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April 27, 2020

VIA ELECTRONIC FILING AND U.S. MAIL

Melanie A. Bachman
Executive Director
Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

Re: Petition No. 1347A – GRE GACRUX LLC Petition for a Declaratory Ruling, pursuant to Connecticut General Statutes § 4-176 and § 16-50k, for the proposed construction, maintenance and operation of a 16.78-megawatt AC solar photovoltaic electric generating facility in Waterford, Connecticut. Reopening of this petition based on changed circumstances

Dear Ms. Bachman:

I am enclosing the Response of GRE GACRUX, LLC to Interrogatories Propounded by the Save the River-Save the Hills, Inc. on April 13, 2020 in the above-referenced Petition.

If you have any questions concerning this submittal, please contact the undersigned at your convenience. I certify that copies of this submittal have been submitted to the service list.

Sincerely,

Lee D. Hoffman

cc: Service List

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

GRE GACRUX LLC petition for a declaratory ruling for the proposed construction, maintenance and operation of a 16.78-megawatt AC solar photovoltaic electric generating facility in Waterford, Connecticut. Reopening of this petition based on changed conditions.	**Petition No. 1347A**

April 27, 2020

PETITION 1347A: GRE GACRUX LLC'S RESPONSES TO SAVE THE RIVER-SAVE THE HILLS, INC. APRIL 13, 2020 INTERROGATORIES

GRE GACRUX LLC ("GRE") hereby submits the following responses to Save the River-Save the Hills, Inc. ("STR-STH") April 13, 2020 Interrogatories.

1. The project is proposed to be built on an environmentally sensitive parcel, sandwiched between two trout supporting cold water streams that are in the headwaters region of the Niantic River. Where does GRE use Low Impact Development standards in its plans in order to not adversely impact the site and the surrounding environment? How has the knowledge that the site is an environmentally sensitive area impacted the design of this project?

Answer: The Petitioner objects to the Intervenor's characterization of the proposed Project Site as an "environmentally sensitive parcel." That term is vague and undefined. Subject to the foregoing objection, Petitioner states that Petitioner's consultation with the NDDB at CTDEEP confirmed that the Site would be an appropriate location for the Project and would not adversely impact the surrounding environment. Moreover, the use of Low Impact Development ("LID") standards is not necessary for the instant Project design. Nonetheless, the Petitioner has incorporated various protective features into its design, including, but not limited to, the following items :

- Preserving pre-development drainage patterns, to the greatest extent feasible, in an effort to maintain pre-development flows to existing wetland and watercourse areas;
- The inclusion of fifteen (15) stormwater management basins that have been designed and strategically located throughout the Project Site to mimic existing runoff collection areas that convey runoff to adjacent wetlands and watercourses;
- All basins have been designed at a minimum distance of 100-ft from delineated wetlands and watercourses; in sensitive areas, the basins will discharge stormwater via a level spreader to mimic a sheet flow condition and avoid point discharge;
- The proposal of laydown areas for each phase of construction. Each site area will be protected by the construction of a sediment trap/basin that will subsequently be converted into a permanent stormwater management basin to manage post-construction stormwater runoff; and

- The utilization of Sedimentation and Erosion Control Plans that have been developed in compliance with the Connecticut Guidelines for Soil Erosion and Sediment Control, as well as the latest guidance from the CTDEEP.

2. According to Davison Environmental, "Available data shows the presence of wild brook trout (Salvelinus fontinalis) in the downstream sections of both Oil Mill Brook and Stony Brook. Brook trout are an indicator of high water quality, requiring cold well-oxygenated waters, with temperatures not exceeding the upper 60s Fahrenheit." (Appendix H at 9.) Has GRE calculated the thermal impact of runoff from the site being directed to the streams, and the impact on the species in those streams? How will GRE ensure that these receiving streams for site stormwater runoff will not be thermally impacted, thereby reducing or eliminating trout habitat?

Answer: The Project will not contain vast surfaces of imperviousness on which stormwater runoff would have the opportunity to pond on, or travel across, which, in turn, would result in a thermal increase, such as parking lots or large rooftops. Instead, runoff on the Site will quickly fall off the Project's solar panels and travel across vegetated surfaces to the respective stormwater basins. Infiltration of stormwater runoff is promoted, to the maximum extent(s) feasible for the Project; and the minimum distance of any proposed basin to either Oil Mill Brook or Stony Brook, is approximately 800 feet. Such distance will allow time for runoff exiting the basins to cool across forested floor before reaching one of the brooks.

3. All stream-spawning trout species require clean gravel sediments in which to spawn. How will GRE ensure that silt and other fine sediments will not be discharged into Oil Mill Brook and Stony Brook, thereby reducing or eliminating trout spawning habitat?

Answer: Post-construction run-off mitigation, stream channel protection, and water quality treatment have been designed in accordance with the *2004 Connecticut Stormwater Quality* Manual, as well as the CTDEEP publication, *Guidance Regarding Solar Arrays*. The respective computations for peak flow mitigation, stream channel protection, and water quality treatment are included in the Stormwater Report (Petition, Appendix B).

4. An LLC associated with GRE was sued by a landowner downstream from their East Lyme Antares Solar Farm (see Petition No. 1056) for damages to his land from the stormwater runoff from the solar project. Has GRE studied the stormwater engineering failure of the Antares Solar Farm that adversely impacted the environment of that site and the surrounding parcels to inform its engineering for the Waterford proposal? If so, please explain how; if not, please explain why not.

Answer: The Petitioner objects to this Interrogatory because Petition No. 1056, and the legal proceeding(s) involving same, have no relevance to the present proceeding before the Council. Notwithstanding the foregoing objection (and the irrelevance of the Antares Solar Farm litigation), the Petitioner states as follows:

The Petitioner disagrees with the Intervenor's contention that the LLC associated with GRE and Antares Solar Farm was responsible for a "stormwater engineering failure." In fact, the presiding judge in the lawsuit referred to by the Intervenor, i.e., *Bialowans v. GRE 314 East Lyme, LLC*,

Docket No. CV 176031625, determined that, despite two (2) days of expert testimony (provided by Mr. Steven D. Trinkaus and Mr. Donald J. Fortunato), Mr. Bialowans "failed to set forth any facts that the unreasonable interference with the storm water flow was caused by the defendant's construction activities[,]" and that "[t]he plaintiff failed to provide any expert testimony which would support his allegations that the storm water system was built other than to design." A copy of the judge's Memorandum of Decision in that case is included herein as Exhibit A.

Moreover, as the Intervenor is likely aware, the engineering designs for stormwater management have evolved and improved significantly since the time that the Antares Solar Farm was constructed. The present Project was designed to conform not only to those requirements contained in the CTDEEP's General Permit, but also to the CTDEEP's latest guidance document, Appendix I (which was not in existence at the time that the Antares Solar Farm was constructed). Thus, even if there were difficulties with the design of the Antares solar field, which Petitioner expressly denies, the increased standards for the construction of solar projects in Connecticut would address any such difficulties. Since the Project that is the subject of this Petition will meet all of these increased standards, Petitioner does not foresee any adverse stormwater issues.

5. Jean-Paul La Marche stated that "a 100-foot wetland non-disturbance buffer has been applied to the Project." (La Marche testimony, Jan. 23, 2020, at 3:21-22.) GRE's environmental consultant, Matt Davison, wrote: "I would recommend a minimum 200-foot buffer around wetlands, with the first 100-feet being a no disturbance zone where existing forest remains intact. The second 100-feet should remain non-impervious [sic] (i.e., no solar panels) but can include stormwater management features and associated grading." (Appendix H at 9.) Why was the suggestion of the environmental consultant for a more protective 200-foot buffer around the wetlands and water courses on the Project site not included in the project design?

Answer: Approximately 300 panels are currently proposed within 200 feet of an on-site wetland. The Petitioner is amenable, however, to removing these solar panels, if the Connecticut Siting Council so desires.

6. GRE indicated that "No tree clearing will take place within 100-ft of designated inland wetlands and watercourses, with the exception of minor selective clearing in locations where the existing dirt access road will be improved." (Petition at 13.) What is "minor selective clearing" within 100 feet of designated inland wetlands and watercourses? Please indicate where such clearing appears on the site plans.

Answer: A Stump Grubbing Map, which depicts the respective limits of proposed clearing and grubbing, had been prepared in support of the Petitioner's response to the Council's Interrogatory No. 8. A copy of the Stump Grubbing Map is attached to the response to that Interrogatory.

7. Will any topsoil gathered during site clearing and grading be deposited elsewhere on the site, or will it be removed from the site? If it is to be removed, explain that process.

Answer: The Petitioner anticipates that any topsoil moved during the site-clearing and/or earthwork phases will be reused onsite.

8. Did GRE investigate the extent and degree of soil compaction from the movement of the tree removal equipment on the site? If so, what type of investigation was performed and where on the site was it performed? If not, why not?

Answer: In accordance with the CTDEEP guidance document, *Guidance Regarding Solar Arrays*, the Petitioner performed a site-specific soil survey, which entailed the exploration of 35 test pits. As a result of this exercise, the digital soil survey information regarding hydrologic soil groups for the Site was confirmed.

9. GRE states that it is following standards developed by the State of Minnesota for the design of ground mounted solar arrays (see Petition at 12), but GRE does not treat the solar panels as impervious for purposes of the calculation of the Water Quality Volume. The Minnesota standards state that solar panels are to be considered impervious for such purposes. Why didn't GRE consider the panels impervious in making its WQV calculations?

Answer: Through consultation(s) with the CTDEEP Stormwater Staff, it was determined that it was acceptable to utilize the Minnesota Drainage Manual's solar panel calculator methodology for purposes of calculating required water quality volumes from a solar array.

10. Please explain how GRE concluded that the channel protection volume will be met when the post-development runoff is based on the assumption that the solar panels are not impervious. Doesn't that assumption mean the post-development runoff is being under-estimated?

Answer: No. Stormwater runoff associated with the solar panel array will fall off the panels and drain across the vegetated surfaces beneath the panels; this, in turn, will allow for normal infiltration into the soils. This vegetated surface has been used in the hydrologic modelling for the proposed conditions within the solar panel array. Additionally, in accordance with the CTDEEP publication, *Guidance Regarding Solar Arrays*, the Project design incorporates the use of a loss of Hydrologic Soil Group to account for possible compaction during construction. Therefore, channel protection volume is being met by the Project's stormwater management design.

11. Please explain why the stormwater report reflects the use of delineated inland-wetland areas for water quality improvement (see Exhibit B at 3-6), when it is the policy of DEEP not to use wetlands for water quality treatment.

Answer: The Petitioner's Stormwater Report (Petition, Appendix B) does not reflect the use of wetland areas as water quality treatment areas. The Report pertinently states that the area between the crushed stone access path and the wetland systems are where water quality treatment is intended to take place.

12. What processes within the proposed stormwater basins will provide water quality treatment?

Answer: Water quality treatment for the Project has been designed in accordance with the *2004 Connecticut Stormwater Quality Manual*, as well as the CTDEEP publication, *Guidance Regarding Solar Arrays*. More specifically, the infiltration basins will infiltrate the water quality

volume into the ground; the sand filters will filter the water quality volume through a sand bedding; and, each pond will contain a stable settling medium for sediment to filter out into. Infiltration of stormwater runoff has been promoted to the maximum extent(s) practicable in the Project's stormwater design.

13. The stormwater report notes that a "timber harvest" performed by the owner of the land "resulted in the cutting of approximately 45 acres of the Project's wooded area within the limits of development, and a total of approximately 66 acres of the Site." (Exhibit B at 2-3.) How and why did a selective timber harvest remove so much forest from the site? Has GRE analyzed the impact of this deforestation on the existing conditions of the site? If so, please explain how.

Answer: The timber harvest was performed by the current landowner, and it is the Petitioner's understanding that it was appropriately permitted through the Town. The Petitioner stresses, however, that it was not in any way involved in that application or work. Indeed, the Petitioner currently has no rights under the Lease for the site until such time as governmental authorities issue their approvals. In an overabundance of caution, however, the existing conditions of the Site were considered to be completely forested in the hydrologic modelling of the Project**.**

14. The stormwater report assumes that the stone access paths are considered impervious. If that is the case, how can GRE also assume that the paths will provide water quality treatment of the runoff? (See Exhibit B at 3-6.) Please explain.

Answer: The Petitioner's Stormwater Report (Petition, Appendix B) does not reflect the use of stone paths as water quality treatment areas. The Report pertinently states that the area between the crushed stone access path and the wetland systems are where water quality treatment is intended to take place.

15. The 2004 Storm Water Quality Manual prohibits the use of Infiltration Basins for temporary sediment traps as it adversely affects the infiltrative capacity of the basin. However, GRE's plans call for some of the stormwater basins to be infiltration basins. How will GRE address this conflict?

Answer: Additional measures, such as the use of straw wattles and compost filter socks, are proposed throughout many areas upstream of the proposed infiltration basin locations. The Petitioner also must clean the basins of accumulated sediment upon final stabilization, and prior to their conversion from short-term to long-term measures.

16. Please explain why GRE used variable soil classifications for the calculations of the Water Quality Volume.

Answer: Through consultation(s) with the CTDEEP Stormwater Staff, it was determined that it was acceptable to utilize the Minnesota Drainage Manual's solar panel calculator methodology for purposes of calculating required water quality volumes from a solar array. This methodology provides varying water quality volumes based upon the clear spacing between rows and based upon the hydrologic soil group of the underlying soils.

17. The petition calls for the site to be cleared, graded and seeded in year one and then the solar panels would be installed in year two. The 2002 Guidelines for Soil Erosion and Sediment Control limit soil disturbance to 5 acres at one time, and a disturbed area must be vegetated prior to moving onto the next 5-acre area. Why was no phasing plan provided which limits site disturbance to five (5) acres or less per phase? Please explain how GRE will disturb and restore 75 acres in less than a year under these criteria.

Answer: The *2002 Guidelines for Soil Erosion and Sediment Control* do not prohibit a project from disturbing greater than five (5) acres at once. However, through consultation with the CTDEEP Stormwater Staff, the Project's construction sequence has been laid out as such. The goals of the proposed sequence are to construct the erosion controls and perform the necessary tree clearing as early as practicable, and allow those areas to vegetate through a growing season, prior to installing the solar infrastructure.

18. Why were small frequent rainfall events not considered in the design of the stormwater management system, when they constitute over 90% of all annual rainfall events?

Answer: Post-construction run-off mitigation, stream channel protection, and water quality treatment have been designed in accordance with the *2004 Connecticut Stormwater Quality Manual*, as well as the CTDEEP publication, *Guidance Regarding Solar Arrays*. The respective computations for peak flow mitigation, stream channel protection, and water quality treatment are included in the Stormwater Report (Petition, Appendix B). Regarding Intervenor's inquiry as to why "small frequent rainfall events [were] not considered in the design of the stormwater management system," the CTDEEP's *Guidance Regarding Solar Arrays* recommends that, for purposes of calculating post-construction stormwater flows, applicants evaluate 2, 25, 50, and 100-year storm events, not smaller events.

19. There are many types of stormwater ponds defined in the 2004 Storm Water Quality Manual. What specific types of ponds are being proposed on this site, particularly for those labeled #1, #4, #6, #9, #11, #12, and #16?

Answer: The goal for the Project's stormwater management design was to maximize the infiltration of stormwater runoff from the Site, and minimize overall disturbance caused by regrading activities. With that knowledge, the basins in question have been designed with the goal of infiltrating runoff. However, given the presence of redoximorphic features that were noted during the geotechnical investigations, the basins have conservatively been modelled hydrologically as containing a starting water surface elevation to reflect likely conditions during the wet season, and have been labelled as ponds accordingly.

20. All stormwater ponds must contain a system for pre-treatment per the 2004 Storm Water Quality Manual. Is a pre-treatment system being provided for all stormwater ponds? If so, then what type of pre-treatment system is being provided? If not, why not?

Answer: Per the *2004 Connecticut Stormwater Quality Manual*, sediment forebays are not required; however, the Petitioner concedes that they are recommended. In this case, because of

the site details, the standard recommendation is not the optimal design to control stormwater quality. Therefore, forebays have not been included in this Project's stormwater management design due to the presence of seasonal shallow high groundwater, which would act to inhibit infiltration in these areas.

21. According to the 2004 Storm Water Quality Manual, infiltration basins must have a pre-treatment system which contains a minimum of 10% of the Water Quality Volume. What type of pre-treatment system is being proposed for the infiltration basins?

Answer: The Site Plans will be revised to include pre-treatment forebays upstream of the proposed infiltration basin locations. In accordance with the *2004 Connecticut Stormwater Quality Manual*, these forebays will be sized to accommodate 25 (%) percent of the water quality volume.

22. The 2004 Storm Water Quality Manual strongly recommends that infiltration basins be installed in an off-line configuration to prevent clogging of the basin. As GRE's plans do not follow this guidance, please explain how clogging of the Infiltration Basin will be prevented.

Answer: The construction sequence proposes removing sediment from all of the measures prior to the completion of Project construction. A Notice of Termination of the CTDEEP Stormwater General Permit cannot be filed until the Site is entirely stabilized; and, at such point in time, the potential for sediment deposition will be extremely low**.**

23. Why is there no pre-treatment of the runoff prior to entering the sand filter when this is required by the 2004 Storm Water Quality Manual?

Answer: Sand Filter Basins 3 and 8 incorporate a pre-treatment basin immediately upstream of the primary basin locations. The Site Plans will be revised, however, to include the addition of a pre-treatment basin for Sand Filter Basin 10.

24. No matter the type of stormwater basin, the outlet structure is a riprap spillway set near the top of the basin berm, which means there will be a ponded water from the bottom of the basin to the invert of the spillway. Therefore, the available storage capacity for runoff is significantly reduced, but GRE considers this volume available. Please explain this discrepancy.

Answer: The Petitioner conducted geotechnical testing within the respective vicinities of each proposed stormwater basin location. The sand filter and infiltration basins were designed such that their bottoms will be above seasonal high groundwater level, and the basins will drain dry between storm events—even during the "wet" season. Regarding the basins designed as ponds—as a conservative measure, and, based upon finding seasonal high groundwater in the proposed locations for same, the Petitioner incorporated a starting water surface elevation into their hydrologic modelling. Input variables and results from the HydroCAD stormwater modelling are included in the Project's Stormwater Report (Petition, Appendix B).

25. Percolation tests were conducted approximately 42" below grade, yet the bottoms of Basin #2, #13, #14, are much deeper below grade. Please explain using a shallow test result when the

2004 Storm Water Quality Manual requires the infiltration testing to be done at or below the bottom of the infiltrative practice.

Answer: All of the on-site percolation tests were dug from a 36-inch (+/-) deep pit. The Petitioner then used a post-hole digger to dig 18 to 24 inches further, resulting in percolation test pit bottom depths of between 4.5 and 5 feet below grade. Reference is also made to the Test Pit Locations Map, which is included in the Project's Stormwater Report (Petition, Appendix B); this Map shows the exact locations where the test pits and percolation tests were performed on the Site. For each of the basins referenced above by the Intervenor, the Petitioner performed percolation testing within their respective soil horizons (where the proposed basin bottom(s) will reside); no restrictive layers were discovered.

26. How will GRE ensure that the Sand Filter (Basins #3, #10), which are infiltrative practices, will work when the vertical separation to groundwater does not comply with the requirement of 36" contained in the 2004 Stormwater Quality Manual?

Answer: Infiltration of stormwater runoff has been promoted, to the maximum extent feasible, in the Project's stormwater design. Vertical separation of surface sand filters to seasonally-high ground water limits is recommended; however, it is not required. The Petitioner is amenable to including an impervious liner around the basin to prevent seasonal groundwater seepage into the sand filter during the wet season, if the Connecticut Siting Council desires. However, this change would inhibit the infiltration of runoff into the bottom of the basin during other parts of the year.

27. Basins #5 and #7 are Infiltration Basins, but according to the information submitted by GRE, the bottoms of the Infiltration Basins are below seasonal high groundwater, so how will infiltration occur in a saturated zone?

Answer: The goal of the Project's stormwater management design is to maximize the infiltration of stormwater runoff from the Site, and minimize overall disturbance caused by regrading activities conducted thereon. With that knowledge, the basins in question have been designed with the goal of infiltrating runoff. No redoximorphic features were discovered within the limits of Basin 7; however, a small portion of Basin 5 falls within a seasonally-high groundwater line. The Petitioner is amenable to modifying this basin to remove it entirely from the seasonally-high groundwater line, if the Connecticut Siting Council so desires.

28. Basins # 3, 5, 8, 10, 12, 13 and 16 all have portions of their embankments over four (4') feet in height. Why are these embankments not designed as dams per the 2004 Stormwater Quality Manual?

Answer: All proposed stormwater basins have had their embankments designed in accordance with the *2004 Connecticut Stormwater Quality Manual* provisions (including, the respective embankment depths and slopes). The site contractor will be required to adequately compact and vegetate these fill berms in conformance with standard engineering practice(s).

29. What is the purpose of a rectangular area on the plan above several of the stormwater basins? What type of pre-treatment system is this?

Answer: The purpose of the rectangular area is to denote the area(s) where pre-treatment basins are proposed; more specifically, those areas are intended to serve as excavated, vegetated water quality treatment storage areas.

30. Terracon performed testing which are not considered Double Ring Infiltration tests and showed that soils were not suitable for infiltration system, so why were infiltration practices proposed?

Answer: The solar panel array's footprint was reduced, in part, due to the findings of the Terracon geotechnical investigation**.** VHB performed geotechnical testing within the respective vicinities of each (currently) proposed stormwater basin location (including standard percolation test holes, dug with a post-hole digger), and these test results are included in the Project's Stormwater Report (Petition, Appendix B). Based upon the results of such testing, the Petitioner incorporated the use of infiltration basins into the Project design, where feasible, and incorporated alternative basin designs, where appropriate.

31. La Marche testified that the site will be cleared in 202 [sic], hydroseeded, and then construction will begin in 2021, after the site "had achieved some level of stabilization." (La Marche testimony, Jan. 23, 2020, at 3.) Please explain what "some level of stabilization" means from a construction point of view.

Answer: From a construction point of view, "some level of stabilization" means that the Site will be adequately stabilized so that it can withstand the Project's contemplated construction activities and minimize potential erosion and sediment issues resulting therefrom.

32. Please provide real world performance data for the ERTEC E-Fence20 system which demonstrates it is more effective than conventional erosion control barriers. (See Sheet C 6.1.)

Answer: The Petitioner's intent in using the ERTEC E-Fence20 System downstream of the proposed stormwater basin locations is not to provide a "more effective" erosion control barrier. Indeed, this System is more porous than a traditional geotextile silt fence; therefore, it will not re-channelize stormwater runoff (that has been discharged from the respective stormwater basins) as much as other conventional erosion control barriers would. Rather, the ERTEC E-Fence20 System is intended to act as a wildlife exclusionary barrier in these areas, as opposed to providing excess sediment filtration.

33. Will the use of the ERTEC system perpendicular to contours create concentrated flow? Why or why not?

Answer: The ERTEC E-Fence20 System will not be installed perpendicular to contours. Rather, it will be installed in those areas downstream of the sediment trap(s) and basin outlets, where existing drainage patterns on the Site presently channelize. In fact, the Petitioner specifically chose the ERTEC E-Fence20 System (over standard geotextile silt fence) to avoid re-channelizing flows.

34. Why are there no erosion control barriers shown downgradient of areas proposed to be regraded on the site?
Answer: All areas that are proposed to be regraded are tributary to either a proposed sediment trap or basin, where the associated stormwater runoff from these areas will be treated prior to discharge from the Site.

35. Why are there no provisions for maintenance of post-development stormwater basins?

Answer: Information relating to the maintenance and long-term inspection(s) of the stormwater basins were included as Appendix C of the Petition; and is similarly included in the Petitioner's Stormwater Pollution Prevention Plan ("SWPPP") that was created in support of the Petitioner's application for the CTDEEP Stormwater General Permit. The Petitioner is amenable to working with both the Connecticut Siting Council and the CTDEEP to determine the most appropriate long-term maintenance plan for these measures as needed.

36. Why are there no intermediate erosion control barriers proposed on the site?

Answer: Contrary to the Intervenor's contention, the Project contemplates the use of immediate erosion control barriers on the Site—including, for example, within the proposed solar panel array area, where straw wattles or compost filter socks are proposed. In addition (and at the request of the Town and the CTDEEP), the Petitioner revised the Project's Site Plans to include the use of "check dams" throughout various locations downstream of the proposed sediment traps and basins. Indeed, the most current layout of the Project's sediment and erosion controls was developed, in part, through consultation and collaboration with the CTDEEP Stormwater Staff.

37. According to the plans, the post-development stormwater basins will be used as temporary sediment traps. How will the basins be properly restored to function as the post-development basins?

Answer: The construction sequence proposes removing sediment from all of the measures prior to the completion of Project construction. The Petitioner intends to revise the Site Plans to denote how, and when, the temporary sediment traps and basins will be converted from short-term to long-term measures.

38. Davison Environmental stated "All clearing should occur between October 15th and March 1st, to prevent impacts to wildlife." (Appendix H at 10.) The Petition, however, provides: "Project construction is anticipated to begin in Spring 2020 pending regulatory approvals. Initial work will involve site clearing and the installation of erosion control measures, including installation of sediment basins." (Petition at 14.) The draft construction schedule timeline provided in Figure 5 (referenced on page 15 of the Petition) showed that except for the passive seed establishment period, no site construction activities were scheduled to take place between October 15, 2020 and March 1, 2021. Why is GRE ignoring the recommendation of its environmental consultant with respect to construction activities by scheduling nearly all site clearing and other work in the spring? (STR-STH recognizes that based on current circumstances, site work likely will not begin during the spring of 2020, but that does not change GRE's plans, which conflict with the recommendations of its consultant.)

Answer: While the Davison Environmental report was accurately quoted by the Intervenor, said report was subsequently supplemented by VHB's (October 2019) comprehensive wildlife report, which provided that there were no temporal restrictions to clearing. As the Intervenor provided in its Interrogatory No. 30 response to the Siting Council, the NDDB reviewed the October 2019 report and concurred with the findings contained therein. Therefore, the Petitioner may engage in construction activities, regardless of the season, without adversely impacting wildlife.

39. Why were there no surveys completed of the physicochemical characteristics and the biota (both fish and macroinvertebrates) found in the two coldwater streams (Oil Mill and Stony Brooks) draining the property as part of satisfying the Council's requirement for a more complete wildlife study?

Answer: The Petitioner consulted with the CTDEEP Wildlife Division to obtain a Preliminary Assessment regarding probable species at the Site. Subsequently, the Petitioner performed studies and/or devised conservation measures, as applicable, for each listed species, to the satisfaction of the CTDEEP Wildlife Division. In turn, as referenced in the response to Interrogatory 38 above, the CTDEEP Wildlife Division issued its Final Determination to the Petitioner. None of the surveys referenced by STR-STH were necessary for GRE to receive this Final Determination.

40. Appendix F, GRE's "Public Outreach Documentation," refers to an agenda for a presentation made to representatives of the Town of Waterford on October 2, 2019. (See also Petition at 21). Both Appendix F and the Petition mention a "comprehensive wildlife survey report" in connection with that presentation. What document is the "comprehensive wildlife survey report" referenced?

Answer: The "comprehensive wildlife survey report" is the October 2, 2019 Memorandum prepared by VHB; it is included in Appendix I to the Petition, beginning on pg. 58.

41. Appendix F includes under Agenda item 3 the term "Invertebrate Animals." Is there any information available either through the NDDB determination and/or GRE-sponsored surveys about terrestrial or aquatic invertebrates found on the project site? If so, please provide that information.

Answer: The GRE-sponsored surveys, as well as subsequent consultation with the CTDEEP's Natural Diversity Data Base ("NDDB"), confirmed that the Project will not have an adverse impact on the terrestrial and/or aquatic invertebrates present at the Project Site. As such, it was determined that it was not necessary to conduct further studies. *See* the NDDB Determination for additional information.

42. The Davison Environmental states: "For many species, this wildlife assessment is habitat-based, with no detailed surveys conducted" and "This assessment does not address all biota that inhabit the site ... Rather, the goal of the study was to focus on those species most likely to be adversely impacted from a change in land use. These include amphibians and reptiles which have low mobility and dispersal capabilities, as well as breeding birds of conservation concern within

the State." (Appendix H at 4-5.) Why were more detailed surveys not conducted in 2019 of onsite amphibians and birds?

Answer: The Petitioner respectfully states that, VHB did conduct more detailed surveys of onsite amphibians and birds in 2019. The results thereof were placed into VHB's October 2019 Report, which confirmed that further studies were not necessary. Subsequent consultation with the NDDB staff confirmed this determination.

43. How will the considerable deforestation and change in ground cover on the site affect resident amphibians, such as frogs, toads, and salamanders, which require such habitat as well as the wetland pools needed for breeding?

Answer: Petitioner objects to this Interrogatory on the grounds that the term "considerable deforestation" is undefined, and is therefore vague and unclear. Moreover, Petitioner objects to this Interrogatory's fundamental contention that any further tree clearing at the Site, will result in "considerable deforestation," given the logging activities that were previously carried out by the site owner pursuant to governmental approvals. Subject to the foregoing objection, the Petitioner states that GRE intends to install a silt fence around the perimeter of the Site, which will act as a wildlife exclusionary barrier during construction and protect native species from any potential harm resulting from construction activities. Upon completion of Project construction, smaller animals, such as those described in this Interrogatory, will be allowed to freely navigate the Project Area, which will be largely vegetated.

44. The Petition notes that "The site has been forested since at least the 1930s," and Davison Environmental consultant stated that "The site lies within an approximately 750 acre block of contiguous forest," and noted that "the site's forests are part of a larger 'core forest.'" (Petition at 24; Appendix H at 7, 10.) How many other large (≥150 acres) blocks of intact forest are presently found within the Town of Waterford?

Answer: The Petitioner objects to this Interrogatory as the Interrogatory exceeds the scope of a petition for declaratory ruling pursuant to Conn. Gen. Stat. §§4-176 and 16-50K. In addition, this information is as equally available to STR-STH as it is to Petitioner, and therefore, no response is required.

45. The Petition states that this site "was selected … to have minimal natural resource impacts, to not have adverse impacts on quality forest land…." (Petition at 8.) How will clear-cutting 75 acres on a 152-parcel located within a contiguous 750-acre core forest block not have an adverse impact on quality forest land?

Answer: The Petitioner believes that there are two aspects to be considered with respect to "adverse impacts on quality forest land." The first aspect is species and habitat of those species. The second aspect relates to removal of trees.

Through the previously discussed wildlife studies, it was demonstrated that there will be no negative impact on rare, threatened or endangered species, nor will the Project take away habitat that is relied upon by said species as agreed to in the final determination concurrence from DEEP.

Thus, Petitioner remains confident that there will be only a minimal impact on those natural resources.

In terms of impact from removal of trees, The University of Connecticut Center for Land Use Education and Research ("CLEAR") has developed a forest fragmentation model that tracks the amount of forest cover in the State. As indicated in CLEAR's most recent Forest Fragmentation Analysis Project report (the "Report"), "[f]orest is the single largest land cover category, by far, in Connecticut,"[1] with approximately 2922 square miles of forest (constituting roughly 59 (%) percent of land).[2] Of these forested lands, approximately 1356 square miles (46 (%) percent) are designated core forests.

Accordingly, as it relates to Intervenor's inquiry regarding the impact that clear-cutting 75 acres (or, 0.117 square miles) would have on "quality forest land" in Connecticut, it is arguably *de minimis*:

> The contemplated clear-cutting's impact on all forested cover (i.e., the 2922 square mile figure) in the State is 0.00004004106;
>
> The contemplated clear-cutting's impact on core forest (i.e., the 1356 square miles) in the State is 0.00008628318.

Two additional points also warrant mentioning: first, the Project Site's landowner has engaged, and currently engages, in timbering and logging activities at the Site, as the landowner is permitted to do. Second, the Project Site is located in the Town of Waterford's residential (RU-120) zone; therefore, pursuant to sections 6.1 and 6.2 of the Town of Waterford Zoning Regulations (the "Zoning Regulations"), the subject land could, as of right, be used for any of the following purposes:

- One-family dwellings;
- Public libraries, public schools, and places of worship, subject to the approval of a site plan;
- Municipal facilities, including firehouses and parking lots serving firehouses;
- Private educational institutions;
- Riding stables, nurseries, and commercial greenhouses;
- Animal hospitals, veterinary hospitals, and kennels;
- Golf courses and country clubs; or,
- Convalescent nursing home, places for assisted living, hospitals, medical clinics or medical service laboratories.

None of these proposed uses would allow for the maintenance of meaningful forested land, assuming full development. GRE opines that, in order to develop the subject land for any of the uses delineated above, more tree-clearing than that which is currently proposed by the Petitioner

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[1] *See* Center for Land Use Education and Research, *Forest Fragmentation in Connecticut: 1985 – 2006 – Research* Summary, accessible at, http://clear.uconn.edu/projects/landscape/v2/forestfrag/forestfrag_public%20summary.pdf.

[2] While the Petitioner acknowledges that CLEAR's report contains 2006 figures, the United States Department of Agriculture's "Forests of Connecticut, 2015" report contains similar findings. *See* United States Department of Agriculture, *Forests of Connecticut, 2015*, available at, https://www.fs.fed.us/nrs/pubs/ru/ru_fs83.pdf (providing, "[a]n estimated 58 percent of the land area of Connecticut meets the FIA definition of forest land").

would be required. The proposed solar Project will bank the land and protect it against more impactful development allowing for possible re-forestation in the future. The carbon debt analysis also demonstrates that the benefit of the emissions-free electricity generated is larger than the negative impact from the associated tree removal.

46. Davison Environmental stated "While no targeted breeding season bird surveys were conducted, all species observed from late April through mid-May were recorded as noted in Table 5. (Appendix H at 7.) Similarly, the 2019 breeding bird survey was only conducted on two days, May 21 and June 14. (VHB memo, Appendix I at 5-6.) Why were the bird surveys limited to just a few days of observation? How does that limited period of observation impact the conclusions of the consultant's reports?

Answer: Proposed bird survey techniques and durations were discussed with the CTDEEP Wildlife Division prior to work being performed on-site. As previously stated, a comprehensive wildlife survey report was prepared in October of 2019, and was subsequently provided to the CTDEEP Wildlife Division for its review. The CTDEEP Wildlife Division took no exception to the findings contained therein and issued a Final Determination for the Project.

47. Why didn't GRE conduct a survey or assessment of fall migratory or winter resident birds on this site?

Answer: The CTDEEP Wildlife Division prepared a Preliminary Assessment of possible Rare, Threatened, and Endangered Species for the Site; all of the listed species were subsequently addressed in the comprehensive wildlife survey report that was provided to the CTDEEP Wildlife Division for its review. The Division took no exception to the findings contained therein relating to fall migratory or winter resident birds and issued a Final Determination for the Project.

48. What would be the regional effects to avian biodiversity resulting from the loss of habitat and the fragmentation of a core forest area as a result of this project?

Answer: The Petitioner objects to this Interrogatory as the Interrogatory is overly broad and exceeds the scope of a petition for declaratory ruling pursuant to Conn. Gen. Stat. §§ 4-176 and 16-50K. Subject to the foregoing objection, the Petitioner states that the CTDEEP approved the Project, in accordance with its statutory mandate to consider the potential impact(s), if any, that the Project would have on the environment, including core forests. Petitioner presumes that any regional impacts were considered by CTDEEP Wildlife Division before it issued its approval.

49. If stormwater and its chemical constituents are to be discharged into the two streams bracketing the site and subsequently these streams continue flowing until each reaches its terminus at the Niantic River, then why were there no assessments made for environmental impacts to both aquatic habitat and biota that are found offsite in each of these streams as well as in the Niantic River?

Answer: The Petitioner objects to this Interrogatory as there is no evidence that any chemical constituents will be discharged anywhere from the Site. Subject to the foregoing objection, the Petitioner states that the CTDEEP requires a permit to discharge stormwater from the Site. Indeed,

this is why such permits require prior consultation with and approval from NDDB staff. The stormwater controls and erosion and sedimentation controls designed by VHB, as well as the related site studies and analysis are indeed assessments and measures to prevent impacts to surrounding environment and species. The Petitioner presumes that any such impacts were considered by CTDEEP Wildlife Division before it issued its approval.

50. Would there be relatively more nitrogen discharged into site groundwater and Oil Mill and Stony Brooks as a result of this project being built as designed or if the site had remained forested, even with the logging that has already taken place?

Answer: Because the Project was designed to mimic the existing pattern/flow(s) of stormwater at the Site, the Petitioner anticipates that the level of nitrogen that would be discharged as a result of the Project being built would be roughly the same as that which is presently discharged. The Petitioner notes, however, that, implicit in this Interrogatory is the supposition that, if the Project were not to come to fruition, the Site would remain in its current, forested state. This is not an entirely accurate portrayal. The Site is zoned residential; therefore, the subject parcel could be developed for residential purposes. Due to the customary utilization of lawn fertilizers, septic systems, and cesspools for private residences, they are considered to be one of the leading causes of nitrogen deposits; solar farms are not. Furthermore, the Project's stormwater management was designed to address water quality treatment in accordance with the *2004 Connecticut Stormwater Quality Manual*.

51. As this site is an environmentally sensitive site that has two streams and the Niantic River Estuary dependent on it for their health, and the proposed development would affect about 90 acres, will GRE engage an independent, third-party engineer having the expertise for such a function to perform onsite inspections during site clearing, construction, and post-construction operation?

Answer: The Petitioner objects to the Intervenor's characterization of the Site as being "environmentally sensitive," since such term is vague and ambiguous. Subject to the foregoing objection, the Petitioner states that it will comply with all of the inspection requirements that are mandated by the CTDEEP, as part of the Stormwater General Permit process. At a minimum, this will likely entail three (3) construction inspections to be performed by the engineer of record for the Project, as well as weekly inspections performed by a qualified third-party inspector. Said qualified third-party inspector will be either a licensed professional engineer or soil scientist (and subject to the written approval of the CTDEEP),in accordance with the CTDEEP publication, *Stormwater Management at Solar Farm Construction Projects*, dated September 8, 2017.

52. Why does GRE repeatedly refer to the project as redeveloping and reusing "underutilized industrial property" (see Petition at 2; Motion to Reopen at 2) when the parcel is zoned RU-120, a residential designation?

Answer: The Petitioner concedes that it mistakenly referred to the subject parcel as an "underutilized industrial property" in its Petition (p.2), as well as in its Motion to Reopen (p.2). To clarify, the Petitioner agrees with the Intervenor's assessment that the entirety of the Project Site is zoned RU-120. The above-cited references to the Site as an "industrial property" were made

in error and were not intended to mislead either Intervenor or the Council. Indeed, the Petitioner acknowledges that the Project Site is zoned RU-120 in various parts of the Petition:

- Petition, p. 1: "The Project Site itself consists of a single parcel of land owned by Rosalie Irene Maguire and Todd Carl Willis, and that parcel is located at 117 Oil Mill Road and is currently zoned Rural Residential RU120. See Figure 1 – Site Location Map and Figure 2 – Project Zoning Map."
- Petition, p. 9: "The parcel is currently zoned Rural Residential RU120 and is bordered to the east and south by parcels located in the General Industrial I-G zone."
- Petition, p. 10: "The Town of Waterford zoning ordinances are silent with respect to the use of solar photovoltaic panels as a use in a residential zone."
- Petition, p. 24: "The project site lies within the Rural Residential RU120 zoning district."
- Petition, p. 26: "The Project, which is located in a residential zone (Class A) surrounded to the north and west by residential properties (Class A) and to the east and south by industrial properties (Class C), is anticipated to be a low source of noise."

53. GRE claims that "The Project has been configured to avoid and minimize other environmental impacts by using to the greatest extent possible portions of the Project Site that have been subject to former agricultural uses." (Petition at 37.) What is meant by "former agricultural uses" and what portion of the site has been subject to such uses?

Answer: By "former agricultural uses," the Petitioner is referring to the landowner's respective timbering and lumbering activities that have been conducted on the Project Site. *See* Conn. Gen. Stat. § 1-1(q) (defining "agriculture" to include, *inter alia*, the "cultivation of…forestry…and the production or harvesting of…any agricultural commodity, including lumber…").

Regarding the portion of the Site that has been subject to such use(s), Appendix B ("Stormwater Report") to the Petition [p.1] provides:

> *A timber harvest performed by the current land owner over the past couple years resulted in the cutting of approximately 45 acres of the Project's wooded area within the development limits, and a total of approximately 66 acres of the Site.*

54. Is GRE expecting that stormwater and its control will require more land to implement its present design than is found on the parcel? If not, why did GRE in December 2019 contact owners of an adjacent parcel to the southeast of the site to try to gain control over 14 acres of land for "stormwater mitigation"?

Answer: No, additional land is not needed to implement the Project as it is currently designed. The CTDEEP Stormwater Staff requested that the Petitioner consider acquiring more land to increase the distance between the edge of the Project area and boundary of land controlled by the Project). The Petitioner stresses, however, that said request was not made because of concerns with the Project's present stormwater design; rather, it is the reality that the more surface land/space that comprises a project area, the less potential for stormwater runoff escaping from the site. The Petitioner has shrunk the overall size of the proposed Project from the original Petition 1347 in order to minimize, in part, potential issues associated with stormwater runoff.

55. Why hasn't GRE completed a Phase 1B Cultural Assessment, as recommended by its own consultant and by the SHPO? How does GRE respond to SHPO's recommendation that "no construction or other ground disturbance should be initiated until SHPO has had an opportunity to review and comment upon the requested [Phase 1B] survey"? (See SHPO letter to Council, dated Mar. 3, 2020.)

Answer: A Phase 1B Cultural Assessment ("Phase 1B") of the Project Site has been completed and is attached hereto as Exhibit B. On April 2, 2020, the Petitioner submitted the completed Phase 1B to the State Historic Preservation Office ("SHPO") for its review, and by correspondence dated April 7, 2020, the SHPO expressed its concurrence with the findings contained therein. The SHPO concurrence is attached hereto as Exhibit C.

56. Had GRE conducted an analysis of what substances might be emitted (and/or end up in the stormwater runoff) by the photovoltaic panels should they burn?

Answer: No, the Petitioner has not conducted an analysis of what substances might be emitted by the photovoltaic panels should they burn. The Petitioner is unaware of any studies that have been conducted to date that have explored this issue, nor is the Petitioner aware of any studies that show potential for emissions/stormwater runoff in the event of housing stock or commercial buildings that catch on fire for purposes of permitting such facilities.

57. Has the Town of Waterford Fire Marshal been consulted about fire safety issues with respect to the project, including the ingress and egress of emergency personnel, emergency vehicles and other necessary equipment, and necessary clearances and turning radiuses required for these vehicles? If so, please provide information about those discussions, including any written communication. If not, please explain why not.

Answer: The Town of Waterford has received Project designs from both the Siting Council (by virtue of the public participation process) as well as from the Petitioner (during the course of meetings held between the Town and the Project Developer). While the Petitioner has not directly reached out to the Town of Waterford Fire Marshal, the Petitioner assumes that the Town engages its internal resources, including its Fire Marshal, in a coordinated review of the Project. Indeed, the Town Engineer was present during the most recent site walk of the Property, and it is the Petitioner's understanding that the Town Engineer reviewed the plans that GRE included in its Petition to the Siting Council. The Project has been designed to incorporate adequate access roads and turnarounds to accommodate emergency vehicles. It is the common practice of GRE to offer to conduct an as-built plan review and site walk with local emergency response personnel, so that they can review and provide guidance on site access/security, equipment signage, and system shut-off. The Petitioner intends to do the same for the instant Project.

58. Would GRE make changes made to the proposed site plan design to address any comments or concerns made by the Town of Waterford with respect to fire safety?

Answer: In general, yes. If the Town were to raise any specific fire and/or life safety issue(s) relating to the Project, GRE would be willing to work with the Town in an effort to address same.

59. The current version of the Waterford Hazard Management Plan does not have a section dealing with 45,976 solar panels should a natural disaster such as a hurricane impact the town. Is GRE willing to pay for an update to that plan to include how first responders should handle solar panels and other parts of the array that might have been destroyed and thrown off of the project site, as was seen in Puerto Rico after Hurricane Maria?

Answer: If the Town were to make such a request, the Petitioner would be amenable to engaging in discussions with the Town on this issue.

With that being said, the Project will undergo a final structural analysis by the selected racking company to develop a final structural design for the Project; such analysis takes into consideration wind data typical in the Northeast. All equipment will be appropriately rated and installed to minimize risk/loss due to high winds. As such, GRE anticipates that the risk of damage to any property outside of the Project Area due to an extreme storm event is extremely low.

Lastly, and as mentioned in Interrogatory No. 57 above, as part of the Project construction process, the Petitioner will offer to hold educational meetings and tours with the Town's first responders.

60. Neither Mr. La Marche's testimony nor the brief description of photovoltaic panels found in the Petition detail the type of photovoltaic panels to be used. However, on Figure 3 - Site Layout Plan, the following was noted: "PANEL TYPE: JINKO SOLAR EAGLE HC 72M G2 400W." Is this the type of panel GRE plans to install? If not, what type of panel will GRE be using?

Answer: The exact module type that will be used for the Project has not yet been finalized. The JINKO modules were intended to act as a placeholder to support design activities. The final module selection will depend upon updates from manufacturers, at the time that full final designs and procurement releases are complete. The intent, however, is to use high wattage modules (the respective capacities of modules increase every year), to enable a very high energy capacity to acreage ratio. The Petitioner expects that, by the time of procurement, the module rating capacity will be higher than 400 W.

61. Please provide the manufacturer's technical specifications for the specific photovoltaic panel that will be used in this project, and state whether the panel is a monocrystalline type, whether there are any hazardous or toxic substances (e.g., lead-based solder, cadmium, nickel) found in its composition, and to what wind speeds from a hurricane or tornado they are designed to withstand.

Answer: Please refer to the Petitioner's response to Interrogatory No. 60 above. In terms of general module cell type, the Petitioner intends to use a monocrystalline technology; however, this is not necessarily certain. The Project will not use the thin film modules that include the cadmium telluride material. The project will be designed to withstand high winds, as is required by local code. The modules themselves are generally designed to withstand wind ratings of between 120 MPH and 150 MPH. Final technical specifications of the modules are anticipated to be included in the Project's D&M Plan, should one be required by the Council.

62. In various places in the Petition and certain of its exhibits, the project is referred to as having a 30-year assumed lifetime or a 35-year design life, yet the lease is for 20 years and the decommissioning plan is based on salvage value in 20 years. (See, e.g., Petition at 10, 17; Exhibit D at 1-2.) Is this project expected to have a 20-, 30-, or 35-year operational lifespan?

Answer: The term "design life" refers to the expectation(s) regarding how long the system components will be able to, and are so designed, to last. The term is not the same as, nor synonymous with, the "assumed project life" or PPA contract. Accordingly, the assumed lifetime of 30 years represents the most realistic expectation(s) concerning how long the Project will be on-site generating electricity. The initial lease-term of 20 years is designed to mirror the term of the base PPA contract; however, the subject Lease contains built-in extensions which, in turn, allows the Project to continue to operate and generate electricity for longer.

63. What decision criteria will be used in determining whether or not to renew the parcel lease after 20 years?

Answer: Presumably, there will be a number of important considerations that will inform the Petitioner's decision as to whether or not it will renew the parcel lease after twenty (20) years. At this time, however, the Petitioner believes that it would be premature (and, purely speculative) to attempt to surmise what said criteria will be. Presumably, economics will play an important factor in this decision.

64. The carbon debt analysis provided by GRE assumes a 30-year period of project life. (See Petition at 18-19; Exhibit E at 2.) Please provide analyses of the carbon debt load should the project have a 20- or 35-year life.

Answer: The carbon debt analysis has been provided as a supplemental document to the Connecticut Siting Council Petition. The Petitioner is willing to expand upon this analysis should the Connecticut Siting Council request additional information.

65. Given the 0.7% decrease in photovoltaic panel efficiency each year, after the initial 3% drop in the first year, is there a plan to replace the panels when a certain level of decreased power production is reached?

Answer: Standard industry assumptions regarding module degradation are not consistent with that posed by the Intervenor in this Interrogatory. Typically, a 0.5 % annual degradation is assumed (of course, certain module types will see either a higher or lower Light Induced Degradation initially), but a three (3 %) percent drop across the board is not accurate. To be clear, the Project's long-term energy and financial estimates do take degradation into account; however, there will not be a need to replace all of the modules (because of expected degradation) during the term of the subject PPA contract.

66. In its decommissioning plan, GRE assumes that the solar panels will be recycled for free. However, the current cost of recycling one panel is $35.00 based on a quote STR-STH received from one of the companies GRE offered as a potential recycler it would use (noted in an answer to interrogatories in 2018). With 45,976 panels proposed for the Waterford project to be recycled,

this results in a total cost of $1,609,160 (present value). Who will be responsible for paying the recycling fees if GRE's assumption that recycling will be free does not come to fruition?

Answer: As a preliminary matter, the Project Owner is responsible for all costs associated with the recycling, re-using, and/ or disposing of the solar modules.

Accurately estimating the disposal/recycling costs of solar panels 20-30 years in the future, however, is challenging, because of the emerging nature of the industry, as well as because of normal price changes/fluctuations for commodity materials (such as aluminum).

Notably, there are solar modules that were installed in the 1980s that are still operating today; this provides evidence that the modules that will be used for the Project will likely still have value at the end of this Project's life; and that, potentially, they could be re-used as well.

It is a realistic assumption that much of the Project equipment and materials will have a substantial salvage value 20 – 30 years in the future.

67. Adding up the individual task cost estimates provided in Appendix D, the total estimated decommissioning cost is $239,643. Is all of the decommissioning and restoration funding expected to come from the salvage value of project equipment and materials? What happens if GRE's assumptions about the salvage value are inaccurate? Who pays for the cost of salvage?

Answer: The Project Owner is responsible for all decommissioning and restoration costs. As such, if GRE's assumptions about the salvage value(s) are inaccurate, it would bear the burden of this mistake.

68. Were the decommissioning cost estimates made using present day costs for labor and equipment or were the estimates escalated to some future year value? If escalated to a future year, please provide the year and escalation rate. If not escalated, please provide the escalated decommissioning costs after 20, 30, and 35 years of operation and the escalation rate used in those calculations.

Answer: The costs included in Exhibit D were estimated with the intent of predicting future costs. As the Intervenor can likely appreciate, estimating construction-related-costs in the distant future is not a straightforward exercise; and there is inherent, substantial uncertainty(ies) in hourly rates and commodity pricing. To insulate the Town, landowner, and public from these cost uncertainties, the Project and its Owner are fully responsible for all decommissioning costs.

69. Following decommissioning how will "The Project…restore the surface to a condition similar to that existed at the inception of the Project" when all or a large majority of the trees, shrubs, ground cover, and forest floor duff within the 75 acre footprint have been removed? (See Petition at 17.) What is the estimated cost to "restore the surface to a condition similar to that existed at the inception of the Project"? Who will pay for that?

Answer: What the Petitioner intended by the above-quoted provision was that, following the decommissioning of the Project, the Petitioner will remove all of the respective racking, posts, and

stormwater features from the Site (as it is contractually obligated to do under its Lease with the present landowner). The Petitioner also intends to leave the land seeded and planted. The Petitioner notes that, following the termination of the Lease (and correspondingly, the decommissioning of the Project), the Petitioner has no control (nor ability to control) how the landowner will subsequently use the Site.

At this time, the Petitioner is unsure of what the exact cost will be to "restore the surface to a condition similar to that existed at the inception of the Project"; however, the Petitioner provided restoration cost estimation(s) in its Decommissioning and Restoration Plan (Petition, Appendix D). The Petitioner will be the party responsible for bearing said costs.

70. Mr. La Marche's testimony and the Petition refer to multiple corporate entities involved in this project, including Greenskies Clean Energy LLC, GRE, Clean Focus, and Clean Focus Yield." (La Marche testimony, dated Jan. 23, 2020, at 1:2-3, 1:6; Petition at 6.) Please explain the corporate relationships among GRE GACRUX LLC, Greenskies Clean Energy LLC, Clean Focus, Clean Focus Yield, Clean Focus Renewables, Inc., and Neo Solar Power. Which entity is ultimately responsible for the construction, operation, maintenance, and decommissioning of this project? What is the role of the new corporate entity that bought Greenskies Clean Energy in January 2020, JCL [sic] Infrastructure?

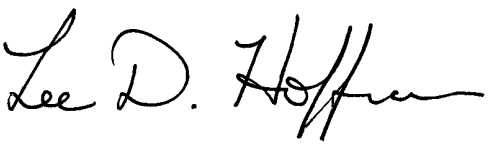
Answer: GRE GACRUX LLC is the Project Company that was created to "own" all of the documents associated with this Project. Greenskies Clean Energy is the development company that is working on behalf of, and in conjunction with, GRE GACRUX to develop the Project and is responsible for the development, construction, and operation of the Company's entire portfolio. Clean Focus Renewables, Clean Focus Yield, and Neo Solar Power are no longer related to this Project. Clean Focus Renewables was a previous owner of Greenskies; JLC Infrastructure is the current owner of Greenskies Clean Energy.

71. Which corporate entity ultimately will receive the incentive monies from the State of Connecticut that are associated with this project?

Answer: The Petitioner objects to this Interrogatory as the Interrogatory exceeds the scope of a petition for declaratory ruling pursuant to Conn. Gen. Stat. §§ 4-176 and 16-50K. Subject to the foregoing objection, the Petitioner states that, information relating to the project selection processes, including information regarding incentive monies derived therefrom, is publicly available for review. *See* CTDEEP's Public Act 15-107 Section 1(b) Request for Proposals ("RFP"). The Petitioner notes, however, that it is not receiving any incentive monies from the State of Connecticut. Rather, the Petitioner receives money from electric distribution companies with which it has contracted, pursuant to a state-approved RFP process.

Respectfully Submitted,

GRE GRACRUX LLC



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CERTIFICATION

I hereby certify that a copy of the foregoing document was delivered by e-mail to the following service list:

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DOCKET NO. CV 176031625	:	SUPERIOR COURT
JOHN BIALOWANS, JR.	:	JUDICIAL DISTRICT OF NEW LONDON
VS.	:	at NEW LONDON
GRE 314 EAST LYME, LLC, ET AL	:	DECEMBER 13, 2019

MEMORANDUM OF DECISION

At the conclusion of the plaintiff's case in the court trial of *Bialowans v. GRE 314 East Lyme, LLC*, the defendant, GRE 314 East Lyme, LLC (hereinafter GRE), made an oral motion to dismiss the action due to the plaintiff's failure to establish a prima facie case under all three counts of the operative complaint dated February 7, 2018. For the reasons stated below, the motion to dismiss the action is granted.

PROCEDURAL BACKGROUND

The action was commenced by complaint dated October 24, 2017. The operative complaint is the revised complaint dated February 7, 2018, (Entry #108) and is in three counts. Count one sounds in common law continuance nuisance, and alleges that the plaintiff's property in East Lyme, Connecticut was damaged and continues to be damaged as a result of surface water runoff and the deposition of sediment from the defendant's adjoining property. The defendant is the owner of a tract of land in East Lyme, upon which it developed a solar farm. The plaintiff contends that the natural flow of surface water on and from the defendant's property was altered as a result of the construction and installation of the solar farm, and that there was and continues to be an increase in the flow and volume of surface water and sediment flowing from the defendant's property onto the plaintiff's down-gradient property.

12/13/19 electronic notice sent & copy mailed to John Bialowans

(183)

In count two, the plaintiff asserts a claim pursuant to General Statues § 22a-44 (b) for violations of the wetland and watercourse provisions of General Statutes §§ 22a-36 to 22a-45. He claims that the surface water run-off created by the development of the solar farm violates the Inland Wetlands and Watercourse Act (IWWA) as set forth in General Statutes § 22a-44. In count three, the plaintiff sets forth a claim for declaratory and equitable relief pursuant to General Statutes §§ 22a-16 and 22a-18 of the Connecticut Environmental Protection Act (CEPA) for the protection of the public trust in the air, water and other natural resources of the state from unreasonable pollution, impairment, or destruction.

On March 9, 2018, the defendant filed its answer as well as eight affirmative defenses. The defendant denies that the construction of the solar farm has increased the flow and volume of surface water or sediment flowing down gradient and asserts that it has complied with all regulatory requirements. In its defenses, GRE argues that some or all of the plaintiff's claims are time barred, and that the plaintiff has suffered no damage caused by GRE.[1]

The case has had many fits and starts. Although the parties were ordered at the start of the case to file a joint proposed scheduling order prior to the April 24, 2018, status conference, the plaintiff's first attorney requested a continuance because the plaintiff "was conferring with another law firm." On June 18, 2018, the plaintiff's first attorney's request to withdraw was granted, and the court ordered the plaintiff to file a pro se appearance by July 11, 2018. No scheduling order had yet to be entered. (Knox, J.)

Although no replacement counsel had appeared, the plaintiff, acting on his own behalf, and the defendant's counsel entered a scheduling order which was filed with the court on July 6, 2018, and accepted by the court. (Frechette, J.) Replacement counsel filed their

[1] Because the court is granting the defendant's motion to dismiss for failure to make out a prima facie case pursuant to Practice Book § 15-8, the court shall not address the defendant's affirmative defenses.

appearance for the plaintiff on July 24, 2018, and sought to revise the scheduling order. In his fifth extension request, the plaintiff represented that the case would be ready for trial by July 16, 2019, and a modification to the scheduling orders was granted over the defendant's objection. After the December 6, 2018 pretrial conference, a judicial notice was sent setting a trial management conference date of June 11, 2019, and a jury selection date of June 18, 2019. A seventh extension request by the plaintiff resulted in a July 18, 2019 trial date being set. After another pretrial conference on April 16, 2019, the parties jointly selected another trial management conference date of July 10, 2019, and a jury selection date of July 22, 2019.

On May 2, 2019, the plaintiff's counsel moved to withdraw its appearance, and after hearing that was held on May 29, 2019, the motion to withdraw was denied by the court. (Calmar, J.) At this point, the matter was scheduled for jury selection on July 22, 2019, with a trial management conference scheduled for July 10, 2019. The plaintiff then filed his eighth modification to the scheduling order requesting a postponement of the July 22 trial date, alleging a scheduling conflict by the plaintiff's counsel. The defendant strenuously objected to this request, and the court initially denied the motion, stating it would address the request for continuance at the trial management conference scheduled for July 10, 2019. (Knox, J.) The court later granted the motion to continue the trial to September 18, 2019, and converted the case to a court trial. (Knox, J.)

On July 2, 2019, the plaintiff's counsel filed another motion to withdraw its appearance. At the hearing on the motion on July 29, 2019, the plaintiff's counsel stated that the attorney-client relationship had broken down. The court granted the motion, and told the plaintiff that the trial was still scheduled for trial on September 18, 2019. (Knox, J.) At the August 20, 2019, trial management conference, with the plaintiff acting on his own behalf and the defendant

through counsel, the court granted another thirty day extension of the trial so the plaintiff could obtain counsel. (Knox, J.)

The matter was set down for trial to commence on October 22, 2019, with the parties ordered to pre-mark exhibits on October 21, 2019. On October 22, 2019, the parties appeared for what was supposed to be the start of trial, with the plaintiff acting on his own behalf. However, the day before the plaintiff disclosed witnesses that he intended to call that were not listed on his original trial management report dated July 9, 2019. There were scheduling issues with his witnesses, and more importantly there were four pending motions in limine filed by the defendant which the defendant argued needed to be addressed by the court. The court heard argument on the motions in limine, indicated it would issue orders on the motions, and continued the trial one week to October 29, 2019.[2]

Two of the motions in limine addressed the plaintiff's experts. The defendant was requesting the preclusion of the expert testimony by Steven D. Trinkaus, arguing that he was not sufficiently qualified in the field of storm water system design and construction for a large scale solar development. The court did not enter any orders precluding Mr. Trinkaus' testimony, but indicated that prior to his testimony, the plaintiff was to inquire of his qualifications and allowing for a voir dire by the defendant. The court would then determine whether his expert opinion would be permitted. The defendant also filed a motion to preclude the testimony of Ron Swaney, as he had not been properly disclosed as an expert witness.[3] It

[2] The motion in limine to preclude the emotional distress claim (Entry #174) did not require action as that claim was withdrawn.

[3] In fact, a disclosure of expert witness of Ron Swaney was never filed by the plaintiff. The trial management report dated July 9, 2019, listed Mr. Swaney as a fact witness for the first time. In the defendant's motion to preclude, it indicates that in a damage statement dated August 9, 2019, Swaney's testimony would be used to establish the damages that the plaintiff was claiming in the amount of $425,320. GRE also indicated in its motion that it had requested dates to depose Swaney, but at the time of the filing of its motion on August 16, 2019, no dates had been provided by the plaintiff. The court notes that the date for filing of expert discovery was November 15, 2018.

was clear from the plaintiff that he intended Mr. Swaney to testify as an expert witness. After review of the file, the court granted the motion to preclude his expert testimony due to the plaintiff's failure to timely disclose him as an expert witness.[4]

The court trial commenced on October 29, 2019. The plaintiff called one witness, Donald J. Fortunato, and then informed the court that any other witnesses were not available. The matter was continued until December 4, 2019, at which time the plaintiff called one witness, Steven D. Trinkaus. The court gave the plaintiff the opportunity to testify on his own behalf, and the plaintiff rested.[5] After the plaintiff rested, the defendant made an oral motion to dismiss the action for failure by the plaintiff to make out a prima facie case.

DISCUSSION

Practice Book § 15-8 provides: "If, on the trial of any issue of fact in a civil matter tried to the court, the plaintiff has produced evidence and rested, a defendant may move for judgment of dismissal, and the judicial authority may grant such motion if the plaintiff has failed to make out a prima facie case. The defendant may offer evidence in the event the motion is not granted, without having reserved the right to do so and to the same extent as if the motion had not been made." "The standard for determining whether the plaintiff has made out a prima facie case, under Practice Book § 15–8, is whether the plaintiff put forth sufficient evidence that, *if believed*, would establish a prima facie case, not whether the trier of fact believes it. . . . For the court to grant the motion [for judgment of dismissal pursuant to Practice Book

[4] The court also reviewed the plaintiff's witness list and asked the plaintiff for offers of proof as to each witness. The court, after hearing from the plaintiff, determined that the plaintiff was going to attempt to elicit expert testimony from several of the witnesses on his list, which the court would not permit.

[5] Between the two dates of the trial, the plaintiff filed an application for subpoenas for Mark Christensen, Ron Swaney, Judith Rondeau, and Eastern CT Conservation District. The plaintiff's application was denied. "Based upon representation previously made by the plaintiff, these witnesses were to be called to give expert testimony, and any testimony does not aid the court in determining the issues." (Entry No. 181.01) Furthermore, the court had already ruled to preclude the testimony of Ron Swaney.

§ 15–8], it must be of the opinion that the plaintiff has failed to make out a prima facie case. In testing the sufficiency of the evidence, the court compares the evidence with the allegations of the complaint. . . . In order to establish a prima facie case, the proponent must submit evidence which, if credited, is sufficient to establish the fact or facts which is adduced to prove. . . [T]he evidence offered by the plaintiff is to be taken as true and interpreted in the light most favorable to [the plaintiff's] favor. . . . Whether the plaintiff has made out a prima facie case is a question of law . . . ." (Citation omitted; emphasis in original; footnote omitted; internal quotation marks omitted.) *Moss* v. *Foster*, 96 Conn. App. 369, 378, 900 A.2d 548 (2006). "A motion for judgment of dismissal has replaced the former motion for nonsuit for failure to make out a prima facie case. . . . The right of the court to grant such a motion is to be sparingly exercised . . . where the granting of a nonsuit must depend in any appreciable degree upon the court's passing upon the credibility of witnesses, the nonsuit should not be granted . . . where a case is close, the preferable course is to deny a motion for a nonsuit . . . ." *Thomas* v. *West Haven*, 249 Conn. 385, 391-92, 734 A.2d 535 (1999), cert. denied, 528 U.S. 1187, 120 S. Ct. 1239, 146 L. Ed. 2d 99 (2000).

As to count one of the complaint sounding in continuing nuisance, the plaintiff failed to set forth any facts that the unreasonable interference with the storm water flow was caused by the defendant's construction activities. There was no evidence of the predevelopment rate or volume of water flow from the defendant's land to the plaintiff's land. The plaintiff failed to provide any expert testimony which would support his allegations that the storm water system was built other than to design. Beyond the failure to allege an unreasonable interference, the plaintiff failed to present evidence of substantial damages other than an alleged increase flow of water on the plaintiff's undeveloped land.

As to count two, alleging a violation of the IWWA, the plaintiff failed to present any evidence that the defendant is responsible for any alleged water damage. The plaintiff is required to show that the defendant did not comply with regulations by the commissioner, which he failed to submit any evidence of the same. Defendant's Exhibit F was submitted as a full exhibit which indicates that GRE was permitted by the appropriate regulatory agency, and further indicates that the defendant complied with the town and regulatory authorities.

As to count three, alleging a violation of CEPA, the plaintiff failed to put forth any evidence that GRE is responsible for water related damages, or whether GRE had failed to comply with the appropriate regulatory scheme.[6]

The self-represented plaintiff was unfamiliar with the rules of evidence and the law setting for the burden which he bore. The defendant made timely and appropriate objections and the court giving as much latitude to a pro se as in justice would allow, heard the plaintiff's "evidence." In his questioning of his expert, Steven Trinkaus, the court again gave wide latitude to the plaintiff, and as much guidance as would be permissible. At the time he rested, he adduced no proof of any facts which would have established a prima facie case in any of the counts set forth in the complaint. The defendant timely moved for a motion to dismiss, which the court hereby grants.[7]

CONCLUSION

For the foregoing reasons, the court grants the defendant's motion to dismiss for failure of the plaintiff to make out a prima facie case. The case is dismissed.

Swienton, J.

[6] The East Lyme Inland and Wetland Agency as well as Commissioner of the Connecticut Department of Energy and Environmental Protection were defendants in this matter, and the plaintiff withdrew his claims as to these two defendants on November 2, 2017.

[7] The defendant had also raised a defense of statute of limitations. Although the court shall not make any rulings as to this defense, it notes that the installation of the storm water management took place in 2012-2013.

MARCH 2020

PHASE I CULTURAL RESOURCES RECONNAISSANCE SURVEY OF A PROPOSED SOLAR CENTER ALONG OIL MILL ROAD IN WATERFORD, CONNECTICUT

PREPARED FOR:

Greenskies
a Clean Focus company

180 JOHNSON STREET
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PREPARED BY:

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ABSTRACT

The project consisted of a Phase IB cultural resources reconnaissance survey of three moderate/high sensitivity areas associated with a proposed solar center along Oil Mill Road in Waterford, Connecticut. It was undertaken on behalf of Greenskies Renewable Energy, LLC in March of 2020. The project was completed through a combination of pedestrian survey, photo-documentation, GPS recordation, and shovel testing. The pedestrian survey of the project area resulted in the recognition of a recent episode of timber harvesting, though this did not appear to have resulted in significant ground disturbance. A total of 277 of 277 (100 percent) planned shovel tests were excavated throughout the moderate/high sensitivity areas. While the first survey area failed to yield any cultural material or evidence of cultural features, the second survey area yielded a single multicomponent locus (Locus 2-1) and the third survey area yielded a single historic period cultural resources locus (Locus 3-1). The materials collected from Locus 2-1 consisted of a single prehistoric quartz artifact and one ceramic sherd dating from the eighteenth to the early nineteenth century. Neither component of Locus 2-1 yielded substantial numbers of artifacts, cultural features, or research potential. Both components of Locus 2-1 were assessed not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Locus 3-1 yielded only two historic period ceramic sherds and no evidence of cultural features. This locus also lacked research potential and it was assessed not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Based on these findings, it was concluded that construction of the solar facility will have no impact on buried archaeological resources in the project parcel. Finally, pedestrian survey of the project parcel resulted in the recognition of 99 groupings of stones. They were clustered within the northeastern portion of the project parcel. The groupings were only visually examined, and no artifacts were identified on top of or within the vicinity of any of them. Due to the lack of cultural material or any other temporally diagnostic attributes, the stone groupings could not be assigned to a specific date or function.

TABLE OF CONTENTS

CHAPTER I: INTRODUCTION 1
Project Description and Methods Overview 1
Project Results and Management Recommendations Overview 2
Project Personnel 2
Organization of the Report 2

CHAPTER II: NATURAL SETTING 3
Introduction 3
Ecoregions of Connecticut 3
Southeast Hills Ecoregion 3
Hydrology in the Vicinity of the Study Area 3
Soils Comprising the Study Area 4
Canton and Charlton Soils: 4
Charlton-Chatfield Soils: 4
Hollis-Chatfield Soils: 5
Paxton and Montauk Soils: 5
Summary 5

CHAPTER III: PREHISTORIC SETTING 6
Introduction 6
Archaic Period (10,000 to 2,700 B.P.) 7
Early Archaic Period (10,000 to 8,000 B.P.) 7
Middle Archaic Period (8,000 to 6,000 B.P.) 7
The Terminal Archaic Period (3,700 to 2,700 B.P.) 8
Woodland Period (2,700 to 350 B.P.) 9
Early Woodland Period (ca., 2,700 to 2,000 B.P.) 9
Middle Woodland Period (2,000 to 1,200 B.P.) 10
Late Woodland Period (ca., 1,200 to 350 B.P.) 10
Summary of Connecticut Prehistory 11

CHAPTER IV: HISTORIC OVERVIEW 12
Introductoin ..... **ERROR! BOOKMARK NOT DEFINED.**
Native American History of the Project Area 12
Seventeenth and Eighteenth Centuries 12
Nineteenth and Twentieth Centuries 12
History of the project area 14
Conclusions 18

CHAPTER V: PREVIOUS INVESTIGATIONS 19
Introduction 19
Previously Recorded Archaeological Sites, National Historic Places Properties, and State Register of Historic Places Properties in the Vicinity of the Study Area 19
Summary and Interpretations 22

CHAPTER VI: METHODS 23
Introduction 23
Research Design 23
Field Methodology 23
Curation 24

CHAPTER VII: RESULTS OF THE INVESTIGATION & MANAGEMENT RECOMMENDATIONS 25
Introduction 25
Existing Landscape Conditions and Project Methods Overview 25
Results of the Field Effort 26
Survey Area 1 26
Survey Area 2 26
Locus 2-1 27
Survey Area 3 27
Locus 3-1 28
Above-Ground Landscape Features 28
Project Summary 28

BIBLIOGRAPHY 30

LIST OF FIGURES

Figure 1. Digital Map showing the location of the proposed solar project in Waterford, Connecticut.

Figure 2. Plan view of the proposed project area in Waterford, Connecticut showing the locations of the proposed solar arrays, access roads and storm water management areas.

Figure 3. Excerpt from a 2019 aerial image showing the location of the no/low and moderate/high sensitivity areas within the development areas associated with the proposed solar project in Waterford, Connecticut.

Figure 4. Excerpt from an 1854 historic map showing the location of the proposed solar project in Waterford, Connecticut.

Figure 5. Digitized map from an 1826 deed showing the boundaries of the William Moore property as conveyed to Guy and Isaac Turner which contains the present project area in Waterford, Connecticut.

Figure 6. Excerpt from an 1868 historic map showing the location of the proposed solar project in Waterford, Connecticut.

Figure 7. Excerpt from a 1934 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

Figure 8. Excerpt from a 1951 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

Figure 9. Excerpt from a 1970 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

Figure 10. Excerpt from a 2016 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

Figure 11. Excerpt from a 2019 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

Figure 12. Digital map showing the location of previously identified archaeological sites in the vicinity of the proposed solar array in Waterford, Connecticut.

Figure 13. Digital map depicting the locations of previously identified historic standing structures, as well as National and State Register of Historic Places properties in the vicinity of the proposed solar center in Waterford, Connecticut.

Figure 14. Excerpt from a 2019 aerial image depicting the locations of no/low and the three moderate/high sensitivity areas throughout the project area in Waterford, Connecticut, as well as the locations of excavated shovel tests and identified archaeological loci.

Figure 15. Overview photo of the eastern portion of Survey Area 1 facing west.

Figure 16. Overview photo of the western portion of Survey Area 1 facing west.

Figure 17. Excerpt from a 2019 aerial image depicting the Survey Area 1, as well as the locations of excavated shovel tests.

Figure 18. Overview photo of the central portion of Survey Area 2 facing northwest and including the northern part of Locus 2-1.

Figure 19. Overview photo of the southern portion of Survey Area 2 facing northwest and including the southern part of Locus 2-1.

Figure 20. Excerpt from a 2019 aerial image depicting the Survey Area 2, as well as the locations of excavated shovel tests and the limits of Locus 2-1.

Figure 21. Overview photo of the northern portion of Survey Area 3 facing northwest.

Figure 22. Overview photo of the southern portion of Survey Area 3 facing west and including Locus 3-1.

Figure 23. Excerpt from a 2019 aerial image depicting the Survey Area 3, as well as the locations of excavated shovel tests and the limits of Locus 3-1.

Figure 24. Excerpt from a 2019 aerial image depicting stone groupings identified during pedestrian survey.

Figure 25. Overview photo of a typical grouping of stones identified within the project parcel facing northwest.

Figure 26. Overview photo of a typical grouping of stones identified within the project parcel facing northeast.

Figure 27. Overview photo of a typical grouping of stones identified within the project parcel facing northwest.

Figure 28. Overview photo of a typical grouping of stones identified within the project parcel facing east.

Figure 29. Overview photo of a typical grouping of stones identified within the project parcel facing north.

Figure 30. Overview photo of a typical grouping of stones identified within the project parcel facing northeast.

CHAPTER I
INTRODUCTION

This report presents the results of a Phase IB cultural resources reconnaissance survey for a proposed solar center in Waterford, Connecticut (the Project) (Figures 1 and 2). Greenskies Renewable Energy, LLC (Greenskies) requested that Heritage Consultants, LLC (Heritage) complete the Phase IB cultural resources reconnaissance survey as part of the planning process for a proposed solar center that will be located on approximately 111.8 acres of land it is referred to hereafter as the study area (Figure 1). The study area is situated to the east of Oil Mill Road in Waterford, Connecticut. It is bordered to the west by residential areas along Oil Mill Road, to the north and east by forested areas, and to the south by Parkway North, a service road that runs parallel to Interstate 95.

During a previously completed Phase IA cultural resources assessment survey, Heritage examined the study area and determined that 94.3 ac of it contained slopes, wet soils, and/or very rocky locations (Heritage Consultants, LLC 2018). This acreage was assigned a no/low archeological sensitivity and was not examined further during the current Phase IB cultural resources reconnaissance survey. In contrast, the remaining 17 ac of land was located along three areas containing low slopes, well-drained soils, and proximity to freshwater sources. These three areas were therefore assessed as retaining a moderate/high potential to yield intact archaeological deposits either from the prehistoric or historic periods. The areas comprising the 17.5 ac of land are the subject of the current investigation. Heritage completed this investigation on behalf of Greenskies in March of 2020. All work associated with this project was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources,* promulgated by the Connecticut State Historic Preservation Office (Poirier 1987).

Project Description and Methods Overview

The proposed Project will include clearing of a parcel of land along with the installation of rows of solar arrays across the study area. Access roads that extend around and through the solar arrays, which will straddle and interconnect with an Eversource Energy electrical transmission line that runs for northeast to southwest through the subject property, also will be installed. The project also will include the construction of several stormwater detention ponds (Figure 2). As mentioned above, the Phase IB cultural resources reconnaissance survey focused on the three previously identified moderate/high sensitivity areas (Figure 3). These three areas were subjected to photo-documentation, GPS recordation of pertinent landscape features, and subsurface testing. The latter consisted of the excavation of shovel tests situated at 15 m (49.2 ft) intervals along parallel north to south trending survey transects spaced 15 m (49.2 ft) apart. During survey, each shovel test measured 50 x 50 cm (19.7 x 19.7 in) in size and each was excavated until glacially derived C-Horizon soils or immovable objects (e.g., boulders, large tree roots) were encountered. Each shovel test was excavated in 10 cm (3.9 in) arbitrary levels within natural strata, and the fill from each level was screened separately. All shovel test fill was screened through 0.635 cm (0.25 in) hardware cloth. Soil characteristics were recorded in the field using Munsell Soil Color Charts and standard soils nomenclature. Each shovel test was backfilled immediately upon completion of the archaeological recordation process. These methods are in keeping with those recommended by the Connecticut State Historic Preservation Office (CT-SHPO).

Project Results and Management Recommendations Overview

The current Phase IB cultural resources reconnaissance survey was completed through a combination of pedestrian survey, photo-documentation, GPS recordation, and shovel testing in three areas deemed to retain a moderate/high archaeological sensitivity. The pedestrian survey of the project area resulted in the recognition of a recent episode of timber harvesting on the property. However, tree stumps and roots were not removed, suggesting that impacts to any archaeological deposits present there would have been minimal. During survey, 277 of 277 (100 percent) planned shovel tests were excavated throughout three moderate/high sensitivity areas, which were designated as Survey Areas 1 through 3. Despite systematic shovel testing, Survey Area 1 failed to yield any cultural material or evidence of cultural features. Survey Area 2, in contrast, yielded a single multicomponent locus (Locus 2-1) and Survey Area 3 produced a single historic period cultural resources locus (Locus 3-1). Both the prehistoric and historic period components of Locus 2-1 lacked significant number of artifacts and cultural features. Thus, both were assessed not retaining research potential or the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Locus 3-1 yielded only two historic period artifacts. This locus also failed to yield evidence of cultural features either above or below the surface. It too was assessed as lacking research potential and the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Based on these findings, it was concluded that construction of the solar facility will have no impact on buried archaeological resources within Locus 2-1, Locus 3-1, or within the project parcel in general. Finally, pedestrian survey of the project parcel also resulted in the recognition of 99 groupings of stones. They were clustered within the northeastern portion of the project parcel. The groupings of stones were only visually examined and not excavated. No artifacts were noted on top of or within the vicinity of any of them. Due to the lack of cultural material or any other temporally diagnostic attributes, the stone groupings could not be assigned to a specific date or function.

Project Personnel

Key personnel for this project included Mr. David R. George, M.A., R.P.A, who served as Principal Investigator for this effort; he was assisted by Mr. Cory Atkinson, M.A., who directed the fieldwork portion of the project. Mr. Stephen Anderson, B.A., completed all project-related geographical information systems tasks. Dr. Kristen Keegan and Ms. Christina Volpe, B.A., completed this historic background research for the project and contributed to the final report. Finally, Ms. Elizabeth Correia, M.A., completed the identification and analysis of artifacts recovered during the fieldwork effort.

Organization of the Report

The natural setting of the region encompassing the study area is presented in Chapter II; it includes a brief overview of the geology, hydrology, and soils, of the project region. The prehistory of the project region is outlined briefly in Chapter III. The history of the region encompassing the project region and study area is chronicled in Chapter IV, while a discussion of previous archaeological investigations in the vicinity of the study area is presented in Chapter V. The methods used to complete this investigation are discussed in Chapter VI. Finally, the results of this investigation and management recommendations for the study area and the identified cultural resources are presented in Chapter VII.

CHAPTER II
NATURAL SETTING

Introduction

This chapter provides a brief overview of the natural setting of the region containing the study area in Waterford, Connecticut. Previous archaeological research has documented that a few specific environmental factors can be associated with both prehistoric and historic period site selection. These include general ecological conditions, as well as types of fresh water sources and soils present. The remainder of this section provides a brief overview of the ecology, hydrological resources, and soils present within the study area and the larger region in general.

Ecoregions of Connecticut

Throughout the Pleistocene and Holocene Periods, Connecticut has undergone numerous environmental changes. Variations in climate, geology, and physiography have led to the "regionalization" of Connecticut's modern environment. It is clear, for example, that the northwestern portion of the state has very different natural characteristics than the coastline. Recognizing this fact, Dowhan and Craig (1976), as part of their study of the distribution of rare and endangered species in Connecticut, subdivided the state into various ecoregions. Dowhan and Craig (1976:27) defined an ecoregion as:

> "an area characterized by a distinctive pattern of landscapes and regional climate as expressed by the vegetation composition and pattern, and the presence or absence of certain indicator species and species groups. Each ecoregion has a similar interrelationship between landforms, local climate, soil profiles, and plant and animal communities. Furthermore, the pattern of development of plant communities (chronosequences and toposequences) and of soil profile is similar in similar physiographic sites. Ecoregions are thus natural divisions of land, climate, and biota."

Dowhan and Craig defined nine major ecoregions for the State of Connecticut. They are based on regional diversity in plant and animal indicator species (Dowhan and Craig 1976). Only one of the ecoregions is germane to the current investigation: Southeast Hills ecoregion. A brief summary of this ecoregion is presented below. It is followed by a discussion of the hydrology and soils found in and adjacent to the study area.

Southeast Hills Ecoregion

The Southeast Hills ecoregion, which consists of "coastal uplands, lying within 25 miles of Long Island Sound, characterized by low, rolling to locally rugged hills of moderate elevation, broad areas of upland, and local areas of steep and rugged topography" (Dowhan and Craig 1976). Elevations in the Southeast Hills ecoregion generally range from 75.7 to 227.2 m (250 to 750 ft) above sea level (Dowhan and Craig 1976). The bedrock of the region is composed of schists, and gneisses deposited during the Paleozoic. Soils in the region have developed on top of glacial till in upland locales, and on top of stratified deposits of sand, gravel, and silt in the local valleys and upland areas (Dowhan and Craig 1976).

Hydrology in the Vicinity of the Study Area

The proposed study area is situated within proximity to several sources of freshwater, including Oil Mill Brook, Willys Meadows Brook, Stony Brook, Latimer Brook, Banning Cove, and the Niantic River, as well as other unnamed streams, ponds, and wetland areas. These brooks and rivers may have served as

resource extraction areas for Native American and historic populations. This is especially true for the Oil Mill Brook, along which many historic period archaeological sites have already been identified. The nearby Niantic River also has numerous documented archaeological sites along its banks. Previously completed archaeological investigations in Connecticut have demonstrated that streams, rivers, and wetlands were focal points for prehistoric and historic occupations because they provided access to transportation routes, sources of freshwater, abundant faunal and floral resources, and, for historic populations, source of power for milling operations.

Soils Comprising the Study Area

Soil formation is the direct result of the interaction of several variables, including climate, vegetation, parent material, time, and organisms present (Gerrard 1981). Once archaeological deposits are buried within the soil, they are subject to several diagenic processes. Different classes of artifacts may be preferentially protected, or unaffected by these processes, whereas others may deteriorate rapidly. Cyclical wetting and drying, freezing and thawing, and compression can accelerate chemically and mechanically the decay processes for animal bones, shells, lithics, ceramics, and plant remains. Lithic and ceramic artifacts are largely unaffected by soil pH, whereas animal bones and shells decay more quickly in acidic soils such as those that are present in within the current study area. In contrast, acidic soils enhance the preservation of charred plant remains.

A review of the soils within the study area is presented below. The study area is characterized by the presence of four major soil types. They include Canton and Charlton, Charlton-Chatfield, Hollis-Chatfield, and Paxton and Montauk soils. Descriptive profiles for each, which were accessed via the National Resources Conservation Service, are presented below.

Canton and Charlton Soils:

Canton and Charlton soils consist of very deep, well drained soils formed in loamy melt-out till. They are nearly level to very steep soils on moraines, hills, and ridges. Slope ranges from 0 to 60 percent. A typical soil profile is as follows: **Oe** -- 0 to 4 cm; black (10YR 2/1) moderately decomposed forest plant material; **A** -- 4 to 10 cm; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; 5 percent gravel; very strongly acid; abrupt smooth boundary; **Bw1** -- 10 to 18 cm; brown (7.5YR 4/4) fine sandy loam; weak coarse granular structure; very friable; many fine and medium roots; 5 percent gravel; very strongly acid; clear wavy boundary; **Bw2** -- 18 to 48 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and medium roots; 10 percent gravel and cobbles; very strongly acid; clear wavy boundary; **Bw3** -- 48 to 69 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; massive; very friable; few medium roots; 15 percent gravel and cobbles; very strongly acid; abrupt wavy boundary; and **C** -- 69 to 165 cm; grayish brown (2.5Y 5/2) gravelly fine sandy loam with thin lenses of loamy sand; massive; friable, some lenses firm; few medium roots; 25 percent gravel and cobbles; strongly acid.

Charlton-Chatfield Soils:

Charlton-Chatfield series consists of well drained soils formed in loamy melt-out till. They are moderately deep to bedrock. They are nearly level to very steep soils on bedrock-controlled hills and ridges. Slope ranges from 0 to 70 percent. A typical soil profile is as follows: **Oi** -- 0 to 3 cm, slightly decomposed leaf, needle, and twig litter; **A** -- 3 to 5 cm, very dark gray (10YR 3/1) fine sandy loam, gray (10YR 5/1), dry; weak fine subangular blocky structure; friable; many fine and medium roots throughout; 5 percent mixed gravel and cobbles; very strongly acid, pH 4.5; abrupt smooth boundary; **Bw1**-- 5 to 33 cm, strong brown (7.5YR 5/6) gravelly fine sandy loam; weak fine subangular blocky structure; friable; common fine roots throughout and common medium roots throughout; 15 percent mixed gravel and cobbles; very strongly

acid, pH 4.5; abrupt wavy boundary; **Bw2** -- 33 to 76 cm, strong brown (7.5YR 5/6) gravelly fine sandy loam; moderate medium subangular blocky structure; friable; few fine roots throughout; 20 percent mixed rock fragments; very strongly acid, pH 4.5; abrupt irregular boundary; and **2R** -- 76 cm; fractured lightly-weathered schist bedrock.

Hollis-Chatfield Soils:

The Hollis series consists of well drained and somewhat excessively drained soils formed in a thin mantle of till. They are shallow to bedrock. They are nearly level to very steep upland soils on bedrock-controlled hills and ridges. Slope ranges from 0 through 60 percent. A typical soil profile is as follows: **Oi** -- 0 to 3 cm; slightly decomposed plant material; **Oa** -- 3 to 5 cm; black (10YR 2/1) highly decomposed plant material; moderate fine granular structure; very friable; many fine and very fine roots; abrupt smooth boundary; **A** -- 5 to 18 cm; very dark grayish brown (10YR 3/2) gravelly fine sandy loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; very friable; common fine, very fine, medium, and coarse roots; 10 percent gravel, 5 percent channers; very strongly acid; clear smooth boundary; **Bw1** -- 18 to 25 cm; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; moderate medium subangular blocky structure; friable; few very fine and fine roots, common medium roots; 10 percent gravel, 10 percent channers; strongly acid; clear wavy boundary; **Bw2** -- 25 to 41 cm; yellowish brown (10YR 5/6) gravelly fine sandy loam; moderate medium and coarse subangular blocky structure; friable; few fine and very fine roots, common medium roots; 10 percent gravel, 5 percent channers; strongly acid; abrupt smooth boundary; and **2R** -- 41 cm; schist bedrock.

Paxton and Montauk Soils:

The Paxton series consists of well drained loamy soils formed in lodgment till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 45 percent. A typical soil profile is as follows: **Ap** -- 0 to 20 cm; dark brown (10YR 3/3) fine sandy loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary; **Bw1** -- 20 to 38 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent gravel; few earthworm casts; strongly acid; gradual wavy boundary; **Bw2** -- 38 to 66 cm; olive brown (2.5Y 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; strongly acid; clear wavy boundary; and **Cd** -- 66 to 165 cm; olive (5Y 5/3) gravelly fine sandy loam; medium plate-like divisions; massive; very firm, brittle; 25 percent gravel; many dark coatings on plates; strongly acid.

Summary

The natural setting associated with the proposed study area is common throughout the Southeast Hills ecoregion. Streams and rivers of this area empty either into the Niantic River or the Long Island Sound and the landscape in general is dominated by well drained, sandy to loamy soil. In addition, low slopes dominate the region. The project region was well suited to Native American occupation throughout the prehistoric era. As a result, prehistoric archaeological sites have been documented in the larger project region, and additional prehistoric cultural deposits may be expected within the study area where there has not been previous disturbance. This area was also used extensively throughout the historic era, as evidenced by the numerous historic era archaeological sites located along Oil Mill Brook; thus, archaeological sites dating from the last 350 years or so may also be expected near this property.

CHAPTER III
PREHISTORIC SETTING

Introduction

Prior to the late 1970s and early 1980s, very few systematic archaeological surveys of large portions of the state of Connecticut had been undertaken. Rather, the prehistory of the region was studied at the site level. Sites chosen for excavation were highly visible and they were located in such areas as the coastal zone, e.g., shell middens, and Connecticut River Valley. As a result, a skewed interpretation of the prehistory of Connecticut was developed. It was suggested that the upland portions of the state, i.e., the northeastern and northwestern hills ecoregions, were little used and rarely occupied by prehistoric Native Americans, while the coastal zone, i.e., the eastern and western coastal and the southeastern and southwestern hills ecoregions, were the focus of settlements and exploitation in the prehistoric era. This interpretation remained unchallenged until the 1970s and 1980s when several town-wide and regional archaeological studies were completed. These investigations led to the creation of several archaeological phases that subsequently were applied to understand the prehistory of Connecticut. The remainder of this chapter provides an overview of the prehistoric setting of the region encompassing the project area.
Paleo-Indian Period (12,000 to 10,000 Before Present [B.P.])

The earliest inhabitants of the area encompassing the State of Connecticut, who have been referred to as Paleo-Indians, arrived in the area by ca., 12,000 B.P. (Gramly and Funk 1990; Snow 1980). Due to the presence of large Pleistocene mammals at that time and the ubiquity of large fluted projectile points in archaeological deposits of this age, Paleo-Indians often have been described as big-game hunters (Ritchie and Funk 1973; Snow 1980); however, as discussed below, it is more likely that they hunted a broad spectrum of animals.

While there have been numerous surface finds of Paleo-Indian projectile points throughout the State of Connecticut, only two sites, the Templeton Site (6-LF-21) in Washington, Connecticut and the Hidden Creek Site (72-163) in Ledyard, Connecticut, have been studied in detail and dated using the radiocarbon method (Jones 1997; Moeller 1980). The Templeton Site (6-LF-21) is located in Washington, Connecticut and was occupied between 10,490 and 9,890 years ago (Moeller 1980). In addition to a single large and two small fluted points, the Templeton Site produced a stone tool assemblage consisting of gravers, drills, core fragments, scrapers, and channel flakes, which indicates that the full range of stone tool production and maintenance took place at the site (Moeller 1980). Moreover, the use of both local and non-local raw materials was documented in the recovered tool assemblage, suggesting that not only did the site's occupants spend some time in the area, but they also had access to distant stone sources, the use of which likely occurred during movement from region to region.

The only other Paleo-Indian site studied in detail in Connecticut is the Hidden Creek Site (72-163) (Jones 1997). The Hidden Creek Site is situated on the southeastern margin of the Great Cedar Swamp on the Mashantucket Pequot Reservation in Ledyard, Connecticut. While excavation of the Hidden Creek Site produced evidence of Terminal Archaic and Woodland Period components (see below) in the upper soil horizons, the lower levels of the site yielded artifacts dating from the Paleo-Indian era. Recovered Paleo-Indian artifacts included broken bifaces, side-scrapers, a fluted preform, gravers, and end-scrapers. Based on the types and number of tools present, Jones (1997:77) has hypothesized that the Hidden Creek Site

represented a short-term occupation, and that separate stone tool reduction and rejuvenation areas were present.

While archaeological evidence for Paleo-Indian occupation is scarce in Connecticut, it, combined with data from the West Athens Road and King's Road Site in the Hudson drainage and the Davis and Potts Sites in northern New York, supports the hypothesis that there was human occupation of the area not long after ca. 12,000 B.P. (Snow 1980). Further, site types currently known suggest that the Paleo-Indian settlement pattern was characterized by a high degree of mobility, with groups moving from region to region in search of seasonally abundant food resources, as well as for the procurement of high-quality raw materials from which to fashion stone tools.

Archaic Period (10,000 to 2,700 B.P.)

The Archaic Period, which succeeded the Paleo-Indian Period, began by ca., 10,000 B.P. (Ritchie and Funk 1973; Snow 1980), and it has been divided into three subperiods: Early Archaic (10,000 to 8,000 B.P.), Middle Archaic (8,000 to 6,000 B.P.), and Late Archaic (6,000 to 3,400 B.P.). These periods were devised to describe all non-farming, non-ceramic producing populations in the area. Regional archeologists recently have recognized a final "transitional" Archaic Period, the Terminal Archaic Period (3,400-2,700 B.P.), which was meant to describe those groups that existed just prior to the onset of the Woodland Period and the widespread adoption of ceramics into the toolkit (Snow 1980; McBride 1984; Pfeiffer 1984, 1990; Witthoft 1949, 1953).

Early Archaic Period (10,000 to 8,000 B.P.)

To date, very few Early Archaic sites have been identified in southern New England. As a result, researchers such as Fitting (1968) and Ritchie (1969), have suggested a lack of these sites likely is tied to cultural discontinuity between the Early Archaic and preceding Paleo-Indian Period, as well as a population decrease from earlier times. However, with continued identification of Early Archaic sites in the region, and the recognition of the problems of preservation, it is difficult to maintain the discontinuity hypothesis (Curran and Dincauze 1977; Snow 1980).

Like their Paleo-Indian predecessors, Early Archaic sites tend to be very small and produce few artifacts, most of which are not temporally diagnostic. While Early Archaic sites in other portions of the United States are represented by projectile points of the Kirk series (Ritchie and Funk 1973) and by Kanawha types (Coe 1964), sites of this age in southern New England are identified on the basis of a series of ill-defined bifurcate-based projectile points. These projectile points are identified by the presence of their characteristic bifurcated base, and they generally are made from high quality raw materials. Moreover, finds of these projectile points have rarely been in stratified contexts. Rather, they occur commonly either as surface expressions or intermixed with artifacts representative of later periods. Early Archaic occupations, such as the Dill Farm Site and Sites 6LF64 and 6LF70 in Litchfield County, are represented by camps that were relocated periodically to take advantage of seasonally available resources (McBride 1984; Pfeiffer 1986). In this sense, a foraging type of settlement pattern was employed during the Early Archaic Period.

Middle Archaic Period (8,000 to 6,000 B.P.)

By the onset of the Middle Archaic Period, essentially modern deciduous forests had developed in the region (Davis 1969). It is at this time that increased numbers and types of sites are noted in Connecticut (McBride 1984). The most well-known Middle Archaic site in New England is the Neville Site, which is located in Manchester, New Hampshire and studied by Dincauze (1976). Careful analysis of the Neville Site indicated that the Middle Archaic occupation dated from between ca., 7,700 and 6,000 years ago. In

fact, Dincauze (1976) obtained several radiocarbon dates from the Middle Archaic component of the Neville Site. The dates, associated with the then-newly named Neville type projectile point, ranged from 7,740+280 and 7,015+160 B.P. (Dincauze 1976).

In addition to Neville points, Dincauze (1976) described two other projectile points styles that are attributed to the Middle Archaic Period: Stark and Merrimac projectile points. While no absolute dates were recovered from deposits that yielded Stark points, the Merrimac type dated from 5,910+180 B.P. Dincauze argued that both the Neville and later Merrimac and Stark occupations were established to take advantage of the excellent fishing that the falls situated adjacent to the site area would have afforded Native American groups. Thus, based on the available archaeological evidence, the Middle Archaic Period is characterized by continued increases in diversification of tool types and resources exploited, as well as by sophisticated changes in the settlement pattern to include different site types, including both base camps and task-specific sites (McBride 1984:96)

Late Archaic Period (6,000 to 3,700 B.P.)

The Late Archaic Period in southern New England is divided into two major cultural traditions that appear to have coexisted. They include the Laurentian and Narrow-Stemmed Traditions (Funk 1976; McBride 1984; Ritchie 1969a and b). Artifacts assigned to the Laurentian Tradition include ground stone axes, adzes, gouges, ulus (semi-lunar knives), pestles, atlatl weights, and scrapers. The diagnostic projectile point forms of this time period in southern New England include the Brewerton Eared-Notched, Brewerton Eared and Brewerton Side-Notched varieties (McBride 1984; Ritchie 1969a). In general, the stone tool assemblage of the Laurentian Tradition is characterized by flint, felsite, rhyolite and quartzite, while quartz was largely avoided for stone tool production.

In terms of settlement and subsistence patterns, archaeological evidence in southern New England suggests that Laurentian Tradition populations consisted of groups of mobile hunter-gatherers. While a few large Laurentian Tradition occupations have been studied, sites of this age generally encompass less than 500 m2 (5,383 ft2). These base camps reflect frequent movements by small groups of people in search of seasonally abundant resources. The overall settlement pattern of the Laurentian Tradition was dispersed in nature, with base camps located in a wide range of microenvironments, including riverine as well as upland zones (McBride 1978, 1984:252). Finally, subsistence strategies of Laurentian Tradition focused on hunting and gathering of wild plants and animals from multiple ecozones.

The second Late Archaic tradition, known as the Narrow-Stemmed Tradition, is unlike the Laurentian Tradition, and it likely represents a different cultural adaptation. The Narrow-Stemmed tradition is recognized by the presence of quartz and quartzite narrow stemmed projectile points, triangular quartz Squibnocket projectile points, and a bipolar lithic reduction strategy (McBride 1984). Other tools found in Narrow-Stemmed Tradition artifact assemblages include choppers, adzes, pestles, antler and bone projectile points, harpoons, awls, and notched atlatl weights. Many of these tools, notably the projectile points and pestles, indicate a subsistence pattern dominated by hunting and fishing, as well the collection of a wide range of plant foods (McBride 1984; Snow 1980:228).

<u>The Terminal Archaic Period (3,700 to 2,700 B.P.)</u>

The Terminal Archaic Period, which lasted from ca., 3,700 to 2,700 BP, is perhaps the most interesting, yet confusing of the Archaic Periods in southern New England prehistory. Originally termed the "Transitional Archaic" by Witthoft (1953) and recognized by the introduction of technological innovations, e.g., broadspear projectile points and soapstone bowls, the Terminal Archaic Period has long posed problems for regional archeologists. While the Narrow-Stemmed Tradition persisted through

the Terminal Archaic and into the Early Woodland Period, the Terminal Archaic is coeval with what appears to be a different technological adaptation, the Susquehanna Tradition (McBride 1984; Ritchie 1969b). The Susquehanna Tradition is recognized in southern New England by the presence of a new stone tool industry that was based on the use of high-quality raw materials for stone tool production and a settlement pattern different from the "coeval" Narrow-Stemmed Tradition.

The Susquehanna Tradition is based on the classification of several Broadspear projectile point types and associated artifacts. There are several local sequences within the tradition, and they are based on projectile point type chronology. Temporally diagnostic projectile points of these sequences include the Snook Kill, Susquehanna Broadspear, Mansion Inn, and Orient Fishtail types (Lavin 1984; McBride 1984; Pfeiffer 1984). The initial portion of the Terminal Archaic Period (ca., 3,700-3,200 BP) is characterized by the presence of Snook Kill and Susquehanna Broadspear projectile points, while the latter Terminal Archaic (3,200-2,700 BP) is distinguished by the use of Orient Fishtail projectile points (McBride 1984:119; Ritchie 1971).

In addition, it was during the late Terminal Archaic Period that interior cord marked, grit tempered, thick walled ceramics with conoidal (pointed) bases made their initial appearance in the Native American toolkit. These are the first ceramics in the region, and they are named Vinette I (Ritchie 1969a; Snow 1980:242); this type of ceramic vessel appears with much more frequency during the ensuing Early Woodland Period. In addition, the adoption and widespread use of soapstone bowls, as well as the implementation of subterranean storage, suggests that Terminal Archaic groups were characterized by reduced mobility and longer-term use of established occupation sites (Snow 1980:250).

Finally, while settlement patterns appeared to have changed, Terminal Archaic subsistence patterns were analogous to earlier patterns. The subsistence pattern still was diffuse in nature, and it was scheduled carefully. Typical food remains recovered from sites of this period consist of fragments of white-tailed deer, beaver, turtle, fish and various small mammals. Botanical remains recovered from the site area consisted of Chenopodium sp., hickory, butternut and walnut (Pagoulatos 1988:81). Such diversity in food remains suggests at least minimal use of a wide range of microenvironments for subsistence purposes.

Woodland Period (2,700 to 350 B.P.)

Traditionally, the advent of the Woodland Period in southern New England has been associated with the introduction of pottery; however, as mentioned above, early dates associated with pottery now suggest the presence of Vinette I ceramics appeared toward the end of the preceding Terminal Archaic Period (Ritchie 1969a; McBride 1984). Like the Archaic Period, the Woodland Period has been divided into three subperiods: Early, Middle, and Late Woodland. The various subperiods are discussed below.

<u>Early Woodland Period (ca., 2,700 to 2,000 B.P.)</u>

The Early Woodland Period of the northeastern United States dates from ca., 2,700 to 2,000 B.P., and it has been thought to have been characterized by the advent of farming, the initial use of ceramic vessels, and increasingly complex burial ceremonialism (Griffin 1967; Ritchie 1969a and 1969b; Snow 1980). In the Northeast, the earliest ceramics of the Early Woodland Period are thick walled, cord marked on both the interior and exterior, and possess grit temper.

Careful archaeological investigations of Early Woodland sites in southern New England have resulted in the recovery of narrow stemmed projectile points in association with ceramic sherds and subsistence remains, including specimens of white-tailed deer, soft and hard-shell clams, and oyster shells (McBride 1984:296-297; Pope 1952). McBride (1984) has argued that the combination of the subsistence remains and the recognition of multiple superimposed cultural features at various sites indicates that Early

Woodland Period settlement patterns were characterized by multiple re-use of the same sites on a seasonal basis by small co-residential groups.

Middle Woodland Period (2,000 to 1,200 B.P.)

The Middle Woodland Period is marked by an increase in the number of ceramic types and forms utilized (Lizee 1994a), as well as an increase in the amount of exotic lithic raw material used in stone tool manufacture (McBride 1984). The latter suggests that regional exchange networks were established, and that they were used to supply local populations with necessary raw materials (McBride 1984; Snow 1980). The Middle Woodland Period is represented archaeologically by narrow stemmed and Jack's Reef projectile points; increased amounts of exotic raw materials in recovered lithic assemblages, including chert, argillite, jasper, and hornfels; and conoidal ceramic vessels decorated with dentate stamping. Ceramic types indicative of the Middle Woodland Period include Linear Dentate, Rocker Dentate, Windsor Cord Marked, Windsor Brushed, Windsor Plain, and Hollister Stamped (Lizee 1994a:200).

In terms of settlement patterns, the Middle Woodland Period is characterized by the occupation of village sites by large co-residential groups that utilized native plant and animal species for food and raw materials in tool making (George 1997). These sites were the principal place of occupation, and they were positioned close to major river valleys, tidal marshes, estuaries, and the coastline, all of which would have supplied an abundance of plant and animal resources (McBride 1984:309). In addition to villages, numerous temporary and task-specific sites were utilized in the surrounding upland areas, as well as in closer ecozones such as wetlands, estuaries, and floodplains. The use of temporary and task-specific sites to support large village populations indicates that the Middle Woodland Period was characterized by a resource acquisition strategy that can best be termed as logistical collection (McBride 1984:310).

Late Woodland Period (ca., 1,200 to 350 B.P.)

The Late Woodland Period in southern New England dates from ca., 1,200 to 350 B.P., and it is characterized by the earliest evidence for the use of corn in the lower Connecticut River Valley (Bendremer 1993; Bendremer and Dewar 1993; Bendremer et al. 1991; George 1997; McBride 1984); an increase in the frequency of exchange of non-local lithics (Feder 1984; George and Tryon 1996; McBride 1984; Lavin 1984); increased variability in ceramic form, function, surface treatment, and decoration (Lavin 1980, 1986, 1987; Lizee 1994a, 1994b); and a continuation of a trend towards larger, more permanent settlements in riverine, estuarine, and coastal ecozones (Dincauze 1974; McBride 1984; Snow 1980).

Stone tool assemblages associated with Late Woodland occupations, especially village-sized sites, are functionally variable and they reflect plant and animal resource processing and consumption on a large scale. Finished stone tools recovered from Late Woodland sites include Levanna and Madison projectile points; drills; side-, end-, and thumbnail scrapers; mortars and pestles; nutting stones; netsinkers; and celts, adzes, axes, and digging tools. These tools were used in activities ranging from hide preparation to plant processing to the manufacture of canoes, bowls, and utensils, as well as other settlement and subsistence-related items (McBride 1984; Snow 1980). Finally, ceramic assemblages recovered from Late Woodland sites are as variable as the lithic assemblages. Ceramic types identified include Windsor Fabric Impressed, Windsor Brushed, Windsor Cord Marked, Windsor Plain, Clearview Stamped, Sebonac Stamped, Selden Island, Hollister Plain, Hollister Stamped, and Shantok Cove Incised (Lavin 1980, 1988a, 1988b; Lizee 1994a; Pope 1953; Rouse 1947; Salwen and Ottesen 1972; Smith 1947). These types are more diverse stylistically than their predecessors, with incision, shell stamping, punctation, single point, linear dentate, rocker dentate stamping, and stamp and drag impressions common (Lizee 1994a:216).

Summary of Connecticut Prehistory

In sum, the prehistory of Connecticut spans from ca., 12,000 to 350 B.P., and it is characterized by numerous changes in tool types, subsistence patterns, and land use strategies. For the majority of the prehistoric era, local Native American groups practiced a subsistence pattern based on a mixed economy of hunting and gathering wild plant and animal resources. It is not until the Late Woodland Period that incontrovertible evidence for the use of domesticated species is available. Further, settlement patterns throughout the prehistoric era shifted from seasonal occupations of small co-residential groups to large aggregations of people in riverine, estuarine, and coastal ecozones. In terms of the region containing the proposed project area, a variety of prehistoric site types may be expected. These range from seasonal camps utilized by Archaic populations to temporary and task-specific sites of the Woodland era.

CHAPTER IV
HISTORIC OVERVIEW

Introduction

The project area is located to the north of the intersection of Oil Mill Road and Waterford Parkway North in the Town of Waterford, which separated from the City of New London in 1801. The project area is situated near Waterford's western border with East Lyme, to the north of Interstate-95, and is in one of the less-developed portions of the town. Prior to the current survey effort, the project was cleared of valuable timber. The remainder of this chapter provides on overview history of the Town of Waterford, as well as historic details concerning the project area.

Native American History of the Project Area

The town of Waterford was part of the large territory taken from the Pequot Indians by the English colonies and their Native allies during the Pequot War of 1636-1637. Prior to that time, various parts of the coastline and interior would have been used by Native Americans for fishing, hunting, and agriculture (De Forest 1852). New London, from which Waterford later separated, fell to the Connecticut government when the spoils of the Pequot War were divided, and in 1641 the General Court ordered it surveyed; distribution of the land and its colonization began thereafter (Crofut 1937). Because the policy of the colonists was to prevent the Pequots from gathering again in their former territory, the Native American history of New London effectively ended with the war. Nevertheless, two groups of Pequots reconstituted themselves later. They became known as the Mashantucket Pequot Tribe and the Eastern Pequot Tribe in Ledyard and North Stonington, respectively. In the late twentieth century, the Mashantucket Pequot Tribe secured Federal recognition and developed a casino and related enterprises on their reservation in the nearby towns of Ledyard. The Eastern Pequot Tribe has yet to gain Federal recognition.

Seventeenth and Eighteenth Centuries

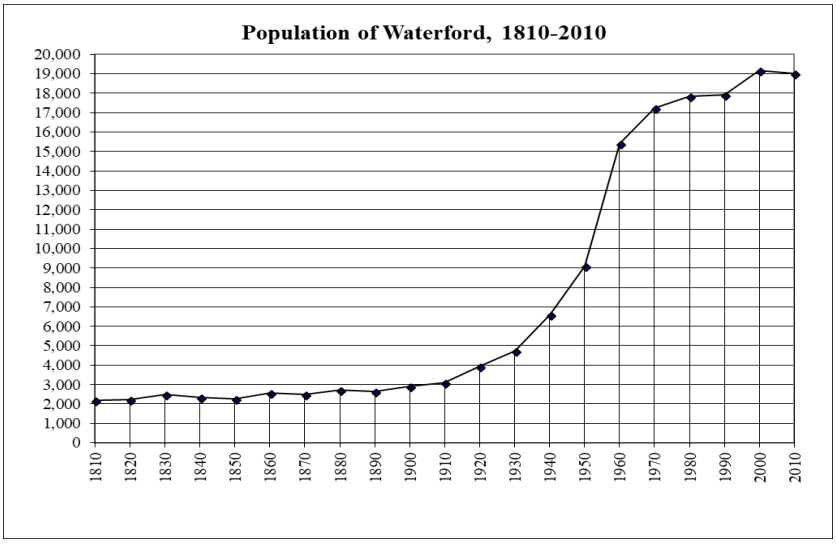
New London was founded in 1648, and the first settlement in what would become Waterford was probably made in the 1660s, on the shore near the southeastern corner of the present town (Crofut 1937). The project area is in the northwestern part of Waterford, near the head of the Niantic River and the historic bridge and village there. Unusually, Waterford does not appear to have had a Congregational church society separate from New London's. Instead, a Baptist congregation was formed in the 1670s, and by the 1830s there were three Baptist churches in the town (Barber 1837). The city of New London was incorporated in 1784, and Waterford's creation as a new town may have reflected the divergence of interests between the city and country populations. Although New London was much involved in wars, from the Pequot War to the Revolutionary War to the War of 1812, most of this activity took place on the east side of the town, where the city and the harbor on the Thames River were located (Crofut 1937). New London (then including Waterford) was the terminus of the Mohegan Road, laid out through the Indian tribe's lands in 1670. Also in the seventeenth century, the Boston Post Road was established, and passed across the head of the Niantic River. In the 1790s, when the state began its efforts to improve transportation routes, the Mohegan Road was made a toll road (Wood 1919).

Nineteenth and Twentieth Centuries

As noted above, the town of Waterford separated from New London in 1801. In 1800, the General Assembly incorporated the Hartford and New London Turnpike Company, which built a road diagonally from Waterford's northwestern corner to the city of New London. In 1807, the New London and Lyme Turnpike

was incorporated to improve the section of the Old Post Road between those two places, with subsequent improvements to bridges along the routes. This turnpike, located a short distance to the south of the project area, remained in business for some time (Wood 1919). In 1850, a railroad link between New Haven and New London was opened; it crossed the Niantic River at its mouth, and by 1858 the "Shore Line" railroad, still partly in operation under a different name, finished a direct rail route between New York and Boston (Turner and Jacobus 1989). The place-names Oil Mill Brook and Oil Mill Road refer to the nearby presence, as shown in an 1813 map of the state, of water-powered mills for the preparation of oils from different types of seeds (Warren and Gillett 1813). The 1854 map of the county still shows an oil mill located to the southwest of the project area (Figure 4).

The rural nature of nineteenth-century Waterford is illustrated by its population figures; between 1810 (its first census year as an independent town) and 1910, its population slowly rose from just over 2,000 to just over 3,000 (see the population chart below; Keegan 2012). After that year, the population began to rise substantially: to just under 4,000 in 1920, to 9,100 in 1950, to nearly 18,000 in 1990 (see the population chart below). These changes are consistent with development trends in the state. During the late nineteenth and early twentieth centuries, the rise of leisure activities led to the development of seaside resorts – hotels, boarding houses, and cottage developments, together with a related rise in the number of year-round residents in shoreline towns. At the same time, declines in fish populations reduced the shoreline's fishing industry, and when faced with competition from western grain and cattle production, regional farmers turned to dairying, fruits, and vegetables or went out of business. As the twentieth century progressed, the trend toward suburban living brought many more permanent residents to Waterford, further boosting the population (Herzan 1997). This is not to say that Waterford had no industrial activity; in 1932, for example, it still had quarrying and "monument work," paper manufacturing, a woolen mill, and bleaching and dyeing, as well as agriculture (Connecticut 1932). The difference is that



these businesses were not in urban areas. Waterford remains a town with considerable development near the shore and New London, but still with large areas of undeveloped land in the interior, even near the major transportation routes. Despite the powerful need for an improved traffic route along the shore, plans for I-95 were not finalized until 1954, and it did not open until 1958, incorporating several earlier improvements to Route 1 (Oglesby 2007). The project area itself does not appear to have been used for any purposes other than agricultural, based on the documentary evidence, as is seen below.

History of the project area

Between ca., 1806 and 1814, William Moore of Waterford, fourth of that name, assembled a farm containing approximately 287 acres via at least four purchases. In 1826, having moved to New York City, he sold it to Guy Turner and Isaac Turner for $3,500; it was subject to mortgages to Asa Spalding, [illegible] Burback, and Jacob B. Gurthy (Waterford Land Records, Vol. 5, Pg. 70=74[1]). Based on the detailed metes and bounds descriptions, shown in Figure 5, the abutting property owners and landmarks were:

> N Bears garden, a brook, Lemuel Caulkins, and James Moore's "Small Gains" property;
> E Black Snake Ledge, James Moore, William Gorton, and others;
> S William Gorton, and the north side of the old New London Road; and
> W the road from Cavarlys Mill toward Walter Chappills, Lodowick Beebe, and Bears garden.

As far as can be determined, "Bears Carden" refers to a garden owned by someone named Bears; in succeeding deeds, its ownership changed, but the garden designation remained for some time. It appears from the land records that William Moore IV assembled this large piece of land in several purchases; although it is possible that he also inherited some of it, the probate records have not been examined. At present, four purchases that are believed to incorporate all or most of the 287-acre farm are as follows:

First, an 1806 purchase from Joseph Smith of 121.5 acres of land with a grist mill and other buildings on it. Based on its description, this parcel extended across the west side of what is now Oil Mill Road and east to Benjamin Gorton's land, and was abutted on the south by a highway (presumably the New London road) (Waterford Land Records, Vol. 3, Pg. 363=333=182). This appears to include the southwestern part of William Moore 4th's farm and is the first purchase of his that is in the records.

Second, a parcel containing 6 acres and 14 square rods that Moore purchased in 1809 of William Richards, for the price of $600. This deed, found in Waterford Land Records, Vol. 3, Pg. 211=181=106, described the property with a simple list of abutters:

> N said Moore [the grantee], Paul Rogers
> E Paul Rogers, Samuel Morgan, Benjamin Gorton
> S Benjamin Gorton
> W William Moore 2nd

In the next preceding deed, Waterford Land Records, Vol. 2, Pg. 6=3, dated 1809, William Richards bought from Samuel Prentice a half-interest in the same parcel, and described the bounds in more detail:

> START at a heap of stones on a ledge [possibly Black Snake Ledge];
> Thence Westerly, 47 rods by Benjamin Gorton;
> Thence Northerly about 176 rods by William Moor;
> Thence Easterly, 49 rods by Paul Rogers;
> Thence Southerly by Samuel Morgan;
> Thence …. 148 rods to START

Comparing this description to that of 1826 suggests it could be a southeastern piece that then (in 1826) abutted south on William Gorton and would be part of the project area. The two half-interests trace back to an 1806 sale by William Stebbens to James Turner and Joel Lummis [or Loomis], when they paid $825 for

[1] Several of the early volumes of the Waterford land records have been repaginated once or twice, with the result that some pages have as many as three different numbers; these multiple page numbers will be represented with the "=" sign.

the 61 acres and 14 square rods. That description, found in Waterford Land Records, Vol. 2, Pg. 183=92, provides slightly more detail:

> START at a heap of stones on a ledge [possibly Black Snake Ledge];
> Thence Westerly, 47 rods by Benjamin Gorton to a heap of stones on a small ledge;
> Thence N 15° 30' E, 176 rods by William Moors to a heap of stones;
> Thence Easterly by said Moor to a large White Oak;
> Thence Southeast, 49 rods 15 links by Paul Rogers to a chestnut tree;
> Thence Southerly and southwesterly, 148 rods by Paul Rogers, Samuel Morgan and Benjamin Gorton to START

Again, this description does not match the 1826 description very well; but, as will be seen next, the third piece confirms that it was part of the 287-acre farm.

Third, a 100-acre parcel that William Moore IV bought from James Moore in 1813, for $1,500. The deed described it as follows in Waterford Land Records, Vol. 4, Pg. 23:

> START at SW corner by Benjamin Gorton's land;
> Thence Easterly, 50 rods by said Gorton to the grantee's land bought of William Richards [that is, the second piece, above];
> Thence Northerly, 200 rods by said grantee's land to William Moore 2nd's "Small Gains";
> Thence Westerly by said Moore's said land, Lemuel Caulkins, and Solomon Dart to the Great Brook; Thence
> By said Brook and Bear's Garden to the road;
> Thence South by said road, Lemuel Caulkins and Ephelet [sic] Beebe to grantee; thence
> …. By said grantee to START

This description matches the 1826 description very well, with Small Gains, Bear's garden, and others mentioned, and mentions the second piece, placing both pieces with some accuracy in the landscape. Further deed research suggests that James Moore acquired some or all this property from William Moore II, but the descriptions are inconclusive.

Fourth, a 2.75 acre piece purchased from Eliphalet Beebe in 1814 for $40. The description, as related in Waterford Land Records, Vol. 4, Pg. 44, is as follows:

> START at a heap of stones = NE corner of said Moore's farm purchased of Joseph Smith;
> Thence N 63° 30' W, 29 rods 21 links on Moore to a heap of stones;
> Thence N 29° E, 18.5 rods by grantor's land to a rock with stones on it;
> Thence Easterly as the old fence runs by said Moore to START

The deed, with its references to Moore's land both north and south of the small parcel, and the 18.5-rod course that is very close to the eastern most course on Lodowick Beebe in the 1826 description, is our best evidence that the first parcel, bought from Joseph Smith, is part of this title chain. In addition, it is possible that certain land Moore purchased from Constant Crocker in 1807 is a large, early, and relevant parcel, but as the deed only specifies "all rights in the property of my deceased father Constant Crocker," this has not been confirmed (Waterford Land Records, Vol. 3, Pg. 81=53=41).

As noted above, the 1826 purchases were made by Guy Turner of New London and Isaac Turner of Montville. In 1832, a probate file was established regarding the estate of Guy C. Turner, age 3, and Isaac N. Turner, age 6, sons of Isaac Turner of Montville; their mother Esther was appointed guardian and was given permission to sell 20 acres of land in Montville (New London Probate District, File No. 5402). In 1833, a probate file was established for Guy Turner of Montville, who clearly was an adult. His personal property was valued at over $5,000.00 and he owned three farms, as well as six stores, houses, and lots of land located in Waterford,

Montville, and New London. The inventory includes the information that the Moore Farm was occupied by W. A. Davis, who owned half the value of the livestock, crops, and farm tools on the property – oxen, cows, sheep, swine, fowls, turkeys, ducks, oats, potatoes, and hay, as well as a cart, plow, and a few other things (total value $609.56). The Moore Farm was valued at $4,200.00 out of a total of over $21,000.00 in real estate. According the distribution, Elisha Turner, Guy's youngest son, and received "one half of the Farm Situate in Waterford called the Moore Farm with one half of the buildings at Two Thousand One Hundred Dollars," plus half of a farm in Montville and a substantial amount of cash. The other half of the Moore Farm went to Mary Louisa Turner, whose relationship to Guy was not specified, but from context she must have been his younger daughter (New London District Probate Records No. 5401). Based on this distribution, Isaac Turner must have transferred his half of this farm to Guy at some point before he died, but that transaction has not been found.

It is not known when Mary Louisa transferred her interest in the farm to Elisha, but in 1843 he was the sole owner and sold it to William P. Benjamin of New London for $2,800.00. The deed referred to it as the "Moore Farm," which contained 287 acres of land purchased from Elisha Turner for $2,800.00. This deed provided little description except that the land had come to Elisha Turner and Mary L. Turner from the estate of Guy Turner, deceased (Waterford Land Records, Vol. 8, Pg. 268). Benjamin held it for less than a year before selling it in several pieces. The part that concerns the current project was sold in 1844 to John F. Brown of Waterford for $2,500.00. It contained 152 acres of and was located on the road near Samuel Mosier. It abutted:

N Samuel Mosier, Comstock Dart, L. Caulkins, and John Keeney;
E John Brown Morgan and William Gorton;
S William Gorton; and
W Ezra M. Keeney, L. Beebe, and others.

The deed also specifically referred to the 1826 purchase by Guy Turner (Waterford Land Records, Vol. 9, Pg. 55). This deed appears to include all the project area and some additional land was well. Helpfully, Brown mortgaged 100 acres of the property, plus two other 50-acre parcels, to William Gorton the same day, as security for $2,500.00 in notes to Gorton that Brown had co-signed with Mary L. Benjamin. This mortgage was released, but the description of the abutters was slightly different:

N John Keeney;
E William Gorton and others;
S William Gorton, Ezra M. Keeney; and
W Lodowick Beebe, highway, Comstock, and others.

The deed specifically mentioned Brown's purchase of the land from William F. Benjamin that same day (Waterford Land Records, Vol. 9, Pg. 487). John F. Brown held most of the land until 1847, when he sold 110 acres of it to Alva A. Brown for $100. The description is a little unclear, but seems to indicate that the abutters listed in Waterford Land Records, Vol. 9, Pg. 132 were:

N Comstock Dart, Samuel Caulkins, John Keeney, and the Hall place;
E(possibly) William Gorton;
S Ezra M. Keeney, Lodowick Beebe, and others; and
W Highway (9 rods or 148.5 feet), Benjamin Gorton, and Comstock Dart

Since the property is situated on the southeast side of the road, this confusion concerning which side faces north or west is not surprising. Of particular interest to this research is that, in 1851, John F. Brown gave a life lease of part of the house he lived in to George and Arilla Fox (husband and wife), which indicates that

the land he sold in 1847 – the deed to which mentioned no buildings – in fact did not include a house or other buildings (Waterford Land Records, Vol. 9, Pg. 132). The 1854 map of New London county shows several names near the current parcel that are featured in the various land descriptions: C. Mosier, T. P. Caulkins (appearing very close to or in the parcel, but this is probably inaccurate), C. Dart, Mrs. C. Brown. A. A. Brown was shown a good half-mile to the east of the parcel, as was J. F. Brown, W. Gorton was marked next to two houses to the southeast of the parcel, and the town almshouse to the south (Figure 5). In the 1868 town map, familiar names were again shown: J. Beebe, S. Mosier, P. Calkins, and C. Brown; A. Brown, W. Gorton, and the almshouse were still shown well away from the parcel (Figure 6).

It could not be determined when Alva A. Brown acquired more of the land included in the project area, but when he sold a large piece of it in 1902 to Leroy and Lucy A. Smith of New London. This area included 167 acres, but no buildings. Its description started at the northwest corner at Black Snake Ledge, and the line was described in Waterford Land Records, Vol. 25, Pg. 443 as running:

> Westerly on the fence on land of the grantor, George Keeney, and William C. Beebe to the Mosier Garden;
> By the Mosier Garden to the highway;
> Southerly by the highway and Mosier land to William C. Beebe;
> Southerly by William C. Beebe and Waterford Town Farm land to Gorton land;
> Easterly by Gorton to other land of Gorton; and
> Northerly by Gorton and others to the starting point

The Smiths mortgaged that land back for $500.00 in a deed that referred to the land as a wood lot; it was later released (Waterford Land Records, Vol. 24, Pg. 302). In 1908, the Smiths (still residents of New London at that time) sold the 167 acres to Clarence P. Dimmock of Waterford, still subject to the mortgage to Brown and also multiple town tax liens, which Dimmock agreed to assume (Waterford Land Records, Vol. 30, Pg. 123).

Dimmock passed away in 1913, leaving two pieces of property to his widow and three daughters. The handwriting on the certificate of devise is poor, but the abutting owners of the second piece, as described in Watertown Land Records, Vol. 32, Pg. 262, were given as:

> N William Beebe, F. Keeney, and the heirs of Alva A. Brown;
> E Henry Gorton;
> S Henry Gorton and Sultz(?); and
> W (blank) Ashcroft, highway, and William Beebe

In 1924, the daughters of Clarence Dimmock sold their interest to James T. Sherlock of East Lyme for $466.66. This deed echoed the description in the 1902 deed to the Smiths, except in the matter of Alva A. Brown being “formerly” an abutter (Waterford Land Records, Vol. 40, Pg. 444). The widow also sold her interest on the same day (Waterford Land Records, Vol. 38, Pg. 630). Sherlock immediately resold the land to William C. Beebe of Waterford (Waterford Land Records, Vol. 38, Pg. 631). In the same year, Beebe gave a permanent easement for electric pole rights to The Lyme Electric Power Company, allowing for a right of way for 20 feet on either side of the line. The easement included several pieces of land, one of them described in Watertown Land Records, Vol. 40, pg. 485 as abutted:

> N Chipman heirs, and the grantor;
> E Henry Gorton, and the Alva M. Brown estate;
> S Waterford Town Farm, and Henry Gorton; and
> W the grantor, Samuel Mosier, and a highway

Beebe sold the land in 1926 to Elizabeth Crandall Barrett of Washington D.C. Then in 1929, a complex series of transactions occurred involving several parties, but winding up with George A. Barrett of Washington D.C. selling the land to Harry W. House (Waterford Land Records, Vol. 41, Pg. 300, Vol. 42, Pg. 116, 454, 456, and 487). The 1934 aerial photograph shows only a few buildings near the subject parcel on Oil Mill Road at that time; they are located to the northwest and to the west of the parcel. Traces of stone walls also were visible through the forest cover near the road, though not further to the east; overall, the parcel was heavily forested. The 1924 power company right-of-way can be seen passing east to west across the southern third of the parcel (Figure 7).

At some point after 1926, the property wound up in the hands of Alfred J. Holbrook, a very active land buyer and developer in Waterford. The 1938 probate certificate documenting the transfer of his property to his widow and sole heir, Sarah S. Holbrook, listed well over a dozen parcels, including this one – now described as containing buildings (Waterford Land Records, Vol. 57, Pg. 131). Up to this point, the property had been described as containing 167 acres, when an acreage was mentioned at all. The current parcel is reported by the town's records to contain only 140.8 acres, however. It was a deed in 1944, from the estate of Sarah S. Holbrook to Carl Willis Jr. and Vivian M. Willis of Stonington that used the newest description – which is almost identical to the 1902 description except in the matter of "Mosier garden" becoming "Losier garden" (Waterford Land Records, Vol. 70, Pg. 208). Whether the property shrank because of better surveying or because part of it was sold off is, therefore, unclear. As of 1951, the newer utility right-of-way extended from southwest to northeast and the older one was the only visible features in the parcel's area besides trees (Figure 8). As of 1974, the older utility corridor appeared to be vanishing, while the newer one had been recently cleared and had an access road crossing the northwestern section of the parcel. The rest was still forested (Figure 9).

The Willises owned the property jointly until 1998, after Vivian M. Willis had passed away in 199, and her interest in it was transferred to the Vivian M. Willis Testamentary Trust. Carl Willis Jr. was initially appointed executor on the estate, but the trustees were two other individuals (Waterford Land Records, Vol. 463, Pg. 307, Vol. 478, Pg. 57). Carl passed away in 2017, leaving a will (Waterford Land Records, Vol. 1526, Pg. 243). Later that year, the testamentary trust passed its interest in the land to its current owners, Rosalie Irene Maguire and Todd Carl Willis (Vol. 1535, Pg. 123). The town's current records concerning the property indicate that it is vacant. The 2016 aerial photography shows only a faint trace of the old utility corridor, while the 1970s access road to the newer one was a little less faint. The parcel itself was otherwise forested; in fact, aside from corridors around the old roads, most of the area was still undeveloped as of 2016 (Figure 10). Figure 11 shows the project area in its current state. Since the time of the previous Phase IA cultural resources assessment survey, the project parcel has been subjected to timbering, the results of which can bees in the area as several cleared areas and paths that were used to remove timber from the property. As discussed in Chapter VII, the timbering operation did not include removal of stumps or grubbing, but rather just the above-ground portion of the trees. Thus, the effect on potential archaeological resources most likely was minimal.

Conclusions

The documentary evidence indicates that it is unlikely that project area will impact any significant historical resources. Any farming activity on the parcel was most likely restricted to its western end, near the road, and was terminated well before the 1934 aerial photographs were taken. There is no convincing evidence that the project area itself has ever been the location of a house, barn, or other structure. The development of nearby roads and power transmission lines does not appear to have had any direct impact on most of the project area.

CHAPTER V
PREVIOUS INVESTIGATIONS

Introduction

This chapter presents an overview of previous archaeological research completed within the vicinity of the study area in Waterford, Connecticut. This discussion provides the comparative data necessary for assessing the results of the current Phase IB cultural resources reconnaissance survey, and it ensures that the potential impacts to all previously recorded cultural resources located within and adjacent to the study area are taken into consideration. Specifically, this chapter reviews those archaeological sites, as well as National and State Register of Historic Places properties, situated in the project region. The discussions presented below are based on information currently on file at the Connecticut State Historic Preservation Office in Hartford, Connecticut. In addition, the electronic site files maintained by Heritage also were examined during this investigation. Both the quantity and quality of the information contained in the original cultural resources survey reports and State of Connecticut archaeological site forms are reflected below.

Previously Recorded Archaeological Sites, National Historic Places Properties, and State Register of Historic Places Properties in the Vicinity of the Study Area

A review of data currently on file at the Connecticut State Historic Preservation Office, as well as the electronic site files maintained by Heritage revealed that while there are no National/State Register of Historic Places properties or districts in the area, there are 14 previously recorded archaeological sites located within 1.6 km (1 mi) mile of the study area (Figures 12 and 13). Although none of these resources are located within the study area itself, their presence in the larger project area indicate that archaeological sites may be expected during completion of the Phase IB Survey. Each of the previously identified archaeological sites are reviewed briefly below.

Site 45-25, originally called the Transect 182 Site, was recorded by the Public Archaeology Survey Team, Inc., (PAST) in July of 1998 (Figure 12). The site was identified during Phase I cultural resources reconnaissance survey of a wooded area in East Lyme, approximately 300 m (1,000 ft) from Gurley Brook ahead of highway construction. The current study area is situated approximately three-quarters of a mile to the east of Site 45-25. Although the site integrity was good, no temporally diagnostic artifacts were recovered, resulting in the date of the occupation remaining unknown. The excavation of eight test pits resulted in the recovery of 47 flakes from stone tool working and five unspecified lithic tools. At this time, Site 45-25 has not been assessed applying the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). The recording archaeologist was unable to define the boundaries of the site or comment upon the research potential of the site, suggesting that additional testing would be necessary.

Site 45-40 was identified during Phase I cultural resources reconnaissance survey and Phase II National Register testing and evaluation of efforts by Archaeological and Historic Services, Inc. in 2002 (Figure 12). The site is located approximately 1.6 km (1.0 mi) to the east of Route 161 and a quarter of a mile (400 m) north of Route 395 in East Lyme, Connecticut. It is just west of Site 45-25 and a little more than three-quarters of a mile from the current study area. Mary Harper, the recording archaeologist, dated the site to the Late Archaic (6,000 to 3,400 B.P.) using a quartz narrow stem projectile point. Following Phase II archaeological reconnaissance survey, CT-SHPO determined that Site 45-40 was not eligible for the

National Register according to the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-37 was reported by Julie L. Hartman-Brodeur of PAST in 1998 (Figure 12). Initially identified during a pedestrian survey, the site was referred to as the Stanton Oil Mill Site. Located at the northwest corner of Oil Mill Road and Gurley Road, near 57 Gurley Road, the site consists of a mill foundation and dam, visible for approximately 150 m (492 ft) along the west side of Oil Mill Road. The mill, namesake of both the road it is accessed through and the brook which powered its water wheel, was utilized beginning in 1782, but the date of abandonment is unknown. Despite the site's importance as an example of Waterford's milling history, Site 45-25 has not yet been assessed applying the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-45, alternatively called the Getchell-Brown House Site, is located on Clam Lane, to the north of the intersection of Fargo Road and Stony Brook and is 425 m (1,400 ft) to the east of the study area (Figure 12). The site was recorded in 1998 as the result of a pedestrian survey conducted by PAST ahead of construction for Route 11. Julie L. Hartman-Brodeur dated the site to the nineteenth century using historic mapping. Hartman-Brodeur described the site as a small stone foundation. Utilizing chain of title research, she attributed the property to the Getchell family and later to Mrs. C. Brown. No artifacts were recovered from the site. Site 152-45 has not been assessed applying the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-67, alternatively called Flat Rock Quarry, is located near Route 85 and the Crystal Mall. In reference to the study area, the site is 0.8 km (0.5 mi) to the west (Figure 12). M. Harper of PAST identified the site as a twentieth century industrial granite quarry following pedestrian survey. According to historical research, this quarry served as an important part of Waterford's economy and provided the stone for such buildings as the Customs House in New London and buildings at Connecticut College. The construction of the Crystal Mall, however, destroyed the site. Therefore, Site 152-67 was never assessed applying the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]) and does not retain any research potential.

Site 152-75 is situated at 21 Gurley Road in Waterford. Identified by the Public Archaeology Survey Team, Inc., in 1998 during pedestrian survey, the site consists of a historic structure (Figure 12). Through historical research, the foundation was identified as the Walter-Moore House. Built in 1691 by Samuel Walter, the property was occupied well into the twentieth century. This home is the oldest extant in Waterford. An 1840 brick addition served as the town poorhouse until a hurricane destroyed it in 1938. At this time, Site 152-75 has not been assessed applying the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]); however, M. Harper, the recording archaeologist, reported that the site may retain significant research potential, especial in regard to the poorhouse tenet lifeways.

Site 152-81 is the site of the original location of the Matthew Stewart House. It was recorded in 1998 by the Public Archaeology Survey Team, Inc., during pedestrian survey (Figure 12). The site is located near 465 Boston Post Road in Waterford, approximately 914 m (3,000 ft) from the study area to the south. The home was built in 1745 and later moved several hundred feet to its present location. The home itself was still occupied at the time of recordation. The property has not been assessed applying the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-108 was identified during the same survey as Site 45-40 by Archaeological and Historic Services, Inc., in July of 1998. It is located just 600 feet to the southeast of Site 45-40. Phase I testing yielded five quartz and one quartzite flakes, and although Phase II testing was planned, no further investigation was completed due to access issues (Figure 12). Although these flakes may date to the Late Archaic, the site remains undated due to lack of firmly diagnostic artifacts. The proximity of the site to Site 45-40, as well as the good site integrity of the layers from which the artifacts were recovered, suggest that the site retains significant research potential. As such, CT-SHPO determined that the site is National Register-eligible according to the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-124 is a prehistoric site situated 3,000 feet to the southeast of the Project Area, about 500 feet south of Gurley Road (Figure 12). Although undated, the recording archaeologist, M. Harper of PAST categorized the site as a prehistoric camp. Artifacts were limited to the plow zone and consisted of 9 quartz flakes as well as some historic scatter. Therefore, the site was not considered eligible for listing on the National Register of Historic Places according to criteria 36 CFR 60.4 [a-d] due to the clearly disturbed context of the find.

Site 152-125 is a historic site situated just south of Site 152-124, approximately 800 feet south of Gurley road and 1600 feet west of Cross Road (Figure 12). The site was identified during Phase I testing by PAST in 2000 and defined as an approximately 100 ft square area as a result of Phase II testing. The artifacts primarily consisted of late historic ceramic from the plow zone. M Harper, the recording archaeologist, suggested that the artifacts may have originated from Site 152-126. Due to poor site integrity and the low artifact density, Site 152-125 was not considered eligible for listing on the National Register of Historic Places.

Site 152-126 is an historic site about 3,000 feet to the southeast of the Project Area and south of Gurley Road (Figure 12). James Poetzinger of PAST reported the site in 2000 as the result of Phase I cultural resources management testing. Artifacts included glass, brick, ceramic, shell, slag, and metal, and were associated with standing ruins. The site was loosely dated to the nineteenth century based upon an 1854 map depicting structures in the project area. The site has not been assessed according to the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-127 is a prehistoric site located approximately three-quarters of a mile to the southeast of the project area, to the south of Gurley Road (Figure 12). The site was identified during Phase I cultural resources management survey by PAST. The recovered artifacts consisted of one biface and two flakes. No date was assigned as these artifacts were not diagnostic. Although further testing was recommended, no further investigation has been completed at this time. As such, the site has not been assessed according to the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Site 152-129 was identified during Phase I cultural resources management testing by Archaeological and Historical Services, Inc. in 2004 (Figure 12). The site is near Route 161 and about three-quarters of a mile to the west of the Project Area, just south of Site 152-108. It was initially dated to the Late Archaic using the seriation of recovered Native American ceramics and a small quartz projectile point stem. The site also contained no diagnostic material which included stone debitage from tool product, charcoal, and calcine (fire treated) bone. Further Phase II testing widened the occupation date from the Late Archaic through the Late Woodland. Site 152-129 was then identified as a revisited camp site. A robust

assemblage from intact soils of over 400 artifacts and two features was recovered, indicating the site was a significant part of prehistoric lifeways. Therefore, CT-SHPO determined that Site 152-129 is National Register of Historic Places eligible.

Site 152-134 is a historic site of unknown date situated on the east bank of Oil Mill Brook, about half a mile from the project area (Figure 12). The site was identified during Phase I cultural resources management testing by Archaeological and Historical Services, Inc. in 2002. A stone dam and mill composed the site, but further testing was recommended (although no documents of such research is extant). The site is a contributing element of the proposed Wolf Pit Hills National Register Archaeological District, which contains sites from the eighteenth to nineteenth centuries that mark an abandoned settlement. A review of the CT-SHPO website suggests that the nomination of this District has not yet been approved. The inhabitants of the former settlement likely exploited the natural resources of the wooded area until they were depleted.

Summary and Interpretations

The review of previously completed research in the vicinity of the proposed study area and the analysis of archaeological sites recorded nearby, indicates that the larger project region contains both prehistoric Native American and historic period occupations. Archaeological sites recorded adjacent to the study region date sometime in the prehistoric era (ca. 12,000 to 350 B.P.), as well as the eighteenth and nineteenth centuries. The long use of the area throughout prehistory and the historic era suggests that additional archaeological sites may have been situated within the study area.

CHAPTER VI
METHODS

Introduction

This chapter describes the research design and field methodology used to complete the current Phase IB cultural resources reconnaissance survey of the moderate/high sensitivity areas associated with the proposed solar facility in along Oil Mill Road in Waterford Connecticut. In addition, the location and point-of-contact for the facility at which all cultural material, drawings, maps, photographs, and field notes generated during survey will be curated as provided below.

Research Design

The Phase IB cultural resources reconnaissance survey was designed to identify all prehistoric and historic cultural resources located within the moderate/high sensitivity portions of the study area. Fieldwork for the project was comprehensive in nature; planning considered the distribution of previously recorded archaeological sites and historic resources located in the vicinity of the study area, as well as an assessment of the natural qualities of the project region. The methods used to complete this investigation were designed to provide complete and thorough coverage of all portions of the three moderate/high sensitivity areas previously identified within the study area. This undertaking entailed pedestrian survey, systematic subsurface testing, GPS recordation, and photo-documentation.

Field Methodology

Following the completion of all background research, the three moderate/high sensitivity areas identified during a previously completed Phase IA cultural resources assessment survey were subjected to a Phase IB cultural resources reconnaissance survey utilizing pedestrian survey, photo-documentation, GPS recordation, and systematic shovel testing. The field strategy was designed such that the entirety of the moderate/high sensitivity areas were examined visually, photographed, and shovel tested. The pedestrian survey portion of this investigation included visual reconnaissance of the moderate/high sensitivity areas scheduled for impacts by the proposed solar project and included GPS recordation or pertinent landscape features. The field methodology also included subsurface testing of the moderate/high sensitivity areas, during which shovel tests were excavated at 15 m (49.2 ft) intervals along parallel survey transects spaced a 15 m (49.2 ft) intervals.

During survey, each shovel test measured 50 x 50 cm (19.7 x 19.7 in) in size and each was excavated until the glacially derived C-Horizon was encountered or until large buried objects (e.g., boulders, large tree roots, etc.) prevented further excavation. Each shovel test was excavated in 10 cm (3.9 in) arbitrary levels within natural strata, and the fill from each level was screened separately. All shovel test fill was screened through 0.635 cm (0.25 in) hardware cloth and examined visually for cultural material. Soil characteristics were recorded in the field using Munsell Soil Color Charts and standard soils nomenclature. Finally, each shovel test was backfilled immediately upon completion of the archaeological recordation process.

A key to the successful completion of the Phase IB archaeological investigation was careful collection of locational data and the production of accurate mapping of the study area to show the locations of shovel tests within the moderate/high sensitivity areas and landscape features noted during pedestrian survey. Thus, during the project, all shovel test locations, identified archaeological loci, and landscape attributes, were recorded with in-house GPS units that have submeter accuracy. All GPS recordation was completed

using Heritage's Trimble R1 receiver, which is a rugged, compact, lightweight GNSS receiver that provides sub-meter positioning information to Heritage's Samsung Galaxy S4 tablets using Bluetooth connectivity. These components are purpose-built for field mapping professionals, and the data collected was seamlessly transferred to Heritage's GIS professionals in "real-time" over the Internet connection on Heritage's Samsung Galaxy S4 tablets. This system not only provided Heritage with accurate locational data for the investigation and this report, but it also allowed our field staff to instantly transfer GPS data related to cultural resources to Heritage's home office.

Curation

Following the completion and acceptance of the Final Report of Investigations, all cultural material, drawings, maps, photographs, and field notes will be curated with:

Dr. Sarah Sportman
Connecticut State Archaeologist
Office of Connecticut State Archaeology
Box U-1023
University of Connecticut
Storrs, Connecticut 06269

CHAPTER VII
RESULTS OF THE INVESTIGATION & MANAGEMENT RECOMMENDATIONS

Introduction

As mentioned in Chapter I, the current undertaking consisted of a Phase IB cultural resources reconnaissance survey for a proposed solar center in Waterford, Connecticut (Figures 1 and 2). Greenskies Renewable Energy, LLC (Greenskies) requested that Heritage Consultants, LLC (Heritage) complete the Phase IB cultural resources reconnaissance survey as part of the planning process for a proposed solar center that will be located on approximately 111.8 acres of land, which is referred to as the study area (Figures 1 and 2). The study area is situated to the east of Oil Mill Road in Waterford, Connecticut. It is bordered to the west by residential areas along Oil Mill Road, to the north and east by forested areas, and to the south by Parkway North, a service road that runs parallel to Interstate 95.

During a previously completed Phase IA cultural resources assessment survey, Heritage examined the study area and determined that 94.3 ac of it contained slopes, wet soils, and/or very rocky locations. This acreage was assigned a no/low archeological sensitivity and was not examined further during the current Phase IB cultural resources reconnaissance survey. In contrast, the remaining 17 ac of land contained low slopes, well-drained soils, and proximity to freshwater sources. This acreage was therefore assessed as retaining a moderate/high potential to yield intact archaeological deposits and is the subject of the current investigation. Heritage completed this investigation on behalf of Greenskies in March of 2020. All work associated with this project was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources,* promulgated by the Connecticut State Historic Preservation Office (Poirier 1987).

Existing Landscape Conditions and Project Methods Overview

The Phase IB cultural resources reconnaissance survey focused on previously identified three moderate/high sensitivity areas within the development area for the solar facility. These three areas consisted of level to moderately sloping terrain and were characterized by well drained and sandy to rocky soils belonging to the Canton and Charlton, Charlton-Chatfield, Hollis-Chatfield, and Paxton and Montauk soils, which were described in detail in Chapter II. The three survey areas were situated at elevations ranging from approximately 51.8 to 73.1 m (170 to 240 ft) NGVD, and all three were situated between Oil Mill Brook to the west and Stony Brook to the east. The Phase IB fieldwork was initiated through a pedestrian survey, photo-documentation, and establishment of an archaeological control grid throughout the three survey areas. The pedestrian survey revealed that all three areas have been subjected to timber removal since the time the Phase IA cultural resources assessment survey was conducted. It was also clear that the timber removal was confined to harvesting of only the above-ground parts of the trees. Stumps and root systems were left in place. Thus, the timber removal effort did not affect buried soils to a large degree.

In addition to the pedestrian survey and photo-documentation described above Heritage personnel conducted both GPS recordation of pertinent landscape features and subsurface testing. Landscape features that were plotted included grouping of stones that did not appear to be natural in occurrence, as well as stone walls. As mentioned in Chapter VI, these were plotted using Heritage's in-house GPS units, which are capable of submeter accuracy. In addition, Heritage field personnel completed the excavation of shovel tests

situated at 15 m (49.2 ft) intervals along parallel north to south trending survey transects spaced 15 m (49.2 ft) apart through the moderate/high sensitivity areas. During survey, each shovel test measured 50 x 50 cm (19.7 x 19.7 in) in size and each was excavated to until glacially derived C-Horizon soils or immovable objects (e.g., boulders, large tree roots) were encountered. Each shovel test was excavated in 10 cm (3.9 in) arbitrary levels within natural strata, and the fill from each level was screened separately. All shovel test fill was screened through 0.635 cm (0.25 in) hardware cloth. Soil characteristics were recorded in the field using Munsell Soil Color Charts and standard soils nomenclature. Each shovel test was backfilled immediately upon completion of the archaeological recordation process. These methods are in keeping with those recommended by the Connecticut State Historic Preservation Office (CT-SHPO).

Results of the Field Effort

As discussed above, the current Phase IB cultural resources reconnaissance survey included previously identified moderate/high sensitivity areas (Figure 3). In order to facilitate control during the fieldwork portion of the investigation, the moderate/high sensitivity areas were designated as Survey Areas 1 through 3 and they were examined separately (Figure 14). The results of survey of each area are presented below.

Survey Area 1

Survey Area 1 was situated in the northern portion of the proposed project parcel and to the north of an existing southwest to northeast trending Eversource Energy electrical transmission line (Figure 12). This area was situated at elevations ranging from approximately 51.8 to 61 m (170 to 200 ft) NGVD and, at the time or survey, was covered by a mixture of sparse stands of pine, oak, and maple trees, as well moderate amounts of branches left behind from the timbering process (Figures 1, 15 and 16). During the Phase IB survey, a total of 26 of 26 (100 percent) planned shovel tests were excavated throughout Survey Area 1 (Figure 17). A typical shovel test situated in this area was excavated to a terminal depth of 49 cmbs (19.6 inbs) and exhibited three soil horizons in profile. The initial soil horizon consisted of a layer of black (10YR 5/1) find sandy silt mixed with organic material that reached from 0 to 4 cmbs (0 to 1.6 inbs). The underlying A-Horizon extended from 4 to 26 cmbs (10.4 inbs) and consisted of a layer of dark brown (10YR 3/3) fine silty loam. The subsoil (B-Horizon) consisted of a deposit of yellowish brown (10YR 5/6) silty fine sand mixed with small amounts of gravel; it terminated at 49 cmbs (19.6 inbs) where large rocks were encountered. Despite the systematic shovel testing, no archaeological deposits were identified within Survey Area 1. Thus, no additional archaeological examination of this area is recommended prior to construction of the proposed solar center.

Survey Area 2

Survey Area 2 was situated in the northeastern portion of the proposed project parcel and to the southeast of the above-referenced Eversource Energy electrical transmission line (Figure 12). This area was situated at approximate elevations ranging of 67 to 73.2 m (220 to 240 ft) NGVD and, at the time of survey, it was covered by a mixture of sparse stands of pine, oak, and maple trees, as well moderate amounts of branches left behind from the timbering process (Figures 1, 18 and 19). During the Phase IB survey, a total of 145 of 145 (100 percent) planned shovel tests were excavated throughout Survey Area 2 (Figure 20). A typical shovel test in this area was excavated to a terminal depth of 74 cmbs (29.6 inbs) and exhibited four soil horizons in profile. The initial soil horizon consisted of a layer of black (10YR 5/1) find sandy silt mixed with organic material; it reached from 0 to 5 cmbs (0 to 2 inbs). It was underlain by the A-Horizon, which extended from 5 to 30 cmbs (2 to 12 inbs) and consisted of a layer of dark brown (10YR 3/3) fine silty loam. The B-Horizon (subsoil) was represented by a deposit of yellowish brown (10YR 5/6) silty fine sand mixed with small amounts of gravel; it ranged in depth from 30 to 62 cmbs (12 to 24.8 inbs). Finally, the glacially derived C-Horizon, which was classified as a layer of light olive brown (2.5Y 5/4)

silt medium sand with oxidation modeling throughout, was encountered at 62 cmbs (24.8 inbs) and reached to a maximum excavated depth of 74 cmbs (29.6 inbs). The Phase IB survey of Survey Area 2 resulted in the identification and recordation of a single non-site cultural resource. It was designated as Locus 2-1 and it is described below.

Locus 2-1

As mentioned above, Survey Area 2, which contained Locus 2-1, was situated in the northeastern portion of the project parcel and just to the south of the nearby Eversource Energy electrical transmission corridor (Figures 18 and 19). This area had been recently cleared of its timber but did not show signs of severe ground disturbance. A total of 145 of 145 (100 percent) planned shovel tests were excavated throughout the survey area along 13 north to south trending survey transects (Figure 23). During survey, two of the shovel tests (Shovel Test 3 along Transect 6 and Shovel Test 13 along Transect 9) produced artifacts. The former yielded a single quartz secondary thinning flake from the uppermost portion of the B-Horizon at 20 to 30 cmbs (8 to 12 inbs). This artifact represented an ephemeral deposit representative of prehistoric stone tool manufacturing and/or maintenance in this location. Since the quartz secondary thinning flake was recovered from an undisturbed soil deposit and was characteristic of a prehistoric occupation, four additional shovel tests were excavated in the cardinal directions at 7.5 m (24.6 ft) intervals around the original findspot. No additional prehistoric cultural material was recovered, and no evidence of intact subsurface cultural features was identified. It was determined that the prehistoric period component of Locus 2-1 lacked substantial numbers of artifacts, cultural features, and research potential. Thus, the prehistoric component of Locus 2-1 was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional archaeological examination of this component of Locus 2-1 is recommended prior to construction of the proposed solar facility.

Locus 2-1 also yielded a single historic period artifact from Shovel Test 13 along Transect 9. This artifact was classified as a blue hand painted pearlware sherd and was recovered from the A-Horizon at a depth of 10 to 20 cmbs (4 to 8 inbs). Blue hand painted pearlware dates from 1775 to 1840, indicating that this artifact was deposited on the property sometime during either the late eighteenth or early nineteenth centuries. No other historic period artifacts were collected from either Area 2 generally or the area containing Shovel Test 13 along Transect 9. Thus, this artifact was considered an incidental loss. Further, no evidence of historic period foundations, privies, well, or others above-ground features were noted in the area. It was determined that historic period component of Locus 2-1 lacked substantial numbers of artifacts, cultural features, and research potential. Thus, it too was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional archaeological examination of this component of Locus 2-1 is recommended prior to construction of the proposed solar facility.

<u>Survey Area 3</u>

Survey Area 3 was situated in the central portion of the proposed project parcel (Figure 12). This area was situated at approximate elevations ranging from 61 to 73.2 m (200 to 240 ft) NGVD and it was characterized by pine, oak, and maple trees, as well branches that were left behind from the timbering process (Figures 1, 21 and 22). During the Phase IB survey, a total of 106 of 106 (100 percent) planned shovel tests were excavated throughout Survey Area 3 (Figure 23). A typical shovel test in this area was excavated to a terminal depth of 81 cmbs (32.4 inbs) and exhibited four soil horizons in profile. The initial soil horizon consisted of a layer of black (10YR 5/1) find sandy silt mixed with organic material that reached from 0 to 3 cmbs (0 to 1.8 inbs). It was underlain by the A-Horizon, which ranged in depth from 3 to 25 cmbs (1.8 to 10 inbs) and was described as deposit of very dark brown (10YR 3/2) fine silty loam. The B-Horizon (subsoil) reached from 25 to 70 cmbs (10 to 28 inbs) was classified as a layer of deposit of

yellowish brown (10YR 5/6) silty fine sand mixed with small amounts of gravel. The glacially derived C-Horizon, which was classified as a layer of light olive brown (2.5Y 5/4) silt medium sand with oxidation modeling throughout, was revealed at 70 cmbs (29 inbs) and was excavated to a depth of 81 cmbs (32.4 inbs). The Phase IB survey of Survey Area 3 resulted in the identification and recordation of a single non-site cultural resource. It was designated as Locus 3-1 and it is described below.

Locus 3-1

As mentioned above, Survey Area 3, which contained Locus 3-1, was situated in the central portion of the project parcel. This area also had been recently cleared of timber, though it did not contain evidence of significant ground disturbance. A total of 106 of 106 (100 percent) planned shovel tests were excavated throughout Survey Area 3; they were situated along eight north to south trending survey transects. During survey, two of the shovel tests on this survey area yielded cultural material. They were Shovel Test 14 along Transect 22 and Shovel Test 13 along Transect 23. These two shovel tests were situated 15 m (49.2 ft) apart in the southeastern portion of Survey Area 3 (Figure 23).

Shovel Test Shovel Test 14 along Transect 24 yielded a single plain English white salt-glazed stoneware sherd from the A-Horizon. It was recovered from a depth of 10 to 20 cmbs (4 to 8 inbs). The artifact collected from Shovel Test 13 along Transect 23 was classified as a clear glazed redware sherd. It too was recovered from the A-Horizon at a depth of 10 to 20 cmbs (4 to 8 inbs). English white salt-glazed stoneware dates from ca., 1690 to 1780, whereas redware may date back to the eighteenth century, although it too is still produced today. Based on the recovered materials it appears that Locus 3-1 most likely represents a late eighteenth century occupation. However, no above-ground features (i.e., foundations, wells, privies, etc.) were noted in this area, which suggests the recovered artifacts represent incidental losses. It was determined that historic period component of Locus 3-1 lacked substantial numbers of artifacts, cultural features, and research potential. Thus, it was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional archaeological examination of this component of Locus 3-1 is recommended prior to construction of the proposed solar facility.

Above-Ground Landscape Features

The pedestrian survey of the project parcel resulted in the identification of 99 groupings of stones on the surface. The locations of these groupings were recorded using a GPS unit with submeter accuracy. As seen in Figure 24, they were clustered within and to the west of Survey Area 2. Despite a thorough search, no groupings were noted within Survey Area 1 or Survey Area 3. In general, the groupings measured approximately 1 m (3.3 ft) in diameter, though there was some variation among them. The groupings consisted of small to medium size stones, many of which were rounded and were likely local in origin because the landscape of the project parcel is very rocky in nature; examples of typical groupings are show in Figures 25 through 30. In addition, while most groupings contained stones with lichens on their surface, some did not. The presence of the lichens suggests that at least some of the groupings have remained in place for some time, though an absolute date cannot be determined from the presence of the lichens alone. None of the groupings was subjected to excavation or dismantled in any way, and no artifacts were observed on their surface or in the immediate area. Because of the lack of associated temporally diagnostic artifacts, as well as their generalized shape, the stone groupings could not be assigned to a specific date or function.

Project Summary

The Phase IB cultural resources reconnaissance survey of Survey Areas 1 through 3 was completed through a combination of pedestrian survey, photo-documentation, GPS recordation, and shovel testing.

The pedestrian survey of the project area resulted in the recognition of a recent episode of timber harvesting on the property, though this did not appear to have resulted in significant ground disturbance. A total of 277 of 277 (100 percent) planned shovel tests were excavated through out Survey Areas 1 through 3. While Survey Area 1 failed to yield any cultural material or evidence of cultural features, Survey Area 2 was found to contain a single multicomponent locus (Locus 2-1) and Survey Area 3 yielded a single historic period cultural resources locus (Locus 3-1). The materials collected from Locus 2-1 consisted of a single prehistoric quartz secondary thinning flake and 1 blue hand painted pearlware sherd dating from the 1775 to 1840. Neither component of Locus 2-1 yielded substantial numbers of artifacts, cultural features or research potential. Thus, both components were assessed not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Locus 3-1 yielded two artifacts that apparently were deposited in the area during the late eigheenth century. This locus also failed to produce substantial numbers of artifacts or evidence of cultural features either above or below the surface. It too lacked research potential and was assessed not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). Based on these findings, it was concluded that construction of the solar facility will have no impact on buried archaeological resources in the project parcel.

Finally, pedestrian survey of the project parcel resulted in the recognition of 99 groupings of stones. They were clustered within and to the west of Survey Area 2 and they were recorded using a GPS unit capable of submeter accuracy. No such groupings were evident within either Survey Area 1 or Survey Area 3. As mentioned above, the groupings were only visually examined, and no artifacts were noted on top of or within the vicinity of any of them. Due to the lack of artifacts or any other temporally diagnostic attributes, the stone groupings could not be assigned to a specific date or function.

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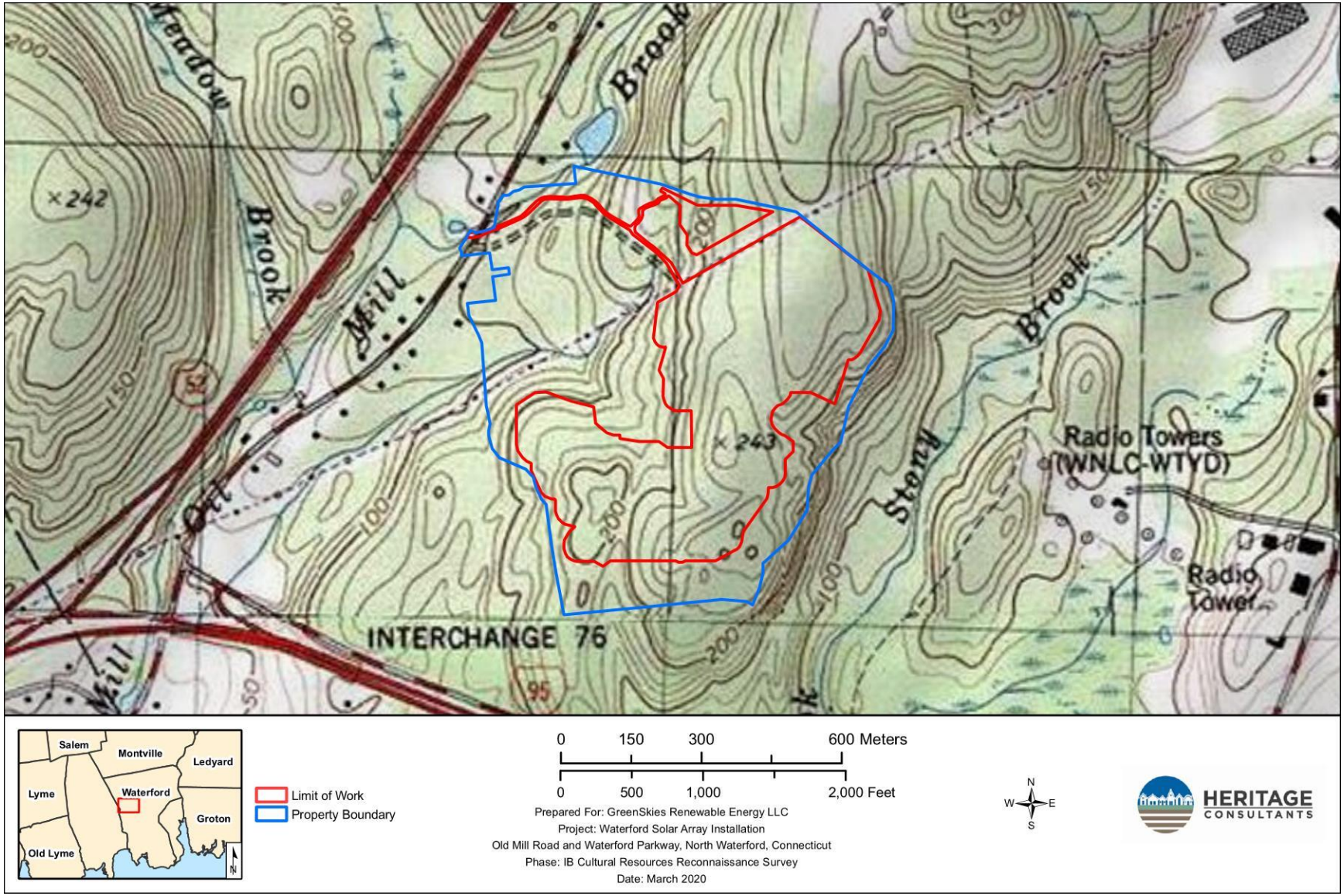

Figure 1. Digital Map showing the location of the proposed solar project in Waterford, Connecticut.

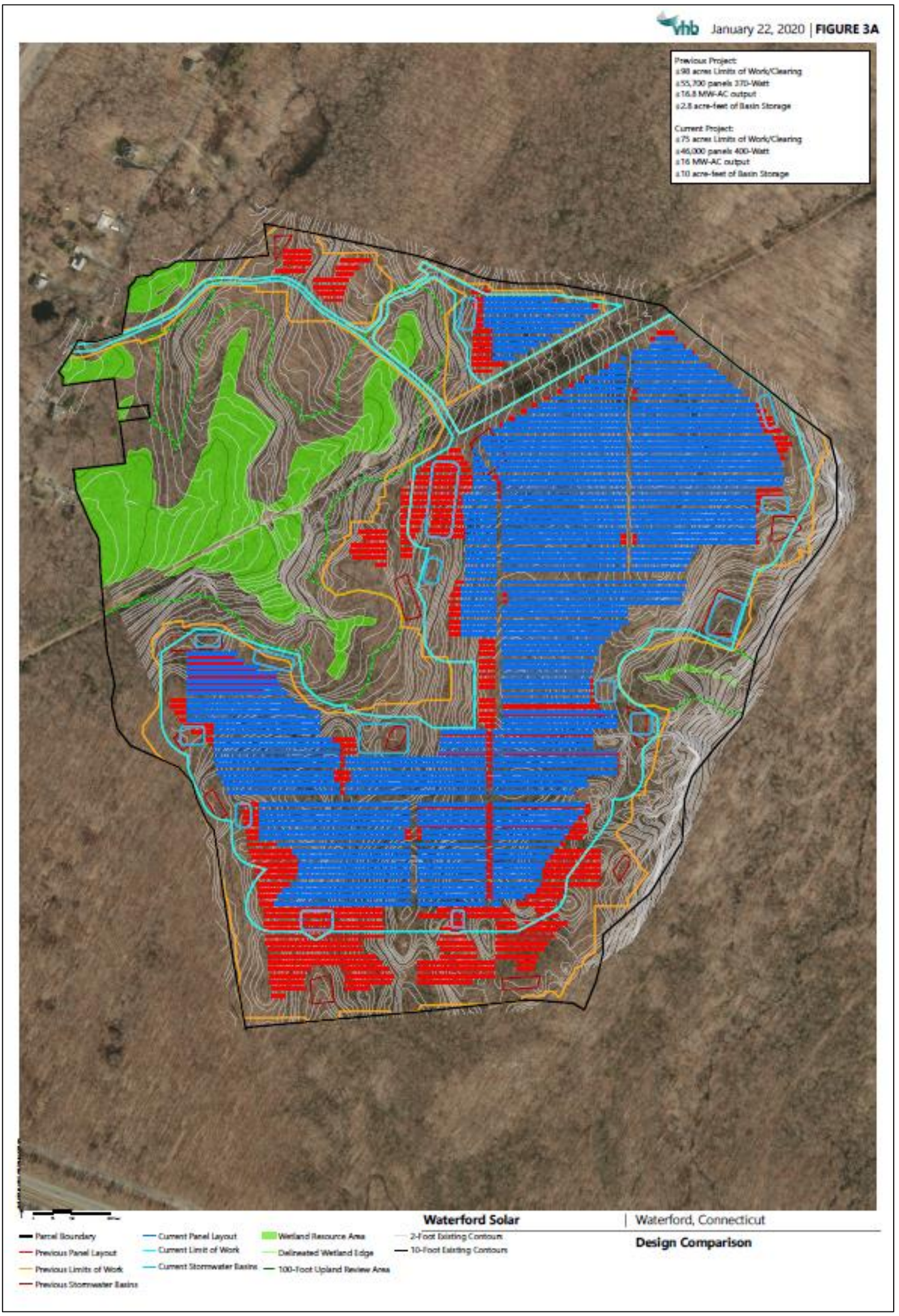

Figure 2. Plan view of the proposed project area in Waterford, Connecticut showing the locations of the proposed solar arrays, access roads and storm water management areas.

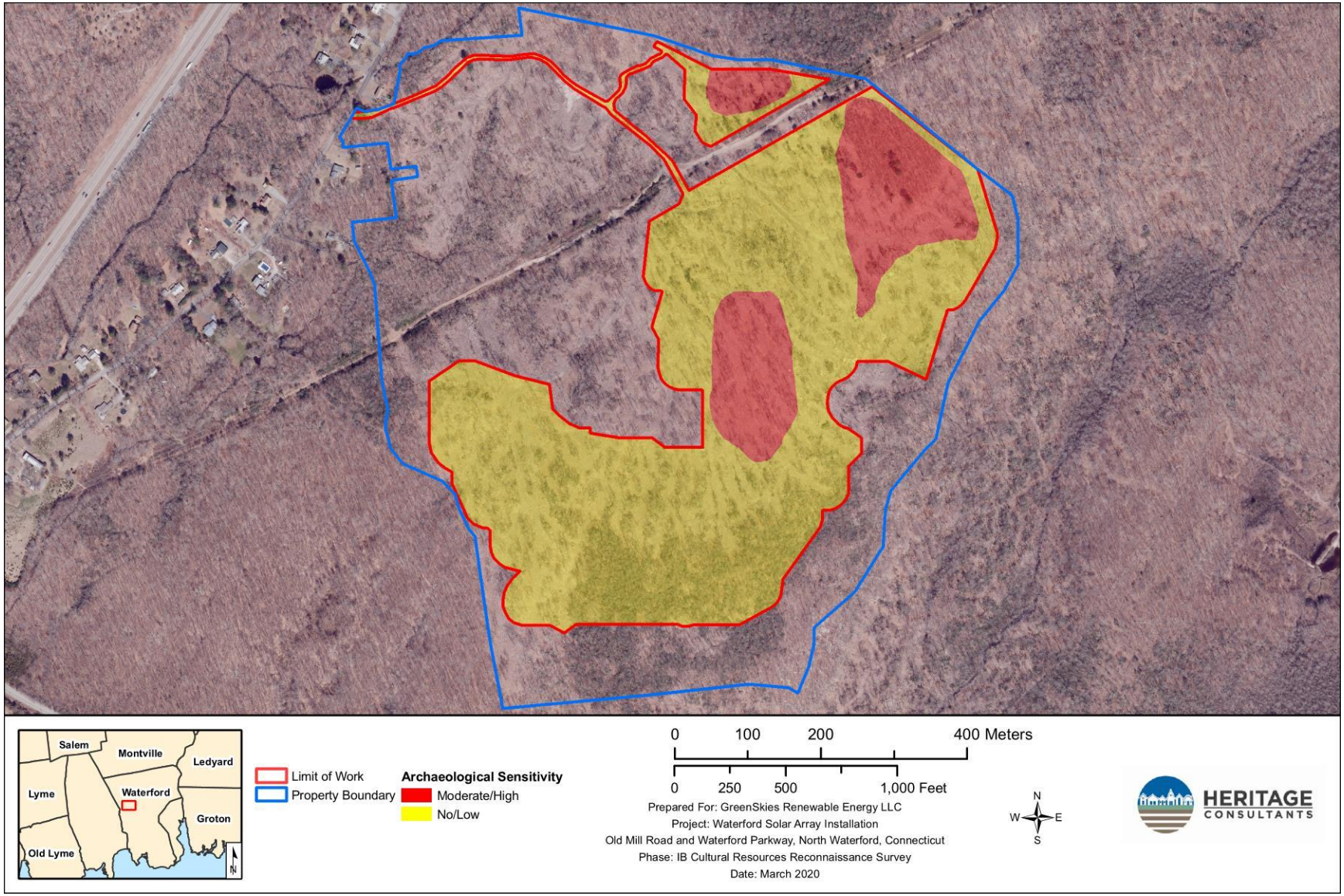

Figure 3. Excerpt from a 2019 aerial image showing the location of the no/low and moderate/high sensitivity areas within the development areas associated with the proposed solar project in Waterford, Connecticut.

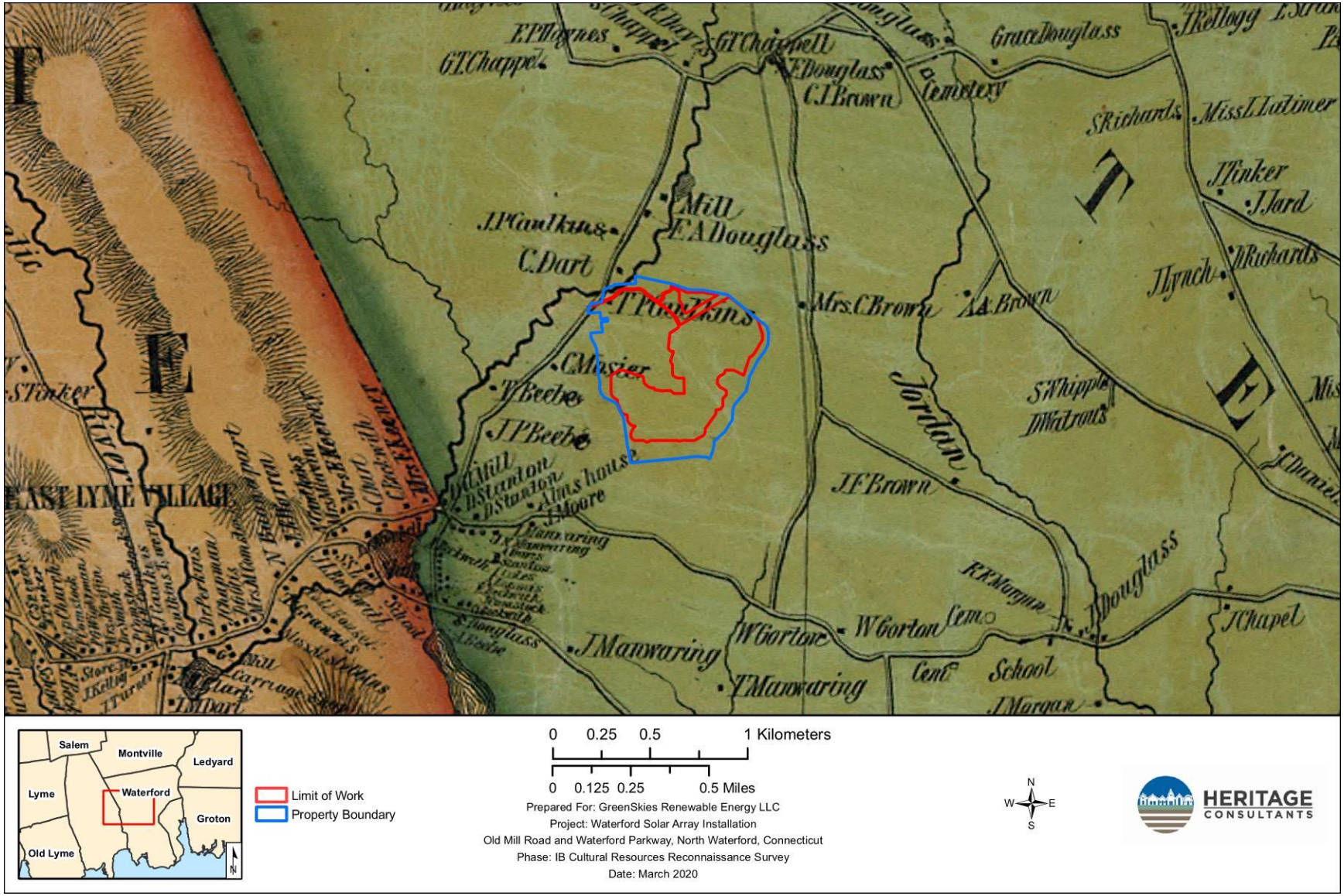

Figure 4. Excerpt from an 1854 historic map showing the location of the proposed solar project in Waterford, Connecticut.

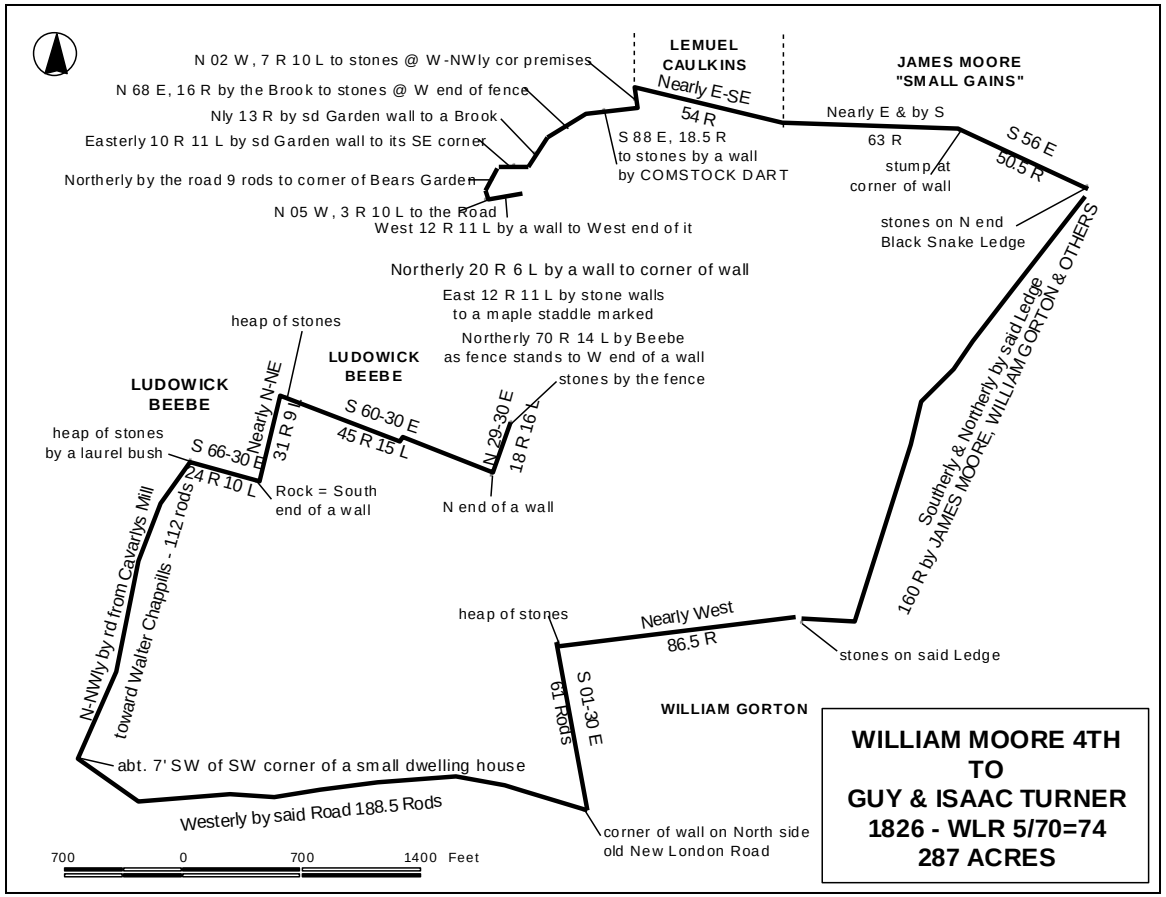

Figure 5. Digitized map from an 1826 deed showing the boundaries of the William Moore property as conveyed to Guy and Isaac Turner which contains the present project area in Waterford, Connecticut.

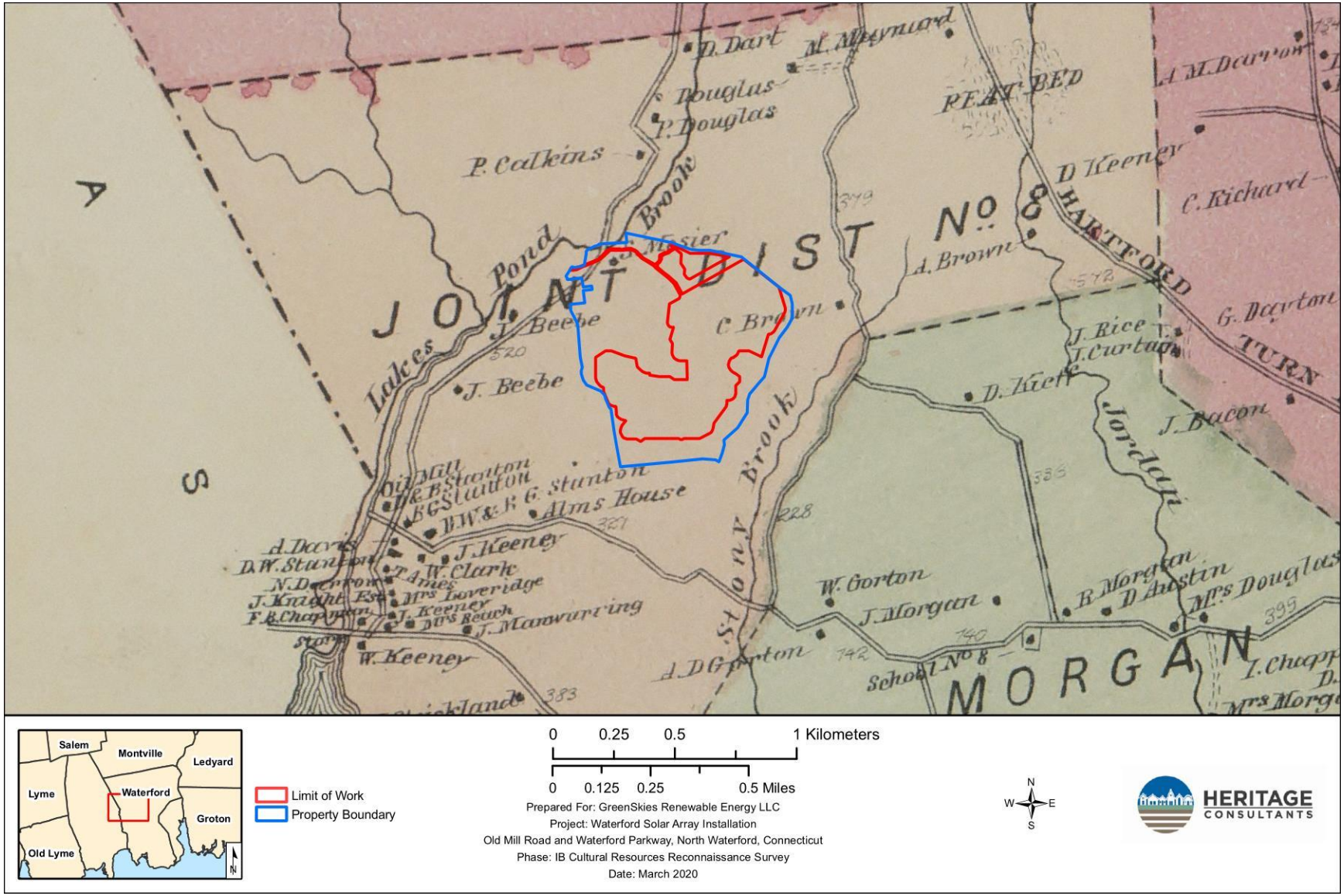

Figure 6. Excerpt from an 1868 historic map showing the location of the proposed solar project in Waterford, Connecticut.

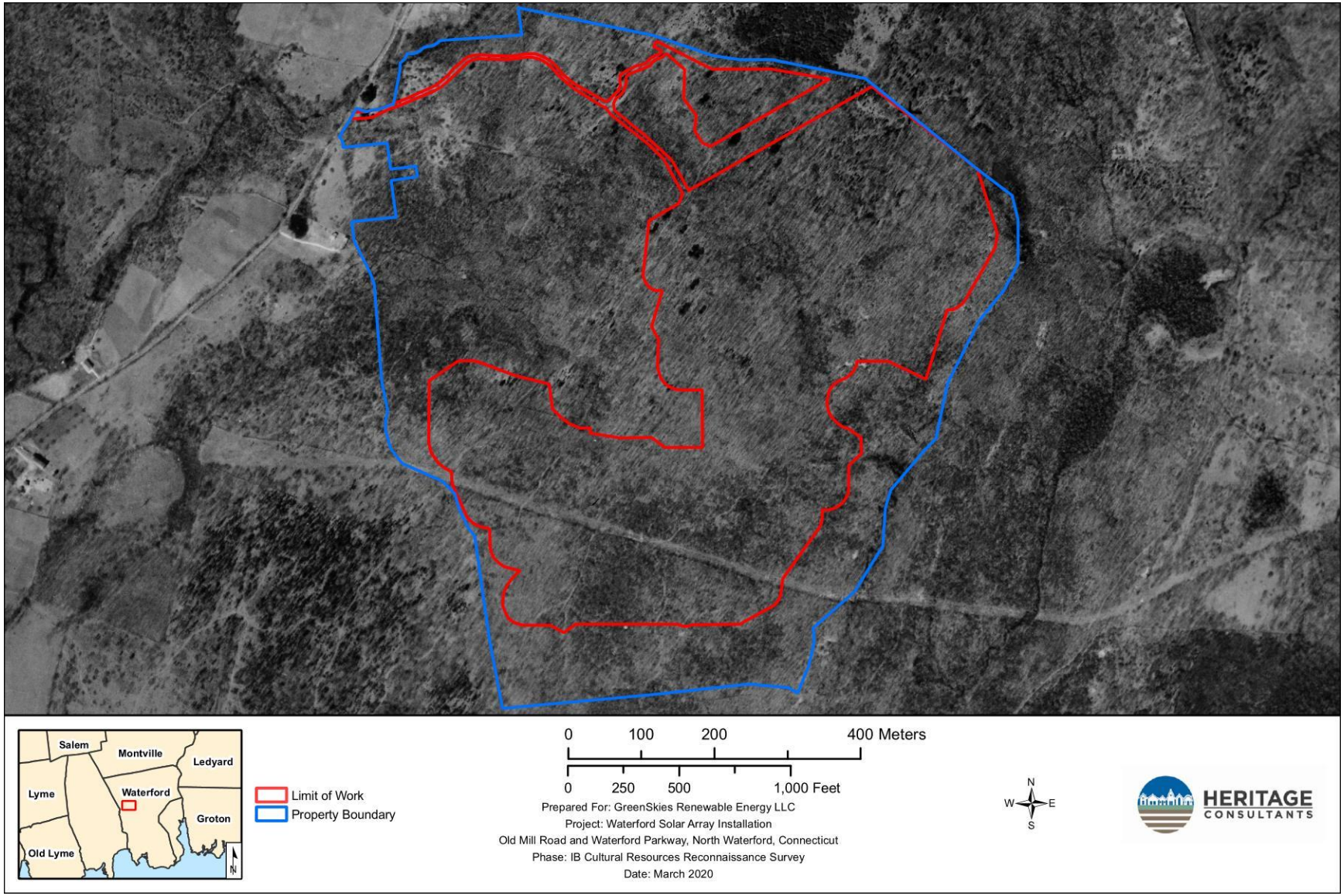

Figure 7. Excerpt from a 1934 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

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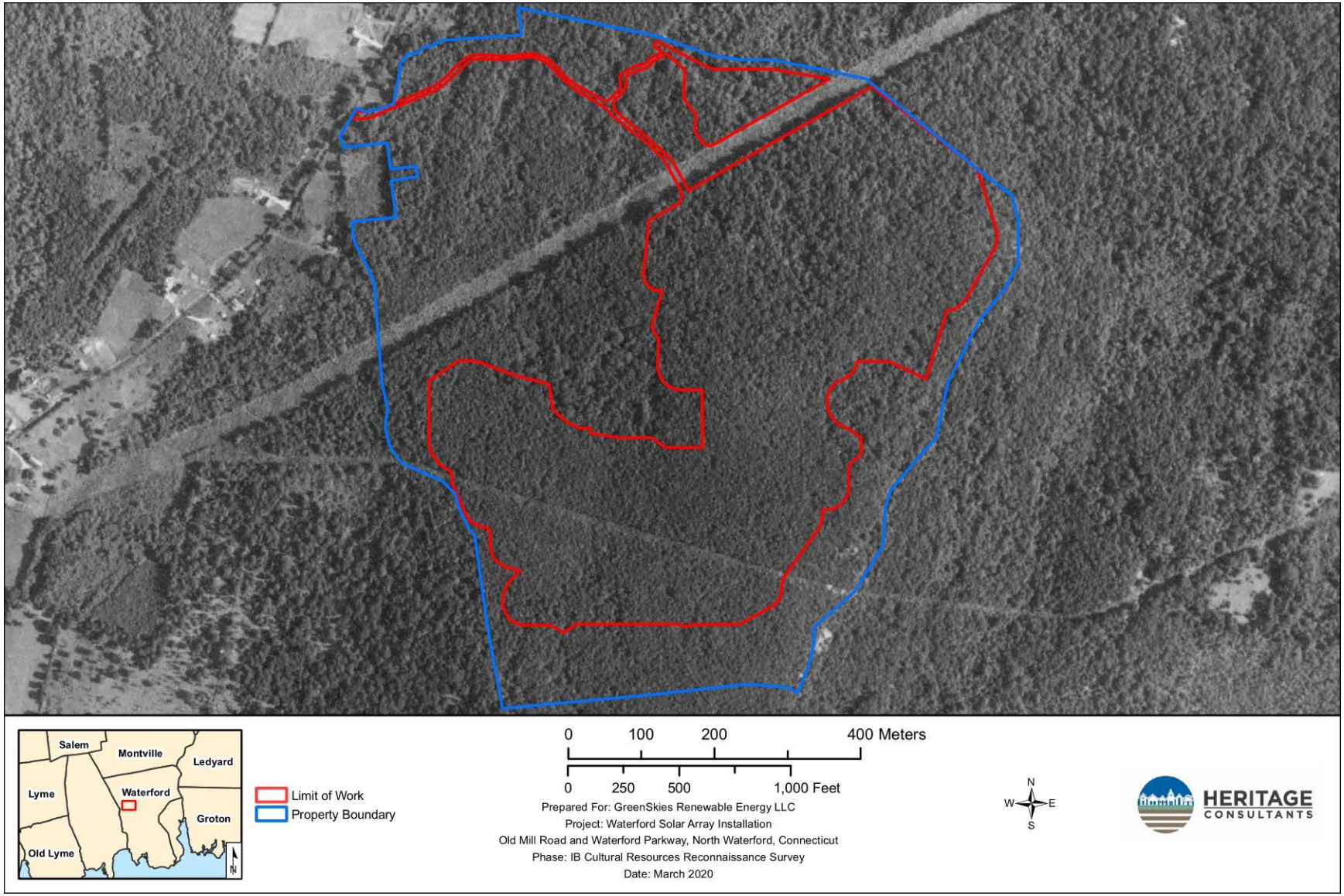

Figure 8. Excerpt from a 1951 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

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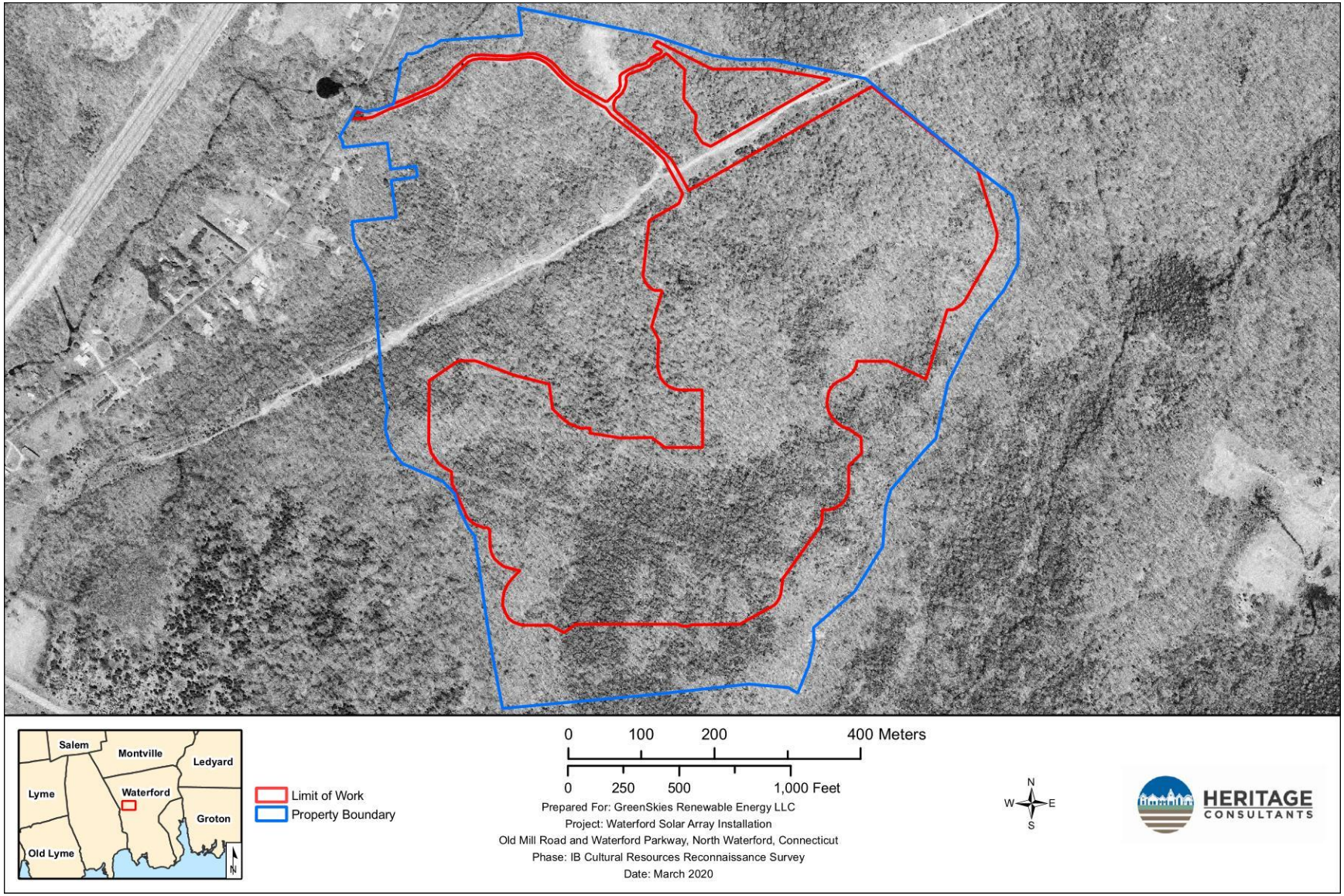

Figure 9. Excerpt from a 1974 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

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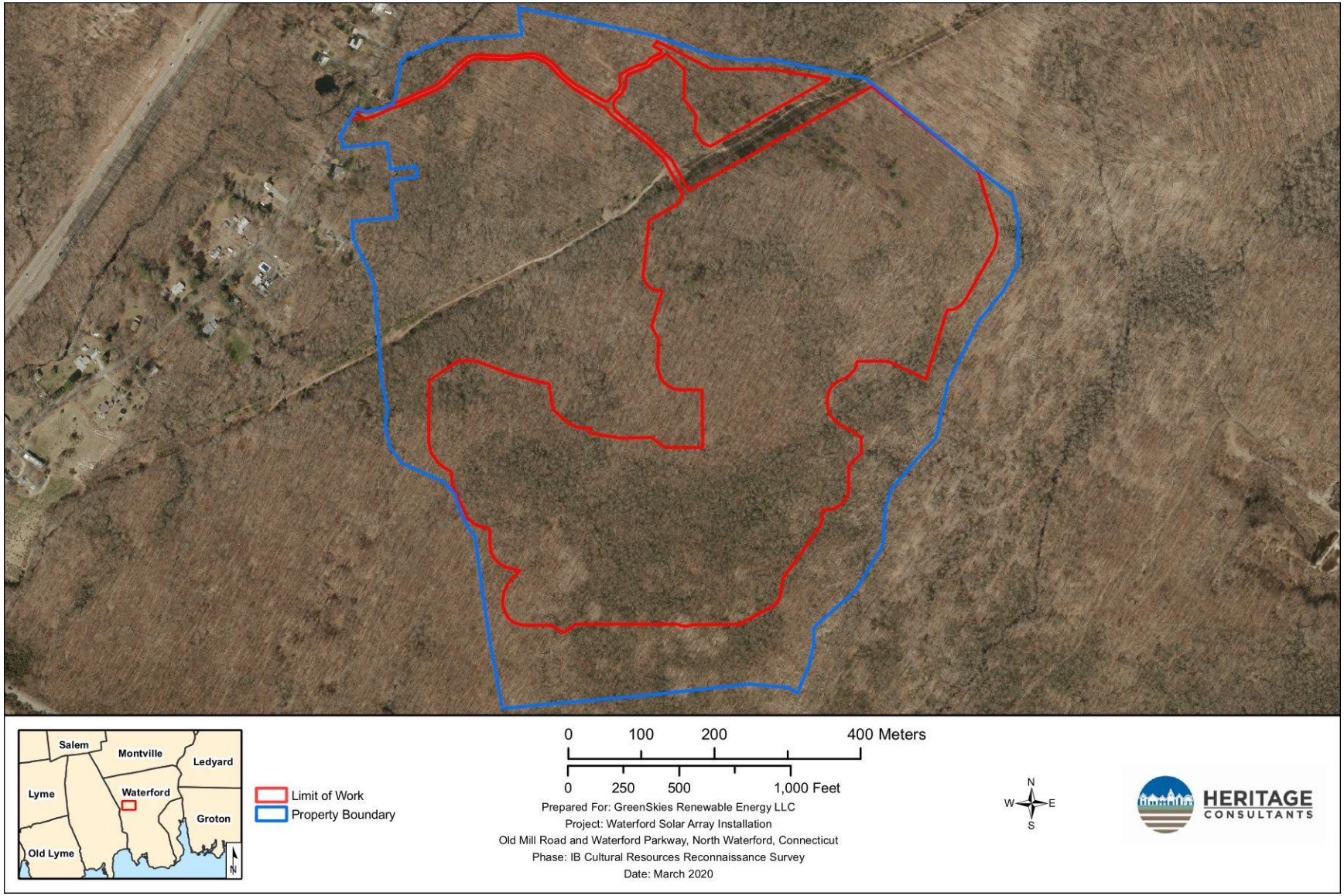

Figure 10. Excerpt from a 2016 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

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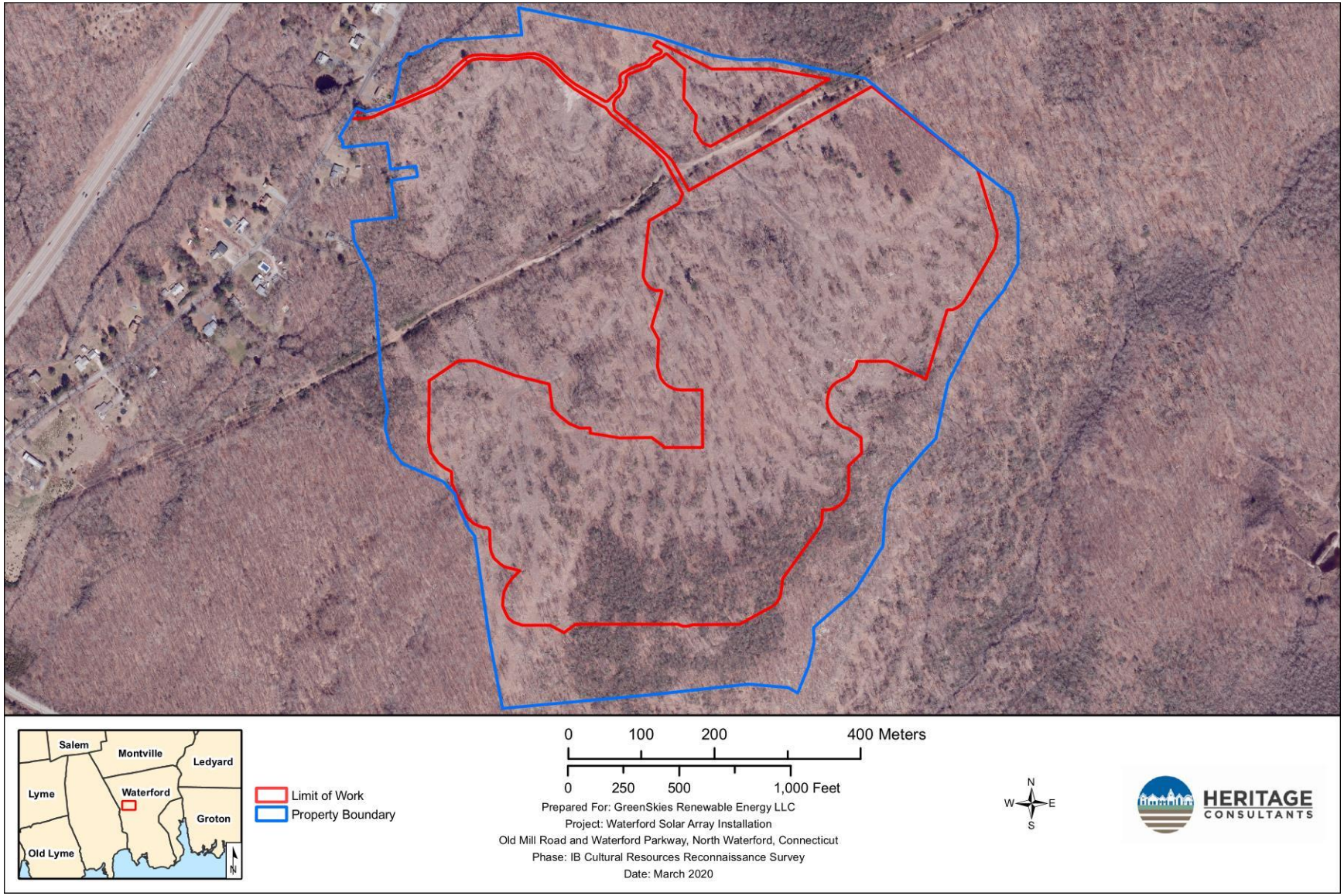

Figure 11. Excerpt from a 2019 aerial photograph showing the location of the proposed solar project in Waterford, Connecticut.

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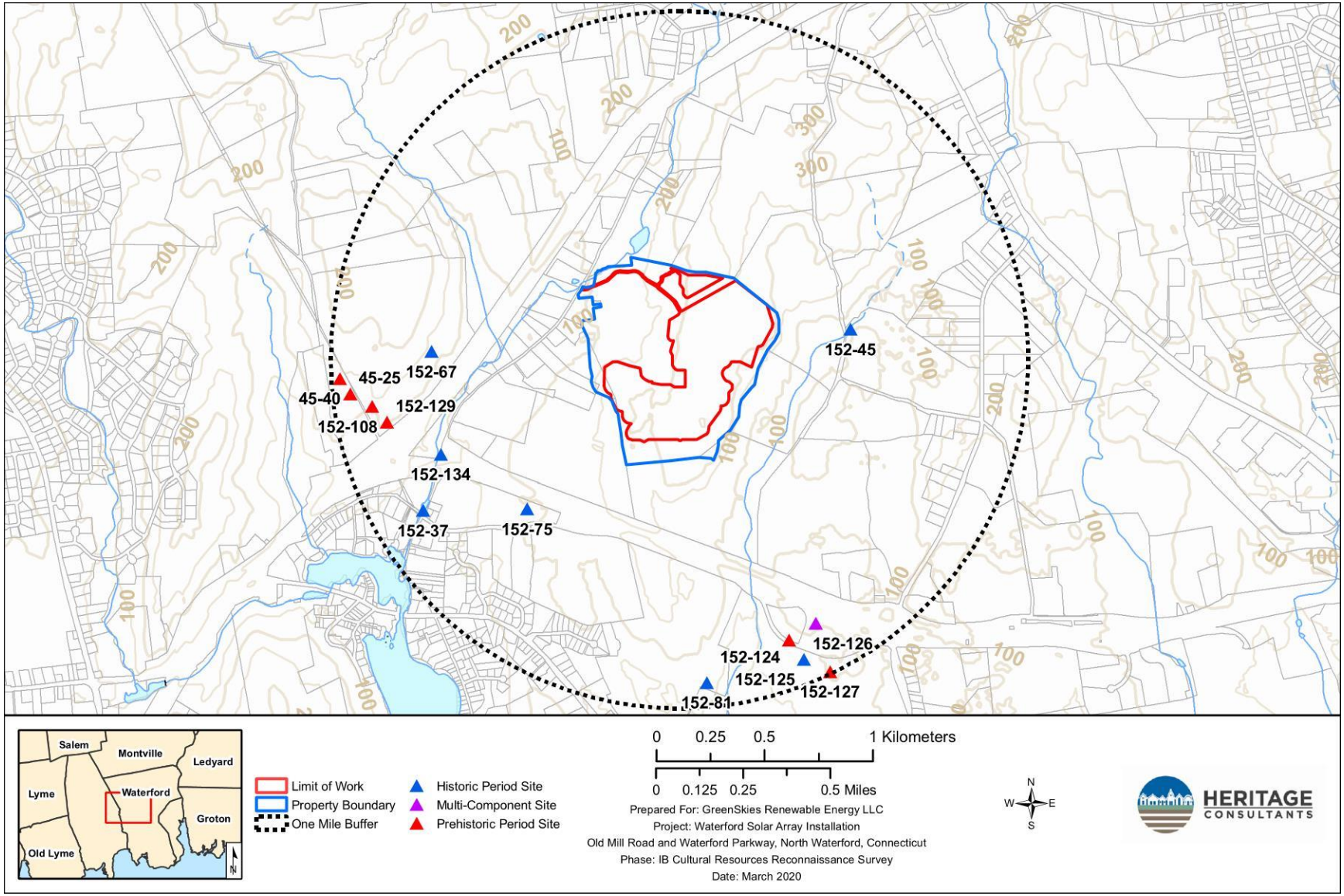

Figure 12. Digital map showing the location of previously identified archaeological sites in the vicinity of the proposed solar project in Waterford, Connecticut.

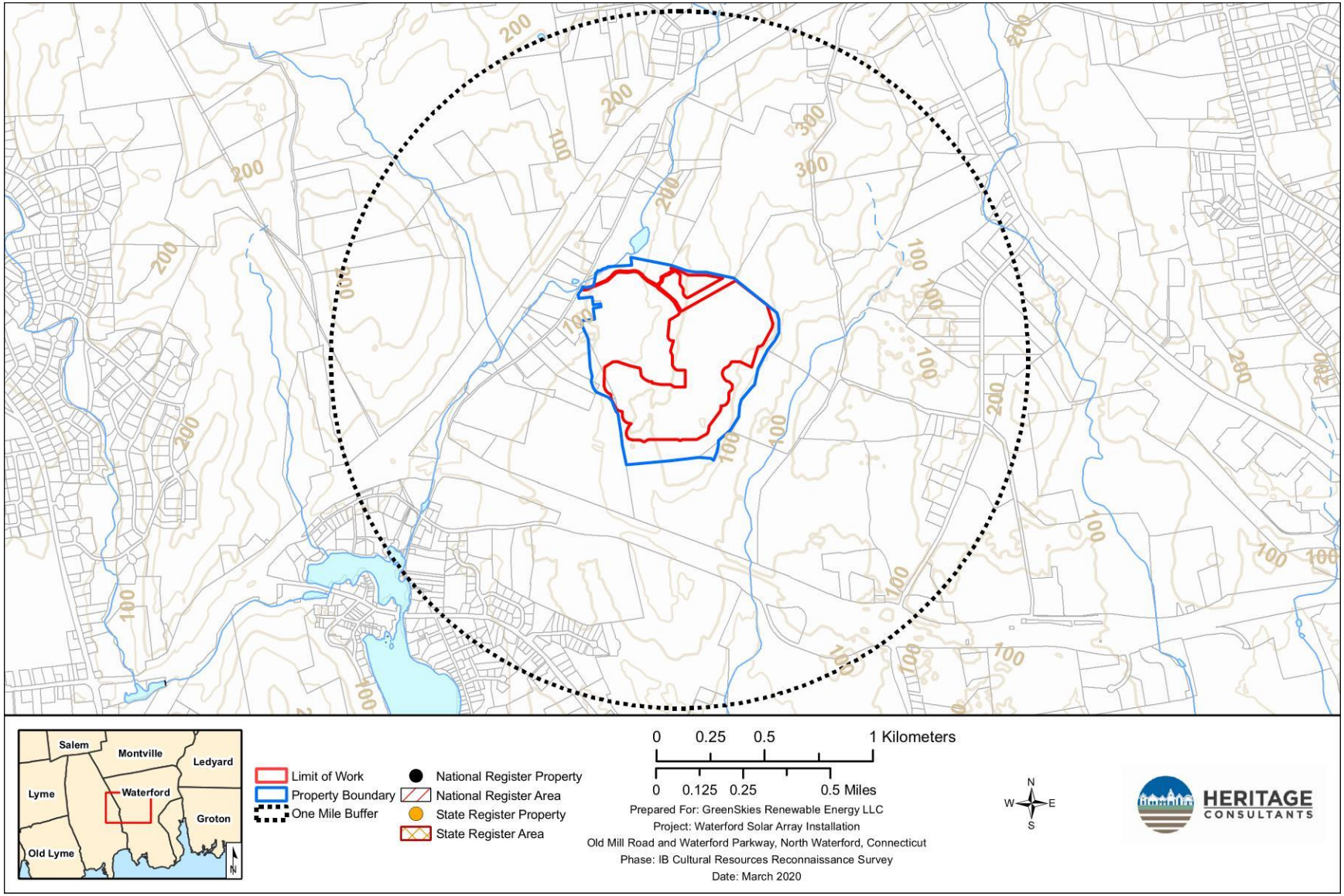

Figure 13. Digital map depicting the locations of previously identified historic standing structures, as well as National and State Register of Historic Places properties in the vicinity of the proposed solar project in Waterford, Connecticut.

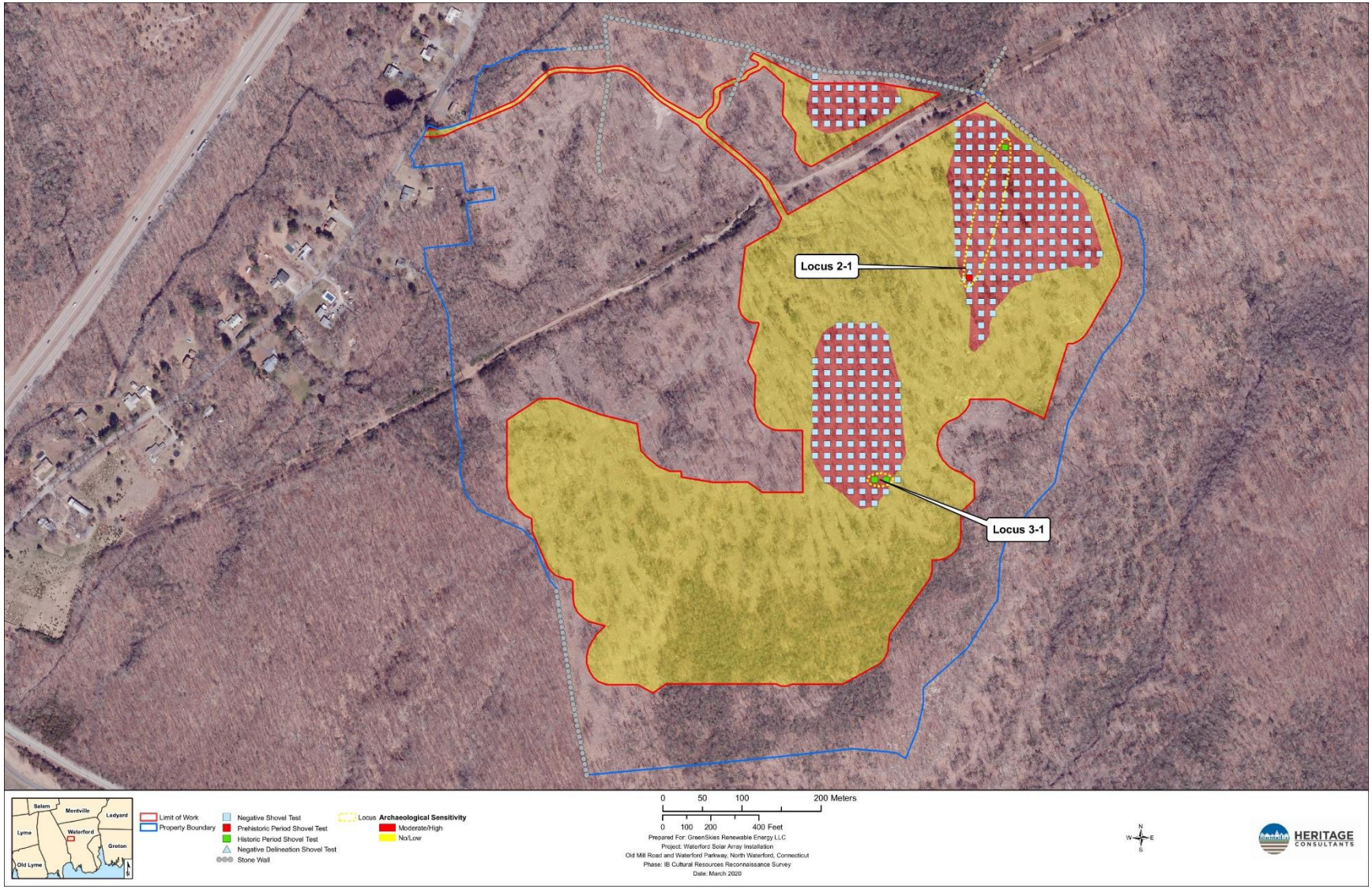

Figure 14. Excerpt from a 2019 aerial image depicting the locations of no/low and the three moderate/high sensitivity areas throughout the study area in Waterford, Connecticut, as well as the locations of excavated shovel tests and identified archaeological loci.

Figure 15. Overview photo of the eastern portion of Survey Area 1 facing west.

Figure 16. Overview photo of the western portion of Survey Area 1 facing west.

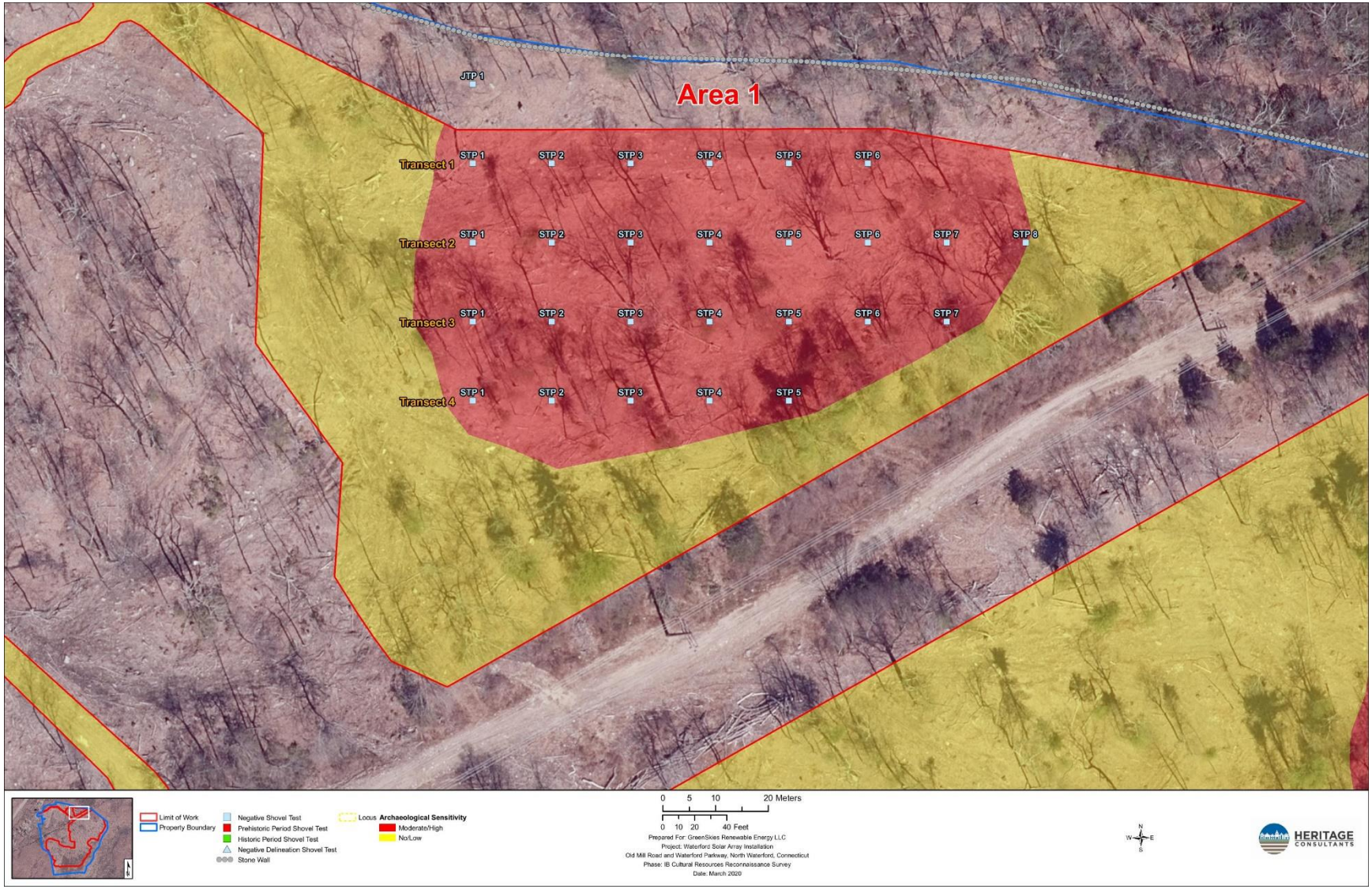

Figure 17. Excerpt from a 2019 aerial image depicting the Survey Area 1, as well as the locations of excavated shovel tests.

Figure 18. Overview photo of the central portion of Survey Area 2 facing northwest and including the northern part of Locus 2-1.

Figure 19. Overview photo of the southern portion of Survey Area 2 facing northwest and including the southern part of Locus 2-1.

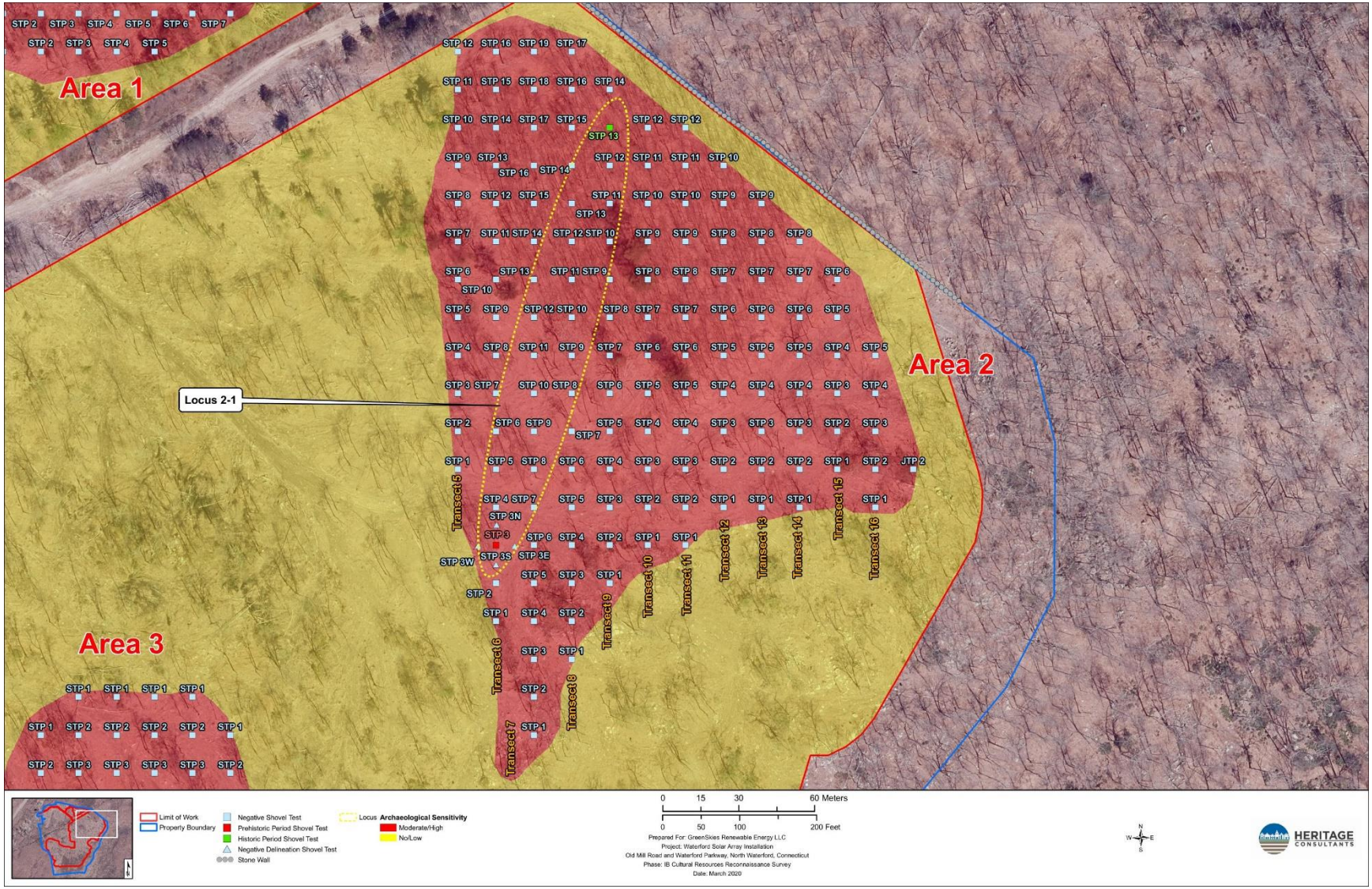

Figure 20. Excerpt from a 2019 aerial image depicting the Survey Area 2, as well as the locations of excavated shovel tests and the limits of Locus 2-1.

Figure 21. Overview photo of the northern portion of Survey Area 3 facing northwest.

Figure 22. Overview photo of the southern portion of Survey Area 3 facing west and including Locus 3-1.

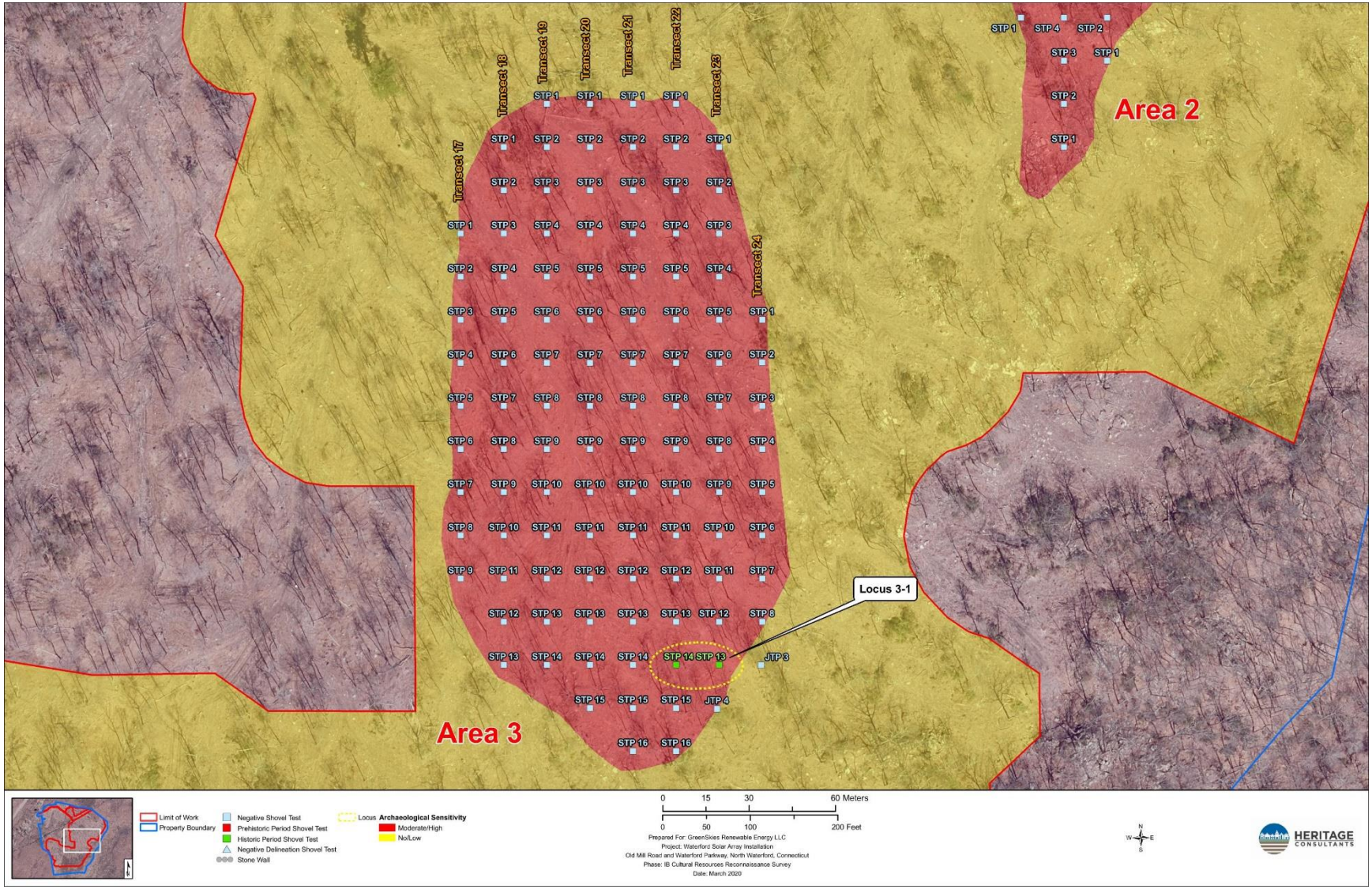

Figure 23. Excerpt from a 2019 aerial image depicting the Survey Area 3, as well as the locations of excavated shovel tests and the limits of Locus 3-1.

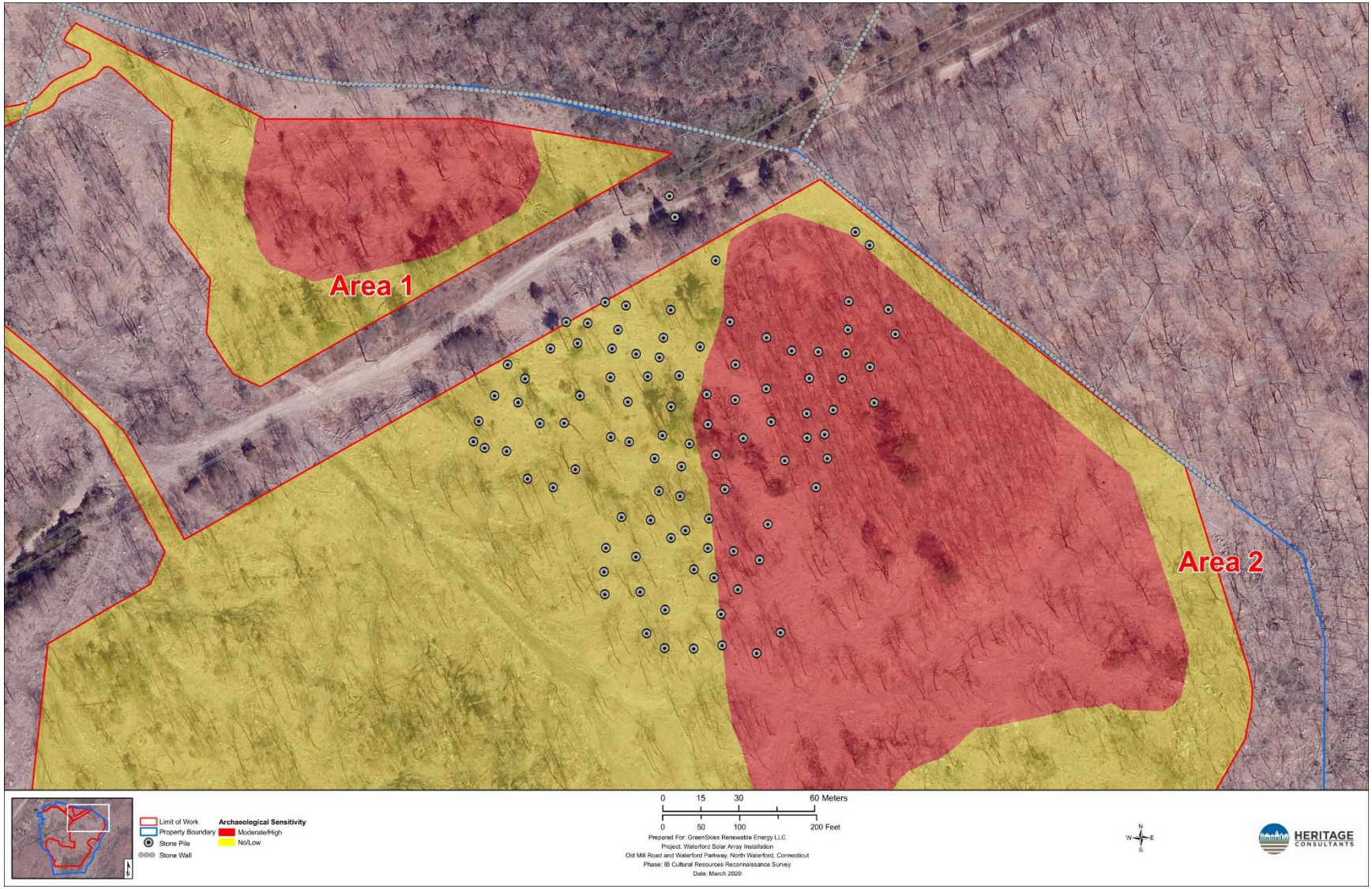

Figure 24. Excerpt from a 2019 aerial image depicting stone groupings identified during pedestrian survey.

Figure 25. Overview photo of a typical grouping of stones identified within the project parcel facing northwest.

Figure 26. Overview photo of a typical grouping of stones identified within the project parcel facing northeast.

Figure 27. Overview photo of a typical grouping of stones identified within the project parcel facing northwest.

Figure 28. Overview photo of a typical grouping of stones identified within the project parcel facing east.

Figure 29. Overview photo of a typical grouping of stones identified within the project parcel facing north.

Figure 30. Overview photo of a typical grouping of stones identified within the project parcel facing northeast.

Department of Economic and Community Development

State Historic Preservation Office

April 7, 2020

Mr. David R. George
Heritage Consultants
PO Box 310249
Newington, CT 06131

Subject: Phase IB Cultural Resource Reconnaissance Survey
Proposed Greenskies Solar Facility
Oil Mill Road
Waterford, Connecticut
ENV-20-0632

Dear Mr. George:

The State Historic Preservation Office (SHPO) has reviewed the cultural resource reconnaissance survey prepared by Heritage Consultants, LLC (Heritage), dated March 2020. The proposed activities are under the jurisdiction of the Connecticut Siting Council and are subject to review by this office pursuant to the Connecticut Environmental Policy Act (CEPA). The proposed facility includes the construction of a solar facility within an approximately 111.8 acre parcel. The parcel is bordered to the north and east by forested areas, to the south by Parkway North, a service road of Interstate 95, and to the West by residential parcels along Oil Mill Road. The submitted report is well-written, comprehensive, and meets the standards set forth in the *Environmental Review Primer for Connecticut's Archaeological Resources*.

Fourteen previously known archaeological sites are located within 1 mile of the project area; however, none will be impacted by the proposed undertaking. No properties listed or formally determined eligible for listing on the National Register of Historic Places, are located within 1 mile of the project area. Similarly, no properties listed or formally determined eligible for listing on the State Register of Historic Places, are located within one mile of the project area. It was also noted that tree clearing had recently taken place in the project area; however, as stumps were not removed, it is unlikely that any archaeological resources were significantly impacted.

The Phase IA assessment survey identified that out of the 111.8 acre study area, approximately 17.5 acres possessed a moderate to high degree to contain intact archaeological deposits, divided into three areas. Phase IB of the reconnaissance survey consisted of subsurface testing of these area. A total of 277 of 277 planned shovel tests were excavated successfully throughout the proposed work area. Survey Area 1, located in the northern section of the project area, did not

yield any cultural material or features. Survey Area 2, located in the northeast corner of the project area, contained a single, multicomponent locus (Locus 2-1), which contained a single quartz secondary thinning flake, and a blue handpainted pearlware sherd. No other cultural materials or features from either the historic or prehistoric periods were identified in Locus 2-1. Survey Area 3, located in the center of the project area, yielded a single historic period locus (Locus 3-1), which contained a plain English white salt-glazed stoneware sherd and a clear glazed redware sherd. No other cultural materials or features from either the historic or prehistoric periods were identified in Locus 3-1. None of the artifacts recovered were significant in number or possessed unique properties, and therefore do not possess the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]).

Additionally, during the survey, 99 groupings of small- to medium-sized, rounded stones were observed within Survey Area 2. Some exhibited lichens, indicating their presence for a long period of time, while others did not. No artifacts were noted on top of or within the vicinity of any of the piles. Due to the lack of artifacts or any other temporally diagnostic attributes, the stone groupings could not be assigned to a specific date or function. Within Connecticut, there are recorded stone features that hold significance to several of the Native American tribes. This office lacks the expertise and knowledge to evaluate such features.

As a result of the information submitted, SHPO concurs with the findings of the report that additional archeological investigations of the project areas are not warranted. However, this office is unable to provide comment regarding the stone groupings, and suggests that the project sponsor contact subject matter experts in the respective tribes. SHPO is happy to provide contact information for such subject matter experts.

This office appreciates the opportunity to review and comment upon this project. For additional information, please contact Marena Wisniewski, Environmental Reviewer, at (860) 256-2754 or marena.wisniewski@ct.gov.

Sincerely,

Mary B. Dunne
State Historic Preservation Officer