Santa Fuel, Inc.

PETITION OF SANTA FUEL, INC. FOR A DECLARATORY RULING THAT A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED IS NOT REQUIRED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A 3.85 MEGA WATT (AC) SOLAR PHOTOVOLTAIC POWER GENERATION FACILITY AT 159 SOUTH ROAD IN SOMERS CONNECTICUT

September 14, 2023

Prepared for:

Santa Fuel, Inc
154 Admiral Street
Bridgeport CT 06605

Project No. 2023-001

Prepared by:

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I. INTRODUCTION

Pursuant to Conn. Gen. Stat.§§ 4-176(a) and 16-50k(a) and Conn. Agencies Regs.§ 16- 50j-38 *et seq.,* Santa Fuel, Inc, ("Santa Fuel" or the "Petitioner") requests that the Connecticut Siting Council ("Siting Council") approve by declaratory ruling the location, construction, operation, and maintenance of a solar photovoltaic facility capable of up to 3.85 MW AC, and associated equipment ("Project") consisting of approximately 17.11 acres of solar panels to be constructed within a 20 acre lease area located at 159 South Road in Somers, Connecticut (the "Project Site").

Conn. Gen. Stat. § 16-50k(a) provides:

> Notwithstanding the provisions of this chapter or title 16a, the council shall, in the exercise of its jurisdiction over the siting of generating facilities, approve by declaratory ruling... the construction or location of any customer-side distributed resources project or facility or grid-side distributed resources project or facility with a capacity of not more thansixty-five megawatts, as long as: (i) Such project meets air and water quality standards of the Department of Energy and Environmental Protection, and (ii) the Council does not find a substantial adverse environmental effect...

As discussed in this Petition, the Petitioner's goal is to design and construct an environmentally compatible project that produces the maximum amount of energy while avoiding and minimizing adverse environmental impacts. Based on the information presented in this Petition, the Project will meet the air and water quality standards established by the Department of Energy and Environmental Protection ("DEEP"), and will not cause any substantial adverse environmental effects to the immediate and surrounding area. Accordingly, the construction, operation, and maintenance of the Project satisfies the criteria of Conn. Gen. Stat. § l6-50k(a).

II. PETITIONER

Santa Fuel will be the owner and lead the development of the project. They are based in Bridgeport, Connecticut and have been providing a variety of energy products to the northeast for over 60 years. To assist in the development, they have retained Louth Callan Renewables, LLC (LCR), a Connecticut-based developer of renewable energy having its principal place of business at 921 Thrall Road in Suffield, Connecticut. LCR is a leading developer and operator of solar energy facilities with over 40 years of experience with solar energy development having developed more than 180 MW of commercial solar projects in North America.

Please address all correspondence and/or communications regarding this Petition to:

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Louth Callan Renewables LLC
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Suffield, CT 06078
kyzer@louthcallanrenewables.com

Sue O'Donovan
Chief Financial Officer
Santa Fuel, Inc
154 Admiral Street, Bridgeport CT 06605
odonovans@santaenergy.com

A copy of all such correspondence and/or communications to the Petitioner's Engineering Consultant:

Timothy Coon, P.E.
Principal Engineer
J.R. Russo & Associates, LLC
P.O. Box 938
East Windsor, CT 06088
tcoon@jrrusso.com

III. PROPOSED PROJECT

A. PROJECT BACKGROUND

In developing this Project, the Petitioner has taken into account the State's energy policy to develop and utilize renewable energy resources, such as solar and wind energy, to the maximum practicable extent. As a solar development, the proposed Project is considered a Class I renewable energy source under General Statutes § 16- 1(a)(26).

The Project creates a significant benefit for the State and its residents. First, the Project will return currently unused land to productive use. Over the course of a 25-year lease between the Company and the landowner, the Project will produce income in the form of rent for the landowner. When the solar array is removed from the Property upon expiration of the lease, the prior agricultural use of the Property can resume, if so desired. During its lifespan, the Project will help to reduce greenhouse gas emissions and pollutants.

B. SITE SELECTION

The Petitioner based the site selection process for the Project on a detailed evaluation of the following key criteria.

- Site suitability (size, topography, and apparent lack of biological and hydrological conflicts in initial screening);
- Site availability and mutual benefits (ability to come to suitable lease terms with landowner; and
- Proposed cost of interconnecting to and proximity to critical infrastructure (suitable electrical grid access).

After performing an initial site evaluation, the Petitioner began a preliminary design of a site layout that would best minimize negative environmental impacts. The Petitioner conducted further due diligence on the Project Site, and entered into a contract option to lease the land. The Petitioner performed outreach within Town government, and met with the Somer's

Conservation Commission and Zoning Commission. In addition, the Petitioner retained the following consultants to assist in the evaluation and design of the Project:

- J.R. Russo & Associates, LLC - Civil Engineering/Surveying/Planning
- Richard Zulick - Wetland Delineation Report
- Hartgen Archeological Associates, Inc. - Archaeologist

C. PROPERTY DESCRIPTION

The Project Site consists of approximately 22.1 acres of undeveloped land, part of a larger 108.5-acre parcel (the Property) located at 159 South Road in Somers, Connecticut. A Vicinity Map is provided as Exhibit I. The Property is owned by the Nancy B. Edgar Revocable Trust & Dianne Bordeaux Lenti. The property is abutted to the north by Geissler's Supermarket plaza and other vacant land of the Nancy B. Edgar Revocable Trust, to the east by undeveloped woodland owned by the Northern Connecticut Land Trust, to the south by residential properties along Stillmeadow Lane and Mountain View Road, and to the west by residential properties along South Road (Rte. 83). Exhibit II includes an aerial map which depicts the surrounding land uses within one-half mile of the Property.

The northeastern portion of the Property and abutting land of the Nancy B. Edgar Revocable Trust to the north was formerly mined for gravel. The gravel mining operation was initiated in 1998 and terminated in 2009. Upon completion of the mining operations, disturbed areas were restored and are currently maintained as hay field. The southeastern portion of the property is undeveloped woodland. The southwestern portion of the property consists of an old orchard that is no longer maintained. An existing single-family home with a couple of barns and a former fruit stand are located adjacent to South Road on the western portion of the Property.

Two dug ponds are located in the northwestern portion of the Property. The area around the ponds has become overgrown with brush.

The Project Site consists of a 17.11-acre fenced area surrounding the array and approximately 5 additional acres outside of the fence that will be disturbed for the purpose of shade management, access, stormwater management, and vegetative screening. The site is currently accessible from South Road from the driveway to the existing house and via an existing dirt farm road on the northern end of the Property. The existing house and out-buildings are anticipated to remain. The Project Site will encompass approximately 13.75 acres of the existing hay field, 3.05 acres of undeveloped woodland, and 5.3 acres of the overgrown orchard.

D. PROJECT DESCRIPTION

The proposed solar array is anticipated to include 8,710 PV tracking modules within a 17.11 acre fenced area. Construction activities will include clearing and grubbing, re-grading, layout and placement of foundation systems, racking, solar PV panels, and string inverters; installation of utility pads and associated electrical equipment; installation of electrical conduit, conduit supports; installation of underground transmission lines; installation of utility poles and overhead 3-phase power lines; installation of a gravel access road; and installation of security fencing. A new 15' wide gravel driveway will be installed south of the existing residence to provide access to the Project Site. The access road will extend from South Road to equipment pads located along the eastern edge of the array. The array will be completely enclosed within a 7-foot chain-link security fence with gated access elevated 8" off the ground to allow for small animal movement into and out of the array areas. Detailed Site Plans are provided in Exhibit III.

The PV panels and inverters will be mounted on a driven post racking system. The rows of panels are oriented along the north-south axis, and the panels will rotate to track the sun from east to west. Inverters will be centrally located near the equipment pads. The minimum and maximum height of the panels above grade will be three feet (3') and thirteen feet (13'), respectively. The aisle width between rows of panels will be 11.23 feet. A specification sheet for the anticipated PV module is included as Exhibit IV. However, the PV module is subject to change as additional optimization and market conditions may dictate.

The panels in the northern portion of the project site will be installed at existing grade without the need to disturb the existing soils or vegetation. However, approximately 5 acres in the southern portion of the array will be re-graded to reduce the existing slopes to 15% or less to facilitate construction. In areas to be re-graded, topsoil will be stripped and set as-side, the subsoils re-graded to the appropriate slope, and then the topsoil re-spread and seeded with a pollinator seed mix. Other excavation and grading will be limited to the construction of the access road, equipment pads, trenching for conduit installation, and construction of two infiltration basins along the downgradient, western edge of the array to collect and infiltrate the majority of the runoff from the site.

As discussed above, the project will involve the clearing of approximately 3.04 acres of trees in the southeast corner of the Project Site. This includes approximately 1.92 acres of clearing outside of the perimeter fence for shade management. In the areas outside of the fence, large trees will be removed, but brush and stumps will remain in order to minimize soil disturbance and retain existing vegetation.

Construction of the project is anticipated to begin in the summer of 2024. The project construction period is estimated at 4-6 months from Notice to Proceed. Once

operational, the Project will have a design life of at a minimum, twenty-five (25) years. The anticipated wattage of the Project is 3,850 kW AC. At the end of the operational life of the Project, the Petitioner will remove all equipment (e.g. racking system, panels, inverters, electrical collection system, etc.) from the Project Site. A Decommissioning Plan is provided as Exhibit V. At that point, the land can be reverted back to an agricultural is if desired

E. INTERCONNECTION

The Petitioner proposes interconnecting the Project to an existing 23kV overhead circuit (27H12) that runs along Mountain View Road and is part of the Eversource distribution system. The interconnection will require the extension of circuit 27H12 from the existing termination point at the intersection of Mountain View Road and South Road approximately 670 feet north to the proposed point of interconnection on a new pole to be installed at the site entrance drive. The extension of the existing circuit to the interconnection point is anticipated to utilize existing Eversource poles located on the west side of South Road. A series of new poles for the necessary reclosers and metering will be installed from the interconnection pole to a new customer riser pole alongside of the access driveway. From there the new power line will be run in new underground MV conduits to the proposed pad mounted transformers and switchgear on the eastern edge of the array.

F. LOCAL INPUT & NOTICE

The Petitioner has actively sought input from the Town of Somers land use boards, and remains committed to providing the Town with as much information regarding the Project as possible. In support of this goal, the Petitioner submitted Site Plans to the Town in July and attended the Somers Conservation Commission meeting on August 2, 2023 to present the site plan and solicit feedback. The project was well received, and the Commission voted for their agent to compose a letter in support of the Project.

This letter is anticipated to be received shortly and will be forwarded upon receipt. In addition, the Petitioner attended a meeting of the Somers Zoning Commission on September 5, 2023 to present the project.. The Zoning Commission did not appear to have any specific issues with the proposed plan; however, they expressed their desire for the public to have the ability to comment on the project. In response, the Commission was informed that it would be up to the Siting Council to decide whether or not a public hearing will be held. The Commission was also informed that all abutters would be notified of the application at the time that it is submitted to the Siting Council, and they can raise questions and provide comments at that time. A copy of the final Site Plans was provided to the Town of Somers Planning Department at the time of the submission of this Petition to the Siting Council.

Additionally, as required by the Regulations of Connecticut State Agencies § 16-50j-40(a), the Petitioner provided notice of its intent to file this Petition to all adjacent property owners and appropriate municipal and state legislative officials. Attached as Exhibit VI, is a copy of the notice, a list of those notified and a map showing the abutting property owners.

IV. POTENTIAL ENVIRONMENTALIMPACTS

The Petitioner and its consultants have completed a comprehensive environmental and cultural resources assessment of the Site. As part of this process, relevant agencies were consulted and environmental impacts were evaluated and mitigated as appropriate. This included a pre-application meeting with the DEEP to discuss the proposed project on August 16, 2023. For these reasons and those addressed further below, this Project avoids, reduces, and mitigates potential environmental impacts.

A. AIR QUALITY

The Project will have no air emissions during operation and only very minor air emissions of regulated air pollutants and greenhouse gases during construction. The Petitioner will control any temporary emissions at the Project Site by enacting appropriate mitigation measures (e.g., water for dust control; avoid mass early morning vehicle startups and excessive idling times, etc.). Accordingly, any potential air effects produced by the Project's construction activities will be *de minimis*. During operation, the Project will not emit regulated air pollutants or greenhouse gases (e.g., PM, VOCs, GHG or ozone). No air permit will be required for either construction or operation of the Project. Moreover, as discussed above, the Project will provide a benefit to Air Quality by eliminating the discharge of CO_2 and other pollutants generated by displacing other fossil fuel burning energy sources.

B. BIOLOGICAL RESOURCES

A review of the Natural Diversity Database (NDDB) map for Somers, Connecticut dated June 2023 shows that the Project Site is not located within any potential locations of State and Federal Listed Species and Critical Habitats (See Exhibit VII). Based on the results of the preliminary screening, no further investigation into the presence of endangered species was conducted.

C. WETLANDS

The state and federal wetlands in the vicinity of the Project were delineated by Richard Zulick, Certified Soil Scientist with Datum Engineering & Surveying LLC, on December 4, 2022. Wetlands identified in the vicinity of the array consist of three excavated ponds. One small pond was identified just off of the subject property in the field to the north at a location topographically cross-gradient from the proposed array. The other two ponds are located east and downgradient of the array, between the open field and South Road. As stated in Mr. Zulick's, Wetland Delineation report provided as Exhibit VIII,

the ponds appear to be man-made by excavation into the water table. The wetland flags were surveyed and mapped, and the wetland resources are shown on the attached Site Plans (Exhibit III.)

The proposed Project was designed to avoid and minimize impacts to the existing wetland resources in the vicinity of the project site. In accordance with the requirements of DEEP's General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (General Permit), a 100-foot buffer has been maintained between all proposed panels in the array and the downgradient wetlands. In addition, an undisturbed buffer of 50 feet has been maintained between any proposed construction activity and all wetlands.

Silt fence will be installed between the construction activities at the array and the downgradient wetlands in order to provide protection from sedimentation. Where trench excavation and conduit installation occur in vegetated areas, the activity should take no more than a day or two. Disturbed areas will be seeded as soon as feasible to facilitate the stabilization of the area and minimize the potential for erosion and sedimentation. All silt fence will be maintained until vegetation becomes established, and the Project will adhere to all requirements of the General Permit. As a result of the limited activity, distance from the wetland, and erosion and sediment control measures to be implemented, no significant adverse impact to the wetland is anticipated as a result of the Project.

D. STORMWATER MANAGEMENT

As discussed above, the northern portion of the array will be installed at existing grades and maintain existing vegetation. However, much of the southern portion of the array will be re-graded in order to achieve slopes of 15% or less to facilitate the construction of the racking system. Additional soil disturbance will be associated with the stump removal where clearing is required within the fenced array area, as well as for the construction of the two infiltration basins, access drive and equipment pads. In addition to the perimeter silt fence to be installed

downgradient of all construction activities, the material generated from the clearing activities will be chipped/ground to generate a coarse woody debris that will be installed in rows along the contours in the southern portion of the site that has been re-graded to provide additional filtering and maintain sheet flow.

The proposed tracker solar arrays will be installed on elevated racks that provide adequate height above the ground to promote the continued growth of the existing vegetative cover and allow for infiltration. Thus, the areas between and surrounding the panels were analyzed as pervious vegetated cover. Two stormwater management basins will be constructed downgradient of the array in order collect the runoff and provide treatment, groundwater recharge, and retention of the stormwater. These basins have been designed in accordance with the Connecticut Stormwater Quality Manual and the DEEP's General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities ("General Permit").

A detailed Drainage Report has been prepared by J.R. Russo & Associates, LLC (Exhibit IX). As detailed in the report, the development of the site is anticipated to result in a reduction of runoff from the site. Other temporary soil erosion and sedimentation control measures will include silt fencing, fiber rolls, anti-tracking pads, outlet protection, woody debris berms, and permanent seeding to stabilize disturbed soils as soon as possible during construction. With these measures, the completed development is not anticipated to have an adverse impact to the surrounding water and wetland resources.

Since the construction will disturb more than 1 acre of land, the Petitioner must register under the DEEP's General Permit at least sixty (60) days prior to commencing construction activities. The Petitioner will prepare a Stormwater Pollution Control Plan, submit it to the DEEP for review, and register under the General Permit in accordance with the requirements and timelines established by the General Permit.

E. FLOODPLAINS

The attached Federal Emergency Management Agency (FEMA) Flood Map (Exhibit X) indicates that the Project is not located within the 100-year flood zone. As a result, the proposed project is not expected to have an impact on the floodplain.

F. DRINKING WATER RESOURCES

The availability of the municipal water supply appears to terminate at the northern end of the subject property. Thus, existing houses at and surrounding the subject property appear to be served by private wells. The proposed activities associated with the Project do not involve the withdrawal of water, nor the storage or use of oil or hazardous materials (other than what is present in the construction equipment). Any water utilized during construction for dust control will be minimal. Thus, the proposed project is not anticipated to have an impact on the water supply and quality in the vicinityof the Site.

A review of the Connecticut Aquifer Protection Area Map prepared by the CT DEEP Aquifer Protection Area Program (Exhibit XI) indicates that the Project is not located within an area identified as an Aquifer Protection Area. The nearest Aquifer Protection Area is located approximately over three (3) miles to the west of the Project Site. Based on the separation distance, the proposed project is not anticipated to have an impact on the Aquifer Protection Area.

G. HISTORIC RESOURCES

On March 7, 2023, a request was submitted to the Connecticut State Historic Preservation Office (SHPO) for review of the Project in relation to historic and archaeological resources. SHPO's response dated March 21, 2023 is provided as Exhibit XII. Based on the environmental characteristics of the Site, SHPO determined that the Project has the potentialto contain significant archeological resources and requested a professional archaeological assessment and reconnaissance survey be completed prior to construction.

Based on SHPO's request, Hartgen Archeological Associates, Inc. (Hartgen) was retained to conduct a Phase 1 archeological reconnaissance investigation at the Project Site. The assessment was completed in June 2023. The Investigation Report prepared by Hartgen is provided as Exhibit XIII. The report concludes that no artifacts of historical or archeological significance were identified and recommended that no further investigation was required. This report was submitted to SHPO for review and approval. SHPO's response letter dated July 25, 2023 (Exhibit XIV) concurs that no historic property will be affected by the proposed development and no additional archaeological investigations are warranted.

H. SCENIC VALUES & VISUAL IMPACTS

No state or local designated scenic roads or scenic areas are located near the Project Site and therefore none will be physically impacted by the development. Similarly, no state parks or trails are located in the vicinity of the project site.

Other than the existing residential home to remain on the Subject Property, the nearest residence is approximately 80 feet south of the southwest corner of the array along South Road. Residential homes are also located on the opposite side of South Road south of the site entrance. The nearest of these homes to the array is approximately 300 feet. In order to mitigate potential visual impacts of the southern portion of the array to these nearby residences, a row of evergreens is proposed along the southern and western limits of the array. As a result of the existing buffers and proposed evergreen screen, the Project is not anticipated to have any significant adverse visual impacts on nearby sensitive receptors. Furthermore, the use of low-profile Project components that will be no greater than thirteen (13) feet above grade (e.g., racking system, panels, inverters, etc.) also significantly reduces potential visible impact.

I. PUBLIC HEALTH AND SAFETY

Overall, the Project will meet or exceed all health and safety requirements applicable for electric power generation. Each employee working on the Project Site will:

- Receive required general and site-specific health and safety training;
- Comply with all health and safety controls as directed by local and state, requirements;
- Understand and employ the Site health and safety plan;
- Know the location of local emergency care facilities, travel times, ingress and egress routes; and
- Report all unsafe conditions to the construction manager.

During construction, heavy equipment and construction vehicles will be required to access the Project Site during normal working hours (7 a.m. to 7 p.m. Monday through Saturdays; Sundays only as required). After construction is complete and during operation, traffic to the Site will be limited to one to two light-duty vehicles on a quarterly recurring basis for the standard operations and maintenance activities. There will not be a permanent staff present at the Site, and the facility will be monitored remotely.

The Project will not produce significant noise during operation. During the construction of the Project, higher levels of noise are anticipated. However, all work will be conducted during normal working hours and it is not anticipated that the levels of noise will exceed State or local noise standards or limits. Commercial transformers will be located on the eastern side of the array and will be limited to 61 decibels which will not be heard on abutting properties.

Because the solar modules are designed to absorb incoming solar radiation and minimize reflectivity, only a small percentage of incidental light will be reflected off

the panels. This incidental light is significantly less reflective than common building materials, such as steel, and the surface of smooth water.

Prior to beginning the Project operation, the Petitioner will meet with Town first responders to provide them information regarding response to emergencies at PV facilities, discuss industry best practices, and provide a tour of the Site. The first responders will also be provided keys to the facility gates so that, in the event of a fire or emergency requiring site access, they will have access to the sites.

J. FEDERAL AVIATION ADMINISTRATION NOTIFICATION

Pursuant to 14 CFR § 77.9 regarding the Federal Aviation Administration (FAA) Notice of Proposed Construction or Alteration, an evaluation was performed using the FAA's on-line Notice Criteria Tool. Based on the proximity to the nearby airports, the Notice Criteria Tool concluded that FAA notification of the project is not required. A copy of the FAA Determination is included as Exhibit XV.

K. CORE FOREST

"Core Forest" is defined as unfragmented forest land that is 300 feet or greater from the boundary between the forest land and non-forest land. As mentioned above, the development will involve the clearing of approximately 3.04 acres of existing woodland in the southeast corner of the Project Site. However, all of the clearing will be within 300 feet of the existing boundary between the forest land and non-forest land. Thus, none of the trees to be removed are within the "Core Forest".

L. FARMLAND CLASSIFICATION

According to mapping prepared by the U.S. Department of Agriculture's Natural Resources Conservation Service available on the Web Soil Survey, the northern and eastern portions of the Project Site, including the existing hayfield and orchard area,

are classified as Farmland of Statewide Importance. The remaining wooded southwestern portion of the project site is classified as Not Prime Farmland. As discussed above, the hayfield area has all been previously disturbed by historic gravel mining operations. Regardless, as a result of no soils on the Project Site being classified as Prime Farmland, consultation with the Department of Agriculture and receipt of a "letter of no material affect" is not required. A Farmland Classification Map is provided as Exhibit XVI.

V. CONCLUSION

The Project will provide numerous and significant benefits to the Town, State and its citizens, and will provide a step toward the State's goal of achieving cleaner, less expensive, and more reliable sources of energy. This development of a source of green energy will produce substantial environmental benefits with minimal environmental impacts. Pursuant to CGS § 16-50k(a), the Siting Council shall approve by declaratory ruling the construction or location of a customer-side distributed resources project or facility with a capacity of not more than sixty-five (65) MW, as long as such project meets DEEP air and water quality standards and will not have a substantial adverse environmental effect. As demonstrated within this Petition, the Project meets the criteria.

Accordingly, and for the reasons stated herein, because the proposed Project will meet state air and water quality standards and will not have a substantial adverse effect on the environment, the Petitioner requests that the Siting Council approve the location and construction of the proposed Project by declaratory ruling.

Respectfully submitted,
Santa Fuel, Inc.

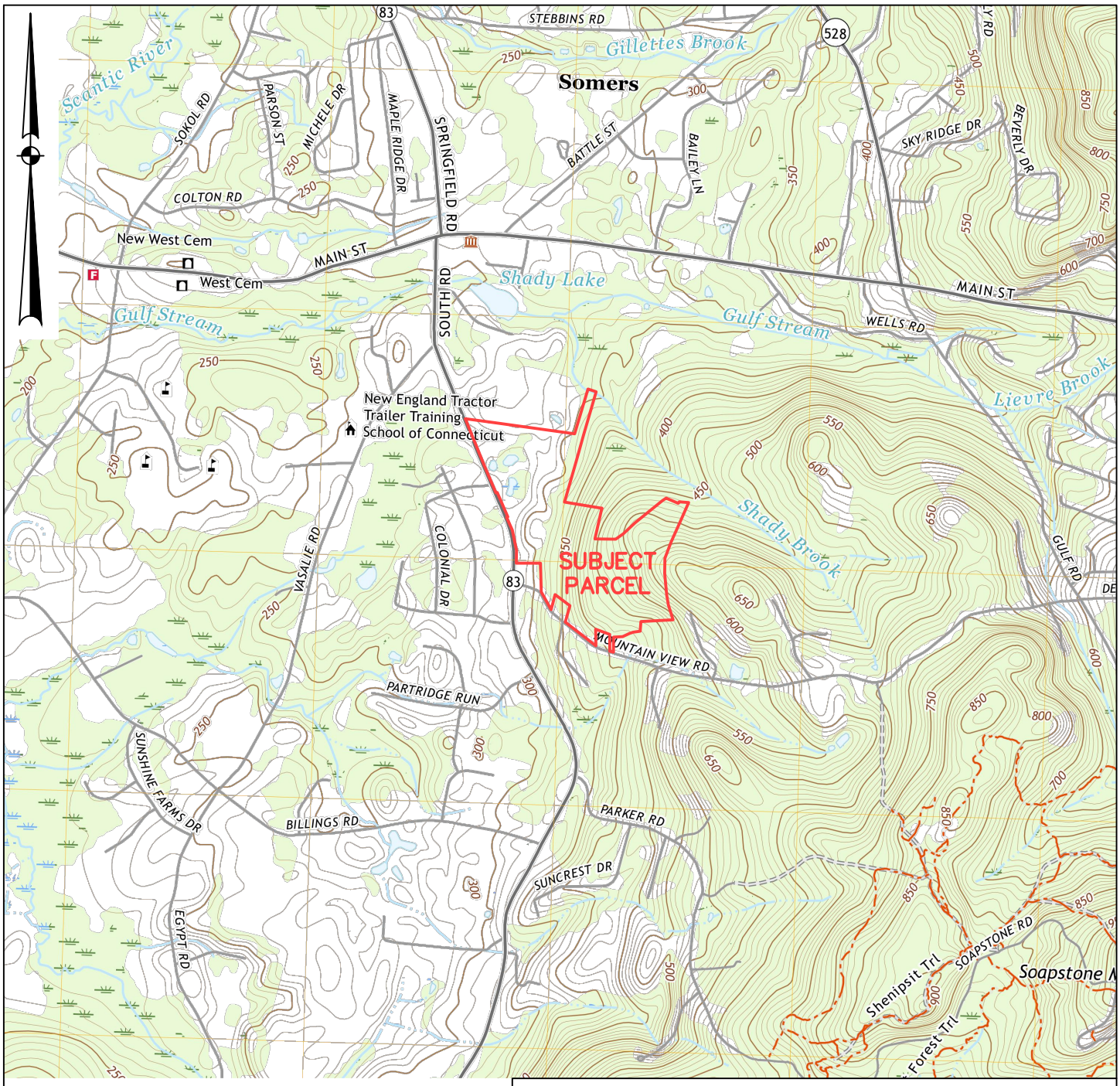
By: _____

Name: Sue O'Donovan

Title: Chief Financial Officer

EXHIBIT I

VICINITY MAP



VICINITY MAP

Somers Solar

Louth Callan Renewables, LLC

159 South Road
Somers, Connecticut

SOURCE:
USGS QUADRANGLE ELLINGTON, CT 2021

RUSSO
SURVEYORS • ENGINEERS
SERVING CT & MA

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1 Shoham Rd East Windsor, CT 06088 • CT 860.623.0569 • MA 413.785.1158
www.jrrusso.com • info@jrrusso.com

DATE	9-5-2023
SCALE	1"=2,000'
JOB NUMBER	2023-001
SHEET	EXHIBIT I

EXHIBIT II

LAND USE MAP

LAND USE MAP

Somers Solar

Louth Callan Renewables, LLC

159 South Road
Somers, Connecticut

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EXHIBIT III

SITE PLANS
(BOUND SEPARATELY)

EXHIBIT IV

PV MODULE SPECIFICATIONS & TCLP TESTING RESULTS

VSUN
Innovative & Smart

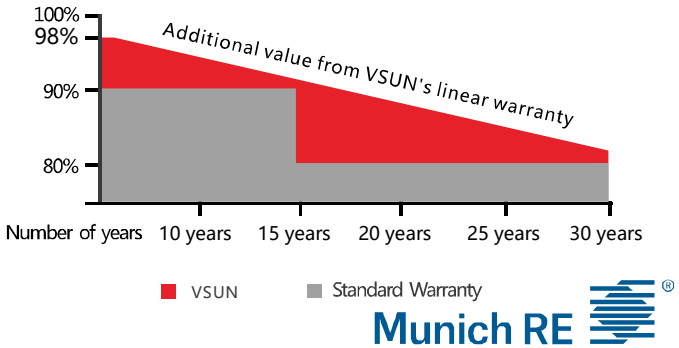
VSUN550-144BMH-DG

550W
Highest power output

21.52%
Module efficiency

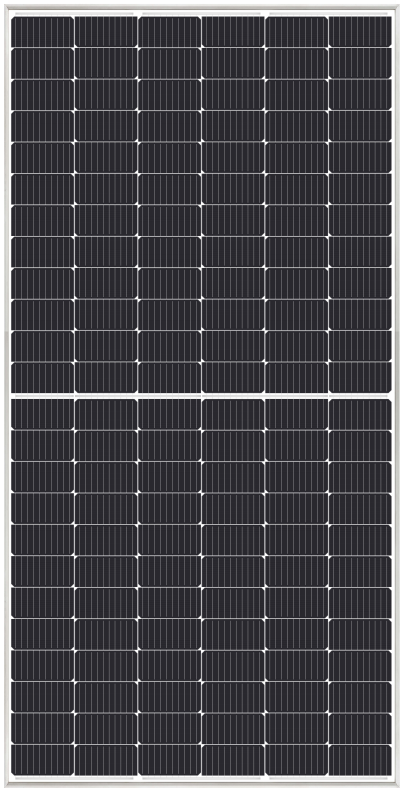
12years
Material & Workmanship warranty

30years
Linear power output warranty



Munich RE

VSUN550-144BMH-DG VSUN545-144BMH-DG
VSUN540-144BMH-DG VSUN535-144BMH-DG



- MBB technology with Circular Ribbon
- Higher output power
- Half-cell Technology
- Positive tolerance offer
- Micro Gap
- Up to 30% extra power generation yield from the back side
- Certified for salt/ammonia corrosion resistance
- Load certificates: wind to 2400Pa and snow to 5400Pa
- Lower LCOE

VSUN, a BNEF Tier-1 PV module manufacturer invested by Fuji Solar, has been committed to providing greener, cleaner and more intelligent renewable energy solutions. VSUN is dedicated to bringing reliable, customized and high-efficient products into various markets and customers worldwide

Engineered in Japan
www.vsun-solar.com

Electrical Characteristics at Standard Test Conditions(STC)

Module Type	VSUN550-144BMH-DG	VSUN545-144BMH-DG	VSUN540-144BMH-DG	VSUN535-144BMH-DG
Maximum Power - Pmax (W)	550	545	540	535
Open Circuit Voltage - Voc (V)	49.92	49.81	49.65	49.5
Short Circuit Current - Isc (A)	13.99	13.92	13.85	13.78
Maximum Power Voltage - Vmpp (V)	42	41.8	41.65	41.5
Maximum Power Current - Impp (A)	13.1	13.04	12.97	12.9
Module Efficiency	21.52%	21.32%	21.13%	20.93%

Standard Test Conditions (STC): irradiance 1,000 W/m²; AM 1,5; module temperature 25°C. Pmax Sorting : 0~5W. Measuring Tolerance: ±3%.

Remark: Electrical data do not refer to a single module and they are not part of the offer. They only serve for comparison among different module types.

Electrical Characteristics with different rear side power gain(reference to 545 front)

Pmax (W)	Voc (V)	Isc (A)	Vmpp (V)	Impp (A)	Pmax gain
575	49.76	14.69	41.80	13.76	5%
602	49.76	15.39	41.80	14.41	10%
656	49.81	16.79	41.75	15.72	20%
684	49.81	17.49	41.75	16.38	25%

Temperature Characteristics

NOCT	45°C(±2°C)
Voltage Temperature Coefficient	-0.27%/°C
Current Temperature Coefficient	+0.048%/°C
Power Temperature Coefficient	-0.32%/°C

Maximum Ratings

Maximum System Voltage [V]	1500
Series Fuse Rating [A]	30
Bifaciality	70%±10%

Material Characteristics

Dimensions	2256×1133×35mm (L×W×H)
Weight	32.5kg
Frame	Silver anodized aluminum profile
Front Glass	High transparency,Antireflection coated,Semi-toughened safety glass, 2.0mm
Cell Encapsulation	EVA (Ethylene-Vinyl-Acetate) or POE
Back Glass	Glazed & Semi-toughened safety glass, 2.0mm
Cells	12×12 pieces bifacial monocrystalline solar cells series strings
Junction Box	IP68, 3 diodes
Cable&Connector	Potrait: 500 mm (cable length can be customized) , 1×4 mm 2 , compatible with MC4

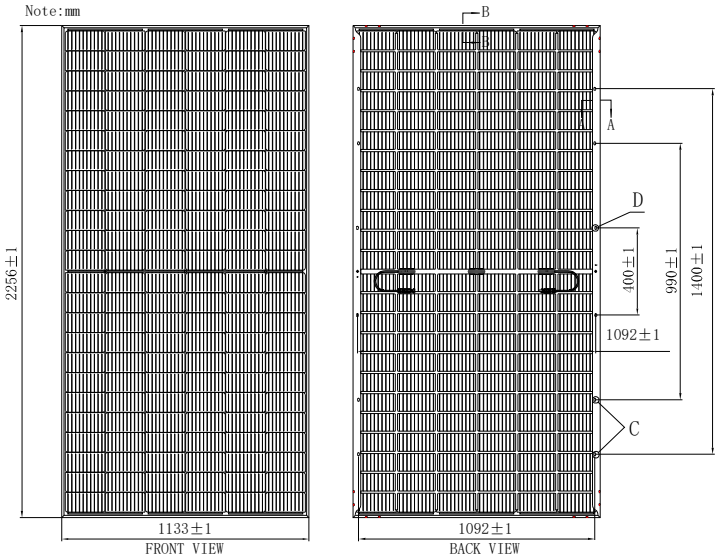
Packaging

Dimensions(L×W×H)	2290×1125×1253mm
Container 20'	150
Container 40'	300
Container 40'HC	600

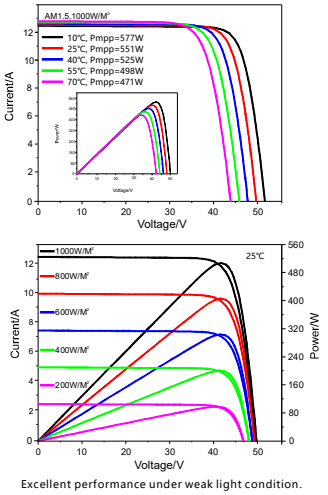
System Design

Temperature Range	-40 °C to + 85 °C
Withstanding Hail	Maximum diameter of 25 mm with impact speed of 23 m/s
Maximum Surface Load	5,400 Pa
Application class	class A

Dimensions



IV-Curves



Excellent performance under weak light condition.

TEST REPORT

CLIENT DETAILS

Contact	-
Client	VIETNAM SUNERGY JOINT STOCK COMPANY
Address	LOT III-DONG VANG AREA,DINH TRAM INDUSTRIAL ZONE,VIET YEN DISTRICT,BAC GIANG PROVINCE 230000
Telephone	-
Facsimile	-
Email	-
Order Number	-
Samples	Solid waste(2)
Project	-

LABORATORY DETAILS

Manager	SGS-CSTC
Laboratory	Environment Laboratory
Address	2/F, 3RD BUILDING NO. 889, YISHAN ROAD, XUHUI DISTRICT, SHANGHAI, CHINA
Telephone	+86 (21) 6140 2666-2002
Facsimile	+86 (21) 6115 2164
Email	REPORT.ENV @SGS.COM
Report Number	SHE23-03234 R0
SGS Reference	0000275298
Date Reported	2023/06/30
Analysis Date	2023/06/13 - 2023/06/30

COMMENTS

1.The results apply to the sample(s) as received.

SIGNATORIES

Reported by	Reviewed by	Approved by
窦卓文	刘真	唐黎珺

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声明
Statement

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5. 本检测报告以中文为准，英文文本（如有）仅为译文，两者发生冲突时，应以中文文本为准。

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   Should you have any queries or objection to the test report, please contact us within 10 days after receiving the report.

符号表/Legend

"-" 未测试该参数或不适用/The parameter is not tested or not applicable

↑ 提高检出限/Detection limit raised

↓ 降低检出限/Detection limit lowered

ND 未检出/Not Detected

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Parameter	Method	Units	MDL	Limit	Testing Results
			Sample Number		23-03234.001
			Sample Name		VSUN545-144BMH-DG
			Test Object		Solid waste
			Sample Description		SHES2306011243TX
			Receive Date		2023/06/13
Arsenic (As)	USEPA 200.8	mg/L	0.050	≤5	ND
Barium (Ba)	USEPA 200.8	mg/L	0.010	≤100	**0.336**
Cadmium (Cd)	USEPA 200.8	mg/L	0.001	≤1	**0.001**
Chromium (Cr)	USEPA 200.8	mg/L	0.010	≤5	ND
Lead (Pb)	USEPA 200.8	mg/L	0.010	≤5	**4.98**
Selenium (Se)	USEPA 200.8	mg/L	0.050	≤1	ND
Silver (Ag)	USEPA 200.8	mg/L	0.010	≤5	ND
Mercury (Hg)	USEPA 7473	mg/L	0.005	≤0.2	ND
2,4-D*	USEPA 8151A	mg/L	0.0005	≤10	ND
2,4,5-TP (Silvex, Fenopop)	USEPA 8151A	mg/L	0.0005	≤1	ND
Benzene	USEPA 8260D	mg/L	0.0005	≤0.5	ND
Carbon tetrachloride	USEPA 8260D	mg/L	0.0005	≤0.5	ND
Chlorobenzene	USEPA 8260D	mg/L	0.0005	≤100	ND
Chloroform	USEPA 8260D	mg/L	0.0005	≤6	ND
1,4-Dichlorobenzene	USEPA 8260D	mg/L	0.0005	≤7.5	ND
1,2-Dichloroethane	USEPA 8260D	mg/L	0.0005	≤0.5	ND
1,1-Dichloroethene	USEPA 8260D	mg/L	0.0005	≤0.7	ND
2-butanone(MEK)	USEPA 8260D	mg/L	0.020	≤200	ND
Tetrachloroethene	USEPA 8260D	mg/L	0.0005	≤0.7	ND
Trichloroethene	USEPA 8260D	mg/L	0.0005	≤0.5	ND
Vinyl chloride	USEPA 8260D	mg/L	0.0005	≤0.2	ND
Methylphenol [1]	USEPA 8270E	mg/L	0.001	≤200	ND
2-Methylphenol	USEPA 8270E	mg/L	0.0005	-	ND
3&4-Methylphenol	USEPA 8270E	mg/L	0.0005	-	ND
2,4-Dinitrotoluene	USEPA 8270E	mg/L	0.0005	≤0.13	ND
Hexachlorobenzene	USEPA 8270E	mg/L	0.0005	≤0.13	ND
Hexachlorobutadiene	USEPA 8270E	mg/L	0.0005	≤0.5	ND
Hexachloroethane	USEPA 8270E	mg/L	0.0005	≤3	ND
Nitrobenzene	USEPA 8270E	mg/L	0.0005	≤2	ND
Pentachlorophenol	USEPA 8270E	mg/L	0.0025	≤100	ND
Pyridine	USEPA 8270E	mg/L	0.002	≤5.0	ND
2,4,5-Trichlorophenol	USEPA 8270E	mg/L	0.0005	≤400	ND
2,4,6-Trichlorophenol	USEPA 8270E	mg/L	0.0005	≤2	ND
Chlordane(Total) [2]	USEPA 8270E	mg/L	0.001	≤0.03	ND
Endrin	USEPA 8270E	mg/L	0.0005	≤0.02	ND
γ-BHC	USEPA 8270E	mg/L	0.0005	≤0.4	ND
Toxaphene	USEPA 8270E	mg/L	0.050	≤0.5	ND
γ-Chlordane	USEPA 8270E	mg/L	0.0005	-	ND
α-Chlordane	USEPA 8270E	mg/L	0.0005	-	ND
Methoxychlor	USEPA 8270E	mg/L	0.0005	≤10	ND
Heptachlor	USEPA 8270E	mg/L	0.0005	≤0.008	ND

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Parameter	Method	Units	MDL	Limit	Testing Results
Sample Number					23-03234.002
Sample Name					VSUN545-144BMH-DG
Test Object					Solid waste
Sample Description					SHES2306011243TX
Receive Date					2023/06/13
Arsenic (As)	USEPA 200.8	mg/L	0.050	≤5	ND
Barium (Ba)	USEPA 200.8	mg/L	0.010	≤100	**0.223**
Cadmium (Cd)	USEPA 200.8	mg/L	0.001	≤1	**0.001**
Chromium (Cr)	USEPA 200.8	mg/L	0.010	≤5	**0.013**
Lead (Pb)	USEPA 200.8	mg/L	0.010	≤5	**4.97**
Selenium (Se)	USEPA 200.8	mg/L	0.050	≤1	ND
Silver (Ag)	USEPA 200.8	mg/L	0.010	≤5	ND
Mercury (Hg)	USEPA 7473	mg/L	0.005	≤0.2	ND
2,4-D*	USEPA 8151A	mg/L	0.0005	≤10	ND
2,4,5-TP (Silvex, Fenopop)	USEPA 8151A	mg/L	0.0005	≤1	ND
Benzene	USEPA 8260D	mg/L	0.0005	≤0.5	ND
Carbon tetrachloride	USEPA 8260D	mg/L	0.0005	≤0.5	ND
Chlorobenzene	USEPA 8260D	mg/L	0.0005	≤100	ND
Chloroform	USEPA 8260D	mg/L	0.0005	≤6	ND
1,4-Dichlorobenzene	USEPA 8260D	mg/L	0.0005	≤7.5	ND
1,2-Dichloroethane	USEPA 8260D	mg/L	0.0005	≤0.5	ND
1,1-Dichloroethene	USEPA 8260D	mg/L	0.0005	≤0.7	ND
2-butanone(MEK)	USEPA 8260D	mg/L	0.020	≤200	ND
Tetrachloroethene	USEPA 8260D	mg/L	0.0005	≤0.7	ND
Trichloroethene	USEPA 8260D	mg/L	0.0005	≤0.5	ND
Vinyl chloride	USEPA 8260D	mg/L	0.0005	≤0.2	ND
Methylphenol [1]	USEPA 8270E	mg/L	0.001	≤200	ND
2-Methylphenol	USEPA 8270E	mg/L	0.0005	-	ND
3&4-Methylphenol	USEPA 8270E	mg/L	0.0005	-	ND
2,4-Dinitrotoluene	USEPA 8270E	mg/L	0.0005	≤0.13	ND
Hexachlorobenzene	USEPA 8270E	mg/L	0.0005	≤0.13	ND
Hexachlorobutadiene	USEPA 8270E	mg/L	0.0005	≤0.5	ND
Hexachloroethane	USEPA 8270E	mg/L	0.0005	≤3	ND
Nitrobenzene	USEPA 8270E	mg/L	0.0005	≤2	ND
Pentachlorophenol	USEPA 8270E	mg/L	0.0025	≤100	ND
Pyridine	USEPA 8270E	mg/L	0.002	≤5.0	ND
2,4,5-Trichlorophenol	USEPA 8270E	mg/L	0.0005	≤400	ND
2,4,6-Trichlorophenol	USEPA 8270E	mg/L	0.0005	≤2	ND
Chlordane(Total) [2]	USEPA 8270E	mg/L	0.001	≤0.03	ND
Endrin	USEPA 8270E	mg/L	0.0005	≤0.02	ND
γ-BHC	USEPA 8270E	mg/L	0.0005	≤0.4	ND
Toxaphene	USEPA 8270E	mg/L	0.050	≤0.5	ND
γ-Chlordane	USEPA 8270E	mg/L	0.0005	-	ND
α-Chlordane	USEPA 8270E	mg/L	0.0005	-	ND
Methoxychlor	USEPA 8270E	mg/L	0.0005	≤10	ND
Heptachlor	USEPA 8270E	mg/L	0.0005	≤0.008	ND

Remark:

1.Methylphenol are the sum of 2-Methylphenol and 3&4-Methylphenol.

2.Chlordane(Total) are the sum of α-Chlordane and γ-Chlordane.

3.Preparative method:USEPA1311-1992(Toxicity Characteristic Leaching Procedure)

4.The Limits comes from CFR(code of federal regulations) title 40 part 261.24.

5.SHE23-03234.001sample No.:CLD4F8201230530905793,SHE23-03234.002 sample No.:CLD4F8201230530904413

6.*:Not certificated by CNAS

检验检测专用章 Inspection & Testing Services

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. Testing Center-Environmental Laboratory

Attention: To check the authenticity of testing /inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

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Method List

USEPA 200.8-1994 Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry
USEPA 7473-2007 Metals-Hg
USEPA 8151A-1996 Acid Herbicides in Water by GC-MS
USEPA 8260D-2018 VOCs
USEPA 8270E-2018 SVOCs

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Method:USEPA 200.8-1994

Equipment Name	Model	Equipment Number	Serial Number
ICP-MS	Agilent 7900	CHEM-998	JP16311502

Method:USEPA 7473-2007

Equipment Name	Model	Equipment Number	Serial Number
Hg analyzer	Milestone DMA-80	CHEM-958	16041979

Method:USEPA 8151A-1996

Equipment Name	Model	Equipment Number	Serial Number
GC-MS	Agilent6890N/5973i	CHEM-126	US144004/CN10539052/US52411034

Method:USEPA 8260D-2018

Equipment Name	Model	Equipment Number	Serial Number
PT-GC-MS	Atomx XYZ/7890B/5977A	CHEM-ENV091	CA20247008/CN13313013/US1330M207

Method:USEPA 8270E-2018

Equipment Name	Model	Equipment Number	Serial Number
GC-MS	Agilent 7890B/5977A	CHEM-1118	CN18053182/US1805M023

Method:USEPA 8270E-2018

Equipment Name	Model	Equipment Number	Serial Number
GC-MS	Agilent 7890B/5977A	CHEM-1118	CN18053182/US1805M023

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Method Blank(MB)

Parameter	Batch ID	Unit	MDL	MB	Control Range
Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry Method: USEPA 200.8-1994					
Arsenic (As)	LB2321699	mg/L	0.050	<0.05	<0.050
Barium (Ba)	LB2321699	mg/L	0.010	<0.01	<0.010
Cadmium (Cd)	LB2321699	mg/L	0.001	<0.001	<0.001
Chromium (Cr)	LB2321699	mg/L	0.010	<0.010	<0.010
Lead (Pb)	LB2321699	mg/L	0.010	<0.01	<0.010
Selenium (Se)	LB2321699	mg/L	0.050	<0.050	<0.050
Silver (Ag)	LB2321699	mg/L	0.010	<0.01	<0.010
Metals-Hg Method: USEPA 7473-2007					
Mercury (Hg)	LB2321802	mg/L	0.005	<0.005	<0.005
Acid Herbicides in Water by GC-MS Method: USEPA 8151A-1996					
2,4-D	LB2321721	mg/L	0.0005	<0.0005	<0.0005
2,4,5-TP (Silvex, Fenopop)	LB2321721	mg/L	0.0005	<0.0005	<0.0005
VOCs Method: USEPA 8260D-2018					
Benzene	LB2321822	mg/L	0.0005	<0.0005	<0.0005
Carbon tetrachloride	LB2321822	mg/L	0.0005	<0.0005	<0.0005
Chlorobenzene	LB2321822	mg/L	0.0005	<0.0005	<0.0005
Chloroform	LB2321822	mg/L	0.0005	<0.0005	<0.0005
1,4-Dichlorobenzene	LB2321822	mg/L	0.0005	<0.0005	<0.0005
1,2-Dichloroethane	LB2321822	mg/L	0.0005	<0.0005	<0.0005
1,1-Dichloroethene	LB2321822	mg/L	0.0005	<0.0005	<0.0005
2-butanone(MEK)	LB2321822	mg/L	0.020	<0.020	<0.020
Tetrachloroethene	LB2321822	mg/L	0.0005	<0.0005	<0.0005
Trichloroethene	LB2321822	mg/L	0.0005	<0.0005	<0.0005
Vinyl chloride	LB2321822	mg/L	0.0005	<0.0005	<0.0005
SVOCs Method: USEPA 8270E-2018					
2-Methylphenol	LB2321643	mg/L	0.0005	<0.0005	<0.0005
3&4-Methylphenol	LB2321643	mg/L	0.0005	<0.0005	<0.0005
2,4-Dinitrotoluene	LB2321643	mg/L	0.0005	<0.0005	<0.0005
Hexachlorobenzene	LB2321643	mg/L	0.0005	<0.0005	<0.0005
Hexachlorobutadiene	LB2321643	mg/L	0.0005	<0.0005	<0.0005
Hexachloroethane	LB2321643	mg/L	0.0005	<0.0005	<0.0005
Nitrobenzene	LB2321643	mg/L	0.0005	<0.0005	<0.0005
Pentachlorophenol	LB2321643	mg/L	0.0025	<0.0025	<0.0025

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Method Blank(MB)

Parameter	Batch ID	Unit	MDL	MB	Control Range
SVOCs Method: USEPA 8270E-2018 (continued)					
Pyridine	LB2321643	mg/L	0.002	<0.002	<0.002
2,4,5-Trichlorophenol	LB2321643	mg/L	0.0005	<0.0005	<0.0005
2,4,6-Trichlorophenol	LB2321643	mg/L	0.0005	<0.0005	<0.0005
SVOCs Method: USEPA 8270E-2018					
Endrin	LB2321641	mg/L	0.0005	<0.0005	<0.0005
γ-BHC	LB2321641	mg/L	0.0005	<0.0005	<0.0005
Toxaphene	LB2321641	mg/L	0.050	<0.050	<0.050
γ-Chlordane	LB2321641	mg/L	0.0005	<0.0005	<0.0005
α-Chlordane	LB2321641	mg/L	0.0005	<0.0005	<0.0005
Methoxychlor	LB2321641	mg/L	0.0005	<0.0005	<0.0005
Heptachlor	LB2321641	mg/L	0.0005	<0.0005	<0.0005

The evaluation of Method Blanks (MB): All results of MB on this batch are lower than method detection limits, which meet the acceptance criteria of lab quality control.

Laboratory Control Sample(LCS)

LCS Recovery%= Result*100/ Reference Value.

Parameter	Batch ID	Unit	MDL	Result	Ref. Value	Recevory%	Control Range Lower	Control Range Upper
Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry Method: USEPA 200.8-1994								
Arsenic (As)	LB2321699	mg/L	0.050	0.195	0.2	97.4	80%	120%
Barium (Ba)	LB2321699	mg/L	0.010	0.199	0.2	99.6	80%	120%
Cadmium (Cd)	LB2321699	mg/L	0.001	0.198	0.2	98.9	80%	120%
Chromium (Cr)	LB2321699	mg/L	0.010	0.199	0.2	99.5	80%	120%
Lead (Pb)	LB2321699	mg/L	0.010	0.207	0.2	103	80%	120%
Selenium (Se)	LB2321699	mg/L	0.050	0.180	0.2	90.1	80%	120%
Silver (Ag)	LB2321699	mg/L	0.010	0.201	0.2	100	80%	120%
Metals-Hg Method: USEPA 7473-2007								
Mercury (Hg)	LB2321802	mg/L	0.005	<0.005	0.001	100	80%	120%
Acid Herbicides in Water by GC-MS Method: USEPA 8151A-1996								
2,4-D	LB2321721	mg/L	0.0005	0.0007	0.001	74.0	70%	130%
2,4,5-TP (Silvex, Fenopop)	LB2321721	mg/L	0.0005	0.0008	0.001	78.0	70%	130%
VOCs Method: USEPA 8260D-2018								
Benzene	LB2321822	mg/L	0.0005	0.0163	0.02	81.6	70%	130%

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Laboratory Control Sample(LCS)

LCS Recovery%= Result*100/ Reference Value.

Parameter	Batch ID	Unit	MDL	Result	Ref. Value	Recevory%	Control Range Lower	Control Range Upper
VOCs Method: USEPA 8260D-2018 (continued)								
Carbon tetrachloride	LB2321822	mg/L	0.0005	0.0156	0.02	77.8	70%	130%
Chlorobenzene	LB2321822	mg/L	0.0005	0.0191	0.02	95.5	70%	130%
Chloroform	LB2321822	mg/L	0.0005	0.0153	0.02	76.6	70%	130%
1,4-Dichlorobenzene	LB2321822	mg/L	0.0005	0.0170	0.02	85.0	70%	130%
1,2-Dichloroethane	LB2321822	mg/L	0.0005	0.0148	0.02	74.1	70%	130%
1,1-Dichloroethene	LB2321822	mg/L	0.0005	0.0142	0.02	71.0	70%	130%
2-butanone(MEK)	LB2321822	mg/L	0.020	<0.02	0.02	79.6	70%	130%
Tetrachloroethene	LB2321822	mg/L	0.0005	0.0187	0.02	93.6	70%	130%
Trichloroethene	LB2321822	mg/L	0.0005	0.0211	0.02	106	70%	130%
Vinyl chloride	LB2321822	mg/L	0.0005	0.0172	0.02	85.9	70%	130%
SVOCs Method: USEPA 8270E-2018								
2-Methylphenol	LB2321643	mg/L	0.0005	0.0033	0.005	65.4	30%	144%
3&4-Methylphenol	LB2321643	mg/L	0.0005	0.0082	0.01	82.1	30%	141%
2,4-Dinitrotoluene	LB2321643	mg/L	0.0005	0.0048	0.005	97.0	46%	140%
Hexachlorobenzene	LB2321643	mg/L	0.0005	0.0032	0.005	64.0	61%	127%
Hexachlorobutadiene	LB2321643	mg/L	0.0005	0.0030	0.005	59.0	10%	111%
Hexachloroethane	LB2321643	mg/L	0.0005	0.0034	0.005	68.6	38%	131%
Nitrobenzene	LB2321643	mg/L	0.0005	0.0032	0.005	64.2	25%	133%
Pentachlorophenol	LB2321643	mg/L	0.0025	0.0152	0.025	60.8	35%	130%
Pyridine	LB2321643	mg/L	0.002	0.004	0.005	73.4	10%	200%
2,4,5-Trichlorophenol	LB2321643	mg/L	0.0005	0.0041	0.005	82.0	40%	140%
2,4,6-Trichlorophenol	LB2321643	mg/L	0.0005	0.0039	0.005	78.8	40%	140%

The evaluation of recoveries for Laboratory Control Samples (LCS): All recoveries of LCS on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

Laboratory Duplicate(DUP)

Relative deviation(RD)%=|Sample Result -Duplicate Result|*100/(Sample Result +Duplicate Result).

Parameter	Sample ID	Unit	MDL	Sample Result	Duplicate Result	RD%	RD Control Range%	Sur Control Range
Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry Method: USEPA 200.8-1994								
Arsenic (As)	SHE23-03413.001	mg/L	0.050	<0.05	<0.05	0.0	≤20	-
Barium (Ba)	SHE23-03413.001	mg/L	0.010	0.081	0.077	2.5	≤20	-

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Laboratory Duplicate(DUP)

Relative deviation(RD)%=|Sample Result -Duplicate Result|*100/(Sample Result +Duplicate Result).

Parameter	Sample ID	Unit	MDL	Sample Result	Duplicate Result	RD%	RD Control Range%	Sur Control Range
Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry Method: USEPA 200.8-1994 (continued)								
Cadmium (Cd)	SHE23-03413.001	mg/L	0.001	0.002	0.001	8.4	≤20	-
Chromium (Cr)	SHE23-03413.001	mg/L	0.010	<0.01	<0.01	0.0	≤20	-
Lead (Pb)	SHE23-03413.001	mg/L	0.010	0.014	0.014	1.3	≤20	-
Selenium (Se)	SHE23-03413.001	mg/L	0.050	<0.05	<0.05	0.0	≤20	-
Silver (Ag)	SHE23-03413.001	mg/L	0.010	0.015	0.013	4.5	≤20	-
Metals-Hg Method: USEPA 7473-2007								
Mercury (Hg)	SHE23-03413.001	mg/L	0.005	<0.005	<0.005	0.0	≤10	-
VOCs Method: USEPA 8260D-2018								
Benzene	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
Carbon tetrachloride	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
Chlorobenzene	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
Chloroform	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
1,4-Dichlorobenzene	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
1,2-Dichloroethane	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
1,1-Dichloroethene	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
2-butanone(MEK)	SHE23-03413.001	mg/L	0.020	<0.02	<0.02	0.0	≤30	-
Tetrachloroethene	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
Trichloroethene	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
Vinyl chloride	SHE23-03413.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤30	-
SVOCs Method: USEPA 8270E-2018								
2-Methylphenol	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
3&4-Methylphenol	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
2,4-Dinitrotoluene	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Hexachlorobenzene	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Hexachlorobutadiene	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Hexachloroethane	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Nitrobenzene	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Pentachlorophenol	SHE23-03234.001	mg/L	0.0025	<0.0025	<0.0025	0.0	≤17.5	-
Pyridine	SHE23-03234.001	mg/L	0.002	<0.002	<0.002	0.0	≤17.5	-
2,4,5-Trichlorophenol	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
2,4,6-Trichlorophenol	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
SVOCs Method: USEPA 8270E-2018								
Endrin	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
γ-BHC	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-

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Laboratory Duplicate(DUP)

Relative deviation(RD)%=|Sample Result -Duplicate Result|*100/(Sample Result +Duplicate Result).

Parameter	Sample ID	Unit	MDL	Sample Result	Duplicate Result	RD%	RD Control Range%	Sur Control Range
SVOCs Method: USEPA 8270E-2018 (continued)								
Toxaphene	SHE23-03234.001	mg/L	0.050	<0.05	<0.05	0.0	≤17.5	-
γ-Chlordane	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
α-Chlordane	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Methoxychlor	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-
Heptachlor	SHE23-03234.001	mg/L	0.0005	<0.0005	<0.0005	0.0	≤17.5	-

The evaluation of Relative Deviation (RD) for Duplicates: All RD of duplicates on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

Matrix Spike(MS)

MS Recovery%= (MS Result-Sample Result) *100/Spike Added (Related factor should be taken into consideration) .

Parameter	Sample ID	Unit	MDL	Sample Result	MS Result	Spike Added	Recevory%	Control Range Lower	Control Range Upper
Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry Method: USEPA 200.8-1994									
Arsenic (As)	SHE23-03413.001	mg/L	0.050	<0.050	0.151	0.2	75.2	70%	130%
Barium (Ba)	SHE23-03413.001	mg/L	0.010	0.079	0.273	0.2	97.2	70%	130%
Cadmium (Cd)	SHE23-03413.001	mg/L	0.001	0.001	0.193	0.2	95.6	70%	130%
Chromium (Cr)	SHE23-03413.001	mg/L	0.010	<0.010	0.205	0.2	99.9	70%	130%
Lead (Pb)	SHE23-03413.001	mg/L	0.010	0.014	0.223	0.2	104	70%	130%
Selenium (Se)	SHE23-03413.001	mg/L	0.050	<0.050	0.170	0.2	78.1	70%	130%
Silver (Ag)	SHE23-03413.001	mg/L	0.010	0.014	0.212	0.2	99.0	70%	130%
VOCs Method: USEPA 8260D-2018									
Benzene	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0164	0.02	82.2	50%	150%
Carbon tetrachloride	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0107	0.02	53.7	50%	150%
Chlorobenzene	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0196	0.02	97.8	50%	150%
Chloroform	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0151	0.02	75.6	50%	150%
1,4-Dichlorobenzene	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0172	0.02	85.9	50%	150%
1,2-Dichloroethane	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0143	0.02	71.3	50%	150%
1,1-Dichloroethene	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0102	0.02	51.2	50%	150%
2-butanone(MEK)	SHE23-03413.001	mg/L	0.020	<0.020	<0.02	0.02	67.7	50%	150%
Tetrachloroethene	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0217	0.02	108	50%	150%
Trichloroethene	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0211	0.02	106	50%	150%
Vinyl chloride	SHE23-03413.001	mg/L	0.0005	<0.0005	0.0104	0.02	52.2	50%	150%

The evaluation of recoveries for Matrix Spiked (MS): All recoveries for MS on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

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Matrix Spike Duplicate(MSD)

Relative deviation(RD)%=|MS Recovery% -MSD Recovery%|*100/(MS Recovery%+MSD Recovery%).

Parameter	Sample ID	Unit	MDL	MS Recovery%	MSD Recovery%	RD%	RD Control Range%	Sur Control Range
Determination of trace elements in waters and wastes by inductively coupled plasma-mass spectrometry Method: USEPA 200.8-1994								
Arsenic (As)	SHE23-03413.001	mg/L	0.050	75.2	73.8	1.0	≤20	-
Barium (Ba)	SHE23-03413.001	mg/L	0.010	97.2	99.4	1.1	≤20	-
Cadmium (Cd)	SHE23-03413.001	mg/L	0.001	95.6	95.2	0.2	≤20	-
Chromium (Cr)	SHE23-03413.001	mg/L	0.010	99.9	98.9	0.5	≤20	-
Lead (Pb)	SHE23-03413.001	mg/L	0.010	104	106	0.9	≤20	-
Selenium (Se)	SHE23-03413.001	mg/L	0.050	78.1	86.0	4.8	≤20	-
Silver (Ag)	SHE23-03413.001	mg/L	0.010	99.0	97.5	0.7	≤20	-
VOCs Method: USEPA 8260D-2018								
Benzene	SHE23-03413.001	mg/L	0.0005	82.2	86.0	2.2	≤30	-
Carbon tetrachloride	SHE23-03413.001	mg/L	0.0005	53.7	64.8	9.4	≤30	-
Chlorobenzene	SHE23-03413.001	mg/L	0.0005	97.8	102	1.9	≤30	-
Chloroform	SHE23-03413.001	mg/L	0.0005	75.6	81.1	3.5	≤30	-
1,4-Dichlorobenzene	SHE23-03413.001	mg/L	0.0005	85.9	91.8	3.3	≤30	-
1,2-Dichloroethane	SHE23-03413.001	mg/L	0.0005	71.3	75.8	3.1	≤30	-
1,1-Dichloroethene	SHE23-03413.001	mg/L	0.0005	51.2	53.9	2.5	≤30	-
2-butanone(MEK)	SHE23-03413.001	mg/L	0.020	67.7	72.5	3.4	≤30	-
Tetrachloroethene	SHE23-03413.001	mg/L	0.0005	108	109	0.3	≤30	-
Trichloroethene	SHE23-03413.001	mg/L	0.0005	106	114	3.6	≤30	-
Vinyl chloride	SHE23-03413.001	mg/L	0.0005	52.2	51.6	0.5	≤30	-

The evaluation of Matrix Spiked Duplicates (MSD): All recoveries for MSD on this batch are in the controlled range, which meet the acceptance criteria of lab quality control. All RD for MS and MSD on this batch are in the controlled range, which meet the acceptance criteria of lab quality control.

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SGS-CSTC Standards Technical Services (Shanghai) Co. Ltd.
Testing Center-Environment Laboratory
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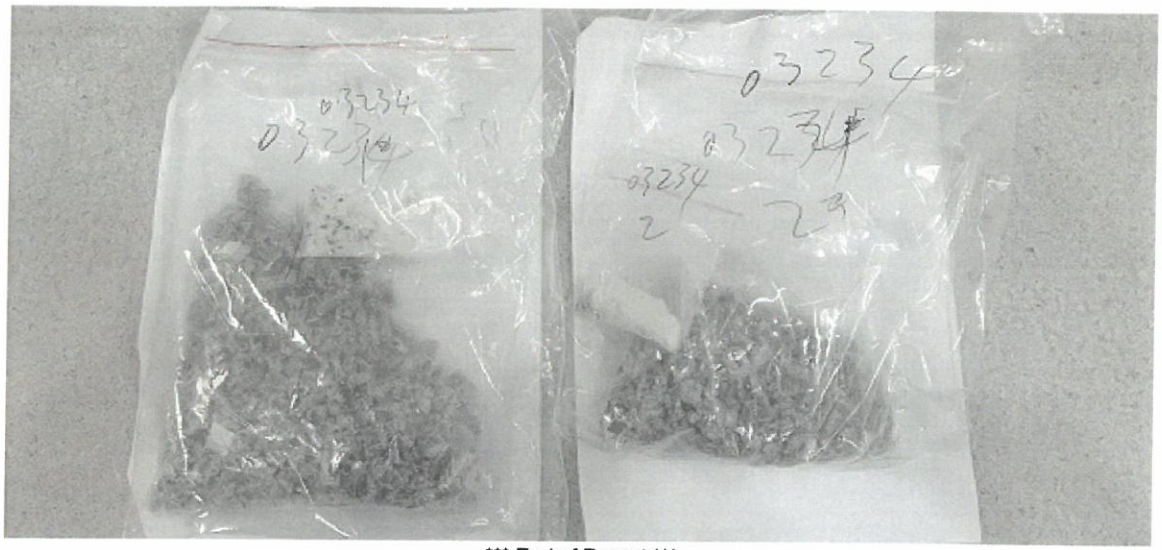

*** End of Report ***

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EXHIBIT V

DECOMMISSIONING PLAN

DECOMMISSIONING PLAN

1. Project Description

Santa Fuel Inc. is proposing to develop a 3.85-megawatt ("MW") solar energy farm in Somers, CT. A solar array consists of photovoltaic panels that transform sunlight into usable energy. The facility will have approximately 8,710 individual panels transforming sunlight each day into usable energy that is fed into the regional electric grid. The project will generate enough electricity to power over 500 homes per year. The estimated operational life of the project will be 25 years with an option to extend.

2. Construction

The Project Site consists of approximately 22.1 acres of undeveloped land, part of a larger 108.5-acre parcel (the Property) located at 159 South Road in Somers, Connecticut. The ground-mounted solar panels will be located within a fenced area of approximately 17.11 acres in size. A new access road coming off South Rd will be utilized to access the solar panels, and a new gravel road will be built to access the panels within the parcel. Each solar panel will rest on a galvanized steel and aluminum frame and will be located on a metal pole that will be driven into the ground. Utility trenches will be excavated to install the underground electrical lines leading to each string of solar panels. Once the utilities are installed the utility trench will be filled and seeded to maintain a consistent grassed surface. Concrete slabs will be installed to hold the necessary inverters/transformers required to operate the solar array.

3. Decommissioning Process

This section sets out the details and different steps of decommissioning the solar farm. The installation will be removed no more than one year after operations are discontinued.

a) Deconstruction: DC-Cabling

All inverter systems and electrical components of the PV system will be switched off. In following all plug-in connectors and string cables will be disconnected. To remove the cables which are laid in the ground, all cable trenches will be opened. In the following, all cables will be removed and separated. After the uninstalling of the wiring, the materials will be disposed of in accordance with the disposal regulations for metal waste which applies at the installation site at the time.

b) Deconstruction: PV-Modules

All PV modules will be removed and separated from the mounting system and removed from the site. After removal, the PV modules will be reused or recycled.

c) Deconstruction: Inverters / Transformers / Substation

After the uninstallation of the entire monitoring system (cabling + components) the inverter / transformer stations as well as the substation will be removed from the site. The concrete foundations will be removed, and the holes will be filled with soil. Then the transformer stations will be removed and disposed of in accordance with the disposal regulations for metal and concrete waste which apply at the installation site at the time.

d) Deconstruction: Mounting System

The mounting system will be removed completely. The deconstruction shall proceed as follows: I. module carrier system, II. purlin profiles, III. Posts. The disposal of the materials will be done in accordance with the disposal regulations for metal waste which applies at the installation site at the time.

e) Deconstruction: AC- Cabling / Earthing

All AC-cables and combiner boxes will be disconnected and removed. To remove the cables which are laid in the ground, all cable trenches will be opened. In the following all cables and earth stripes will be removed and separated. The cable trenches will be back filled. After all wiring has been uninstalled, the materials will be disposed of in accordance with the disposal regulations for metal waste which applies at the installation site at the time.

f) Deconstruction: Fence and Alarm System

All parts of the fence as well as the alarm system (if applicable) will be removed. The disposal of the materials follows in accordance with the disposal regulations for metal waste which apply at the installation site at the time.

g) Ground Regulation

When the decommission works are completed, the land will be restored by grading and revegetating disturbed areas.

All equipment and fixtures removed from the solar farm will either be reused, recycled, or disposed of at the time of decommissioning. Upon decommissioning of this solar farm, reuse of the solar panels will be the priority. If reuse is not feasible, the solar panels will be recycled in accordance with the PV CYCLE USA waste management scheme, or similar. Items that are not able to be reused or recycled will be disposed of in accordance with local rules and regulations.

4. Cost

We have researched the current price estimates for the disassembly & disposal of the solar equipment, site restoration, and value of salvageable materials and have made the following assumptions:

- Current labor costs are currently about $26 per hour for the state of Connecticut, according to the Bureau of Labor Statistics. We have assumed 2% inflation per annum over the lifetime of the project (40 years).
- Salvage values have been estimated using data from http://www.scrapmonster.com.

The value of salvageable parts offsets approximately 35% of decommissioning costs. Salvage value is likely to fluctuate and change over the next 40 years.

Projected Cost of Decommissioning		
Item	Tasks	Estimated Labor Cost
1	Remove panels from racks/disassemble racking	$56,857
2	Remove earth screws	$59,590
3	Remove fencing	$12,900
4	Remove underground electrical	$10,476
5	Remove concrete pads	$2,640
6	Load salvageable parts	$30,696
7	Grade and seed disturbed areas	$18,938
8	Supervision	$9,631
9	116 haul truck loads	$34,254
	Total Cost	**$235,981**
Salvageable Parts and Materials		
Item	Parts/Materials	Salvageable Cost
1	Steel fence – 9.8 tons at $111/ton	$1,086
2	Solar racking components - 458 tons at $160/ton	$73,617
3	Copper wiring – 2.4 tons at $1.43/lb	$6,864
4	Aluminum wiring – 3.1 tons at $0.25/lb	$1,581
5	Solar inverters + transformers (value covers removal)	$ -
	Total Value of Salvageable Materials	**$83,148**
	Net Decommissioning Cost	**$152,832**

5. Force Majeure

An exception to these requirements will be allowed for a force majeure event, which is defined as any event or circumstance that wholly or partly prevents or delays the performance of any material obligation arising under the Project permits, but only to the extent:

- Such event is not within the reasonable control, directly or indirectly, of Santa Fuel Inc. (including without limitation event such as fire, earthquake, flood, tornado, hurricane, acts of God and natural disasters; war, civil strike or similar violence);
- Santa Fuel Inc has taken all responsible precautions and measures to prevent or avoid such event or mitigate the effect of such event on Santa Fuel Inc's ability to perform its obligations under the Project permits and which, by the exercise of due diligence, it has been unable to overcome; and

- Such event is not the direct or indirect result of the fault of negligence of Santa Fuel Inc.

In the event of force majeure event, which results in the absence of electrical generation by one or more solar panels for 12 months, Santa Fuel Inc will demonstrate to the Municipality by the end of the 12 months of non-operation that the Project, or any single solar panel, will be substantially operational and producing electricity within 24 months of the force majeure event. If such a demonstration is not made to the Municipality's satisfaction, the decommissioning of any single solar panel only (and no other part of the Project that is operational) or if the entire Project is not substantially operational and producing electricity, then decommissioning of the Project will be initiated within 18 months after the force majeure event.

EXHIBIT VI

NOTICE TO TOWN AND STATE OFFICIALS AND ABUTTERS AND ABUTTERS MAP

September 15, 2023

Via Certified Mail

<Name and Address>

Re: Santa Fuel, Inc. – Notice of Intent to File a Petition for Declaratory Ruling for the Construction, Operation and Maintenance of a 3.85 MW(ac) Solar Photovoltaic Electric Generating Facility at the 159 South Road in Somers, Connecticut

Dear <Salutation>:

Pursuant to the provisions of §16-50j-40(a) of the Regulations of Connecticut State Agencies, this letter serves as notice that the Santa Fuel, Inc. intends to file a Petition for Declaratory Ruling (Petition) with the Connecticut Siting Council (Council) on or about September 15, 2023, seeking approval of the construction, operation and maintenance of a 3.85 megawatt (MW)(ac) solar power generating facility, including all associated equipment, related site improvements, and interconnection (the Project).

The Project is located at 159 South Road in Somers, Connecticut. The Project will include an approximate 17.11 acre solar array. The Project shall provide power to the Eversource grid. The Project will consist of the installation of ground-mounted photovoltaic panels, centralized inverters and transformers, electrical lines, electrical transformers, a perimeter fence and stormwater management controls, and evergreens for screening. For details regarding the location and layout of the Project, please see the attached reduced sized copy of the Overall Site Plan.

Pursuant to the provisions of the Connecticut General Statutes §16-50g et seq., the location of certain project features may change as this Petition proceeds through the Council's regulatory review process.

If you have any questions, please feel free to contact me. My contact information is provided below.

Respectfully,

Timothy A. Coon, P.E.
J.R. Russo & Associates, LLC

Attachment (Overall Plan)

CERTIFICATION OF SERVICE

I hereby certify that on this 15th day of September 2023 notice of intent to file the Santa Fuel, Inc. Petition for Declaratory Ruling was sent, via certified mail, to the following:

Somers Town Officials:
Tim Keeney, First Selectman
Town of Somers
600 Main Street
Somers, CT 06071

Joan Formeister, Chairman
Somers Conservation Commission
600 Main Street
Somers, CT 06071

W. Karl Walton, Chairperson
Somers Zoning Commission
600 Main Street
Somers, CT 06071

Regional Council of Governments:
Capitol Region Council of Governments (CRCOG)
241 Main Street
Hartford, CT 06106-5310

State Officials:
Kurt Vail
Representative – 52th District
Legislative Office Building
300 Capitol Avenue, Room 4200
Hartford, CT 06106

John Kissel
Senator – 7th District
Legislative Office Building
300 Capitol Avenue, Room 3400
Hartford, CT 06106-1591

The Honorable William Tong
Attorney General
Office of the Attorney General
165 Capitol Avenue
Hartford, CT 06106

James C. Rovella, Commissioner
Department of Emergency Services and Public Protection
Emergency Management and Homeland Security Division
1111 Country Club Road
Middletown, CT 06457
Katie Dykes, Commissioner
Department of Energy & Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

Manisha Juthani, M.D, Commissioner
Department of Public Health
410 Capitol Avenue
Hartford, CT 06134

Paul Aresta, Executive Director
Council on Environmental Quality
79 Elm Street
P.O. Box 5066
Hartford, CT 06106

Marissa Gillett, Chair
Public Utilities Regulatory Authority
Ten Franklin Square
New Britain, CT 06051

Jeffrey R. Beckham, Acting Secretary
Office of Policy and Management
450 Capitol Avenue
Hartford, CT 06106

Alexandra Daum, Commissioner
Department of Economic and Community Development
450 Columbus Boulevard
Hartford, CT 06103

Garrett Eucalitto, Commissioner
Department of Transportation
P.O. Box 317546
2800 Berlin Turnpike
Newington, CT 06131-7546

Jonathan Kinney
State Historic Preservation Officer
Department of Economic & Community Development
450 Columbus Boulevard, Suite 5
Hartford, CT 06103

Bryan P. Hurlburt, Commissioner
Department of Agriculture
450 Columbus Boulevard, Suite 701
Hartford, CT 06103

Michelle Gilman, Commissioner
Department of Administrative Services
450 Columbus Boulevard
Hartford, CT 06103

(see attached List of Abutters)

Abutting Property Owners

Northern Connecticut Land
Trust, Inc.
P.O. Box 324
Somers, CT 06071

JVLADD Properties, LLC
P.O. Box 8
Somers, CT 06071

Nancy B. Edgar Revocable Trust
11 Mountain View Road
Somers, CT 06071

Dianne B. Lenti
41 Haystack Road
Manchester, CT 06040

Tara J. & Lennon A Cormie
35 Stillmeadow Lane
Somers, CT 06071

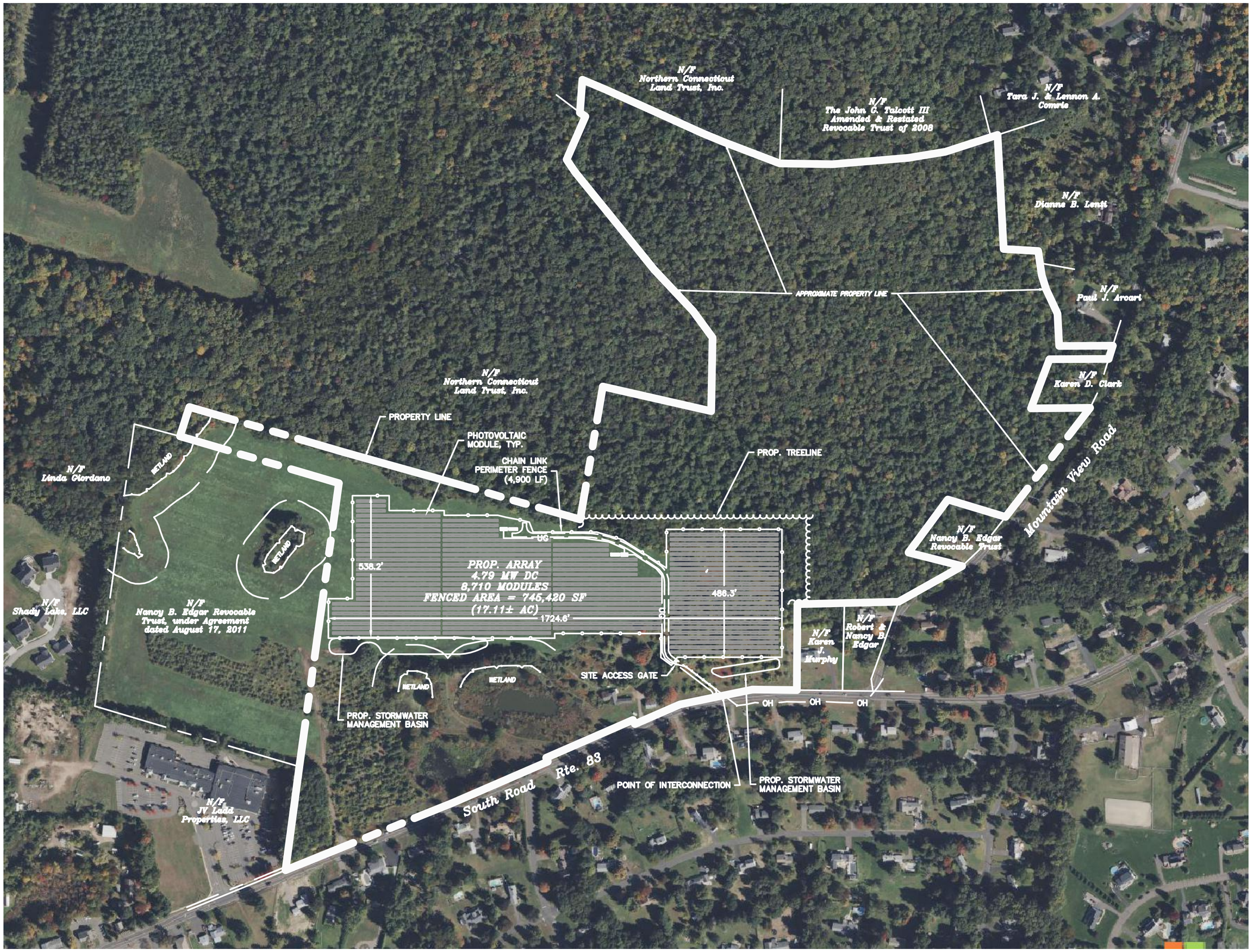
John G. Talcott III Amended &
Restated Trust
48 Main Street
Talcottville, CT 06066

Karen J. Murphy
187 South Road
Somers, CT 06071

Robert & Nancy B. Edgar
11 Mountain View Road
Somers, CT 06071

Karen D. Clark
70 Mountain View Road
Somers, CT 06071

Paul J. Arcari
71 Mountain View Road
Somers, CT 06071



GRAPHIC SCALE

(IN FEET)
1 inch = 200 ft.

RUSSO
SURVEYORS • ENGINEERS
SERVING CT & MA

J.R. Russo & Associates, LLC
P.O. Box 938, 1 Shoham Rd East Windsor, CT 06088
www.jrrusso.com • CT 860.623.0569 • MA 413.785.1158

Applicant
Santa Fuel, Inc.
154 Admiral Street
Bridgeport, CT 06605

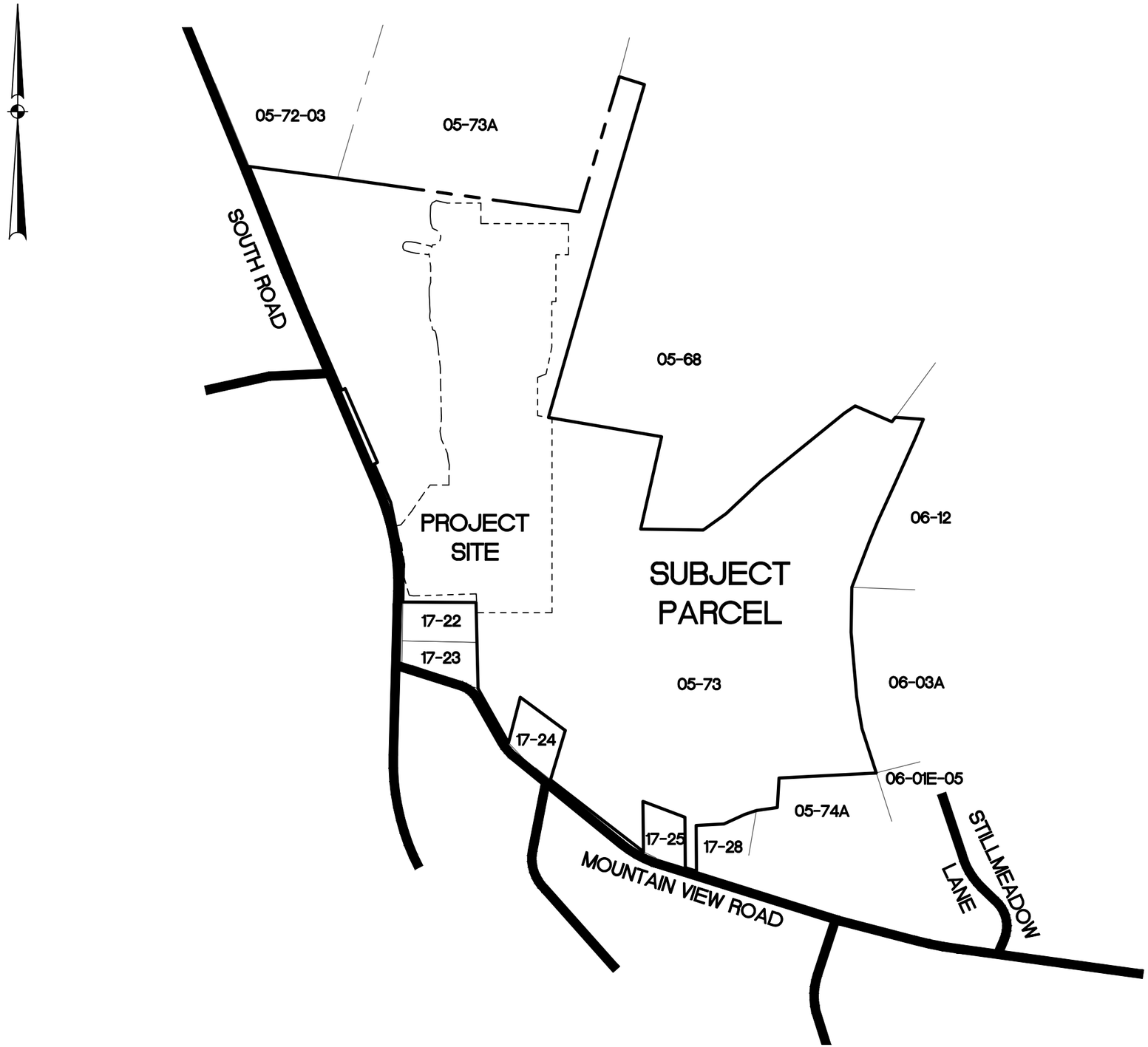
REVISIONS

BY: LF/TAC | CHK: JEU

Somers Solar
159 South Road
Somers, Connecticut
Map 05 Lot 73 Zone: A-1

Overall Aerial Site Plan

DATE	9-14-23
SCALE	1"=200'
JOB NUMBER	2023-001
SHEET	4 of 8



Lot#	Name & Address
05–68	Northern Connecticut Land Trust, Inc. P.O. Box 324 Somers, CT 06071
05–72–03	JVLADD Properties, LLC P.O. Box 8 Somers, CT 06071
05–73A	Nancy B. Edgar Revocable Trust 11 Mountain View Road Somers, CT 06071
05–74A	Dianne B. Lenti 41 Haystick Road Manchester, CT 06040
06–01E–05	Tara J. & Lennon A. Comrie 35 Stillmeadow Lane Somers, CT 06071
06–03A	John G. Talcott III Amended & Restated Trust 48 Main Street Talcottville, CT 06066
06–12	Northern Connecticut Land Trust, Inc. P.O. Box 324 Somers, CT 06071
17–22	Karen J. Murphy 187 South Road Somers, CT 06071
17–23	Robert & Nancy B. Edgar 11 Mountain View Road Somers, CT 06071
17–24	Nancy B. Edgar Revocable Trust 11 Mountain View Road Somers, CT 06071
17–25	Karen D. Clark 70 Mountain View Road Somers, CT 06071
17–28	Paul J. Arcari 71 Mountain View Road Somers, CT 06071

ABUTTERS MAP

Somers Solar

Louth Callan Renewables, LLC

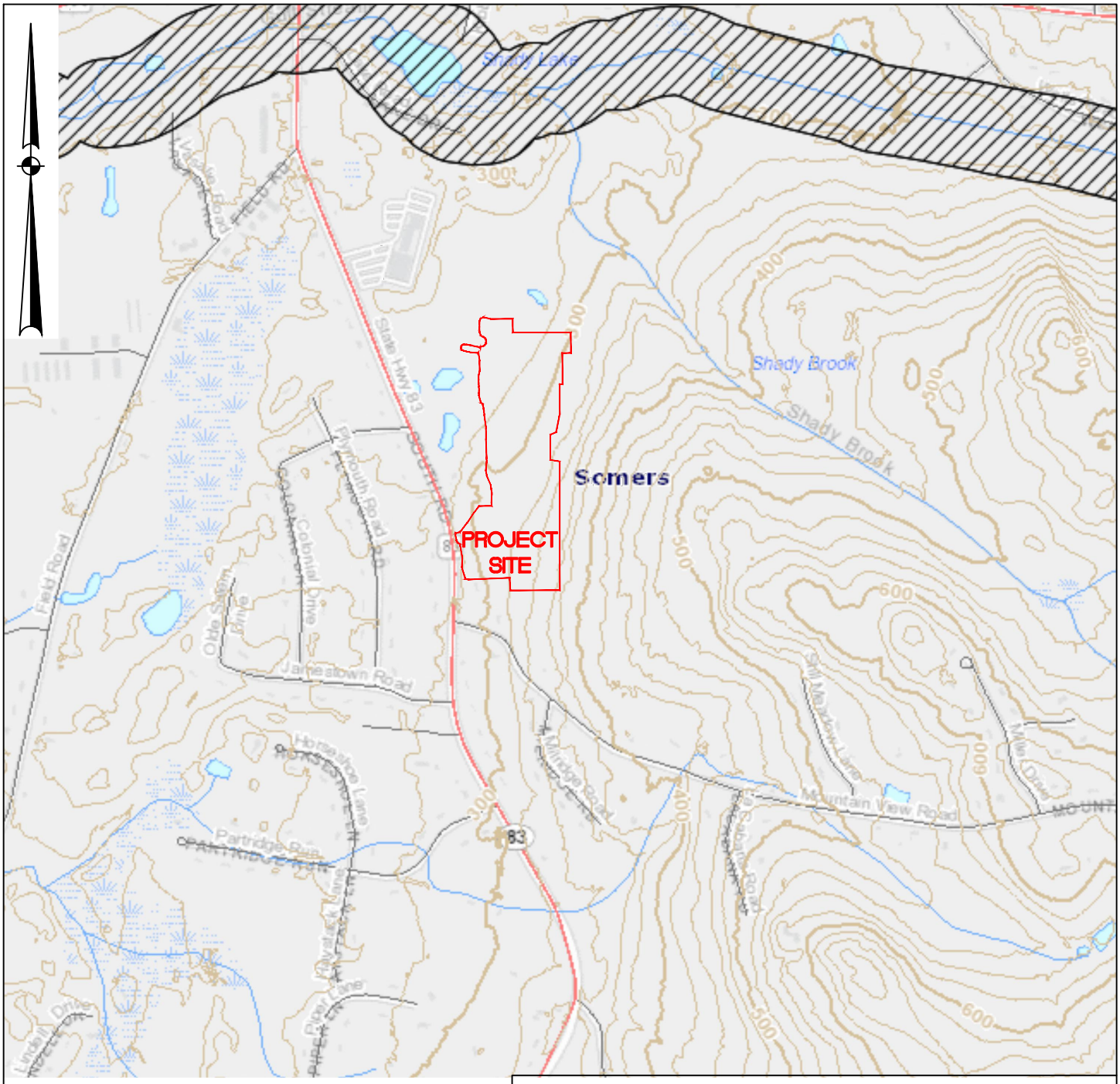
159 South Road
Somers, Connecticut

RUSSO
SURVEYORS·ENGINEERS
SERVING CT & MA
J.R. Russo & Associates, LLC
1 Shoham Rd East Windsor, CT 06088 • CT 860.623.0569 • MA 413.785.1158
www.jrrusso.com • info@jrrusso.com

DATE	9–5–2023
SCALE	NOT TO SCALE
JOB NUMBER	2023–001
SHEET	EXHIBIT VI

EXHIBIT VII

NATURAL DIVERSITY DATABASE MAP



NATURAL DIVERSITY DATABASE AREA

SOURCE:
CT ENVIRONMENTAL CONDITIONS ONLINE
NDDB MAP JUNE 2023

ENDANGERED SPECIES MAP

Somers Solar

Louth Callan Renewables, LLC

159 South Road
Somers, Connecticut

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DATE	9-5-2023
SCALE	1"=1,000'
JOB NUMBER	2023-001
SHEET	EXHIBIT VII

EXHIBIT VIII

WETLAND REPORT

Datum Engineering & Surveying LLC.
Richard Zulick
Certified Forester / Soil Scientist
400 Nott Highway
Ashford, CT
06278

March 7, 2023

Timothy Coon, P.E.
JR Russo & Associates,LLC
P.O. Box 938
East Windsor, CT 06088

Re: Wetland report Solar Project – South Road, Somers, CT Map 05 – Lot 73

Dear Tim:

Per your request, I have conducted a wetland delineation to identify the Connecticut regulated wetland soils on the above referenced parcel located on the east side of South Road (Route 83) in Somers. This delineation was conducted for the purposes of identifying wetland soils as they relate to a proposed solar project. The wetlands were delineated on December 4, 2022.

The wetlands on this plan have been field delineated in accordance with the standards of the National Cooperative Soil Survey and the definition of wetlands as found in the Connecticut General Statutes, Chapter 440, Section 22A-38.

This delineation is not intended to be used for soil mapping but to identify the wetland soils relative to the development and management of this parcel

Wetland/watercourses on the site consist of two excavated ponds. The wetland boundaries have been marked with pink and blue flagging and labeled as shown on the plan. Flag numbers are W40 to W47 and W 48 to W54 and delineate the easterly extent of the ponds adjacent to the proposed activity.

All soils on the site, including the field and ponds have been altered by extensive gravel extraction. Based on existing conditions, upland soils were restored with topsoil placed over excavated subsoils. The fields have been producing well maintained grasses and have developed a robust topsoil horizon with depths of 8"-16", overlying sandy to gravelly loam subsoil.

The two ponds appear to be man-made excavations with notable berms around the edges. The ponds were cut into the existing groundwater table and appear to maintain a relatively consistent water level. Based on vegetation within the ponds, they are relatively old and have well developed herbaceous and shrub layer. Shallow areas around the pond fringe have also been colonized by small trees.

Since the ponds were excavated into existing subsoil and substratum, they are defined as Aquepts and consist of the original soil and subsoil (identified as Manchester sand and gravel on the Web Soil Survey)

that are saturated by groundwater at or near the soil surface. The wetland soils do not have a lot of horizon development and consist of dark to dark grey organic sand and gravel.

As indicated above, upland soils are mapped as Manchester series. The Manchester series consists of very deep, excessively drained soils formed in sandy and gravelly glacial outwash and stratified drift. They are nearly level to steep soils on outwash plains, terraces, kames, deltas and eskers. Slope ranges from 0 to 45 percent

TAXONOMIC CLASS: Sandy-skeletal, mixed, mesic Typic Udorthents

Since most of the deep sands and gravels were previously excavated, the remaining soils typically consist of restored topsoil overlying compacted sand and gravel. Borings conducted by hand met often met refusal within 16-24 inches.

I have reviewed the overview plan for the purposes of assessing the wetland functions and values and potential impacts to the wetlands associated with the development of the proposed solar array.

Existing Conditions

The proposed development area consists of a gently sloping gravelly sandy loamy upland area located east of Somers Road and is currently in agricultural (hay) production. This entire area is considered disturbed by definition, in that, the area was previously excavated for sand and gravel and was subsequently restored and maintained in hay production.

Wetland Functions and Values

The wetland complex was inspected to determine wetland functions and values utilizing the Army Corps. of Engineers methodology as outlined in "The Highway Methodology Workbook Supplement". These wetlands exhibited the following wetland functions and values with the corresponding rationale:

***Ground water recharge and discharge**: both ponds are excavated into the existing groundwater table. The ponds drain into a culvert across south road and as such, serve to discharge groundwater. Potential for and public or private wells occur downstream of the wetland. The wetland is underlain by gravel or sandy soils present in or adjacent to the wetland.*

***Flood flow alteration:** the wetland receives stormwater runoff from the drainage area to the east, but capacity for flood storage is limited by the existing ponded area, which (also) appears to be the local groundwater level.*

***Sediment/toxicant retention:** potential sources of sediment are in the watershed above the wetland, opportunity for sediment trapping by slow moving water and shallow water habitat are present in this wetland. The wetland has a high degree of water and vegetation interspersion, and dense vegetation provides opportunity for sediment trapping.*

***Nutrient removal:** Overall potential for sediment trapping exists within the pond/wetland system. Saturated soils exist for most of the season, ponded water is present in the wetland, organic/sediment deposits are present, dense vegetation is present with emergent vegetation and/or dense woody stems dominant, water retention/detention time in this wetland is increased by thick vegetation and other dense*

herbaceous and shrub vegetation in wetlands utilize and immobilize excess nutrients transported/deposited by developed areas up-gradient.

Production export: *The pond/wetland complex appear to maintain a stable permanent pool and have diverse vegetation. With permanent ponding and moderate cover, waterfowl use is possible, but may be limited by proximity to South Road. With a permanent pool and diverse wetland vegetation, the ponds likely support a diverse amphibian population. The pond an wetland complex exhibits moderate degree of plant community structure/species diversity and the wetland contains flowering plants that are used by nectar-gathering insects.*

The wetlands were also examined for wetland values (recreational, educational/scientific, visual/aesthetic, or uniqueness/heritage values) and the following values were noted with their rationale:

None found

Conclusions:

In summary, it is my opinion that the pond and wetland area are a functioning wetland ecosystem which exhibits 5 wetland functions and 0 out of the 5 wetland values. No significant negative impacts will result from this proposed development. The wetland areas will remain undeveloped and wetland functions will not be altered.

If you have any questions concerning the wetland function assessment or this report, please feel free to contact me.

Sincerely,

Richard Zulick
Certified Forester and Soil Scientist
Member SSSSNE

22-008

EXHIBIT IX

DRAINAGE REPORT

DRAINAGE REPORT
Louth Callan Renewables, LLC
Somers Solar
159 South Road
Somers, CT

September 12, 2023

Prepared for:

Santa Fuel, Inc.
154 Admiral Street
Bridgeport, CT 06605

Owner:

Nancy B. Edgar Revocable Trust
& Dianne Bordeax Lenti
11 Mountain View Road
Somers, CT 06071

Project No. 2023-001

Prepared by:

J.R. Russo & Associates
Land Surveyors & Professional Engineers
P.O. Box 938
East Windsor, CT 06088
(860) 623-0569

I. INTRODUCTION

A. Project Description

The applicant is proposing to construct a ground mounted solar array at 159 South Road in Somers. The proposed project includes a fenced area of approximately 17.1 acres containing 8,710 solar panel modules. The development will include two stormwater management basins designed to provide groundwater recharge and retention of stormwater to ensure no environmental or flooding impacts downstream. The development and stormwater management system have been designed in accordance with the CT Stormwater Quality Manual and Department of Energy & Environmental Protection's (DEEP's) Stormwater General Permit.

B. Existing Conditions

The project site consists of approximately 22.1 acres of undeveloped land, part of a larger 108.5-acre parcel (the property) located at 159 South Road in Somers, Connecticut. The property is located on the east side of South Road and the north side of Mountain View Road. The northeastern portion of the property was formerly mined for gravel. The gravel mining operation was initiated in 1998 and terminated in 2009. Upon completion of the mining operations, disturbed areas were restored and are currently maintained as hay field. The southeastern portion of the property is undeveloped woodland. The southwestern portion of the property consists of an old orchard that is no longer maintained. An existing single-family home with a couple of barns and a former fruit stand are located adjacent to South Road on the western portion of the Property. Two dug ponds are located in the northwestern portion of the Property. The area around the ponds has become overgrown with brush.

The project site slopes downwards from east to the west. Runoff from the northern portion of the project site flows into the two on-site dug ponds. Runoff from the southern portion of the project site flows into an existing depressed area along Somers Road that conveys water to an existing culvert that crosses under Somers Road to the west.

Based on a review of the USDA Soil Survey, the soils in the drainage area of the proposed development are classified as Manchester gravelly sand, Charlton-Chatfield complex, or Cheshire fine sandy loam (See Soils Map in Appendix 1). The USDA Soil Survey defines groups of soils into Hydrologic Soil Groups (HSG) according to their runoff-producing characteristics. Soils are assigned to four groups (A, B, C, and D Groups). In group A, are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They typically are deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a hardpan or clay layer at or near the surface, have a permanent high-water table, or

are shallow over nearly impervious bedrock or other nearly impervious material. Charlton-Chatfield complex and Cheshire fine sandy loam are classified as HSG B. The HSG classification of Manchester gravelly sand is HSG A.

On April 7, 2023, a series of five test pits were performed in the area of the proposed stormwater management basins to confirm the existing soil conditions. Two additional test pits were performed on June 13, 2023 in the area of the second proposed stormwater management basin. Test pits 1-3 were located in the former gravel pit area in the vicinity of the northern basin (#1) while test pits 4-7 were in the orchard in the vicinity of the southern basin (#2). Test Pits 1-3 were excavated to a depth of 108 inches. Soils encountered included 12-16 inches of topsoil over fine to coarse sand with gravel. Soil mottling indicative of the seasonal high water table was encountered at 48 inches below the ground surface in TP1, 80 inches in TP2, and 60 inches in TP3. Test pits 4 & 5 are farther up the hill to the east of the southern basin. Soils encountered included 10-11 inches of topsoil over light brown sandy loam subsoils to a depth of 24 inches, overlying coarse sand and gravel. No soil mottling was encountered in either test pit, but TP5 hit refusal at 66 inches. TP4 was excavated to a depth of 108 inches. Test pits 6 & 7 are down the hill near the southern basin. They were excavated to depths of 144 and 120 inches. Soils encountered included 8-12 inches of topsoil with some brown loamy sand subsoils in TP6 to a depth of 20 inches, overlying fine to coarse sand with gravel. No soil mottling was encountered in either test pit. Test pit logs are provided on the Site Plans.

Soil samples were subsequently collected in the vicinity of test pits 1, 2, 6 and 7 at depths of 18-24 inches with a post hole digger. These samples were submitted to New England Materials Testing Lab, LLC for permeability testing by ASTM D2434. The permeability calculated for the four samples were 5.7 in/hr, 0.75 in/hr, 1.784 in/hr, and 0.49 in/hr, respectively. Permeability test results are also provided in Appendix 1.

II. STORMWATER RUNOFF ANALYSIS

A. Methodology

Peak runoff flow rates were determined for pre- and post-development conditions using Applied Microcomputer System's HydroCAD™ Stormwater Modeling System. This computer software employs the SCS Technical Release 55 and 20 (TR-55 & TR-20) methodology. The potential stormwater impacts downstream were evaluated for the 2-yr, 25-yr, 50-yr, and 100-yr; 24-hour storm events. The rainfall for these storm events was taken from NOAA Atlas 14 provided in Appendix 2.

Based on the present drainage patterns, two design points were selected for the analysis. Design point #1 (DP1) is the wetland at the edge of the dug ponds located that receives runoff from the northern portion of the development. Design Point #2 (DP2) is the roadside

swale that collects runoff from the southern portion of the project site and conveys it to the culvert south of the site that crosses under Somers Road.

B. Pre-Development Hydrology

The pre-development site was divided into four subcatchments as shown on the pre-development drainage area map in Appendix 3. Subcatchment E1 includes the off-site area that flows through the site to DP1. Subcatchment E2 includes the on-site area that flows to DP1. Subcatchment E3 includes the off-site area that flows through the site to DP2. Subcatchment E4 includes the on-site area that flows to DP2. The pre-development runoff characteristics of the contributing areas are provided on the HydroCAD data sheets in Appendix 4. The pre-development discharge rates from the site during the design storms are summarized in Tables 1-2.

C. Post-Development Hydrology

The Project Site consists of a 17.11-acre fenced area surrounding the array. The proposed solar array will be mostly be installed at existing grade. Some grading will occur in the area of the existing orchard where slopes are in excess of 15%. These slopes will be reduced to less than 15%. Overall, the drainage patterns will be maintained. Soil disturbance will be limited to the construction of the stormwater management basins and driveway; the stump removal of the southeastern portion of the array; and the re-grading of slopes in excess of 15%. The existing vegetation within the undisturbed portion of the array will be maintained throughout the project to provide stabilization of the underlying soils and prevent erosion and sedimentation. The proposed tracker panel solar arrays will be installed on elevated racks that provide adequate height above the ground to allow for infiltration, and promote the revegetation of the southwest portion and the continued growth of the existing vegetative cover. As a result, post construction, the areas containing the solar arrays can be considered pervious vegetated groundcover.

In accordance with Appendix I of the DEEP's General Permit, the hydrologic analysis is required to account for the compaction of soils that result from extensive machinery traffic over the course of the construction of the array. To account for this, the runoff curve number must be increased by one full HSG category where grading within the array exceeds a 2-foot difference between existing and proposed grades and one half the difference between the on-site HSG and the next higher HSG for the remainder of the array. As discussed above, majority of the proposed array at our site will utilize existing grades. Of the 17.1 acres within the array, only 0.7 acres exceed a 2-foot difference between existing and proposed grades. Thus, to meet this requirement, the post construction runoff curve number was increased by one full HSG category for the 0.7 acres and by one half the difference for the remainder of the array.

The project will include the construction of two stormwater management basins to mitigate the increase in runoff from the development. The northern stormwater management basin (Basin 1) will be equipped with a 30" flared end as a primary outlet and a 20-feet wide earthen berm spillway. The southern stormwater management basin (Basin 2) will be equipped with a 12" pipe as a primary outlet and a 20-feet wide earthen berm spillway. Basin 1's outlet pipe will discharge onto a Type 1 preformed scour hole upgradient of the wetland associated with the northern pond. Basin 2's outlet pipe will discharge onto a Type A riprap apron into the roadside swale. Outlet protection for the basins' spillways will consist of 12" thick modified riprap slopes extended 5 feet beyond the toe of the slope. A stone trench will also be installed in the bottom of each basin to facilitate infiltration, especially in the winter months when the ground could freeze.

As discussed above, two soil samples were collected from the soils at the base of each of the proposed stormwater management basins and analyzed for permeability. Samples PH1 and PH2 were collected from the vicinity of test pits TP1 and TP2 in the area of Basin 1. Samples PH6 and PH7 were collected from the vicinity of test pits TP6 and TP7 in the area of Basin 2. The resulting permeabilities were 5.7 in/hr (PH1), 0.75 in/hr (PH2), 1.784 in/hr (PH6) and 0.49 in/hr (PH7). As a conservative measure, the slowest permeability rate in each the basins (0.75 in/hr for Basin 1 and 0.49 in/hr for Basin 2) was used as the basis for the design infiltration rate.

The post-development site was divided into 6 subcatchments as shown on the post-development drainage area map in Appendix 3. Subcatchment S1 includes the off-site area that flows through the site into the northern basin (Basin 1) that will discharge towards the DP1. Subcatchment S2 includes the on-site area that flows into Basin 1. Subcatchment S3 includes the off-site area that flows through the site into the southern basin (Basin 2) that will discharge towards DP2. Subcatchment S4 includes the on-site area that flows into Basin 2. Subcatchment S5 includes the area that bypasses Basin 2 and sheet flows directly to DP2. Subcatchment S6 includes the area that bypasses the Basin 1 and sheet flows directly to DP1. The post development subcatchment characteristics are summarized in the attached HydroCAD data sheets in Appendix 5. The post-development discharge rates from the site during the design storms are summarized in Tables 1-2.

Using the characteristics described above, the Post Development peak flow rates for the site were calculated for the 2, 25, 50, and 100-year 24-hour rainfall design storms. Refer to Appendices 4 and 5 for pre-development and post-development HydroCAD data sheets. Tables 1-2 compares the pre-development peak flows with the post-development peak flows at the design point. As shown, the resulting post-development peak flows are less than the pre-development peak flows.

TABLE 1 – COMPARISON OF PRE- & POST-DEVELOPMENT DISCHARGE RATES (CFS) TO DESIGN POINT 1 (WETLAND)

	2-year	25-year	50-year	100-year
Pre-Development	1.9	24.3	33.6	46.2
Post Development	0.4	16.5	24.5	33.8

TABLE 2 – COMPARISON OF PRE- & POST-DEVELOPMENT DISCHARGE RATES (CFS) TO DESIGN POINT 2 (STREET CULVERT)

	2-year	25-year	50-year	100-year
Pre-Development	0.3	4.8	7.0	9.7
Post Development	0.1	4.1	5.1	8.9

D. Stormwater Treatment

Appendix I of the DEEP Stormwater General Permit requires that all solar panels in the array be considered effective impervious cover for the purposes of calculating Water Quality Volume if the proposed post-construction slopes at a site are 15% or more or if slopes less than 15% do not meet the four listed conditions:

a) The vegetated area receiving runoff between rows of solar panels is equal to or greater than the average width of the row of solar panels draining to the vegetated area;
b) Overall site conditions and solar panel configuration within the array are designed so stormwater runoff remains as sheet flows across the entire site towards the intended stormwater management controls;
c) The following conditions are satisfied regarding the design of the post-construction slope of the site:
    i. Slopes less than or equal to 5%:
        Appropriate vegetation shall be established that will ensure sheet flow conditions and that will provide sufficient ground cover throughout the site.
    ii. Slopes between 5% and 10%:
        Practices such as level spreaders, terraces, or berms shall be used to ensure long term sheet flow conditions.
    iii. Slopes greater than or equal to 10% and less than 15%:
        The plan must include specific engineered stormwater control measures with detailed specifications that are designed to provide permanent stabilization and non-erosive conveyance of runoff downgradient from the site.
    iv. Slopes greater than or equal to 8%:
        Erosion control blankets, stump grindings, erosion control mix mulch, or hydroseed with tackifier shall be applied within 72 hours of final grading, or

when a rainfall of 0.5 inches or greater is predicted within 24 hours of final grading, whichever time period is less.

d) The solar panels shall be designed as to allow the growth of native vegetation beneath and between the panels.

Proposed grading of the existing steep slopes at the site will reduce slopes to less than 15%. Therefore, conditions (a)-(d) are required to be met in order to avoid treating the panels as impervious area. To satisfy condition (a), the proposed row spacing of 11.23' will exceed the 7.40' width of the panels' horizontal projection. To satisfy condition (b), the existing grades and vegetation will be maintained in the northern portion of the array. Where re-grading occurs in the southern portion of the array, berms of coarse woody debris generated from clearing activities will be installed and maintained along the contours at regular intervals throughout the portion of the array that has been cleared to capture and redistribute runoff as sheet flow. For condition (c), where the existing vegetation will be maintained throughout construction, the need for additional erosion control measures to provide stabilization of the slopes are not necessary. Where tree clearing and re-grading woody berms will be installed along the contours at regular intervals to provide additional slope to satisfy condition c. In addition, all disturbed areas will be seeded with a pollinator seed mix and mulched immediately to establish a vegetated cover. Finally, to satisfy condition (d), the proposed fixed panel solar arrays will be installed on elevated racks that provide adequate height above the ground to promote the continued growth of the existing vegetative cover and allow for infiltration.

As a result of satisfying the conditions above, the panels need not be considered as impervious coverage for the calculation of the WQV. Thus, the only proposed surfaces required to be included in the calculation of the WQV are the equipment pads and gravel access drive. However, these areas are small in relation to the overall site and not directly connected to the stormwater collection system. Thus, runoff from these areas will sheet flow over significant distances through the established, dense vegetation which will provide adequate filtering to treat and remove any pollutants that may be generated in these areas.

E. Summary of Results

The proposed design and analysis indicates that the proposed development will not result in negative flooding impacts downstream. In addition, the maintenance of existing grades, vegetation and sheet flow drainage patterns during and after construction will prevent any negative impacts downstream resulting from erosion or sedimentation.

Appendix 1:
SOILS INFORMATION

Custom Soil Resource Report
Soil Map

Map Scale: 1:5,930 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	43.8	44.1%
62C	Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony	0.7	0.7%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	5.8	5.9%
73C	Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky	45.3	45.6%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	3.6	3.7%
Totals for Area of Interest		**99.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not

mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

State of Connecticut

37C—Manchester gravelly sandy loam, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9ln6
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 54 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Manchester and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Manchester

Setting

Landform: Terraces, outwash plains, kames, eskers
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy and gravelly glaciofluvial deposits derived from sandstone and shale and/or basalt

Typical profile

Ap - 0 to 9 inches: gravelly sandy loam
Bw - 9 to 18 inches: gravelly loamy sand
C - 18 to 65 inches: stratified extremely gravelly coarse sand to very gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hartford

Percent of map unit: 5 percent
Landform: Terraces, outwash plains

Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Penwood

Percent of map unit: 5 percent
Landform: Terraces, outwash plains
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Branford

Percent of map unit: 3 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Ellington

Percent of map unit: 3 percent
Landform: Terraces, outwash plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Unnamed, gravelly loamy sand surface

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, nongravelly surface

Percent of map unit: 2 percent
Hydric soil rating: No

62C—Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2wks7
Elevation: 0 to 1,310 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 50 percent
Charlton, extremely stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Moraines, hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield, extremely stony

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, extremely stony

Percent of map unit: 5 percent
Landform: Hills, drainageways, depressions, ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, extremely stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

64B—Cheshire fine sandy loam, 3 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 9lpz
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 54 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Cheshire and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cheshire

Setting

Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from basalt and/or sandstone and shale

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
C - 26 to 65 inches: gravelly sandy loam

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F145XY013CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Wilbraham
Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Yalesville
Percent of map unit: 5 percent
Landform: Ridges, hills
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wethersfield
Percent of map unit: 5 percent
Landform: Hills, drumlins
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Watchaug
Percent of map unit: 3 percent
Landform: Till plains, hills
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Menlo
Percent of map unit: 2 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

73C—Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Map Unit Setting
National map unit symbol: 2w698
Elevation: 0 to 1,550 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Charlton, very stony, and similar soils: 50 percent
Chatfield, very stony, and similar soils: 30 percent

Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Very Stony

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Chatfield, Very Stony

Setting

Landform: Hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

Hollis, very stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

73E—Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 9lql
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Charlton and similar soils: 45 percent
Chatfield and similar soils: 30 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 45 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B

Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Chatfield

Setting

Landform: Ridges, hills
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Oa - 0 to 1 inches: highly decomposed plant material
A - 1 to 6 inches: gravelly fine sandy loam
Bw1 - 6 to 15 inches: gravelly fine sandy loam
Bw2 - 15 to 29 inches: gravelly fine sandy loam
2R - 29 to 80 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 45 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Sutton

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Hollis

Percent of map unit: 3 percent
Landform: Ridges, hills
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Unnamed, sandy subsoil

Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed, red parent material

Percent of map unit: 1 percent
Hydric soil rating: No

NEW ENGLAND MATERIALS TESTING LAB, LLC.
NEW ENGLAND REGIONAL OFFICE
72 Bissell Street Manchester, CT 06040 • Tel: 860-783-5830 • Fax: 860-783-5832

Client: JR Russo Surveyors & Engineers
P. O Box 938
East Windsor, CT. 06088

Report #: 001-23

Lab ID: 210-23

Project: Somers Solar
59 South Rd. Somers, CT.

Client ID: PH-1

Technician: Z. A

Date: 09/05/2023

LAB PERMEABILITY TEST

Sample description: 1 ½" minus reddish br. sand.

Location: Onsite (Somers Solar, 159 South Rd. Somers, CT).

Sample depth: 18" to 24"

Method: Permeability by ASTM D2434 (Constant Head Method)

k = QL/ath

Where k = coefficient of permeability,

Q = quantity of water discharged,	Q =	1000 cm^3
L = length of sample in centimeters	L =	15.24 cm
A = cross sectional area of specimen,	A =	43.10 cm^2
t = total time for discharge, in seconds	t =	1440 sec
h = difference in head manometers,	h =	61.5 cm

k = 0.003992731 cm/sec.

k = 5.7 inch/hour

Reported To: JR Russo Surveyors & Engineers

Submitted By: New England Materials Testing Lab, LLC.

Reviewed By: Laboratory Manager

NEW ENGLAND MATERIALS TESTING LAB, LLC.
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Client: JR Russo Surveyors & Engineers
P. O Box 938
East Windsor, CT. 06088

Report #: 002-23

Lab ID: 211-23

Project: Somers Solar
59 South Rd. Somers, CT.

Client ID: PH-2

Technician: Z. A

Date: 09/05/2023

LAB PERMEABILITY TEST

Sample description: 1 ½" minus reddish br. sand, little fines.

Location: Onsite (Somers Solar, 159 South Rd. Somers, CT).

Sample depth: 18" to 24"

Method: Permeability by ASTM D2434 (Constant Head Method)

k = QL/ath

Where k = coefficient of permeability,

Q = quantity of water discharged,	Q =	500 cm^3
L = length of sample in centimeters	L =	15.24 cm
A = cross sectional area of specimen,	A =	43.10 cm^2
t = total time for discharge, in seconds	t =	5400 sec
h = difference in head manometers,	h =	61.5 cm

k = 0.000532364 cm/sec.

k = 0.75 inch/hour

Reported To: JR Russo Surveyors & Engineers

Submitted By: New England Materials Testing Lab, LLC.

Reviewed By: Laboratory Manager

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Client: JR Russo Surveyors & Engineers
P. O Box 938
East Windsor, CT. 06088

Report #: 003-23

Lab ID: 212-23

Project: Somers Solar
59 South Rd. Somers, CT.

Client ID: PH-6

Technician: Z. A

Date: 09/05/2023

LAB PERMEABILITY TEST

Sample description: 1 ½" minus reddish br. sand, some fines.

Location: Onsite (Somers Solar, 159 South Rd. Somers, CT).

Sample depth: 18" to 24"

Method: Permeability by ASTM D2434 (Constant Head Method)

k = QL/ath

Where k = coefficient of permeability,

Q = quantity of water discharged,	Q =	1000 cm^3
L = length of sample in centimeters	L =	15.24 cm
A = cross sectional area of specimen,	A =	43.10 cm^2
t = total time for discharge, in seconds	t =	4560 sec
h = difference in head manometers,	h =	61.6 cm

k = 0.0012588157 cm/sec.

k = 1.784 inch/hour

Reported To: JR Russo Surveyors & Engineers

Submitted By: New England Materials Testing Lab, LLC.

Reviewed By: Laboratory Manager

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Client: JR Russo Surveyors & Engineers
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East Windsor, CT. 06088

Report #: 004-23

Lab ID: 213-23

Project: Somers Solar
59 South Rd. Somers, CT.

Client ID: PH-7

Technician: Z. A

Date: 09/05/2023

LAB PERMEABILITY TEST

Sample description: 1 ½" minus reddish br. silty clayed sand.

Location: Onsite (Somers Solar, 159 South Rd. Somers, CT).

Sample depth: 18" to 24"

Method: Permeability by ASTM D2434 (Constant Head Method)

k = QL/ath

Where k = coefficient of permeability,

Q = quantity of water discharged,	Q =	400 cm^3
L = length of sample in centimeters	L =	15.24 cm
A = cross sectional area of specimen,	A =	43.10 cm^2
t = total time for discharge, in seconds	t =	6600 sec
h = difference in head manometers,	h =	61.5 cm

k = 0.000348457 cm/sec.

k = 0.49 inch/hour

Reported To: JR Russo Surveyors & Engineers

Submitted By: New England Materials Testing Lab, LLC.

Reviewed By: Laboratory Manager

Appendix 2:
RAINFALL DATA

NOAA Atlas 14, Volume 10, Version 3
Location name: Town of Somers, Connecticut, USA*
Latitude: 41.977°, Longitude: -72.4422°
Elevation: m/ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.334** (0.257-0.434)	**0.402** (0.309-0.523)	**0.513** (0.393-0.670)	**0.606** (0.462-0.796)	**0.733** (0.542-1.01)	**0.829** (0.602-1.16)	**0.929** (0.655-1.35)	**1.04** (0.699-1.55)	**1.20** (0.775-1.85)	**1.33** (0.839-2.09)
10-min	**0.473** (0.364-0.614)	**0.569** (0.438-0.741)	**0.727** (0.557-0.949)	**0.858** (0.654-1.13)	**1.04** (0.768-1.43)	**1.17** (0.852-1.65)	**1.32** (0.929-1.92)	**1.47** (0.989-2.20)	**1.70** (1.10-2.63)	**1.88** (1.19-2.97)
15-min	**0.556** (0.428-0.723)	**0.670** (0.515-0.871)	**0.856** (0.655-1.12)	**1.01** (0.769-1.33)	**1.22** (0.903-1.68)	**1.38** (1.00-1.94)	**1.55** (1.09-2.26)	**1.73** (1.16-2.59)	**2.00** (1.29-3.09)	**2.21** (1.40-3.49)
30-min	**0.753** (0.580-0.979)	**0.908** (0.698-1.18)	**1.16** (0.890-1.52)	**1.37** (1.05-1.80)	**1.66** (1.23-2.28)	**1.88** (1.36-2.64)	**2.11** (1.49-3.07)	**2.36** (1.58-3.52)	**2.72** (1.76-4.20)	**3.01** (1.90-4.75)
60-min	**0.950** (0.731-1.24)	**1.15** (0.881-1.49)	**1.47** (1.12-1.92)	**1.73** (1.32-2.28)	**2.10** (1.55-2.88)	**2.37** (1.72-3.33)	**2.66** (1.88-3.88)	**2.98** (2.00-4.45)	**3.44** (2.22-5.32)	**3.80** (2.41-6.01)
2-hr	**1.21** (0.938-1.57)	**1.46** (1.12-1.88)	**1.85** (1.43-2.41)	**2.18** (1.67-2.85)	**2.63** (1.96-3.61)	**2.97** (2.17-4.17)	**3.33** (2.38-4.87)	**3.76** (2.53-5.58)	**4.39** (2.85-6.75)	**4.92** (3.12-7.73)
3-hr	**1.39** (1.08-1.79)	**1.67** (1.30-2.16)	**2.13** (1.64-2.76)	**2.51** (1.93-3.27)	**3.03** (2.27-4.14)	**3.42** (2.51-4.79)	**3.83** (2.75-5.60)	**4.34** (2.93-6.43)	**5.11** (3.32-7.84)	**5.77** (3.67-9.03)
6-hr	**1.75** (1.37-2.25)	**2.12** (1.65-2.72)	**2.72** (2.12-3.51)	**3.22** (2.49-4.17)	**3.91** (2.94-5.33)	**4.41** (3.27-6.17)	**4.97** (3.60-7.27)	**5.66** (3.83-8.34)	**6.74** (4.40-10.3)	**7.69** (4.90-12.0)
12-hr	**2.17** (1.71-2.77)	**2.67** (2.09-3.41)	**3.47** (2.71-4.45)	**4.14** (3.22-5.33)	**5.06** (3.83-6.88)	**5.73** (4.27-7.99)	**6.48** (4.72-9.45)	**7.42** (5.04-10.9)	**8.91** (5.83-13.5)	**10.2** (6.54-15.8)
24-hr	**2.57** (2.03-3.26)	**3.20** (2.52-4.06)	**4.22** (3.31-5.37)	**5.06** (3.95-6.49)	**6.23** (4.74-8.43)	**7.08** (5.30-9.84)	**8.03** (5.89-11.7)	**9.24** (6.29-13.5)	**11.2** (7.34-16.9)	**12.9** (8.28-19.8)
2-day	**2.91** (2.31-3.67)	**3.65** (2.89-4.61)	**4.86** (3.83-6.15)	**5.86** (4.60-7.46)	**7.24** (5.54-9.76)	**8.24** (6.21-11.4)	**9.36** (6.92-13.6)	**10.8** (7.40-15.7)	**13.2** (8.69-19.8)	**15.3** (9.86-23.4)
3-day	**3.17** (2.52-3.98)	**3.97** (3.16-5.00)	**5.29** (4.19-6.68)	**6.38** (5.02-8.10)	**7.88** (6.05-10.6)	**8.97** (6.78-12.4)	**10.2** (7.56-14.8)	**11.8** (8.07-17.0)	**14.4** (9.49-21.5)	**16.7** (10.8-25.5)
4-day	**3.41** (2.71-4.27)	**4.26** (3.39-5.35)	**5.66** (4.49-7.13)	**6.82** (5.38-8.63)	**8.41** (6.47-11.3)	**9.57** (7.24-13.2)	**10.9** (8.07-15.7)	**12.6** (8.62-18.1)	**15.3** (10.1-22.9)	**17.8** (11.5-27.0)
7-day	**4.06** (3.25-5.07)	**5.02** (4.01-6.27)	**6.59** (5.25-8.27)	**7.90** (6.26-9.96)	**9.69** (7.48-12.9)	**11.0** (8.35-15.0)	**12.5** (9.26-17.9)	**14.3** (9.87-20.6)	**17.4** (11.5-25.8)	**20.1** (13.0-30.3)
10-day	**4.71** (3.78-5.87)	**5.73** (4.60-7.15)	**7.40** (5.92-9.26)	**8.79** (6.98-11.1)	**10.7** (8.26-14.2)	**12.1** (9.18-16.4)	**13.6** (10.1-19.4)	**15.6** (10.8-22.3)	**18.7** (12.4-27.6)	**21.4** (13.9-32.2)
20-day	**6.77** (5.46-8.38)	**7.86** (6.34-9.74)	**9.65** (7.75-12.0)	**11.1** (8.89-13.9)	**13.2** (10.2-17.2)	**14.7** (11.1-19.6)	**16.3** (12.0-22.7)	**18.2** (12.6-25.8)	**21.0** (14.0-30.8)	**23.4** (15.2-35.0)
30-day	**8.51** (6.89-10.5)	**9.63** (7.79-11.9)	**11.5** (9.23-14.2)	**13.0** (10.4-16.2)	**15.1** (11.7-19.5)	**16.7** (12.6-22.0)	**18.3** (13.4-25.1)	**20.1** (14.0-28.3)	**22.5** (15.1-32.9)	**24.5** (16.0-36.6)
45-day	**10.7** (8.67-13.1)	**11.8** (9.59-14.5)	**13.7** (11.1-16.9)	**15.3** (12.3-19.0)	**17.4** (13.5-22.4)	**19.1** (14.4-25.0)	**20.7** (15.1-28.0)	**22.4** (15.6-31.4)	**24.5** (16.4-35.6)	**26.1** (17.0-38.8)
60-day	**12.5** (10.2-15.3)	**13.7** (11.1-16.8)	**15.6** (12.6-19.2)	**17.2** (13.8-21.3)	**19.4** (15.1-24.8)	**21.1** (16.0-27.5)	**22.8** (16.6-30.6)	**24.3** (17.1-34.0)	**26.2** (17.6-38.0)	**27.6** (18.0-40.9)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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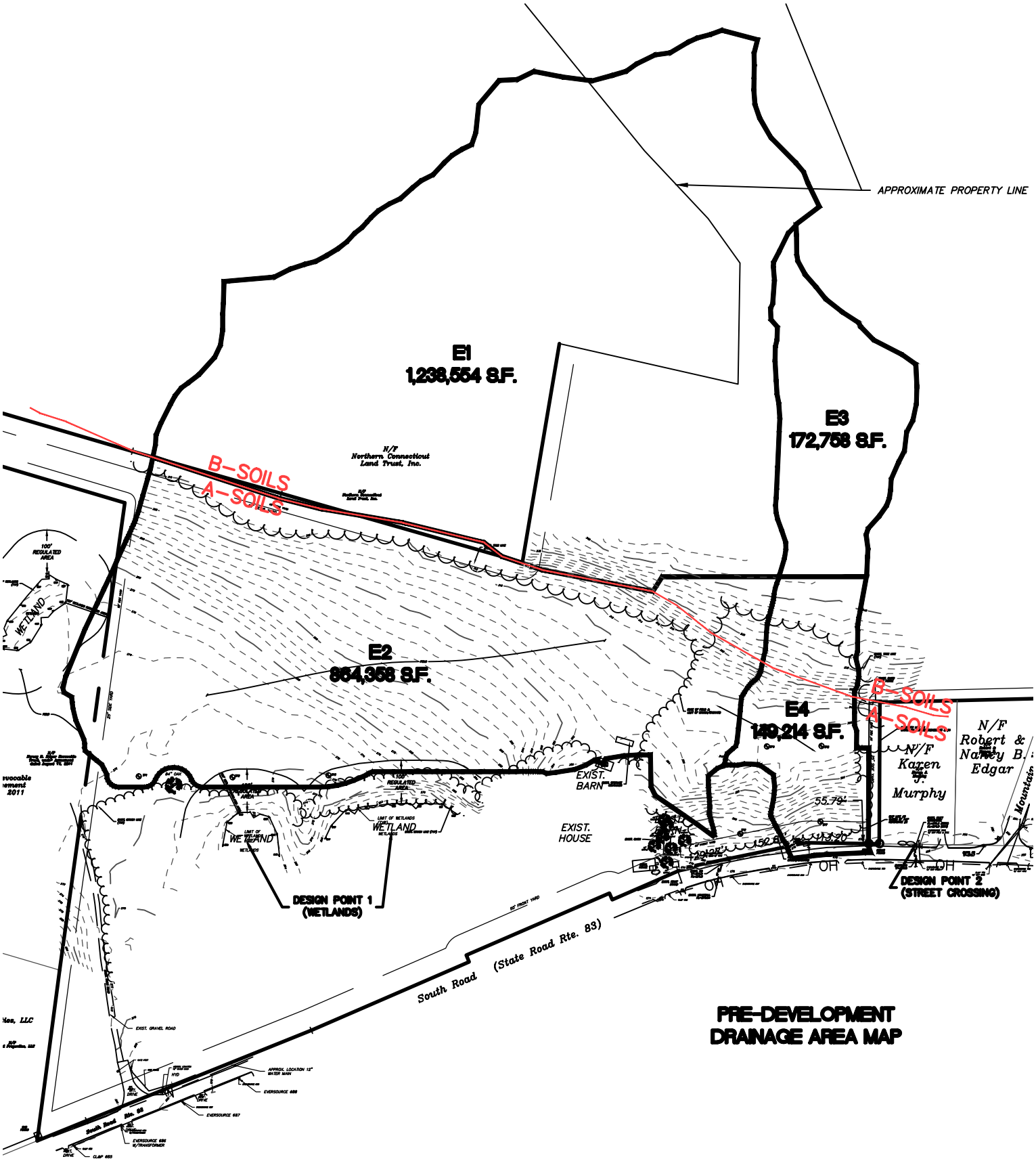
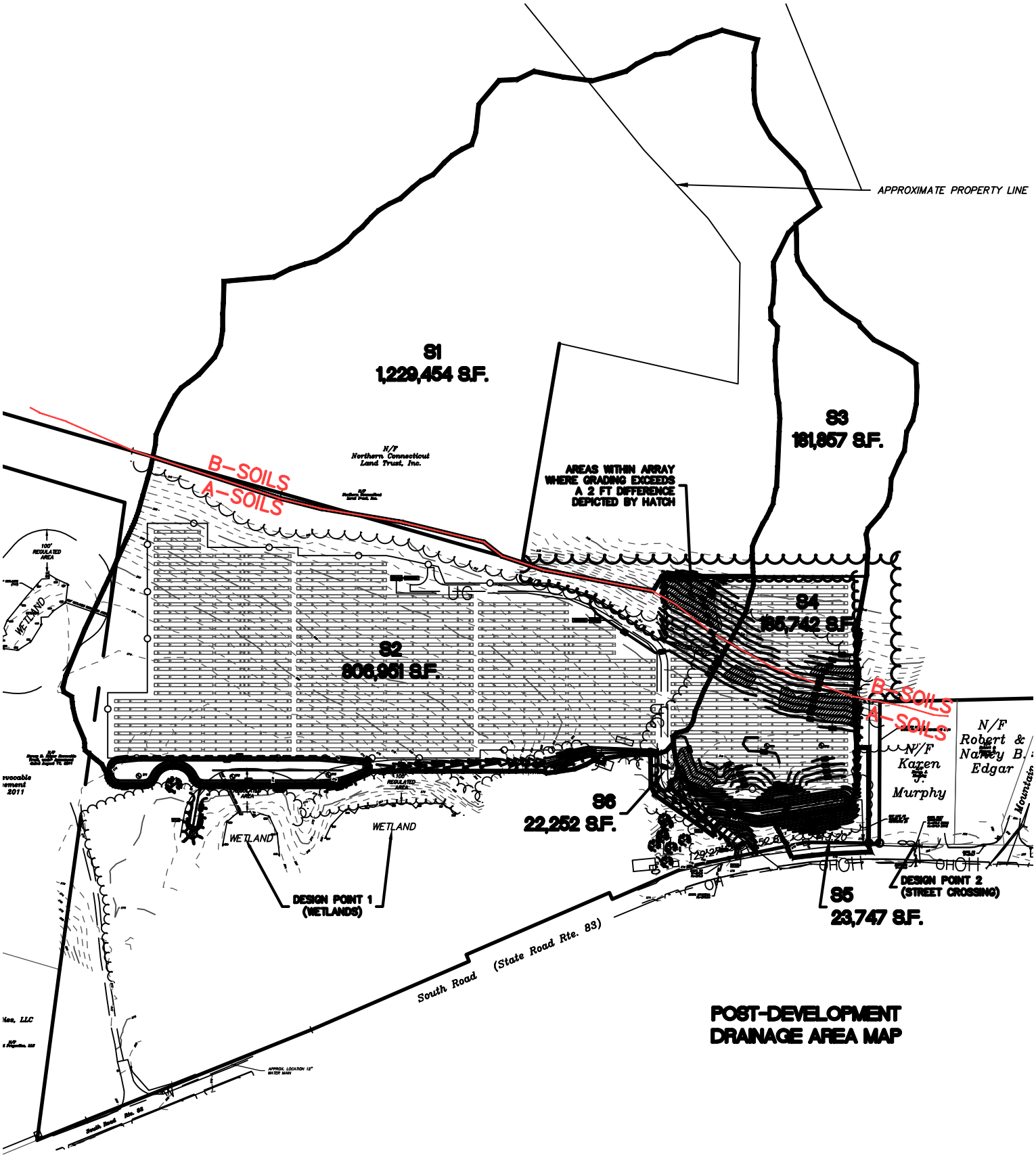
PF graphical

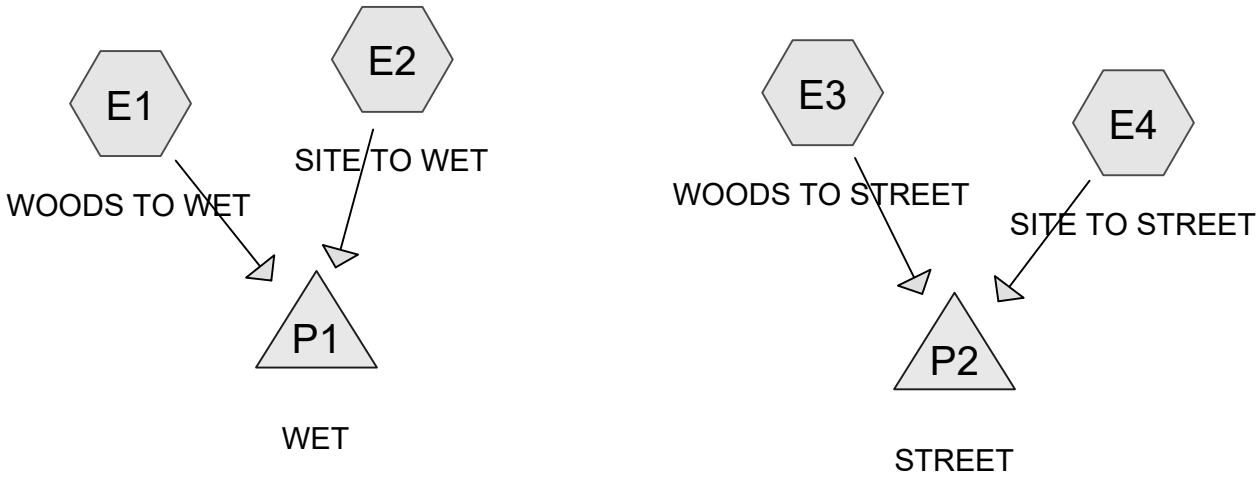
Appendix 3:
DRAINAGE AREA MAPS


APPROXIMATE PROPERTY LINE
E1
1,238,554 S.F.
E2
864,368 S.F.
E3
172,758 S.F.
E4
149,214 S.F.
B-SOILS
A-SOILS
B-SOILS
A-SOILS
N/F
Northern Connecticut
Land Trust, Inc.
N/F
Robert &
Nancy B.
Edgar
N/F
Karen
J.
Murphy
EXIST.
BARN
EXIST.
HOUSE
WETLAND
WETLAND
100'
REGULATED
AREA
DESIGN POINT 1
(WETLANDS)
DESIGN POINT 2
(STREET CROSSING)
South Road (State Road Rte. 83)
EXIST. GRAVEL ROAD
55.79'
OH
PRE-DEVELOPMENT
DRAINAGE AREA MAP



POST-DEVELOPMENT DRAINAGE AREA MAP

Appendix 4:
PRE-DEVELOPMENT ANALYSIS



Subcat Reach Pond Link

Routing Diagram for 2023-001 Louth Callan - South Rd, Somers
Prepared by {enter your company name here}, Printed 9/14/2023

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.227	39	>75% Grass cover, Good, HSG A (E4)
16.213	30	Meadow, non-grazed, HSG A (E2)
0.066	98	Paved parking, HSG A (E4)
1.303	30	Woods, Good, HSG A (E2)
33.465	55	Woods, Good, HSG B (E1, E2, E3, E4)
3.545	32	Woods/grass comb., Good, HSG A (E2, E4)
0.848	58	Woods/grass comb., Good, HSG B (E2, E4)

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment E1: WOODS TO WET Runoff Area=1,238,554 sf 0.00% Impervious Runoff Depth=2.80"
Flow Length=2,707' Tc=40.5 min CN=55 Runoff=43.79 cfs 6.645 af

Subcatchment E2: SITE TO WET Runoff Area=864,358 sf 0.00% Impervious Runoff Depth=0.50"
Flow Length=1,037' Tc=25.1 min CN=31 Runoff=2.51 cfs 0.820 af

Subcatchment E3: WOODS TO STREET Runoff Area=172,758 sf 0.00% Impervious Runoff Depth=2.80"
Flow Length=1,759' Tc=29.9 min CN=55 Runoff=7.07 cfs 0.927 af

Subcatchment E4: SITE TO STREET Runoff Area=149,214 sf 1.94% Impervious Runoff Depth=1.45"
Flow Length=930' Tc=28.6 min CN=42 Runoff=2.64 cfs 0.415 af

Pond P1: WET Inflow=46.21 cfs 7.465 af
Primary=46.21 cfs 7.465 af

Pond P2: STREET Inflow=9.69 cfs 1.342 af
Primary=9.69 cfs 1.342 af

Summary for Subcatchment E1: WOODS TO WET

Runoff = 43.79 cfs @ 12.60 hrs, Volume= 6.645 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
1,238,554	55	Woods, Good, HSG B
1,238,554		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.1600	0.18		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
14.6	1,617	0.1369	1.85		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
2.7	357	0.0964	2.17		**Shallow Concentrated Flow, FARM** Short Grass Pasture Kv= 7.0 fps
9.5	401	0.0102	0.71		**Shallow Concentrated Flow, FARM** Short Grass Pasture Kv= 7.0 fps
4.4	232	0.0310	0.88		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
40.5	2,707	Total			

Summary for Subcatchment E2: SITE TO WET

Runoff = 2.51 cfs @ 12.67 hrs, Volume= 0.820 af, Depth= 0.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
21,189	55	Woods, Good, HSG B
11,505	58	Woods/grass comb., Good, HSG B
56,742	30	Woods, Good, HSG A
68,684	32	Woods/grass comb., Good, HSG A
706,238	30	Meadow, non-grazed, HSG A
864,358	31	Weighted Average
864,358		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	20	0.1283	0.12		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
5.7	80	0.1263	0.23		**Sheet Flow, FARM** Grass: Dense n= 0.240 P2= 3.20"
2.3	291	0.0919	2.12		**Shallow Concentrated Flow, FARM** Short Grass Pasture Kv= 7.0 fps
9.9	414	0.0099	0.70		**Shallow Concentrated Flow, FARM** Short Grass Pasture Kv= 7.0 fps
4.4	232	0.0310	0.88		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
25.1	1,037	Total			

Summary for Subcatchment E3: WOODS TO STREET

Runoff = 7.07 cfs @ 12.46 hrs, Volume= 0.927 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
172,758	55	Woods, Good, HSG B
172,758		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.1333	0.17		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
7.6	891	0.1539	1.96		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
1.9	202	0.1317	1.81		**Shallow Concentrated Flow, ORCHARD** Woodland Kv= 5.0 fps
2.5	113	0.0228	0.75		**Shallow Concentrated Flow, ORCHARD** Woodland Kv= 5.0 fps
1.8	200	0.1440	1.90		**Shallow Concentrated Flow, ORCHARD** Woodland Kv= 5.0 fps
6.0	253	0.0100	0.70		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
29.9	1,759	Total			

Summary for Subcatchment E4: SITE TO STREET

Runoff = 2.64 cfs @ 12.49 hrs, Volume= 0.415 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
25,220	55	Woods, Good, HSG B
25,450	58	Woods/grass comb., Good, HSG B
85,754	32	Woods/grass comb., Good, HSG A
9,895	39	>75% Grass cover, Good, HSG A
2,895	98	Paved parking, HSG A
149,214	42	Weighted Average
146,319		98.06% Pervious Area
2,895		1.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	92	0.0641	0.12		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
1.4	8	0.1258	0.10		**Sheet Flow, ORCHARD** Woods: Light underbrush n= 0.400 P2= 3.20"
1.9	201	0.1258	1.77		**Shallow Concentrated Flow, ORCHARD** Woodland Kv= 5.0 fps
5.1	191	0.0157	0.63		**Shallow Concentrated Flow, ORCHARD** Woodland Kv= 5.0 fps
1.6	185	0.1530	1.96		**Shallow Concentrated Flow, ORCHARD** Woodland Kv= 5.0 fps
6.0	253	0.0100	0.70		**Shallow Concentrated Flow, GRASS** Short Grass Pasture Kv= 7.0 fps
28.6	930	Total			

Summary for Pond P1: WET

Inflow Area = 48.276 ac, 0.00% Impervious, Inflow Depth = 1.86" for 100-year event
Inflow = 46.21 cfs @ 12.60 hrs, Volume= 7.465 af
Primary = 46.21 cfs @ 12.61 hrs, Volume= 7.465 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond P2: STREET

Inflow Area = 7.391 ac, 0.90% Impervious, Inflow Depth = 2.18" for 100-year event
Inflow = 9.69 cfs @ 12.46 hrs, Volume= 1.342 af
Primary = 9.69 cfs @ 12.47 hrs, Volume= 1.342 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment E1: WOODS TO WET Runoff Area=1,238,554 sf 0.00% Impervious Runoff Depth=0.25"
Flow Length=2,707' Tc=40.5 min CN=55 Runoff=1.88 cfs 0.594 af

Subcatchment E2: SITE TO WET Runoff Area=864,358 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,037' Tc=25.1 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment E3: WOODS TO STREET Runoff Area=172,758 sf 0.00% Impervious Runoff Depth=0.25"
Flow Length=1,759' Tc=29.9 min CN=55 Runoff=0.30 cfs 0.083 af

Subcatchment E4: SITE TO STREET Runoff Area=149,214 sf 1.94% Impervious Runoff Depth=0.01"
Flow Length=930' Tc=28.6 min CN=42 Runoff=0.01 cfs 0.004 af

Pond P1: WET Inflow=1.88 cfs 0.594 af
Primary=1.88 cfs 0.594 af

Pond P2: STREET Inflow=0.30 cfs 0.087 af
Primary=0.30 cfs 0.087 af

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment E1: WOODS TO WET Runoff Area=1,238,554 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=2,707' Tc=40.5 min CN=55 Runoff=24.28 cfs 3.914 af

Subcatchment E2: SITE TO WET Runoff Area=864,358 sf 0.00% Impervious Runoff Depth=0.13"
Flow Length=1,037' Tc=25.1 min CN=31 Runoff=0.35 cfs 0.218 af

Subcatchment E3: WOODS TO STREET Runoff Area=172,758 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=1,759' Tc=29.9 min CN=55 Runoff=3.92 cfs 0.546 af

Subcatchment E4: SITE TO STREET Runoff Area=149,214 sf 1.94% Impervious Runoff Depth=0.70"
Flow Length=930' Tc=28.6 min CN=42 Runoff=0.96 cfs 0.199 af

Pond P1: WET Inflow=24.28 cfs 4.131 af
Primary=24.28 cfs 4.131 af

Pond P2: STREET Inflow=4.81 cfs 0.745 af
Primary=4.81 cfs 0.745 af

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

Subcatchment E1: WOODS TO WET Runoff Area=1,238,554 sf 0.00% Impervious Runoff Depth=2.17"
Flow Length=2,707' Tc=40.5 min CN=55 Runoff=33.12 cfs 5.153 af

Subcatchment E2: SITE TO WET Runoff Area=864,358 sf 0.00% Impervious Runoff Depth=0.28"
Flow Length=1,037' Tc=25.1 min CN=31 Runoff=0.80 cfs 0.459 af

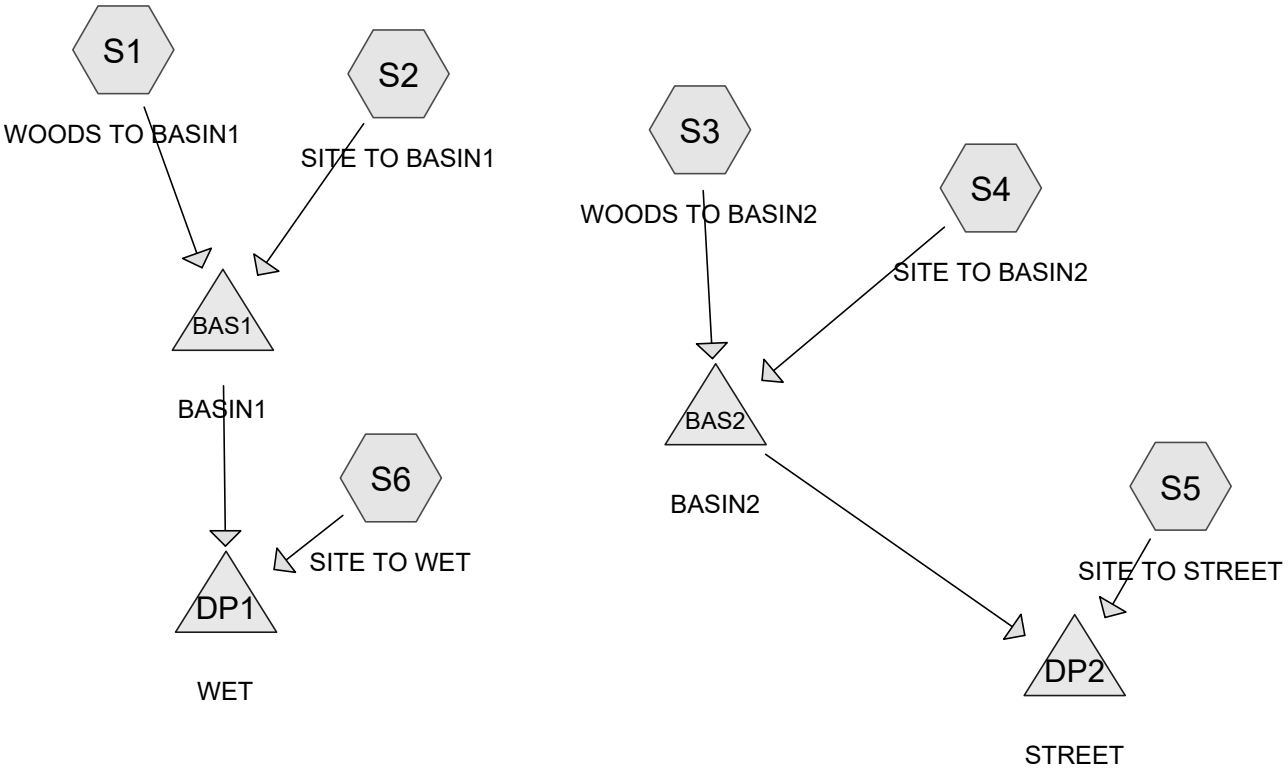
Subcatchment E3: WOODS TO STREET Runoff Area=172,758 sf 0.00% Impervious Runoff Depth=2.17"
Flow Length=1,759' Tc=29.9 min CN=55 Runoff=5.36 cfs 0.719 af

Subcatchment E4: SITE TO STREET Runoff Area=149,214 sf 1.94% Impervious Runoff Depth=1.03"
Flow Length=930' Tc=28.6 min CN=42 Runoff=1.66 cfs 0.294 af

Pond P1: WET Inflow=33.60 cfs 5.612 af
Primary=33.60 cfs 5.612 af

Pond P2: STREET Inflow=6.96 cfs 1.012 af
Primary=6.96 cfs 1.012 af

Appendix 5:
POST-DEVELOPMENT ANALYSIS



Subcat Reach Pond Link

Routing Diagram for 2023-001 Louth Callan - South Rd, Somers
Prepared by {enter your company name here}, Printed 9/14/2023

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentS1: WOODS TO BASIN1 Runoff Area=1,229,454 sf 0.00% Impervious Runoff Depth=2.80"
Flow Length=2,404' Tc=34.4 min CN=55 Runoff=47.22 cfs 6.597 af

SubcatchmentS2: SITE TO BASIN1 Runoff Area=806,951 sf 1.86% Impervious Runoff Depth=1.45"
Flow Length=733' Tc=19.0 min CN=42 Runoff=16.62 cfs 2.246 af

SubcatchmentS3: WOODS TO BASIN2 Runoff Area=181,857 sf 0.00% Impervious Runoff Depth=2.80"
Flow Length=1,450' Tc=20.6 min CN=55 Runoff=8.73 cfs 0.976 af

SubcatchmentS4: SITE TO BASIN2 Runoff Area=191,130 sf 0.00% Impervious Runoff Depth=2.27"
Flow Length=606' Tc=15.2 min CN=50 Runoff=7.97 cfs 0.829 af

SubcatchmentS5: SITE TO STREET Runoff Area=23,747 sf 12.19% Impervious Runoff Depth=1.08"
Flow Length=367' Tc=16.3 min CN=38 Runoff=0.31 cfs 0.049 af

SubcatchmentS6: SITE TO WET Runoff Area=8,207 sf 24.20% Impervious Runoff Depth=2.37"
Tc=5.0 min CN=51 Runoff=0.51 cfs 0.037 af

Pond BAS1: BASIN1 Peak Elev=271.10' Storage=85,726 cf Inflow=61.48 cfs 8.842 af
Discarded=1.97 cfs 1.105 af Primary=33.70 cfs 7.744 af Outflow=35.67 cfs 8.849 af

Pond BAS2: BASIN2 Peak Elev=291.15' Storage=19,903 cf Inflow=16.34 cfs 1.805 af
Discarded=0.13 cfs 0.108 af Primary=8.68 cfs 1.698 af Outflow=8.80 cfs 1.806 af

Pond DP1: WET Inflow=33.77 cfs 7.781 af
Primary=33.77 cfs 7.781 af

Pond DP2: STREET Inflow=8.90 cfs 1.747 af
Primary=8.90 cfs 1.747 af

Summary for Subcatchment S1: WOODS TO BASIN1

Runoff = 47.22 cfs @ 12.50 hrs, Volume= 6.597 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
1,201,860	55	Woods, Good, HSG B
27,594	48	Brush, Good, HSG B
1,229,454	55	Weighted Average
1,229,454		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.3	100	0.1600	0.18		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
14.6	1,617	0.1369	1.85		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
2.7	357	0.0964	2.17		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
7.8	330	0.0102	0.71		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
34.4	2,404	Total			

Summary for Subcatchment S2: SITE TO BASIN1

Runoff = 16.62 cfs @ 12.33 hrs, Volume= 2.246 af, Depth= 1.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

	Area (sf)	CN	Description
	498	48	Brush, Good, HSG B
	1,265	58	Meadow, non-grazed, HSG B
*	10,045	65	Meadow, non-grazed, HSG B/C
	9,578	71	Meadow, non-grazed, HSG C
	39,631	30	Woods, Good, HSG A
	16,454	30	Brush, Good, HSG A
	171,745	30	Meadow, non-grazed, HSG A
*	541,433	44	Meadow, non-grazed, HSG A/B
	1,307	58	Meadow, non-grazed, HSG B
*	14,836	98	Paved parking, HSG A/B
	159	98	Roofs, HSG A
	806,951	42	Weighted Average
	791,956		98.14% Pervious Area
	14,995		1.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.8	20	0.1283	0.12		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
5.7	80	0.1263	0.23		**Sheet Flow, ARRAY** Grass: Dense n= 0.240 P2= 3.20"
2.3	291	0.0919	2.12		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
8.2	342	0.0099	0.70		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
19.0	733	Total			

Summary for Subcatchment S3: WOODS TO BASIN2

Runoff = 8.73 cfs @ 12.30 hrs, Volume= 0.976 af, Depth= 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
168,909	55	Woods, Good, HSG B
12,948	48	Brush, Good, HSG B
181,857	55	Weighted Average
181,857		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.7	100	0.1900	0.19		**Sheet Flow, W** Woods: Light underbrush n= 0.400 P2= 3.20"
5.3	632	0.1551	1.97		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
0.9	99	0.1311	1.81		**Shallow Concentrated Flow, W** Woodland Kv= 5.0 fps
2.6	388	0.1311	2.53		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
2.5	131	0.0153	0.87		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
0.6	100	0.1500	2.71		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
20.6	1,450	Total			

Summary for Subcatchment S4: SITE TO BASIN2

Runoff = 7.97 cfs @ 12.23 hrs, Volume= 0.829 af, Depth= 2.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

	Area (sf)	CN	Description
	1,146	48	Brush, Good, HSG B
	2,932	58	Meadow, non-grazed, HSG B
*	55,619	65	Meadow, non-grazed, HSG B/C
	2,281	71	Meadow, non-grazed, HSG C
	23,326	30	Meadow, non-grazed, HSG A
*	87,095	44	Meadow, non-grazed, HSG A/B
	18,731	58	Meadow, non-grazed, HSG B
	191,130	50	Weighted Average
	191,130		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	100	0.0660	0.19		**Sheet Flow, ARRAY** Grass: Dense n= 0.240 P2= 3.20"
1.5	223	0.1197	2.42		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
4.2	183	0.0109	0.73		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
0.6	100	0.1500	2.71		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
15.2	606	Total			

Summary for Subcatchment S5: SITE TO STREET

Runoff = 0.31 cfs @ 12.33 hrs, Volume= 0.049 af, Depth= 1.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

Area (sf)	CN	Description
20,852	30	Meadow, non-grazed, HSG A
2,895	98	Paved parking, HSG A
23,747	38	Weighted Average
20,852		87.81% Pervious Area
2,895		12.19% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	100	0.1470	0.26		**Sheet Flow, ARRAY** Grass: Dense n= 0.240 P2= 3.20"
9.9	267	0.0041	0.45		**Shallow Concentrated Flow, ARRAY** Short Grass Pasture Kv= 7.0 fps
16.3	367	Total			

Summary for Subcatchment S6: SITE TO WET

Runoff = 0.51 cfs @ 12.08 hrs, Volume= 0.037 af, Depth= 2.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-year Rainfall=8.03"

	Area (sf)	CN	Description
	998	30	Brush, Good, HSG A
	2,494	30	Meadow, non-grazed, HSG A
*	2,729	44	Meadow, non-grazed, HSG A/B
	414	98	Paved parking, HSG A
*	1,572	98	Paved parking, HSG A/B
	8,207	51	Weighted Average
	6,221		75.80% Pervious Area
	1,986		24.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Summary for Pond BAS1: BASIN1

[86] Warning: Oscillations may require smaller dt (severity=28)

Inflow Area = 46.749 ac, 0.74% Impervious, Inflow Depth = 2.27" for 100-year event
Inflow = 61.48 cfs @ 12.49 hrs, Volume= 8.842 af
Outflow = 35.67 cfs @ 12.88 hrs, Volume= 8.849 af, Atten= 42%, Lag= 23.6 min
Discarded = 1.97 cfs @ 12.88 hrs, Volume= 1.105 af
Primary = 33.70 cfs @ 12.88 hrs, Volume= 7.744 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 271.10' @ 12.88 hrs Surf.Area= 36,250 sf Storage= 85,726 cf
Flood Elev= 272.00' Surf.Area= 63,880 sf Storage= 130,814 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 52.8 min (943.2 - 890.4)

Volume	Invert	Avail.Storage	Storage Description
#1	268.00'	130,814 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
268.00	21,706	0	0
270.00	29,312	51,018	51,018
271.00	33,200	31,256	82,274
272.00	63,880	48,540	130,814

Device	Routing	Invert	Outlet Devices
#1	Discarded	268.00'	**0.750 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 267.00'
#2	Primary	268.00'	**30.0" Round Culvert** L= 156.0' Ke= 0.500 Inlet / Outlet Invert= 268.00' / 267.00' S= 0.0064 '/' Cc= 0.900 n= 0.012, Flow Area= 4.91 sf
#3	Primary	271.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=1.97 cfs @ 12.88 hrs HW=271.10' (Free Discharge)
└**1=Exfiltration** (Controls 1.97 cfs)

Primary OutFlow Max=33.70 cfs @ 12.88 hrs HW=271.10' TW=0.00' (Dynamic Tailwater)
├**2=Culvert** (Inlet Controls 32.14 cfs @ 6.55 fps)
└**3=Broad-Crested Rectangular Weir** (Weir Controls 1.56 cfs @ 0.78 fps)

Summary for Pond BAS2: BASIN2

Inflow Area = 8.563 ac, 0.00% Impervious, Inflow Depth = 2.53" for 100-year event
Inflow = 16.34 cfs @ 12.27 hrs, Volume= 1.805 af
Outflow = 8.80 cfs @ 12.62 hrs, Volume= 1.806 af, Atten= 46%, Lag= 21.1 min
Discarded = 0.13 cfs @ 12.62 hrs, Volume= 0.108 af
Primary = 8.68 cfs @ 12.62 hrs, Volume= 1.698 af

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 291.15' @ 12.62 hrs Surf.Area= 9,528 sf Storage= 19,903 cf
Flood Elev= 292.00' Surf.Area= 11,327 sf Storage= 28,771 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 54.5 min (929.2 - 874.7)

Volume	Invert	Avail.Storage	Storage Description
#1	288.00'	28,771 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
288.00	3,250	0	0
290.00	7,097	10,347	10,347
292.00	11,327	18,424	28,771

Device	Routing	Invert	Outlet Devices
#1	Discarded	288.00'	**0.490 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 276.00'
#2	Primary	291.00'	**20.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	288.30'	**12.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 288.30' / 278.00' S= 0.1776 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf

Discarded OutFlow Max=0.13 cfs @ 12.62 hrs HW=291.15' (Free Discharge)
└**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=8.67 cfs @ 12.62 hrs HW=291.15' TW=0.00' (Dynamic Tailwater)
├**2=Broad-Crested Rectangular Weir**(Weir Controls 2.88 cfs @ 0.96 fps)
└**3=Culvert** (Inlet Controls 5.80 cfs @ 7.38 fps)

Summary for Pond DP1: WET

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 46.938 ac, 0.83% Impervious, Inflow Depth = 1.99" for 100-year event
Inflow = 33.77 cfs @ 12.88 hrs, Volume= 7.781 af
Primary = 33.77 cfs @ 12.89 hrs, Volume= 7.781 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Summary for Pond DP2: STREET

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 9.108 ac, 0.73% Impervious, Inflow Depth = 2.30" for 100-year event
Inflow = 8.90 cfs @ 12.62 hrs, Volume= 1.747 af
Primary = 8.90 cfs @ 12.63 hrs, Volume= 1.747 af, Atten= 0%, Lag= 0.6 min

Routing by Sim-Route method, Time Span= 1.00-72.00 hrs, dt= 0.01 hrs

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentS1: WOODS TO BASIN1 Runoff Area=1,229,454 sf 0.00% Impervious Runoff Depth=0.25"
Flow Length=2,404' Tc=34.4 min CN=55 Runoff=2.00 cfs 0.590 af

SubcatchmentS2: SITE TO BASIN1 Runoff Area=806,951 sf 1.86% Impervious Runoff Depth=0.01"
Flow Length=733' Tc=19.0 min CN=42 Runoff=0.03 cfs 0.021 af

SubcatchmentS3: WOODS TO BASIN2 Runoff Area=181,857 sf 0.00% Impervious Runoff Depth=0.25"
Flow Length=1,450' Tc=20.6 min CN=55 Runoff=0.36 cfs 0.087 af

SubcatchmentS4: SITE TO BASIN2 Runoff Area=191,130 sf 0.00% Impervious Runoff Depth=0.13"
Flow Length=606' Tc=15.2 min CN=50 Runoff=0.09 cfs 0.047 af

SubcatchmentS5: SITE TO STREET Runoff Area=23,747 sf 12.19% Impervious Runoff Depth=0.00"
Flow Length=367' Tc=16.3 min CN=38 Runoff=0.00 cfs 0.000 af

SubcatchmentS6: SITE TO WET Runoff Area=8,207 sf 24.20% Impervious Runoff Depth=0.15"
Tc=5.0 min CN=51 Runoff=0.01 cfs 0.002 af

Pond BAS1: BASIN1 Peak Elev=268.24' Storage=5,256 cf Inflow=2.00 cfs 0.611 af
Discarded=0.48 cfs 0.476 af Primary=0.35 cfs 0.152 af Outflow=0.83 cfs 0.628 af

Pond BAS2: BASIN2 Peak Elev=288.47' Storage=1,746 cf Inflow=0.45 cfs 0.134 af
Discarded=0.05 cfs 0.077 af Primary=0.13 cfs 0.058 af Outflow=0.18 cfs 0.134 af

Pond DP1: WET Inflow=0.35 cfs 0.154 af
Primary=0.35 cfs 0.154 af

Pond DP2: STREET Inflow=0.13 cfs 0.058 af
Primary=0.13 cfs 0.058 af

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentS1: WOODS TO BASIN1 Runoff Area=1,229,454 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=2,404' Tc=34.4 min CN=55 Runoff=26.14 cfs 3.885 af

SubcatchmentS2: SITE TO BASIN1 Runoff Area=806,951 sf 1.86% Impervious Runoff Depth=0.70"
Flow Length=733' Tc=19.0 min CN=42 Runoff=5.88 cfs 1.075 af

SubcatchmentS3: WOODS TO BASIN2 Runoff Area=181,857 sf 0.00% Impervious Runoff Depth=1.65"
Flow Length=1,450' Tc=20.6 min CN=55 Runoff=4.81 cfs 0.575 af

SubcatchmentS4: SITE TO BASIN2 Runoff Area=191,130 sf 0.00% Impervious Runoff Depth=1.26"
Flow Length=606' Tc=15.2 min CN=50 Runoff=3.90 cfs 0.460 af

SubcatchmentS5: SITE TO STREET Runoff Area=23,747 sf 12.19% Impervious Runoff Depth=0.46"
Flow Length=367' Tc=16.3 min CN=38 Runoff=0.09 cfs 0.021 af

SubcatchmentS6: SITE TO WET Runoff Area=8,207 sf 24.20% Impervious Runoff Depth=1.33"
Tc=5.0 min CN=51 Runoff=0.26 cfs 0.021 af

Pond BAS1: BASIN1 Peak Elev=269.83' Storage=46,066 cf Inflow=31.80 cfs 4.960 af
Discarded=1.26 cfs 0.889 af Primary=16.44 cfs 4.077 af Outflow=17.70 cfs 4.966 af

Pond BAS2: BASIN2 Peak Elev=289.93' Storage=9,873 cf Inflow=8.57 cfs 1.034 af
Discarded=0.09 cfs 0.095 af Primary=4.02 cfs 0.940 af Outflow=4.11 cfs 1.035 af

Pond DP1: WET Inflow=16.48 cfs 4.098 af
Primary=16.48 cfs 4.098 af

Pond DP2: STREET Inflow=4.09 cfs 0.960 af
Primary=4.09 cfs 0.960 af

Time span=1.00-72.00 hrs, dt=0.01 hrs, 7101 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Sim-Route method - Pond routing by Sim-Route method

SubcatchmentS1: WOODS TO BASIN1 Runoff Area=1,229,454 sf 0.00% Impervious Runoff Depth=2.17"
Flow Length=2,404' Tc=34.4 min CN=55 Runoff=35.66 cfs 5.115 af

SubcatchmentS2: SITE TO BASIN1 Runoff Area=806,951 sf 1.86% Impervious Runoff Depth=1.03"
Flow Length=733' Tc=19.0 min CN=42 Runoff=10.32 cfs 1.588 af

SubcatchmentS3: WOODS TO BASIN2 Runoff Area=181,857 sf 0.00% Impervious Runoff Depth=2.17"
Flow Length=1,450' Tc=20.6 min CN=55 Runoff=6.59 cfs 0.757 af

SubcatchmentS4: SITE TO BASIN2 Runoff Area=191,130 sf 0.00% Impervious Runoff Depth=1.71"
Flow Length=606' Tc=15.2 min CN=50 Runoff=5.73 cfs 0.626 af

SubcatchmentS5: SITE TO STREET Runoff Area=23,747 sf 12.19% Impervious Runoff Depth=0.72"
Flow Length=367' Tc=16.3 min CN=38 Runoff=0.18 cfs 0.033 af

SubcatchmentS6: SITE TO WET Runoff Area=8,207 sf 24.20% Impervious Runoff Depth=1.80"
Tc=5.0 min CN=51 Runoff=0.37 cfs 0.028 af

Pond BAS1: BASIN1 Peak Elev=270.40' Storage=63,013 cf Inflow=45.16 cfs 6.703 af
Discarded=1.55 cfs 0.988 af Primary=24.42 cfs 5.721 af Outflow=25.97 cfs 6.710 af

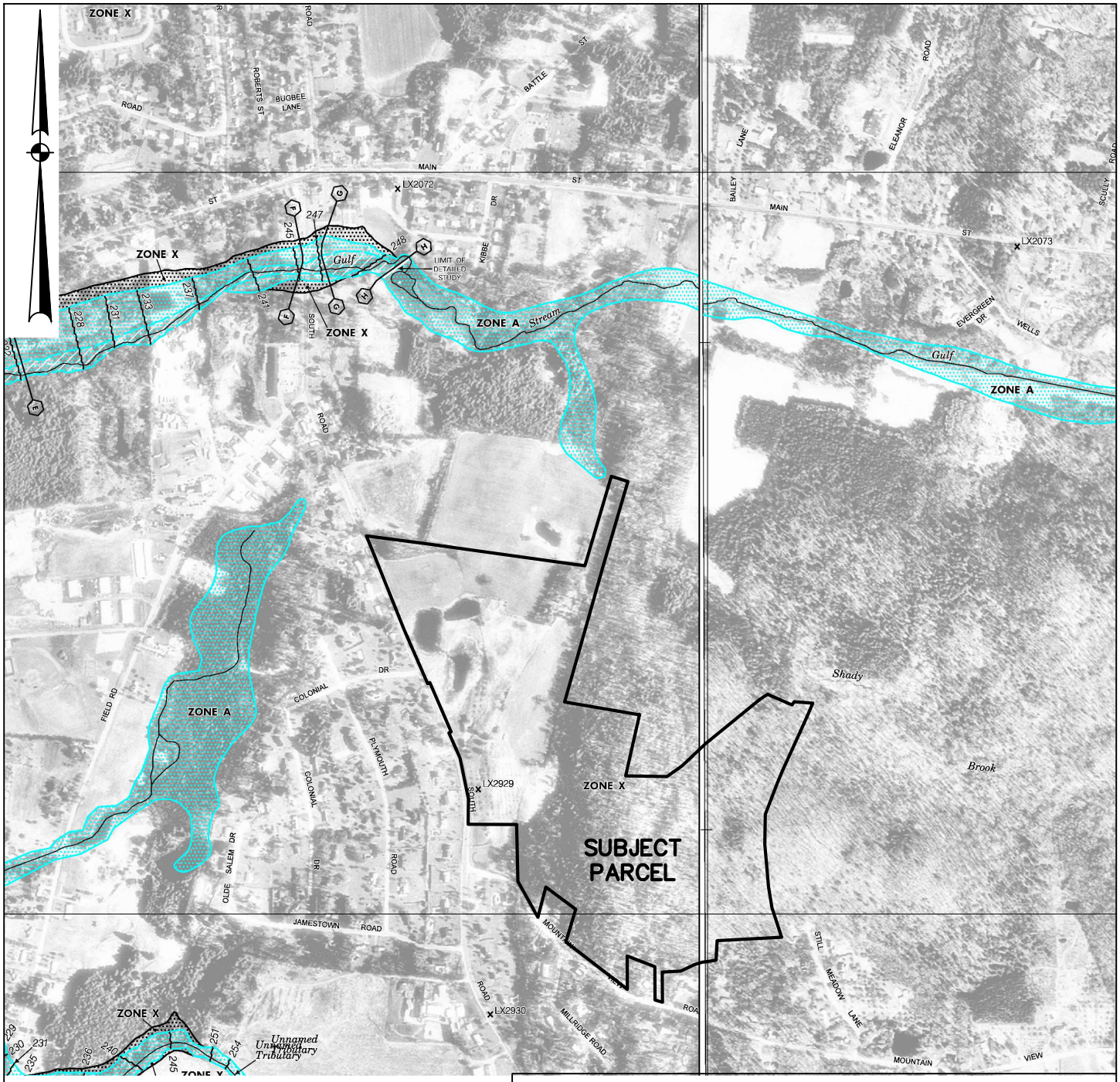
Pond BAS2: BASIN2 Peak Elev=290.57' Storage=14,699 cf Inflow=12.07 cfs 1.382 af
Discarded=0.11 cfs 0.101 af Primary=5.02 cfs 1.282 af Outflow=5.13 cfs 1.383 af

Pond DP1: WET Inflow=24.47 cfs 5.750 af
Primary=24.47 cfs 5.750 af

Pond DP2: STREET Inflow=5.14 cfs 1.315 af
Primary=5.14 cfs 1.315 af

EXHIBIT X

FEMA FLOOD MAP



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A — No Base Flood Elevations determined.

ZONE AE — Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the National Geodetic Vertical Datum of 1929

A — A — Cross section line

23 — 23 — Transect line

97° 07' 30", 32° 22' 30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

4276000 M — 1000-meter Universal Transverse Mercator grid values, zone 18

600000 FT — 5000-foot grid values: Connecticut State Plane coordinate system, FIPSZONE 600, Lambert Conformal Conic Projection

DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 — River Mile

SOURCE:
FEMA FIRM MAPS
0901120013D & 0901120014D
REVISED AUGUST 16, 2006

FLOOD MAP

Somers Solar

Louth Callan Renewables, LLC

159 South Road
Somers, Connecticut

RUSSO
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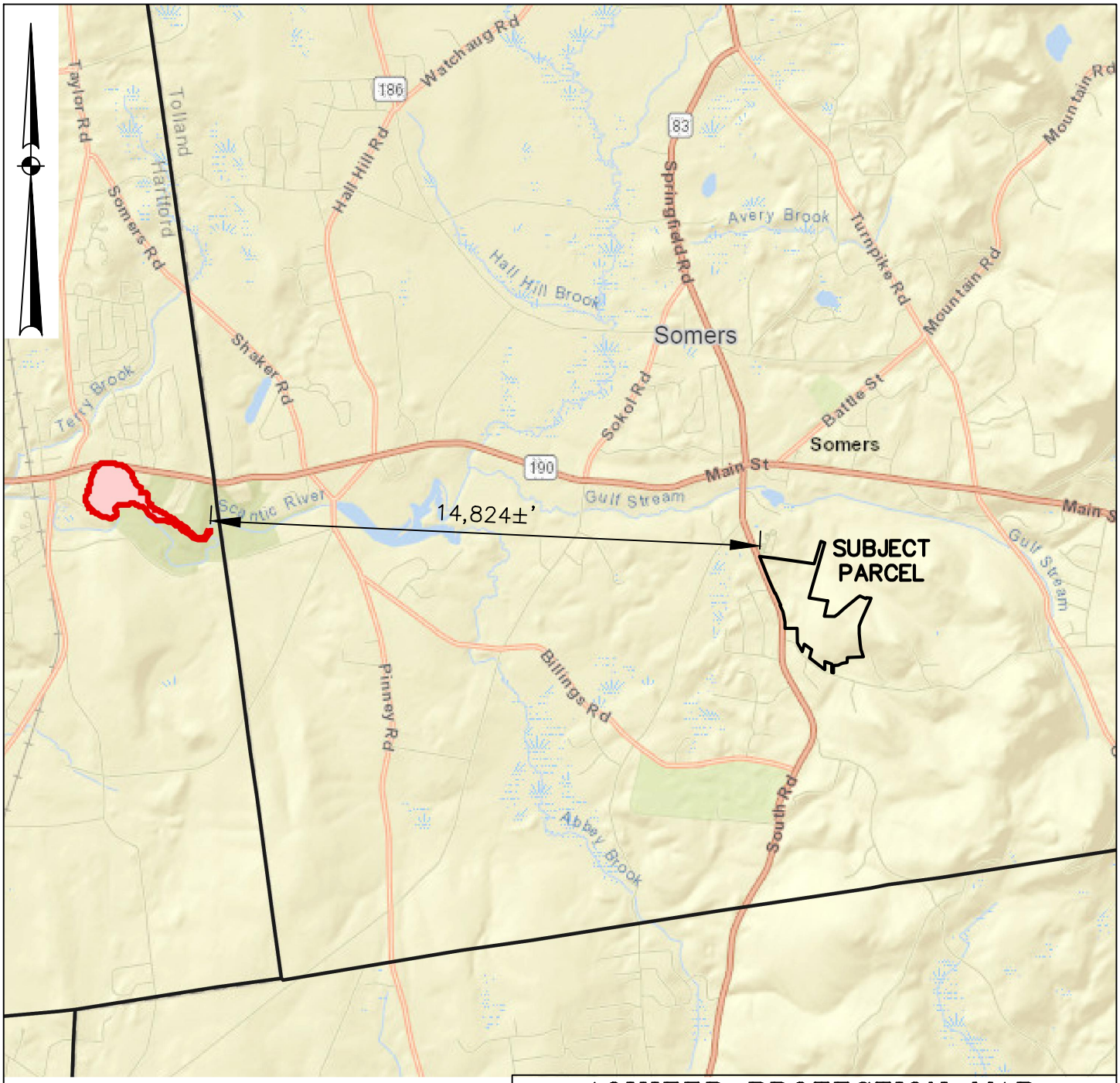
DATE	9-5-2023
SCALE	1"=1000'
JOB NUMBER	2023-001
SHEET	EXHIBIT X

EXHIBIT XI

AQUIFER PROTECTION MAP



Aquifer Protection Areas

- Final Adopted Aquifer Protection
- Final Aquifer Protection
- Preliminary Aquifer Protection

SOURCE:
CT DEEP AQUIFER PROTECTION AREAS MAP

AQUIFER PROTECTION MAP

Somers Solar

Louth Callan Renewables, LLC

159 South Road
Somers, Connecticut

RUSSO
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DATE	9-5-2023
SCALE	1"=4000'
JOB NUMBER	2023-001
SHEET	EXHIBIT XI

EXHIBIT XII

SHPO INITIAL DETERMINATION

March 21, 2023

Mr. Timothy Coon
J.R. Russo & Associates, LLC
P.O. Box 938
East Windsor, CT 06088
(sent via email only to tcoon@jrrusso.com)

Subject: Somers Solar
159 South Road
Somers, Connecticut

Dear Mr. Coon:

The State Historic Preservation Office (SHPO) has reviewed your request for information concerning the potential effects to historic properties associated with the referenced project. SHPO understands that the proposed project entails the construction of a 4.95 Megawatt AC ground mounted solar photovoltaic electric facility with associated site improvements. The proposed activities are under the jurisdiction of the Connecticut Siting Council and will require a Stormwater Discharge permit issued by the Department of Energy and Environmental Protection through the authority of the Environmental Protection Agency. As a result, the project is subject to review by this office pursuant to the Connecticut Environmental Policy Act and Section 106 of the National Historic Preservation Act.

There are no properties listed on the National Register of Historic within or immediately adjacent to the Area of Potential Effect (APE) associated with the project. In addition, two previously identified archaeological sites (Site 129-1 and 129-3) have been recorded within a mile of the proposed project. SHPO understands that much of the project area has been previously disturbed by a gravel operation in operation between 1990 and 2010. However, readily available historic aerial imagery indicates that approximately four acres at the southern end of the APE remain intact and retain the potential to contain intact archaeological deposits. Further, the potentially intact portion of the APE retains environmental characteristics frequently associated with archaeological sites. Therefore, SHPO requests that a professional archaeological assessment and reconnaissance survey be completed prior to construction. Areas that will not be developed do not need to be tested. Subsurface testing should evaluate all areas of anticipated ground disturbance that retain a moderate/high archaeological sensitivity unless sufficient research or fieldwork documents that this level of effort is unwarranted. All work should be in compliance with our *Environmental Review Primer for Connecticut's Archaeological Resources* and no construction or other project-related ground disturbance should be initiated until SHPO has had an opportunity to review and comment upon the requested survey. A list of qualified consultants is attached for your convenience.

SHPO appreciates the opportunity to comment upon this project and we look forward to continuing consultation. Do not hesitate to contact Cory Atkinson, Staff Archaeologist and Environmental Reviewer, for additional information at (860) 500-2458 or cory.atkinson@ct.gov.

Sincerely,

Jonathan Kinney

Jonathan Kinney
State Historic Preservation Officer

EXHIBIT XIII

PHASE 1 ARCHEOLOGICAL INVESTIGATION

HARTGEN
archeological associates inc

PHASE I ARCHEOLOGICAL INVESTIGATION

Somers CT Solar

Town of Somers
Tolland County, Connecticut

HAA 5987-PH1

Submitted to:
Santa Fuel Inc.
154 Admiral Street
Bridgeport, CT 06605

Prepared by:
Hartgen Archeological Associates, Inc.

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June 2023

MANAGEMENT SUMMARY

Involved Agencies:	*United States Department of Energy and Environmental Protection* and *United States Environmental Protection Agency (US EPA)*
Phase of survey:	*Phase I Archeological Investigation*

LOCATION INFORMATION

Municipality:	*Town of Somers*
County:	*Tolland County*

ARCHEOLOGICAL SURVEY OVERVIEW

Area of Potential Effect (APE):	*20 acres*
Survey Area:	5.5 *acres*
Shovel Tests:	78 *tests at 15-meter intervals*

RESULTS OF ARCHEOLOGICAL SURVEY

Precontact sites identified:	*None*
Historic sites identified:	*None*

RECOMMENDATIONS

Based on the results of the Phase I archeological investigation, the APE will not affect any significant archeological sites or deposits. No national Register-eligible sites or properties will be impacted by the Project. No further work is recommended for the Somers Connecticut Solar APE if the current project plans are not altered or changed to include further ground disturbance.

Report Authors:	*Jaclyn Galdun MA RPA, and Matthew J. Kirk MA RPA*
Date of Report:	*June 27, 2023*

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PHASE I ARCHEOLOGICAL INVESTIGATION

1 Introduction

Hartgen Archeological Associates, Inc. (Hartgen) conducted a Phase I archeological investigation for the proposed Somers Solar (Project) located in the Town of Somers, Tolland County, Connecticut. The Project requires permits issued by the Connecticut Department of Energy and Environmental Protection through the United States Environmental Protection Agency (US EPA).

This investigation was conducted to comply with Section 106 of the National Historical Preservation Act and will be reviewed by the Connecticut State Historic Preservation Office. The investigation and report was conducted according to the Connecticut Historical Commission/State Historic Preservation Office's Environmental Review Primer for Connecticut's Archaeological Resources (1987).

1.1 Project Location

The Project is located in the southern portion of the town of Somers. The proposed Project is located in an agricultural field and wooded area south of the intersection of South Road and Field Road and north of Mountain View Road (Map 1).

1.2 Description of the Project

The Project entails the construction of ground mounted solar arrays on drilled or driven posts, associated access roads, electrical lines, and equipment pads (Appendix 1). According to plans available during fieldwork, it is unclear whether trees located in proposed locations of solar arrays will be simply cut to accommodate the arrays or will be cut then stumped and grubbed.

1.3 Description of the Area of Potential Effects (APE)

The area of potential effects (APE) includes all portions of the property that will be directly altered by the proposed undertaking. The APE encompasses 20 acres (Map 2). However, according to historical aerial imagery, a letter from the Connecticut State Historic Preservation Office, and speaking to the landowner, the northern portion of the Project has been severely disturbed by a gravel operation from 1990 to 2010. Excluding the area affected by the gravel operation, the Phase IB study area includes 5.5 acres (Map 2).

2 Environmental Background

The environment of an area is significant for determining the sensitivity of the APE for archeological resources. Precontact and historic groups often favored level, well-drained areas near wetlands and waterways. Therefore, topography, proximity to wetlands, and soils are examined to determine if there are landforms in the APE that are more likely to contain archeological resources. In addition, bedrock formations may contain chert or other resources that may have been quarried by precontact groups. Soil conditions can provide a clue to past climatic conditions, as well as changes in local hydrography.

2.1 Soils

Soil surveys provide a general characterization of the types and depth of soils that are found in an area. This information is an important factor in determining the appropriate methodology if and when a field study is recommended. The source of this data is the Soil Survey Geographic (SSURGO) Database, maintained by the Natural Resources Conservation Service, United States Department of Agriculture (2018). A total of two soils are mapped within the APE and are shown on Map 3 and listed in Table 1. There are no alluvial, colluvial, aeolian, or fill soils present. Therefore, any archeological deposits present are likely to be located at shallow depths. Shovel testing is an appropriate survey methodology.

Table 1. Soils in the APE.

Symbol	Name	Depth	Textures	Slope	Drainage	Landform
37C	Manchester gravelly sandy loam	0-22 cm (0-9in)	Gravelly sandy loam	3-15%	Excessively drained	Terraces, outwash plains, kames, eskers
		22- 45 cm (9-18in)	Gravelly sandy loam			
		45 -165 cm (18-65 in)	Stratified extremely gravelly coarse sand to gravelly loamy sand			
64B	Cheshire fine sandy loam	0-22 cm (0-8 in)	Fine sandy loam	3-8%	Well drained	Till plains, hills
		22-40 cm (8-16 in)	Fine sandy loam			
		40-66 cm (16-26 in)	Fine sandy loam			
		66-165 cm (26-65 in)	Gravelly sandy loam			

2.2 Bedrock Geology

According to the Geologic Map of Connecticut, the bedrock within the APE is both the Portland Arkose formation and silicified rock and mylonite along Mesozoic faults (Rodgers 1985). The Portland Arkose formation was formed during the Lower Jurassic and is comprised of sandstone, siltstone, and shale and is not chert bearing. The Portland Arkose formation is part of the Central Lowlands of Connecticut and part of the Newark supergroup that was formed in the Upper Triassic and Lower Jurassic (Rodgers 1985). The silicified rock and mylonite along Mesozoic faults were formed during the Jurassic and made up of mylonite. This bedrock formation is part of the Eastern Uplands and is fault related rocks (Rodgers 1985). There are no known outcrops within the APE.

2.3 Topography and Hydrography

The Project consists of relatively flat terrain that slopes upwards to the east and south. The northern portion of the APE consists of open fields/agricultural fields that were previously disturbed by a gravel operation. The southern portion of the APE is an overgrown orchard with some paths as well as a wooded area. There are no streams or bodies of water located within the APE, and the APE is drained by intermittent streams. However, three ponds found are directly to the west of the APE with the Shady Brook to the north flowing southwest (Map 2).

3 Documentary Research

Hartgen conducted research using the Connecticut Cultural Resource Information System (ConnCRIS), which is maintained by the Connecticut State Historic Preservation Office (CT SHPO) and the Department of Economic and Community Development. ConnCRIS contains a comprehensive inventory of State and National Register (NR) properties and properties determined eligible for the NR (NRE). Files detailing inventoried archeological sites and previous cultural resource surveys were obtained with the assistance of Catherine Labadia of CT SHPO. The National Park Service (NPS) online database of NR listed properties was also consulted.

3.1 Archeological Sites

An examination of files from CT SHPO identified two reported archeological sites within one mile (1.6 km) of the APE (Table 2). Previously reported archeological sites provide an overview of both the types of sites that may be present in the APE and the relation of sites throughout the surrounding region. The presence of few reported sites, however, may result from a lack of previous systematic survey and does not necessarily indicate a decreased archeological sensitivity within the APE.

The two sites located within one mile of the APE are both precontact sites. The first which is the Gulf Stream Site, identified by the landowner while surface collecting is an assemblage of ten precontact ceramic sherds that

date to the Middle Woodland. The second precontact site, which is closest to the APE, is composed of five dime-sized quartz projectile points with an unknown cultural affiliation.

Table 2. Archeological sites within one mile (1.6 km) of the APE.

Site No.	Site Identifier	Description	Proximity to APE
129-001	Gulf Stream Site	Middle Woodland site consisting of ceramic sherds; several sherds appear decorated.	4,800 feet northeast
129-003	Stevenson House	Possible precontact site consisting of five small (dime-sized) quartz projectile points recovered from a disturbed context.	4,200 feet northeast

3.2 Historic Properties

An examination of ConnCRIS and the NPS database identified seven inventoried properties within the vicinity of the APE. Of these, none of the properties are listed on the NR, and none have been determined eligible for the National Register. The seven properties are located within the Bordeaux Farmstead, a 108.4-acre farm located directly west of the APE boundary at 159 South Road (CT-83). The Bordeaux Farmstead is State Register (SR) listed; four of the seven inventoried properties are contributing resources to the SR listing for the farmstead (Table 3).

Table 3. Inventoried properties near the APE.

Property Name	Status	Description	Proximity to APE
House	SR listed	The 1 ½-story Bordeaux farmhouse was constructed in the late-18th century in vernacular style with a gable-end roof. Construction materials include mortared fieldstone foundation, painted clapboard siding, and asphalt shingle roof. Contributing resource to Bordeaux Farmstead.	140 feet west
Barn	SR listed	Extended English barn in vernacular style located north of the Bordeaux House; constructed c. 1790, with later additions. Construction materials include fieldstone and poured concrete foundations, vertical wood siding, and asphalt shingle roof. Contributing resource to Bordeaux Farmstead.	180 feet west
Workshop	SR listed	Located southeast of the house, the workshop has dry-laid stone foundation, wooden siding, and asphalt shingle roof. Contributing resource to Bordeaux Farmstead.	100 feet west
Milk House	SR listed	Located east of the Bordeaux House, the milk house was constructed in the late-19th century. Contributing resource to Bordeaux Farmstead.	140 feet west
Farmstand	Not eligible	Located just east of South Road, the farmstand was constructed in the mid-20th century and is noncontributing to the Bordeaux Farmstead.	150 feet west
Wagon Shed	Not eligible	Located east of the house, the wagon shed was constructed in the mid-20th century and is noncontributing to the Bordeaux Farmstead.	30 feet west
Coop	Not eligible	Located east of the house, the coop was constructed in the mid-20th century and is noncontributing to the Bordeaux Farmstead.	35 feet west

3.3 Previous Surveys

A review of files from CT SHPO identified no previous surveys within the immediate vicinity of the Project.

4 Historical Map Review

Maps depicting the APE between 1796 and the present were examined. Selected maps of Eaton 1857, Gray 1869, USGS 1892 and 1952 are reproduced in Map 4a. There was no map documented or existing structures within the APE.

The earliest map of the APE is the Sotzman 1796 *Atlas Von Nordamerika* which shows county boundaries, waterways and bodies of water, roadways, and major topography such as mountains and hills. However, information of home/parcel ownership and presence of structures is not rendered.

The first detailed map of the APE and surrounding area is the Eaton 1857 *Map of Tolland County, Connecticut: from actual surveys*. Similar to the Sotzman 1796 map, the Eaton 1857 map depicts major roads, major topography, and water ways, but also includes smaller roads and structures and the owner's names. For instance, the "P. Fuller" which is now known as the Bordeaux Farmstead (SR # 24073) and is listed on the State Register of Historic Places is directly west of the APE. The farmstead was constructed ca. 1790 in the Extended English Barn, vernacular style with various outbuildings which include a barn, shop, farmstand and chicken coop.

The developing town of Somers is pictured to the north, and referred to as Somers Street, with multiple structures surrounding the modern-day intersections of South Road, Springfield Road, and Main Street. Just south of the street intersections is Gulf Stream immediately north of the APE. The stream supported at least one mill as shown on the Eaton 1857 map. The road configurations on the Eaton 1857 map for the most part, follow the current roads.

Gray's 1869 *Atlas of Windham and Tolland Counties, with a Map of Connecticut, from Actual Surveys* map provides a more detailed picture of the APE and the immediate surrounding area. The "P. Fuller" structure depicted on the Eaton 1857 map is now labeled as "H.L. Fuller" with a "P. Fuller" structure right across the street. There are no structures within the APE, and no additional structures adjacent to the APE. The road configurations are similar to the modern road configurations. The developing town north of the APE which is known as Somers today is still referred to as Somers Street on this map.

The 1886 Beers *Map of the State of Connecticut* shows the APE generally with very little detail. The map details roads, county boundaries, and major waterways such as the Scantic River which is found northwest of the commercial/downtown center of Somers. The town of Somers is shown as a series of dense buildings and structures but no information concerning ownership or type of structure is available. The road configurations shown on the map resemble modern road configurations. Similarly, the 1893 *Town and City Atlas of the State of Connecticut* renders similar features such as the road configurations and waterways. However, the 1893 map does offer specific information about certain structures and their purpose. For instance, in the commercial portion of Somers, there is a hotel, two churches, and a schoolhouse located on Main Street. In addition, topographical features such as mountains and hills are also depicted.

Lastly, a series of USGS topographic maps were reviewed from the years 1892, 1921, 1952, 1967, and 1984. All of the topographic maps reviewed include the same features. The road alignments shown in all the topographic maps match the current configuration of roads in the area. All the maps show water ways, structures, and topographic features of mountains and hills, as well as road names. The topographic maps through time show development of rural areas radiating around Somers, and even the expansion of residential development west of the APE across South Road.

5 Archeological Sensitivity Assessment

Archeologically sensitive areas exhibit one or more variables that may contain evidence of past human activities. Sensitive areas can include location near known sites that share the same ecological setting or similar landform (e.g., terrace above a river). They may also include areas where historic maps or photographs show that a building once stood.

Table 4. Factors influencing precontact and historic archeological sensitivity of the APE.

Precontact		Historic	
Water sources: wetlands, ponds, streams, lakes, bays and ocean	☒	Water sources: wetlands, ponds, streams, lakes, bays and ocean	☒
Nearby chert sources	☐	Nearby natural resources (iron, limestone, building stone, etc.)	☐
Well-drained soils for habitation	☒	Well-drained soils for habitation	☒

Precontact		Historic	
Favorable landforms (level, good solar exposure, leeward facing)	☒	Proximity to transportation systems (road, canals, rivers, railroads, etc.)	☒
Known archeological sites in the vicinity	☒	Known archeological sites in the vicinity	☐
Other documentary sources	☐	Map-documented structures	☒
Abundance of nearby stone tool ores	☐	Other documentary evidence	☐
Overall assessment: Moderate sensitivity		Overall assessment: Moderate sensitivity	

6 Archeological Potential

Archeological potential is the likelihood of locating intact archeological remains within an area. The consideration of archeological potential takes into account subsequent uses of an area and the impact those uses would likely have on archeological remains.

A large portion of the APE has been documented to have been disturbed previously from a gravel operation operating in the northern portion of the APE. From the years 1990 to 2010, aerial photography of the APE shows significant ground disturbance and earth moving within the APE. Based on the aerial photography available the disturbance began in the northwest corner in 2004, where an access road connected to South Road (Map 5b). By 2009, the ground moving expanded to the eastern and central portion of the APE (Map 5b). A letter concerning this Project from the Connecticut State Historic Preservation Office (SHPO) stated that the entire northern extent of the APE, besides the 5.5 acres in the southern extent of the APE, has been disturbed previously (See Appendix 3).

Table 5. Factors influencing archeological potential within the APE.

Precontact		Historic	
Undisturbed soils	☒	Lack of modern development	☒
No erosion or cutting of sediments	☐	Limited historical re-use of landscape	☒
Alluvial deposits (cap and preserve deposits)	☐	Alluvial deposits (cap and preserve deposits)	☐
Relatively deep soils (features)	☐	Historic fill (cap and preserve deposits)	☐
		Relatively deep soils (features)	☐
Overall assessment: Low potential		Overall assessment: Moderate potential	

7 Survey Methodology

Archeological sensitivity for precontact and historic resources within the APE is considered moderate, the potential for the archeological resources is considered low for precontact resources and moderate for historic resources due to the previous disturbance of the gravel operation in the area. The soils mapped within the APE are not alluvium or eolian and are relatively shallow, so hand excavated shovel tests are an appropriate survey method for the Project.

7.1 Shovel Testing

Shovel tests were excavated at a standard interval of 15 meters (50 ft). Each shovel test was 40 centimeters in diameter. All excavated soil was passed through 0.25-inch hardware mesh and examined for both precontact (Native American) and historic artifacts. The stratigraphy of each test was recorded including the depth, Munsell color, soil description, and artifact content (Munsell Color 2000). The location of each shovel test was plotted on the project map.

7.2 Artifacts and Laboratory

As general procedure, all precontact (Native American) cultural material identified during the fieldwork are collected. Significant historic artifacts such as glass, ceramics, food remains, hardware, and miscellaneous items are collected. Coal, ash, cinder, brick, and modern materials are noted. Any artifacts collected are placed in paper or plastic bags labeled by provenience and inventoried in a bag list. Bags are numbered in the field and

transported to the Hartgen laboratory in the Town of North Greenbush, Rensselaer County, New York, for processing. Shovel test records and other provenience information were entered into a Microsoft *Access* database (Appendix 1).

8 Survey Results

The Phase IB archeological field reconnaissance was conducted on June 19 to June 20th. The field crew consisted of Catherine Gagnon, Jacquelene Poveromo, and Erin Sheades under the direction of Jaclyn Galdun. Matthew J. Kirk, MA, was the Principal Investigator. The APE is partly agricultural hay fields (Photo 1) and an overgrown orchard with mowed paths through portions of the southern APE (Photo 2 and 3). A wooded area is found along the eastern and southern portions of the APE that is sloped at the very southern portion (Photo 4 and 5). The structures associated with 139/159 South Road are found to the west outside of the APE boundary (Photo 6). The weather was sunny and warm with a slight breeze.

A total of 78 shovel tests were excavated across the southern portion of the APE, where it was determined to not be disturbed by previous ground disturbance associated with the gravel operation to the north.

The soil mapped throughout the site was topsoil/A-horizon over subsoil/B-horizon. The A-horizon is a dark brown to dark yellowish brown silty loam with gravel and cobbles and ranged in thickness from 11 centimeters in the wooded portion to 33 centimeters in the overgrown orchard closer to South Road. The B-horizon is brown with gravel and cobbles. Shovel tests were excavated to an average depth of 43 centimeters. No artifacts were recovered from shovel test excavations in the southern undisturbed portion of the APE.

9 Recommendations

Based on the results of the Phase I archeological investigation, the APE will not affect any significant archeological sites or deposits. No National Register-eligible sites or properties will be impacted by the Project. No further work is recommended for the Somers Connecticut Solar APE, if the current project plans are not altered or changed to include further ground disturbance.

10 Bibliography

Anonymous
1893 *Town and City Atlas of the State of Connecticut*. D.H. Hurd & Co., Boston.

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1886 *Map of the State of Connecticut*. J.B. Beers & Co., New York.

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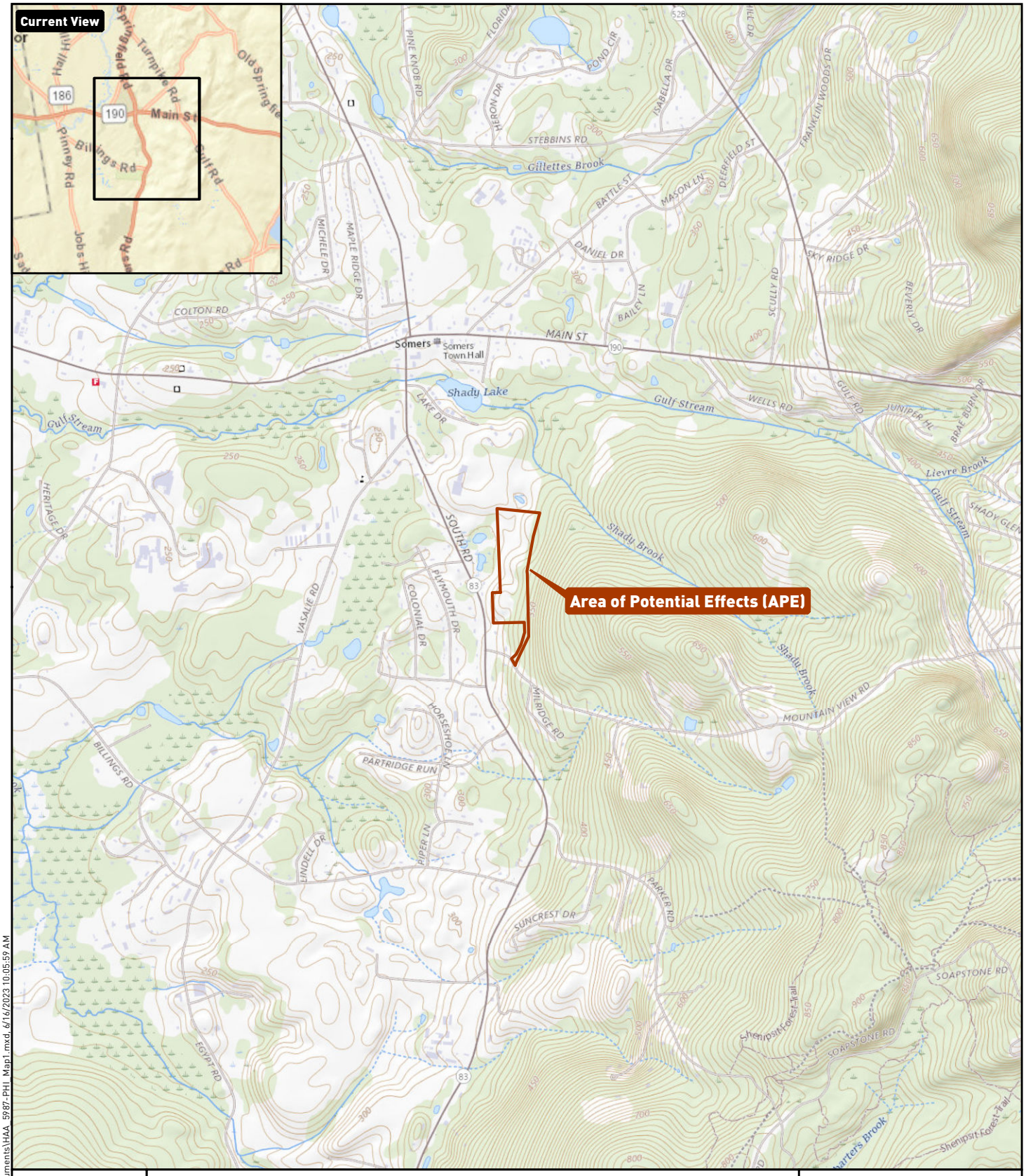
1952 *Ellington, Connecticut Topographic Quadrangle Map, 1:24,000 scale*. USGS Historical Topographic Map Explorer, Reston, Virginia, http://historicalmaps.arcgis.com/usgs.

1967 *Ellington, Connecticut Topographic Quadrangle Map, 1:24,000 scale*. USGS Historical Topographic Map Explorer, Reston, Virginia, http://historicalmaps.arcgis.com/usgs.

1984 *Ellington, Connecticut Topographic Quadrangle Map, 1:24,000 scale*. USGS Historical Topographic Map Explorer, Reston, Virginia, http://historicalmaps.arcgis.com/usgs.

Maps



1,000 0 1,000 2,000 Feet

300 0 300 600 Meters

Note: Contour interval is 20 feet.

Project Location

GIS Services Accessed 6/16/2023: Environmental Systems Research Institute, Inc., World Street Map; USGS The National Map

HARTGEN archeological associates inc

Map 1

C:\HAA\projects\5987\GIS\Documents\HAA_5987_PHI_Map1.mxd, 6/16/2023 10:05:59 AM

100 0 100 200 Feet
30 0 30 60 Meters

Legend

- Shovel Test (ST)
- Photo Angle
- Phase I Study Area
- Area of Potential Effects (APE)
- Sloped

Project Map

Connecticut Environmental Conditions
Online, Orthoimagery, 2019

HARTGEN archeological associates inc

Map 2

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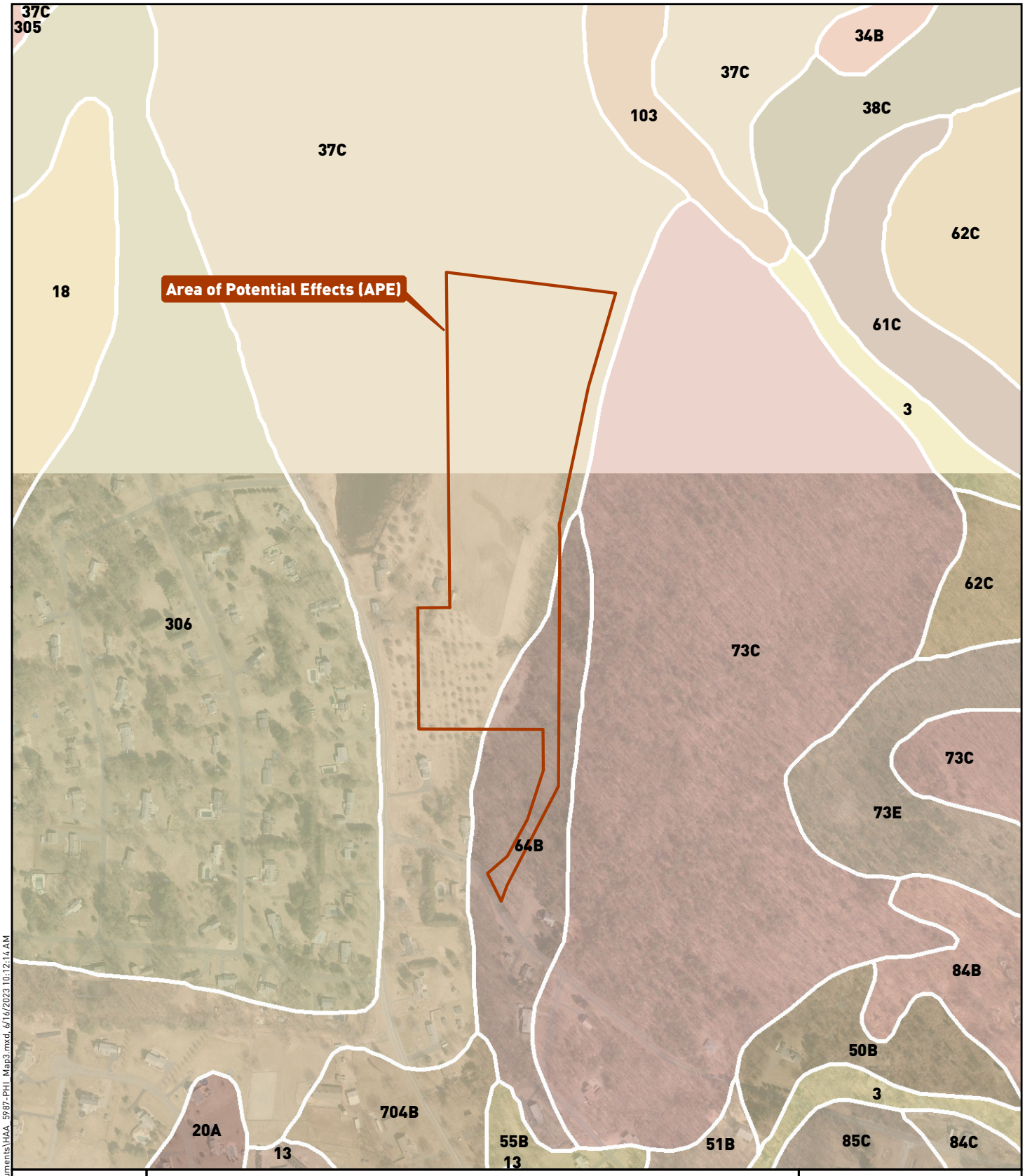

250 0 250 500 Feet

75 0 75 150 Meters

Soil Map

Connecticut Environmental Conditions Online, Orthoimagery, 2019; U.S. Department of Agriculture, Natural Resources Conservation Service Soil Survey Geographic Database 2022

HARTGEN archeological associates inc

Map 3

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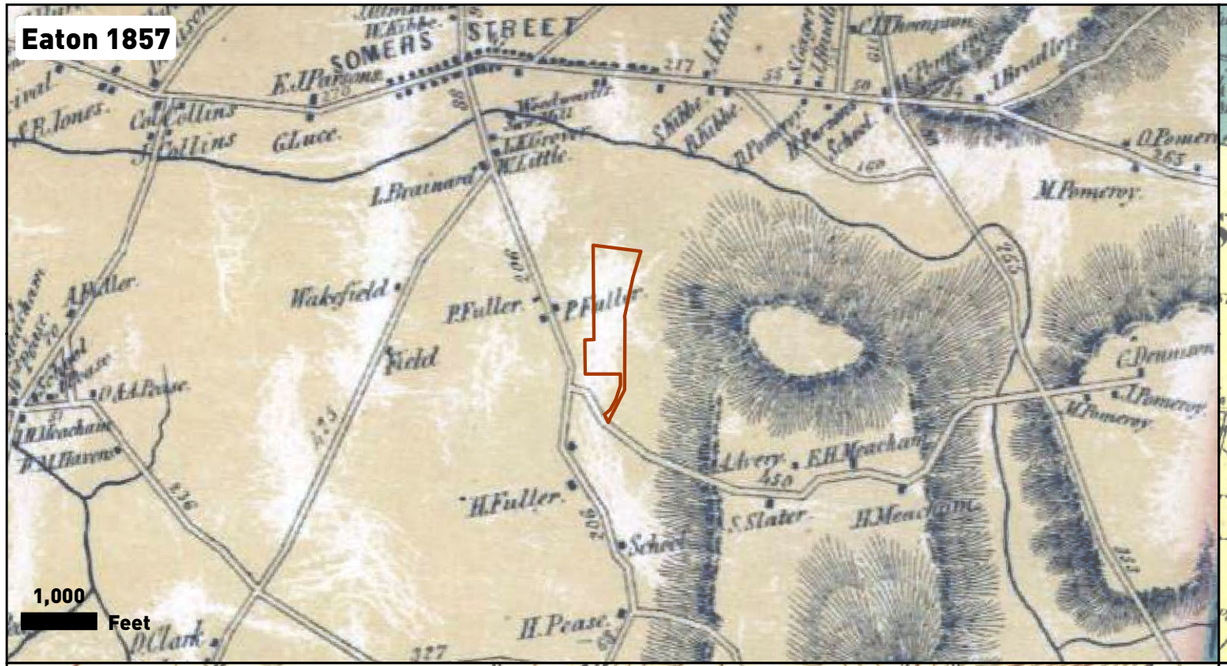

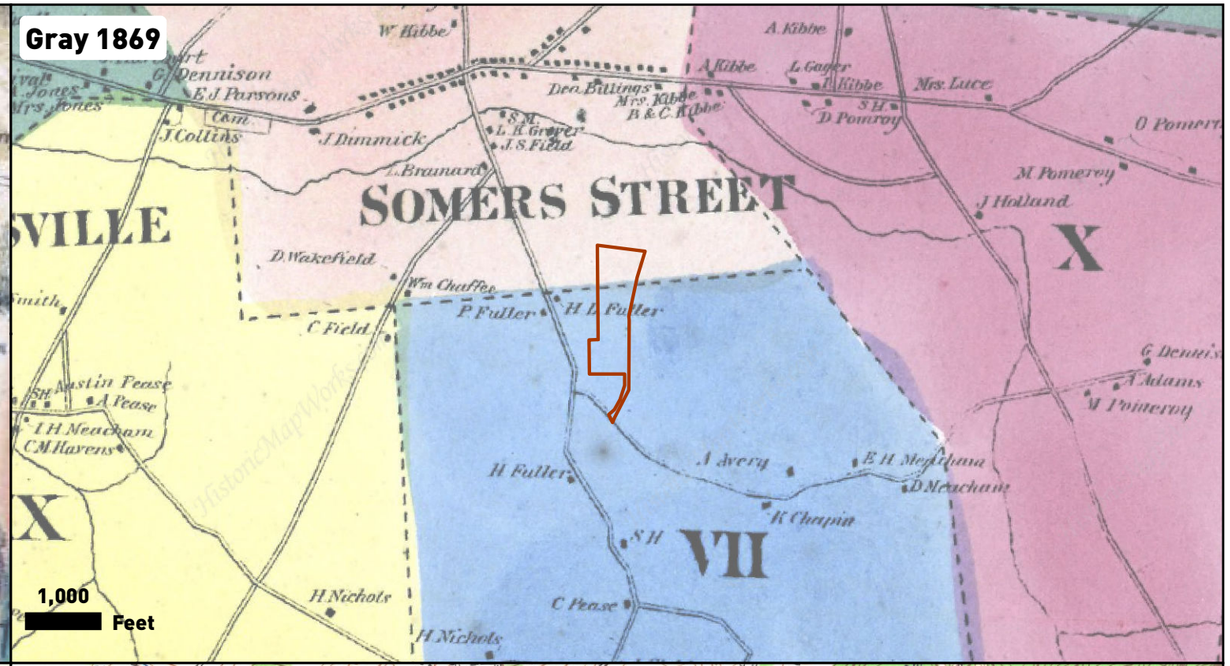

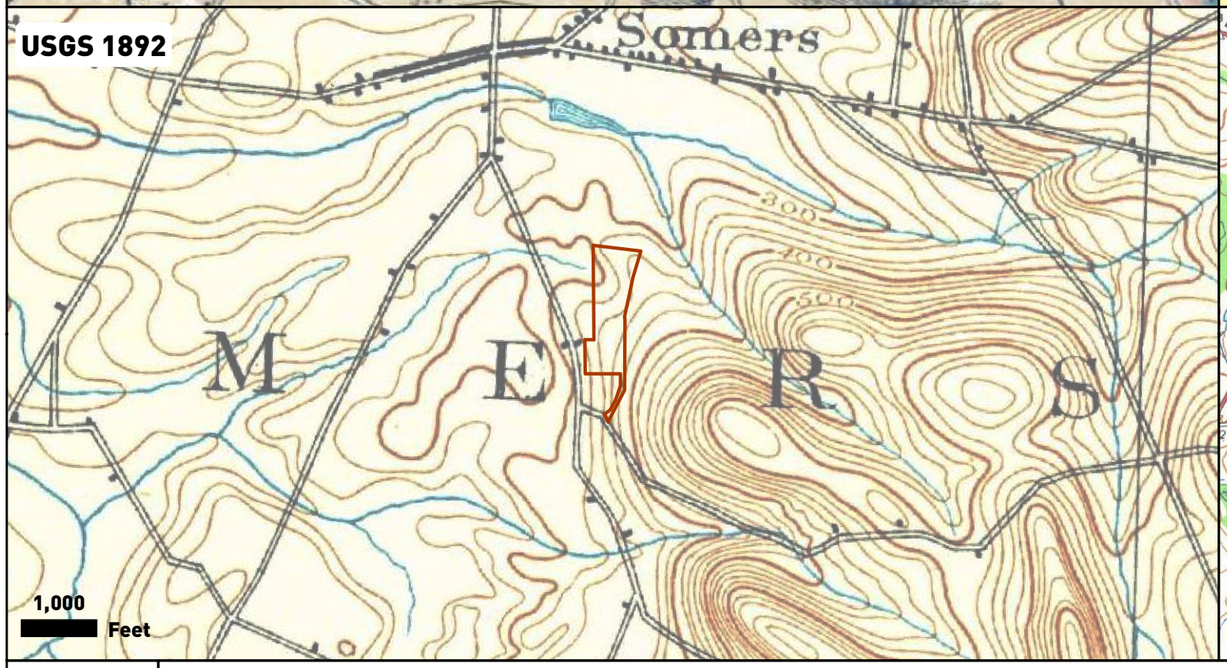

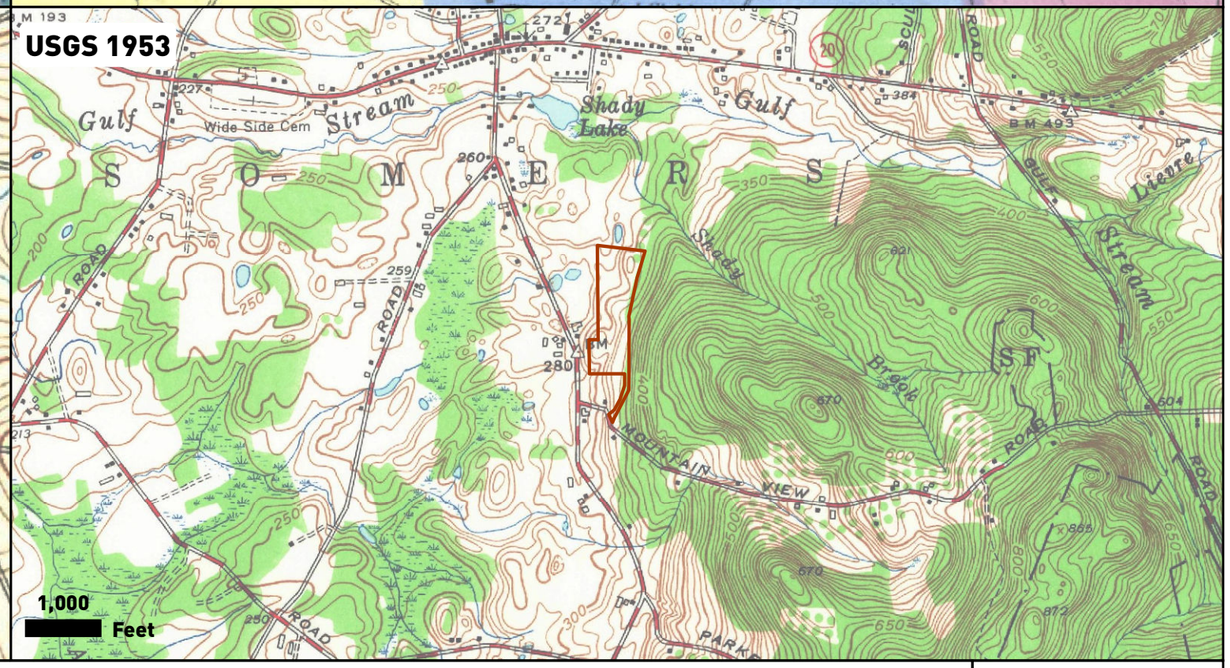

Legend

Area of Potential Effects (APE)

Historical Maps

1857-1953

HARTGEN archeological associates inc

Map 4

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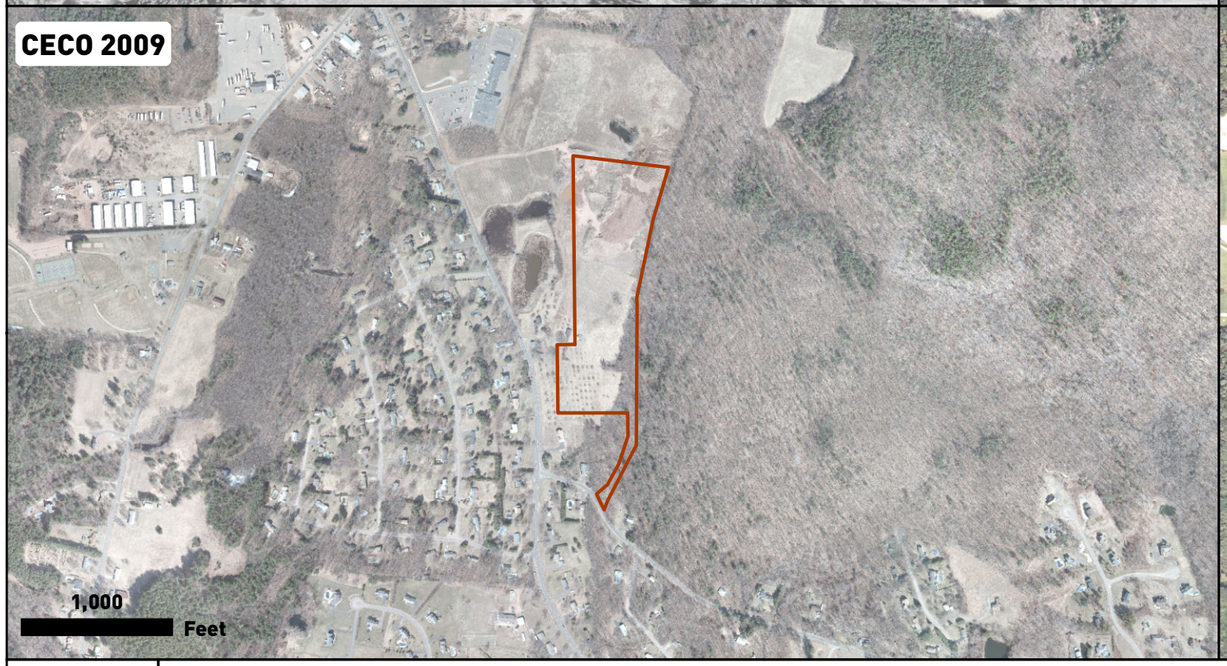

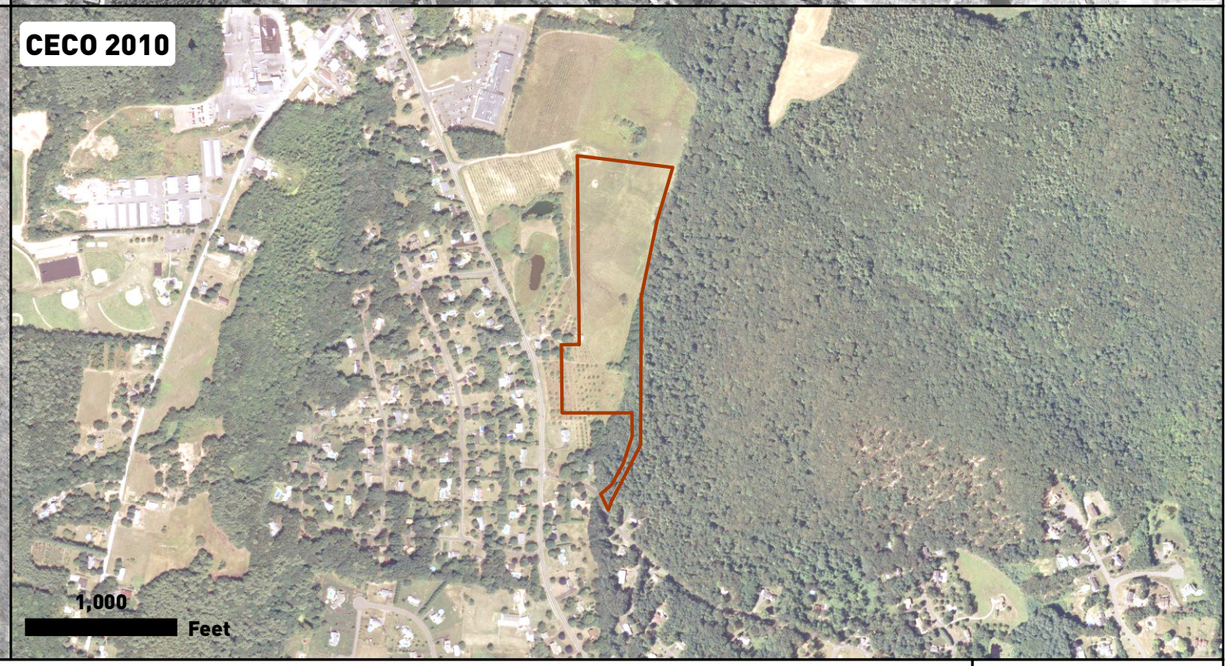

N

Legend

Area of Potential Effects (APE)

Historical Aerials

1990-2010

HARTGEN archeological associates inc

Map 4b

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Photographs

Photo 1. Northern view of the northern portion of APE previously disturbed from previous gravel operation.

Photo 2. Archeologist excavating Shovel Test 20 in overgrown orchard with mowed paths, view to the south.

Photo 3. Sloped area located in southeastern portion of APE, view to southeast.

Photo 4. Archeologist excavating Shovel Test 63 in the wooded eastern portion of the APE, view to north.

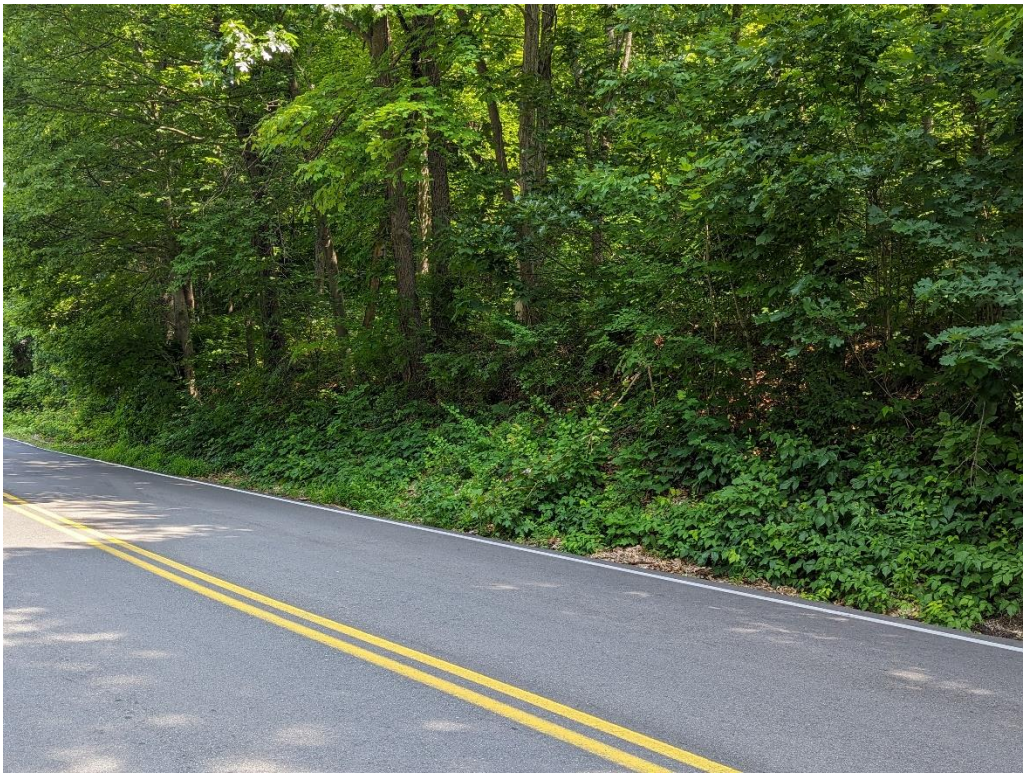

Photo 5. Sloped southern portion of APE of proposed access road, view to north.

Photo 6. State Registered Historic Property found at 139/159 South Road, view from northeast.

Appendix 1: Shovel Test Records

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
1	20	1	10yr 3/3 dark brown	sand loam	gravel, cobbles		Brick (13 x 5 x 3.5cm)
	40	2	7.5yr 4/4 brown	sand loam	cobbles, glacial till	subsoil	
2	24	1	10yr 3/4 dark yellowish brown	silt	gravel, cobbles		
	44	2	7.5yr 4/4 brown	silt	gravel, cobbles	subsoil	
3	33	1	7.5yr 3/4 dark brown	silt loam	gravel, cobbles, roots		
	58	2	7.5yr 5/6 strong brown	sand	gravel, cobbles	subsoil	
4	24	1	10yr 3/4 dark yellowish brown	silt	gravel, cobbles		
	46	2	7.5yr 4/4 brown	silt	gravel, cobbles	subsoil	
5	34	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles		
	52	2	7.5yr 4/4 brown	sand loam	gravel, cobbles	subsoil	
6	23	1	7.5yr 4/4 brown	loam	gravel, cobbles, roots		
	46	2	2.5yr 5/6 red	sand	gravel, cobbles	subsoil	
7	20	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles		
	40	2	7.5yr 4/4 brown	sand loam	gravel, cobbles, glacial till	subsoil	
8	22	1	10yr 3/4 dark yellowish brown	silt	gravel, cobbles		
	30	2	7.5yr 4/4 brown	silt	gravel, cobbles		
	55	3	10yr 5/4 yellowish brown	sand	gravel	subsoil	
9	24	1	7.5yr 4/3 brown	silt loam	gravel, cobbles, roots		
	46	2	7.5yr 5/6 strong brown	sand loam	gravel, cobbles	subsoil	
10	16	1	10yr 3/4 dark yellowish brown	silt loam	gravel, cobbles, roots		Modern glass frag
	40	2	10yr 5/8 yellowish brown	sand loam	cobbles	subsoil	
11	23	1	10yr 3/2 very dark grayish brown	sand loam			
	48	2	7.5yr 4/4 brown	sand loam	cobbles	subsoil	
12	28	1	10yr 3/4 dark yellowish brown	silt	gravel, roots		
	48	2	7.5yr 4/4 brown	silt sand	gravel, cobbles	subsoil	

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
13	23	1	10yr 3/6 dark yellowish brown	silt loam	gravel, cobbles		
	49	2	7.5yr 4/4 brown	silt loam	gravel, cobbles	subsoil	
14	22	1	5yr 3/4 dark reddish brown	sand loam	gravel, cobbles, roots		
	43	2	5yr 4/6 yellowish red	sand	cobbles	subsoil	
15	33	1	10yr 3/2 very dark grayish brown	silt sand	gravel		
	55	2	7.5yr 4/4 brown	silt sand	gravel	subsoil	
16	23	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	52	2	10yr 5/4 yellowish brown	silt loam	gravel, cobbles	subsoil	
17	30	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles		
	45	2	7.5yr 4/4 brown	sand loam	gravel, cobbles	subsoil	
18	20	1	5yr 3/3 dark reddish brown	silt loam	gravel, cobbles		
	41	2	2.5yr 4/6 dark red	sand loam	gravel, cobbles	subsoil	
19	18	1	5yr 4/3 reddish brown	silt loam	gravel, cobbles		
	39	2	5yr 5/6 yellowish red	sand loam	cobbles	subsoil	
20	30	1	10yr 3/4 dark yellowish brown	silt sand	gravel, cobbles, roots		
	50	2	7.5yr 4/4 brown	silt sand	gravel	subsoil	
21	26	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	56	2	10yr 5/4 yellowish brown	silt loam	gravel, cobbles	subsoil	
22	25	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles		
	45	2	7.5yr 4/4 brown	sand loam	gravel, cobbles	subsoil	
23	13	1	5yr 3/2 dark reddish brown	silt loam	gravel, cobbles		
	47	2	5yr 4/6 yellowish red	silt clay		subsoil	
24	26	1	10yr 3/4 dark yellowish brown	silt sand	gravel		
	50	2	7.5yr 4/4 brown	silt sand	gravel, cobbles	subsoil	
25	32	1	10yr 3/3 dark brown	sand loam	roots		
	50	2	7.5yr 4/4 brown	sand loam	cobbles, roots	subsoil	

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
26	22	1	7.5yr 3/3 dark brown	silt loam	gravel, cobbles		
	38	2	7.5yr 5/6 strong brown	silt loam	gravel	subsoil	
27	26	1	7.5yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	41	2	7.5yr 5/6 strong brown	silt loam	gravel	subsoil	
28	30	1	10yr 3/2 very dark grayish brown	sand loam	roots		
	45	2	7.5yr 4/4 brown	sand loam	gravel, cobbles	subsoil	
29	23	1	10yr 3/2 very dark grayish brown	silt loam	gravel, roots		
	50	2	7.5yr 4/4 brown	loam	gravel, cobbles, roots	subsoil	
30	21	1	7.5yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	45	2	7.5yr 5/8 strong brown	silt loam	cobbles	subsoil	
31	31	1	10yr 3/3 dark brown	silt sand	gravel, roots		
	41	2	7.5yr 4/4 brown	loam	gravel	impasse (compact soil)	
32	25	1	10yr 3/2 very dark grayish brown	loam	gravel, roots		
	40	2	10yr 5/4 yellowish brown	sand loam	gravel, cobbles, glacial till	subsoil	
33	14	1	7.5yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	40	2	7.5yr 5/8 strong brown	silt loam	cobbles	subsoil	
34	20	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, roots		
	35	2	10yr 5/4 yellowish brown	sand loam	gravel, cobbles	subsoil	
35	26	1	10yr 3/4 dark yellowish brown	sand loam			
	46	2	7.5yr 4/4 brown	sand loam		subsoil	
36	23	1	7.5yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	48	2	7.5yr 5/8 strong brown	silt loam	cobbles	subsoil	
37	21	1	10yr 3/4 dark yellowish brown	silt sand	gravel, cobbles		
	40	2	7.5yr 4/4 brown	loam	gravel, cobbles	subsoil	

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
38	30	1	7.5yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	52	2	7.5yr 5/8 strong brown	silt loam	cobbles	subsoil	
39	25	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	56	2	10yr 5/4 yellowish brown	silt loam	gravel, cobbles	subsoil	
40	25	1	7.5yr 3/2 dark brown	silt loam	gravel, cobbles, roots		
	50	2	7.5yr 5/6 strong brown	silt loam	gravel, cobbles	subsoil	
41	28	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	57	2	10yr 5/4 yellowish brown	silt loam	gravel, cobbles	subsoil	
42	26	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	33	2	10yr 5/4 yellowish brown	silt loam	gravel, cobbles	impasse (roots)	
43	30	1	10yr 3/2 very dark grayish brown	sand loam	roots		
	50	2	10yr 5/4 yellowish brown	sand loam	gravel, cobbles	subsoil	
44	27	1	10yr 3/2 very dark grayish brown	sand loam	roots		
	45	2	10yr 5/4 yellowish brown	sand loam	gravel, cobbles	subsoil	
45	30	1	10yr 3/3 dark brown	loam	gravel, cobbles, roots	impasse (rocks)	
46	25	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	55	2	10yr 5/4 yellowish brown	silt loam	gravel, cobbles	subsoil	
47	23	1	10yr 3/3 dark brown	silt loam	gravel, cobbles		
	54	2	7.5yr 4/4 brown	silt loam	gravel, cobbles	subsoil	
48	30	1	7.5yr 3/2 dark brown	silt loam	gravel, cobbles, roots		
	39	2	7.5yr 4/3 brown	sand loam	gravel, cobbles		
	62	3	7.5yr 5/6 strong brown	sand clay	gravel	subsoil	
49	22	1	10yr 3/2 very dark grayish brown	silt sand	gravel, cobbles, roots		
	29	2	10yr 2/2 very dark brown	sand clay			
	50	3	7.5yr 4/4 brown	loam	gravel, cobbles	subsoil	

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
50	24	1	10yr 2/2 very dark brown	sand loam	gravel, cobbles, roots		
	45	2	10yr 3/4 dark yellowish brown	sand loam	gravel, cobbles	subsoil	
51	21	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles		
	38	2	10yr 3/4 dark yellowish brown	sand loam	gravel, cobbles	subsoil	
52	22	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots	impasse (rocks)	
53	20	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles		Barbed wire
	38	2	10yr 4/4 dark yellowish brown	sand loam	gravel, cobbles	subsoil	
54	27	1	7.5yr 4/3 brown	silt loam	gravel, cobbles		
	56	2	7.5yr 5/8 strong brown	silt loam	gravel, cobbles	subsoil	
55	24	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots	impasse (roots, rocks)	
56	35	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, roots	impasse (roots, rocks)	
57	20	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	43	2	10yr 5/6 yellowish brown	sand clay	gravel, cobbles	subsoil	
58	26	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	51	2	10yr 5/4 yellowish brown	sand clay	gravel, cobbles	subsoil	
59	10	1	10yr 3/3 dark brown	loam	roots	impasse (roots)	
60	13	1	10yr 3/3 dark brown	silt sand	gravel, cobbles, roots		
	32	2	7.5yr 3/4 dark brown	loam	gravel, cobbles, roots	subsoil	
61	19	1	7.5yr 4/3 brown	silt loam	gravel, cobbles, roots		
	43	2	7.5yr 5/8 strong brown	silt loam	gravel, roots	subsoil	
62	20	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, roots		
	39	2	10yr 4/4 dark yellowish brown	sand loam	gravel, cobbles	subsoil	

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
63	21	1	10yr 3/2 very dark grayish brown	silt sand	gravel, cobbles, roots		
	42	2	10yr 4/4 dark yellowish brown	silt loam	gravel, cobbles	subsoil	
64	14	1	7.5yr 4/2 brown	silt loam	gravel, roots		
	29	2	7.5yr 5/6 strong brown	silt loam	gravel, roots	subsoil	
65	22	1	10yr 3/2 very dark grayish brown	silt loam	gravel, cobbles, roots		
	53	2	10yr 4/4 dark yellowish brown	silt loam	gravel, cobbles, roots	subsoil	
66	15	1	10yr 3/2 very dark grayish brown	silt loam	cobbles, roots		
	43	2	10yr 4/4 dark yellowish brown	silt loam	gravel, cobbles, roots	subsoil	
67	20	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, exfoliating bedrock, roots		
	35	2	10yr 4/4 dark yellowish brown	sand loam	gravel, cobbles, exfoliating bedrock	subsoil	
68	11	1	10yr 3/2 very dark grayish brown	silt loam	gravel, cobbles, roots		
	39	2	7.5yr 5/4 brown	silt loam	gravel, cobbles, roots	subsoil	
69	24	1	10yr 4/2 dark grayish brown	silt loam	gravel, roots		
	51	2	10yr 5/4 yellowish brown	loam	gravel, roots	subsoil	
70	16	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	32	2	7.5yr 4/4 brown	loam	gravel, cobbles	impasse (rocks)	
71	18	1	10yr 4/2 dark grayish brown	silt loam	gravel, roots		
	44	2	10yr 5/4 yellowish brown	silt clay	gravel, roots	subsoil	
72	20	1	10yr 3/2 very dark grayish brown	sand loam	cobbles, roots		
	38	2	10yr 4/4 dark yellowish brown	sand loam	cobbles, exfoliating bedrock	subsoil	
73	20	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	40	2	7.5yr 4/4 brown	loam clay	gravel, cobbles	subsoil	

5987PH1: Phase I Archeological Investigation, Somers CT Solar

Shovel Test Records

Test	Ending Depth (cm)	Level	Munsell Color	Soil Type	Soil Inclusions	Termination Reason	Not Collected
74	18	1	10yr 3/2 very dark grayish brown	sand loam	gravel, cobbles, roots		
	33	2	10yr 4/4 dark yellowish brown	sand loam	gravel, cobbles, exfoliating bedrock, glacial till	subsoil	
75	21	1	10yr 2/2 very dark brown	silt loam	gravel, roots	impasse (rocks)	
76	18	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	40	2	7.5yr 4/4 brown	loam	gravel, cobbles	subsoil	
77	28	1	10yr 3/3 dark brown	silt loam	gravel, cobbles, roots		
	53	2	10yr 6/8 brownish yellow	silt loam	gravel, roots	subsoil	
78	27	1	10yr 3/2 very dark grayish brown	silt loam	gravel, cobbles, roots	impasse (roots)	

Appendix 2: Site Plan

SYSTEM INFORMATION	
MODULE / QTY:	(11,388) VSUN, VSUN550-144BMH-DG (550W)
INVERTERS:	(18) CPS SCH275KTL-DO/US-800-36
SYSTEM SIZE (DC / AC):	(6,263.40kW DC / 4,950.00kW AC)
MOUNTING SYSTEM:	SINGLE AXIS TRACKER
TILT ANGLE:	±60°
ARRAY AZIMUTH:	180°
MONITORING SYSTEM:	ALSOENERGY

NEW GROUND MOUNT PV TRACKER SYSTEM
(11,544) VSUN 550W MODULES

TOTAL SYSTEM SIZE:
6,263.40.00 kWDC / 5,000.00 kWAC

FENCE LINE, 7 FT KNOT WIRE PERIMETER FENCE

NEW EQUIPMENT PAD 2:
(1) 2500kVA 23kV-800V WYE-G-WYE, Z=5.75%, X/R=6, 5-LEGGED CORE TRANSFORMER (XFMR-2)
(1) 2500A SWITCHBOARD (SWBD-2)
(1) DAS ENCLOSURE (EN2)
(1) 5kVA MINI LOAD CENTER 2
(1) WEATHER STATION

INVERTER BANK 2:
(9) CPS SCH275KTL-DO/US-800-36

VEHICLE TURNAROUND

20 FT ACCESS ROAD

NEW INVERTER BANK 1:
(9) CPS SCH275KTL-DO/US-800-36

EXISTING STORAGE CONTAINER TO BE RELOCATED

TRACKERS TO BE REMOVED FROM STEEP SLOPE AND FORESTED AREA ON SOUTH EASTERN PORTION OF THE SITE

EQUIPMENT PAD 1:
(1) 112.5kVA 23kV-480V WYE-G:DELTA GROUNDING TRANSFORMER, Z=4%, X/R=4 (GXFMR-1)
(1) 2500kVA 23kV-800V WYE-G-WYE, Z=5.75, X/R=6, 5-LEGGED CORE TRANSFORMER (XFMR-1)
(1) 2500A SWITCHBOARD (SWBD-1)
(1) DAS ENCLOSURE (EN1)
(1) 5kVA MINI LOAD CENTER 1

ACCESS FENCE GATE

NEW 20 FT GRAVEL ACCESS ROAD WITH VEHICLE TURNAROUND, ACCESSIBLE TO THE UTILITY 24/7

POLE CP3:
NEW CUSTOMER OWNED RISER POLE

POLE CP2:
NEW CUSTOMER OWNED POLE MOUNTED 27kV RECLOSER (MANUAL GENERATOR INTERRUPTING DEVICE)

POLE CP1:
NEW CUSTOMER OWNED 27kV LOAD BREAK DISCONNECT SWITCH (MANUAL GENERATOR

ACCESS ROAD AND POINT OF INTERCONNECTION (POI) TO REMAIN

POLE UP4:
NEW UTILITY OWNED PRIMARY METER FOR PV SERVICE ONLY (POINT OF COMMON COUPLING ON LOAD SIDE OF NEW METERING CLUSTER)

POLE UP3:
NEW UTILITY OWNED RECLOSER

POLE UP1:
NEW UTILITY OWNED MID SPAN POLE

POLE UP2:
NEW UTILITY OWNED POLE MOUNTED UTILITY LOAD BREAK DISCONNECT SWITCH (MANUAL GENERATOR DISCONNECTING MEANS), GANG OPERATED, UTILITY LOCKABLE IN THE OPEN POSITION, ACCESSIBLE 24/7, VISIBLE BREAK

EXISTING UTILITY POLE ON CIRCUIT 27H12, POINT OF INTERCONNECTION (POI), HOSTING CAPACITY AVAILABLE 23kV OPERATING VOLTAGE (41.972218, -72.442348)

01 SITE PLAN

SCALE 1" = 250'-0"
ORIGINAL DRAWING SIZE: ARCH D (24"x36")

Louth Callan Renewables
921 THRALL AVENUE
SUFFIELD, CT 06078

PE STAMP AND SIGNATURE:

PUNGO ENGINEERING SERVICES
PUNGO ENGINEERING SERVICES, PLLC.
424 EAST MAIN STREET
WASHINGTON, NORTH CAROLINA 27889
INFO@PUNGOENGINEERING.COM
(252) 945-8652

PROJECT OWNER:

Santa SOLAR

SOMERS SOLAR
SANTA SOLAR
159 SOUTH RD., SOMERS , CT 06071

DRAFT ONLY
NOT FOR CONSTRUCTION

DRAWING ISSUE

REVISION	DATE	DESCRIPTION	ENG
A	03/31/2023	INTERCONNECTION SET	LH

PROJECT NO:	12087
CAD DWG FILE:	SOMERS SOLAR_IC_TRACKERS
SHEET SIZE:	ANSI D
DRAWN BY:	
CHECKED BY:	
COPYRIGHT:	
LOUTH CALLAN RENEWABLES, LLC. 2022	

SHEET TITLE

SITE PLAN

A-101

SYSTEM INFORMATION	
MODULE / QTY:	(8,710) VSUN, VSUN550-144BMH-DG (550W)
INVERTERS:	(14) CPS SCH275KTL-DO/US-800-36
SYSTEM SIZE (DC / AC):	(4,790.50kW DC / 3,850.00kW AC)
MOUNTING SYSTEM:	SINGLE AXIS TRACKER
TILT ANGLE:	±60°
ARRAY AZIMUTH:	180°
MONITORING SYSTEM:	ALSOENERGY

N/F Nancy B. Edgar Revocable Trust, under Agreement dated August 17, 2011

N/F Northern Connecticut Land Trust, Inc.

- NEW GROUND MOUNT PV TRACKER SYSTEM (8,710) VSUN 550W MODULES
  TOTAL SYSTEM SIZE: 4,790.50 kWDC / 3,850.00 kWAC
- FENCE LINE, 7 FT KNOT WIRE PERIMETER FENCE
- NEW EQUIPMENT PAD 2: (1) 2000kVA 23kV-800V WYE:G-WYE, Z=5.75%, X/R=6, 5-LEGGED CORE TRANSFORMER (XFMR-2) (1) 2500A SWITCHBOARD (SWBD-2) (1) DAS ENCLOSURE (EN2) (1) 5kVA MINI LOAD CENTER 2 (1) WEATHER STATION
- INVERTER BANK 2: (7) CPS SCH275KTL-DO/US-800-36
- VEHICLE TURNAROUND
- 20 FT ACCESS ROAD
- EXISTING STORAGE CONTAINER TO BE RELOCATED
- NEW 20 FT GRAVEL ACCESS ROAD WITH VEHICLE TURNAROUND, ACCESSIBLE TO THE UTILITY 24/7
- NEW INVERTER BANK 1: (7) CPS SCH275KTL-DO/US-800-36
- EQUIPMENT PAD 1: (1) 112.5kVA 23kV-480V WYE-G:DELTA GROUNDING TRANSFORMER, Z=4%, X/R=4 (GXFMR-1) (1) 2000kVA 23kV-800V WYE:G-WYE, Z=5.75, X/R=6, 5-LEGGED CORE TRANSFORMER (XFMR-1) (1) 2500A SWITCHBOARD (SWBD-1) (1) DAS ENCLOSURE (EN1) (1) 5kVA MINI LOAD CENTER 1
- POLE CP1: NEW CUSTOMER OWNED 27kV LOAD BREAK DISCONNECT SWITCH (MANUAL GENERATOR DISCONNECTING MEANS), GANG OPERATED, UTILITY LOCKABLE IN THE OPEN POSITION, ACCESSIBLE 24/7, VISIBLE BREAK
- POLE CP2: NEW CUSTOMER OWNED POLE MOUNTED 27kV RECLOSER (MANUAL GENERATOR INTERRUPTING DEVICE)
- POLE CP3: NEW CUSTOMER OWNED RISER POLE
- POLE UP1: NEW UTILITY POLE ON CIRCUIT 27H12, POINT OF INTERCONNECTION (POI), HOSTING CAPACITY AVAILABLE 23kV OPERATING VOLTAGE (41.974038, -72.443582)
- POLE UP2: NEW UTILITY OWNED POLE MOUNTED UTILITY LOAD BREAK DISCONNECT SWITCH (MANUAL GENERATOR DISCONNECTING MEANS), GANG OPERATED, UTILITY LOCKABLE IN THE OPEN POSITION, ACCESSIBLE 24/7, VISIBLE BREAK
- POLE UP3: NEW UTILITY OWNED RECLOSER
- POLE UP4: NEW UTILITY OWNED PRIMARY METER FOR PV SERVICE ONLY (POINT OF COMMON COUPLING ON LOAD SIDE OF NEW METERING CLUSTER)
- POLE UP5: NEW UTILITY OWNED MID SPAN POLE

01 SITE PLAN

N

0 100'-0" 200'-0" 400'-0"

SCALE 1" = 100'-0"

ORIGINAL DRAWING SIZE: ARCH D (24"x36")

Louth Callan Renewables

921 THRALL AVENUE
SUFFIELD, CT 06078

PE STAMP AND SIGNATURE:

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INFO@PUNGOENGINEERING.COM
(252) 945-8652

PROJECT OWNER:

Santa SOLAR

SOMERS SOLAR
SANTA SOLAR
159 SOUTH RD., SOMERS , CT 06071

DRAFT ONLY
NOT FOR CONSTRUCTION

DRAWING ISSUE

REVISION	DATE	DESCRIPTION	ENG
A	03/31/2023	INTERCONNECTION SET	LH

PROJECT NO:	12087
CAD DWG FILE:	SOMERS SOLAR_IC_TRACKER(1)
SHEET SIZE:	ANSI D
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COPYRIGHT:	LOUTH CALLAN RENEWABLES, LLC. 2022

SHEET TITLE

SITE PLAN

A-101C

Appendix 3: Connecticut State Historic Preservation Office (SHPO) Letter

March 21, 2023

Mr. Timothy Coon
J.R. Russo & Associates, LLC
P.O. Box 938
East Windsor, CT 06088
(sent via email only to tcoon@jrrusso.com)

Subject: Somers Solar
159 South Road
Somers, Connecticut

Dear Mr. Coon:

The State Historic Preservation Office (SHPO) has reviewed your request for information concerning the potential effects to historic properties associated with the referenced project. SHPO understands that the proposed project entails the construction of a 4.95 Megawatt AC ground mounted solar photovoltaic electric facility with associated site improvements. The proposed activities are under the jurisdiction of the Connecticut Siting Council and will require a Stormwater Discharge permit issued by the Department of Energy and Environmental Protection through the authority of the Environmental Protection Agency. As a result, the project is subject to review by this office pursuant to the Connecticut Environmental Policy Act and Section 106 of the National Historic Preservation Act.

There are no properties listed on the National Register of Historic within or immediately adjacent to the Area of Potential Effect (APE) associated with the project. In addition, two previously identified archaeological sites (Site 129-1 and 129-3) have been recorded within a mile of the proposed project. SHPO understands that much of the project area has been previously disturbed by a gravel operation in operation between 1990 and 2010. However, readily available historic aerial imagery indicates that approximately four acres at the southern end of the APE remain intact and retain the potential to contain intact archaeological deposits. Further, the potentially intact portion of the APE retains environmental characteristics frequently associated with archaeological sites. Therefore, SHPO requests that a professional archaeological assessment and reconnaissance survey be completed prior to construction. Areas that will not be developed do not need to be tested. Subsurface testing should evaluate all areas of anticipated ground disturbance that retain a moderate/high archaeological sensitivity unless sufficient research or fieldwork documents that this level of effort is unwarranted. All work should be in compliance with our *Environmental Review Primer for Connecticut's Archaeological Resources* and no construction or other project-related ground disturbance should be initiated until SHPO has had an opportunity to review and comment upon the requested survey. A list of qualified consultants is attached for your convenience.

SHPO appreciates the opportunity to comment upon this project and we look forward to continuing consultation. Do not hesitate to contact Cory Atkinson, Staff Archaeologist and Environmental Reviewer, for additional information at (860) 500-2458 or cory.atkinson@ct.gov.

Sincerely,

Jonathan Kinney

Jonathan Kinney
State Historic Preservation Officer

EXHIBIT XIV

SHPO FINAL DETERMINATION

July 25, 2023

Mr. Timothy Coon
J.R. Russo & Associates, LLC
P.O. Box 938
East Windsor, CT 06088
(sent via email only to tcoon@jrrusso.com)

Subject: Somers Solar Phase I Archaeological Reconnaissance Survey
159 South Road
Somers, Connecticut

Dear Mr. Coon:

The State Historic Preservation Office (SHPO) has reviewed the technical report titled *Phase I Archaeological Investigation: Somers CT Solar* prepared by Hartgen Archaeological Associates, Inc. (Hartgen), dated June 2023. The fieldwork was completed at the request of this office in a letter dated March 21, 2023, in support of Stormwater Discharge permitting issued by the Connecticut Department of Energy and Environmental Protection through the authority of the Environmental Protection Agency. The completed investigation submitted to our office for review does not meet the standards set forth in the *Environmental Review Primer for Connecticut's Archaeological Resources*. However, SHPO is willing to accept the report in its present form and will work with Hartgen to ensure that future fieldwork meets the standards promulgated by this office.

The investigation identified two previously recorded archaeological sites (Sites 129-1 and 129-3) and a single property listed on the State Register of Historic Places within proximity to the project area. The report concluded that the project will not impact previously identified cultural resources. In addition, the report noted that an approximately 5.5-acre area at the southern end of project parcel retained environmental characteristics associated with intact archaeological deposits and recommended archaeological reconnaissance survey prior to construction. The remaining northern portion of the project area was characterized by previous disturbance related to a former gravel mining operation. A subsequent archaeological reconnaissance survey included the excavation of 78 round shovel tests measuring 40 cm in diameter. The shovel tests were excavated at 15 m intervals along transects placed 15 m apart throughout the single moderate archaeological sensitivity area. The field effort failed to identify evidence of cultural material and no further investigation was recommended. Based on the information submitted to this office, it is the opinion of SHPO that no historic properties will be affected by the proposed development and no additional archaeological investigation is warranted.

This office appreciates the opportunity to review and comment upon this project. Do not hesitate to contact Cory Atkinson, Staff Archaeologist and Environmental Reviewer, for additional information at (860) 500-2458 or cory.atkinson@ct.gov.

Sincerely,

Jonathan Kinney
State Historic Preservation Officer

cc (via email): Venables, Hartgen
Kirk, Hartgen
Mija, Louth Callan Renewables
Gardiola, Louth Callan Renewables

EXHIBIT XV

FAA DETERMINATION

Notice Criteria Tool

Notice Criteria Tool - Desk Reference Guide V_2018.2.0

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc. For more details, please reference CFR Title 14 Part 77.9.

You must file with the FAA at least 45 days prior to construction if:

- your structure will exceed 200ft above ground level
- your structure will be in proximity to an airport and will exceed the slope ratio
- your structure involves construction of a traverseway (i.e. highway, railroad, waterway etc...) and once adjusted upward with the appropriate vertical distance would exceed a standard of 77.9(a) or (b)
- your structure will emit frequencies, and does not meet the conditions of the FAA Co-location Policy
- your structure will be in an instrument approach area and might exceed part 77 Subpart C
- your proposed structure will be in proximity to a navigation facility and may impact the assurance of navigation signal reception
- your structure will be on an airport or heliport
- filing has been requested by the FAA

If you require additional information regarding the filing requirements for your structure, please identify and contact the appropriate FAA representative using the Air Traffic Areas of Responsibility map for Off Airport construction, or contact the FAA Airports Region / District Office for On Airport construction.

The tool below will assist in applying Part 77 Notice Criteria.

* **Structure Type:**	SOLAR | Solar Panel Please select structure type and complete location point information.
Latitude:	41 Deg 58 M 34 S N
Longitude:	72 Deg 26 M 30 S W
Horizontal Datum:	NAD83
Site Elevation (SE):	338 (nearest foot)
Structure Height :	12 (nearest foot)
Is structure on airport:	(•) No ( ) Yes

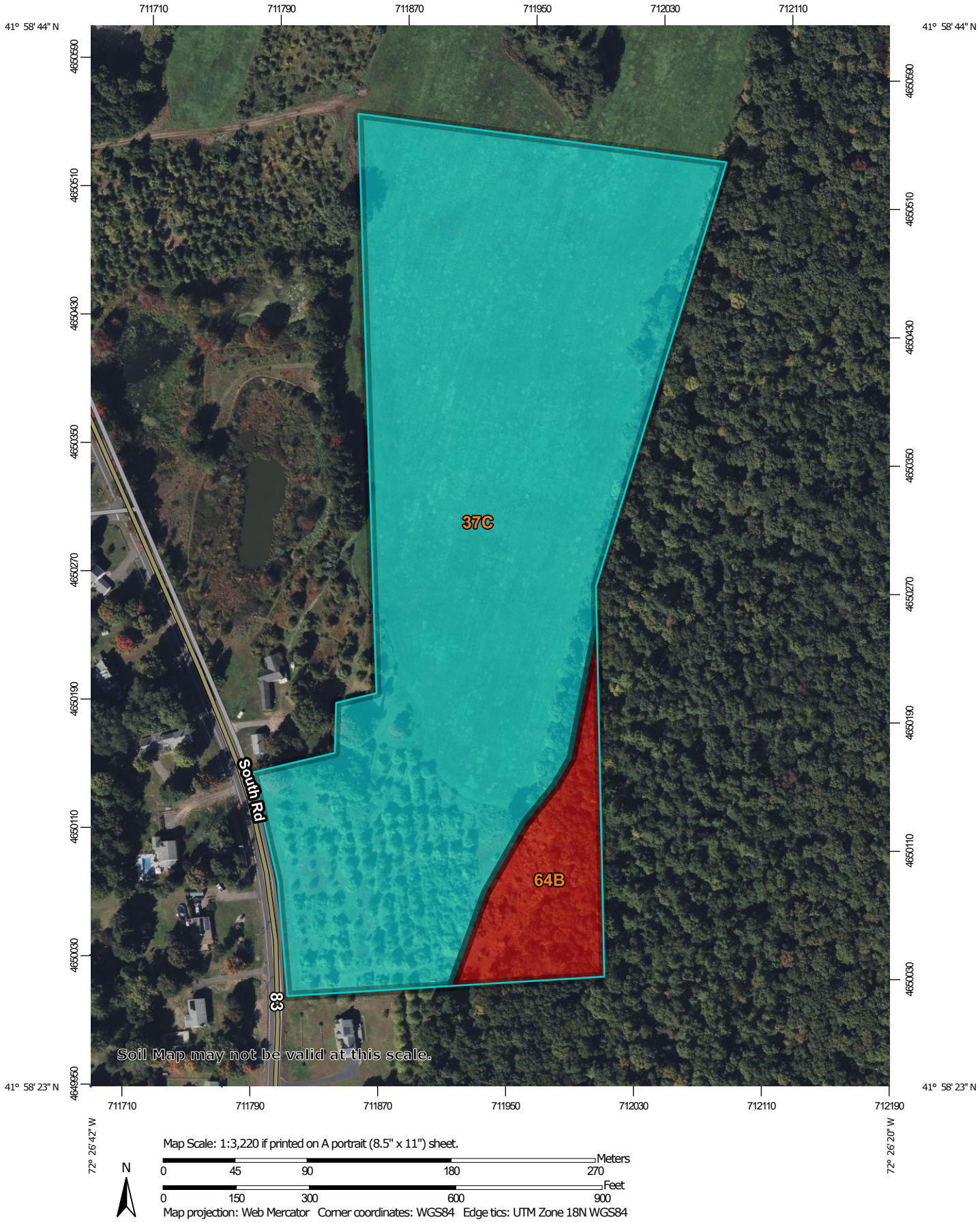
Results

You do not exceed Notice Criteria.

EXHIBIT XVI

FARMLAND CLASSIFICATION MAP

Farmland Classification—State of Connecticut
(Somers Solar)



Map Scale: 1:3,220 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 45 90 180 270

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

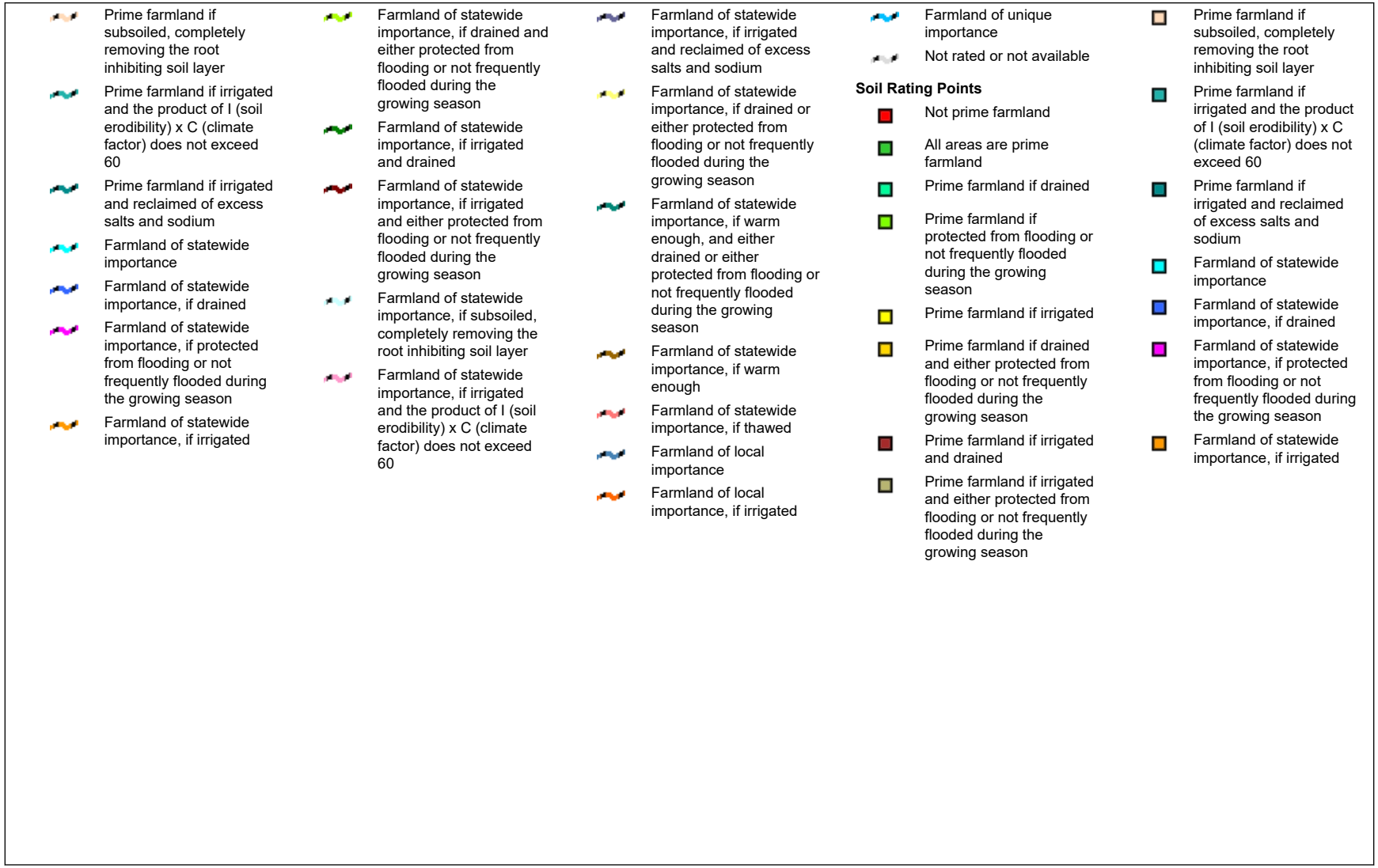
Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of statewide importance, if drained
- Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated
- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season


Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated
Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available
Soil Rating Points
Not prime farmland
All areas are prime farmland
Prime farmland if drained
Prime farmland if protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated
Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Prime farmland if irrigated and drained
Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
Prime farmland if subsoiled, completely removing the root inhibiting soil layer
Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Prime farmland if irrigated and reclaimed of excess salts and sodium
Farmland of statewide importance
Farmland of statewide importance, if drained
Farmland of statewide importance, if protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated

- Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if irrigated and drained
- Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
- Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance, if drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
- Farmland of statewide importance, if warm enough
- Farmland of statewide importance, if thawed
- Farmland of local importance
- Farmland of local importance, if irrigated
- Farmland of unique importance
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: State of Connecticut
Survey Area Data: Version 22, Sep 12, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	Farmland of statewide importance	21.8	90.6%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	Not prime farmland	2.3	9.4%
Totals for Area of Interest			**24.1**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower