THE STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE
SITE EVALUATION COMMITTEE

SEC DOCKET NO. 2019-02

APPLICATION OF CHINOOK SOLAR, LLC FOR A CERTIFICATE OF SITE AND FACILITY FOR THE CHINOOK SOLAR PROJECT IN FITZWILLIAM, NEW HAMPSHIRE

PREFILED SUPPLEMENTAL TESTIMONY OF DANA VALLEAU
ON BEHALF OF
CHINOOK SOLAR, LLC
August 31, 2020

Q. Please state your name and business address.

A. My name is Dana Valleau. My business address is TRC, 14 Gabriel Drive, Augusta, Maine 04330.

Q. Who is your current employer and what position do you hold?

A. I am employed by TRC as an Environmental Specialist and Project Manager.

Q. Have you testified previously in this docket?

A. Yes. On October 18, 2019, I submitted pre-filed direct testimony jointly with Kara Moody in this docket. That testimony described the potential effects of the Chinook Solar Project on the natural environment, including wetlands, vernal pools, wildlife and wildlife habitat. The testimony also summarized the actions that Chinook Solar took to map, inventory, and review the natural resources at the Project site, and to analyze potential effects of the Project on natural resources and wildlife, including an acoustic bat

survey.

Q. Are you adopting that testimony in its entirety as your own testimony?

A. Yes I am. Ms. Moody will not be testifying during the hearing. Instead, I will be the witness who will sponsor the original direct pre-filed testimony, as well as this supplemental testimony.

Q. Since you filed your direct testimony in this docket has anything happened that would change any of the issues that were the subject of that testimony?

A. Yes, at least to some degree. Since that time we have participated in informational hearings and a public hearing before the Committee and received comments from members of the public. We have also worked with consultants hired by Counsel for the Public ("CFP") and the Town of Fitzwilliam. In addition, we have had subsequent discussions with representatives of different state agencies. CFP's consultants have also submitted pre-filed testimony which has raised some issues to which I would like to respond.

Q. What was raised in the July 8, 2020 testimony submitted by CFP to which you would like to respond?

A. The pre-filed testimony submitted by Arrowwood Environmental, LLC on behalf of CFP indicated that the Project will not have an unreasonable adverse impact on moose wintering areas, hard mast stand resources, wildlife corridors, streams, vernal pools, and wetlands. This testimony also found that the Project would not have an unreasonable adverse impact on Blanding's and wood turtles if additional conditions are incorporated

into the Project, conditions which the Applicant has agreed to with the New Hampshire Fish and Game Department ("NHF&G"). In addition, the testimony and analysis found that the Project is unlikely to have population-level impact on the silver-haired bat, eastern red bat, hoary bat, big brown bat, and tricolored bat if tree removal and construction activities are conducted in accordance with best management practices which the Applicant already outlined in its Application. The testimony noted that even though it is unlikely that the Project will contribute to a regional decline of little brown bats, it is possible that a well-designed conservation and habitat enhancement strategy could enhance the conservation and recovery of the little brown bat. It also said that given the Applicant's proposal to conduct tree removal during the non-active season (November-March) and conduct construction activities in accordance with United States Fish and Wildlife Service best management practices, it is unlikely to have population-level impacts on the northern long-eared bat. The testimony went on to say, however, that there is not enough information to adequately assess the impacts of the Project on deer wintering. The testimony also stated that more needs to be done to avoid wetland buffer impact and more was needed to assess rare and exemplary natural communities and rare, threatened, and endangered plants. Finally, the testimony expressed concern about the potential impact of construction and blasting impacts on the eastern small-footed bat and said that there should be a blasting monitoring plan or a Programmatic Agreement with NHF&G.

Q. Do you have any comment on the testimony regarding deer wintering areas?

A. The Applicant has consulted with NHF&G regarding potential wildlife impacts that could result from the Project. That Department has never expressed concern about the impact the Project could have on deer wintering areas and the Department never provided any mapping of deer wintering habitat to the Applicant. In fact, we submit that there is significant doubt as to whether the portion of the Project area under the control of the Applicant that will be disturbed to construct the Project even contains any deer wintering areas based upon the current condition of the area within the limit of disturbance. The deer wintering area mapping to which the Arrowwood testimony cites as coincident with the Project area was mapped through a modeling exercise by a student MS candidate at UNH. Discussion with the Department deer biologist about deer wintering area mapping indicated that the Department considers the UNH mapping as good at identifying some of the habitat characteristics, but that it is not as effective at predicting that a mapped area will be utilized by deer. The Department biologist also stated that the deer wintering area mapping is not meant to be regulatory in nature, which is at least part of the reason why the Applicant was not informed by the Department about the deer wintering area mapping. In addition, we want to point out that Chinook Solar is offering to set aside the remainder of the area under the Applicant's control that will not be disturbed by the Project, an area that is approximately 342 acres in size. This area would be conserved and thereby enhance any deer wintering areas that could otherwise be disturbed by other potential development activities, making this a distinct

improvement over much of the current area, which could be disturbed by development at any time.

Q. Do you have any comment on the portion of Arrowwood's testimony concerning wetland buffer impacts?

A. Chinook Solar has discussed wetland impacts and wetland buffer impacts with the New Hampshire Department of Services ("NHDES") and have also reviewed it with the Town's environmental consultant. Based on those discussions we submit that the Project does not require permits for the vegetation clearing proposed and sufficiently avoids wetland buffer impacts. In order to respond to Arrowwood's conclusion that only one road is necessary to access the solar arrays in one of the array areas, located in the southeast area of the Project, we have reviewed engineering design in that area. While we believe having two roads is far preferable from a construction, service and safety perspective, and that two roads as designed will not have any unreasonable adverse effect on the natural environment, the design will be modified to include only one road. The existing road that is part of the current design will be kept and the second road, which would be new construction, will be removed from the layout.

Q. Do you have any comment on the portion of Arrowwood's testimony concerning natural communities, and rare, threatened and endangered plants?

A. As we noted in various materials submitted with the Application, Chinook Solar consulted with the New Hampshire Natural Heritage Bureau ("NHNHB") on natural communities, and rare, threatened and endangered plants. The NHNHB determined that

there are no known rare or exemplary natural communities in the Project site. Further, during a consultation meeting with the NHNHB, dated March 15, 2019 (provided in Appendix 15C of the Application) they state: "Overall, this site appears unlikely to support rare plant species." For this reason, as well as observations we have made while on the site, we do not believe that more needs to be done to assess natural communities on the Project site. That said, to help address these concerns Chinook Solar performed a rare plant and natural community survey during August 2020. A survey report is attached to this testimony as Attachment A. The survey did not discover any plants that are included on the NHNHB tracking list. The habitats observed were fairly uniform mixed forest – dominated by beech, paper birch, hemlock, red maple, and red oak, with a minor component of white ash. These areas had been cut over in recent years, including one area of a recent clear cut and chipping operation at the north end of the Project area, and others cut estimated to have been conducted over the past 10-20 years. Plant diversity on the site was in general quite low and included typical plants for the region, with some weedy and invasive introduced plant species found along the logging roads and along the powerline corridor margin. The report, which includes a species list, has been shared with the NHNHB and CFP. Moreover, as noted above, approximately 342 acres of land that is outside of the proposed limit of disturbance will be set aside and protected from development as part of this Project. This will clearly benefit any natural communities that might be present now or in the future.

Q. Do you have any comment on the portion of Arrowwood's testimony concerning the need for a blasting monitoring plan or Programmatic Agreement?

A. I would like to point out that the Applicant has consulted numerous times with NHF&G on wildlife in general and various bat species in particular, starting a few years before the Application was submitted and continuing up to the time of this supplemental testimony. At no time during these discussions did NHF&G express any particular concern about various bat species in connection with this Project, nor did they suggest there was a need for a blasting plan or a Programmatic Agreement. For this reason, as well as observations we have made on the site, and other materials submitted as part of the Application, including the bat monitoring that was done by the Applicant in 2016, we do not agree that there is a need for a blasting plan or a Programmatic Agreement. Chinook Solar has performed additional acoustic bat surveys on the site in order to provide more information to NHF&G and the CFP. See Attachment B for the survey report. In summary, these acoustic bat surveys were designed to meet the 2020 USFWS Survey Guidelines for northern long-eared bat ("NLEB"). In order to address concerns about rock habitats that may be occupied by eastern small footed bat, acoustic detectors were also placed at three locations identified on the site that have potential roosting habitat for eastern small-footed bat. Potential roosting habitat for eastern small-footed bats include rock outcrops, talus slopes, rock piles, or rock walls. As suggested in the CFP response to data request Q.33, Scott Reynolds defers to my familiarity with rock features within the Project area. Mr. Reynolds provided a response to Q.1 which

included a photo of a rock feature, marked as CFP 144 in the attachments to the response. See Attachment C for Q.33, the CFP response and CFP 144. I assisted on site with review of rock features in the Project area, and the rock feature depicted in CFP 144 and two sites along rock walls were selected for acoustic detector deployment. Based on the results of the habitat assessment, four detectors targeting NLEB and three additional detectors targeting eastern small footed bats were deployed for up to 6 detector nights between August 5-11, 2020 for a total of 30 detector-nights. Although eastern small-footed bat was the target species at three of the detector locations, these sites were suitable for NLEB as well. Weather conditions were met during all nights of the survey. Results of these surveys indicate that the acoustic detectors deployed did not detect the presence of NLEB or eastern small-footed bat. A single bat pass was classified as the federally threatened NLEB and the state endangered eastern small-footed bat by analysis software, but presence was not confirmed during manual vetting. All NLEB, eastern small-footed bat, tricolored bat (*Perimyotis subflavus*) and a subset of little brown bat (*Myotis lucifugus*) classifications were reviewed for false negatives. The presence of six species were confirmed at the Project during the survey including big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), little brown bat, and tri-colored bat. A survey report has been shared with NHF&G and CFP.

Q. Are there any issues that have come up during information sessions, the public hearing, or in written comments that have been filed with the Committee which you would like to discuss?

A. I noticed that one comment has been filed with the Committee (Suzanne Fournier – April 8, 2020) which says that there is no record of any survey of reptiles or endangered turtles or any study of their use of the site. As noted in the Application and original pre-filed testimony, we have discussed these issues with the NHF&G and as a result of those discussions they did not recommend surveys, but they did recommend practices to avoid and minimize potential for impacts to rare turtles. Chinook Solar has agreed to install a perimeter silt fence around the entirety of the construction area following turtle hibernation and prior to spring emergence. An environmental monitor, who is a qualified biologist, will also inspect the perimeter prior to the start of construction each day to search for turtles and to inspect the condition of the silt fence. Any turtles found in the area will be relocated outside of the construction area. Environmental awareness training, including Project specific concerns, will also be provided to individuals working at the Project during construction.

Q. What issues have come up in discussions with the Town of Fitzwilliam that you would like the Committee to be aware of?

A. We conducted a site visit with an environmental consultant hired by the Town, Rick Van de Poll. As a result of that site visit, we made a few wetland line adjustments in three areas: one small wetland adjacent to the substation location; one small wetland

on the east side of the stream crossing that is outside of the Project footprint but is adjacent; and an adjustment to the wetland line on the west side of the bridge crossing that will cause a shift to the location the stream crossing to avoid wetland impacts. We agreed to make these wetland delineation revisions. Mr. Van de Poll also wanted us to change the characterization of two stream segments, both outside of the Project limit of disturbance, one intermittent to perennial (we did find aquatic obligate animals in the stream) and one ephemeral drainage to intermittent which is supported by obligate aquatic flora. We have also made these changes. A revised resources map, wetland table, stream table, and Army Corps forms are provided in Attachment D.

Q. What discussions have you had with state agencies since the Application was filed which you would like to describe to the Committee?

A. Since the Application was filed we have had discussions with NHF&G. The goal of the discussions is a written agreement with NHF&G which incorporates any concerns the Department has about the Project, including turtle impacts as discussed above, as well as what seed mix to use when we reseed the disturbed area around the solar arrays. We have also had subsequent discussions with the NHDES. In November 2019, I had discussions with Craig Rennie, Inland Wetland Supervisor, Wetlands Bureau, regarding wetland spans and use of existing logging roads on the Project site. A summary of those discussions were provided to Mr. Rennie and also were filed with the Committee November 26, 2019. I also had discussions with Bethann McCarthy, P.E., Alteration of Terrain Bureau, regarding acceptable seed mixes to use on the Project site for permanent

stabilization. Additional discussions with NHDES are covered in the supplemental testimony of Joseph Persechino.

Q. Is there anything else you would like to discuss in this, your supplemental testimony?

A. Yes. In Section D.1. of the Chinook SEC Application, we would like to add one more agency having jurisdiction, the Environmental Protection Agency New England, which issues the Construction General Permit.

Q. Does this conclude your supplemental testimony?

A. Yes.

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ATTACHMENT A

Rare Plant Survey Memo Report

Gilman & Briggs Environmental
1 Conti Circle, #5, Barre, VT 05641
Ph: 802-479-7480; team@gbevt.com

MEMORANDUM

To: Dana Valleau, TRC
From: Art Gilman
Date: 26 August 2020
Re: Chinook Solar Project, Fitzwilliam, NH: Botanical Resources

Chinook Solar proposes development of a large solar array on lands south of NH Rte. 119 and west of Fullam Hill Road in Fitzwilliam, New Hampshire. The parcel lies on the upper west slopes of Fullam Hill. The area is generally upland, with major streams to the west (Scott Brook) and to the southeast (Woodland Brook). A small portion of the project area drains westerly to Scott Brook, but the majority drains southward via Woodland Brook. The site is underlain by Concord granite, although no outcrops were observed; it comprises several soil types, primarily characterized (NRCS) as very stony fine sandy loams.

On 13 August 2020, I inspected portions of the land that are proposed for development of the solar project, as shown on the accompanying Figure 1, for the presence of any rare, threatened, or endangered plants on the New Hampshire Natural Hertiage Bureaus's"tracking list." The project has been designed to avoid wetlands, resulting in a footprint with a convoluted boundary. My searches included the actual footprint as well as some intervening lands, inspected while accessing different portions of the footprint. I did not extend searches to the extensive wetlands along Scott Brook or Woodland Brook; although within the project ownership, these areas are not within the proposed project. As noted, the project has been designed to avoid wetland areas, but wetland plants noted in the overall list (Table 1) were mostly observed plants in these intervening areas.

Searches were conducted using a combination of the Focused (Intuitive Controlled) Survey and "Random Survey protocols developed by the USDA Forest Service (2005).[1] Following desktop review of available resources, maps, and aerial photographs, I determined there were no particular habitats requiring complete searches, unless encountered in the field, so I did not focus on any particular areas of the project area Under the random search protocol, the entire area is inspected for potential suitable habitats for rare species, i.e., habitat patches in which particular, listed tracking list species might occur based on particular habitat requirements, and if encountered, then these are thoroughly searched (it is true as well that rare plants are sometimes encountered where not anticipated). This search method, similar to a mathematical "Levy walk" is considered optimum for finding rare targets in a large environment (e.g., Sakiyama and Gunji 2013 and references therein).

[1] Quoting, "The Focused, or Intuitive Controlled, Survey is the most commonly used and most efficient method of surveying for TES [threatened, endangered and sensitive] plants. During pre-field analysis, potential suitable habitat is identified for each species of interest and the survey effort is focused in those areas." … "Random surveys employ and undirected, typically non-linear, traverse through a project area."

Results

I observed no rare, threatened, or endangered species in the subject area, which is forest that has been subject to recent harvesting operations, with some areas of clearcuts and, in one area at the north end, with complete harvesting and chipping. The area is dissected with numerous logging roads and there are several log landings. The forest is apparently at the second- or third-growth stage following former agricultural use (there are some old stone walls apparent) and is of mixed, upland character, with white pine, red oak, and red maple prominent. It is also of a uniform character, with no remarkable stands of any one species. The shrub layer and the ground layer plants are common and typical for the area; I would consider that the communities in general have low diversity. Overall, the habitats are very typically for southern New Hampshire, especially for areas of granitic bedrock which (because they are so common in New Hampshire), in general do not support plant species considered rare.

The only community encountered to be considered different from this general forest type is a small wetland centered in the recently clearcut area in the northern tip. This is a small peatland with an abundance of *Sphagnum* and little water movement. Plants such as Massachusetts fern (*Parathelypteris simulata* and lesser prickly sedge (*Carex echinata*) were observed in this community. However, no rare species were observed within the community.

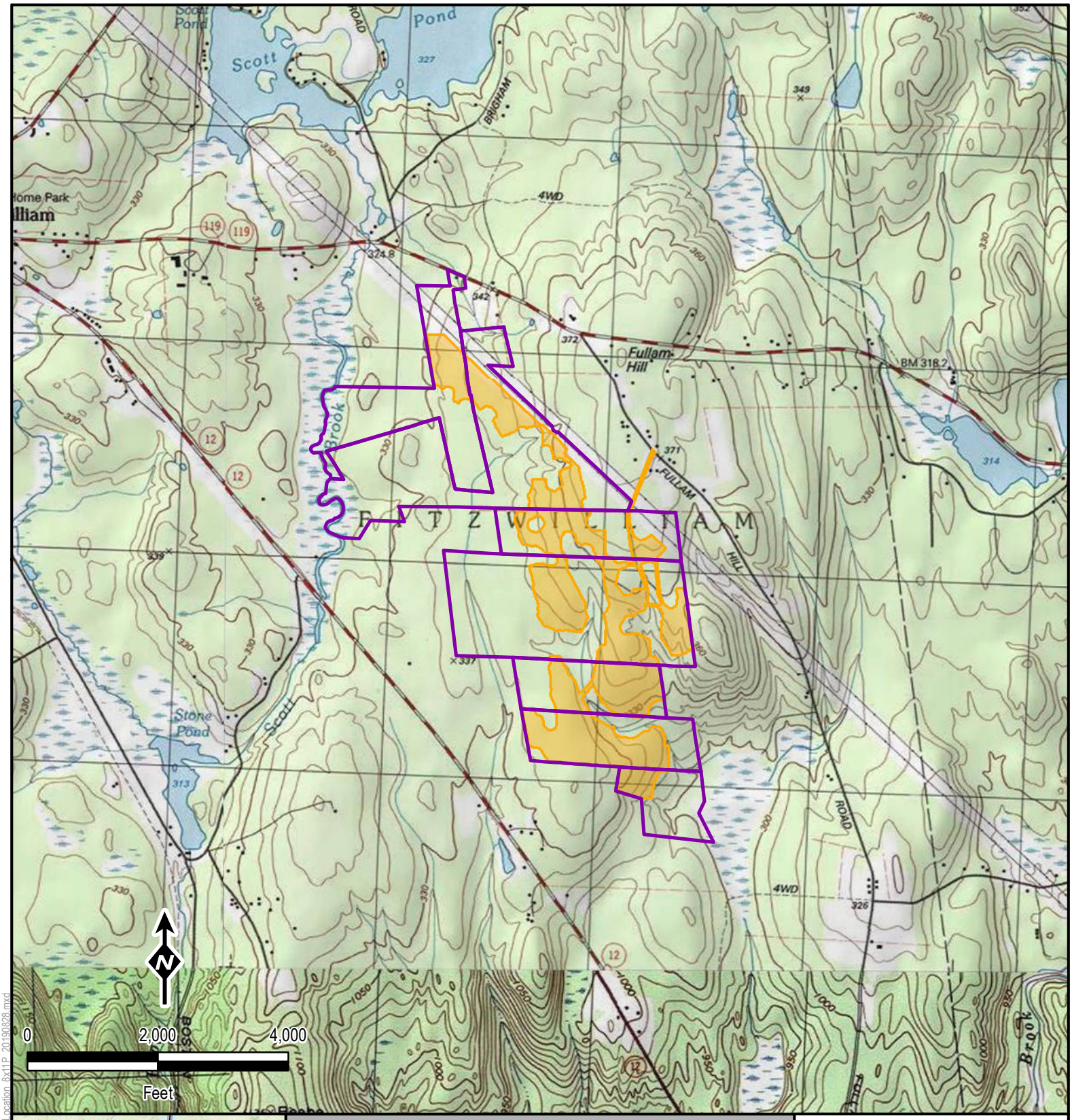
A complete list of plant species observed (Table 1) is attached.

Literature Cited:

Haines, A. 2011. Flora Novae Angliae, Flora Novae Angliae: A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England. Yale University Press, New Haven

Sukiyama, T. and Y.-P. Gunji. 2013. Emergence of an optimal search strategy from a simple random walk. Royal Society Interface 10(86). Doi: 10.1098/rsif.2013.0486

USDA Forest Service. 1998. 2005. Threatened, Endangered and Sensitive Plants Survey Field Guide. Washington, DC.



Legend

- Project Land Control
- Limit of Work (156.8 acres)

Sources: ESRI, NEER, TRC.

Chinook Solar, LLC
Chinook Solar Project

Figure 1
Project Location Map

Fitzwilliam, NH

Created: 8/28/2019

TRC

6 Ashley Drive
Scarborough, Maine 04074

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Table 1. Plants observed, 13 Aug 2020, on the Chinook Solar project, Fitzwilliam, NH. Note, only areas within and adjacent to the proposed development were searched, while substantial portions of the parcel, including the extensive wetlands in the northwest (along Scott Brook) and southeast (along an unnamed Wood Brook) were not inspected. Non-forest, weedy species are mostly from along margins of logging roads and log-landings. Taxonomy from Haines (2011)

Scientific Name	**Common Name**
TREES, SHRUBS & WOODY VINES	
Abies balsamea	Balsam fir
Acer pensylvanica	Striped maple
Acer rubrum	Red maple
Betula alleghaniensis	Yellow birch
Betula lenta	Sweet birch
Betula papyrifera	Paper birch
Betula populifolia	Gray birch
Comptonia peregrina	Sweet-fern
Elaeagnus umbellatus	Autumn olive
Fagus grandifolia	Beech
Frangula alnus	Glossy buckthorn
Fraxinus americana	White ash
Gaylussacia baccata	Black huckleberry
Hamamelis virginiana	Witch-hazel
Ilex verticillata	Winterberry
Kalmia angustifolia	Sheep laurel
Larix laricina	Tamarack
Picea rubens	Red spruce
Pinus resinosa	Red pine
Pinus strobus	White pine
Prunus pensylanica	Pin cherry
Prunus serotina	Black cherry
Quercus rubra	Red oak
Rhus typhina	Staghorn sumac
Rubus alleghaniensis	Tall blackberry
Rubus flagellaris	Dewberry
Rubus hispidus	Bristly dewberry
Rubus idaeus	Red raspberry
Sorbus americana	American mountain-ash
Spiraea alba var. *latifolia*	Meadowsweet
Spiraea tomentosa	Steeplebush
Tsuga canadensis	Hemlock
Vaccinium angustifolium	Low sweet blueberry
Vaccinium corymbosum	Highbush blueberry
Viburnum nudum var. cassinoides	Wild raisin
FERNS & ALLIES	
Dendrolycopodium dendroideum	Tree clubmoss
Dennstaedtia punctilobula	Hay-scented fern

Table 1., cont.

FERNS & ALLIES, cont.	
Dryopteris campyloptera	Mountain woodfern
Dryopteris carthusiana	Spinulose woodfern
Dryopteris cristata	Crested woodfern
Dryopteris intermedia	Intermediate woodfern
Dryopteris marginalis	Marginal woodfern
Equisetum arvense	Field horsetail
Equisetum sylvaticum	Woodland horsetail
Onoclea sensibilis	Sensitive fern
Osmunda claytoniana	Interrupted fern
Osmunda regalis	Royal fern
Osmundastrum cinnamomeum	Cinnamon fern
Pararthelypteris simulata	Massachusetts fern
Pteridium aquilinum	Bracken
Thelypters palustris	Marsh fern
GRASSES, SEDGES & RUSHES	
Agrostis scabra	Ticklegrass
Agrostis tenuis	Brown bent grass
Anthoxanthum odoratum	Sweet vernal grass
Brachyelytrum aristosum	Short-husk grass
Calamagrostis canadensis	Canada blue-joint
Carex arctata	Drooping wood sedge
Carex brevior	
Carex communis	Common sedge
Carex crinita	Fringed sedge
Carex deweyana	Dewey's sedge
Carex echinata	Lesser prickly sedge
Carex folliculata	Follicle sedge
Carex intumescens	Swollen sedge
Carex leptalea	Bristle-stalked sedge
Carex lurida	Sallow sedge
Carex scoparia	Broom sedge
Danthonia compressa	Flat-stemmed oat grass
Dichanthelium acuminatum ssp. *implicatum*	Panic grass
Dichanthelium acuminatum ssp. *fasciculatum*	Panic grass
Dichanthelium clandestinum	Deer-tongue grass
DIgitaria sanguinalis	Crabgrass
Echinochloa crus-galli	Barnyard grass
Eleocharis obtusa	Obtuse spike-rush
Glyceria striata	Fowl manna-grass
Juncus brevicaudatus	Rush
Juncus canadensis	Canada rush
Juncus marginatus	Grass-leaved rush
Juncus tenuis	Path rush

Table 1, cont.

GRASSES, SEDGES & RUSHES, cont.	
Panicum capillare	Old witch grass
Rhynchospora capitellata	Small-headed beakrush
Scirpus cyperinus	Wool-grass
Scirpus hattorianus	Hattori black bulrush
Setaria pumila	Yellow foxtail grass
HERBS	
Agalinis tenuifolia	Slender gerardia
Ambrosia artemisiifola	Ragweed
Aralia hispida	Bristly aralia
Arisaema triphyllum	Jack-in-the-pulpit
Bidens frondosa	3-leaved beggar-ticks
Capnoides sempervirens	Pale corydalis
Cardamine pensylvanica	Bittercress
Chrysosplenium americanum	Golden saxifrage
Coptis trifolia	Goldthread
Cornus canadensis	Bunchberry
Cypripedium acaule	Moccasin flower
Epilobium coloratum	Willow-herb
Erechtites hieraciifolia	Fireweed
Erigeron strigosus	Daisy fleabane
Eupatorium perfoliatum	Boneset
Euthamia graminifolia	Grass-leaved goldenrod
Fallopia cilinodis	Fringed bindweed
Galium palustre	Marsh bedstraw
Galium tinctorium	Bedstraw
Gaultheria procumbens	Wintergreen
Gentiana linearis	Linear-leaved bottle gentian
Hieracium paniculatum	Panicled hawkweed
Hieracium scabrum	Rough-leaved hawkweed
Houstonia caerulea	Bluets
Hydrocotyle americana	Water pennywort
Hypericum canadensis	Canada St. John’s-wort
Hypericum perforatum	Common St. John’s-wort
Impatiens capensis	Jewelweed
Lactuca biennis	Wild lettuce
Lactuca canadensis	Canada wild lettuce
Leucanthemum vulgare	Oxeye daisy
Lobelia inflata	Indian tobacco
Lotus corniculatus	Bird’s-eye trefoil
Lycopus uniflorus	Water-horehound
Lysimachia borealis	Starflower
Lysimachia ciliata	Fringed loosestrife
Maianthemum canadense	False lily-of-the-valley
Medeola virginiana	Indian cucumber
Nabalus albus	White snakeroot

Table 1., cont.

HERBS, cont.	
Nabalus altissimus	Tall white lettuce
Oenothera biennis	Biennial evening primrose
Oenothera perennis	Sundrops
Oxalis montana	Wood sorrel
Oxalis stricta	Yellow wood sorrel
Packera aurea	Golden ragwort
Persicaria hydropiper	Water smartweed
Persicaria pensylvanica	Smartweed
Persicaria sagittata	Arrow-leaved tearthumb
Plantago rugellii	Plantain
Polygala sanguinea	Red milkwort
Potentilla recta	Sulphur cinquefoil
Potentilla simplex	Old-field cinquefoil
Pseudognaphalium obtusum	Cudweed
Rubus pubescens	Dwarf raspberry
Scutellaria lateriflora	Mad-dog skullcap
Solanum ptychanthum	Black nightshade
Solidago canadensis	Canada goldenrod
Solidago juncea	Early goldenrod
Solidago nemoralis	Ashy goldenrod
Solidago puberula	Downy goldenrod
Symphyotrichum lateriflorum	Calico aster
Symphyotrichum pilosum var. *pringlei*	Pringle's aster
Symphyotrichum puniceum	Red-stemmed aster
Trifolium aureum	Yellow hop clover
Trifolium pratense	Red clover
Trifolium repens	White clover
Trillium undulatum	Painted trillium
Uvularia sessilifolia	Bellwort
Verbascum thapsus	Mullein
Vicia cracca	Cow vetch
Viola cucullata	Marsh blue violet
Viola labradorica	Dog violet
Viola sagittata var. *ovata*	Arrow-leaved violet

ATTACHMENT B

2020 Bat Survey Report

TETRA TECH

Date: August 24, 2020

Mr. Ben Dritenbas
NextEra Energy Resources
700 Universe Blvd
Juno Beach, FL 33408

Project	**Northern Long-eared Bat (NLEB) Presence/Absence and Eastern Small-footed Bat Potential Roost Location Survey at Chinook Solar Project.**
Town	**Fitzwilliam, NH**
Area of Forest for Clearing	**158 acres (Limit of Work)**
Surveyor Name/Firm	**Clinton Parrish / Tetra Tech, Inc.**
Nights of Detector Operation	**August 5–10 2020**
# of Detectors/Total Detector-nights	**7 Detectors / 30 Detector-nights**
Survey Results	**NLEB/Eastern small-footed bat: NOT DETECTED**

Dear Mr. Dritenbas,

This report contains summary results of the northern long-eared bat (*Myotis septentrionalis*, NLEB) summer presence/absence survey performed for the Chinook Solar Project (Project) located near Fitzwilliam, NH. This survey differed from typical NLEB presence/absence surveys in that additional survey effort for eastern small-footed bat (*Myotis leibii*) was included per information requests received during expert witness testimony and technical sessions. Specifically, that rock features within the Project be acoustically surveyed to determine if they serve as roost locations for eastern small-footed bat. Although there were two objectives for this survey effort, results are presented cumulatively for the survey following the 2020 U.S. Fish and Wildlife Service (USFWS) *Range-wide Indiana Bat Summer Survey Guidelines for Indiana Bat and Northern Long-eared Bat* (Guidelines; USFWS 2020).

Acoustic detectors deployed by Tetra Tech, Inc. (Tetra Tech) did not detect the presence of NLEB or eastern small-footed bat. One bat pass was classified as the federally threatened NLEB and one bat pass was classified as the state endangered eastern small-footed bat by analysis software, but presence was not confirmed during manual vetting. All NLEB, eastern small-footed bat, tri-colored bat (*Perimyotis subflavus*) and a subset of little brown bat (*Myotis lucifugus*) classifications were reviewed for false negatives. The presence of six species were confirmed at the Project during the

Tetra Tech, Inc.
451 Presumpscot Street, Portland, Maine 04103
Tel 207.358.2400 Fax 207.879.9481 www.tetratech.com

survey including big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), little brown bat, and tri-colored bat.

The following memo provides a summary of the survey. Appendix A includes Project detector maps and photographs illustrating site conditions and microphone orientation. Appendix B includes copies of the completed Phase 1 Summer Habitat Assessment forms for the Project. Appendix C includes a summary of Maximum Likelihood Estimates (MLE), and Appendix D includes resumes for relevant staff members involved with the Project.

1.0 Project Description

The Project entails solar development at a site approximately 2 miles southeast of Fitzwilliam, NH between routes 12 and 119 with a proposed Limit of Work (LOW) of 158 acres (Figure 1; Project Area). The Project Area has a recent history of frequent timber harvests and is characterized by recently cleared forest with openings created by skid roads and log landings. It is currently dominated by grasses and forbs and early to mid-successional forest. Dominant tree species in the mixed, managed forest include red maple (*Acer rubrum*), white pine (*Pinus strobus*), white birch (*Betula papyrifera*), red oak (*Quercus rubra*), and eastern hemlock (*Tsuga canadensis*). Historical land use at the Project Area and in the surrounding region was dominated by agriculture resulting in numerous rock piles and rock walls throughout the landscape. The Project Area is surrounded by contiguous forest with light residential development to the northeast along Fullnam Hill road and Route 119. Numerous ponds and lakes dot the region and Scotts Brook winds from north to south just west of the Project Area. Protected lands in the vicinity include Rhododendron State Park 3 miles to the east and Monadnock State park 5 miles to the north.

2.0 Methods

The summer presence/absence survey was conducted in accordance with the 2020 USFWS Guidelines (USFWS 2020). This survey utilized a two-phased approach: Phase 1, desktop and field-based habitat assessments, and Phase 2, acoustic surveys. Tetra Tech deployed full spectrum acoustic detectors during Phase 2, and the resulting data was processed using Kaleidoscope Pro version 4.2.0 (Wildlife Acoustics, Inc.). Qualified Tetra Tech personnel carried out all phases of the survey. Specific roles are summarized in Table 1; resumes for relevant staff are provided in Appendix D.

Table 1. Personnel Involved in NLEB Acoustic Presence/Absence Surveys and Analyses for Chinook Solar Project, Fitzwilliam, NH (August 2020).

Personnel	Desktop Analysis	Field Assessment	Detector Deployment	Acoustic Analysis	Qualitative Analysis
Clinton Parrish Wildlife Biologist	X	X	X	X	X
Derek Hengstenberg Wildlife Biologist	X				

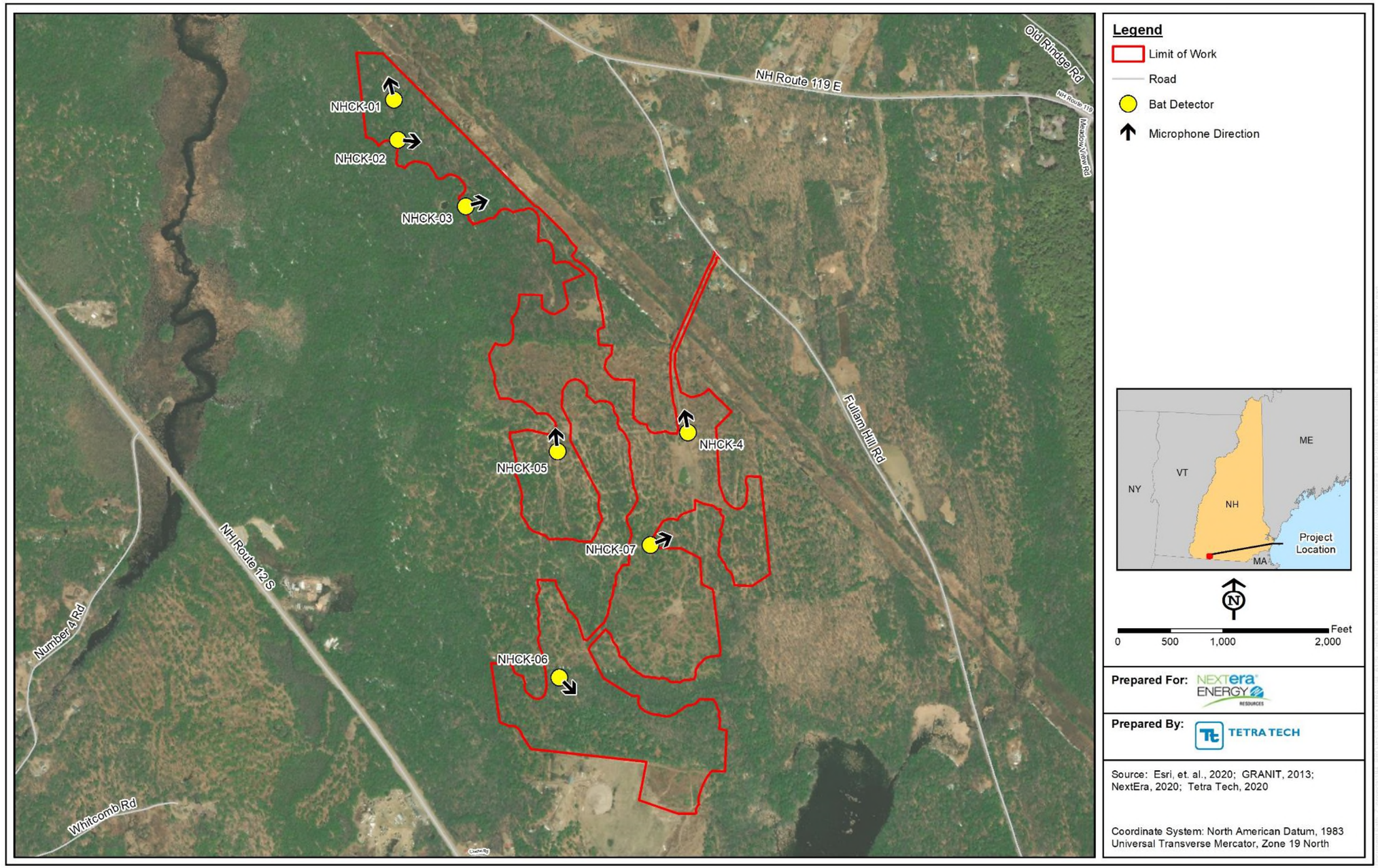

Figure 1. Locations of Acoustic Detectors Deployed at Chinook Solar Project, Fitzwilliam, NH (August 5–11, 2020).

2.1 Habitat Assessment

2.1.1 Desktop Assessment

Prior to conducting field work, Tetra Tech performed a desktop land cover analysis to identify suitable NLEB habitat within the proposed Project Area (Figure 1). Tetra Tech reviewed aerial photography and Google Earth imagery to identify areas that may be used by NLEB for foraging and roosting during the maternity season and spring/fall regional migration. This determination was based on forest patch size, proximity to closed-canopy forests, and landscape features that may be used by bats commuting between roosting and foraging habitats (e.g., forested tracts, wetlands, and streams). All relatively contiguous forested lands that were not highly fragmented by residential or commercial developments were considered suitable NLEB habitat, and all densely populated or developed stretches were determined to be unsuitable (USFWS 2020). The Guidelines indicate that for non-linear projects, one site or two detector locations are required per 123 acres of suitable habitat. The LOW for this non-linear project is 158 acres, all of which was considered suitable habitat. Therefore it was determined that two sites or four detector stations were required to meet the Guidelines.

North East Ecological Services identified rock features within the Project Area and provided the locations to Tetra Tech. In addition, stone walls within the Project Area were mapped by TRC as part of the site evaluation process. This information was used by Tetra Tech during the field-based assessment to locate potential suitable roosting sites for eastern small-footed bat.

2.1.2 Field-based Assessment

On August 5, 2020, Tetra Tech conducted a site visit to describe and verify the presence of the NLEB habitat identified during the desktop assessment, describe and assess the rock features and stone walls for suitability as eastern small-footed bat roosting habitat, and to deploy full spectrum acoustic detectors. General habitat descriptions are provided in Table 2. The completed Phase 1 Summer Habitat Assessment is included in Appendix B.

Table 2. Detector Station Descriptions and Survey Data for Chinook Solar Project, Fitzwilliam, NH (August 5–11, 2020).

Detector Station	Suitable NLEB Habitat	Target Species	Description	GPS Coordinates	Microphone Orientation (degrees)	Survey Dates (night of)	Level of Effort (detector nights)
NHCK-01	Yes	Eastern small-footed bat	Station is located within a recent clear cut along the intersection of a stone wall. Site offers good sun exposure.	42.775580, -72.112175	346°	8/5–8/9	5
NHCK-02	Yes	Eastern small-footed bat	Station is located within a recent clear cut along the intersection of a stone wall. Site offers good sun exposure.	42.774537, -72.111973	96°	8/5–8/9	5
NHCK-03	Yes	NLEB	Station is located along a slight flyway within mid-successional forest. An open water pond is located approximately 60 meters to the northwest. Several suitable snags present nearby.	42.772875, -72.109486	75°	8/5–8/9	5
NHCK-04	Yes	Eastern small-footed bat	Station is located along a road/flyway within mid-successional forest. Rock pile identified by NEES as potential eastern small footed bat habitat 20 meters from station.	42.767189, -72.101349	350°	8/5–8/8[1]	3.5
NHCK-05	Yes	NLEB	Station is located along a slight flyway along skid road within mid-successional forest. Old stone wall nearby, but it is collapsed and doesn't have good sun exposure.	42.766567, -72.105930	355°	8/5–8/7[2]	2.5
NHCK-06	Yes	NLEB	Station is located on the edge of recent timber harvest with numerous remnant wildlife trees that may serve as roost locations. Mature hemlocks and stonewall back station to the north. This edge may serve as flyway.	42.764224, -72.102516	68°	8/5–8/7[3]	3
NHCK-07	Yes	NLEB	Station is located along a slight flyway within mid-successional forest. An intermittent wetland was located approximately 60m to the east but was currently dry.	42.760681, -72.105567	135°	0	6

[1]Last recording on 8/8 at 10:21 PM
[2]Last recording on 8/8 at 1:13 AM
[3]Last recording on 8/8 at 5:55 AM

2.2 Acoustic Surveys

2.2.1 Detector Type

Wildlife Acoustics Song Meter-4 BAT ultrasonic bat detectors (Wildlife Acoustics, Inc., Massachusetts, USA) equipped with SMM-U2 microphones were used for the duration of the survey effort. Detectors were set to record from an hour before sunset to an hour after sunrise (approximately 8:05 PM–5:44 AM) in full-spectrum mode, and files were saved in .WAV format on internal SD cards.

The detectors were fully waterproof and were powered by internal D cell batteries. Each detector and microphone was tested prior to deployment with a Wildlife Acoustics Ultrasonic Calibrator to ensure equipment was functioning properly and device sensitivity was within the manufacturer's suggested thresholds. A "chirp test" with the Ultrasonic Calibrator was used to confirm all connections were sound and that the microphones registered high frequency noise once the detectors were set. Tetra Tech performed this test again at demobilization to ensure microphones were functioning while they were deployed. Log files were reviewed when units were pulled to verify proper functioning for the duration of the survey.

2.2.2 Detector Deployment

Four detectors were micro-sited in suitable habitat for NLEB within the Project Area to ensure potential habitats were sampled in accordance with the Guidelines. Detectors were deployed on August 5, 2020 and were retrieved on August 10 and 11, 2020. Detectors were deployed along potential flyways near open water and wetlands, canopy gaps created by logging roads, and forest edges.

Three detectors were micro-sited near rock features that may serve as potential roost structures for eastern small-footed bats. The extent to which these features may serve as roost locations for bats such as the eastern small-footed bat is not well known and suitability is likely related to sun exposure, which was available at all three sites. These sites were also suitable sampling locations for NLEB.

Microphones were mounted at a minimum height of 9 feet to avoid ground vegetation and to elevate the cone of detection. Microphones were oriented in line with suspected flight paths to increase the number of call pulses and quality of recordings. Therefore, specific orientation was determined by microsite conditions (arrows in Figure 1 indicate microphone direction at each station). Appendix A includes station conditions and photographs illustrating detector orientation.

2.2.3 Weather Requirements

Weather requirements outlined in the Guidelines (temperatures remain above 50 degrees Fahrenheit, no precipitation that exceeds 30 minutes, and sustained wind speed less than 9 miles/hour) must be met during the first 5 hours of the survey period for each detector-night for valid survey results. Weather history in hourly increments was reviewed from the closest weather station to the Project that had data on temperature, wind speed, wind gusts, precipitation rate, and precipitation accumulation. This ensured that the Guidelines were met for a valid survey night (Weather Underground 2020).

2.2.4 Acoustic Analysis

Tetra Tech analyzed the recorded data according to the Guidelines. Data was filtered and analyzed using Kaleidoscope Pro version 4.2.0, using the classifier "Bats of North America 4.2.0" for species of bats in New Hampshire at the 0 Balanced "Neutral" sensitivity level. Signals of interest ranged from 16–120 kilohertz, lasting 2–500 milliseconds, with a minimum of two call pulses. Full spectrum .WAV files were converted to zero-crossing using a division ratio of eight. All files, auto-classified as NLEB, eastern small-footed bat, and tri-colored bat were subsequently manually reviewed using SonoBat v 4.2.0. A subset of little brown bat calls were manually reviewed until the species' presence was confirmed for each site-night. Eastern small-footed bats, little brown bats, and tri-colored bats were included in qualitative analysis because of their elevated conservation status in New Hampshire (NHFG 2017).

In addition, a subsample of files auto-classified as big brown bat, silver-haired bat, and hoary bat were manually reviewed to confirm species presence. Bat passes auto-classified as "No ID" means that the program recognized the recording as a bat but could not identify it to species level. These "No ID" auto-classifications were filtered by characteristic frequency (Fc), and those with an Fc greater than or equal to 35 kilohertz were labeled "unidentified high frequency bat species" and those less than 35 kilohertz were labeled "unidentified low frequency bat species." Results were summarized by station and by night.

3.0 Results

The desktop and field-based habitat assessments revealed approximately 158 acres of suitable NLEB habitat within the LOW. Based on the results of the habitat assessment, Tetra Tech deployed four detectors targeting NLEB and three additional detectors targeting eastern small footed bats for up to 6 detector nights each August 5–11, 2020 for a total of 30 detector-nights. Although eastern small-footed bat was the target species at three of the detector locations, these sites were suitable for NLEB as well and results are presented cumulatively for the survey. Weather conditions were met during all nights of the survey (Table 3).

Table 3. Summary of Weather Information during the First 5 Hours of each Survey Night at Chinook Solar Project, Fitzwilliam, New Hampshire (August 5–11, 2020).

Survey Night	Temperature Range (Fahrenheit)	Wind Range (mph)	Precipitation	Qualifying Night
5-Aug	59–78	0–8	none	Y
6-Aug	57–76	0–0	none	Y
7-Aug	59–61	0–0	none	Y
8-Aug	61–65	0–3	none	Y
9-Aug	69–83	0–5	none	Y
10-Aug	73–81	0–5	none	Y

Interpreting results solely on the number of species' bat passes by software auto-classification can be misleading, as there are varying levels of confidence associated each classification. MLEs are used as a secondary measure to determine likelihood of species presence by incorporating known error rates for each species classifier within the software. In most cases, manual review of bat passes by experienced biologists serves as the most accurate method for species identification. MLEs indicate that seven of the eight New Hampshire bat species (big brown bat, eastern red bat, hoary bat, silver-haired bat, eastern small-footed bat, little brown bat, and tri-colored bat) are likely present within the Project Area (Table 4). Manual review confirmed the presence of these species except eastern small footed bat.

Tetra Tech recorded 2,846 total bat passes at the seven stations the nights of August 5–11, 2020 (Table 5). Batteries died prior to pulling the detectors on August 11 at stations NHCK-04, 05 and 06 (see Table 2 for survey nights and level of effort). Overall, six species are present in the Project Area, with 56 percent of the activity by big brown bat, followed by little brown bat and hoary bats (both 11 percent), silver-haired bat (7 percent), eastern red bat (6 percent) unidentified high frequency bats (5 percent) and unidentified low frequency bats (3 percent). One bat pass was classified as NLEB and one bat pass was classified as eastern small-footed bat by analysis software, but neither species was confirmed during manual vetting. Analysis software initially classified 330 bat passes as little brown bat and presence was confirmed during the qualitative assessment, though some of the reviewed files were downgraded to unknown high frequency species or eastern red bat. Analysis software classified 11 bat passes as tri-colored bat and presence was confirmed during the qualitative assessment.

Table 4. Summary of Species Presence by Kaleidoscope Pro at Chinook Solar Project, Fitzwilliam, NH (August 5–11, 2020).

Species	MLE Prediction[1]	Qualitative Analysis	Overall Evaluation
Big brown bat	**Present**	**Present**	**Present**
Eastern red bat	**Present**	**Present**	**Present**
Hoary bat	**Present**	**Present**	**Present**
Silver-haired bat	**Present**	**Present**	**Present**
Eastern Small-footed bat	**Present**	Absent	Absent
Little brown bat	**Present**	**Present**	**Present**
Northern long-eared bat	Absent	Absent	Absent
Tri-colored bat	**Present**	**Present**	**Present**

1. Based on probability of presence for any site on any night. See Appendix C for complete listing of MLEs by site/night.

Table 5. Summary of Bat Passes Recorded at Chinook Solar Project, Fitzwilliam, NH (August 5–11, 2020).

Station	Night	Big brown bat	Eastern red bat	Hoary bat	Silver-haired bat	Little brown bat	Tri-colored bat	Unknown High Frequency Species	Unknown Low Frequency Species	Grand Total
NHCK-01	**Station Total**	**90**	**28**	**71**	**60**	**23**	**0**	**24**	**16**	**312**
	5-Aug	5	3	12	8	6	0	4	0	38
	6-Aug	0	6	1	3	3	0	4	1	18
	7-Aug	24	4	11	12	1	0	6	2	60
	8-Aug	29	6	22	21	7	0	5	6	96
	9-Aug	32	9	25	16	6	0	5	7	100
NHCK-02	**Station Total**	**169**	**25**	**52**	**92**	**22**	**1**	**16**	**34**	**411**
	5-Aug	13	5	4	5	0	1	2	2	32
	6-Aug	15	4	1	6	0	0	5	1	32
	7-Aug	34	5	7	28	5	0	3	11	93
	8-Aug	53	5	20	29	7	0	4	13	131
	9-Aug	54	6	20	24	10	0	2	7	123
NHCK-03	**Station Total**	**282**	**44**	**22**	**22**	**59**	**0**	**12**	**10**	**451**
	5-Aug	17	9	4	1	8	0	3	0	42
	6-Aug	8	11	0	0	10	0	0	1	30
	7-Aug	77	9	4	6	11	0	3	2	112
	8-Aug	74	10	6	6	14	0	2	2	114
	9-Aug	106	5	8	9	16	0	4	5	153
NHCK-04	**Station Total**	**618**	**40**	**114**	**1**	**84**	**1**	**38**	**2**	**898**
	5-Aug	131	20	0	0	32	0	24	0	207
	6-Aug	168	10	99	0	29	1	5	1	313
	7-Aug	134	9	15	0	23	0	8	0	189
	8-Aug	185	1	0	1	0	0	1	1	189
NHCK-05	**Station Total**	**44**	**24**	**5**	**1**	**60**	**0**	**17**	**3**	**154**
	5-Aug	34	15	5	0	41	0	17	2	114
	6-Aug	10	9	0	1	19	0	0	1	40
NHCK-06	**Station Total**	**175**	**0**	**0**	**0**	**4**	**0**	**0**	**0**	**179**
	5-Aug	173	0	0	0	4	0	0	0	177
	6-Aug	0	0	0	0	0	0	0	0	0
	7-Aug	2	0	0	0	0	0	0	0	2
NHCK-07	**Station Total**	**222**	**28**	**37**	**30**	**70**	**0**	**31**	**23**	**441**
	5-Aug	26	1	1	3	13	0	7	4	55
	6-Aug	13	6	0	0	15	0	4	2	40
	7-Aug	34	2	5	6	12	0	5	3	67
	8-Aug	95	5	6	3	9	0	7	10	135
	9-Aug	42	4	4	7	10	0	4	1	72
	10-Aug	12	10	21	11	11	0	4	3	72
Project Total		**1,600**	**189**	**301**	**206**	**322**	**2**	**138**	**88**	**2,846**

4.0 Conclusion

One bat pass was auto-classified as the federally threatened NLEB and one bat pass was auto-classified as the state endangered eastern small-footed bat by Kaleidoscope Pro software, but species presence was not confirmed through manual vetting. MLE values generated by the software indicate that presence of NLEB was unlikely during any of the site/nights over the duration of the survey period although a significant MLE value was generated for the eastern small-footed bat pass auto-classified at NHCK-04 on the night of August 6. However, the pass was determined to be little brown bat during manual review as pulses exhibited tails, a characteristic of *Myotis* bats, but the maximum frequency did not exceed 75 kilohertz and it was not as steep as typical eastern small-footed bat pulses. Further, the program SonoBat classified the pass as: "Indefinite result. Assess as possible HiF species." See Appendix C for a complete listing of MLEs by site night. Given that no NLEBs or eastern small-footed bats were detected while following the summer survey protocol and by targeting rock features that may serve as potential roosting locations, it is unlikely that the Project will negatively impact the NLEB or eastern small-footed bat.

4.1 NLEB

Seven mine and one artificial NLEB hibernacula are known in New Hampshire, with the highest concentration and quality mines located in Grafton County greater than 50 miles north of the Project Area (NHFG 2015). Lack of data combined with dwindling populations preclude a clear picture on summer distribution and management strategies for the species (NHFG 2015). Habitat conversion and degradation due to removal of summer roosting and foraging areas is a lower ranking threat to the species in the New Hampshire Wildlife Action Plan (NHFG 2015). However, the USFWS final 4(d) rule only prohibits incidental take within a hibernaculum and tree removal activities occurring within a 1/4-mile of a known NLEB hibernaculum at any time of the year (USFWS 2016). Avoiding tree removal activities when possible may also improve foraging and roosting opportunities for this species if populations recover.

4.2 Eastern Small-footed Bat

Information on hibernating eastern small-footed bats in New Hampshire is limited with records from New Boston (Hillsboro County; Reynolds et al. 2016), Mascot Mine (Coos County; NHFG 2015), Rockingham County (NHFG 2015), and Chester Mine (55 miles southeast in Hampshire County, MA; Veilleux 2007). Most summer records are from the southern part of the state including telemetry data from Surry Lake Dam approximately 20 miles northwest of the Project Area, where individuals were located roosting in rock outcrops (Moosman et al. 2013, NHFG 2015) and from long-term studies from New Boston Air Force Station 25 miles northeast of the Project Area (Moosman et al. 2007, LaGory et al. 2008, Reynolds et al. 2016). No natural rock features with crevices for roosting were identified but numerous stone walls and rock piles associated with historical agricultural use were located in the Project Area. Stone walls are included in a brief guide of "Representative Photographs of Suitable Bat Rock-Roosting Sites" by Maine Department of Inland Fisheries and Wildlife (MDIFW no date). Although eastern small-footed bats are known to roost in various rock features, no studies have documented roosts on talus slopes within a closed canopy or with leaf litter

(Moosman et al. 2015), and there are no known records documenting use of stone walls by eastern small-footed bat. Yet, use is plausible in locations that offer sun exposure and microclimates with elevated temperatures for basking and thermoregulation (Moosman et al. 2015). The most promising rock features in the Project Area were identified—one by North East Ecological Services and one by Tetra Tech—and surveyed for 2.5 to 6 detector nights each. No eastern small-footed bat passes were recorded at these locations. While they may serve as suitable habitat, these features are not unique or even preferential within the broader landscape. Given the low population size of the species, individuals may select more preferable sites. Yet, features within the Project Area may offer an opportunity for mitigation by potentially increasing suitability by tree removal and enhancing sun exposure. Mitigation through creation of roosting habitat has been successful at projects in Pennsylvania (PAGC 2016).

4.3 Little Brown Bat and Tri-colored Bat

Presence was confirmed for the tri-colored bat (only two passes) and little brown bat (11 percent of total bat activity), which are both listed as endangered by New Hampshire Fish and Game (NHFG; NHFG 2017). As such these species are granted protection through Chapter 212-A Endangered Species Conservation Act (Animal Law 2019), though no regulatory protections are currently in place other than requiring a NHFG permit for collection or possession (NHFG 2015). These species have experienced significant regional population declines due to White Nose Syndrome (Frick et al. 2010) and mortality and species impacts (loss of fitness) due to White Nose Syndrome are identified as a High Threat Rank in the New Hampshire Wildlife Action Plan (NHFG 2015). Habitat conversion and degradation due to removal of summer roosting and foraging areas is a lower ranking threat to the species in the Wildlife Action Plan (NHFG 2015). Large stands of forest in the northern and southern limits of the LOW had undergone logging activities in 2019. Any additional clearing required within the LOW would not be considered a significant habitat loss in the context of the broader landscape and common logging activities in the region and would likely not have a negative impact on the species populations. Retaining a forested buffer around ponds and wetlands is recommended as little brown bat and tri-colored bat often forage over water in forested habitat (Krusic et al. 1996, Broders et al. 2001, Nelson and Gillam 2016). Retaining habitat for these species may allow them to continue to use the Project Area in the future.

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APPENDIX A. STATION CONDITIONS AND DETECTOR ORIENTATION PHOTOGRAPHS

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PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 01

Station: NHCK-01

Date: August 10, 2020

Comments: Station located in recent clear cut along stone wall intersection. Microphone oriented north along wall.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 02

Station: NHCK-01

Date: August 10, 2020

Comments: View south along wall.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 03

Station: NHCK-01

Date: August 10, 2020

Comments: Close-up of stone wall crevices at detector.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 04

Station: NHCK-02

Date: August 10, 2020

Comments: View northeast of clear cut, detector and stone wall runs to the north and east.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 05

Station: NHCK-02

Date: August 10, 2020

Comments: View east to edge of cut and another stone wall at the tree line

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 06

Station: NHCK-02

Date: August 10, 2020

Comments: Close up of stone wall within the tree line mentioned in Photo No. 05.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 07

Station: NHCK-02

Date: August 10, 2020

Comments: Suitable snags in tree line along stone wall seen in background of Photo No. 05.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 08

Station: NHCK-03

Date: August 10, 2020

Comments: View east along slight flyway near pond. Several suitable snags are present. Spruce and white birch with exfoliating bark.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 09

Station: NHCK-03

Date: August 10, 2020

Comments: View west along slight flyway.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 10

Station: NHCK-03

Date: August 10, 2020

Comments: Open water pond is located just outside of the LOW approximately 60 meters to the northwest.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 11

Station: NHCK-03

Date: August 10, 2020

Comments: Old rock and spring origin for pond approximately 40 meters west of the detector.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 12

Station: NHCK-04

Date: August 11, 2020

Comments: View north in line with microphone orientation along forest road and flyway amid mid-successional forest. Rockpile identified by North East Ecological Services as potential eastern small-footed bat habitat is located 20 meters northwest of the station.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 13

Station: NHCK-04

Date: August 11, 2020

Comments: View south to road/flyway intersections and rock pile

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

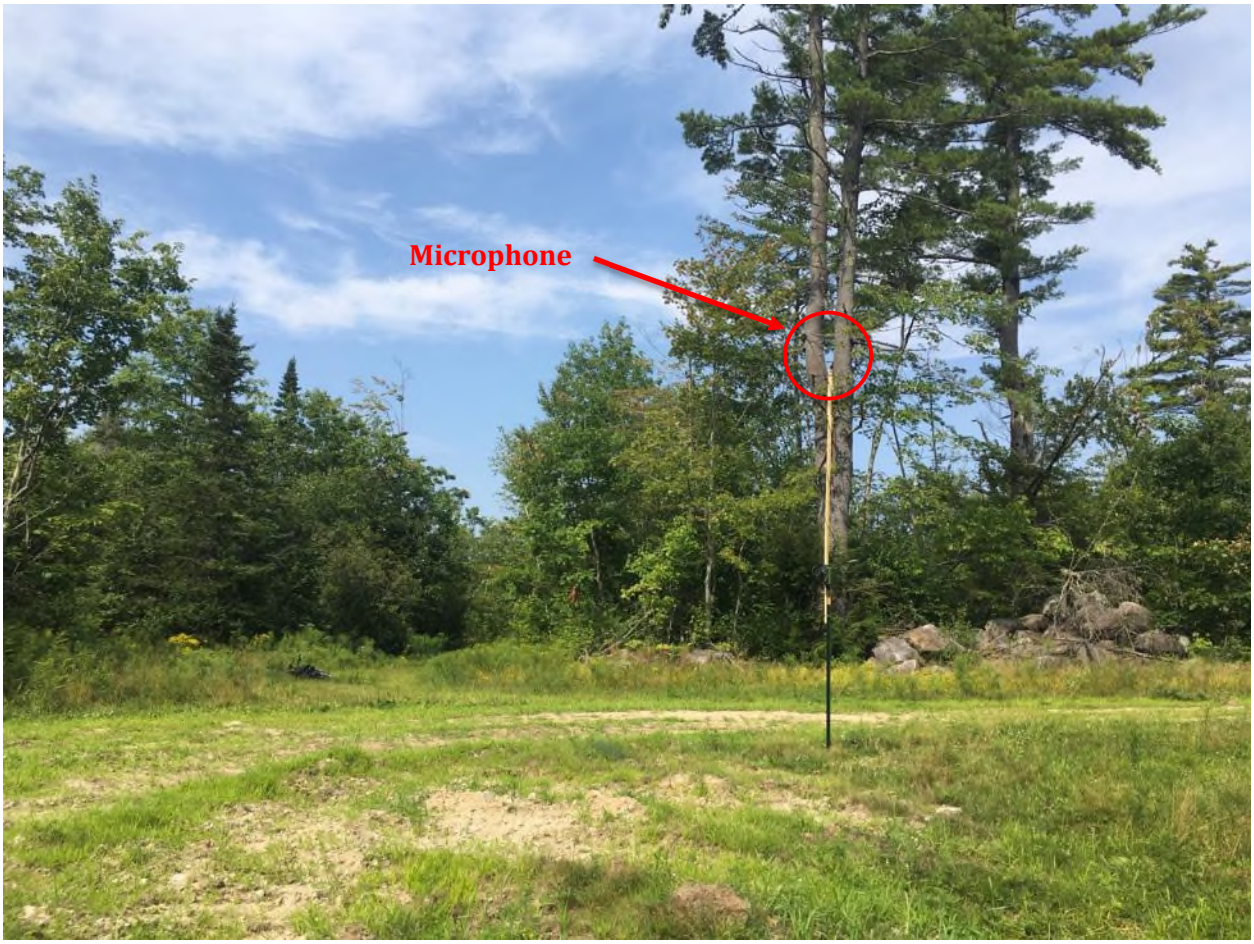

Photo No.: 14

Station: NHCK-04

Date: August 11, 2020

Comments: View west to road/flyway intersections and rock pile.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 15

Station: NHCK-04

Date: August 11, 2020

Comments: Close up of potential eastern small-footed bat habitat identified by North East Ecological Services. Suitable snag located 10 meters to the north of rock pile.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 16

Station: NHCK-05

Date: August 11, 2020

Comments: View north along flyway within mid-successional forest.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 17

Station: NHCK-05

Date: August 11, 2020

Comments: View south along flyway within mid-successional forest.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 18

Station: NHCK-05

Date: August 11, 2020

Comments: Old stone wall located approximately 20 meters to the northeast of detector. This is an example of a stone wall that is unlikely to be suitable eastern small-footed bat habitat due to lack of sun exposure and the amount of debris within crevices/ collapsed condition of wall.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 19

Station: NHCK-06

Date: August 11, 2020

Comments: View to the east along mature hemlocks backed by a stone wall.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 20

Station: NHCK-06

Date: August 11, 2020

Comments: View to the south towards recent timber harvest and numerous snags or "wildlife trees" remnant from recent timber harvest.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 21

Station: NHCK-06

Date: August 11, 2020

Comments: View to the west overlooking timber harvest and snags.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

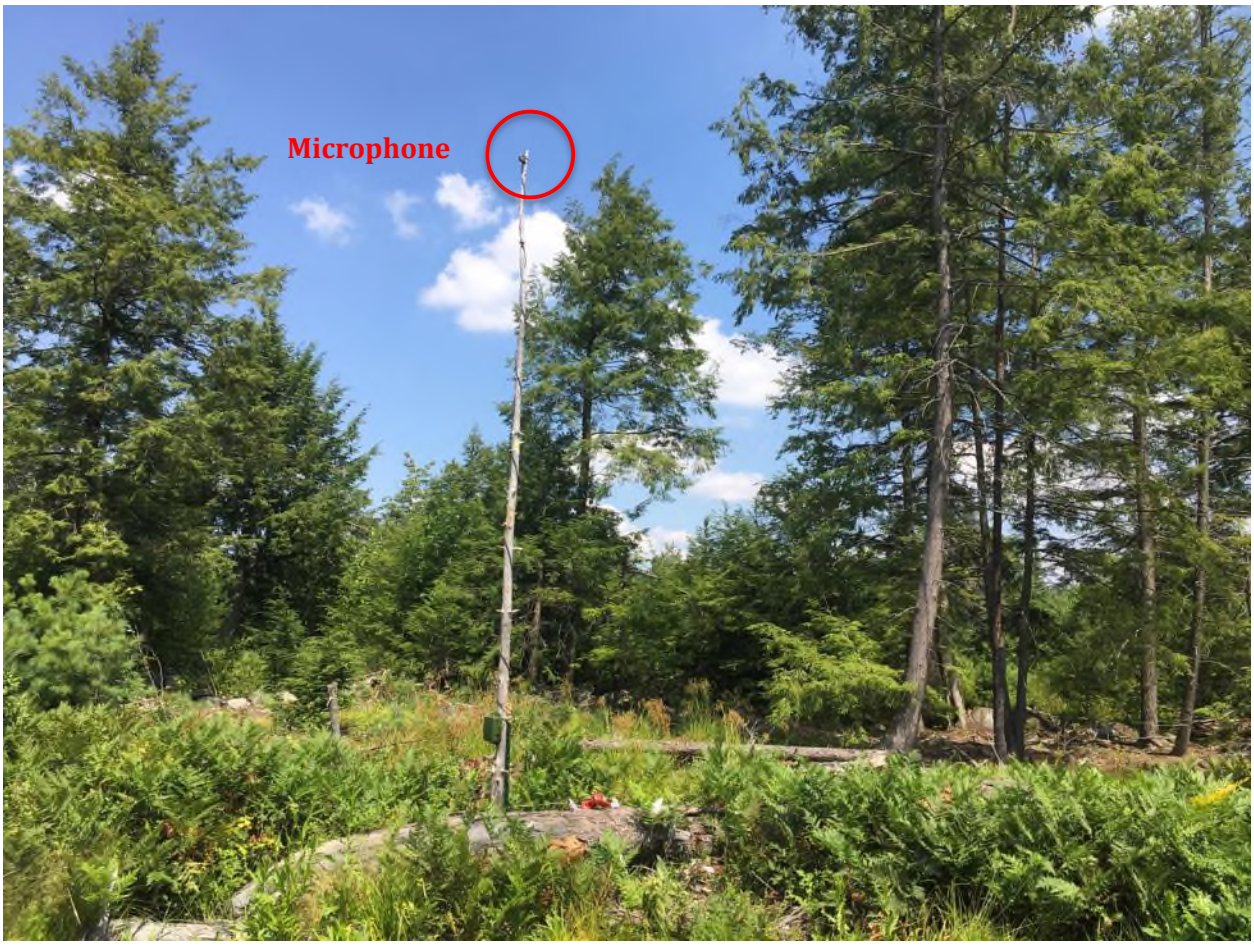

Photo No.: 22

Station: NHCK-06

Date: August 11, 2020

Comments: View to the north along mature hemlocks backed by a stone wall.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 23

Station: NHCK-06

Date: August 11, 2020

Comments: Suitable snags and stone wall approximately 20 meters north of the station.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 24

Station: NHCK-07

Date: August 11, 2020

Comments: View to the east down slope and a skid trail to a seasonal wetland.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 25

Station: NHCK-07

Date: August 11, 2020

Comments: View to the west along slight flyway within mid-successional forest.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 26

Station: NHCK-07

Date: August 11, 2020

Comments: Boulders pile located 15 meters to the east of station. Unlikely eastern small-footed bat habitat due to large crevice size and lack of sun exposure.

PHOTOGRAPHIC RECORD

Company: NextEra

Project: Chinook Solar

Photo No.: 27

Station: NHCK-07

Date: August 11, 2020

Comments: Seasonal wetland located approximately 60 meters to the east of station. Wetland is currently dry, but it has been an abnormally dry year. This likely holds water most springs.

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APPENDIX B. COMPLETED PHASE 1 SUMMER HABITAT ASSESSMENT

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APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Northern Long-eared **BAT HABITAT ASSESSMENT DATASHEET**

Project Name: Chinook Solar Project Date: 8/12/202

Township/Range/Section:

Lat Long/UTM/ Zone: 18T 735213 4739635 Surveyor: C.Parrish

Brief Project Description

The Chinook Solar Project is proposed to be developed 2 miles southeast of Fitzwilliam, NH and is currently in the application process with the NH SEC.

Project Area

	Total Acres	Forest Acres	Open Acres
Project	158	unk (approx. 100)	unk (approx 58)

	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
Proposed Tree Removal (ac)	TBD	TBD	TBD

Vegetation Cover Types

Pre-Project	Post-Project
Working forest that has undergone heavy logging in the past including several recent clear cuts on the north and south end.	Additional forested lands would be cleared for solar panels and associated infrastructure

Landscape within 5 mile radius

Flight corridors to other forested areas?

Ample, nearly the entire landscape is forested with nearby streams, wetlands, and ponds

Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

Predominately forested lights interspersed with wetlands, streams, ponds, and light residential development

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Rhododendron State park is located approx. 3 mi to the west.
Mt. Monadnock state park is located approx. 5 mi to the north.

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description	
Sample Site No.(s): _____	NHCK-01: extensive rock wall located in recent clear cut. Forest edges located 60 m to East and 80m to west.

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		None nearby
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	3	4	3	
Dominant Species of Mature Trees	White pine,red maple			
% Trees w/ Exfoliating Bark	1	1	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	4	3	3	
No. of Suitable Snags		4		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Y

Additional Comments:
Station located in recent clear cut along stone wall. Mic oriented north along stone wall. Primary focus with station is capturing MYLE activity to see if rock features serve as potential habitat. No forest canopy present at station. Forest conditions describe surrounding forest.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

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Sample Site Description	
Sample Site No.(s): _____	NHCK-02: extensive rock wall located in recent clear cut. Forest edges located 60 m to East and 100m to west.

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		None nearby
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	3	4	3	
Dominant Species of Mature Trees	White pine,red maple			
% Trees w/ Exfoliating Bark	1	1	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	4	3	3	
No. of Suitable Snags		9		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Y

Additional Comments:

Station located in recent clear cut along stone wall. Mic oriented east along stone wall. Station located approximately 140m south of NKCK-01. Primary focus with station is capturing MYLE activity to see if rock features serve as potential habitat.

No forest canopy present at station. Forest conditions describe surrounding forest.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description	
Sample Site No.(s): _____	NHCK-03: station located in flyway with sparse canopy. Nearby flight paths to small open water pond (only one in area)

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)	1	Open and accessible to bats?		Small spring fed pond with emergent vegetation. Approx. 20x 15m, located 60m to west.
		Y		
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	1	1	3	
Dominant Species of Mature Trees	White pine,hemlock, birch, oak			
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	4	3	3	
No. of Suitable Snags		3		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Y

Additional Comments:
Station located on LOW boundary near open water pond. Sparse canopy but slight flyway in old two tracks leading from pond by station.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description	
Sample Site No.(s): _____	NHCK-04: station located at intersection of two track roads that may serve as flyways within successional forest with low canopy.

Water Resources at Sample Site				
Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		None nearby
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site				
Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	1	5	3	
Dominant Species of Mature Trees	White pine, birch, oak, red maple			
% Trees w/ Exfoliating Bark				
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	5	1	1	
No. of Suitable Snags		1		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____ Y

Additional Comments:
Station located next to rock pile identified by NEER as potential MYLE roosting habitat. Primary objective at site is to survey for MYLE pretense but site is also suitable for NLEB.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): _____ NHCK-05: station located along a two track road that may serve as flyways within successional forest with low canopy.

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		None nearby
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	1	3	5	
Dominant Species of Mature Trees	White pine, birch, oak, red maple			
% Trees w/ Exfoliating Bark	0	0	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	6	3	0	
No. of Suitable Snags		0		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? _____ N

Additional Comments:

Station located representative forest within project along potential flyway. Target sp. is NLEB. An old rock pile is located 20m from detector. Likely too shaded to serve as MYLE roost location.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): _____ NHCK-06: station located at intersection of a two track road and skid road which may serve as flyways within successional forest with low canopy.

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		Wetland located 50m to East but is currently dry (dry year)
Wetlands (approx. ac.)	Permanent	Seasonal		
		1 ac		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	1	3	3	
Dominant Species of Mature Trees	White pine, birch, balsam fir,red maple			
% Trees w/ Exfoliating Bark	0	0	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	4	3	0	
No. of Suitable Snags		0		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Y

Additional Comments:

Station located representative forest within project along potential flyway. Target sp. is NLEB. A boulder pile is located 10m from detector but is likely too shaded to serve as MYLE roost location. Two track leads to seasonal wetland 50m to East

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX A
PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): _____ NHCK-07: station located on the edge of a recent timber harvest and is backed by a line of mature hemlocks and rock wall. Edge of cut may serve as flyway.

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
Pools/Ponds (# and size)		Open and accessible to bats?		None nearby
Wetlands (approx. ac.)	Permanent	Seasonal		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50 ')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81=100%
	1	3	2	
Dominant Species of Mature Trees	White pine, birch, balsam fir,red maple			
% Trees w/ Exfoliating Bark	1	0	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	4	3	2	
No. of Suitable Snags		12		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR INDIANA BATS? Y

Additional Comments:

Station located on slight hill top on edge of cut which may serve as flyway and foraging location for bats. A long rock wall is also located 20m from detector. Potential roost habitat for MYLE is marginal. Wildlife trees (dead standing snags) left from cut provide many suitable root locations.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Photos1-5

APPENDIX C. MAXIMUM LIKELIHOOD ESTIMATES (MLE) SUMMARY

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Summary of Maximum Likelihood Estimates (MLEs) for Species Presence by Kaleidoscope Pro at Chinook Solar Project, Fitzwilliam, NH (August 2020).

Station	Date	Big Brown Bat	Eastern Red Bat	Hoary Bat	Silver-haired Bat	Eastern Small-footed Bat	Little Brown Bat	Northern Long-eared Bat	Tri-colored Bat
NHCK-01	5-Aug	0.10	**0.01**	**0.00**	0.05	1.00	**0.00**	1.00	1.00
	6-Aug	1.00	**0.00**	0.40	**0.02**	1.00	0.28	1.00	1.00
	7-Aug	**0.00**	**0.00**	**0.00**	0.16	1.00	0.51	1.00	**0.04**
	8-Aug	**0.00**	**0.00**	**0.00**	**0.01**	1.00	**0.01**	0.39	1.00
	9-Aug	**0.00**	**0.00**	**0.00**	0.22	1.00	**0.01**	1.00	1.00
NHCK-02	5-Aug	**0.00**	**0.00**	0.06	0.64	1.00	0.98	1.00	0.40
	6-Aug	**0.00**	**0.00**	1.00	0.39	1.00	0.90	1.00	1.00
	7-Aug	**0.00**	**0.00**	0.13	**0.00**	1.00	**0.00**	1.00	1.00
	8-Aug	**0.00**	**0.00**	**0.00**	**0.00**	1.00	**0.00**	1.00	1.00
	9-Aug	**0.00**	**0.00**	**0.00**	**0.05**	1.00	**0.00**	1.00	1.00
NHCK-03	5-Aug	**0.00**	**0.00**	0.08	1.00	1.00	**0.00**	1.00	1.00
	6-Aug	**0.00**	**0.00**	1.00	1.00	1.00	**0.00**	1.00	0.71
	7-Aug	**0.00**	**0.00**	1.00	1.00	1.00	**0.00**	1.00	1.00
	8-Aug	**0.00**	**0.00**	0.65	1.00	1.00	**0.00**	1.00	1.00
	9-Aug	**0.00**	**0.01**	0.67	1.00	1.00	**0.00**	1.00	1.00
NHCK-04	5-Aug	**0.00**	**0.00**	1.00	1.00	1.00	**0.00**	1.00	0.98
	6-Aug	**0.00**	**0.00**	**0.00**	1.00	**0.00**	**0.00**	1.00	0.76
	7-Aug	**0.00**	**0.00**	**0.04**	1.00	1.00	**0.00**	1.00	0.71
	8-Aug	**0.00**	0.70	1.00	1.00	1.00	1.00	1.00	1.00
NHCK-05	5-Aug	**0.00**	**0.00**	0.17	1.00	1.00	**0.00**	1.00	0.95
	6-Aug	**0.00**	**0.00**	1.00	1.00	1.00	**0.00**	1.00	1.00
NHCK-06	5-Aug	**0.00**	1.00	1.00	1.00	1.00	**0.00**	1.00	1.00
	7-Aug	**0.02**	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NHCK-07	5-Aug	**0.00**	0.88	1.00	1.00	1.00	**0.00**	1.00	1.00
	6-Aug	**0.00**	**0.00**	1.00	1.00	1.00	**0.00**	1.00	1.00
	7-Aug	**0.00**	0.34	0.18	1.00	1.00	**0.00**	1.00	1.00
	8-Aug	**0.00**	**0.00**	0.92	1.00	1.00	**0.00**	1.00	0.08
	9-Aug	**0.00**	**0.01**	0.61	1.00	1.00	**0.00**	1.00	1.00
	10-Aug	**0.00**	**0.00**	**0.00**	0.13	1.00	**0.00**	1.00	0.69

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APPENDIX D. RELEVANT STAFF RESUMES

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Professional Summary

Mr. Parrish has more than seventeen years of experience conducting wildlife and habitat projects in the Northeast, California, and Idaho. His responsibilities have been distributed over a wide variety of terrestrial and aquatic projects with a particular emphasis on bat acoustic monitoring, avian ecology, habitat assessment, and avian response to wind development. Mr. Parrish has conducted over 40 northern long-eared bat presence absence studies comprised of over 175 detector stations in Connecticut, Maine, Massachusetts, Michigan, Pennsylvania, and New Hampshire. In addition, Mr. Parrish serves as equipment manager and one of the lead analysists for Tetra Tech's bat program. Mr. Parrish is involved in all stages of acoustic bat surveys including: habitat assessment, deployment, analysis, manual vetting, and report preparation. Mr. Parrish regularly participates in bat acoustic workshops to remain current with changing protocols, survey techniques and advances in hardware and software. Mr. Parrish is proficient with data management and analysis using MS Access, GIS, BCID, Kaleidoscope Pro, SonoBat, and the program R

Education

- MS, Biology, Plymouth State University, 2013
- BS, Environmental Biology, Plymouth State University, 2003
- Geographic Information Systems (GIS) Certification, University of Idaho, 2011
- Bat Conservation and Management, Inc: Acoustic Data Management and Analysis Workshop, 2015
- International Bat Echolocation Symposium, 2017

Selected Project Experience

Wildlife Biologist, Patriot Renewables, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Multiple Wind facilities, Maine

Deployed 15 SM4 detectors at proposed wind/solar facility in 2020 for a NLEB presence absence survey. Deployed 15 SM4 detectors at proposed wind facility in 2018 for a NLEB presence absence survey. Four detectors were deployed in the project area in 2016 to determine the species composition, activity levels, and potential presence of threatened or endangered species. Deployed 14 SM3 detectors in 2015 for a NLEB presence absence survey. Habitat assessments completed with each project and methodology followed all phases of current NLEB Guidelines All data was processed using an approved version of Kaleidoscope Pro and recordings were manually reviewed using SonoBat v. 3.2 or 4.2 at sites where high frequency or Myotid calls were auto classified. Results of activity levels by species and time of year were presented in a report.

Wildlife Biologist, USACE, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Tobyhanna Army Depot, Pennsylvania

Deployed 20 SM4 detectors in 2019 and conducted habitat assessments at each location according to USFWS 2019 Indiana Bat Summer Survey Guidelines. Analyzed bat acoustic data, manually vetted recordings to confirm species presence, summarized results and prepared report.

Data Analyst and Reviewer, Multiple National Wildlife Refuge Acoustic Bat Monitoring Projects, 2013 - 2018 – USFWS.

One of two Tetra Tech employees responsible for manually vetting acoustic bat recordings in an effort to determine the occupancy of Threatened or Endangered bat species on National Wildlife Refuge (NWR) lands. Automated classifications were summarized and qualitatively vetted (i.e., manually reviewed on a spectrogram) to determine accuracy of automated classification. Mr. Parrish worked closely with the client on a vetting protocol to meet the shifting goals of the client, which is now to determine presence of Threatened or Endangered species, allowing for more statistically robust measures of occupancy. Reviewed and summarized data/results from 12 NWRs from 2012, 28 NWRs from 2013, and 18 NWRs from 2015.

Wildlife Biologist, NextEra, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Various Solar Projects, Connecticut, Maine, New Hampshire.

Deployed 58 SM3 and SM4 Bat detectors for seven independent projects and conducted habitat assessments at each location according to USFWS Indiana Bat Summer Survey Guidelines in 2016, 2017 and 2019. Analyzed bat acoustic data, manually vetted recordings to confirm species presence and summarized data for reports.

Wildlife Biologist, Ranger Solar, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Various Solar Projects, Connecticut, Maine, New Hampshire.

Deployed 32 SM3 and SM4 Bat detectors for six independent projects and conducted habitat assessments at each location according to USFWS Indiana Bat Summer Survey Guidelines in 2016 and 2017. Analyzed bat acoustic data, manually vetted

recordings to confirm species presence and summarized data for reports.

Wildlife Biologist, US Marine Corp, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Michigan

Deployed four SM3 detectors in 2016 and conducted habitat assessments at each location according to USFWS 2016 Indiana Bat Summer Survey Guidelines. Analyzed bat acoustic data and manually vetted *Myotis spp*. Summarized data for report.

Wildlife Biologist, CES, Inc., NLEB Presence/Absence Habitat Assessment and Detector Deployment, Utility Corridor, Maine

Deployed seven SM3 detectors in 2015 and conducted habitat assessments at each location according to USFWS 2015 Indiana Bat Summer Survey Guidelines. Analyzed bat acoustic data and manually vetted *Myotis spp*. Summarized data for report.

Wildlife Biologist, MassDOT, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Various Road and Bridge Improvement Projects, Massachusetts

Deployed 10 detectors in 2015 and conducted habitat assessments at each location according to USFWS 2015 Indiana Bat Summer Survey Guidelines. In addition, analyzed bat acoustic data from 17 additional projects (57 bat detectors) with Kaleidoscope Pro and manually vetted calls with Sonobat software. Summarized data for reports.

Wildlife Biologist, MaineDOT, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Various Road and Bridge Improvement Projects, Maine

Deployed 13 detectors in 2015 and conducted habitat assessments at each location according to USFWS 2015 Indiana Bat Summer Survey Guidelines. Analyzed bat acoustic data with Kaleidoscope Pro and manually vetted calls with Sonobat software. Summarized data for reports. In addition, conducted bridge surveys for bats and created protocol for surveying for bats at bridges using a FLIR thermal camera.

Wildlife Biologist, Eolian, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Small Scale Wind Development, Maine

Deployed six SM2 and SM3 detectors in 2014 and conducted habitat assessments at each location according to USFWS 2014 Indiana Bat Summer Survey Guidelines. Analyzed bat acoustic data and manually vetted *Myotis spp*. Summarized data for report.

Wildlife Biologist, Pioneer Green, NLEB Presence/Absence Habitat Assessment and Detector Deployment, Small Scale Wind Development, Connecticut and Maryland.

Deployed 20 SM2 and SM3 detectors in 2014 and conducted habitat assessments at each location according to USFWS 2014 Indiana Bat Summer Survey Guidelines. Analyzed bat acoustic data and manually vetted *Myotis spp*. Summarized data for report.

Wildlife Biologist, Commercial Wind Projects, Bat Acoustic Monitoring, Multiple locations throughout the country 2013-Present.

Mr. Parrish has been involved with Tetra Tech's bat program since 2013 and has been participated in over 70 bat acoustic bat projects. Mr. Parrish deploys long-term detector set ups, trains personnel on detector operation and protocols, selects sampling locations, manages and analyzes acoustic data, and prepares reports. Mr. Parrish serves as bat equipment manager and provides logistical support for planning acoustic deployments. Commercial wind projects have been in Maine, Maryland, North Dakota, South Dakota Nebraska, Colorado, Kansas, Oklahoma, Texas, Oregon, Iowa, and Alberta Canada.

Wildlife Biologist, Kinder Morgan, Ecological Assessment of Bats, Birds, and Small Mammals, Bearfort Mountain Natural Area, New Jersey

Four detectors were deployed in the project area to determine the species composition, activity levels, and potential presence of threatened or endangered species. Deployment scenarios adhered to the *2015 Range-Wide Indiana Bat Summer Survey Guidelines*. All data was processed using an approved version of Kaleidoscope Pro and recordings were manually reviewed using SonoBat v. 3.2 at sites where high frequency or Myotid calls were auto classified. Results of activity levels by species and time of year were presented in a report.

Baseline Bat Survey, – U.S. Department of the Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic, Virginia and New Jersey 2014- Deployed 16 acoustic bat detectors at three naval stations in the Norfolk, Virginia area, and at a Navy installation in New Jersey. Responsible for managing all incoming acoustic recordings and acting as the lead data analyst for generating results for survey reports.

Baseline Bat Survey, Camp Edwards, Massachusetts 2014-2015 – Massachusetts Army National Guard- Collected information on the species richness, activity levels, and spatio-temporal use patterns of bats. Passive acoustic bat monitors were used to record calls, which were analyzed using two software programs. Conducted statistical analysis examining spatial and temporal relationships and presented results in a final report.

Experience Summary

Mr. Hengstenberg is a Certified Wildlife Biologist with 18 years of experience in wildlife biology, wind energy ecology, natural resource assessment, aero-ecology studies, tropical field studies, and project management. Mr. Hengstenberg has extensive knowledge of wildlife studies and is well versed in scientific techniques and equipment including bat acoustic surveys, raptor migration studies, breeding bird surveys, avian radar ornithology, threatened & endangered species surveys, seabird & shorebird surveys, grassland bird surveys, tropical flora and fauna, and mist-netting of birds and bats. Mr. Hengstenberg has worked on natural resources projects across the country and throughout Latin America.

Mr. Hengstenberg has extensive range of field experience throughout New England, the Mid-Atlantic, the Northwest, the Southwest, Puerto Rico, and Mexico. Mr. Hengstenberg is a proficient technical writer and has extensive knowledge of various word processing, presentation, and statistical analysis applications. Mr. Hengstenberg is also experienced with endangered species and has worked closely with both state and federal agencies during the permitting process of wind energy and natural resource projects.

Education

MS, Wildlife & Fisheries Science, Mississippi State University, 2003
BS, Interdisciplinary Studies/Wilderness Research Administration, Plymouth State University, 1998

Registrations/Certifications

Certified Wildlife Biologist- The Wildlife Society; 2011

Training

Bat Acoustic Data Management; 2015
CPR and First Aid Certification; 2015
Airport Wildlife Hazard Management Workshop; 2010
OSHA HAZWOPER Certification and Refresher; 2008
Basic and Advanced Erosion & Sediment Control Course; 2008
Red Card Certification (Wildland Firefighter); 1997

Corporation Project Experience

Lead Project Biologist- March 2016 to January 2017
Northern Long-Eared Bat Planning Level Surveys- Camp Curtis Guild and Camp Edwards

Managing and providing field support of planning level surveys for the northern long-eared bat (*Myotis septentrionalis*) at Camp Curtis Guild and Camp Edwards, Massachusetts. Field surveys mist netting surveys, emergence surveys, and radio telemetry in accordance with federal protocols established by the United States Fish and Wildlife Service. Information collected will be used by natural resources managers to make informed decisions.

Lead Project Biologist- July 2014 to Present
Northern Long-Eared Bat Surveys at multiple United States Department of the Navy Installations – Naval Facilities Engineering Command, Mid-Atlantic

Managing and providing field support for completion of presence/absence surveys for northern long-eared bat (*Myotis septentrionalis*) at multiple Naval installations located along the east coast of the United States. Field surveys include bat acoustic and mist netting surveys in accordance with federal protocols established by the United States Fish and Wildlife Service (USFWS). Information collected will be used by

natural resources managers to make informed decisions at the eight Installations where these surveys are being conducted to avoid negative impacts to this vulnerable species from Naval activities. Tetra Tech has teamed with Biodiversity Research Institute to complete the field work and data analysis.

Lead Project Biologist – May 2015 – Present
State of Maine Department of Transportation (MaineDOT), Two Stand-Alone State-Wide Multi-PIN Project Contracts: Natural Resources and Underwater Sound Monitoring, Maine
Wildlife biologist for Endangered Species Act (ESA) Biological Assessments, consultation, and conferencing support for northern long-eared bat and bat habitat assessment and presence/absence acoustic monitoring. Recent listing of northern long-eared bat has increased the focus on evaluating potential impacts of MaineDOT projects on the species through habitat assessments and presence/absence surveys in accordance with recommended guidance from USFWS: the Northern Long-Eared Bat Interim Conference and Planning Guidance: USFWS Regions 2, 3, 4, 5 & 6 (NLEB Guidance) and the 2015 Range-Wide Indiana Bat Summer Survey Guidelines (Indiana Bat Guidelines).

Lead Project Biologist, May 2015 – Present
Northern Long-Eared Bat Support Services for the State of Massachusetts Department of Transportation (MassDOT), Massachusetts
Wildlife biologist for all northern long-eared bat support services for MassDOT, performing a variety of tasks related to the understanding the potential impacts to the species following its listing under the ESA. Projects are expected to include habitat assessments and presence/absence surveys in accordance with recommended guidance from USFWS: NLEB Guidance and the Indiana Bat Guidelines.

Lead Project Biologist- January 2009 to Present
Spruce Mountain Wind Project, Maine – Patriot Renewables.
Managed and conducted pre-construction and post-construction survey including a bird and bat mortality surveys, avian radar survey, bat acoustic survey, raptor migration survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos. Provided the client advice on erosion and sediment control measures at the newly constructed site so that they comply with permit conditions.

Lead Project Biologist- January 2009 to Present
Saddleback Ridge Wind Project, Maine – Patriot Renewables.
Managed and conducted pre-construction avian surveys including a spring and fall avian radar survey, bat acoustic survey, raptor migration survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans, bird and bat conservation strategy plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos.

Lead Project Biologist- January 2010 to Present
Canton Mountain Wind Project, Maine – Patriot Renewables.
Managed and conducted pre-construction avian surveys including a spring and fall avian radar survey, bat acoustic survey, raptor migration survey, eagle aerial survey, migrant stopover survey, RTE species survey, and breeding bird survey as part of the permitting process. Developed and negotiated pre and post-construction monitoring plans with state and federal agencies, authored proposals, designed field studies, and prepared reports and memos.

ATTACHMENT C

Q.33. CFP Response and CFP 144 Feature 168

33. On page 8, lines 7-9, of the pre-filed testimony you say that "[p]re-construction monitoring should be performed prior to any relocation or disturbance to rock features within the Project area to determine if bats are roosting." Please define what you mean by "rock features." Did you observe any such rock features that could be classified as potential roosting habitat when you visited the Project site? If so, please provide any and all documents prepared as a result of the site visit which describe any and all such rock features and their locations.

RESPONSE:

Response by Scott Reynolds

The eastern small-footed bat is known as a saxicolous species (a species that lives on or is highly dependent on rock features). "Rock features" would include any rock-based substrate that has the potential for roosting or hibernation. This includes rocky slopes (Fenton et al. 1980), rock slabs (Thomas 1993), rock outcrops (Best 1997), 'rock clusters' (Roble 2004), 'rock fields' (Johnson et al. 2011), talus material (LaGory et al. 2008), and dam riprap (Moosman et al. 2007). Few of these features are present at the Project Site, but eastern small-footed bats can use almost any ground-level rock surface or rock pile that has holes or fissures capable of entering. Such rock features that have south- or south-east exposure would be particularly relevant for summer roosting, as these features would absorb heat during the day-roosting period. NEES observed multiple rock features that would be potential roosting sites for this species; the most notable was Feature 168. However, Dana Valleau (TRC) could provide a much more extensive and informed summary of these features given his knowledge of the Project site.


CFP 000144

ATTACHMENT D

Updated Wetland Information

Not Field Surveyed
S-CHI-THE-31
W-CHI-THE-32
W-CHI-THE-27
TRC-VP1
TRC-VP2
NJD-CHI-THE-26
NJD-CHI-THE-28
W-CHI-THE-2
W-CHI-THE-32
W-CHI-THE-1
W-CHI-THE-13
S-CHI-THE-14
W-CHI-THE-3
W-CHI-THE-15
W-CHI-THE-13
W-CHI-THE-10
W-CHI-THE-11
NJD-CHI-THE-12
NJD-CHI-THE-25
NJD-CHI-THE-17
W-CHI-DRB-45
W-CHI-THE-10
W-CHI-DRB-46
W-CHI-THE-16
W-CHI-DRB-43
W-EBL-20197
W-CHI-DRB-44
W-CHI-THE-20
W-CHI-THE-18
W-GAR-1
NJD-CHI-THE-19
NJD-CHI-THE-24
NJD-CHI-THE-9
W-CHI-THE-4
W-CHI-THE-23
W-CHI-DRB-41
W-CHI-DRB-40
NJD-CHI-DRB-42
W-CHI-THE-8
NJD-CHI-THE-22
S-CHI-THE-7
W-CHI-THE-21
W-CHI-THE-8
W-GAR-2
S-CHI-THE-6
S-CHI-THE-5
W-CHI-TRS-3
TRC-VP4
W-CHI-THE-4
Not Field Surveyed
W-CHI-THE-1
Old Ridge Rd
Phillips Ct
Fullam Hill Rd
Number 4 Rd
Winchendon Rd
Crane Rd
119
12

Site Area

Project Land Control Area
Not Field Surveyed
Delineated Wetland Boundary
Wetland
Perennial Stream
Intermittent Stream
Ephemeral Stream
Non-Jurisdictional Drainage
Natural Vernal Pool (2017)
Un-natural Vernal Pool (2017)
Natural Vernal Pool (2016)
Natural-Modified Vernal Pool (2016)
Un-natural Vernal Pool (2016)

Note: Resource IDs for vernal pools are only shown for pools surveyed in 2017. Additional vernal pool mapping includes resource IDs for pools surveyed in 2016.

0 375 750
Feet

Chinook Solar Project, Delineated Resources

NEXTera® ENERGY RESOURCES

TRC

July 2020

Sources: ESRI, TRC

Projection: NAD 1983 StatePlane New Hampshire FIPS 2800 Feet Units: Foot US

STATE OF NEW HAMPSHIRE GREGORY A. RUSSO CERTIFIED WETLAND SCIENTIST No. 302

Document Path: S:\1-PROJECTS\NEXTERA\Ranger_Solar\Chinook_Resources_11x17P_20200729.mxd

Table 1. Summary of Delineated Wetlands in the Project Area (Revised 8-12-2020)

Resource ID	Dominant Covertype [1, 2]	Soil Map Unit [3]	Wildlife Observations	Potential Functions and Values [4]	Dominant Vegetation	Hydrologic Regime	Hydrology Indicators [5]	Hydric Soil Indicator [6]
W-CHI-THE-1	PFO	647B Pillsbury Fine Sandy Loam	Green frog (*Rana clamitans)*	Groundwater Recharge/Discharge, Production Export, Wildlife Habitat, Fish and Shellfish Habitat	Balsam fir (*Abies balsamea*), Red maple (*Acer rubrum*), Eastern white pine (*Pinus strobus*), Sensitive fern (*Onoclea sensibilis*), Glossy buckthorn (*Frangula alnus*)	Seasonally Flooded	Saturation (A3), Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-4	PFO	559B Skerry Fine Sandy Loam	Eastern newt (*Notophthalmus viridescens)*	Groundwater Recharge/Discharge, Production Export, Wildlife Habitat, Fish and Shellfish Habitat, Visual Quality/Aesthetics, Nutrient Removal, Sediment/Toxicant Retention	Carex spp., Red Maple, Yellow birch (*Betula allegheniensis*), Fringed sedge (*Carex crinita*), Spotted touch-me-not (*Impatiens capensis*), Balsam fir, Black ash (*Fraxinus nigra*), Interrupted fern (*Osmunda claytonia*)	Saturated	Saturation (A3), Drainage Patterns (B10), Geomorphic Position (D2)	Redox Dark Surface (F6)
W-CHI-THE-8	PFO	77B Marlow Fine Sandy Loam	White-tailed deer (*Odocoileus virginianus)*	Groundwater Recharge/Discharge, Wildlife Habitat, Production Export, Sediment/Toxicant Retention, Nutrient Removal	Red maple, Black ash, White pine, Glossy buckthorn, Giant goldenrod (*Solidago gigantea*), Sensitive fern, Steeplebush (*Spirea tomentosa*)	Saturated	Drainage Patterns (B10),Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-10	PFO	559B Skerry Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat, Sediment/Toxicant Retention, Nutrient Removal	Red maple, Yellow birch, White pine, Fringed sedge	Seasonally Flooded	Water-Stained Leaves (B9), Water Marks (B1), Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-11	PFO	559B Skerry Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat, Sediment/Toxicant Retention, Nutrient Removal	Balsam fir, White pine, Red maple, Yellow birch, Fringed sedge	Seasonally Flooded	Water-Stained Leaves (B9), Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-13	PEM	57C Beckett Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat, Production Export	Steeplebush, Sensitive fern, Woolgrass, Fringed sedge, Giant goldenrod, Glossy buckthorn, Yellow birch, Black ash, Red maple	Saturated	Saturation (A3), Geomorphic Position (D2)	Sandy Redox (S5)
W-CHI-THE-15	PEM	57C Beckett Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Bluejoint (*Calamagrostis canadensis*), Sensitive fern, Meadowsweet, Fringed sedge	Saturated	Saturation (A3), Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-16	PSS	559B Skerry Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Steeplebush, Woolgrass, Rattlesnake mannagrass (*Glyceria canadensis*), Red maple, Glossy buckthorn	Saturated	Geomorphic Position (D2)	Redox Dark Surface (F6)
W-CHI-THE-18	PFO	57B Beckett Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat, Sediment/Toxicant Retention, Nutrient Removal	Bluejoint, Steeplebush, Glossy buckthorn, Woolgrass, Red maple, Black Ash	Saturated	Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-20	PFO	57B Beckett Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Black ash, Red maple, Glossy buckthorn, Balsam fir, Steeplebush, Woolgrass, Sensitive fern, Fringed sedge	Seasonally Flooded	Water-Stained Leaves (B9), Geomorphic Position (D2)	Histic Epipedon (A2)
W-CHI-THE-21	PEM	60C Tunbridge-Berkshire Complex	None	Groundwater Recharge/Discharge, Wildlife Habitat, Sediment/Toxicant Retention, Nutrient Removal	Steeplebush, Woolgrass, Lamp rush (*Juncus effusus*), Fringed sedge, Red Maple, White pine	Saturated	Geomorphic Position (D2)	Depleted Matrix (F3), Redox Dark Surface (F6)
W-CHI-THE-23	PEM	77C Marlow Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Sensitive fern, Fringed sedge, Woolgrass, Rattlesnake mannagrass, Giant goldenrod, Glossy buckthorn, Steeplebush	Saturated	Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-26	PFO	559B Skerry Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Red maple, Eastern hemlock, Cinnamon fern, Three-leaved goldthread (*Coptis trifolia*)	Saturated	Geomorphic Position (D2)	Depleted Matrix (F3)
W-CHI-THE-27	PEM	559C Skerry Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Bluejoint, Blue iris (*Iris versicolor*), Woolgrass, Dark-green bulrush (*Scirpus atrovirens*)	Saturated	Saturation (A3), Geomorphic Position (D2), FAC-Neutral Test (D5)	Redox Dark Surface (F6)
W-CHI-THE-32	PSS	295 Greenwood Mucky Peat	None	Groundwater Recharge/Discharge, Sediment/Toxicant Retention, Nutrient Removal, Shoreline Stabilization, Wildlife Habitat	Speckled alder (*Alnus incana* ssp. *rugosa*), Spotted touch-me-not, Balsam fir, Sensitive fern, Fringed sedge	Saturated	High Water Table (A2), Saturation (A3), Drainage Patterns (B10), Geomorphic Position (D2), FAC-Neutral Test (D5)	Sandy Redox (S5)
W-CHI-DRB-40	PFO	77C Marlow Fine Sandy Loam	None	Groundwater Recharge/Discharge, Production Export, Wildlife Habitat	Yellow birch, Sensitive fern, Melic mannagrass (*Glyceria melicaria*), Aster sp., Red maple	Saturated	Drainage Patterns (B10), Microtopographic Relief (D4)	Depleted Below Dark Surface (A11)
W-CHI-DRB-41	PFO	77C Marlow Fine Sandy Loam	Green frogs, Eastern newt	Groundwater Recharge/Discharge, Production Export, Wildlife Habitat	Yellow birch, Bluejoint, Woolgrass, Bristly dewberry (*Rubus hispidus*) glossy buckthorn, Red maple	Saturated	Microtopographic Relief (D4)	Depleted Below Dark Surface (A11)
W-CHI-DRB-43	PSS	77C Marlow Fine Sandy Loam	None	Groundwater Recharge/Discharge, Production Export, Wildlife Habitat	Glossy buckthorn, Sensitive fern, Steeplebush, Lamp rush, Bluejoint	Saturated	Oxidized Rhizospheres on Living Roots (C3), Microtopographic Relief (D4)	Depleted Below Dark Surface (A11)
W-CHI-DRB-44	PSS	77C Marlow Fine Sandy Loam	Green frogs	Groundwater Recharge/Discharge, Wildlife Habitat	Leatherleaf (*Chamaedaphne calyculata*), Red maple, Steeplebush	Seasonally Flooded	Algal Mat or Crust (B4)	Depleted Below Dark Surface (A11)
W-CHI-DRB-45	PSS	77C Marlow Fine Sandy Loam	None	Groundwater Recharge/Discharge, Nutrient Removal, Sediment/Toxicant Retention, Production Export, Wildlife Habitat	Grey birch (*Betula populifolia*), Bluejoint, Steeplebush, Glossy buckthorn, Maleberry (*Lyonia ligustrina*)	Seasonally Flooded	Water-Stained Leaves (B9), Oxidized Rhizospheres on Living Roots (C3), Algal Mat or Crust (B4), Drainage Patterns (B10), Microtopographic Relief (D4)	Depleted Matrix (F3)

Table 1. Summary of Delineated Wetlands in the Project Area (Revised 8-12-2020)

Resource ID	Dominant Covertype [1, 2]	Soil Map Unit [3]	Wildlife Observations	Potential Functions and Values [4]	Dominant Vegetation	Hydrologic Regime	Hydrology Indicators [5]	Hydric Soil Indicator [6]
W-CHI-DRB-46	PSS	57B Beckett Fine Sandy Loam	None	Groundwater Recharge/Discharge, Wildlife Habitat	Glossy buckthorn, Lamp rush, Sensitive fern, Canada goldenrod (*Solidago canadensis*)	Seasonally Flooded	Water-Stained Leaves (B9), Oxidized Rhizospheres on Living Roots (C3), Microtopographic Relief (D4)	Redox Dark Surface (F6)
W-CHI-TRS-3	PEM	559C Skerry Fine Sandy Loam	None	Groundwater Recharge/Discharge, Sediment/Toxicant Retention	Red maple, Balsam fir, Fringed sedge, Shallow sedge (*Carex lurida*)	Saturated	High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9)	Histic Epipedon (A2), Black Histic (A3)
W-EBL-20197	PSS	57B Beckett Fine Sandy Loam	None	Groundwater Recharge/Discharge, Nutrient Removal, Sediment/Toxicant Retention, Production Export, Wildlife Habitat	Red maple, Yellow birch, Gray birch (*Betula populifolia*), Steeplebush, Fringed sedge, Shallow sedge		High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9)	Sandy Redox (S5), Depleted Matrix (F3)
W-CHI-GAR-1	PSS	77C Marlow Fine Sandy Loam	None	Groundwater Recharge/Discharge, Nutrient Removal, Sediment/Toxicant Retention, Production Export, Wildlife Habitat	Frangula alnus (alder buckthorn), Acer rubrum (red maple), Onoclea sensibilis (sensitive fern), Toxicodendron radicans (poison ivy)	Seasonally Flooded	Saturation (A3), Presence of Reduced Iron (C4), Microtopographic Relief (D4)	Depleted Matrix (F3)
W-CHI-GAR-2	PSS	347B Lyme and Moosilauke Soils/ 60C Tunbridge-Berkshire Complex	None	Groundwater Recharge/Discharge, Sediment/Toxicant Retention	Acer rubrum (red maple), Betula populifolia (gray birch), Betula alleghaniensis (yellow birch), Frangula alnus (alder buckthorn), Tsuga canadensis (Canadian hemlock), Abies balsamea (balsam fir), Scirpus cyperinus (Woolgrass), Rubus hispidus (swamp dewberry),	Seasonally Flooded	Saturation (A3), Microtopographic Relief (D4)	Depleted Below Dark Surface (A11)

[1] Cowardin et al.
[2] PFO = palustrine forested wetland; PSS = palustrine scrub-shrub wetland; PEM = palustrine emergent wetland.
[3] USDA-NRCS Web Soil Survey
[4] USACE Highway Methodology Workbook Supplement
[5] USACE Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (version 2)
[6] USDA-NRCS Field Indicators for Hydric Soils v7 (and v8.2 released in 2018)

Table 2. Summary of Delineated Streams in the Project Area (Revised 8-12-2020)

Resource ID	Flow Regime	Dominant Substrate	Water Width (feet)	Water Depth at Max (inches)	Flow Stage	Flow Velocity	Flow Direction	Bank Width (feet)	Bank Height (inches)	Stability	Sinuosity Ratio	Floodplain Habitat	Associated Wetland ID	Evidence of Aquatic Wildlife	Evidence of Disturbance
S-CHI-THE-6	Intermittent	Cobble-Gravel	3-10	0-3	Moist, no flow	Minimal	SW	3-10	0-3	Moderate	0.5	Mature Forest, Quality Wetland	W-CHI-THE-4	No aquatic wildlife observed	No impacts - Pristine
S-CHI-THE-5	Intermittent, Perennial (discontinuous channels)	Boulder/Slabs	0-3	3-6	Low	Minimal	SE	3-10	12-24	Moderate	2	Mature and Immature Forest, Quality Wetland	W-CHI-THE-4	Salamanders, Frogs or tadpoles	Logging
S-CHI-THE-7	Ephemeral	Cobble-Gravel	0-3	0-3	Dry	Minimal	S	0-3	6-12	Moderate	1	Immature Forest	W-CHI-THE-8	Salamanders	Logging
S-CHI-THE-14	Ephemeral	Cobble-Gravel	0-3	0-3	Moist, no flow	Slow	W	0-3	6-12	Moderate	1	Mature Forest	W-CHI-THE-13, W-CHI-THE-15	No aquatic wildlife observed	Logging
S-CHI-THE-29	Intermittent	Boulder/Slabs	0-3	6-12	Above average flow	Slow	W	6-12	6-12	High	0.5	Mature Forest, Quality Wetland	W-CHI-THE-1	No aquatic wildlife observed	Logging
S-CHI-THE-31	Perennial	Cobble-Gravel	0-3	6-12	Above average flow	Moderate	W	12-24	12-24	Moderate	0.5	Mature Forest, Quality Wetland / Quality Wetland, Paved Road	W-CHI-THE-32	No aquatic wildlife observed	Road impacts

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Chinook **City/County:** Fitzwilliam, Cheshire **Sampling Date:** 2020-July-22
Applicant/Owner: NextEra **State:** NH **Sampling Point:** WCHI-GR-1-WET_PSS-1
Investigator(s): Greg Russo, Dana Valleu **Section, Township, Range:** NA
Landform (hillslope, terrace, etc.): Depression **Local relief (concave, convex, none):** Concave **Slope (%):** 2 to 5
Subregion (LRR or MLRA): LRR R **Lat:** 42.7679539193 **Long:** -72.1011091211 **Datum:** WGS84
Soil Map Unit Name: Marlow fine sandy loam, 8 to 15 percent slopes, very stony **NWI classification:** None
Are climatic/hydrologic conditions on the site typical for this time of year? Yes _✓_ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes _✓_ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _✓_ No ____		
Hydric Soil Present?	Yes _✓_ No ____	**Is the Sampled Area within a Wetland?**	**Yes _✓_ No ____**
Wetland Hydrology Present?	Yes _✓_ No ____	**If yes, optional Wetland Site ID:**	WCHI-GR-1-WET

Remarks: (Explain alternative procedures here or in a separate report)
Covertype is PSS. Area is wetland, all three wetland parameters are present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
_✓_ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Marl Deposits (B15)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
_✓_ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
_✓_ Microtopographic Relief (D4)
_✓_ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____ No _✓_	Depth (inches):	
Water Table Present?	Yes ____ No _✓_	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes _✓_ No ____	Depth (inches):	4

Wetland Hydrology Present? Yes _✓_ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
The criterion for wetland hydrology is met.

VEGETATION -- Use scientific names of plants.

Sampling Point: WCHI-GR-1-WET_PSS-1

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Frangula alnus*	80	Yes	FAC
2. *Acer rubrum*	25	Yes	FAC
3.			
4.			
5.			
6.			
7.			
	105	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Onoclea sensibilis*	25	Yes	FACW
2. *Toxicodendron radicans*	10	Yes	FAC
3. *Carex gynandra*	5	No	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	4	(A)
Total Number of Dominant Species Across All Strata:	4	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply By:	
OBL species	5	x 1 =	5
FACW species	25	x 2 =	50
FAC species	115	x 3 =	345
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals	145 (A)		400 (B)
Prevalence Index = B/A =	2.8		

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation

_✓_ 2 - Dominance Test is >50%

_✓_ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

Tree – Woody plants 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/shrub – Woody plants less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes _✓_ No ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

SOIL

Sampling Point: WCHI-GR-1-WET_PSS-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/2	100					Silt Loam	
6 - 14	2.5Y 4/2	95	7.5YR 4/6	5	C	M	Silty Clay Loam	
14 - 20	2.5Y 4/2	85	7.5YR 4/6	15	C	M	Silty Clay Loam	

[1]Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. [2]Location: PL = Pore Lining, M = Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR R, MLRA 149B)**
___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
___ Loamy Mucky Mineral (F1) **(LRR K, L)**
___ Loamy Gleyed Matrix (F2)
_✓_ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
___ Coast Prairie Redox (A16) **(LRR K, L, R)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
___ Dark Surface (S7) **(LRR K, L)**
___ Polyvalue Below Surface (S8) **(LRR K, L)**
___ Thin Dark Surface (S9) **(LRR K, L)**
___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: None

Depth (inches):

Hydric Soil Present? Yes _✓_ No ____

Remarks:

A positive indication of hydric soil was observed.

Photo of Sample Plot North

Photo of Sample Plot East

Photo of Sample Plot South

Photo of Sample Plot
West

WETLAND DETERMINATION DATA FORM – Northcentral and Northeast Region

Project/Site: Chinook **City/County:** Fitzwilliam, Cheshire **Sampling Date:** 2020-July-22
Applicant/Owner: NextEra **State:** NH **Sampling Point:** W-GAR-02_PEM-1
Investigator(s): Greg Russo, Dana Valleu **Section, Township, Range:** NA
Landform (hillslope, terrace, etc.): Depression **Local relief (concave, convex, none):** Concave **Slope (%):** 2 to 5
Subregion (LRR or MLRA): LRR R **Lat:** 42.7620937117 **Long:** -72.1041421965 **Datum:** WGS84
Soil Map Unit Name: Tunbridge-Berkshire complex, 8 to 15 percent slopes, very stony **NWI classification:** PFO4E
Are climatic/hydrologic conditions on the site typical for this time of year? Yes ✓ No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ✓ No ____		
Hydric Soil Present?	Yes ✓ No ____	**Is the Sampled Area within a Wetland?**	**Yes ✓ No ____**
Wetland Hydrology Present?	Yes ✓ No ____	**If yes, optional Wetland Site ID:**	W-GAR-02

Remarks: (Explain alternative procedures here or in a separate report)
Covertype is PEM. Area is wetland, all three wetland parameters are present.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

___ Surface Water (A1)
___ High Water Table (A2)
✓ Saturation (A3)
___ Water Marks (B1)
___ Sediment Deposits (B2)
___ Drift Deposits (B3)
___ Algal Mat or Crust (B4)
___ Iron Deposits (B5)
___ Inundation Visible on Aerial Imagery (B7)
___ Sparsely Vegetated Concave Surface (B8)
___ Water-Stained Leaves (B9)
___ Aquatic Fauna (B13)
___ Marl Deposits (B15)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres on Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Tilled Soils (C6)
___ Thin Muck Surface (C7)
___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

___ Surface Soil Cracks (B6)
___ Drainage Patterns (B10)
___ Moss Trim Lines (B16)
___ Dry-Season Water Table (C2)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Stunted or Stressed Plants (D1)
___ Geomorphic Position (D2)
___ Shallow Aquitard (D3)
✓ Microtopographic Relief (D4)
✓ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____ No ✓	Depth (inches):	
Water Table Present?	Yes ____ No ✓	Depth (inches):	
Saturation Present? (includes capillary fringe)	Yes ✓ No ____	Depth (inches):	0

Wetland Hydrology Present? Yes ✓ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
The criterion for wetland hydrology is met.

VEGETATION -- Use scientific names of plants.

Sampling Point: W-GAR-02_PEM-1

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1. *Acer rubrum*	10	Yes	FAC
2. *Betula populifolia*	10	Yes	FAC
3. *Betula alleghaniensis*	10	Yes	FAC
4. *Frangula alnus*	10	Yes	FAC
5. *Tsuga canadensis*	10	Yes	FACU
6. *Abies balsamea*	10	Yes	FAC
7.			
	60	= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Scirpus cyperinus*	40	Yes	OBL
2. *Rubus hispidus*	40	Yes	FACW
3. *Dennstaedtia punctilobula*	10	No	UPL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90	= Total Cover	
Woody Vine Stratum (Plot size: 30 ft)			
1.			
2.			
3.			
4.			
	0	= Total Cover	

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	7	(A)
Total Number of Dominant Species Across All Strata:	8	(B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	87.5	(A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply By:	
OBL species	40	x 1 =	40
FACW species	40	x 2 =	80
FAC species	50	x 3 =	150
FACU species	10	x 4 =	40
UPL species	10	x 5 =	50
Column Totals	150 (A)		360 (B)
Prevalence Index = B/A =	2.4		

Hydrophytic Vegetation Indicators:

____ 1- Rapid Test for Hydrophytic Vegetation

_✓_ 2 - Dominance Test is >50%

_✓_ 3 - Prevalence Index is ≤ 3.0[1]

____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Definitions of Vegetation Strata:

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Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vines – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes _✓_ No ____

Remarks: (Include photo numbers here or on a separate sheet.)

A positive indication of hydrophytic vegetation was observed (>50% of dominant species indexed as OBL, FACW, or FAC).

SOIL

Sampling Point: W-GAR-02_PEM-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 6	10YR 2/1	100					Silt Loam	
6 - 14	2.5Y 4/1	100					Sandy Loam	

[1]Type: C = Concentration, D = Depletion, RM = Reduced Matrix, MS = Masked Sand Grains. [2]Location: PL = Pore Lining, M = Matrix.

Hydric Soil Indicators:

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5)
_✓_ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Dark Surface (S7) **(LRR R, MLRA 149B)**
___ Polyvalue Below Surface (S8) **(LRR R, MLRA 149B)**
___ Thin Dark Surface (S9) **(LRR R, MLRA 149B)**
___ Loamy Mucky Mineral (F1) **(LRR K, L)**
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)

Indicators for Problematic Hydric Soils[3]:

___ 2 cm Muck (A10) **(LRR K, L, MLRA 149B)**
___ Coast Prairie Redox (A16) **(LRR K, L, R)**
___ 5 cm Mucky Peat or Peat (S3) **(LRR K, L, R)**
___ Dark Surface (S7) **(LRR K, L)**
___ Polyvalue Below Surface (S8) **(LRR K, L)**
___ Thin Dark Surface (S9) **(LRR K, L)**
___ Iron-Manganese Masses (F12) **(LRR K, L, R)**
___ Piedmont Floodplain Soils (F19) **(MLRA 149B)**
___ Mesic Spodic (TA6) **(MLRA 144A, 145, 149B)**
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (TF12)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Rock
Depth (inches): 14

Hydric Soil Present? Yes _✓_ No ____

Remarks:

A positive indication of hydric soil was observed.

Photo of Sample Plot
North

Photo of Sample Plot East

Photo of Sample Plot South

Photo of Sample Plot
West