



Connecticut Department of
**ENERGY &
ENVIRONMENTAL
PROTECTION**

October 19, 2020

Mr. Jeffrey Shamas
VHB, Inc.
100 Great Meadow Road
Wethersfield, CT 06109
jshamas@vhb.com

Project: Greenskies Clean Energy LLC 55 Acre 5-MW AC Photovoltaic Electric Generating Solar Facility Project Located at 233 Boombridge Road in North Stonington, Connecticut
NDDB Determination No.: 201908214

Dear Jeffrey Shamas,

I have reviewed Natural Diversity Data Base maps and files regarding the area delineated on the map provided for the proposed Greenskies Clean Energy LLC 55 Acre 5-MW AC Photovoltaic Electric Generating Solar Facility Project Located at 233 Boombridge Road in North Stonington, Connecticut.

According to our records there are known extant populations of State Listed Species known that occur within or close to the boundaries of this property. They included:

State Endangered

Scaphiopus holbrookii (Eastern spadefoot)

State Threatened

Calopteryx dimidiata (Sparkling jewelwing)

State Special Concern

Margaritifera margaritifera (Eastern pearlshell)

Crocanthemum propinquum (Low frostweed)

Plantago virginica (Hoary plaintain)

Rubus cuneifolius (Sand blackberry)

I received a 2020 Rare Species Summary Report dated October 12, 2020 from Brett Trowbridge and Jeffrey Shamus of VHB, Inc. The 2020 Rare Species Summary Report described surveys for state listed species at the project site and provided impact analysis and mitigation plans for impacted species from the development of a 55 acres 5-MW AC solar facility. Although no state listed plants or invertebrates were discovered during the site assessments and field work, two state-listed species State Endangered *Scaphiopus holbrookii* (Eastern spadefoot) and State Special Concern *Terrapene c. carolina* (Eastern box turtle) were discovered on this project site.

I also reviewed a specialized herpetological report Habitat Assessment and Impact Analysis to Guide: Project Planning, Construction Phasing and Mitigation Initiatives for the Protection of the Eastern Spadefoot (*Scaphiopus holbrookii*) dated October 9, 2020 prepared by Dennis P. Quinn of Quinn Ecological, LLC that was submitted within the 2020 Rare Species Summary Report. This particular report provided data on both the eastern spadefoot and the eastern box turtle at this site.

I concur with impact analysis and mitigation proposals described in the Habitat Assessment and Impact Analysis to Guide. The surveys conducted by Quinn Ecological, LLC documented the presence of the eastern spadefoot and eastern box turtle on site and discussed the adverse impacts of this proposed solar facility on these two species. His report focused on science guided protection and mitigation methods to allow for the long term persistence of both the eastern spadefoot and the box turtle. The report outlined Species Protection Measures including Phase One (pre-construction measures), Phase Two (construction measures) and Phase Three (post construction measures).

The following provisions are the Required Protection Mitigation Measures that must be implemented for *Scaphiopus holbrookii* and *Terrapene c. carolina* as described in the Habitat Assessment and Impact Analysis to Guide developed by Quinn Ecological, LLC to avoid adverse impacts from this project on the state listed species.

Specific Species Protection Measures

To conserve the eastern spadefoot, the following modifications have been made to the engineering design plans to reduce impacts to the eastern spadefoot. These protection measures will be implanted during the construction phase of the project:

1. Stormwater features will be excluded with permeant exclusionary barriers, ERTEC Environmental Systems' E-Fence, to prevent eastern spadefoots from accessing stormwater features for reproduction.
2. Due to the fossorial nature of the eastern spadefoot, no fixed synthetic plastic netting, used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], mesh-reinforced silt fence) will be used outside of the permanently excluded stormwater features for soil stabilization. These fixed netting products, even when biodegradable, have been found to entangle wildlife, including reptiles, amphibians, birds, and small mammals. Temporary erosion control products such as erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a continuous matrix (net-less) and/or natural biodegradable jute fiber will be used to avoid/minimize wildlife entanglement.
3. Access and maintenance roads will be top dressed in grass to the greatest extent possible. Top dressing access and maintenance roads with crushed stone will be limited to the greatest extent possible.

The following species protection measures will take place during the Three Phases outlined below:

1. Phase One: Pre-construction – establishment of a 7-acre conservation easement, in addition to exclusionary fencing, nocturnal species sweeps and PIT-fall trapping to reduce direct mortality to eastern spadefoots within the construction footprint.
2. Phase Two: During construction – maintenance and monitoring of exclusionary fencing to prevent spadefoots from accessing the construction area.
3. Phase Three: Post-construction – enhancements habitats in restoration area disturbed during construction.

Phase One: Pre-construction Species Protection Measures

To reduce direct impacts to eastern spadefoots the following pre-construction protection measures will be implemented: these include the establishment of a 7-acre conservation easement, exclusionary measures, nocturnal species sweeps and PIT-fall trapping surveys. A report summarizing the implementation and results of the pre-construction protection measures will be provided to the CTDEEP.

1. 7-acre Conservation Easement: A 7-acre conservation easement will be established to offset impacts to the early/late successional habitat resulting from the construction of the proposed solar facility. The conservation easement will be established immediately south southwest of the solar installation. This area was selected because it contains a substantial amount of suitable early/late successional habitat and both identified potential breeding pools. During nocturnal surveys, both spadefoots were also encountered in this area. The conservation easement will also serve as the relocation zone for spadefoots captured within the footprint of construction during the pre-construction species sweeps.

2. Installation of exclusionary barrier: Installation of exclusionary fencing (i.e., contractor grade silt fencing), will be installed as a barrier to migrating/dispersing herpetofauna. The intent of the barrier is to isolate the majority of the work zone from foraging/migrating/dispersing eastern spadefoots. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs. In these circumstances all access roads and openings, used during the workday for accessibility, will be closed with temporary silt fencing backed with hay bales at the completion of each workday. Exclusionary fencing will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or an approved equivalent. In areas where the silt fence cannot be buried, the fencing will be placed with the unburied flap facing away from the construction area and covered with six inches of crushed stone. The extent of the exclusionary fencing will be shown on the site plans. The Contractor will have available additional barrier fencing should field conditions warrant extending the fencing as directed by the environmental monitor. The extent of the exclusionary fencing around the staging area may increase in size from what is currently depicted on the site plans to accommodate all construction and personnel vehicles and materials. The exclusionary fencing will also serve as the backdrop for the one-way linear pit-fall trap line during pre-construction species sweeps.

Prior to the installation of the exclusionary fencing, the vegetation within the construction area will be mowed to enhance eastern spadefoot detection during nocturnal surveys. No soil disturbance will occur during clearing activities. Installation of the exclusionary fencing is anticipated to be completed by April 15th, 2021.

3. Installation and monitoring of PIT-fall trap arrays: A total of 75 PIT-fall traps will be installed in the areas designated on Figure 5. Two array styles will be used: a one-way linear trap line along the limit of disturbance and four cross arrays within the site interior. Each PIT-fall trap will consist of a five-gallon bucket with approximately 5 one-eighth inch holes drilled into the bottom to prevent buckets from filling with water. Each bucket will be dug into the ground, with the top at or slightly below grade. The back of each bucket will sit flush against the silt fence so when spadefoots follow the trap-line they cannot pass between the bucket and fence. Buckets will be placed only in upland habitats with a spacing of approximately ninety feet (≈ 30 -meters). Weather permitting, the PIT-fall traps will be opened during rainy evenings and checked the following morning and closed. To close the PIT-fall arrays, each bucket will be topped with a lid and further secured by placing a rock on the lid weighing approximately 5 pounds. The PIT-fall array will be active for a maximum of 10 trapping nights, up until the anticipated construction start date of May 15, 2021. Once PIT-fall trapping is complete, all buckets will be removed, and each remaining hole backfilled to maintain the integrity of the exclusionary fencing. All captured spadefoots will be relocated outside the construction area into the designated relocation zone depicted on Figure 5. A qualified herpetologist with experience installing PIT-falls will oversee the installation of the trap-lines.

4. *Nocturnal eye-shine surveys*: A maximum of 10 nocturnal eye-shine surveys will be conducted prior to the commencement of construction on May 15, 2021. These surveys will be conducted during optimal conditions for the detection of eastern spadefoots. All surveys will be conducted within the exclusionary area, focusing efforts in areas where eastern spadefoots are most likely to occur. All captured spadefoots will be relocated outside the construction area into the designated relocation zone depicted on Figure 5.

5. Following the completion of the pre-construction surveys efforts, a summary report will be provided to the CTDEEP documenting the listed species relocated outside of the construction area.

Phase Two: Construction Protection Measures

1. Monitoring and Maintaining Exclusionary Fencing

- a. The Contractor will be responsible for daily inspections of the fencing for tears or breaches in the fabric and accumulation of sediment, particularly following storm events of 0.25 inch or greater. All compromised areas of silt fence will be immediately repaired. A qualified herpetologist will conduct random inspections to ensure the exclusionary barrier is appropriately maintained and functioning in its exclusionary capacity. The extent of the exclusionary fencing will be shown on the site plans but may increase in its extent surrounding the staging area.
- b. The intent of the exclusionary fencing is to isolate the majority of the work zone from foraging/migrating/dispersing eastern spadefoots. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs. In this circumstance all openings in the exclusionary barrier, used during the workday for accessibility, will be closed with temporary silt fencing backed with hay bales at the end of each day.
- c. No equipment, vehicles or construction materials will be stored outside of the exclusionary barrier fencing.
- d. All exclusionary fencing will be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Contractor Education

- a. Prior to work on site, the Contractor will attend an educational session at the preconstruction meeting with a qualified herpetologist. This orientation and educational session will consist of an introductory meeting providing photos of herpetofauna that may be encountered during construction activities, including the eastern spadefoot.
- b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary “false alarms” and how to document and relocate all encountered species.
- c. The Contractor will be provided with the cell phone and email contacts of the Herpetologist to immediately report any encounters with listed species, or other herpetofauna species. Educational poster materials will be provided and displayed on the job site to maintain worker awareness as the project progresses.

3. Reporting

- a. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the barrier fence will be completed. Any observations of state listed species will be included in this report with photo documentation (if possible) and specific information on the location and disposition of all listed herpetofauna encountered.

Phase Three: Post-construction Protection Measures

1. Management of the Conservation Easement

The 7-acre Conservation Easement will be donated to a local land trust with a gift from Greenskies in the amount of \$5,000.00 to manage the early successional habitat. Quinn Ecological, LLC will provide the land trust with a management plan and train them in the implementation of this plan. The 7-acre conservation easement contains a substantial amount of suitable early/late successional habitat and both identified potential breeding pools for the eastern spadefoot (Figure 6). Because the vegetation is well established in this area, no plantings by the land trust will be required. Habitat management to maintain the current successional state of this area will be outlined in the management plan provided by Quinn Ecological, LCC and occur on an approximate 5-year cycle during the inactive season for the eastern spadefoot between November 30th and April 1st. While conducting management, only herbaceous vegetation will be mowed, all low-growing shrubs will be avoided unless they begin to over-take the conservation easement. There will be a goal in preserving no more than 30 to 40 percent shrub cover within the conservation easement, once this threshold is met, active removal of shrubs will take place. Shrub cover will be maintained in small dense patches, measuring approximately 20 m x 20 m, scattered throughout the conservation easement (Figure 6). This will distribute and preserve protective cover for foraging eastern spadefoots. Invasive species control measures will be outlined in the management plan and follow those described in the Invasive Species Control Plan outline in Section 4 of this report.

2. Management of the Habitat Restoration Area

All direct impacts will occur within 27-acres of early/late successional habitat. Approximately 9.5 acres of this early/late successional habitat will be temporarily impacted during construction activities. These 9.5-acres will be restored post-construction by Greenskies to early/late successional habitat for the eastern spadefoot (Figures 7 and 8).

This 9.5-acre will be planted with a mix of early successional warm-season grasses, herbaceous plantings and augmented with the low growing shrub species sweetfern (*Comptonia peregrina*), favored by the eastern spadefoot for cover while foraging. Sweetfern plantings will not be random, but instead dispersed in multiple dense clusters to create micro-habitat areas for night-time foraging activities (Figure 7). Herbaceous plants with an indicator status of Upland (UPL) to FAC will be used. The plants in Table 4 have been selected to promote areas of bare soil. Wildflowers include species intended to attract Lepidoptera and other insects.

Habitat management in the habitat restoration area will be conducted by Greenskies. Management needs will be monitored by Greenskies and take place as required to maintain the recommended successional state of herbaceous and shrub vegetation cover. The successional state will preserve no more than 40 percent shrub cover within the habitat restoration area, once this threshold is met, active management to remove shrub cover will take place. Shrub cover will be maintained in small dense patches, measuring approximately 20 m x 20 m, scattered throughout the restoration area. This will distribute and enhance the available protective cover for foraging spadefoots. Invasive species control measures will be conducted by Greenskies in the habitat restoration zone and follow those outlined in the Invasive Species Control Plan in Section 4 of this report. A list of recommended species for planting have been compiled in Table 4.

3. Invasive Species Control Plan

The CT DEEP, under PA 03-136 and in cooperation with the Connecticut Invasive Plants Council (through the Invasive Plant Atlas of New England [IPANE]), has compiled a State list of invasive plants. The target species of greatest concern are those that readily invade. These include autumn olive (*Elaeagnus umbellata*), Russian olive (*Elaeagnus angustifolia*), multiflora rose (*Rosa multiflora*), mugwort (*Artemisia vulgaris*) and morrow's honeysuckle (*Lonicera morrowii*). These species have the potential to form monocultures which may adversely impact the ecological integrity of natural habitat areas.

A. Control Area:

Invasive plant control will occur within the habitat restoration area (conducted by Greenskies) and conservation easement (conducted by the land trust). Monitoring for invasive species encroachment will take place approximately once every five years. Invasive species will be maintained at a level below 20-percent total cover within the habitat restoration area and conservation easement.

B. Control Measures:

Mechanical control is recommended by hand pulling or mowing wherever practical. While these non-chemical controls are preferred, the extent of any invasion will dictate the appropriate control method. The final determination of control methods will be dependent on the extent of target species. The most effective control techniques will be determined by the parties conducting management activities.

Any herbicide application will be conducted by a commercial herbicide applicator licensed by the Connecticut Department of Energy and Environmental Protection, according to product labels. Small woody specimens of bush honeysuckle, olive or multiflora rose will be controlled by hand pulling if the infestations are small. If the infestations are large or the plants are more mature, they will be controlled using basal bark applications of an herbicide with the active ingredient Triclopyr in a BEE formulation such as Pathfinder II or Garlon4 mixed in a methylated seed oil carrier. This herbicide penetrates the stem bark and translocates throughout the plant, killing the root system and preventing re-sprouting after cutting. This application is conducted using a low-volume backpack sprayer to wet the entire circumference of the bottom 12 inches of the plant stem and around the root collar. Small and intermediate-sized shrubs can be managed using a foliar application, using herbicides with the active ingredients Imazpyr, such as Habitat or Roundup.

I have attached the entire required mitigation plan developed by Quinn Ecological, LLC to this letter. The result of this review does not preclude the possibility that listed species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits. This determination is good for two years. Please re-submit an NDDB Request for Review if the scope of work changes or if work has not begun on this project by October 19, 2022.

Natural Diversity Data Base information includes all information regarding critical biological resources available to us at the time of the request. This information is a compilation of data collected over the years by the Department of Energy and Environmental Protection's Natural History Survey and cooperating units of DEEP, private conservation groups and the scientific community. This information is not necessarily the result of comprehensive or site-specific field investigations. Consultations with the Data Base should not be substitutes for on-site surveys required for environmental assessments. Current research projects and new contributors continue to identify additional populations of species and locations of habitats of concern, as well as, enhance existing data. Such new information is incorporated into the Data Base as it becomes available. The result of this review does not preclude the possibility that listed

species may be encountered on site and that additional action may be necessary to remain in compliance with certain state permits.

Please contact me if you have further questions at (860) 424-3592, or dawn.mckay@ct.gov . Thank you for consulting the Natural Diversity Data Base.

Sincerely,

Dawn M. McKay

Dawn M. McKay
Environmental Analyst 3

2020 Rare Species Summary
233 Boombridge Rd, North Stonington, CT

Attachment 1

Spadefoot Toad Summary Report

Habitat Assessment and Impact Analysis to Guide:
Project Planning, Construction Phasing and Mitigation Initiatives for the Protection of the Eastern
Spadefoot (*Scaphiopus holbrookii*)

233 Boom Bridge Road, North Stonington, Connecticut
NDDB Preliminary Assessment No.: 201908214

Prepared by:
Dennis P. Quinn
Quinn Ecological, LLC

Prepared for:
Vanasse Hangen Brustlin, Inc.

October 9, 2020

Introduction

The Eastern Spadefoot (*Scaphiopus holbrookii*), the only member of the spadefoot family (Scaphiopodidae) east of the Mississippi River, is among the rarest amphibians in the northeastern United States. It is listed as endangered under Connecticut's Endangered Species Act and designated as most important in Connecticut's Wildlife Action Plan for Species of Greatest Conservation Need (CT DEEP 2015). New England populations are scattered and disjunct, and typically found in low elevation river valleys with sandy, well-drained soils. Some of these already localized populations have been extirpated, presumably related to urban/suburban development (Klemens 1993). These extirpations likely resulted in part from impacts to their breeding pools, which are often not afforded wetland protection status due to their highly ephemeral nature and difficulty in detecting spadefoot breeding activity. In eastern Connecticut spadefoot locations coincided with Hinckley Soils and elevations below 200 feet with two notable exception in the towns of Lisbon and Griswold where elevations are greater than 300 feet (Moran and Button 2011, Klemens 1993, D. Quinn, observations, 2016). Hinckley soils are sandy, gravelly, and well drained (NRCS, 2008), characteristics that are consistent with reports of soil types preferred by spadefoots.

Data on the movement patterns and habitat use/selection of spadefoots in the Northeast are sparse with a few exceptions, most notably Ryan *et al.* (*in preparation*), Timm *et al.* (2014) and Quinn (2017). Timm *et al.* (2014) and Quinn (2017), found individuals selecting areas closer to deciduous shrub and forest edges and in areas with greater percent cover of low growing shrub species. Similar trends in habitat selection were found by Ryan *et al.* (*in prep*), with burrow

locations in, or at the edge of, open-canopy cover types with open soils and nearby patches of dense vegetation having soil temperatures warmer than those of randomly selected locations nearby. Timm *et al.* (2014), attributes habitat preferences to individuals seeking out locations that provide suitable burrowing substrates, cool and moist subterranean conditions, ample prey availability and protection from predators during nighttime foraging forays. Burrowing observed by Ryan *et al.* (*in prep*), was consistent with Jansen *et al.* (2001) experimental selection of substrates, where spadefoots burrowed primarily in bare, sandy soils avoiding grassy areas all together presumably due to dense root systems prohibiting burrow excavation. Timm and Ryan documented similar trends in burrow use where on average 3.6 (range 1 to 8) and 3 (range 1 to 7) unique burrows were selected by individual spadefoots during their studies. In addition, both studies showed similarities in duration of burrow use with many spadefoots using a single burrow for greater than 30 consecutive days and occasionally returning to previously used burrow locations. The selection of new burrow locations was often associated with nocturnal rain events (Timm *et al.*, 2014 and Ryan *et al.*, (*in prep*)). Timm *et al.* (2014), documented burrow depths up to 0.96 meters below the surface prior to November, no data on burrow depths were reported during winter months. Maximum Convex Polygon (MCP) home-range sizes for individuals were reported from 45–21,108 m² (mean = 4,729 m², max 61,391 m²) with home-range lengths of 22.0–455.9 m (mean = 157.6 m) reported by Timm *et al.* (2014). Ryan *et al.* (*in prep*), observed mean maximum straight-line distances of 155 ± 29 m (range 1–724 m) from the original point of release. Timm *et al.* (2014) reports average migratory distances from the closest breeding wetland of 130.4m (range 3 – 449 m), while Quinn has observed juvenile migratory distances from natal pools to average 212m (range 31.8 – 480 m). Timm *et al.* (2014) and Paton *et al.* (2003) report these migratory distances from wetlands as critical in the protection of amphibian populations, stating that the closer breeding pools are to roads, the greater the likelihood populations and metapopulations will be impacted by road mortality. Timm *et al.* (2014) associates the lack of breeding in wetlands within proximity to park roads within his study site to be a result of past mortality events reducing spadefoot population size and the primary cause of local metapopulation extirpation at his site.

Background

Vanasse Hangen Brustlin Inc. (VHB) retained Quinn Ecological, LLC to investigate the presence and potential impacts to eastern spadefoots resulting from their proposed installation of a ground-mounted 5-megawatt AC (“MWac”) solar-based electric generating facility in the Town of North Stonington, Connecticut. Quinn Ecological, LLC assessed this population to help guide the design, layout and mitigation initiatives to reduce impacts resulting from this solar generating facility prior to, during and after the completion of construction.

Methods

Presence/absence surveys were conducted through Visual Encounter Surveys (VES) using nocturnal eye-shine methodologies conducted over ten-nights during optimal conditions for detecting eastern spadefoots. A team of two to three individuals conducted VES's using 1,000

lumen high-output LED headlamps in habitats optimal for locating spadefoots. Visual encounter surveys typically began 15 minutes prior to sunset and continued until a drop-off in amphibian detection rates occurred. All surveys and activities associated with the study were performed under Scientific Collectors Permit No. 1317004.

Site Description

The project site is situated east of Boom Bridge Road, north of Anthony Road, south of Interstate-95 and approximately 464 m west of the Connecticut-Rhode Island state border. The leased portion of the project site is comprised of approximately 63 acres that was formerly forested and cleared sometime between 2015 and 2016 based on time-stamped aerial images. The proposed solar generating facility, occupying approximately 17.5-acres, is comprised of agricultural fields, early to late successional uplands and various wetland features. A dirt/gravel farm road provide access to the southwestern corner of the site from Boom Bridge Road and a small cart path extends across the site from the southeast to northwest. A stockpile area for farm and timber harvest operations exists near the center of the Site at the transition between agricultural field and early/late successional uplands (Figure 1).

Results

Presence/absence surveys were conducted over 10-nights beginning June 27th and concluding August 17th, 2020. Surveys were conducted during conditions with night-time temperatures ranging between 62- and 74-degrees Fahrenheit (Table 1). Surveys consisted of two to three-person field crews and totaled 38.5 hours (103.5 person hours) (Table 2). Search efforts were concentrated in early to late successional uplands, agricultural fields and along ecological edges. Although surveys were concentrated within optimal habitats, surveys were also conducted in habitats not often associated with spadefoot activity (i.e. forested wetlands).

A total of 2 eastern spadefoots were encountered on the subject property during nocturnal surveys: 1 adult female and 1 juvenile (estimated to be from a 2019 cohort) (Figure 2 and Table 3). Although only two individuals were encountered, dense late successional vegetation throughout the survey area made detection of this cryptic species difficult. In addition, an overall reduction in spadefoot activity during the 2020 season was detected across the Quinebaug Valley. This reduction in activity is likely attributable to abnormally dry conditions across the region, reducing the frequency of spadefoot over-land foraging forays and burrow relocation activities. As with the two individuals at the subject property, most spadefoots encountered during the 2020 field season within the Quinebaug Valley were very close their daytime burrows. Prior to the initiation of surveys on June 27th, breeding choruses were documented across the Quinebaug Valley in the towns of North Stonington, Lisbon and Plainfield on the night of May 1, 2020. Although no subsequent breeding events occurred in 2020, two potential breeding areas were identified on the subject property (Figure 3). These pools were dip-netted and visually inspected; however, no spadefoot tadpoles were detected. It should be noted that monitoring at

other known breeding sites in the Quinebaug Valley documented complete tadpole mortality by the end of May, one month prior to our commencement of surveys on June 27th. Based on the distance of the captured juvenile spadefoot, it is probable that breeding is occurring on the subject property in one or both identified potential breeding wetlands. Juvenile spadefoots being monitored through mark-recapture PIT-tag methodologies, as part of the North Stonington Solar Monitoring Program, dispersed on average 212 m (max – 480 m) from their natal wetland, distances that when transposed would encompass both potential breeding pools identified on the subject property (Figure 4).

Discussion of Impacts

With any development project there is inherently going to be associated impacts. It is important to understand the potential magnitude of impacts for each species and allow science guided protection and mitigation measures to reduce these impacts to the greatest extent possible. Most important for the long-term persistence of the eastern spadefoot is eliminating direct impacts to their breeding wetlands. Coupled with breeding wetland protections, reducing impacts within the spadefoot's early/late successional upland foraging and burrowing habitats is important. The proposed solar installation will have no direct impacts to the identified potential breeding pools but will directly impact approximately 27-acres of suitable early/late successional upland habitat. Of this 27-acres, approximately 9.5-acres within the limits of disturbance, can be restored to suitable upland habitat immediately following the completion of construction. The remaining 17.5-acres will serve as the footprint of the solar installation and can be maintained with early successional vegetation that may potentially serve as suitable habitat for the eastern spadefoot, however no data are currently available to support the use of habitats under solar arrays by this species.

Species Protection Measures

To conserve the eastern spadefoot, the following modifications have been made to the engineering design plans to reduce impacts to the eastern spadefoot. These protection measures will be implanted during the construction phase of the project:

1. Stormwater features will be excluded with permeant exclusionary barriers, ERTEC Environmental Systems' E-Fence, to prevent eastern spadefoots from accessing stormwater features for reproduction.
2. Due to the fossorial nature of the eastern spadefoot, no fixed synthetic plastic netting, used in a variety of erosion control products (i.e., erosion control blankets, fiber rolls [wattles], mesh-reinforced silt fence) will be used outside of the permanently excluded stormwater features for soil stabilization. These fixed netting products, even when biodegradable, have been found to entangle wildlife, including reptiles, amphibians, birds, and small mammals. Temporary erosion control products such as erosion control blankets, fiber rolls composed of processed fibers mechanically bound together to form a

continuous matrix (net-less) and/or natural biodegradable jute fiber will be used to avoid/minimize wildlife entanglement.

3. Access and maintenance roads will be top dressed in grass to the greatest extent possible. Top dressing access and maintenance roads with crushed stone will be limited to the greatest extent possible.

The following species protection measures will take place during the Three Phases outlined below:

1. Phase One: Pre-construction – establishment of a 7-acre conservation easement, in addition to exclusionary fencing, nocturnal species sweeps and PIT-fall trapping to reduce direct mortality to eastern spadefoots within the construction footprint.
2. Phase Two: During construction – maintenance and monitoring of exclusionary fencing to prevent spadefoots from accessing the construction area.
3. Phase Three: Post-construction – enhancements habitats in restoration area disturbed during construction.

Phase One: Pre-construction Species Protection Measures

To reduce direct impacts to eastern spadefoots the following pre-construction protection measures will be implemented: these include the establishment of a 7-acre conservation easement, exclusionary measures, nocturnal species sweeps and PIT-fall trapping surveys. A report summarizing the implementation and results of the pre-construction protection measures will be provided to the CTDEEP. Pre-construction protection measures are depicted on Figure 5.

1. *7-acre Conservation Easement:* A 7-acre conservation easement will be established to offset impacts to the early/late successional habitat resulting from the construction of the proposed solar facility. The conservation easement will be established immediately south-southwest of the solar installation. This area was selected because it contains a substantial amount of suitable early/late successional habitat and both identified potential breeding pools. During nocturnal surveys, both spadefoots were also encountered in this area. The conservation easement will also serve as the relocation zone for spadefoots captured within the footprint of construction during the pre-construction species sweeps.
2. *Installation of exclusionary barrier:* Installation of exclusionary fencing (i.e., contractor grade silt fencing), will be installed as a barrier to migrating/dispersing herpetofauna. The intent of the barrier is to isolate the majority of the work zone from foraging/migrating/dispersing eastern spadefoots. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs. In these circumstances all access roads and openings, used during the workday for accessibility, will be closed with temporary silt fencing backed with hay bales at the completion of each workday. Exclusionary fencing

will consist of non-reinforced conventional erosion control woven fabric, installed approximately six inches below surface grade and staked at seven to ten-foot intervals using four-foot oak stakes or an approved equivalent. In areas where the silt fence cannot be buried, the fencing will be placed with the unburied flap facing away from the construction area and covered with six inches of crushed stone. The extent of the exclusionary fencing will be shown on the site plans. The Contractor will have available additional barrier fencing should field conditions warrant extending the fencing as directed by the environmental monitor. The extent of the exclusionary fencing around the staging area may increase in size from what is currently depicted on the site plans to accommodate all construction and personnel vehicles and materials. The exclusionary fencing will also serve as the backdrop for the one-way linear pit-fall trap line during pre-construction species sweeps.

Prior to the installation of the exclusionary fencing, the vegetation within the construction area will be mowed to enhance eastern spadefoot detection during nocturnal surveys. No soil disturbance will occur during clearing activities. Installation of the exclusionary fencing is anticipated to be completed by April 15th, 2021.

3. *Installation and monitoring of PIT-fall trap arrays:* A total of 75 PIT-fall traps will be installed in the areas designated on Figure 5. Two array styles will be used: a one-way linear trap line along the limit of disturbance and four cross arrays within the site interior. Each PIT-fall trap will consist of a five-gallon bucket with approximately 5 one-eighth inch holes drilled into the bottom to prevent buckets from filling with water. Each bucket will be dug into the ground, with the top at or slightly below grade. The back of each bucket will sit flush against the silt fence so when spadefoots follow the trapline they cannot pass between the bucket and fence. Buckets will be placed only in upland habitats with a spacing of approximately ninety feet (\approx 30-meters). Weather permitting, the PIT-fall traps will be opened during rainy evenings and checked the following morning and closed. To close the PIT-fall arrays, each bucket will be topped with a lid and further secured by placing a rock on the lid weighing approximately 5 pounds. The PIT-fall array will be active for a maximum of 10 trapping nights, up until the anticipated construction start date of May 15, 2021. Once PIT-fall trapping is complete, all buckets will be removed, and each remaining hole backfilled to maintain the integrity of the exclusionary fencing. All captured spadefoots will be relocated outside the construction area into the designated relocation zone depicted on Figure 5. A qualified herpetologist with experience installing PIT-falls will oversee the installation of the traplines.
4. *Nocturnal eyeshine surveys:* A maximum of 10 nocturnal eye-shine surveys will be conducted prior to the commencement of construction on May 15, 2021. These surveys will be conducted during optimal conditions for the detection of eastern spadefoots. All surveys will be conducted within the exclusionary area, focusing efforts in areas where

eastern spadefoots are most likely to occur. All captured spadefoots will be relocated outside the construction area into the designated relocation zone depicted on Figure 5.

5. Following the completion of the pre-construction surveys efforts, a summary report will be provided to the CTDEEP documenting the listed species relocated outside of the construction area.

Phase Two: Construction Protection Measures

1. Monitoring and Maintaining Exclusionary Fencing

- a. The Contractor will be responsible for daily inspections of the fencing for tears or breaches in the fabric and accumulation of sediment, particularly following storm events of 0.25 inch or greater. All compromised areas of silt fence will be immediately repaired. A qualified herpetologist will conduct random inspections to ensure the exclusionary barrier is be appropriately maintained and functioning in its exclusionary capacity. The extent of the exclusionary fencing will be shown on the site plans but may increase in its extent surrounding the staging area.
- b. The intent of the exclusionary fencing is to isolate the majority of the work zone from foraging/migrating/dispersing eastern spadefoots. Oftentimes complete isolation of a work zone is not feasible due to accessibility needs. In this circumstance all openings in the exclusionary barrier, used during the workday for accessibility, will be closed with temporary silt fencing backed with hay bales at the end of each day.
- c. No equipment, vehicles or construction materials will be stored outside of the exclusionary barrier fencing.
- d. All exclusionary fencing will be removed within 30 days of completion of work and permanent stabilization of site soils.

2. Contractor Education

- a. Prior to work on site, the Contractor will attend an educational session at the preconstruction meeting with a qualified herpetologist. This orientation and educational session will consist of an introductory meeting providing photos of herpetofauna that may be encountered during construction activities, including the eastern spadefoot.
- b. The education session will also focus on means to discriminate between the species of concern and other native species to avoid unnecessary “false alarms” and how to document and relocate all encountered species.

4. The Contractor will be provided with the cell phone and email contacts of the Herpetologist to immediately report any encounters with listed species, or other herpetofauna species. Educational poster materials will be provided and displayed on the job site to maintain worker awareness as the project progresses.

3. Reporting

- a. Following completion of the construction project, a summary report to the CTDEEP documenting the monitoring and maintenance of the barrier fence will be completed. Any observations of state listed species will be included in this report with photo-documentation (if possible) and specific information on the location and disposition of all listed herpetofauna encountered.

Phase Three: Post-construction Protection Measures

1. Management of the Conservation Easement

The 7-acre Conservation Easement will be donated to a local land trust with a gift from Greenskies in the amount of \$5,000.00 to manage the early successional habitat. Quinn Ecological, LLC will provide the land trust with a management plan and train them in the implementation of this plan. The 7-acre conservation easement contains a substantial amount of suitable early/late successional habitat and both identified potential breeding pools for the eastern spadefoot (Figure 6). Because the vegetation is well established in this area, no plantings by the land trust will be required. Habitat management to maintain the current successional state of this area will be outlined in the management plan provided by Quinn Ecological, LCC and occur on an approximate 5-year cycle during the inactive season for the eastern spadefoot between November 30th and April 1st. While conducting management, only herbaceous vegetation will be mowed, all low-growing shrubs will be avoided unless they begin to over-take the conservation easement. There will be a goal in preserving no more than 30 to 40 percent shrub cover within the conservation easement, once this threshold is met, active removal of shrubs will take place. Shrub cover will be maintained in small dense patches, measuring approximately 20 m x 20 m, scattered throughout the conservation easement (Figure 6). This will distribute and preserve protective cover for foraging eastern spadefoots. Invasive species control measures will be outlined in the management plan and follow those described in the Invasive Species Control Plan outline in Section 4 of this report.

2. Management of the Habitat Restoration Area

All direct impacts will occur within 27-acres of early/late successional habitat.

Approximately 9.5 acres of this early/late successional habitat will be temporarily impacted during construction activities. These 9.5-acres will be restored post-construction by Greenskies to early/late successional habitat for the eastern spadefoot (Figures 7 and 8).

This 9.5-acre will be planted with a mix of early successional warm-season grasses, herbaceous plantings and augmented with the low growing shrub species sweetfern (*Comptonia peregrina*), favored by the eastern spadefoot for cover while foraging. Sweetfern plantings will not be random, but instead dispersed in multiple dense clusters to create micro-habitat areas for night-time foraging activities (Figure 7). Herbaceous plants with an indicator status of Upland (UPL) to FAC will be used. The plants in Table 4 have been selected to promote areas of bare soil. Wildflowers include species intended to attract Lepidoptera and other insects.

Habitat management in the habitat restoration area will be conducted by Greenskies. Management needs will be monitored by Greenskies and take place as required to maintain the recommended successional state of herbaceous and shrub vegetation cover. The successional state will preserve no more than 40 percent shrub cover within the habitat restoration area, once this threshold is met, active management to remove shrub cover will take place. Shrub cover will be maintained in small dense patches, measuring approximately 20 m x 20 m, scattered throughout the restoration area. This will distribute and enhance the available protective cover for foraging spadefoots. Invasive species control measures will be conducted by Greenskies in the habitat restoration zone and follow those outlined in the Invasive Species Control Plan in Section 4 of this report. A list of recommended species for planting have been compiled in Table 4.

3. *Invasive Species Control Plan*

The CT DEEP, under PA 03-136 and in cooperation with the Connecticut Invasive Plants Council (through the Invasive Plant Atlas of New England [IPANE]), has compiled a State list of invasive plants. The target species of greatest concern are those that readily invade. These include autumn olive (*Elaeagnus umbellata*), Russian olive (*Elaeagnus angustifolia*), multiflora rose (*Rosa multiflora*), mugwort (*Artemisia vulgaris*) and morrow's honeysuckle (*Lonicera morrowii*). These species have the potential to form monocultures which may adversely impact the ecological integrity of natural habitat areas.

A. Control Area:

Invasive plant control will occur within the habitat restoration area (conducted by Greenskies) and conservation easement (conducted by the land trust). Monitoring for invasive species encroachment will take place approximately once every five years. Invasive species will be maintained at a level below 20-percent total cover within the habitat restoration area and conservation easement.

B. Control Measures:

Mechanical control is recommended by hand pulling or mowing wherever practical. While these non-chemical controls are preferred, the extent of any invasion will dictate the appropriate control method. The final determination of control methods will be dependent on the extent of target species. The most effective control techniques will be determined by the parties conducting management activities.

Any herbicide application will be conducted by a commercial herbicide applicator licensed by the Connecticut Department of Energy and Environmental Protection, according to product labels. Small woody specimens of bush honeysuckle, olive or multiflora rose will be controlled by hand pulling if the infestations are small. If the infestations are large or the plants are more mature, they will be controlled using basal bark applications of an herbicide with the active ingredient Triclopyr in a BEE formulation such as Pathfinder II or Garlon4 mixed in a methylated seed oil carrier. This herbicide penetrates the stem bark and translocates throughout the plant, killing the root system and preventing re-sprouting after cutting. This application is conducted using a low-volume backpack sprayer to wet the entire circumference of the bottom 12 inches of the plant stem and around the root collar. Small and intermediate-sized shrubs can be managed using a foliar application, using herbicides with the active ingredients Imazpyr, such as Habitat or Roundup.

Conclusions

With the implementation of the outlined species protection measures, I do not anticipate significant long-term adverse impacts to the eastern spadefoot resulting from the proposed solar installation project.

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Tables and Figures

Table 1. Spadefoot survey conditions

Date	Temperature	Precipitation (previous 24/hrs.) *	% Relative Humidity
6/27/2020	68°F	0.57"	56%
6/29/2020	68°F	0.69"	89%
6/30/2020	69°F	1.01"	78%
7/01/2020	74°F	0.55"	73%
7/03/2020	69°F	0.08"	78%
7/10/2020	70°F	0.0" (tropical storm missed)	76%
7/30/2020	70°F	0.49"	79%
8/13/2020	78°F	0.06"	91%
8/16/2020	62°F	0.37"	90%
8/17/2020	62°F	0.22"	73%

* Recorded from North Stonington Solar's rain gauge approximately 1.5 miles southwest of the property

Table 2. Survey effort

Date	Survey Time	Survey Hours	Field Crew	Person Hours	
6/27/2020	8:30pm - 12:30am	4 hrs.	3	12 hrs.	
6/29/2020	8:30pm - 12:30am	4 hrs.	3	12 hrs.	
6/30/2020	8:30pm - 12:30am	4 hrs.	3	12 hrs.	
7/1/2020	9:00pm - 12:30am	3.5 hrs.	3	10.5 hrs.	
7/3/2020	8:30pm - 12:30am	4 hrs.	2	8 hrs.	
7/10/2020	8:30pm - 12:30am	4 hrs.	2	8 hrs.	
7/30/2020	8:30pm - 11:30pm	3 hrs.	3	9 hrs.	
8/13/2020	8:30pm - 12:30am	4 hrs.	3	12 hrs.	
8/16/2020	8:30pm - 12:30am	4 hrs.	3	12 hrs.	
8/17/2020	8:30pm - 12:30am	4 hrs.	2	8 hrs.	
Total Survey Hours		38.5 hrs.	Total Person Hours		103.5 hrs.

Table 3. Eastern Spadefoots encountered

Date	Time	Age Class	Sex	STV (mm)	Mass (g)	Latitude	Longitude
6/29/2020	10:25 PM	Adult	Female	57.0	23.0	41.4312	-71.8072
8/17/2020	9:45 PM	Juvenile*	n/a	45.2	9.7	41.4294	-71.8075

* This juvenile is likely from a 2019 breeding based on comparable biometrics of individuals monitored from this breeding event.

Table 4. Recommended plantings for spadefoot habitat restoration area

Common Name	Scientific Name	Indicator Status
Little Bluestem	<i>Schizachyrium scoparium</i>	FACU
Big Bluestem	<i>Andropogon gerardii</i>	FAC
Indian Grass	<i>Sorghastrum nutans</i>	FAC
Butterfly Milkweed	<i>Asclepias tuberosa</i>	FACU
Wild Blue Lupine	<i>Lupinus perennis</i>	UPL
Golden Alexanders	<i>Zizia Aurea</i>	FAC
Grey Goldenrod	<i>Solidago nemoralis</i>	UPL
Marsh Blazing Star	<i>Liatris spicata</i>	FAC+
Broomsedge Bluestem	<i>Andropogon virginicus</i>	FACU
Blue Wood Aster	<i>Aster cordifolius</i>	UPL
Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	FAC
Shrub		
Sweet Fern	<i>Comptonia peregrina</i>	UPL
Stock Seed Mixes (source: New England Wetland Plants, Inc.)		
New England Wildflower Mix		
New England Native Warm Season Grass Mix		
New England Roadside Matrix Upland Seed Mix		

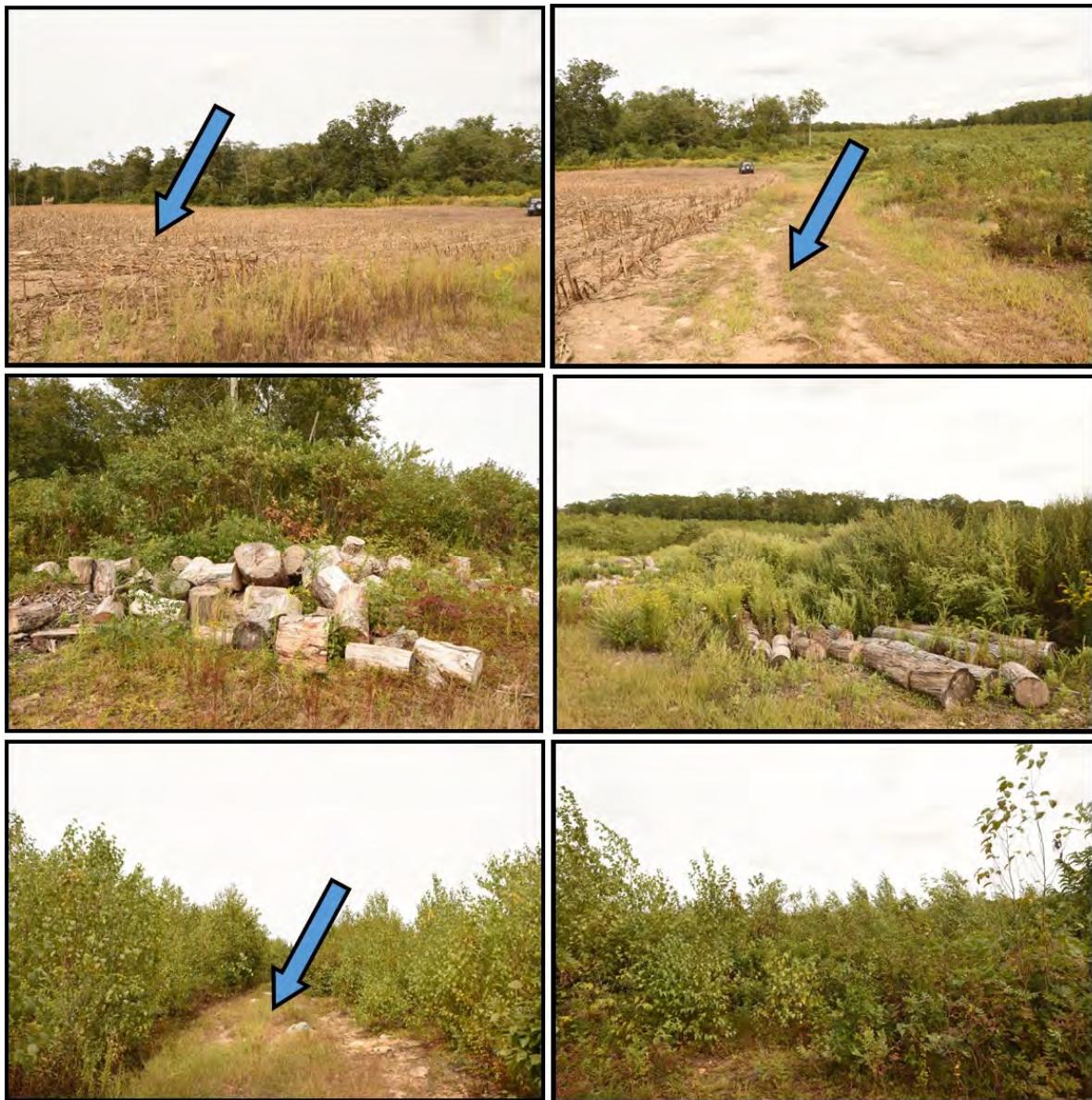


Figure 1. Site photos showing agricultural field (top left), farm access road (top right), stockpiled logs from timber harvest (middle photos), cart path (bottom left) and early/late successional regrowth (bottom right).



Figure 2. Adult female and juvenile eastern spadefoots observed during nocturnal surveys.



Figure 3. Potential breeding areas. Top photos showing breeding area one (photos from Wetlands Report dated May 8th, 2020) and bottom photos showing breeding area two. No photos of breeding area two were obtained while containing water.



Figure 4. Site map with eastern spadefoots capture locations, potential breeding wetlands and proposed solar installation.

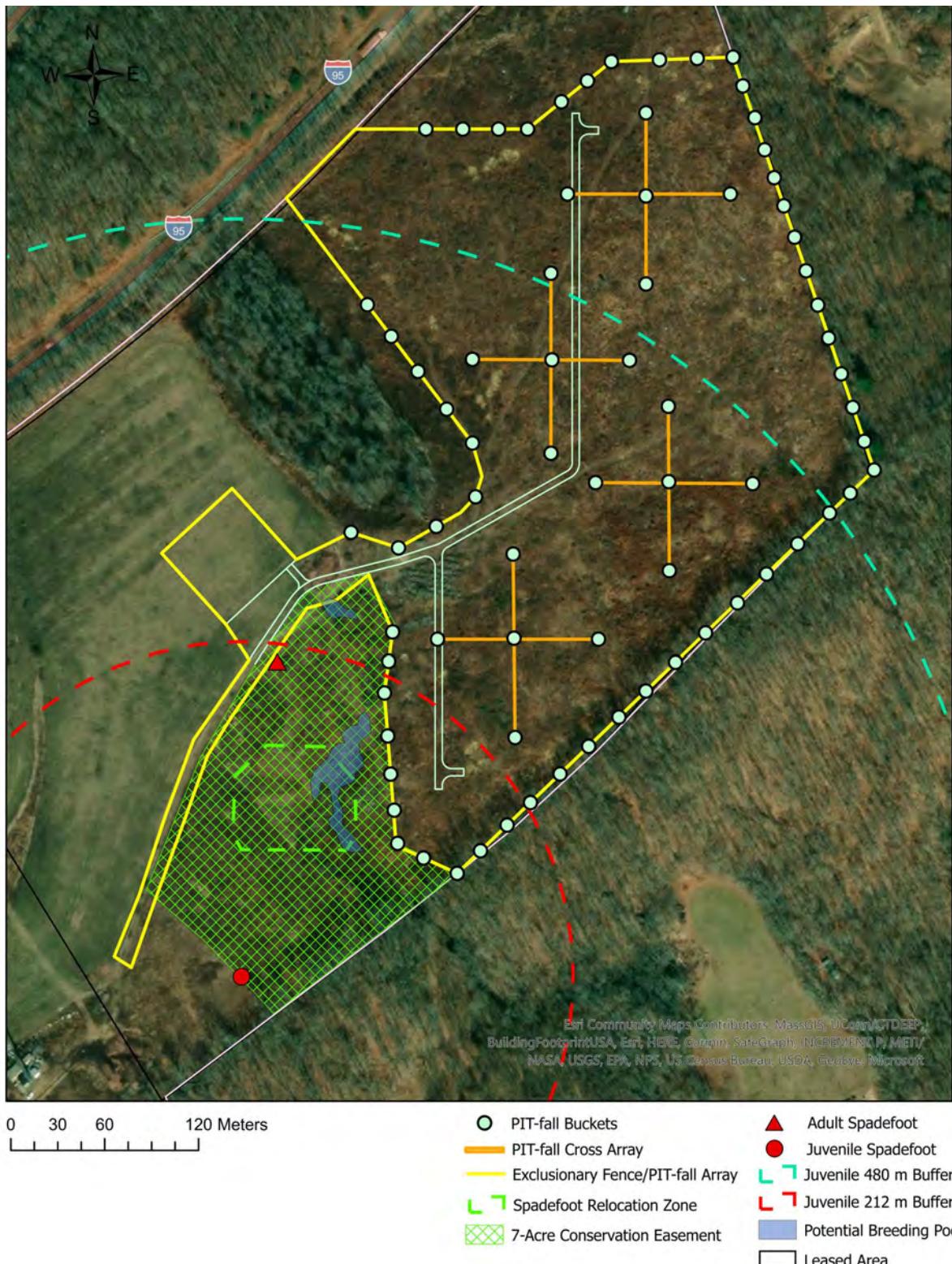


Figure 5. Pre-construction species protection measures showing exclusionary fence, PIT-fall arrays, conservation easement and spadefoot relocation zone.



Figure 6. Photos of the early/late successional habitat in the no build conservation zone. Note the clumped shrubs used as foraging areas for eastern spadefoots.

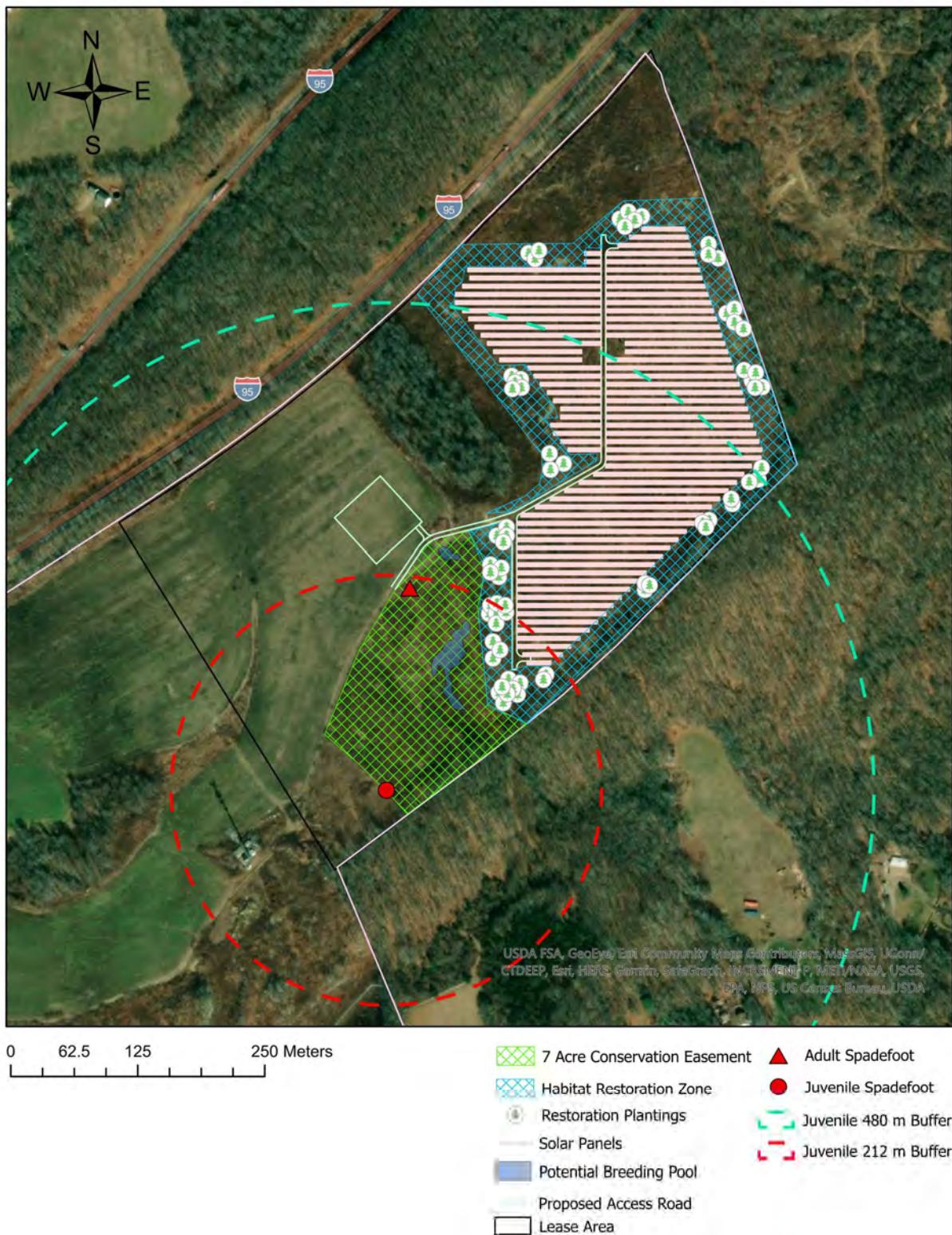


Figure 7. Post-construction management map showing habitat restoration area and recommended location for shrub plantings.



Figure 8. Photos of proposed habitat restoration area.