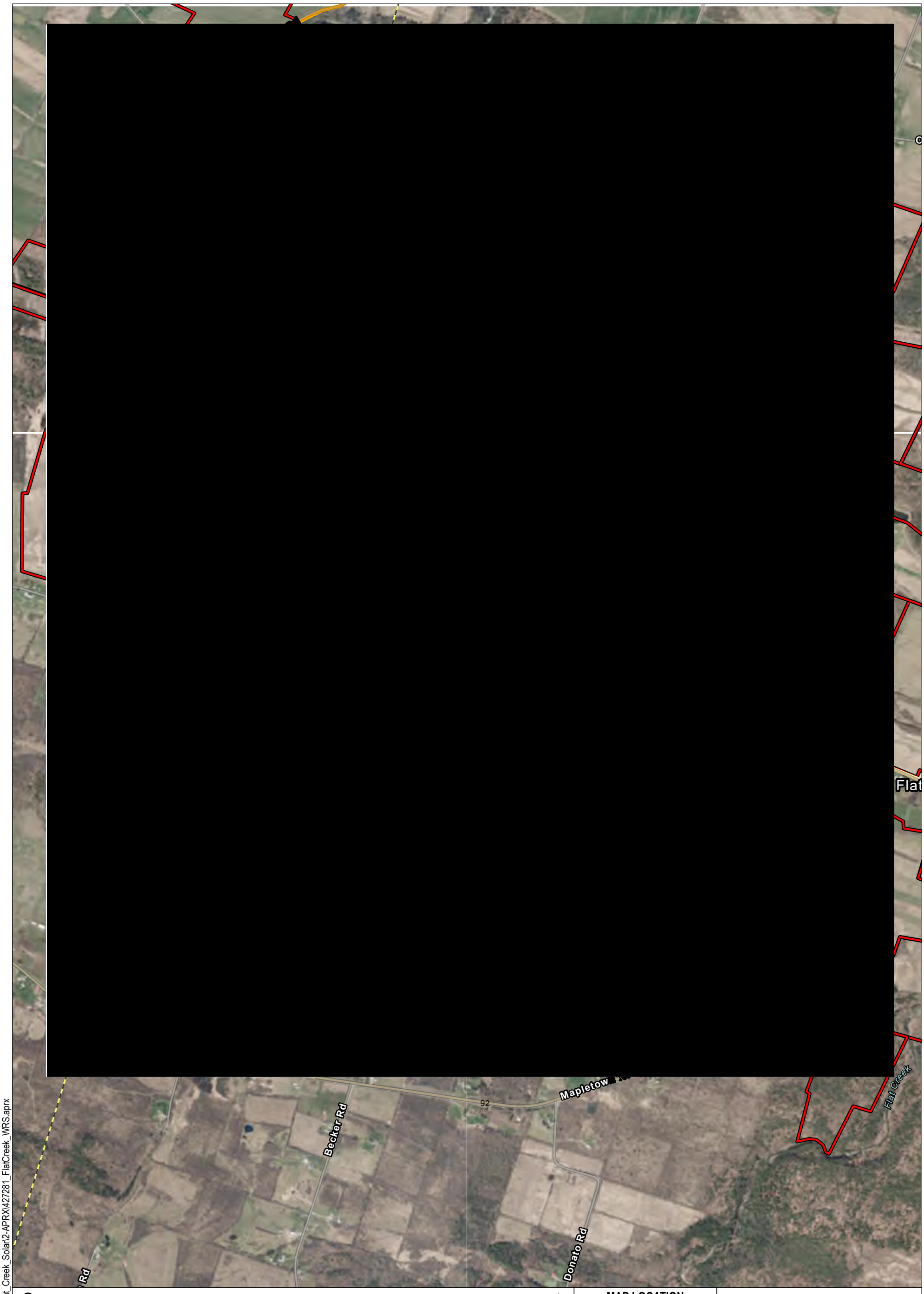


WINTER RAPTOR SURVEY LOCATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 2 | MAY 2022

MAP PRODUCED BY TRC



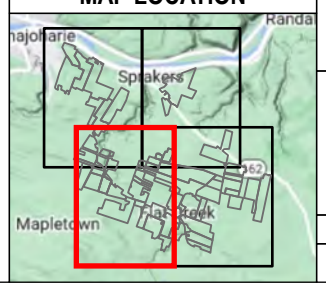
2021-2022 DRIVING SURVEY LOCATIONS
2021-2022 STATIONARY SURVEY LOCATIONS
2021-2022 DRIVING ROUTE
2020-2021 DRIVING SURVEY LOCATIONS
2020-2021 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING ROUTE
PROJECT SURVEY AREA
MUNICIPAL BOUNDARY
COUNTY BOUNDARY

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



SUNEAST DEVELOPMENT

WINTER RAPTOR SURVEY LOCATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 2	MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

[redacted]

93

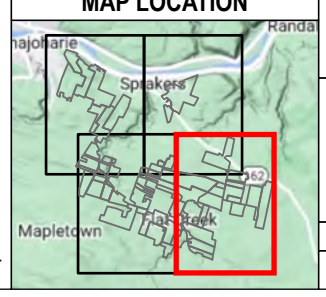
2021-2022 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING SURVEY LOCATIONS
2020-2021 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING ROUTE
PROJECT SURVEY AREA
MUNICIPAL BOUNDARY
COUNTY BOUNDARY

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



SUNEAST DEVELOPMENT

WINTER RAPTOR SURVEY LOCATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 2 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

FIGURE 3

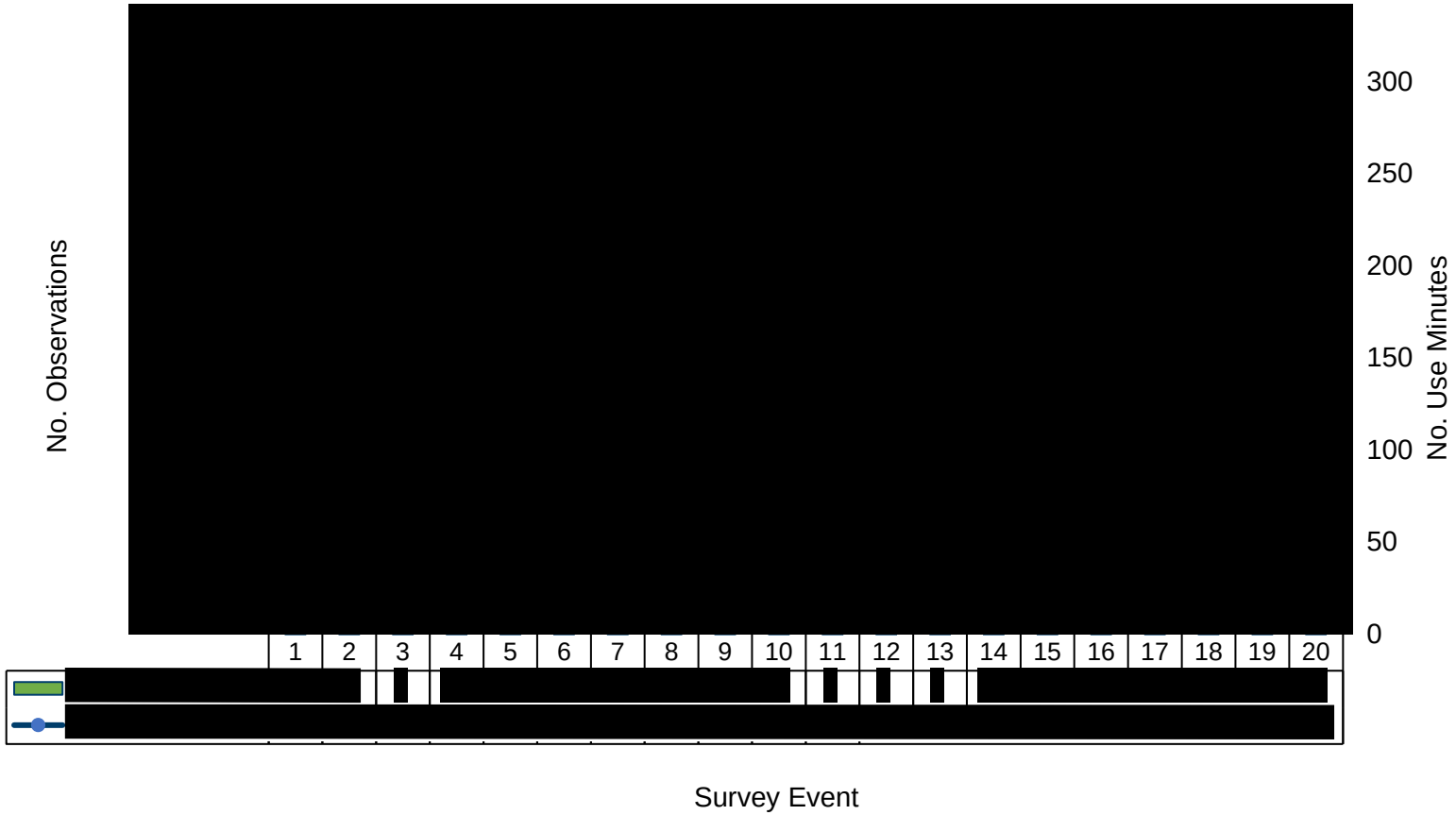


Figure 3. Number of Observations and Raptor Use by Survey Event for Stationary Surveys

FIGURE 4

PROJECT SURVEY AREA
VILLAGE BOUNDARY
MUNICIPAL BOUNDARY
COUNTY BOUNDARY
2021-2022 DRIVING ROUTE

OBSERVATIONS
6

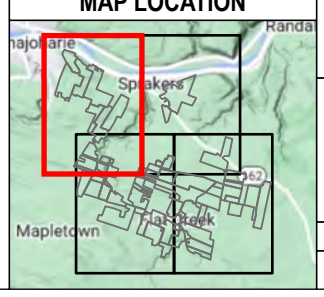
7 - 9
10 - 13
14 - 17
18 - 24

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

0 1,000 2,000 FEET

N

MAP LOCATION



SUNEAST DEVELOPMENT

DISTRIBUTION AND FREQUENCY OF RAPTOR OBSERVATIONS DURING DAYTIME DRIVING SURVEYS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 4 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

[redacted]

[redacted]

[redacted]

Brower Rd
TOWN OF PALATINE
TOWN OF MOHAWK
5
State Highway 5
State Highway 5
Mohawk River
New York State Thruway
State Highway 5S
Sprakers
Sloansville Rd
Flat Creek
Canyon Rd
Lasher Creek
Moyer Rd
Hilltop Rd
Rappa Rd
Oser Dr

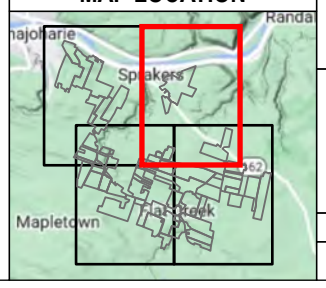
PROJECT SURVEY AREA
MUNICIPAL BOUNDARY
COUNTY BOUNDARY
2021-2022 DRIVING ROUTE
OBSERVATIONS
6
7 - 9
10 - 13
14 - 17
18 - 24

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

N

0 1,000 2,000 FEET

MAP LOCATION



SUNEAST DEVELOPMENT

DISTRIBUTION AND FREQUENCY OF RAPTOR OBSERVATIONS DURING DAYTIME DRIVING SURVEYS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 4 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

[redacted]

Mapletown Rd
92
Becker Rd
King Rd
Donato Rd
Flat Creek

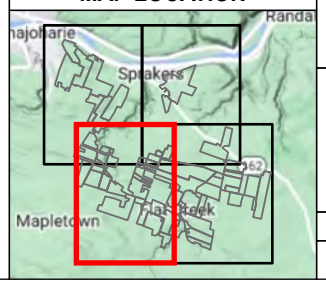
PROJECT SURVEY AREA
MUNICIPAL BOUNDARY
COUNTY BOUNDARY
2021-2022 DRIVING ROUTE
OBSERVATIONS
6
7 - 9
10 - 13
14 - 17
18 - 24

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



SUNEAST DEVELOPMENT

DISTRIBUTION AND FREQUENCY OF RAPTOR OBSERVATIONS DURING DAYTIME DRIVING SURVEYS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 4 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

[redacted]

PROJECT SURVEY AREA
MUNICIPAL BOUNDARY
COUNTY BOUNDARY
2021-2022 DRIVING ROUTE

OBSERVATIONS
6

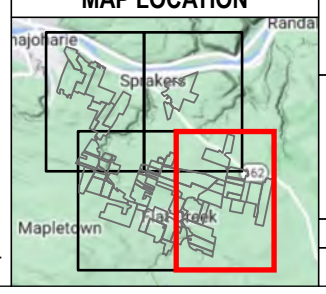
7 - 9
10 - 13
14 - 17
18 - 24

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



SUNEAST DEVELOPMENT

DISTRIBUTION AND FREQUENCY OF RAPTOR OBSERVATIONS DURING DAYTIME DRIVING SURVEYS

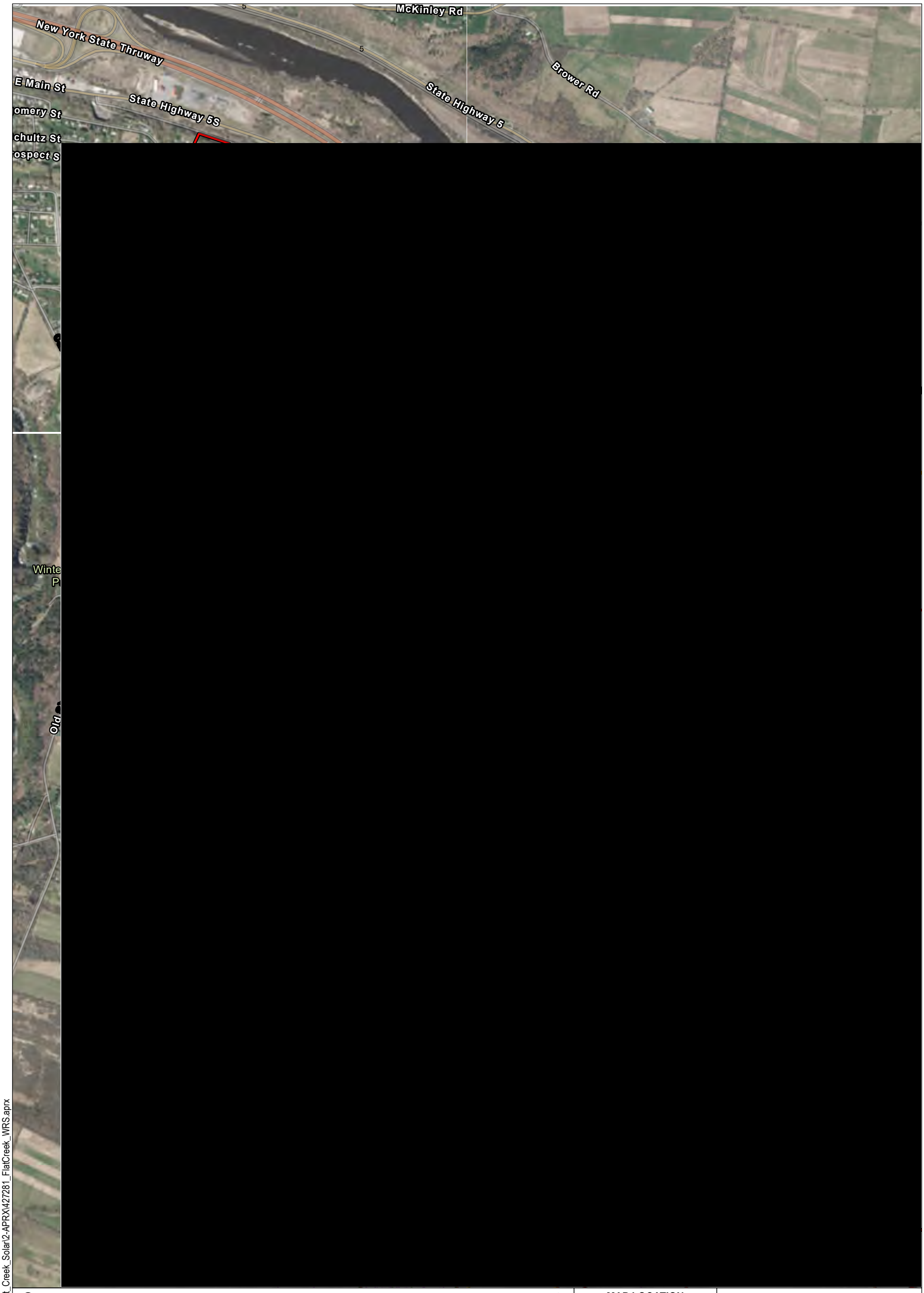
SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 4 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

FIGURE 5



DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

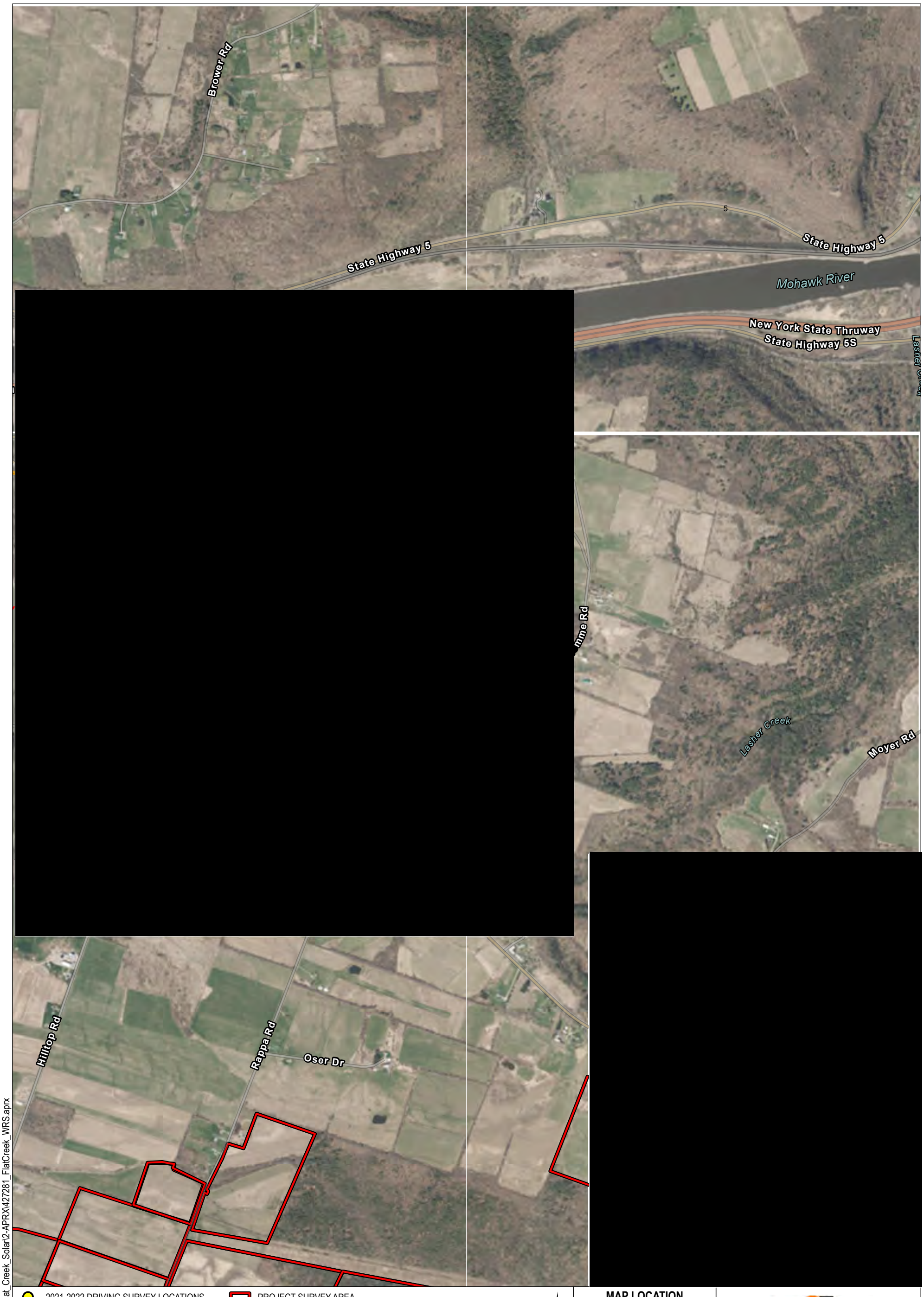
LISTED SPECIES OBSERVATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 5	MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx



2021-2022 DRIVING SURVEY LOCATIONS
2021-2022 STATIONARY SURVEY LOCATIONS
2021-2022 DRIVING ROUTE
2020-2021 DRIVING SURVEY LOCATIONS
2020-2021 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING ROUTE

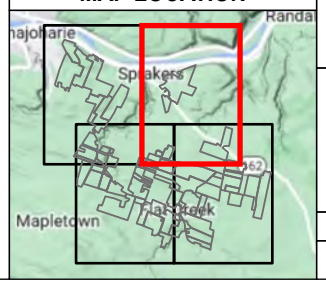
PROJECT SURVEY AREA
FLIGHT PATHS
[redacted]

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



SUNEAST DEVELOPMENT

LISTED SPECIES OBSERVATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 5 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

[redacted]

Donato Rd

2021-2022 DRIVING SURVEY LOCATIONS
2021-2022 STATIONARY SURVEY LOCATIONS
2021-2022 DRIVING ROUTE
2020-2021 DRIVING SURVEY LOCATIONS
2020-2021 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING ROUTE
[redacted]

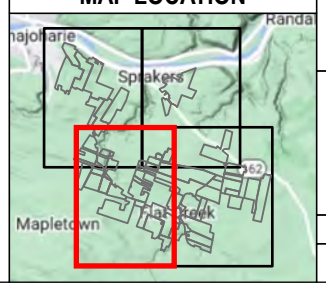
PROJECT SURVEY AREA
FLIGHT PATHS
[redacted]

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

N

0 1,000 2,000 FEET

MAP LOCATION



SUNEAST DEVELOPMENT

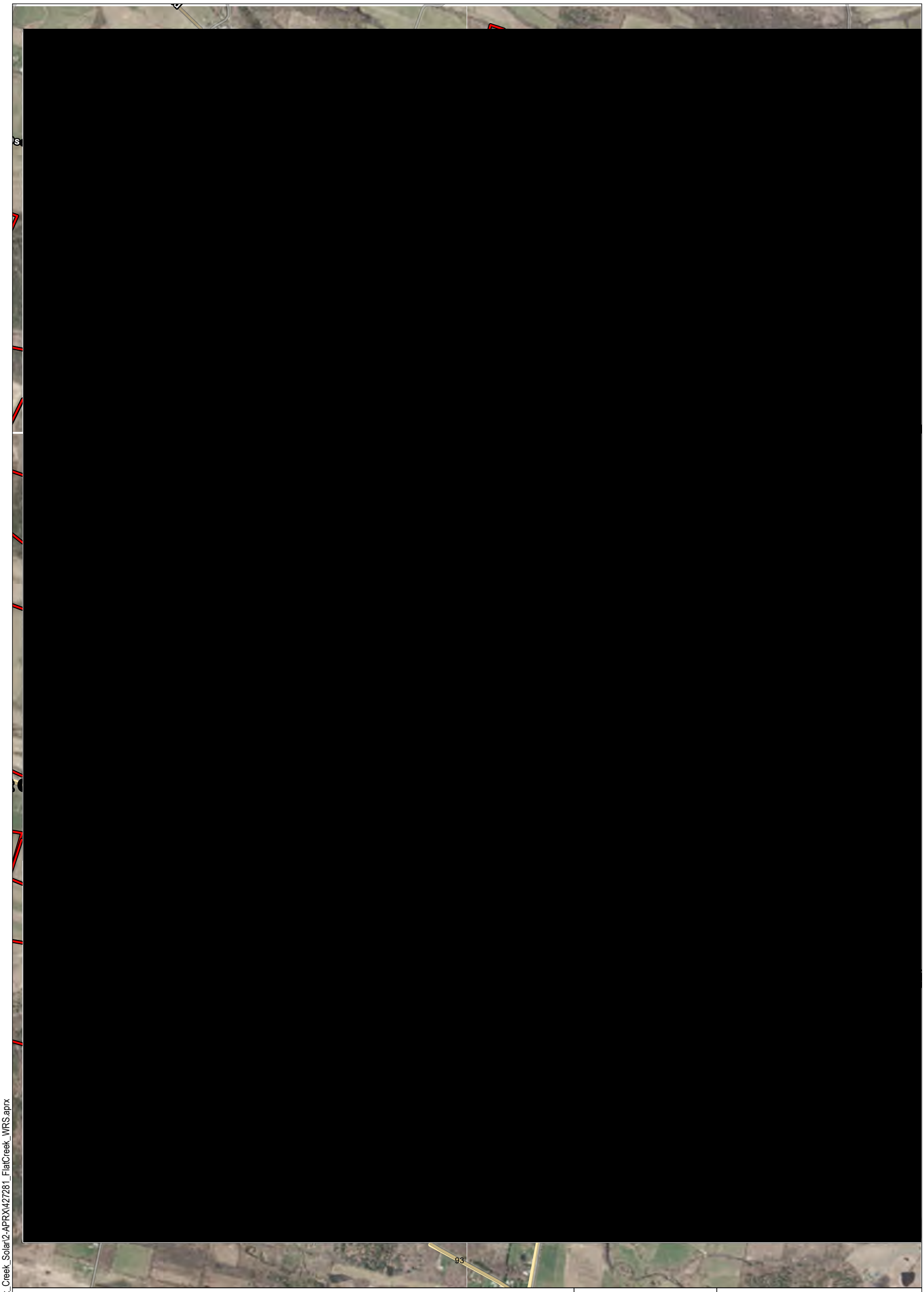
LISTED SPECIES OBSERVATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 5 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx



2021-2022 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING SURVEY LOCATIONS
2020-2021 STATIONARY SURVEY LOCATIONS
2020-2021 DRIVING ROUTE
PROJECT SURVEY AREA

FLIGHT PATHS

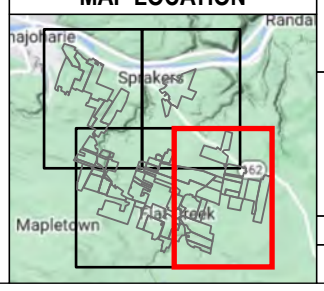
[redacted]

N

0 1,000 2,000 FEET

DATA: NYS OFFICE OF INFORMATION TECHNOLOGY SERVICES, GIS PROGRAM OFFICE, 2020
BASE MAP: USGS/THE NATIONAL MAP; ESRI AND ITS CONTRIBUTORS 2021

MAP LOCATION



SUNEAST DEVELOPMENT

LISTED SPECIES OBSERVATIONS

SUNEAST FLAT CREEK SOLAR
MONTGOMERY COUNTY, NY

FIGURE 5 | MAY 2022

MAP PRODUCED BY TRC

T:\1-PROJECTS\SunEast\427281_Flat_Creek_Solar\2-APRX\427281_FlatCreek_WRS.aprx

APPENDIX A

SURVEY EFFORT TABLE

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D18	1	11/15/2021	13:46	13:51	5.0
D18	2	11/22/2021	13:26	13:31	5.0
D18	3	12/6/2021	13:25	13:30	5.0
D18	4	12/13/2021	13:23	13:28	5.0
D18	5	12/20/2021	13:28	13:33	5.0
D18	6	12/28/2021	12:54	12:59	5.0
D18	7	1/3/2022	13:02	13:07	5.0
D18	19	4/5/2022	16:48	16:53	5.0
D18	20	4/12/2022	17:09	17:14	5.0
D19	1	11/15/2021	13:54	13:59	5.0
D19	2	11/22/2021	13:33	13:38	5.0
D19	3	12/6/2021	13:34	13:39	5.0
D19	4	12/13/2021	13:31	13:36	5.0
D19	5	12/20/2021	13:35	13:40	5.0
D19	6	12/28/2021	13:06	13:11	5.0
D19	7	1/3/2022	13:16	13:21	5.0
D19	14	2/22/2022	14:32	14:37	5.0
D19	17	3/15/2022	17:15	17:20	5.0
D19	18	3/23/2022	17:32	17:37	5.0
D19	19	4/5/2022	16:55	17:00	5.0
D19	20	4/12/2022	17:15	17:20	5.0
D20	1	11/15/2021	14:02	14:07	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D20	2	11/22/2021	13:42	13:47	5.0
D20	3	12/6/2021	13:41	13:46	5.0
D20	4	12/13/2021	13:39	13:44	5.0
D20	5	12/20/2021	13:45	13:50	5.0
D20	6	12/28/2021	13:19	13:24	5.0
D20	7	1/3/2022	13:30	13:35	5.0
D20	8	1/10/2022	14:53	14:58	5.0
D20	9	1/18/2022	15:10	15:15	5.0
D20	10	1/25/2022	15:27	15:32	5.0
D20	11	2/1/2022	14:51	14:56	5.0
D20	12	2/8/2022	14:55	15:00	5.0
D20	13	2/15/2022	14:59	15:04	5.0
D20	14	2/22/2022	14:40	14:45	5.0
D20	15	3/2/2022	16:07	16:12	5.0
D20	16	3/8/2022	16:16	16:21	5.0
D20	17	3/15/2022	17:06	17:11	5.0
D20	18	3/23/2022	17:22	17:27	5.0
D20	19	4/5/2022	17:02	17:07	5.0
D20	20	4/12/2022	17:22	17:27	5.0
D21	1	11/15/2021	14:09	14:14	5.0
D21	2	11/22/2021	13:55	14:00	5.0
D21	3	12/6/2021	13:53	13:58	5.0
D21	4	12/13/2021	13:49	13:54	5.0
D21	5	12/20/2021	13:52	13:57	5.0
D21	6	12/28/2021	13:28	13:33	5.0
D21	7	1/3/2022	13:41	13:46	5.0
D21	8	1/10/2022	14:46	14:51	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D21	9	1/18/2022	15:01	15:06	5.0
D21	10	1/25/2022	15:11	15:16	5.0
D21	11	2/1/2022	14:32	14:37	5.0
D21	12	2/8/2022	14:48	14:53	5.0
D21	13	2/15/2022	14:51	14:56	5.0
D21	14	2/22/2022	14:46	14:51	5.0
D21	15	3/2/2022	16:00	16:05	5.0
D21	16	3/8/2022	16:08	16:13	5.0
D21	17	3/15/2022	16:59	17:04	5.0
D21	18	3/23/2022	17:15	17:20	5.0
D21	19	4/5/2022	17:09	17:14	5.0
D21	20	4/12/2022	17:28	17:33	5.0
D22	1	11/15/2021	14:16	14:21	5.0
D22	2	11/22/2021	14:03	14:08	5.0
D22	3	12/6/2021	14:02	14:07	5.0
D22	4	12/13/2021	13:56	14:01	5.0
D22	5	12/20/2021	13:59	14:04	5.0
D22	6	12/28/2021	13:41	13:46	5.0
D22	7	1/3/2022	13:50	13:55	5.0
D22	8	1/10/2022	14:36	14:41	5.0
D22	9	1/18/2022	14:53	14:58	5.0
D22	10	1/25/2022	14:59	15:04	5.0
D22	11	2/1/2022	14:22	14:27	5.0
D22	12	2/8/2022	14:42	14:47	5.0
D22	13	2/15/2022	14:43	14:48	5.0
D22	14	2/22/2022	15:32	15:37	5.0
D22	15	3/2/2022	15:52	15:57	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D22	16	3/8/2022	15:59	16:04	5.0
D22	17	3/15/2022	16:50	16:55	5.0
D22	18	3/23/2022	17:07	17:12	5.0
D22	19	4/5/2022	17:16	17:21	5.0
D22	20	4/12/2022	17:34	17:39	5.0
D23	1	11/15/2021	14:22	14:27	5.0
D23	2	11/22/2021	14:15	14:20	5.0
D23	3	12/6/2021	14:09	14:14	5.0
D23	4	12/13/2021	14:12	14:17	5.0
D23	5	12/20/2021	14:07	14:12	5.0
D23	6	12/28/2021	13:54	13:59	5.0
D23	7	1/3/2022	13:59	14:04	5.0
D23	8	1/10/2022	14:29	14:34	5.0
D23	9	1/18/2022	14:42	14:47	5.0
D23	10	1/25/2022	14:47	14:52	5.0
D23	11	2/1/2022	14:15	14:20	5.0
D23	12	2/8/2022	14:35	14:40	5.0
D23	13	2/15/2022	14:34	14:39	5.0
D23	14	2/22/2022	14:52	14:57	5.0
D23	15	3/2/2022	15:46	15:51	5.0
D23	16	3/8/2022	15:50	15:55	5.0
D23	17	3/15/2022	16:44	16:49	5.0
D23	18	3/23/2022	17:01	17:06	5.0
D23	19	4/5/2022	17:23	17:28	5.0
D23	20	4/12/2022	17:40	17:45	5.0
D24	1	11/15/2021	14:44	14:49	5.0
D24	2	11/22/2021	14:44	14:49	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D24	3	12/6/2021	14:29	14:34	5.0
D24	4	12/13/2021	14:38	14:43	5.0
D24	5	12/20/2021	14:30	14:35	5.0
D24	6	12/28/2021	14:25	14:30	5.0
D24	7	1/3/2022	14:20	14:25	5.0
D24	14	2/22/2022	15:00	15:05	5.0
D24	15	3/2/2022	15:28	15:33	5.0
D24	16	3/8/2022	15:33	15:38	5.0
D24	17	3/15/2022	16:28	16:33	5.0
D24	18	3/23/2022	16:46	16:51	5.0
D24	19	4/5/2022	17:30	17:35	5.0
D24	20	4/12/2022	17:46	17:51	5.0
D25	1	11/15/2021	14:58	15:03	5.0
D25	2	11/22/2021	15:02	15:07	5.0
D25	3	12/6/2021	14:40	14:45	5.0
D25	4	12/13/2021	14:48	14:53	5.0
D25	5	12/20/2021	14:44	14:49	5.0
D25	6	12/28/2021	14:32	14:37	5.0
D25	7	1/3/2022	14:30	14:35	5.0
D25	14	2/22/2022	15:09	15:14	5.0
D25	15	3/2/2022	15:38	15:43	5.0
D25	16	3/8/2022	15:40	15:45	5.0
D25	17	3/15/2022	16:36	16:41	5.0
D25	18	3/23/2022	16:53	16:58	5.0
D25	19	4/5/2022	17:37	17:42	5.0
D25	20	4/12/2022	17:53	17:58	5.0
D26	1	11/15/2021	14:29	14:34	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D26	2	11/22/2021	14:23	14:28	5.0
D26	3	12/6/2021	14:15	14:20	5.0
D26	4	12/13/2021	14:18	14:23	5.0
D26	5	12/20/2021	14:13	14:18	5.0
D26	6	12/28/2021	14:10	14:15	5.0
D26	7	1/3/2022	14:05	14:10	5.0
D26	8	1/10/2022	14:18	14:23	5.0
D26	9	1/18/2022	14:36	14:41	5.0
D26	10	1/25/2022	14:37	14:42	5.0
D26	11	2/1/2022	14:08	14:13	5.0
D26	12	2/8/2022	14:28	14:33	5.0
D26	13	2/15/2022	14:28	14:33	5.0
D26	14	2/22/2022	15:17	15:22	5.0
D26	15	3/2/2022	15:19	15:24	5.0
D26	16	3/8/2022	15:24	15:29	5.0
D26	17	3/15/2022	16:20	16:25	5.0
D26	18	3/23/2022	16:39	16:44	5.0
D26	19	4/5/2022	17:46	17:51	5.0
D26	20	4/12/2022	18:00	18:05	5.0
D27	1	11/15/2021	14:36	14:41	5.0
D27	2	11/22/2021	14:34	14:39	5.0
D27	3	12/6/2021	14:23	14:28	5.0
D27	4	12/13/2021	14:27	14:32	5.0
D27	5	12/20/2021	14:20	14:25	5.0
D27	6	12/28/2021	14:17	14:22	5.0
D27	7	1/3/2022	14:11	14:16	5.0
D27	8	1/10/2022	14:12	14:17	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D27	9	1/18/2022	14:25	14:30	5.0
D27	10	1/25/2022	14:29	14:34	5.0
D27	11	2/1/2022	13:56	14:01	5.0
D27	12	2/8/2022	14:20	14:25	5.0
D27	13	2/15/2022	14:22	14:27	5.0
D27	14	2/22/2022	15:24	15:29	5.0
D27	15	3/2/2022	15:12	15:17	5.0
D27	16	3/8/2022	15:18	15:23	5.0
D27	17	3/15/2022	17:25	17:30	5.0
D27	18	3/23/2022	16:33	16:38	5.0
D27	19	4/5/2022	17:52	17:57	5.0
D27	20	4/12/2022	18:05	18:10	5.0
D28	1	11/15/2021	13:34	13:39	5.0
D28	2	11/22/2021	13:16	13:21	5.0
D28	3	12/6/2021	13:16	13:21	5.0
D28	4	12/13/2021	13:04	13:09	5.0
D28	5	12/20/2021	13:13	13:18	5.0
D28	6	12/28/2021	12:46	12:51	5.0
D28	7	1/3/2022	12:53	12:58	5.0
D28	8	1/10/2022	13:45	13:50	5.0
D28	9	1/18/2022	14:07	14:12	5.0
D28	10	1/25/2022	14:13	14:18	5.0
D28	11	2/1/2022	13:42	13:47	5.0
D28	12	2/8/2022	14:03	14:08	5.0
D28	13	2/15/2022	14:12	14:17	5.0
D28	14	2/22/2022	14:10	14:15	5.0
D28	15	3/2/2022	15:01	15:06	5.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
D28	16	3/8/2022	15:08	15:13	5.0
D28	17	3/15/2022	16:10	16:15	5.0
D28	18	3/23/2022	16:23	16:28	5.0
D28	19	4/5/2022	16:35	16:40	5.0
D28	20	4/12/2022	17:00	17:05	5.0
S10	1	11/15/2021	15:34	17:04	90.0
S10	2	11/22/2021	15:30	17:00	90.0
S10	3	12/6/2021	15:23	17:00	97.0
S10	4	12/13/2021	15:24	17:05	101.0
S10	5	12/20/2021	15:26	17:10	104.0
S10	6	12/27/2021	15:24	17:05	101.0
S10	7	1/3/2022	15:36	17:16	100.0
S10	8	1/10/2022	15:44	17:19	95.0
S10	9	1/18/2022	15:43	17:26	103.0
S10	10	1/24/2022	16:00	17:35	95.0
S10	11	2/1/2022	16:11	17:48	97.0
S10	12	2/7/2022	16:18	17:55	97.0
S10	13	2/14/2022	16:28	18:05	97.0
S10	14	2/21/2022	16:37	18:15	98.0
S10	15	3/2/2022	16:49	18:25	96.0
S10	16	3/11/2022	16:59	18:38	99.0
S10	17	3/18/2022	18:08	19:40	92.0
S10	18	3/23/2022	18:14	19:44	90.0
S10	19	4/4/2022	18:28	20:00	92.0
S10	20	4/11/2022	18:36	20:08	92.0
S11	1	11/15/2021	15:24	17:07	103.0
S11	2	11/22/2021	15:27	17:01	94.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
S11	3	12/6/2021	15:15	16:53	98.0
S11	4	12/13/2021	15:17	17:03	106.0
S11	5	12/20/2021	15:20	17:02	102.0
S11	6	12/27/2021	15:28	17:05	97.0
S11	7	1/3/2022	15:30	17:10	100.0
S11	8	1/10/2022	15:43	17:15	92.0
S11	9	1/18/2022	15:42	17:24	102.0
S11	10	1/24/2022	15:58	17:31	93.0
S11	11	2/1/2022	16:09	17:44	95.0
S11	12	2/8/2022	16:20	17:52	92.0
S11	13	2/14/2022	16:25	17:58	93.0
S11	14	2/21/2022	16:35	18:10	95.0
S11	15	3/2/2022	16:49	18:19	90.0
S11	16	3/11/2022	17:00	18:32	92.0
S11	17	3/17/2022	18:07	19:37	90.0
S11	18	3/23/2022	18:13	19:46	93.0
S11	19	4/4/2022	18:23	20:00	97.0
S11	20	4/11/2022	18:32	20:06	94.0
S12	1	11/15/2021	15:36	17:06	90.0
S12	2	11/22/2021	15:29	17:00	91.0
S12	3	12/7/2021	15:25	16:55	90.0
S12	4	12/13/2021	15:25	16:55	90.0
S12	5	12/20/2021	15:27	17:02	95.0
S12	6	12/27/2021	15:30	17:02	92.0
S12	7	1/3/2022	15:37	17:07	90.0
S12	8	1/10/2022	15:44	17:14	90.0
S12	9	1/20/2022	15:55	17:25	90.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
S12	10	1/24/2022	16:00	17:30	90.0
S12	11	2/1/2022	16:10	17:41	91.0
S12	12	2/7/2022	16:19	17:49	90.0
S12	13	2/14/2022	16:28	17:58	90.0
S12	14	2/21/2022	16:38	18:08	90.0
S12	15	3/2/2022	16:49	18:19	90.0
S12	16	3/8/2022	16:56	18:26	90.0
S12	17	3/17/2022	18:07	19:37	90.0
S12	18	3/23/2022	18:14	19:45	91.0
S12	19	4/4/2022	18:27	19:57	90.0
S12	20	4/11/2022	18:35	20:05	90.0
S13	1	11/17/2021	15:29	17:05	96.0
S13	2	11/24/2021	15:25	17:01	96.0
S13	3	12/8/2021	15:23	16:54	91.0
S13	4	12/15/2021	15:21	16:53	92.0
S13	5	12/22/2021	15:27	17:00	93.0
S13	6	12/29/2021	15:30	17:01	91.0
S13	7	1/5/2022	15:35	17:10	95.0
S13	8	1/12/2022	15:45	17:18	93.0
S13	9	1/19/2022	15:54	17:24	90.0
S13	10	1/25/2022	16:01	17:33	92.0
S13	12	2/10/2022	16:22	17:53	91.0
S13	13	2/15/2022	16:25	18:02	97.0
S13	14	2/28/2022	16:46	18:16	90.0
S13	15	3/8/2022	16:53	18:27	94.0
S13	16	3/15/2022	17:59	19:35	96.0
S13	17	3/21/2022	18:10	19:43	93.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
S13	18	3/29/2022	18:16	19:51	95.0
S13	19	4/5/2022	18:29	19:59	90.0
S13	20	4/12/2022	18:37	20:07	90.0
S14	1	11/16/2021	15:33	17:03	90.0
S14	2	11/23/2021	15:28	17:02	94.0
S14	3	12/7/2021	15:24	17:00	96.0
S14	4	12/14/2021	15:24	17:08	104.0
S14	5	12/21/2021	15:27	17:05	98.0
S14	6	12/28/2021	15:31	17:02	91.0
S14	7	1/4/2022	15:37	17:12	95.0
S14	8	1/11/2022	15:44	17:14	90.0
S14	9	1/19/2022	15:54	17:33	99.0
S14	10	1/25/2022	16:01	17:31	90.0
S14	12	2/8/2022	16:20	17:55	95.0
S14	13	2/15/2022	16:30	18:00	90.0
S14	14	2/28/2022	16:46	18:20	94.0
S14	15	3/8/2022	16:56	18:30	94.0
S14	16	3/14/2022	18:04	19:36	92.0
S14	17	3/21/2022	18:11	19:43	92.0
S14	18	3/29/2022	18:21	19:51	90.0
S14	19	4/5/2022	18:29	20:02	93.0
S14	20	4/13/2022	18:38	20:10	92.0
S15	1	11/17/2021	15:33	17:03	90.0
S15	2	11/24/2021	15:28	17:03	95.0
S15	3	12/8/2021	15:24	17:00	96.0
S15	5	12/22/2021	15:27	17:00	93.0
S15	6	12/29/2021	15:32	17:02	90.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
S15	7	1/5/2022	15:38	17:12	94.0
S15	8	1/12/2022	15:46	17:18	92.0
S15	9	1/20/2022	15:55	17:29	94.0
S15	10	1/26/2022	16:01	17:31	90.0
S15	12	2/10/2022	16:04	17:52	108.0
S15	13	2/15/2022	16:21	18:00	99.0
S15	14	2/28/2022	16:46	18:16	90.0
S15	15	3/11/2022	17:00	18:30	90.0
S15	16	3/17/2022	18:07	19:37	90.0
S15	17	3/23/2022	18:08	19:43	95.0
S15	18	3/29/2022	18:21	19:51	90.0
S15	19	4/4/2022	18:18	19:58	100.0
S15	20	4/11/2022	18:30	20:06	96.0
S16	1	11/23/2021	15:28	17:02	94.0
S16	2	11/30/2021	15:20	16:57	97.0
S16	3	12/7/2021	15:20	16:55	95.0
S16	4	12/14/2021	15:19	17:00	101.0
S16	5	12/21/2021	15:25	17:00	95.0
S16	6	12/28/2021	15:25	17:01	96.0
S16	7	1/4/2022	15:36	17:08	92.0
S16	8	1/13/2022	15:38	17:16	98.0
S16	9	1/20/2022	15:54	17:26	92.0
S16	10	1/25/2022	16:01	17:34	93.0
S16	11	2/1/2022	16:07	17:41	94.0
S16	12	2/8/2022	16:10	17:51	101.0
S16	13	2/14/2022	16:26	17:58	92.0
S16	14	2/21/2022	16:36	18:08	92.0

Survey Location	Survey Event	Survey Date	Survey Start Time	Survey End Time	Survey Duration (mins)
S16	15	3/2/2022	16:44	18:19	95.0
S16	16	3/8/2022	16:56	18:26	90.0
S16	17	3/15/2022	17:56	19:35	99.0
S16	18	3/21/2022	18:07	19:42	95.0
S16	19	4/5/2022	18:12	19:59	107.0
S16	20	4/12/2022	18:25	20:07	102.0

APPENDIX B

WEATHER CONDITIONS TABLE

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
D18	1	11/15/2021	3	W	41	79	29.74	100	9	0 - None	None	0
D19	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D20	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D21	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D22	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D23	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D23	14	2/22/2022	1	SE	51	76	30.05	100	9	3 - Rain	Slush	1
D24	1	11/15/2021	3	W	41	79	29.74	100	9	0 - None	None	0
D25	1	11/15/2021	3	W	41	79	29.74	100	9	0 - None	None	0
D26	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D27	1	11/15/2021	3	W	41	79	29.74	100	9	2 - Drizzle	None	0
D28	1	11/15/2021	3	W	41	79	29.74	100	9	0 - None	None	0
D28	2	11/22/2021	3	WNW	39	52	29.88	80	10	0 - None	None	0
D28	3	12/6/2021	3	SSE	50	82	29.8	100	10	0 - None	None	0
D28	4	12/13/2021	3	W	50	32	30.12	0	10	0 - None	None	0
D28	5	12/20/2021	1	S	29	62	30.24	40	10	0 - None	None	0
D28	6	12/28/2021	3	W	39	66	29.82	20	10	0 - None	None	0
D28	7	1/3/2022	2	WNW	17	70	30.19	80	10	0 - None	None	0
D28	8	1/10/2022	4	W	22	52	30.07	70	9	0 - None	Ice	0
D28	9	1/18/2022	4	W	22	59	29.96	50	9	0 - None	Crust	4
D28	10	1/25/2022	3	W	27	64	30	40	10	0 - None	Crust	6
D28	11	2/1/2022	2	SE	33	42	30.48	25	10	0 - None	Crust	5
D28	12	2/8/2022	2	NW	32	71	29.91	90	9	0 - None	Crust	6
D28	13	2/15/2022	3	SW	23	59	30.58	60	10	0 - None	Ice layer	5
D28	14	2/22/2022	2	SE	51	76	30.05	100	9	0 - None	Slush	1
D28	15	3/2/2022	2	NW	33	55	29.99	20	10	0 - None	Crust	3

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
D28	16	3/8/2022	3	E	36	43	30.15	10	10	0 - None	None	0
D28	17	3/15/2022	2	NE	51	54	30.14	100	10	0 - None	None	0
D28	18	3/23/2022	1	NE	42	37	30.15	70	10	0 - None	None	0
D28	19	4/5/2022	1	E	58	39	29.93	60	10	0 - None	None	0
D28	20	4/12/2022	3	NE	63	32	30.03	0	10	0 - None	None	0
S10	1	11/15/2021	3	WNW	38	85	29.79	65	10	0 - None	None	0
S10	2	11/22/2021	3	WNW	35	54	29.9	90	10	0 - None	None	0
S10	3	12/6/2021	3	SSW	56	74	29.48	100	10	2 - Drizzle	None	0
S10	4	12/13/2021	3	W	52	26	30.1	100	10	0 - None	None	0
S10	5	12/20/2021	2	S	31	59	30.19	45	10	0 - None	None	0
S10	6	12/27/2021	1	E	28	77	30	100	10	0 - None	None	0
S10	7	1/3/2022	2	WNW	17	70	30.19	80	10	0 - None	None	0
S10	8	1/10/2022	4	W	21	49	30.07	50	10	0 - None	Ice layer	0.25
S10	9	1/18/2022	4	WNW	21	56	30.01	5	10	0 - None	Crust	4
S10	10	1/24/2022	2	E	21	52	29.87	100	10	0 - None	Crust	4
S10	11	2/1/2022	3	SE	34	45	30.45	5	10	0 - None	Crust, Powder	5
S10	12	2/7/2022	1	E	34	74	30.17	100	8	0 - None	Granular, Ice layer	4
S10	13	2/14/2022	4	W	13	43	30.24	5	10	0 - None	Crust	4
S10	14	2/21/2022	2	E	49	43	30.26	40	9	0 - None	Slush	0.5
S10	15	3/2/2022	2	WNW	33	55	29.98	80	10	0 - None	Granular	2
S10	16	3/11/2022	1	SE	44	63	29.87	95	10	0 - None	None	0
S10	17	3/18/2022	2	N	67	46	29.96	60	10	0 - None	None	0
S10	18	3/23/2022	2	E	41	41	30.13	100	10	2 - Drizzle	None	0
S10	19	4/4/2022	2	WNW	42	56	29.98	90	10	0 - None	None	0
S10	20	4/11/2022	2	E	57	40	29.94	100	10	0 - None	None	0
S11	1	11/15/2021	3	W	37	86	29.79	50	10	2 - Drizzle	None	0

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
S11	2	11/22/2021	3	W	36	54	29.9	90	10	0 - None	None	0
S11	3	12/6/2021	4	SW	55	74	29.48	100	10	3 - Rain	None	0
S11	4	12/13/2021	3	W	52	26	30.11	0	10	0 - None	None	0
S11	5	12/20/2021	1	S	30	62	30.18	60	10	0 - None	Ice layer	0
S11	6	12/27/2021	1	E	28	76	30	100	10	0 - None	None	0
S11	7	1/3/2022	1	W	18	69	30.17	90	10	0 - None	None	0
S11	8	1/10/2022	3	W	21	49	30.07	40	10	0 - None	Ice layer	0.5
S11	9	1/18/2022	4	NW	22	55	30	5	10	0 - None	Crust	4
S11	10	1/24/2022	3	E	20	52	29.87	100	10	0 - None	Crust	4
S11	11	2/1/2022	2	NW	32	46	30.46	0	10	0 - None	Crust	6
S11	12	2/8/2022	3	E	32	70	29.94	100	8	5 - Snow	Powder	5
S11	13	2/14/2022	4	SE	13	43	30.23	0	10	0 - None	Crust	3
S11	14	2/21/2022	1	W	49	43	30.26	10	10	0 - None	Slush	1
S11	15	3/2/2022	2	E	32	55	29.97	100	10	0 - None	Crust	3
S11	16	3/11/2022	1	NW	45	62	29.87	100	10	0 - None	None	0
S11	17	3/17/2022	2	NW	54	81	29.91	100	10	0 - None	None	0
S11	18	3/23/2022	1	W	41	40	30.13	80	7	2 - Drizzle	None	0
S11	19	4/4/2022	2	E	37	57	29.98	75	10	0 - None	None	0
S11	20	4/11/2022	2	S	58	30	29.94	100	10	0 - None	None	0
S12	1	11/15/2021	2	E	34	92	29.79	50	10	0 - None	None	0
S12	2	11/22/2021	2	SE	34	55	29.91	90	10	0 - None	None	0
S12	3	12/7/2021	2	SE	31	63	30.14	100	10	0 - None	None	0
S12	4	12/13/2021	2	NE	50	26	30.11	0	10	0 - None	None	0
S12	5	12/20/2021	1	N	28	63	30.18	75	10	0 - None	Ice layer	0
S12	6	12/27/2021	1	W	27	76	30.01	100	10	0 - None	Granular	0.2
S12	7	1/3/2022	2	SE	16	70	30.17	85	10	0 - None	Powder	0.02

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
S12	8	1/10/2022	2	E	20	49	30.07	30	10	0 - None	Granular	0.5
S12	9	1/20/2022	2	SE	15	57	30.34	3	10	0 - None	Powder	5
S12	10	1/24/2022	1	NW	20	51	29.87	99	10	0 - None	Granular	8
S12	11	2/1/2022	2	NW	28	47	30.52	7	10	0 - None	Powder	6
S12	12	2/7/2022	1	NW	34	74	30.1	100	8	0 - None	Granular ,Powder	7
S12	13	2/14/2022	3	SE	12	42	30.22	5	10	0 - None	Granular	4
S12	14	2/21/2022	2	W	48	43	30.26	5	9	0 - None	Slush	0.2
S12	15	3/2/2022	1	SE	31	55	29.97	75	10	0 - None	Granular, Powder	2
S12	16	3/8/2022	3	SE	34	42	30.16	20	10	0 - None	None	0
S12	17	3/17/2022	1	NW	53	86	29.91	75	10	0 - None	Granular	0.25
S12	18	3/23/2022	2	W	39	43	30.13	100	10	2 - Drizzle	None	0
S12	19	4/4/2022	3	SE	42	57	29.98	70	10	0 - None	None	0
S12	20	4/11/2022	1	N	58	30	29.94	90	10	0 - None	None	0
S13	1	11/17/2021	1	E	43	75	30.12	100	10	0 - None	None	0
S13	2	11/24/2021	1	W	37	53	30.29	30	10	0 - None	None	0
S13	3	12/8/2021	1	NE	28	92	29.93	100	6	5 - Snow	Powder	0
S13	4	12/15/2021	1	E	37	76	30.43	100	7	3 - Rain	None	0
S13	5	12/22/2021	4	W	30	55	29.67	100	10	0 - None	None	0
S13	6	12/29/2021	1	E	36	100	29.92	100	6	0 - None	None	0
S13	7	1/5/2022	1	S	36	69	29.7	100	10	0 - None	None	0
S13	8	1/12/2022	1	SW	28	61	29.99	100	10	0 - None	Crust	0.5
S13	9	1/19/2022	2	SW	41	54	29.85	15	10	0 - None	Powder	4
S13	10	1/25/2022	3	W	25	69	30.06	100	10	0 - None	Crust	7
S13	12	2/10/2022	1	NE	39	70	29.8	80	10	0 - None	Powder	4
S13	13	2/15/2022	2	E	24	56	30.62	30	10	0 - None	Crust	3
S13	14	2/28/2022	2	E	20	39	30.36	5	10	0 - None	Powder	3

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
S13	15	3/8/2022	3	E	36	41	30.16	5	10	0 - None	None	0
S13	16	3/15/2022	1	SW	48	63	30.13	100	9	3 - Rain	Slush	0.5
S13	17	3/21/2022	4	E	47	38	30.06	5	10	0 - None	None	0
S13	18	3/29/2022	4	E	30	37	30.16	0	10	0 - None	None	0
S13	19	4/5/2022	1	E	57	41	29.94	0	10	0 - None	None	0
S13	20	4/12/2022	3	W	60	26	30.07	40	10	0 - None	None	0
S14	1	11/16/2021	2	WNW	38	92	30.11	90	7	0 - None	None	0
S14	2	11/23/2021	3	WNW	35	54	29.9	10	10	0 - None	None	0
S14	3	12/7/2021	2	WNW	32	62	30.14	95	10	0 - None	None	0
S14	4	12/14/2021	2	W	44	48	30.57	5	10	0 - None	None	0
S14	5	12/21/2021	1	NW	37	68	30.01	5	10	0 - None	None	0
S14	6	12/28/2021	3	WNW	39	64	29.84	90	10	0 - None	None	0
S14	7	1/4/2022	1	SW	28	67	30.25	25	10	0 - None	None	0
S14	8	1/11/2022	3	WNW	7	50	30.53	5	10	0 - None	Ice layer	0.25
S14	9	1/19/2022	2	WSW	41	54	29.85	60	10	0 - None	Crust	4
S14	10	1/25/2022	2	E	21	52	29.87	95	10	0 - None	Crust	5
S14	12	2/8/2022	3	W	33	70	29.94	100	7	0 - None	Crust	5
S14	13	2/15/2022	2	SE	22	55	30.62	15	10	0 - None	Ice layer	4
S14	14	2/28/2022	2	WNW	22	38	30.35	50	10	0 - None	Powder	4
S14	15	3/8/2022	3	WNW	36	42	30.17	5	10	0 - None	None	0
S14	16	3/14/2022	2	SSW	47	44	30.26	70	10	0 - None	Slush	0.25
S14	17	3/21/2022	4	WNW	47	38	30.06	5	10	0 - None	None	0
S14	18	3/29/2022	4	WNW	30	36	30.16	5	10	0 - None	None	0
S14	19	4/5/2022	2	E	57	40	29.94	10	10	0 - None	None	0
S14	20	4/13/2022	2	WSW	68	57	29.78	90	10	0 - None	None	0
S15	1	11/17/2021	1	E	41	77	30.12	100	10	0 - None	None	0

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
S15	2	11/24/2021	1	W	37	51	30.29	10	10	0 - None	None	0
S15	3	12/8/2021	1	NE	28	89	29.93	100	8	5 - Snow	Powder	0
S15	5	12/22/2021	3	WNW	30	56	29.66	50	10	0 - None	None	0
S15	6	12/29/2021	1	E	33	100	29.92	100	6	1 - Haze or Fog	Slush	0.25
S15	7	1/5/2022	2	S	35	66	29.7	95	10	0 - None	None	0
S15	8	1/12/2022	1	SW	31	52	29.99	100	10	0 - None	Ice layer	0.25
S15	9	1/20/2022	3	W	15	57	30.35	15	10	0 - None	Crust	4
S15	10	1/26/2022	3	NW	14	46	30.43	0	10	0 - None	Powder	6
S15	12	2/10/2022	2	W	38	65	29.79	85	9	0 - None	Crust	6
S15	13	2/15/2022	3	W	23	59	30.58	15	10	0 - None	Ice layer	4
S15	14	2/28/2022	2	NW	19	38	30.35	10	10	0 - None	Powder	5
S15	15	3/11/2022	1	NW	45	58	29.89	100	10	0 - None	Granular	0.5
S15	16	3/17/2022	1	SE	53	86	29.91	90	9	0 - None	None	0
S15	17	3/23/2022	2	E	40	42	30.14	100	10	2 - Drizzle	None	0
S15	18	3/29/2022	3	NW	28	38	30.16	10	10	0 - None	None	0
S15	19	4/4/2022	3	NW	43	57	29.98	90	10	0 - None	None	0
S15	20	4/11/2022	1	S	60	30	29.94	90	10	0 - None	None	0
S16	1	11/23/2021	3	W	30	52	30.08	0	10	0 - None	None	0
S16	2	11/30/2021	1	SW	34	79	29.88	100	7	5 - Snow	Powder	0
S16	3	12/7/2021	1	W	32	64	30.15	100	10	0 - None	Granular	0
S16	4	12/14/2021	2	W	46	48	30.58	0	10	0 - None	None	0
S16	5	12/21/2021	1	W	37	69	30	0	10	0 - None	None	0
S16	6	12/28/2021	3	W	37	66	29.84	75	10	0 - None	Slush	0
S16	7	1/4/2022	1	SW	28	68	30.25	0	10	0 - None	None	0
S16	8	1/13/2022	1	NE	35	81	29.92	25	9	0 - None	Crust	1
S16	9	1/20/2022	3	W	16	56	30.34	0	10	0 - None	Crust	5

Survey Location	Survey Event	Survey Date	Wind Speed (Beaufort Scale)	Wind Direction	Temp. (F)	Relative Humidity (%)	Pressure (inHg)	Cloud Cover (%)	Visibility (mi)	Precip.	Snow Condition	Snow Depth (in)
S16	10	1/25/2022	3	NW	25	69	30.06	90	9	0 - None	Crust	5
S16	11	2/1/2022	2	SE	34	46	30.46	10	10	0 - None	Crust	6
S16	12	2/8/2022	3	W	33	71	29.94	90	7	0 - None	Crust	7
S16	13	2/14/2022	4	W	14	43	30.23	10	10	0 - None	Ice layer	5
S16	14	2/21/2022	2	E	49	44	30.26	20	9	0 - None	Slush	3
S16	15	3/2/2022	2	NW	33	55	29.99	80	10	0 - None	Powder	3
S16	16	3/8/2022	3	NW	36	41	30.16	15	10	0 - None	None	0
S16	17	3/15/2022	1	NE	51	54	30.14	100	10	0 - None	None	0
S16	18	3/21/2022	3	NW	48	38	30.06	20	10	0 - None	None	0
S16	19	4/5/2022	2	E	59	39	29.94	15	10	0 - None	None	0
S16	20	4/12/2022	3	W	63	32	30.03	5	10	0 - None	None	0

APPENDIX C

AVIAN SPECIES TABLE

Common Name	Scientific Name	Listing Status
American Crow	*Corvus brachyrhynchos*	
American Goldfinch	*Spinus tristis*	
American Kestrel	*Falco sparverius*	
American Robin	*Turdus migratorious*	
American Tree Sparrow	*Spizella arborea*	
American Woodcock	*Scolopax minor*	
[redacted]	[redacted]	[redacted]
Barred Owl	*Strix varia*	
Black Vulture	*Coragyps atratus*	
Black-capped Chickadee	*Poecile atricapillus*	
Blue Jay	*Cyanocitta cristata*	
Canada Goose	*Branta Canadensis*	
Cedar Waxwing	*Bombycilla cedrorum*	
Common Grackle	*Quiscalus quiscula*	
Common Raven	*Corvus corax*	
[redacted]	[redacted]	[redacted]
Dark-eyed junco	*Junco hyemalis*	
Downy Woodpecker	*Dryobates pubescens*	
Eastern Meadowlark	*Sturnella magna*	
European Starling	*Sturnus vulgaris*	
Field Sparrow	*Spizella pusilla*	
Great Blue Heron	*Ardea herodias*	
Great Horned Owl	*Bubo virginianus*	
Hairy Woodpecker	*Picoides vollosus*	
[redacted]	[redacted]	[redacted]
House Sparrow	*Passer domesticus*	
Killdeer	*Charadrius vociferus*	
Mallard	*Anas platyrhynchos*	
Merlin	*Falco columbarius*	
Mourning Dove	*Zenaida macroura*	
Northern Cardinal	*Cardinalis cardinalis*	
Northern Flicker	*Colaptes auratus*	
[redacted]	[redacted]	[redacted]
Pileated Woodpecker	*Dryocopus pileatus*	
Red winged Blackbird	*Agelaius phoeniceus*	
Red-bellied Woodpecker	*Melanerpes carolinus*	
Red-tailed Hawk	*Buteo jamaicensis*	
Ring-billed Gull	*Larus delawarensis*	
Ring-necked Pheasant	*Phasianus colchicus*	
Rock Pigeon	*Columba livia*	

Common Name	Scientific Name	Listing Status
Rough-legged Hawk	*Buteo lagopus*	
Savannah Sparrow	*Passerculus sandwichensis*	
[redacted]	[redacted]	[redacted]
Snow Bunting	*Plectrophenax nivalis*	
Song Sparrow	*Melospiza melodia*	
Tufted Titmouse	*Baeolophus bicolor*	
Turkey Vulture	*Cathartes aura*	
White-breasted Nuthatch	*Sitta carolinensis*	
White-throated Sparrow	*Zonotrichia albicollis*	
Wild Turkey	*Meleagris gallopavo*	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	

ATTACHMENT A

STATE-LISTED WINTERING GRASSLAND RAPTOR 2020-2021 SURVEY REPORT FOR THE FLAT CREEK SOLAR PROJECT

State-Listed Wintering Grassland Raptor 2020-2021 Survey Report for the Flat Creek Solar Project

Town of Root Montgomery County, New York

Prepared for:
SunEast Development, LLC
5-2 Davis Road East
Old Lyme, CT 06371

Prepared by:
TRC Environmental Corporation
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065

May 2021

EXECUTIVE SUMMARY

SunEast Flat Creek Solar LLC (Applicant), a subsidiary to SunEast Development LLC, is proposing the construction of the Flat Creek Solar Project (Project), an approximately 200-megawatt (MW) photovoltaic (PV) solar energy generation facility in the Town of Root, Montgomery County, New York. The Project Area at the time of the study consisted of approximately 2,175 acres, of which the actual Project will require only a portion to construct and operate the facility.

TRC Environmental Corporation (TRC) was conducted a winter raptor study at the proposed Project Area from November 16, 2020, to March 31, 2021, following the *NYSDEC Survey Protocol for State-listed Wintering Grassland Raptor Species* (Draft 2015, [Protocol]). In accordance with the Protocol, an additional survey event was performed between April 1 and April 15, 2021, based on observations of listed species recorded during the final two weeks of March. The objective of the winter raptor surveys was to determine the presence and Project Area use of state-listed grassland raptor species during the winter season and assess the need for any additional studies.

The study included both stationary and driving surveys throughout the Project Area in areas of potential habitat for state-listed overwintering grassland raptors. A total of nine stationary survey points were identified in areas of potential habitat, and a driving route consisting of 18 driving survey stops was established along public roads traversing the Project Area. A total of 99 stationary surveys and 196 driving route survey stops were completed over 11 Survey Events, amounting to a total survey effort of 153.3 stationary survey hours and 16.0 driving survey hours during the study.

[redacted] observations of [redacted] raptor species were recorded during stationary surveys comprising a total of [redacted] use minutes. Overall mean use of the Project Area by raptors during stationary surveys was [redacted]. [redacted] observations of [redacted] species were recorded during driving route surveys in the Project Area. Red tailed hawk (*Buteo jamaicensis*) was the most frequently observed raptor during both stationary and driving surveys, accounting for 45.1 percent and 38.1 percent of stationary and driving route survey observations, respectively.

[redacted] state-listed wintering grassland raptors were observed during the study, including [redacted] observations of [redacted] and [redacted] observations of [redacted]. [redacted] were commonly observed flapping, hunting, and perching and [redacted] (i.e., [redacted]). [redacted] observations were recorded [redacted], while [redacted] observations were recorded during [redacted]. [redacted] were commonly documented hunting, flapping, and gliding at [redacted] the Project Area over the course of the [redacted] survey period; although, sightings tended to be more consistent in the [redacted] of the Project Area. Indeed, the most numerous consistent observations of both species were recorded at survey location [redacted].

Additionally, [redacted] state-listed species, the [redacted] and [redacted], and [redacted] state-listed species of special concern, [redacted] and [redacted], were observed during the study. Overall, raptor use of the Project Area was [redacted] throughout the study period, with observations being the [redacted] and [redacted].

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APPENDICES

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Appendix B Data Form Example
Appendix C List of Avian Species Observed
Appendix D Survey Data Sheets (*provided as zipped file)*
Appendix E GIS Shapefile Package (*provided as zipped file)*

1.0 INTRODUCTION

SunEast Flat Creek Solar LLC (Applicant), a subsidiary to SunEast Development LLC, is proposing the construction of the Flat Creek Solar Project (Project), a 200-megawatt (MW) photovoltaic (PV) solar energy generation facility in the Town of Root, Montgomery County, New York. On behalf of the Applicant, TRC Environmental Corporation (TRC) has prepared this State-Listed Wintering Grassland Raptor Survey Report supporting development of the Project.

1.1 Project Description

The Project is located in a rural residential community. Lands surrounding the Project Area are predominantly comprised of cropland (active and fallow), interspersed with successional old fields and isolated patches of northern hardwood forest. The location of Project components is evolving as siting and design efforts progress. The Project Area at the time of the study consisted of approximately 2,175 acres; however, Project components will not require usage of the full extent of lands within the Project Area. Project components may consist of tracker technology PV panels, inverters, access roads, buried (and possibly overhead) electric collection lines, a collection substation, and electrical interconnection facilities.

[redacted] in the Project Area contain potential habitat for overwintering grassland raptor species including the state-listed [redacted] and [redacted]. Potential habitat for wintering grassland raptors is located [redacted] the Project Area and consists of [redacted] and [redacted]. The Project Area contains [redacted] and [redacted]. The Project is located immediately adjacent to the Mohawk River, and is intersected by Flat Creek, sites which might potentially concentrate migratory raptors and eagles. A review of the New York Natural Heritage Program (NYNHP) database and Environmental Resource Mapper, and consultation with NYSDEC received on December 3, 2020, indicated [redacted] records occupied habitat or occurrences of state-listed species targeted by the surveys (i.e., [redacted]) exist within or nearby the Project Area.

Survey protocols were based on the *New York State Department of Environmental Conservation (NYSDEC) Survey Protocol for State-listed Wintering Grassland Raptor Species, Draft 2015* (Protocol, Appendix A). NYSDEC provided comments on the survey study plan on December 3, 2020, which were incorporated as applicable.

1.2 Purpose and Objectives

The purpose of the winter raptor survey was to determine the presence and Project Area use by state-listed threatened/endangered grassland raptor species during the winter season. Target species were the state-listed [redacted] and [redacted]. Data was used to develop a qualitative assessment of general patterns of use by those species and other raptors identified within the vicinity of the proposed Project.

The main objectives of winter raptor surveys were to:

- document presence of state-listed species within the Project Area,
- summarize and map use of the Project Area by state-listed species, and
- summarize and map use of the Project Area by any non-listed raptor species observed during surveys.

Information obtained from these surveys will help determine the need for additional comprehensive studies, regulatory review, and if necessary, avoidance and minimization.

2.0 STUDY PROTOCOL

2.1 Survey Site Selection

A total of nine stationary survey locations were selected within the Project Area in areas of potential habitat that may be used by [redacted] and/or [redacted] (Figure 1). Stationary survey locations were selected based on habitat and visibility at the Project Area to effectively survey potential habitat for grassland wintering raptors. Review of aerial imagery of potential habitat within the Project Area was used to pre-determine locations for stationary points and driving routes with consideration of site-specific topographical conditions and visual obstructions. Survey locations were established within potential habitat for over-wintering raptors (e.g., [redacted] and [redacted]) at vantage points with clear visibility of the habitat area. Locations were situated along public rights-of-way or in participating parcels within the Project Area. Locations were established along hedgerows or forest edges or were conducted within or next to vehicles to conceal surveyors from raptors flying overhead. Locations were spaced approximately 1,000 meters apart where multiple sites were required to survey a contiguous area of unobstructed grassland habitat. Several locations also provided views of presumed reference areas (e.g., [redacted] or [redacted] not located within the proposed Project Area or area to be developed). Where possible, observations were determined to represent control data where the viewshed was primarily of potential habitat located outside of the Project Area boundary effective at the time of the study.

A driving survey route was established along roads traversing the Project Area. Short-duration point counts were conducted at pre-determined locations along the route which provided visibility of potential habitat for grassland wintering raptors from the public road. Point-count locations were established approximately every 0.5 mile along the driving route where habitat was visible.

Potential habitat is located throughout the Survey Area and is visible from State Route 162, Flat Creek Road, Carlisle Road, Hilltop Road, and Conway Road. One driving survey route consisting of 18 stops was selected along the above roadways. Routes and survey stops are depicted on Figure 1. GIS shapefiles of the survey points and driving routes/stops are included in a zipped package as Appendix E.

2.2 Survey Protocol

The protocol for state-listed wintering grassland raptor surveys at the Flat Creek Solar Project followed the *NYSDEC Survey Protocol for State-listed Wintering Grassland Raptor Species, Draft 2015*, supplemented with input received from NYSDEC on December 3, 2020. Surveys included rotating stationary survey points as described above (Figure 1), and a driving route survey along public roads in areas of potential habitat.

Per NYSDEC recommendations, stationary surveys were designed such that weekly presence was maintained at the Project Area throughout the duration of the study, weather permitting. Approximately half of the stationary survey locations were surveyed each week such that all

stationary locations were surveyed over a two-week period ("Survey Event"). Stationary surveys were completed by a single observer.

A driving route survey was completed once during each Survey Event, with one of the two driving routes completed each week. Driving surveys were completed by a single surveyor. Surveyors followed a set route along public roads within the Project Area and completed five-minute point counts at each established point count location along the route. Where raptors were noted between intended point count locations, the driver pulled over as needed to confirm identification.

Survey dates were selected to take advantage of optimal weather during each Survey Event; however, some surveys were conducted under unfavorable conditions. Whenever possible, surveys were not conducted during inclement weather that would significantly interfere with either visibility or use of sites by raptors. Inclement weather included heavy precipitation, dense fog, or strong winds (i.e., wind speed 3 or 4 on Beaufort Scale).

2.2.1 Number and Timing of Surveys

Surveys were performed in winter of 2020-2021 and were conducted during the NYSDEC recommended study period between November 15, 2020, and March 31, 2021 (study period). This study was initiated on November 16, 2020. Due to observations of listed species during the last two weeks of March, an additional Survey Event was completed between April 1 and April 15, 2021. A total of 11 complete Survey Events occurred during the study period, which ended on April 15, 2021. One complete Survey Event encompassed stationary surveys at all stationary locations and one daytime driving survey along the driving route, conducted over a two-week period.

Stationary surveys were initiated one hour before sunset and concluded when it was too dark to see flying birds, typically one-half hour after sunset, or up to one hour after sunset if conditions such as snow cover or a full moon allowed for observing flying birds after dark. This timing targeted the temporal window when overwintering raptors are foraging and leaving/returning to their roosts.

The driving route survey was initiated prior to stationary surveys scheduled for the day, providing for ample time to complete the driving route and mobilize to stationary survey locations within the required timeframe.

2.2.2 Surveyor Preparedness

Field biologists with experience conducting natural resource assessments, including rare, threatened and endangered species assessments, performed this study. Biologists received specialized training in bird observation and species identification. In addition, surveyors familiarized themselves with the survey protocol, survey locations, driving routes, and the Project Area as a whole to facilitate identification of site-specific features that raptors may use (i.e., stacked hay bales, trees stumps, fence posts, etc.). This training also highlighted the importance of surveyor concealment next to a parked vehicle or hedgerow vegetation to lessen behavioral

avoidance by wintering raptors during the stationary surveys. Biologists were outfitted with binoculars with a magnification of 10x42 or higher and received training on proper use and techniques.

2.2.3 Data Collection

Detailed weather and bird observation data was collected during each survey. All data was entered onto digital data forms accessed by smartphone or tablet. Data was collected on forms adapted from those utilized by the Hawk Migration Association of North America (HMANA) for raptor migration surveys using HMANA-suggested codes and guidelines. An example data form is provided in Appendix B. Any observed roost sites, foraging paths, or flight paths were recorded digitally, and appended to the digital data sheet. Data was collected for any raptor or owl species observed at the Project Area. Additionally, observations of listed non-raptor species, arctic songbirds and winter resident grassland birds (i.e., snow buntings (*Plectrophenax nivalis*), [redacted], and Lapland longspurs (*Calcarius lapponicus*)), and incidental observations were documented, if sighted. Incidental observations include species documented within the Project Area, outside of the scheduled survey window (i.e., when walking to or from a survey location).

A data form was completed for each survey, regardless of anything observed. General information that was recorded on the forms include:

- project name,
- survey type (driving or stationary),
- survey location,
- visit number,
- date,
- observer name(s),
- survey start and end time,
- duration of survey (minutes), and
- sunset time.

2.2.3.1 Weather Observations

Weather conditions known to influence detectability of raptor species were noted at the beginning of each survey and as conditions changed significantly throughout the survey. Parameters that were recorded included:

- wind speed (recorded based on the Beaufort scale),
- wind direction (compass direction from which the wind is coming, or “variable”),
- temperature (degrees Fahrenheit),
- relative humidity (percent relative),
- barometric pressure (in mmHg),
- percent cloud cover,
- visibility (approximate distance in kilometers [km]),

- precipitation, and
- snow depth (inches [in]) and condition (i.e., powder, crust, slush, etc.).

2.2.3.2 Individual Raptor Observations

Observations of any raptor or owl were recorded continuously throughout each survey. When collecting data, surveyors performed continuous scanning of the habitat, both with the naked eye and with binoculars. The following data was recorded for each individual bird observed:

- species (if possible) or genera,
- whether the raptor observation was an incidental sighting or not,
- count of individuals,
- first and last time observed,
- duration of observation (rounded to the nearest minute),
- age class (if possible),
- gender (if possible),
- behavior (such as circling, flapping, gliding, hunting, perching, soaring, or other),
- general compass bearing flight direction (S, SSW, NE, etc.),
- approximate flight height (in feet),
- digital map of flight path(s)/roost site(s)/etc., and
- any additional notes about the observation.

In the event that a bird could not be identified to the species level, the bird was described to the greatest extent possible. For example, unknown raptors were further described as “buteo” versus “accipiter”, or “large” versus “small.”

If [redacted] or [redacted] were observed, documentation of behavioral observations of [redacted] and [redacted] was as specific as possible, particularly when attempting to identify potential [redacted] locations. [redacted] of [redacted] and [redacted] were documented where [redacted] behavior was observed. [redacted] behavior was identified by observing [redacted] dropping down to the ground and not taking flight again as it gets dark, or observation of one or more [redacted] taking flight from the ground in the evening. Additionally, any concentrated activity in an area at or near dusk, interactions between [redacted] and [redacted], and individuals coming and going or appearing from a [redacted], or other protected locations were noted as potential [redacted] locations. Locations of these sites, as well as number of individuals using a [redacted], were recorded in addition to the standard information recorded for all observations, if applicable. Additionally, [redacted] locations and substrate were recorded for [redacted] and [redacted]. Any observed [redacted] sites, foraging paths, or flight paths were documented digitally, overlain on photos of the Project Area, and then attached to the digital data form. Flight paths and roost locations for listed species are shown on Figure 5.

2.2.3.3 Additional and Incidental Observations

When it did not detract from the detection of target species, observations of non-raptor species and/or other animals were recorded as “Additional Observations” on the digital data form. The time of the observation and a description of the observation were recorded.

Target species (i.e., raptors) where observed outside of a regular survey period were recorded as incidental observations and appended to the stationary survey data form for the survey being conducted on the evening of the observation. During driving route surveys, individuals observed between driving stops were not considered incidental. These observations were appended to the survey data form at the next driving route stop.

A full list of avian species documented at the Project, including non-target species and those observed incidentally, is included as Appendix C.

2.2.3.4 Field Quality Assurance and Quality Control

Data forms were reviewed for completeness and accuracy prior to leaving the survey location. Any errors or inconsistencies noted were rectified at that time. Data was further reviewed and verified by Project management staff following each Survey Event. Data was analyzed concurrently with on-going field work to ensure Project objectives were being met by the types and method of data being collected.

2.3 Data Entry and Analysis

2.3.1 Data Entry

Data was uploaded to the survey database after every survey was completed in order to ensure that no data was stored on the devices on which it was collected. Flight paths and locations for listed and target species were digitized over aerial maps of the Project and appended to data forms. Survey Data Forms are provided as Appendix D in a zipped file.

2.3.2 Data Analysis

The following summaries and statistics were generated in map or table form as appropriate to address the objectives and goals of this study:

- species composition,
- number and frequency of observations,
- raptor use patterns, both temporal and spatial, throughout the Project Area,
- [redacted]/foraging site locations of state-listed species, if identified, and
- flight paths of state-listed species observed.

Standard statistical parameters (e.g., means) were computed where appropriate to support the basis for any determinations.

3.0 RESULTS

3.1 Survey Effort

A total of 99 stationary surveys and 196 driving route survey stops were completed over 11 Survey Events (Table 1). High winds were noted during surveys conducted on March 2, 2021, potentially impacting observations. [redacted] state-listed raptor species including [redacted], and [redacted], and [redacted]-state-listed species of special concern (SSC) [redacted], and [redacted], were observed during the study. Observations of state-listed raptor species are further described in Section 3.4. A list of all avian species documented at the Project is included as Appendix C.

Table 1. Summary of Survey Effort

Survey Event	Survey Dates	Number of Stationary Survey Hours	Number of Driving Route Stops Completed	Conditions Affecting Detectability	Raptors Observed
1	11/16/2020-11/24/2020	13.9	18	-	Yes
2	12/1/2020-12/08/2020	14.1	18	-	Yes
3	12/14/2020-12/23/2020	14.0	18	Snow depths >6 inches	Yes
4	12/28/2020-1/7/2021	14.2	18	-	Yes
5	1/12/2021-1/22/2021	14.1	18	-	Yes
6	1/25/2021-2/4/2021	14.1	18	Snow depths >6 inches	Yes
7	2/8/2021-2/17/2021	13.9	18	Snow depths >6 inches	Yes
8	2/23/2021-3/4/2021	13.9	18	High Winds; Snow depths >6 inches	Yes
9	3/8/2021-3/17/2021	13.6	18	-	Yes
10	3/22/2021-3/31/2021	14.0	18	-	Yes
11	4/4/201-4/14/2021	13.5	18	-	Yes

3.2 Stationary Surveys

A total of [redacted] observations of [redacted] raptor species were recorded over the 153.3 hours of surveys completed at stationary survey locations during the study. The most observed species was the red-tailed hawk, which was observed 41 times (45.1 percent of observations). Overall, [redacted] raptor use minutes[1] were recorded throughout the study for a mean use of [redacted][2]. Raptor use was highest by the red-tailed hawk, which had a mean overall use of 0.058. Table 2 summarizes the frequency and use of raptor species observed during stationary surveys. Listed species were observed during stationary surveys. Section 3.4 summarizes observations of state- and/or federally listed species. Observations of non-raptor species and species observed incidentally to surveys are discussed in Section 3.5.

Table 2: Frequency of Raptor Observations During Stationary Surveys by Species

Species	No. Observations[1]	Percent of Total Observations	Use Minutes[2]	Mean Overall Use[3]
American Kestrel	6	6.6	69	0.008
[redacted]				
Merlin	1	1.1	2	0.000
[redacted]				
Red-tailed Hawk	41	45.1	533	0.058
Rough-legged Hawk	1	1.1	5	0.001
[redacted]				
Turkey Vulture	10	11.0	12	0.001
Total Observations	**91**	**100.0**	**852**	**0.093**

1 Includes only observations recorded during regular surveys
2 Raptor use minutes are defined as the number of minutes raptors were observed within the Project Area during surveys.
3 Mean overall use is calculated by dividing the number of use minutes by the total number of survey minutes conducted to determine a use rate.
4 Indicates state-listed species

3.2.1 Spatial and Temporal Patterns of Raptor Use

Raptors were documented from all nine stationary survey locations. Table 3 summarizes the spatial distribution of observations recorded during stationary surveys. Raptor activity was concentrated at survey location [redacted], with a total of [redacted] observations of [redacted] species, representing [redacted] percent of stationary survey observations. Additionally, [redacted] accounts for [redacted] raptor use

[1] Raptor use minutes are defined as the number of minutes raptors were observed within the Project Area during surveys.
[2] Mean overall use is calculated by dividing the number of use minutes by the total number of survey minutes conducted to determine a use rate.

minutes, the [redacted] number of use minutes observed at a stationary location, behind [redacted] with [redacted] raptor use minutes.

Use at the Project Area was widespread, with observations occurring at [redacted] stationary survey locations; however, the most concentrated observations were in the [redacted] portions of the Project Area at locations [redacted] and [redacted] (Figure 2). The highest number of species was recorded at location [redacted] with [redacted] species observed (Table 3).

Table 3: Raptor Observations During Stationary Surveys by Survey Location

Survey Location	Species[1]	No. Observations[2]	% Total Observations	Use Minutes	Mean Overall Use
S1	Red-tailed Hawk	3	3.3	6	0.006
		3	**3.3**	**6**	**0.006**
[redacted]	[redacted]				
[redacted]	American Kestrel	6	6.6	69	0.067
	Red-tailed Hawk	3	3.3	138	0.132
[redacted]	[redacted]				
	Red-tailed Hawk	7	7.7	92	0.088
[redacted]	[redacted]				
	Merlin	1	1.1	2	0.002
	[redacted]				
	Red-tailed Hawk	5	5.5	66	0.065
	[redacted]				
	[redacted]				
	Turkey Vulture	1	1.1	1	0.001
[redacted]	[redacted]				
	[redacted]				
	Rough-legged Hawk	1	1.1	5	0.005
	[redacted]				
	Turkey Vulture	9	9.9	11	0.011
[redacted]	[redacted]				
	Red-tailed Hawk	12	13.2	162	0.155

Survey Location	Species[1]	No. Observations[2]	% Total Observations	Use Minutes	Mean Overall Use
	[redacted]				
	[redacted]				
[redacted]	[redacted]				
	[redacted]				
	Red-tailed Hawk	11	12.1	69	0.064
	[redacted]				
	[redacted]				
[redacted]	[redacted]				
	[redacted]				
	Grand Total	[redacted]			

1 indicates state-listed species

2 Includes only observations recorded during regular surveys

Observations were recorded during [redacted] 11 Survey Events. Raptor use documented on stationary surveys was highest during Survey Event [redacted] with a total of [redacted] use minutes across [redacted] observations (Figure 3). Raptor use was inconsistent throughout the study period, with several peaks throughout (Figure 3). The number of observations fluctuated as well. The greatest number of observations were recorded during Survey Events [redacted], and [redacted], with [redacted] observations each. Species richness was highest during Survey Events [redacted] and [redacted] with [redacted] species recorded during each.

3.3 Daytime Driving Surveys

Driving route surveys were conducted during every Survey Event throughout the study, with total observation time totaling 16.0 hours. A total of [redacted] raptor observations of [redacted] species were documented during driving route surveys, with [redacted] incidental observations also being recorded. Table 4 summarizes the frequency of raptor species observed during the driving surveys. [redacted] state-listed species, [redacted], was observed during daytime driving surveys. The [redacted], a state-listed SSC, was also observed. All species observed during the driving survey were also observed during the stationary surveys. Section 3.4 summarizes observations of state and/or federally listed species. Red-tailed hawks were the most frequently observed raptor during daytime driving surveys, accounting for 38.1 percent of raptor observations.

Table 4: Frequency of Raptor Observations During Daytime Driving Surveys by Species

Species	No. Observations	No. Incidental Observations	Percent of Observations
American Kestrel	1	1	4.8
[redacted]			
[redacted]			
Red-tailed Hawk	8	1	38.1
Rough-legged Hawk	5	1	23.8
[redacted]			
Turkey Vulture	2	-	9.5
Total Observations	[redacted]		

3.3.1 Spatial and Temporal Patterns of Raptor Use

Raptors were observed most frequently in the [redacted] portion of the Project Area during driving route surveys. Figure 4 summarizes the spatial distribution of observations recorded along the driving route. Raptors were observed from [redacted] of 18 driving route locations. The greatest number of observations ([redacted]) was recorded at driving survey location [redacted] which is adjacent to [redacted] and [redacted], bordered by [redacted]. No observations were recorded at driving survey locations [redacted] and [redacted] (Figure 4).

Table 5 summarizes the temporal distribution of observations recorded during driving route surveys. Raptor activity was heavily skewed toward the [redacted] of the survey season, with [redacted] of [redacted] observations occurring between Survey Events [redacted] and [redacted]. The highest number of raptor observations was recorded during Survey Event [redacted], which accounted for [redacted] percent of total observations during the study period. Species richness was greatest during Survey Event [redacted], with [redacted] raptor species observed.

Table 5: Raptor Observations During Driving Surveys by Survey Event

Survey Event	Survey Dates	Species	No. Observations	% Total Observations
[redacted]	[redacted]	[redacted]		
		Red-tailed Hawk	1	4.8
		Rough-legged Hawk	1	4.8
		[redacted]		
		Turkey Vulture	1	4.8
			[redacted]	

Survey Event	Survey Dates	Species	No. Observations	% Total Observations
2	12/7/2020	Red-tailed Hawk	5	23.8
		Rough-legged Hawk	1	4.8
			6	**28.6**
3	12/22/2020	Red-tailed Hawk	2	9.5
			2	**9.5**
4	1/5/2021	No Raptors Observed		
[redacted]		Rough-legged Hawk	3	14.3
		[redacted]		
			[redacted]	
6	2/3/2021	No Raptors Observed		
7	2/17/2021	No Raptors Observed		
8	3/4/2021	No Raptors Observed		
9	3/15/2021	No Raptors Observed		
[redacted]		American Kestrel	1	4.8
		[redacted]		
		Turkey Vulture	1	4.8
			[redacted]	[redacted]
11	4/13/2021	No Raptors Observed		
		Grand Total	[redacted]	[redacted]

3.4 Project Area Use by State-Listed Species

A total of [redacted] observations of state-listed threatened, endangered, and special concern species, including [redacted] incidental observations, were recorded during the study period for a total of [redacted] use minutes. Observations were [redacted] [redacted] the Project Area but were [redacted] at stationary locations [redacted] in the [redacted] portion of the Project Area.

A total of [redacted] observations, including [redacted] incidental sightings, and [redacted] observations occurred during winter raptor surveys at the Project Area. [redacted] was observed for a total of [redacted] use minutes at [redacted] of the stationary survey locations and at [redacted] of 18 driving route stops. [redacted] were observed at [redacted] stationary locations for a total of [redacted] use minutes. These [redacted] species were documented at the [redacted] locations throughout the study, but not on the same survey days.

[redacted] was observed [redacted] times at [redacted] stationary locations for [redacted] use minutes and [redacted] driving route stop. [redacted] was observed at one stationary location for [redacted] use minute. [redacted] were observed at [redacted] stationary locations for [redacted] use minutes and at [redacted] driving route stop. [redacted] was observed at [redacted] stationary survey locations for [redacted] use minutes. Table 6 summarizes observations of state-listed species.

[redacted] *Observations*

A total of [redacted] (SE) were recorded during the study period, with all observations occurring during stationary surveys. [redacted] of these observations occurred at location [redacted], [redacted] occurred at [redacted], and [redacted] occurred at [redacted], located in the [redacted] and [redacted] portions of the Project Area (Figure 5). The first observation (location [redacted]) occurred on November 24, 2020, and the last observation (location [redacted]) occurred on April 14, 2021. [redacted] were observed during every month of the study except January 2021. Most observations were brief (<3 minutes) and no observations was for longer than seven minutes.

More than one individual was observed at the same location, [redacted], on November 24, 2020. Individuals were documented actively hunting within the vicinity of [redacted] on several occasions (Survey Events [redacted], and [redacted]). The presence of multiple individuals at or near the ground, emerging at dusk to hunt fields suggests this location may contain a [redacted] location. Specific information for each observation is provided on the data forms in Appendix D.

[redacted] *Observations*

A total of [redacted] observations of [redacted] were recorded during or incidental to stationary surveys and [redacted] observations were recorded during daytime driving surveys. [redacted] of the stationary survey observations occurred at location [redacted] in the [redacted] portion of the Project Area, with remaining observations at locations [redacted] and [redacted] (Figure 5). The first observation occurred at location [redacted] on November 24, 2020, and the last observation occurred at location [redacted] on April 13, 2021. [redacted] of the [redacted] observations occurred during March. [redacted] observation of [redacted] individuals occurred on March 15, 2020, at location [redacted]; remaining observations were of a single individual. Hunting behavior was observed during all non-incidental observations. Observations of multiple individuals at a single location could indicate a potential [redacted] location in the vicinity of location [redacted]. No nesting or breeding behavior was documented for this species, and only [redacted] observation was recorded during the additional visit on April 14, 2021. Specific information for each observation is provided on the data forms in Appendix D.

[redacted] *Observations*

A total of[redacted] observations of [redacted] were recorded during or incidental to stationary surveys, with [redacted] incidental observation recorded during daytime driving surveys. [redacted] of the stationary survey observations occurred at location [redacted] in the [redacted] portion of the Project Area (Figure 5), and an additional [redacted] observations were recorded as incidental in the vicinity of this location. The first observation occurred on December 8, 2020 (location [redacted]) and the last observation

occurred on March 10, 2021 (location [redacted]). [redacted] observations except for [redacted] occurred between December 8, 2020, and February 8, 2021, with [redacted] of the [redacted] observations recorded on December 23, 2020. Common behaviors include circling, perching, gliding, and soaring. Individuals were observed using multiple perch locations proximal to survey locations where observed, specifically along [redacted] to the [redacted] and [redacted] of [redacted]. No nests or nest-building behaviors were documented for any observation of this species. Specific information for each observation is provided on the data forms in Appendix D.

[redacted] ***Observation***

[redacted] was observed during stationary surveys at location [redacted] on March 29, 2021, for [redacted] minute. The individual was recorded flapping and hunting behind a barn to the [redacted] of the survey location (Figure 5).

[redacted] ***Observations***

[redacted] were observed during stationary surveys at locations [redacted] and [redacted] on December 29, 2020, and January 13th, 2021, respectively. The individuals were recorded flapping, gliding, and perching for [redacted] minute each (Figure 5).

[redacted] ***Observations***

[redacted] observations of [redacted] (SSC) were recorded during the survey period, with [redacted] occurring during stationary surveys and [redacted] occurring daytime driving surveys. There was also [redacted] observation recorded incidentally to the daytime driving survey. The first observation occurred on November 24, 2020 (location [redacted]) and the last observation occurred on March 29, 2021 (location [redacted]). Individuals were observed flying through or across the Project Area, with individual observed to be hunting on November 24, 2020, in [redacted] to the [redacted] of location [redacted]. Specific information for each observation is provided on the data forms in Appendix D.

Table 6. Observations of State-listed Species

Species	Listing Status	No. Observations[1]	No. Incidental Observations[2]	Survey Locations Observed[3]	No. Use Minutes[4]	Roosts/ Roosting Behavior Recorded
[redacted]						
[redacted]						
[redacted]						

Species	Listing Status	No. Observations[1]	No. Incidental Observations[2]	Survey Locations Observed[3]	No. Use Minutes[4]	Roosts/ Roosting Behavior Recorded
[redacted]						
[redacted]						
[redacted]						

1 Includes only observations recorded during regular surveys
2 Includes only observations recorded incidentally to regular surveys
3 Includes both stationary and driving route survey locations
4 Calculated using only observations recorded during regular stationary surveys

Flight paths documented for listed species observed during surveys are shown in Figure 5. No definitive [redacted] locations were documented, though a potential [redacted] may exist in the vicinity of survey location [redacted] based on behaviors observed in proximity to this point. GIS shapefiles of winter raptor survey stationary points and driving routes/stops, state-listed and special concern species observations, and the Project Area are included as Appendix E, a zipped file.

3.5 Additional Observations

Twenty-nine non-raptor avian species were recorded during surveys including American woodcock (*Scolopax minor*) eastern meadowlark (*Sturnella magna*), [redacted], ruffed grouse (*Bonasa umbellum*), and snow bunting. Observations include both those documented during scheduled surveys and incidentally while observers were present within the Project Area. A list of all avian species observed is provided as Appendix C.

4.0 CONCLUSIONS

A total of 153.3 hours of stationary surveys and 16.0 hours of driving surveys were completed over 11 Survey Events during the Winter Raptor Survey implemented at the Project. [redacted] observations of [redacted] species were recorded during stationary surveys, with an additional [redacted] observations of [redacted] species during driving surveys. Across both surveys a total of [redacted] species were observed. Both stationary and driving wintering grassland raptor surveys at the SunEast Flat Creek Solar Project indicated that the Project Area is used most by red-tailed hawks. Activity was [redacted] the Project Area but was concentrated in the [redacted] portion of the Project Area near stationary location [redacted].

Observations were recorded at [redacted] stationary survey locations. No observations were recorded at driving survey locations [redacted], and [redacted].The number of birds observed was relatively consistent throughout the study period with the more than[redacted] observations recorded during [redacted] of the [redacted] survey events. However, use was highest during the middle and end of the study period, peaking during Survey Event [redacted].

[redacted] state listed species were observed during the study, including [redacted] (ST), [redacted] (SE), [redacted] (ST), [redacted] (SE), and [redacted] species of special concern, [redacted] and [redacted]. [redacted] were observed throughout the Project Area, during most Survey Events. [redacted] were observed primarily at stationary location [redacted], during multiple Survey Events. [redacted] was observed [redacted] at location [redacted] in the [redacted] portion of the Project Area during Survey Event [redacted]. [redacted] were observed [redacted] the Project Area during Survey Events [redacted]

Behaviors exhibited by the [redacted] and [redacted] observed suggest both species are winter [redacted], utilizing the Project Area for foraging and potentially [redacted] during the winter season. No nests or breeding behavior were documented for any state-listed species observed. No additional studies to determine presence and use by state-listed wintering grassland raptors are recommended at this time.

5.0 REFERENCES

eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org.

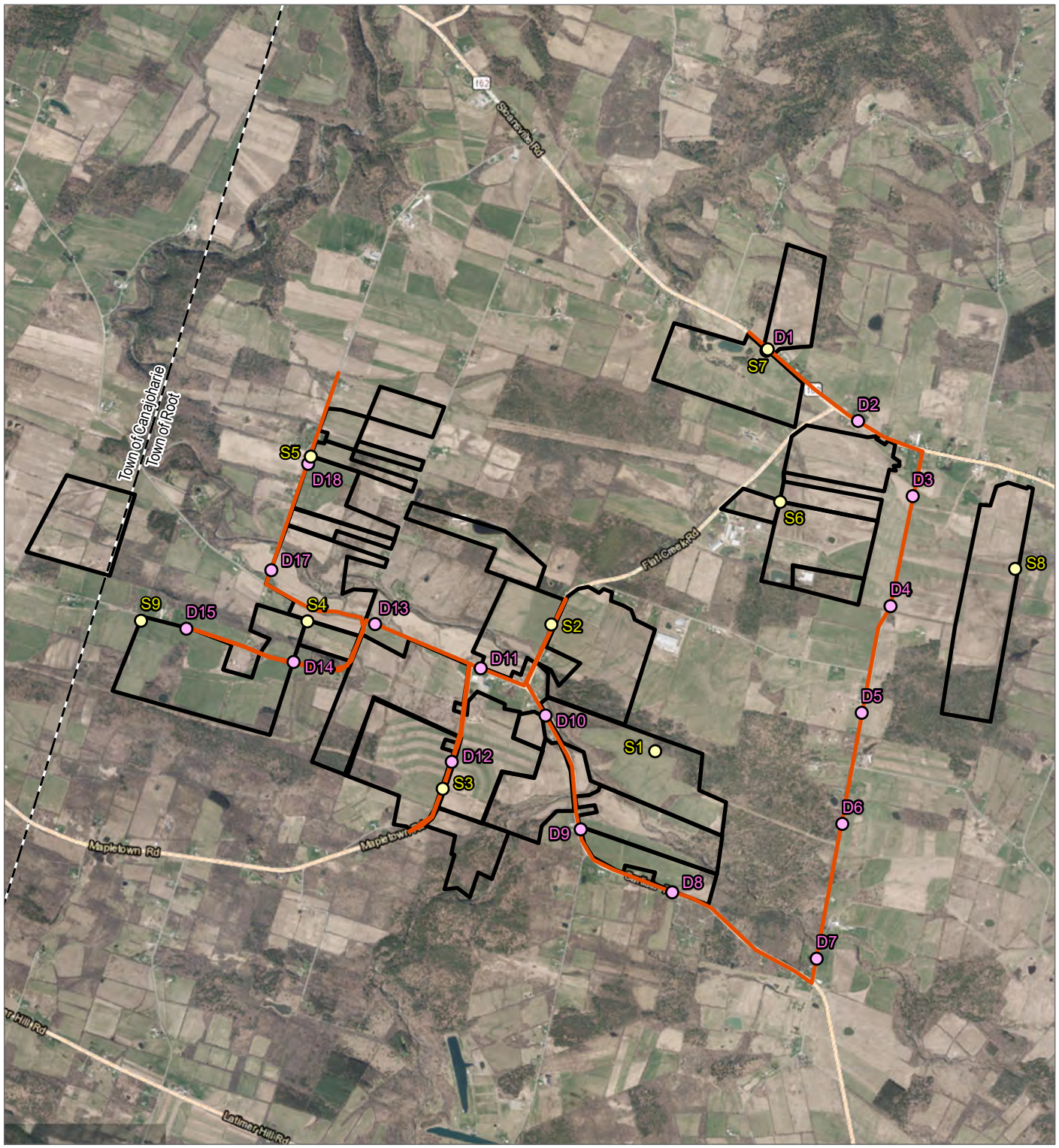
Hawk Migration Association of North America (HMANA). 2005. Hawk Migration Association of North America Daily Report Form and data collection instructions. Information available online at: www.hmana.org

New York State Department of Environmental Conservation (NYSDEC). Environmental Resource Mapper (ERM). Available at https://gisservices.dec.ny.gov/gis/erm/

NYSDEC. 2015. New York State Department of Environmental Conservation Survey Protocol for State -listed Wintering Grassland Raptor Species- Draft 2015.

FIGURES

Figure 1. Wintering Grassland Raptor Survey Locations



- DRIVING SURVEY LOCATION
- STATIONARY SURVEY LOCATION
- DRIVING ROUTE
- PROPOSED PROJECT AREA
- MUNICIPAL BOUNDARY

BASE MAP: ESRI WORLD IMAGERY MAP SERVICE
DATA SOURCES: ESRI, TRC

N

0 1,750 3,500
FEET
1:42,000 1" = 3,500'

New York Overview

SITE LOCATION

PROJECT: **SUNEAST - FLAT CREEK SOLAR PROJECT**
MONTGOMERY COUNTY, NY

TITLE:
WINTER RAPTOR SURVEY
SURVEY LOCATIONS MAP

DRAWN BY:	R. BARBER	PROJ. NO.:	427281
CHECKED BY:	R. MONROE		
APPROVED BY:	K. BARNSTEAD		**FIGURE 1**
DATE:	APRIL 2021		

TRC
10 MAXWELL DRIVE
CLIFTON PARK, NY 12065
PHONE: 518-348-1190

FILE: Flat_Creek_WRS

Coordinate System: NAD 1983 StatePlane New York East FIPS 3101 Feet. Map Rotation: 0
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Figure 2. Raptor Use Minutes Recorded During Stationary Surveys by Survey Location

[redacted]

PROPOSED PROJECT BOUNDARY

MUNICIPAL BOUNDARIES

BASE MAP: ESRI WORLD IMAGERY MAP SERVICE
DATA SOURCES: ESRI, TRC

N

0 1,750 3,500

FEET

1:42,000 1" = 3,500'

New York Overview

SITE LOCATION

PROJECT: **SUNEAST - FLAT CREEK SOLAR PROJECT**

MONTGOMERY COUNTY, NY

TITLE: **RAPTOR USE MINUTES RECORDED DURING STATIONARY SURVEYS BY SURVEY LOCATION**

DRAWN BY:	R. BARBER	PROJ. NO.:	427281
CHECKED BY:	R. MONROE		
APPROVED BY:	K. BARNSTEAD		**FIGURE 2**
DATE:	APRIL 2021		

TRC
10 MAXWELL DRIVE
CLIFTON PARK, NY 12065
PHONE: 518-348-1190

FILE: Flat_Creek_WRS

Coordinate System: NAD 1983 StatePlane New York East FIPS 3101 Feet. Map Rotation: 0
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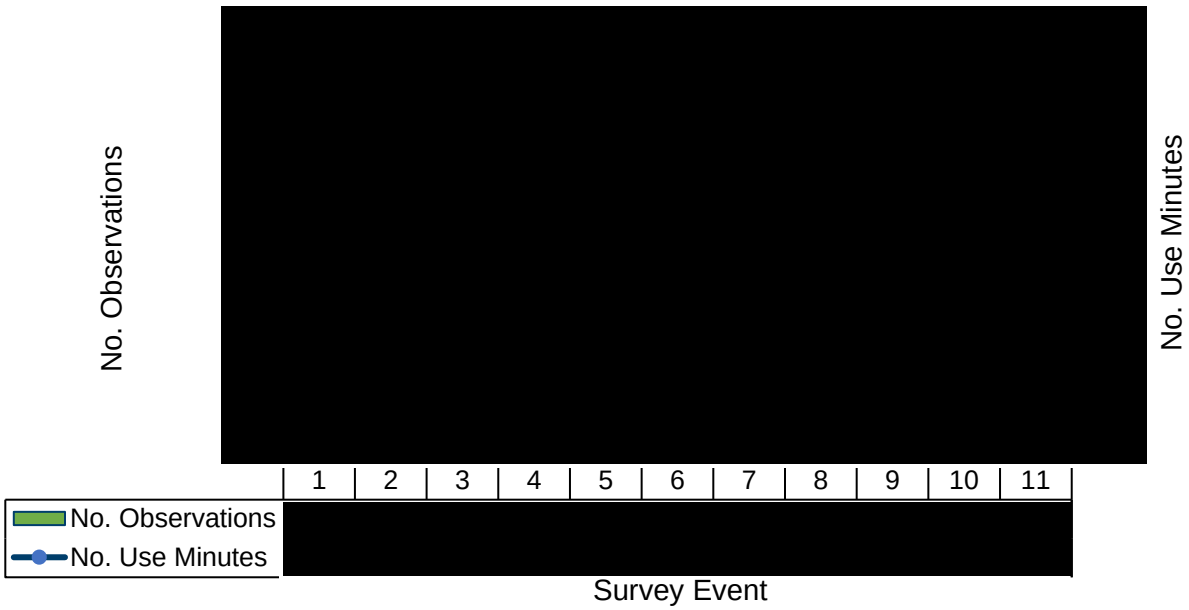

Figure 3. Number of Observations and Raptor Use by Survey Event for Stationary Surveys

Figure 4. Distribution and Frequency of Raptor Observations During Daytime Driving Surveys

OBSERVATIONS

[redacted]

DRIVING ROUTE

PROPOSED PROJECT BOUNDARY

BASE MAP: ESRI WORLD IMAGERY MAP SERVICE
DATA SOURCES: ESRI, TRC

N

0 1,750 3,500

FEET

1:42,000 1" = 3,500'

New York Overview

SITE LOCATION

PROJECT: **SUNEAST - FLAT CREEK SOLAR PROJECT**

MONTGOMERY COUNTY, NY

TITLE: **DISTRIBUTION AND FREQUENCY OF RAPTOR OBSERVATIONS DURING DAYTIME DRIVING SURVEYS**

DRAWN BY:	R. BARBER	PROJ. NO.:	427281
CHECKED BY:	R. MONROE		
APPROVED BY:	K. BARNSTEAD		**FIGURE 4**
DATE:	APRIL 2021		

TRC
10 MAXWELL DRIVE
CLIFTON PARK, NY 12065
PHONE: 518-348-1190

FILE: Flat_Creek_WRS

Coordinate System: NAD 1983 StatePlane New York East FIPS 3101 Feet. Map Rotation: 0
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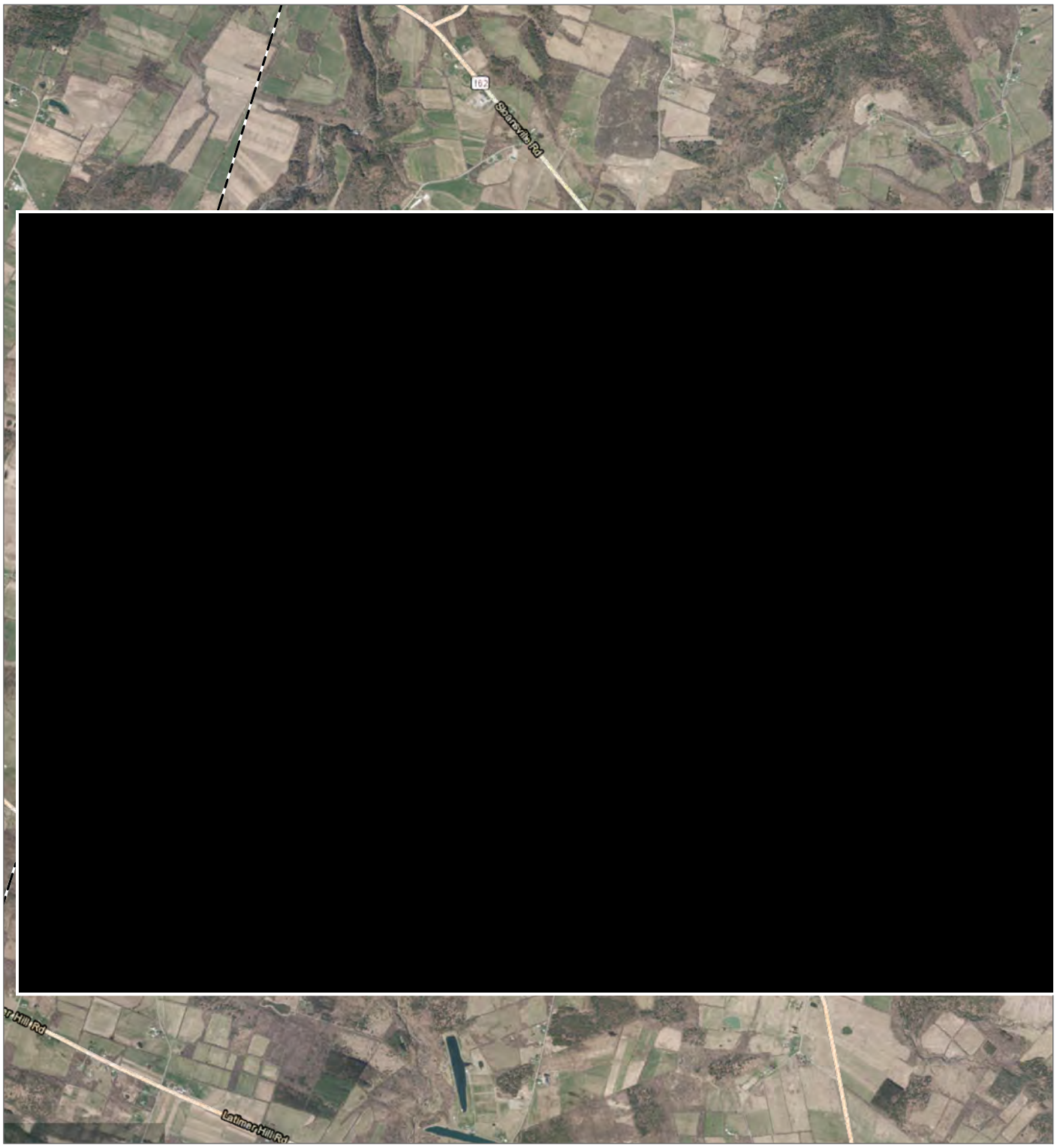
Figure 5. Listed Species Flight Paths



DRIVING SURVEY LOCATION
STATIONARY SURVEY LOCATION
DRIVING ROUTE
[redacted]
PROPOSED PROJECT BOUNDARY

BASE MAP: USGS NATIONAL MAP
DATA SOURCES: TRC

N

0 1,750 3,500
FEET
1:42,000 1" = 3,500'

New York Overview

SITE LOCATION

PROJECT: **SUNEAST- FLAT CREEK SOLAR PROJECT**
MONTGOMERY COUNTY, NY

TITLE:
OBSERVATIONS OF STATE-LISTED SPECIES

DRAWN BY:	R. BARBER	PROJ. NO.:	427281
CHECKED BY:	R. MONROE		
APPROVED BY:	K. BARNSTEAD		**FIGURE 5**
DATE:	APRIL 2021		

TRC
10 MAXWELL DRIVE
CLIFTON PARK, NY 12065
PHONE: 518-348-1190

FILE: Flat_Creek_WRS

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APPENDIX A

NYSDEC SURVEY PROTOCOL FOR STATE-LISTED WINTERING GRASSLAND RAPTOR SPECIES DRAFT 2015

New York State Department of Environmental Conservation
Survey Protocol for State-listed Wintering Grassland Raptor Species
DRAFT- 2015

These protocols describe requirements for determining presence and site use by state-listed threatened/endangered grassland raptor species during the winter season as part of the NYSDEC permit review process for a project application. These protocols specifically target the New York state listed Short-eared Owl (Endangered) and Northern Harrier (Threatened). Information obtained from surveys will be considered in determining the possible need for additional comprehensive studies (e.g., using radio-telemetry and/or night-vision optics), regulatory review and, if necessary, avoidance, minimization, and/or mitigation strategies pursuant to 6 NYCRR Part 182.9.

Survey Periods

Surveys should be conducted during the winter season, here defined as November 15-March 31, the primary time period during which Short-eared Owl and Northern Harrier often occur at winter concentration areas. At a minimum, surveys will be conducted every other week between November 15 and March 31, for a total of nine survey periods during the course of the winter season. Additional surveys may be required in April should Short-eared Owls and/or Northern Harrier be present at the project site during the second March survey period. When that occurs, applicants should discuss the possible need for April and/or breeding season surveys with NYSDEC.

Establishing Survey Points and Driving Routes

The primary survey method for wintering Short-eared Owl and Northern Harrier should consist of a regimented series of visual scans and observations with binoculars from one or more stationary points or "stations" within a given project area. A spotting scope may also be necessary to aid in making positive species identifications for birds perched far from a survey station. The total number of stations will depend on the size of the project area, the amount of grassland habitat within the project area, and the visibility of that grassland habitat from selected survey station(s). Survey stations should be situated in or near grassland habitat at vantage points with clear visibility in all directions, or most directions if stations are from roadside locations or edges of grasslands. Actual observations should be made from within or next to a vehicle or blind if the station is within an open grassland habitat. When the station is at the edge of grassland habitat, the observer(s) should be backed up to a hedgerow or other background feature at the edge of a grassland habitat, or within or next to a vehicle. Stations should not be located further than 1,000 meters from one another (observations have shown that birds seen at distances greater than 1,000 meters are less likely to be correctly identified to species), and the total number of stations need to provide full coverage of the grassland habitat within the entire project site.

Driving routes, where an observer drives between a series of roadside stops and conducts observations of a short duration from multiple stationary, roadside locations may serve as

an additional survey method for Northern Harrier. However, due to the short time period during which Short-eared Owls are active and visible before dark, driving surveys **cannot** be the sole survey method at a project site. Driving route(s) for a site should include all roads within the project site from which grassland habitat can be easily viewed. The number and distribution of roadside stops will be dictated by the length and distribution of roads in the project area, and what areas may be viewed from various roadside stops. Stops located approximately a half mile apart will typically allow for sufficient coverage.

Timing of Surveys

Because of the late afternoon/evening activity period of Short-Eared Owls, surveys for State-listed wintering grassland raptor species **must** be conducted during the 1 hour before sunset to ½ hour (or up to 1 hour) after sunset period described below. Daytime surveys and/or driving route surveys can be added as an additional survey method, but cannot replace the evening surveys.

Short-eared owls are crepuscular and nocturnal hunters and while they may occasionally, and at some sites, be active in the late afternoon, winter surveys conducted throughout New York State from 2008-2013 indicate that at many sites, they often do not leave their daytime roost to begin hunting until sunset or later, and sometimes just 5 or 10 minutes before full dark. Northern Harriers are diurnal and crepuscular raptors and may be seen hunting throughout the day, but are most active in the morning and late afternoon right up until sunset, when they can be observed landing at their nighttime roost site. In order to observe both species, surveys **must** be conducted from one hour before sunset until it is too dark to observe flying birds (up to one hour after sunset). On many nights, especially those with clear, moonlit skies, and on days with complete snow cover, birds can frequently be seen well after the official time of sunset. Therefore, the entire length of the survey will typically be 1.5 hours, but on some nights could be as long as 2.5 hours, depending on conditions and bird activity.

Conducting Surveys

These required surveys have two primary purposes: (1) documenting the presence (occupied habitat) or apparent absence of the target species, and (2) recording particular areas used by the target species, such as roost sites or foraging areas, within a project site. Both Short-eared Owls and Northern Harriers typically roost on the ground, though Short-eared owls may roost in conifers or thick hedgerows when snow becomes deeper than roughly 6 inches. At times, these two species may roost in close proximity to one another and Northern Harriers may be observed dropping to the ground at their nighttime roost just before dark at the same time that Short-eared Owls are leaving their daytime roost to begin foraging for the evening. The period surrounding sunset is particularly critical for the identification of likely roost locations and determining the number of individuals using them.

Surveys should not be conducted during inclement weather, including precipitation, fog, or moderate to strong winds (i.e. wind greater than 12 mph, or Beaufort Scale 3). Multiple

observers at different stations and/or multiple evenings will be needed to sufficiently cover most project sites for a given stationary survey period because the survey time constraints dictate that an observer can only cover one station per evening. Repeated trips on additional evenings may be necessary to adequately confirm species presence or suspected absence and to adequately document foraging and roost areas. For example, Short-eared Owls may fly considerable distances from roost sites to foraging areas. Appropriately stationing observers on subsequent nights farther out along these flight paths may be necessary to identify important foraging areas.

Observers conducting stationary surveys should scan the available grassland habitat throughout the course of the survey period. Particular attention should be paid to birds perching on fence posts, on utility poles, on hay bales, coursing low over the ground, or perched on the ground. Observers should also listen for the bark-like call of the Short-eared Owl and rapid series of *kek* calls of the Northern Harrier.

While one observer is sufficient for conducting stationary surveys at a given station, two observers are recommended if driving routes are conducted. As noted above, survey stops will typically be spaced approximately a half mile apart. Roadside surveys for other established bird monitoring programs vary from 3-5 minutes per survey stop and this should be considered a minimum time for the purposes of these winter grassland raptor surveys, though there would be no restriction regarding a longer observation time period. The length of the driving route and the number of points to be included would dictate whether stops last longer than 3-5 minutes. At each stop, the observer(s) should get out of the vehicle and scan the surrounding suitable open-country habitat in all directions for the 3-minute (or longer) observation period. For each raptor seen, record the time that each raptor is first observed and mark its location on a map. Behavior or activity notes must also be recorded. If a raptor is observed while driving between stops, the observation location and data should be recorded upon reaching the next stationary point.

Observations of other species during the stationary and driving surveys, as well as incidentally while on the project area (not necessarily during the survey period), should also be recorded on data sheets. Other species of interest include all state-listed endangered, threatened, and special concern species, all raptors (owls, hawks, falcons, eagles, osprey), shrikes, and arctic-breeding songbirds such as snow buntings, larkspurs, and pipits.

Recording Data

Data recorded for each survey must include: date; observer name(s); survey location (i.e. stationary survey locations and driving route stops, if any); start and end time of observation period; weather information (including temperature, wind speed, wind direction, snow depth, and cloud cover); number and identification of each species observed; individual behavior; and the location of target species relative to observer. Record Northern Harriers as male or female/juvenile. Observations of all raptors should also be documented, and birds identified to species, where possible. When species identification is uncertain, record “unidentified raptor”, although “unidentified buteo” or

"unidentified accipiter" would be preferable where possible. Location coordinates for all Short-eared Owls and Northern Harriers must be provided or locations indicated on an aerial photograph or map of the survey area. Where raptors fly into or out of an area of visibility, indicate direction of flight on the maps. Foraging and roost areas should be clearly shown on the maps.

Specific behaviors to be noted for Short-Eared Owl and Northern Harrier include foraging (defined as flying low over vegetation, over in a back and forth pattern, and dropping to or toward the ground in an attempt to capture prey, at least once during the observation period), perching (as on elevated perches such as fence posts, utility poles, hay bales, on the ground, etc.), fly-through (i.e., straight-line flight such as when relocating between roosting and foraging areas), and roosting. Flight height and direction should be recorded for all raptors observed at proposed wind energy projects.

Any likely roost areas should also be noted on aerial photographs, maps, and data sheets. Roost areas would be suspected in cases where one or more Short-eared owls are observed arising from the ground or conifers in the evening and then begin flying and foraging activities, or where one or more Northern Harriers are active in an area near dusk and are then observed dropping to the ground, but not coming back up as it gets dark. Late winter surveys (late March and April) should specifically document any breeding behavior observed.

Reporting Requirements

A detailed, site specific work plan, including stationary survey locations and driving route stops, if they are to be used, should be developed and submitted to NYSDEC for review and written approval prior to the start of field work. A final report should be submitted to NYSDEC at the conclusion of each year of surveys. Final reports should include data sheets; maps (ideally recent aerial photographs); summaries of all observations of Short-eared Owls, Northern Harriers, and any other state-listed species; and a conclusion whether more comprehensive studies may be necessary to assess the potential for the project to negatively affect endangered or threatened winter raptor species.

APPENDIX B

DATA FORM EXAMPLE

APPENDIX C

List of Avian Species Observed

Common Name	Scientific Name	Listing Status
American Crow	*Corvus brachyrhynchos*	-
American Goldfinch	*Spinus tristis*	-
American Kestrel	*Falco sparverius*	HPSGCN
American Robin	*Turdus migratorious*	-
American Tree Sparrow	*Spizelloides arborea*	-
American Woodcock	*Scolopax minor*	SGCN
[redacted]	[redacted]	[redacted]
Black-capped Chickadee	*Poecile atricapillus*	-
Canada Goose	*Branta canadensis*	-
Common Raven	*Corvus corax*	-
[redacted]		[redacted]
Downy Woodpecker	*Picoides pubescens*	-
European Starling	*Sturnus vulgaris*	-
Great Blue Heron	*Ardea herodias*	-
Killdeer	*Charadrius vociferus*	-
Merlin	*Falco columbarius*	-
Mourning Dove	*Zenaida macroura*	-
Northern Cardinal	*Cardinalis cardinalis*	-
Northern Flicker	*Colaptes auratus*	-
[redacted]		[redacted]
Pileated Woodpecker	*Dryocopus pileatus*	-
Red-tailed Hawk	*Buteo jamaicensis*	-
Red-winged Blackbird	*Agelaius phoeniceus*	-
Ring-billed Gull	*Larus delawarensis*	-
Rock Pigeon	*Columba livia*	-
Rough-legged Hawk	*Buteo lagopus*	-
Ruffed Grouse	*Bonasa umbellum*	SGCN
[redacted]		[redacted]
Snow Bunting	*Plectrophenax nivalis*	-
Song Sparrow	*Melospiza melodia*	-
Turkey Vulture	*Cathartes aura*	-
Wild Turkey	*Meleagris gallopavo*	-
Wilson's Snipe	*Gallinago delicata*	-

APPENDIX D

SURVEY DATA SHEETS (*provided as zipped file*)

APPENDIX E

GIS SHAPEFILES (*provided as zipped file*)

ATTACHMENT B

SURVEY LOCATION PHOTOS

(DIGITALLY PROVIDED AS A COMPRESSED FILE)

ATTACHMENT C

SURVEY DATA SHEETS

(DIGITALLY PROVIDED AS A COMPRESSED FILE)

ATTACHMENT D

GIS SHAPEFILES

(*DIGITALLY PROVIDED AS A COMPRESSED FILE*)