ENVIRONMENTAL ASSESSMENT

PROPOSED

FOSTER STREET

SOLAR PROJECT

186 FOSTER STREET

SOUTH WINDSOR, CONNECTICUT

Prepared for:

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1 Introduction

All-Points Technology Corporation, P.C. ("APT") prepared this Environmental Assessment report ("EA") on behalf of CTEC Solar, LLC (the "Petitioner") for the proposed installation and utility interconnection of a solar-based electric generating facility (the "Project" or "Facility") having an output of approximately 1.66 megawatts[1] located in the Town of South Windsor, Connecticut ("Town"). This EA has been completed to support the Petitioner's submission to the Connecticut Siting Council ("Council") of a petition for declaratory ruling that no Certificate of Environmental Compatibility and Public Need is required for the construction, maintenance, and operation of the electric generating facility.

The results of this assessment demonstrate that the proposed development will comply with the Connecticut Department of Energy and Environmental Protection's ("DEEP") air and water quality standards and will not have an undue adverse effect on the existing environment and ecology. Further, the proposed Project is neither defined as an "affecting facility"[2] nor located within an "environmental justice community"[3] under Connecticut General Statutes § 22a-20a.

The Project will be located at 186 Foster Street in South Windsor, Connecticut ("Property"). The Property is a parcel of approximately 16.47 acres. It is largely cleared, with a single barn-type structure in the southwestern portion of the Property. Narrow wooded areas are found along the northern, eastern and southern boundaries. The Property is privately owned and is zoned Rural Residential (RR).

Figure 1, *Location Map*, depicts the location of the Property and surrounding area.

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[1] The output referenced is Alternating Current (AC).

[2] "Affecting facility" is defined, in part, as any electric generating facility with a capacity of more than ten megawatts.

[3] "Environmental justice community" means (A) a United States census block group, as determined in accordance with the most recent United States census, for which thirty per cent or more of the population consists of low income persons who are not institutionalized and have an income below two hundred per cent of the federal poverty level, or (B) a distressed municipality, as defined in subsection (b) of § 32-9p.

Legend

Property

Municipal Boundary

Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Map, Manchester, CT (1992)
Map Scale: 1:24,000
Map Date: November 2023

2,000 1,000 0 2,000 Feet

Figure 1
Location Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

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2 Proposed Project

2.1 Project Setting

The Property is located on the eastern side of Foster Street, in the southeastern section of South Windsor. The Project will be located within the central and eastern portion of the Property. Access will be via a proposed gravel drive extending from Foster Street. The interconnect route will follow the access drive. The Project in its entirety will occupy approximately 7.91 acres of the Property ("Site").

The Property's existing topography ranges from approximately 229 feet above mean sea level ("AMSL") in the southwestern corner to 313 feet AMSL at the northeastern corner. Grades within the Project Area generally slope downward from the northeastern portion to the south and west.

Figure 2, *Existing Conditions*, depicts the Site and current conditions on the Property.

The surrounding land use is characterized primarily by residential development to the north, east, and west, and residential development and agricultural use to the south. The Green Ridge Open Space, which appears to be Town open space designated as a result of subdivision development, is located to the northwest across Foster Street; it consists of a mix of cleared and wooded land.

Map Notes:
Base Map Source: CTECO 2019 Aerial Photograph
Map Scale: 1 inch = 250 feet
Map Date: December 2023

Figure 2
Existing Conditions Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

2.2 Project Development and Operation

2.2.1 The Site

Upon its completion, the solar electric energy generating facility will consist of a total of 3,680 photovoltaic modules ("panels"); 13 inverters; pad mounted switchgear and one 1000-kVA transformer on a concrete pad ("Facility"). A ground-mounted racking system will be used to secure the panel arrays. The perimeter of the Facility will be surrounded by a seven-foot tall chain link fence.

The Facility will be accessed via a new gravel access drive extending east from Foster Street to the western fence line. The access drive will be approximately 448 feet long and 15 feet wide, ending at a chain-link fence on the western side of the Facility.

The Project will require one electrical service interconnection that will require the installation of five new utility poles. The interconnection route will extend overhead from the existing Eversource distribution system along Foster Street to utility poles on the north side of the access drive to pad-mounted electrical equipment, and from there underground within the Facility.

Once complete, the fenced Facility will occupy approximately 5.24 acres of the Site with an additional ±2.67 acres of improvements beyond the fenced limits, for a total Project Area of ±7.91 acres. Proposed development drawings are provided in Appendix A, *Project Plans*.

The leading edge of the panels will be approximately thirty-six (36) inches above the existing ground surface, which will provide adequate room for any accumulating snow to "sheet" off. Any production degradation due to snow build-up has already been modeled into the annual system output and performance calculations. No need for snow removal operations is anticipated; rather, the snow will be allowed to melt or slide off.

The Facility is unstaffed; after construction is complete and the Project is operable, traffic at the Site will be minimal. It is anticipated that the Facility will require routine inspection/maintenance of the electrical equipment one time per year. Annual maintenance will typically involve two technicians for a day. Repairs will be made on an as-needed basis.

2.2.2 Public Health and Safety

The Project will meet applicable local, state, national and industry health and safety standards and requirements related to electric power generation. The Facility will not consume any raw materials, will not produce any by-products and will be unstaffed during normal operating conditions.

The Facility array will be fenced and entrance to the Facility will be gated, limiting access to authorized personnel only. All Town emergency response personnel will be provided access via a Knox padlock. The Facility will be remotely monitored and will have the ability to remotely de-energize in the case of an emergency.

2.2.3 Land Use Plans

The Project is consistent with state and federal policies and will support the state's energy goals by developing a renewable energy resource while not having a substantial adverse environmental effect. The Project will benefit the local community by improving electrical service for existing and future development through the availability of enhanced local generating capacity that does not rely solely on the congested regional electrical transmission network.

The Town's Zoning Regulations include a section on large scale solar energy systems, the intent of which is to "promote the use of large scale solar collectors and provide for the regulation of the construction and operation of Large Scale Solar Energy Systems, subject to reasonable conditions that will protect the environment, public health, safety, and welfare." Zoning Regulations, Section 7.21 Large Scale Solar Energy System.

The Town's 2013 Plan of Conservation and Development ("POCD") identifies a strategy to plan for alternative energy, specifically noting solar energy. POCD, Section 14.D.

3 Environmental Conditions

This section provides an overview of the current environmental conditions at the Site and an evaluation of the Project's potential impacts on the environment. The results of this assessment demonstrate that the Project will comply with the DEEP air and water quality standards and will not have an undue adverse effect on the existing environment and ecology.

Please refer to Figure 3, *Proposed Conditions* for a depiction of the Project and its compatibility with the Site resources discussed herein.

Legend

Property	Fence	Stone Trench	Wetland Area
Approximate Parcel Boundary	Grass Berm	Solar Modules	Limit of Disturbance
Delineated Wetland Boundary	Stormwater Swale	Concrete Equipment Pad	
Utility Pole	Interconnection Path	Gravel Access Drive	
	Underground Electrical Utility	Stormwater Structure	
	Contour		

Map Notes:
Base Map Source: CTECO 2019 Aerial Photograph
Map Scale: 1 inch = 250 feet
Map Date: December 2023

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250 125 0 250 Feet

Figure 3
Proposed Conditions Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

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3.1 Air Quality

The Site is primarily undeveloped land, with a single uninhabited structure. Due to the nature of a solar energy generating facility, no air emissions will be generated during operations and, therefore, the operation of the Project will have no adverse effects on air quality and no permit is required.

Temporary, potential, construction-related mobile source emissions will include those associated with construction vehicles and equipment. Any potential air quality impacts related to construction activities can be considered de minimis. Such emissions will, nonetheless, be mitigated using available measures, including, inter alia, limiting idling times of equipment; proper maintenance of all vehicles and equipment; and watering/spraying to minimize dust and particulate releases. In addition, all on-site and off-road equipment will meet the latest standards for diesel emissions, as prescribed by the United States Environmental Protection Agency.

3.2 Water Resources

3.2.1 Wetlands and Watercourses

APT Registered Soil Scientists conducted a review of publicly available data and client provided resources associated with the Property. A field inspection and wetland investigation was completed on October 27, 2022; a portion of one (1) wetland was delineated on the Property. The results of the wetland delineation are summarized below. The location of this resource is depicted on Figure 2, *Existing Conditions*; it is included in Forested Wetland habitat.

The delineated wetland is a seasonally saturated wetland system resulting from hillside seepage and anthropogenic influences related to the historic agricultural use of the Property. The majority of the wetland complex is located outside the Property as it drains in a southwesterly direction. This narrow wetland complex contains a variety of vegetative communities including emergent, scrub/shrub and forest habitats. Beginning at the northernmost point emergent vegetation dominated by reed canary grass, soft rush, and broad-leaf cattail dominates the cover type, then transitions to a more scrub-shrub dominant area with native and invasive species including elderberry, silky dogwood, and multiflora rose in the wetland's central portion. The interior southern extents of this system, on the abutting property, are forested with red maple and silver maple as the dominant tree species. A discontinuous intermittent watercourse is located within the wetland interior. This channel is less than one foot wide, contains a silty bottom and is highly ephemeral, with hydrology driven primarily by runoff from the adjacent agricultural field. Evidence of varying degrees of historic alteration to the wetland is present with cut/fill areas, field stone that reinforces the interior watercourse channel and deposition of woody debris.

3.2.2 Wetland Impacts

The Project avoids direct impact to the delineated wetland resource. Installation of solar panels and perimeter fencing will generally maintain a 100-foot buffer from the wetland. The southeast corner of the grass-lined stormwater management basin will be located ±58 feet from the limit of grading to the nearest wetland area; the limit of disturbance to install this feature, consisting of the associated erosion controls, is ±50 feet from the wetland. A proposed 12-inch culvert outfall at the southern end of the stormwater basin will be located ±100 feet from the wetland, and will both protect and recharge hydrology to this resource. These indirect Project wetland impacts in proximity to the wetland resource (50 to 100 feet) occur entirely in areas of existing dense, primarily herbaceous vegetation with low erodibility potential and limited need for removal of mature woody vegetation. In addition, the Project's erosion control and stormwater plans have been carefully designed in accordance with both the *Connecticut Guidelines for Soil Erosion and Sediment Control* and the *Connecticut Stormwater Quality Manual*, both effective March 30, 2024. As such, the Project is not anticipated to result in a likely adverse impact to the nearby wetland. Any potential secondary wetland impacts will be further mitigated through the implementation of a Resource Protection Plan during Site construction. The detailed Resource Protection Plan is contained in the Project Plans, Appendix A.

Table 1, Wetland Impacts provides the approximate impacts and distances from the Project to wetland resources located on the Property.

Table 1: Wetland Impacts		
Site Proximity to Wetlands (from limit of disturbance)	Distance (±ft.)	Direction (of wetland from LOD)
Site Proximity to the wetland	50	SE

3.2.3 Floodplain Areas

APT reviewed the United States Federal Emergency Management Agency ("FEMA") Flood Insurance Rate Map ("FIRM") for the Property. A FIRM is the official map of a community on which FEMA has delineated both the special hazard areas and risk premium zones applicable to the community. The area of the Property is mapped on FIRM PANEL #09003C 0383 F, dated September 26, 2008 and FIRM PANEL #09003C 0384 F, dated September 26, 2008. The majority of the Property and all but the western portion of the access road are located within FIRM PANEL #09003C 0384 F, with the remainder of the Property and the access drive within FIRM PANEL #09003C 0383 F. Based upon the reviewed FIRM Maps, the Property and proposed Site are located in an area designated as Area of Minimal Flood Hazard – Zone X.

The Site is not located within a 100- and 500-year flood zone and as such, no special considerations or precautions relative to flooding are required for the Project.

3.3 Water Quality

Once operative, the Facility will be unstaffed, and no potable water uses or sanitary discharges are planned. No liquid fuels are associated with the operation of the Facility. Stormwater generated by the proposed development will be properly handled and treated in accordance with the *Connecticut Stormwater Quality Manual*, effective March 30, 2024, and Appendix I, Stormwater Management at Solar Array Construction Projects ("Appendix I).

3.3.1 Groundwater

Groundwater underlying the Property is classified by DEEP as "GA".[4] This classification indicates groundwater within the area is presumed to be suitable for human consumption without treatment. Based upon reviewed DEEP mapping, the Property is not located within a mapped (preliminary or final) DEEP Aquifer Protection Area ("APA").

The Project will have no adverse environmental effect on ground water quality.

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[4] Designated uses in GA classified areas include existing private and potential public or private supplies of drinking water <u>and</u> base flow for hydraulically connected surface water bodies.

3.3.2 Surface Water

Based upon DEEP mapping, the majority of the Site is located in Major Drainage Basin 4 (Connecticut River), Regional Drainage Basin 40 (Connecticut River), Subregional Drainage Basin 4004 (Podunk River), and Local Drainage Basin 4004-02 (Farm Brook above Unnamed Brook 4004-03-1). The remainder of the Site is located in Major Drainage Basin 4 (Connecticut River), Regional Drainage Basin 45 (Hockanum River), Subregional Drainage Basin 4500 (Hockanum River), and Local Drainage Basin 4500-09 (Averys Brook above Unnamed Brook 4500-10-1). The nearest mapped waterbody is Farm Brook located on the opposite (west) side of Foster Street from the Property. Farm Brook flows southward with the closest portion located downgradient and approximately 500 feet from the closest limits of disturbance associated with the Project. Farm Brook is classified as a Class A surface waterbody by the DEEP[5]. The Site will have no effect on this surface waterbody. Based upon DEEP mapping, the property is not located within a mapped Public Drinking Supply Watershed.

The Project will be sufficiently set back from water resources proximate to the Site and will have no adverse environmental effect on surface water quality. During construction, E&S controls will be installed and maintained in accordance with the *Connecticut Guidelines for Soil Erosion and Sediment Control*, effective March 30, 2024. Once operative, stormwater will be managed in accordance with the *Connecticut Stormwater Quality Manual*, effective March 30, 2024.

3.3.3 Stormwater Management

In addition to the Connecticut Stormwater Quality Manual and Connecticut Guidelines for Soil Erosion and Sediment Control, both effective March 30, 2024, the Project has been designed to meet Appendix I. Combined, these address three (3) main concerns: stormwater runoff peak attenuation, water quality volume treatment, and E&S control during construction. The Applicant will apply for a General Permit from DEEP. Technical details, mapping, and HydroCAD modeling results are provided in a Stormwater Management Report to be provided to DEEP and included as Appendix B. A summary of these results is provided below.

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[5] Designated uses for A classified waterbodies include fish and other aquatic life and wildlife habitat, potential drinking water supply, recreational use, navigation, and water supply for industry and agriculture.

Stormwater Runoff Peak Attenuation

The potential for changes in runoff from the Site as a result of Project construction has been evaluated and addressed in compliance with Appendix I. The Project will require the installation of underground utilities and overhead interconnection, an access drive and multiple stormwater management features. A ½ step reduction is required for the entire solar array to account for the compaction of soils that result from extensive machinery traffic over the course of the construction of the array. The full step reduction is required where grading exceeds a two (2) foot difference between existing and proposed grades. These reductions result in an increase in runoff.

To manage the increase in post-development runoff, one (1) grass-lined stormwater management basin with associated diversion with rip-rap lined overflow and one (1) rock lined stormwater infiltration trench are proposed. The stormwater management basin will collect surface runoff from within the Facility, while the stormwater infiltration trench will collect surface runoff from the 448-foot gravel access road thus managing the timing and release of flow from the Project Area.

The stormwater calculations for the Project predict that the post-development peak discharges to the waters of the State of Connecticut for the 2-, 25-, 50- and 100- year storm events are less than the pre-development peak discharges. Therefore, the Project is not anticipated to result in any adverse conditions to the surrounding areas and properties.

Water Quality Volume Treatment

The Project design also provides for adequate treatment of water quality volume associated with effective impervious cover, which includes the proposed gravel access drive and concrete equipment pads. The proposed basin is designed to provide the requisite treatment volume associated with these features.

Erosion and Sediment Control During Construction

To safeguard water resources from potential impacts during construction, the Petitioner is committed to implementing protective measures in the form of a Stormwater Pollution Control Plan ("SWPCP"), to be finalized and submitted to the Council, subject to approval by DEEP Stormwater Management. The SWPCP will include monitoring of established E&S controls that are to be installed and maintained in accordance with the *Connecticut Guidelines for Soil Erosion* *and Sediment Control*, effective March 30, 2024, the Dewatering Wastewaters from Construction Activities ("General Permit") and Appendix I.

To meet the requirement of the General Permit, one (1) temporary sediment basin will be installed prior to the start of Facility construction. Perimeter erosion controls (compost filter sock & silt fence) will encircle the Project Area to capture sediment potentially mobilized during site work. The basin will be cleaned of deposited sediment as needed during construction to maintain sufficient sediment storage capacity. Upon final site stabilization, the temporary sediment basin will be converted to a permanent stormwater management basin by removing any accumulated sediments, removal of sediment baffles if applicable, and installation of permanent outlet control structures.

Open areas will be temporarily stabilized with quick growing annual seed during construction. The Project Area will subsequently be seeded with a permanent Ernst Pollinator-friendly Solar Farm Seed Mix (ERNMX-147 Fuzz & Buzz) upon completion of construction. The phased erosion control plan and details are provided in Appendix A, *Project Plans*.

With the incorporation of these protective measures, stormwater runoff from Project development is not anticipated to result in an adverse impact to water quality associated with nearby surface water bodies.

3.4 Habitat and Wildlife

3.4.1. Habitat Types

Three (3) distinct habitat types (vegetative communities) separated by transitional ecotones are located on the Property; two (2) of them are found within the Site. These habitats were assessed using remote sensing and publicly available datasets and were physically inspected during the October 27, 2022 field evaluation.

The habitats occupying the Property are as follows.

- Open Field
- Edge Forest; and
- Wetland Forest

Open Field and Edge Forest habitats are found within the Site.

Open Field

Open Field habitat dominates a majority of the Property with a narrow band of Edge Forest along the northern, eastern and southern boundaries. This habitat type consists of a large open field segregated into two distinct agricultural uses: the eastern end of the field consists of maintained cool season grasses for the production of hay; the central and western portions of the field extending out to Foster Street are cultivated for crop production. A minor transitional ecotone of goldenrod, orchard grass, and multiflora rose divides this habitat from the bordering Edge Forest to the north, south, and east. Additionally, an existing access road leading to the Open Field habitat has been included within this functional habitat type due to the unimproved nature of the farm road surface. A majority of the Project's footprint will occur within Open Field. The Project will not result in a significant adverse impact to the existing Open Field from a wildlife habitat perspective due to the existing high level of human activity, disturbed nature of these areas from agricultural practices, limited wildlife habitat values, and minimal species utilization. The Project will actually result in some improvement to wildlife habitat utilization with the planting of native pollinator-friendly meadow species within and around the perimeter of the fenced solar facility.

Edge Forest

Edge Forest habitat occupies the northern, eastern, and southern boundaries of the Property and consists of a narrow, predominantly upland, forest margin. The upland Edge Forest differs from the small area of Wetland Forest by occurring entirely within upland soils and consisting of significantly different vegetative species indicative of well-drained soils. Tree species within this habitat are dominated by even aged red maple, red oak, eastern white pine, quaking aspen, and black cherry. Invasive species autumn olive and multiflora rose dominate the understory with pockets of staghorn sumac in complex with fox grape along forest edges.

Minimal clearing of Edge Forest is proposed along the northern and southern portions of the Project Area. Any potential secondary short-term impacts to this forested area during construction of the Project will be minimized through the proper stabilization of soils through strict adherence to the *Connecticut Guidelines for Soil Erosion and Sediment Control*, effective March 30, 2024. While Site development necessitates removal of a limited area of forest for shading purposes, the proposed clearing will be isolated to the outside margin of Edge Forest. This limited clearing to the north is located within close proximity to a residential development and the Open Field, which experiences routine maintenance and high level of human activity. Similar narrow forested habitat occurs along the eastern boundary with a larger continuation of Edge Forest extending east off the Property. As such, the Project is not anticipated to result in a significant impact to the Edge Forest habitat type.

Wetland Forest

Wetland Forest habitat occurs in the southcentral portion of the Property and in complex with a portion of the Upland Forest habitat which serves as a buffer between the Wetland Forest and the Open Field. The Wetland Forest is dominated by red and silver maple in the overstory with honeysuckle and gray dogwood dominating the shrub layer. Native herbaceous species observed consist of soft rush and skunk cabbage. Native shrub species include elderberry and silky dogwood in complex with herbaceous vegetation. A small pocket of emergent and scrub-shrub habitat is present within the northern limits of the wetland complex, likely due to historic maintenance that suppressed vegetation growth. This embedded vegetative community was discussed in Section 3.2.1 and is included within the Wetland Forest habitat type. Wetland Forest differs from other forest habitat on the Property by occurring entirely within poorly drained wetland soils and consisting of significantly different vegetative species.

Project impacts will not encroach into this habitat and are therefore not anticipated to result in a negative impact to the Wetland Forest habitat. Any potential short-term impacts to this habitat will be minimized through the proper stabilization of soils during construction through strict adherence to the *Connecticut Guidelines for Soil Erosion and Sediment Control*, effective March 30, 2024 and the Resource Protection Plan.

Table 2, Habitat Areas provides the total acreages of each habitat type located on the Property and within the Site, and the changes resulting from development of the Project.

Table 2: Habitat Areas		
Habitat Type	Total Area On-Property (±ac.)	Area Displaced by Project (±ac.)
Open Field	12.40	7.82
Edge Forest	3.94	<0.10
Wetland Forest	0.12	0.00

3.4.2 Wildlife

Development of the Site will primarily occur within the Open Field habitat, with limited impacts to Edge Forest. The roughly 12.40-acre Open Field provides limited value from a wildlife utilization standpoint as a result of historic and current routine agricultural management of these areas, small habitat block size, lack of diverse vegetative communities and/or structure and high level of human activity. The limited Edge Forest area offers higher quality forested habitat, but will be minimally affected by the Project, and extends to the east off the Property.

Based on the surrounding land uses, the adjacent disturbed areas located in proximity to the Property are likely utilized by species that are more tolerant of human disturbance and habitat fragmentation. Generalist wildlife species common to the region, including several resident and migrant song birds and mammals such as raccoon, striped skunk, grey squirrel, Virginia opossum, white-tailed deer, and eastern chipmunk could be expected to use this area. Due to the limited removal of Edge Forest habitat within the Property, and given the abundance of more suitable habitat for these common species surrounding the Property, the Project is not anticipated to result in a likely adverse impact to wildlife.

Noise and associated human activities during construction may result in limited, temporary disruption to wildlife using the Property. Any possible wildlife displaced during construction would be expected to temporarily disperse deeper into the nearby Wetland Forest and Edge Forest habitats. Post-construction, operation of the Facility will not result in a likely adverse effect to wildlife using these habitats due to its unoccupied nature and lack of significant noise, traffic, or high level of human activity.

3.4.3 Core Forest Determination

The DEEP's *Forestland Habitat Impact Mapping*, does not depict an area mapped as core forest on the Property. Therefore, the Project will not affect core forest resources.

3.5 Rare Species

APT reviewed publicly available information to determine the potential presence of state/federally listed species and critical habitat on or proximate to the Site. A discussion is provided in the following sections.

3.5.1 Natural Diversity Data Base

The DEEP Natural Diversity Data Base ("NDDB") program performs hundreds of environmental reviews each year to determine the impact of proposed development projects on state-listed species and to help landowners conserve the state's biodiversity. In furtherance of this endeavor, the DEEP also developed maps to serve as a pre-screening tool to help determine if there is the potential for project-related impact to state-listed species.

The NDDB maps represent approximate locations of (i) endangered, threatened and special concern species and, (ii) significant natural communities in Connecticut. The locations of species and natural communities depicted on the maps are based on data collected over the years by DEEP staff, scientists, conservation groups, and landowners. In some cases, an occurrence represents a location derived from literature, museum records and/or specimens. These data are compiled and maintained in the NDDB. The general locations of species and communities are symbolized as shaded (or cross-hatched) polygons on the maps. Exact locations have been masked to protect sensitive species from collection and disturbance and to protect landowners' rights whenever species occur on private property.

APT reviewed the most recent DEEP NDDB mapping (December 2023), which revealed that no known areas of state-listed species are located within or adjacent to the Property. The nearest NDDB polygon exists ±0.63-mile south of the Property. Since the proposed Site and Property are not located within an NDDB buffer area, consultation with DEEP is not required in accordance with their review policy.[6]

3.5.2 USFWS Consultation

Federal consultation was completed in accordance with Section 7 of the Endangered Species Act through the U.S. Fish and Wildlife Service's ("USFWS") Information, Planning, and Conservation System ("IPaC"). Based on the results of the IPaC review, the federally-listed[7] Endangered species northern long-eared bat ("NLEB"; *Myotis septentrionalis*) habitat range includes the Property. The NLEB's range encompasses the entire State of Connecticut and suitable NLEB roost habitat includes trees (live, dying, dead, or snag) with a diameter at breast height ("DBH") of three (3) inches or greater.

APT reviewed the DEEP's publicly available *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance* map (February 1, 2016)

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[6] DEEP Requests for NDDB State Listed Species Reviews. https://portal.ct.gov/DEEP/NDDB/Requests-for-NDDB-Environmental-Reviews

[7] Listing under the federal Endangered Species Act

to determine the locations of any known maternity roost trees or hibernaculum in the state. This map reveals that there are currently no known NLEB maternity roost trees in Connecticut. The nearest NLEB habitat resource to the Site is located in East Granby, approximately 13.4 miles to the northwest.

Effective March 31, 2023 the NLEB is classified as Endangered under the ESA. The reclassification eliminates use of the previous 4(d) rule for the NLEB, which is applicable only to Threatened species. An NLEB Interim Consultation Framework has been developed by USFWS to facilitate transition from the 4(d) rule to typical Endangered species consultation procedures for activities that are reasonably certain to occur before April 1, 2024 (date on which the NLEB Interim Consultation Framework expires). APT reviewed the new NLEB Determination Key for this Project and determined the Project will not likely result in an adverse effect or incidental take of NLEB and does not require a permit from USFWS. A USFWS letter dated July 21, 2023 confirmed the "No Effect" determination.

A full review of the *Endangered Species Act (ESA) Compliance Determination* and USFWS's Response Letter is provided in Appendix C, *USFWS and NDDB Compliance Statement*.

3.6 Soils and Geology

Construction of the water quality basin and swales and grading within the Project Area will generate excess material. To the extent feasible, that will be redistributed on Site. Topsoil will be segregated from underlying soil, stockpiled, and spread over disturbed areas being seeded. Any excess materials will be removed from the Site in accordance with appropriate regulations and guidelines.

All exposed soils resulting from construction activities will be properly and promptly treated in accordance with the *Connecticut Guidelines for Soil Erosion and Sediment Control*, dated September 30, 2023, effective March 30, 2024.

Surficial materials on the Property are predominantly thin deposits of glacial till, as well as coarse deposits of sand and gravel. Bedrock beneath the property is identified as Portland Arkose. Portland Arkose is described as a reddish-brown to maroon micaceous arkose and siltstone and red to black fissile silty shale which grades eastward into coarse conglomerate (fanglomerate).

The Petitioner does not anticipate encountering bedrock during Project development.

3.6.1 Prime Farmland Soils

In accordance with the Code of Federal Regulations, CFR Title 7, part 657, farmland soils include land that is defined as prime, unique, or farmlands of statewide or local importance based on soil type. They represent the most suitable land for producing food, feed, fiber, forage, and oilseed crops.

According to the Connecticut Environmental Conditions Online Resource Guide[8], approximately 9.52 acres of the Site contain Prime Farmland Soils (See Figure 2, *Existing Conditions Map)*, with approximately 4.56 acres located within the Project Area. The Site encompasses areas currently under cultivation for agricultural purposes. The Site has been designed to maximize the areas remaining for cultivation while meeting the requirements of Appendix I.

Excavation and regrading activities are necessary, along with some tree removal, within areas mapped as Prime Farmland Soils to facilitate Project development. Topsoil removed from these areas will be segregated from underlying horizons, temporarily stockpiled and used as top dressing for reestablishing vegetation (with a pollinator-friendly seed mix). No topsoil will leave the Site.

After its useful life, the Facility will be decommissioned and all of the disturbed areas will be reseeded with the same (or approved equivalent) blend as established within the rest of the Project Area, ultimately creating additional available cleared areas for agricultural use. Therefore, the Project will not materially affect Prime Farmland Soils.

3.7 Historic and Archaeological Resources

At the request of APT, and on behalf of the Petitioner, Heritage Consultants LLC ("Heritage") reviewed relevant historic and archaeological information to determine whether the Site holds potential historic or cultural resource significance. Their review of historic maps and aerial images of the Site, examination of files maintained by the Connecticut State Historic Preservation Office ("SHPO"), and a pedestrian survey of the Property revealed that there is a precontact era archaeological site near the southeast corner of the Property and 14 historical or potentially historical structures within 0.5 mile of the Project, including four on or in the immediate vicinity of the Property. The Project Area was determined to retain moderate/high potential to yield intact

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8 Connecticut Environmental Conditions Online (CTECO) Resource Guide, https://cteco.uconn.edu.

archaeological deposits. The Petitioner plans to have a Phase 1B investigation performed in the future.

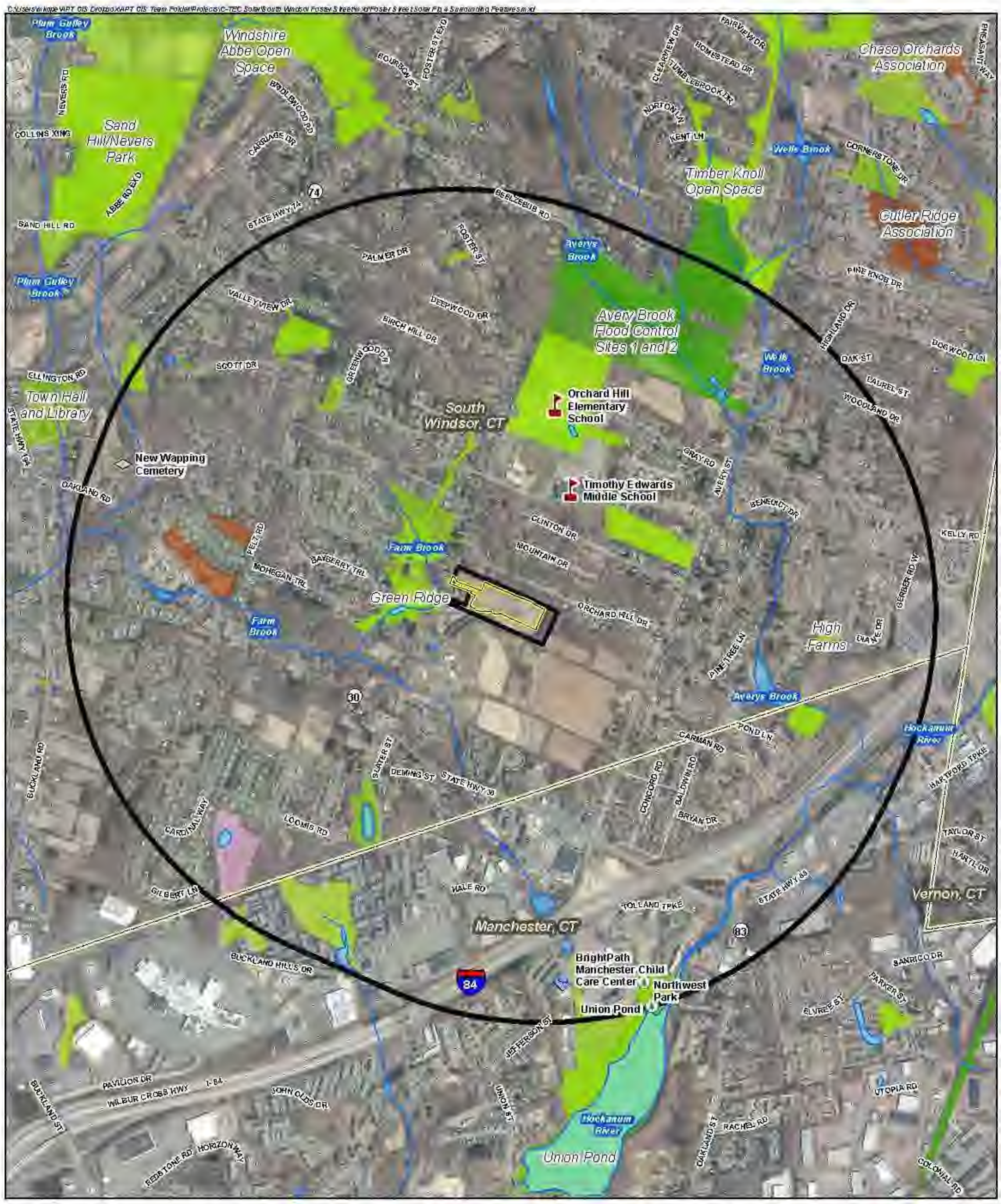
See Appendix D, *Cultural Resources Reconnaissance Survey Report*.

3.8 Scenic and Recreational Areas

No state or local designated scenic roads or scenic areas are located near the Site and therefore none will be physically or visually impacted by development of the Project. The nearest designated scenic road is a portion of State Route 74, approximately 6.2 miles to the northeast. Additionally, there are no Connecticut Blue Blaze Hiking Trails located proximate to the Site.

The nearest existing recreational area to the Site is Green Ridge Open Space, which is west of the Property across Foster Street. No impacts are anticipated to this resource.

See Figure 4, *Surrounding Features Map,* for this and other resources located within one mile of the Site.



Legend

- Property
- Site
- 1 Mile Radius
- Municipal Boundary

Surrounding Features

- Cemetery
- Daycare
- Park / Recreation / Open Space
- School

Open Space Property (CTDEEP)

- Land Trust
- Municipal
- Private
- State
- Watercourse (CTDEEP)
- Open Water (CTDEEP)

Map Notes:
Base Map Source: 2019 Aerial Photograph (CTECO)
Map Scale: 1 inch = 1,800 feet
Map Date: December 2023

1,800 900 0 1,800 Feet

Figure 4
Surrounding Features Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

CTEC

ALL-POINTS TECHNOLOGY CORPORATION

3.9 Visibility

Portions of the Facility are predicted to be visible from the immediately surrounding area to the north and west as well as over open fields to the south. The interconnection poles could be visible in areas extending to the south. Visibility in these areas will be primarily seasonal, when the leaves are off the deciduous trees. Year-round visibility will be limited to the Property, directly across Foster Street from the Facility, and a limited area within 0.25 mile to the south.

See Appendix E, *Viewshed Maps and Photo-Simulations*.

3.10 Noise

The Petitioner retained WSP to evaluate the predicted sound levels from the Facility and determine the potential impact from the proposed Facility in the surrounding community. The primary sources of the noise from the Facility derive from 13 inverters and one 2,000 kVA transformer. Upon development of the Facility, the Property will be considered a Class C source property. Properties immediately surrounding the Property are primarily residential and are considered Class A receptors.

The report concludes that the proposed Facility will be in compliance with both the State of Connecticut noise control regulations and the Town Noise Control Ordinance. Based on modeling results, the sound level from the proposed Facility will comply with the State of Connecticut standards at all residential property lines and that increases in background sound levels are expected to be minimal. See Appendix F, *Noise Study.*

Construction noise is exempted under State of Connecticut regulations for the control of noise, RCSA 22a-69-1.8(h).

3.11 Lighting

No exterior lighting is planned for the Project. There will be some small, non-intrusive lighting fixtures within the equipment to aid in maintenance. Given the existing ambient lighting within the area of the Property, any incremental effect of Project lighting will be minimal.

3.12 FAA Determination

APT submitted relevant Project information to the Federal Aviation Administration ("FAA") for an aeronautical study to evaluate potential hazards to air navigation. The FAA provided a Determination of No Hazard to Air Navigation on December 11, 2023. See Appendix G, *FAA Determinations*.

The nearest airport is Bancroft Airport, located approximate 4.75 miles northwest of the Site in the East Windsor Hill section of East Windsor, Connecticut.

4 Conclusion

As demonstrated in this Environmental Assessment, the Project will comply with the DEEP air and water quality standards. Further, it will not have an undue adverse effect on the existing environment and ecology; nor will it affect the scenic, historic and recreational resources in the vicinity of the Project. Once operative, the Facility will be unstaffed and generate minimal traffic.

The Site will be developed on an approximately 16.47-acre Property located east of Foster Street in South Windsor, and will occupy approximately 7.91 acres of the Property.

No wetlands or watercourses will be directly or indirectly impacted by the Project. The nearest point of the Project to wetlands, the stormwater management basin, will maintain a setback of 50 feet from this resource.

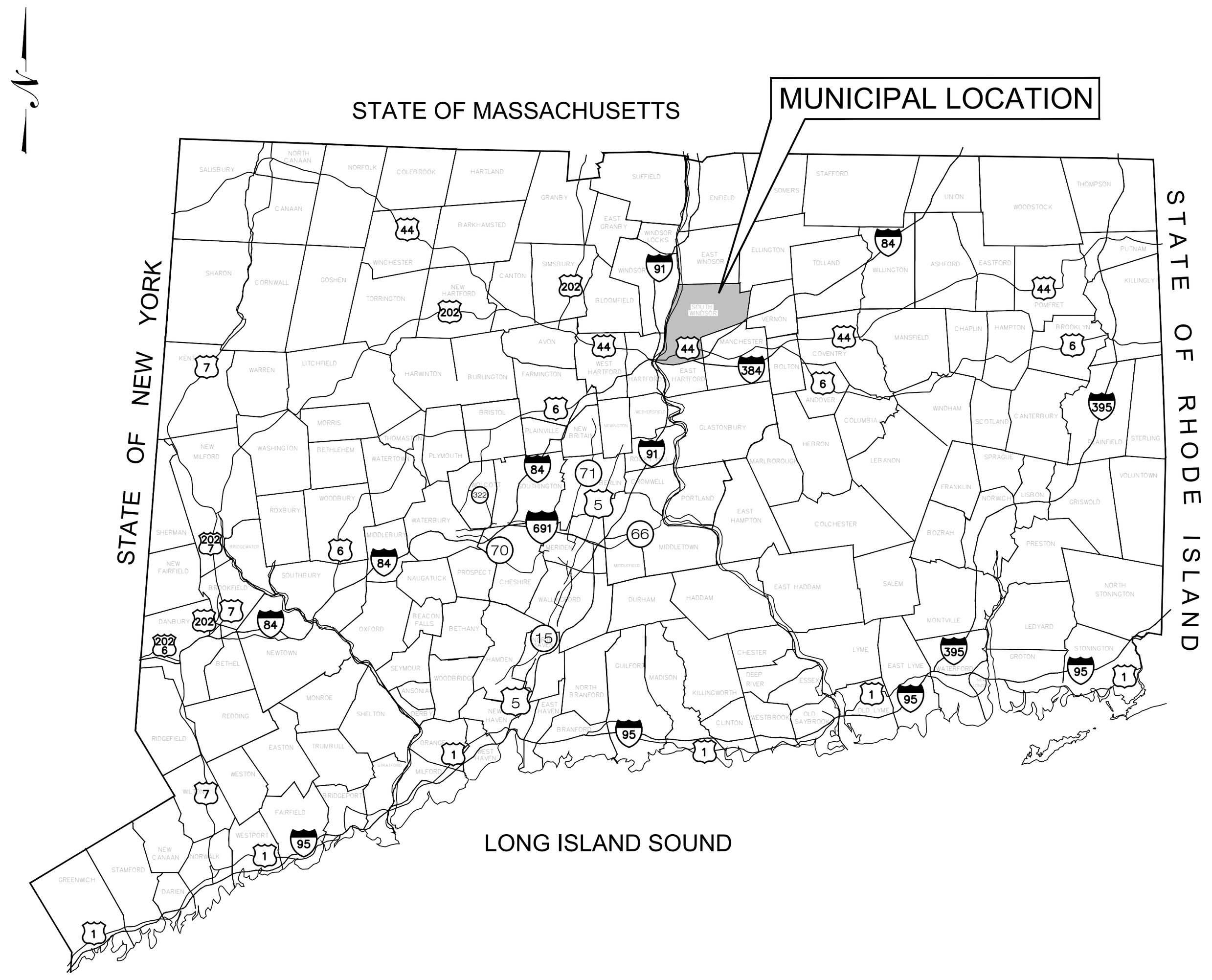
No core forest is located on the Site. No prime farmland will be affected; topsoils will be retained on the Property and the Site will be reseeded and available for return to agricultural cultivation upon decommissioning of the Project.

The Facility is anticipated to be visible within the immediately surrounding area, primarily on a seasonal basis.

Based on a noise analysis, the Facility will comply with State of Connecticut noise standards.

APPENDIX A

PROJECT PLANS



STATE OF CONNECTICUT

CTEC SOLAR

"FOSTER SOLAR"

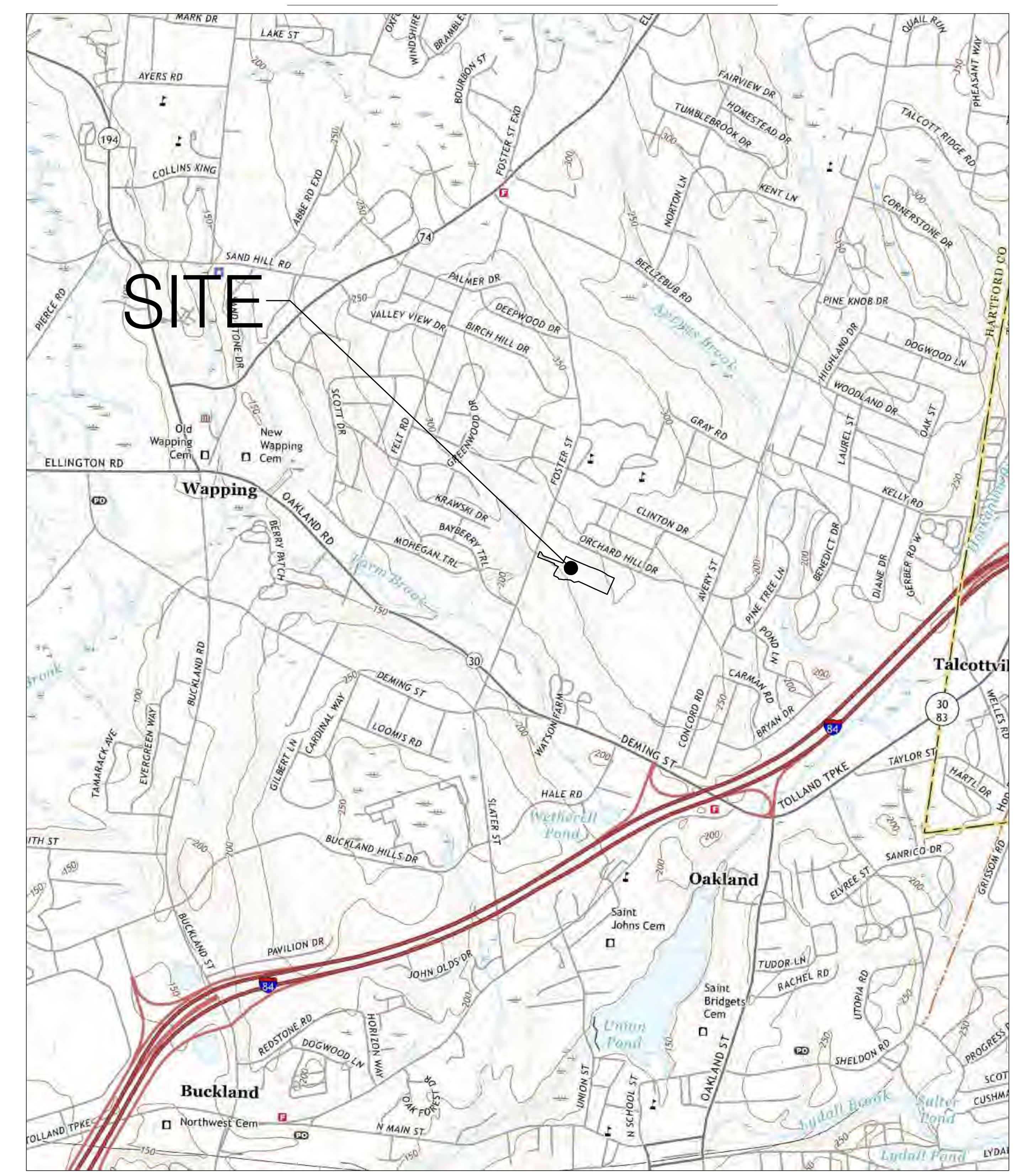
186 FOSTER STREET
SOUTH WINDSOR, CT

LIST OF DRAWINGS

SITE INFORMATION

SITE NAME:	"FOSTER SOLAR"
LOCATION:	186 FOSTER STREET SOUTH WINDSOR, CT 06074
SITE TYPE/DESCRIPTION:	ADD (1) 1.66MW (AC), 1.99MW (DC) GROUND MOUNTED SOLAR PANEL ARRAY W/ ASSOCIATED EQUIPMENT.
PROPERTY OWNER:	HELEN K. GALLIVAN 186 FOSTER STREET SOUTH WINDSOR, CT 06074
APPLICANT:	CTEC SOLAR 1 GRIFFIN ROAD SOUTH, SUITE 200 BLOOMFIELD, CT 06002
ENGINEER CONTACT:	THOMAS E. LITTLE, P.E. (860) 552-2046 x203
LATITUDE:	41° 49' 19.69" N
LONGITUDE:	72° 31' 45.64" W
ELEVATION:	265'± AMSL
MBLU:	53-99
ZONE:	RR - RURAL RESIDENTIAL
EXISTING LAND USE:	AGRICULTURAL
PROPOSED LAND USE:	COMMUNICATIONS, TRANSPORTATION AND PUBLIC UTILITY USES - LARGE SCALE GROUND MOUNTED SOLAR PHOTOVOLTAIC INSTALLATIONS
TOTAL SITE ACREAGE:	16.47± AC.
TOTAL DISTURBED AREA:	7.91± AC.
APPROX. VOLUME OF CUT:	6,949± CY
APPROX. VOLUME OF FILL:	587± CY
APPROX. NET VOLUME:	6,362± CY OF CUT/FILL

USGS TOPOGRAPHIC MAP



SCALE : 1" = 2000'± SOURCE: USGS 7.5 ESSEX QUADRANGLE, CT 2012

CTEC SOLAR
1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
0		
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: HELEN K. GALLIVAN
ADDRESS: 186 FOSTER STREET, SOUTH WINDSOR, CT

FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

DRAWN BY: TEL

DATE: 10/20/2023 CHECKED BY: SMC

SHEET TITLE:

TITLE SHEET & INDEX

SHEET NUMBER:

T-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

MAP NOTES:

1. THIS MAP AND SURVEY HAVE BEEN PREPARED PURSUANT TO THE REGULATIONS OF CONNECTICUT STATE AGENCIES SECTIONS 20-300b-1 THROUGH 20-300b-20 AND "THE MINIMUM STANDARDS FOR SURVEYS AND MAPS IN THE STATE OF CONNECTICUT" ADOPTED JUNE 21, 1996; AMENDED OCTOBER 26, 2018.

2. THE TYPE OF SURVEY PERFORMED AND THE MAPPED FEATURES DEPICTED HEREON ARE IN ACCORDANCE WITH THE REQUIREMENTS OF A PROPERTY/BOUNDARY & TOPOGRAPHIC SURVEY.

3. THE HORIZONTAL BASELINE CONFORMS TO A CLASS A-2 ACCURACY. THE VERTICAL BASELINE CONFORMS TO A CLASS V-2 ACCURACY. THE TOPOGRAPHIC FEATURES CONFORM TO A CLASS T-3 ACCURACY.

4. THE PROPERTY/BOUNDARY OPINION DEPICTED HEREON IS BASED UPON A RESURVEY OF MAP REFERENCE 'A' AND CONFORMS TOP A CLASS A2 ACCURACY.

5. THE NORTH ARROW AND BEARINGS ARE BASED UPON THE CONNECTICUT STATE COORDINATE SYSTEM N.A.D. 1983 (2011). THE ELEVATIONS ARE BASED UPON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) USING GEOID 18. COORDINATES AND ELEVATIONS WERE DETERMINED FROM RTK GPS OBSERVATIONS MADE ON OCTOBER 15, 2022, USING THE CT DOT RTK NETWORK KNOWN AS ACORN (CTEG BASE), HAVING THE FOLLOWING VALUES:

   LATITUDE = N 41° 55' 24.34700"
   LONGITUDE= 72° 41' 55.88092"
   ELLIPSOID HEIGHT = 30.293M

6. THE GROUND RELIEF CONTOURS DEPICTED HEREON ARE BASED UPON THE 2016 LIDAR DATA SET COMPILED BY THE STATE OF CONNECTICUT AVAILABLE AT CT.ECO.UCONN.EDU. LIDAR ELEVATIONS WERE FIELD VERIFIED AT VARIOUS LOCATIONS THROUGHOUT THE SUBJECT PARCEL. CERTAIN AREA WERE REVISED WITH A CONVENTIONAL FIELD SURVEY CONDUCTED IN NOVEMBER, 2022.

7. UNDERGROUND UTILITIES, STRUCTURES AND FACILITY LOCATIONS DEPICTED AND NOTED HEREON ARE BASED UPON OBSERVABLE SURFACE EVIDENCE WHILE CONDUCTING THE FIELD SURVEY. THESE LOCATIONS MUST BE CONSIDERED AS APPROXIMATE IN NATURE. ADDITIONALLY, OTHER SUCH FEATURES MAY EXIST ON THE SITE, THE EXISTENCE WHICH IS UNKNOWN TO MARTIN SURVEYING ASSOCIATES, LLC.. ALL CONTRACTORS ARE REQUIRED TO CONTACT CALL-BEFORE-YOU-DIG AT 1-800-922-4455 FOR LOCATION AND OR STAKEOUT OF ANY UTILITY PRIOR TO ANY EXCAVATION.

MAP NOTES (CONTINUED):

8. REFERENCE IS MADE TO PROPERTY BEING SUBJECT TO AN EASEMENT IN FAVOR OF THE NORTHERN CONNECTICUT POWER COMPANY AND DESCRIBED IN VOLUME 32 PAGE 563 OF THE SOUTH WINDSOR LAND RECORDS. SAID EASEMENT APPEARS TO RUN ALONG THE SOUTHERLY BOUNDARY LINE OF THE SUBJECT PARCEL.

9. THE WETLANDS DEPICTED HEREON WERE DELINEATED AND PROVIDED BY ALL-POINTS TECHNOLOGY CORPORATION.

MAP REFERENCES:

A. "BOUNDARY SURVEY STATUTORY DIVISION" SCALE: 1"=50'; DATED: AUGUST 19, 1997; BY: DESIGN PROFESSIONALS. *MAP NO. 3397 OF THE TOWN OF SOUTH WINDSOR LAND RECORDS (S.W.L.R.)*

B. "LAND OF JOSEPH A. SR., EVA, & ANTHONY F. KRAWSKI TOWN OF SOUTH WINDSOR, CONNECTICUT" SCALE: 1"=100'; DATED: APRIL 27, 1973; BY: *ILLEGIBLE* MAP NO. 649A S.W.L.R.

C. "MAP OF OAK RIDGE ESTATES SOUTH WINDSOR, CONNECTICUT" (SHEETS 1 THROUGH 3) SCALE: 1"=40'; DATED: SEPTEMBER 5, 1963; BY: HAYDEN L. GRISWOLD. MAP NO. 486B S.W.L.R.

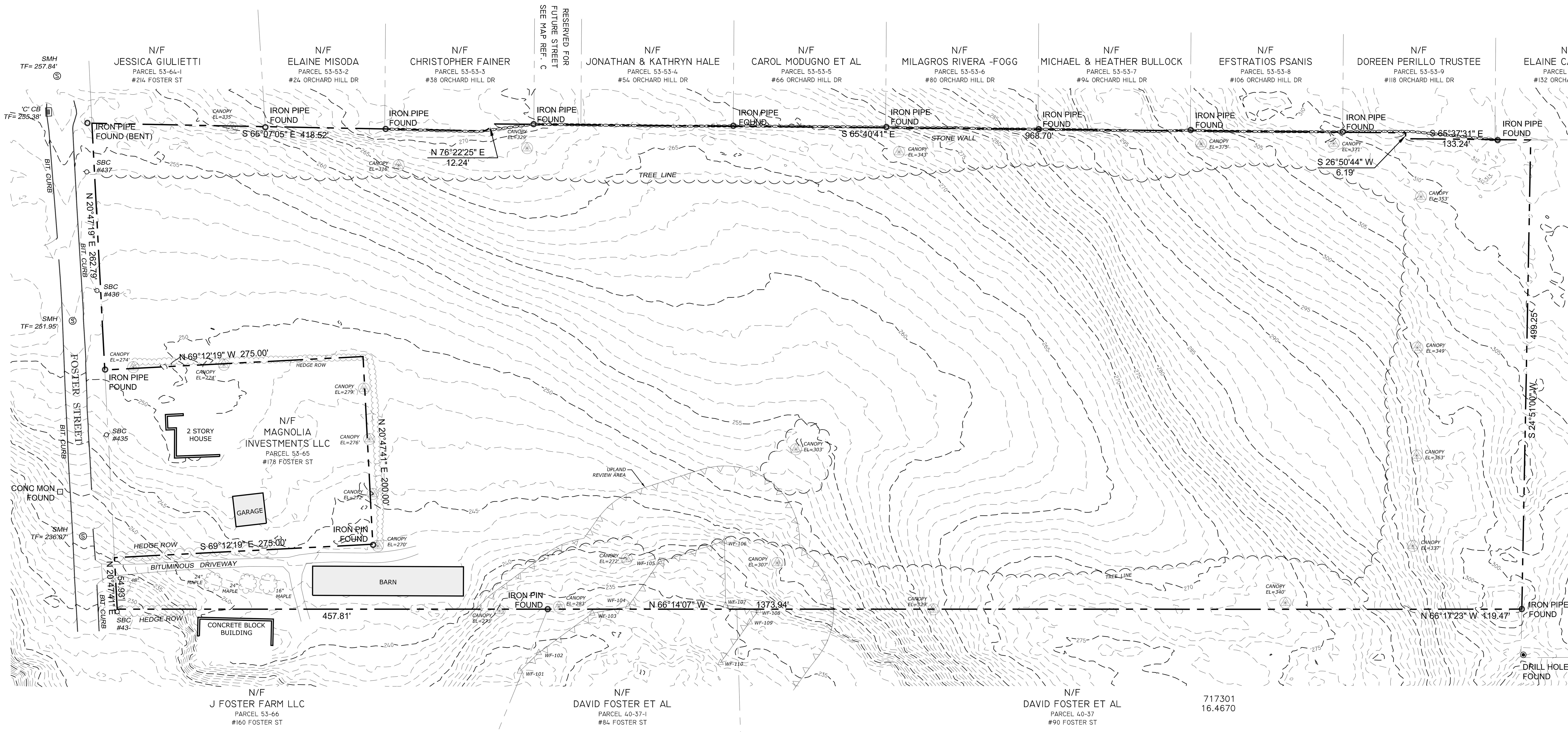
D. "PLAN SHOWING REVISIONS OF LOTS 1 AND 2 OAK RIDGE ESTATES" SCALE: 1"=40' DATED: AUGUST 20, 1964; BY: HAYDEN L. GRISWOLD. MAP NO 1133B S.W.L.R.

E. "SECTION 2 MAP OF OAK RIDGE ESTATES FOSTER STREET SOUTH WINDSOR, CONNECTICUT" (SHEETS 1 THROUGH 3) SCALE: 1"=40'; DATED: SEPTEMBER 5, 1963; BY: HAYDEN L. GRISWOLD. MAP NO. 514A S.W.L.R.

F. "BOUNDARY SURVEY, FOSTER FAMILY TRUST 90 FOSTER STREET SOUTH WINDSOR, CONNECTICUT" SHEETS 2 AND 3) SCALE: 1"=100'; DATED: MARCH 14, 2008; BY: DESIGN PROFESSIONALS. MAP NO. 3585 S.W.L.R.

G. "LOT LINE MODIFICATION, FOSTER FARM 90 FOSTER STREET SOUTH WINDSOR , CONNECTICUT, PREPARED FOR FOSTER FAMILY TRUST C / O WALTER T. FOSTER 60 FOSTER STREET SOUTH WINDSOR, CONNECTICUT" (SHEETS V1 & V2) DATED: NOVEMBER 10, 2016; BY: DESIGN PROFESSIONALS. MAP NO. 4142 S.W.L.R.

H. "LOCATION OF RIGHT OF WAY OF THE NORTHERN CONNECTICUT POWER COMPANY ACROSS THE PROPERTY OF WALTER N. FOSTER" SCALE: 1"=100'; DATED: AUGUST, 1935; BY: *ILLEGIBLE*. MAP NO. 353B S.W.L.R.



SITE LOCATION MAP (NOT TO SCALE)

LEGEND:

- IRON PIN (FOUND)
- Rebar/Drill Hole (To Be Set)
- MONUMENT (FOUND)
- MANHOLE
- DRAINAGE MANHOLE
- SANITARY MANHOLE
- ELEC. MANHOLE
- TELE. MANHOLE
- "C" CATCH BASIN
- "C-L" CATCH BASIN
- DECIDUOUS TREES
- EVERGREEN TREES
- SHRUB/BUSH
- FLAG POLE
- CBX TRAFFIC CONTROL BOX
- SIGN
- POST
- LIGHT POLE
- GUY ANCHOR
- UTILITY POLE
- WG WATER GATE
- WM WATER METER
- GV GAS VALVE
- GM GAS METER
- TRANSFORMER
- EM ELEC. METER
- MAIL BOX
- HAND HOLE
- BUTTON BOX
- A.C. UNIT
- TRAFFIC LIGHT POLE
- BOUNDARY LINE
- GUARD RAIL
- UNDERGROUND PIPING (San.,Stm.)
- G U/G GAS LINE
- E U/G ELEC. LINE
- W WATER LINE
- \\ OVERHEAD UTILITIES
- T U/G TELE. LINE
- CHAIN LINK FENCE
- TREE LINE

martin
Surveying Associates, LLC
201 CHRISTIAN LANE BERLIN, CT 06037
860-832-9328 860-357-4604 (FAX)
WWW. MARTINSURVEY.COM

REVISIONS:

PROPERTY & TOPOGRAPHIC SURVEY

LAND OF HELEN K. GALLIVAN

186 FOSTER STREET SOUTH WINDSOR, CONNECTICUT

MSA PROJECT NO: 22-107	
SCALE: 1"=60'	DRAWN BY: G.S.D.
DATE: 2022-11-30	CHECKED BY: D.G.M.
	SHEET: 1 OF 1

SUBJECT PARCEL
717,301 S.F. ±
16.467 ACRES ±
VOL. 1246 PG. 42

TO MY KNOWLEDGE AND BELIEF, THIS MAP IS SUBSTANTIALLY CORRECT AS NOTED HEREON.

DEAN MARTIN 70147
LICENSE NO.

THIS DOCUMENT AND COPIES THEREOF ARE VALID ONLY IF THEY BEAR THE SIGNATURE AND EMBOSSED SEAL OF THE DESIGNATED LICENSED PROFESSIONAL. UNAUTHORIZED ALTERATIONS TO THIS PLAN RENDER THE DECLARATION HEREON NULL AND VOID.

STATE OF CONNECTICUT DEAN G. MARTIN No.70147 LICENSED LAND SURVEYOR

GENERAL NOTES

1. ALL CONSTRUCTION SHALL COMPLY WITH PROJECT DEVELOPER STANDARDS, TOWN OF SOUTH WINDSOR STANDARDS, CONNECTICUT DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS IN THE ABOVE REFERENCED INCREASING HIERARCHY. IF SPECIFICATIONS ARE IN CONFLICT, THE MORE STRINGENT SPECIFICATION SHALL APPLY.
2. IF NO PROJECT CONSTRUCTION SPECIFICATION PACKAGE IS PROVIDED BY THE PROJECT DEVELOPER OR THEIR REPRESENTATIVE, THE CONTRACTOR SHALL COMPLY WITH THE MANUFACTURER, SOUTH WINDSOR, OR CONNECTICUT DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, AND BE IN ACCORDANCE WITH ALL APPLICABLE OSHA, FEDERAL, STATE AND LOCAL REGULATIONS.
3. THE PROJECT DEVELOPER IS RESPONSIBLE FOR OBTAINING ALL NECESSARY ZONING AND STORMWATER PERMITS REQUIRED BY GOVERNMENT AGENCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL OBTAIN ALL SOUTH WINDSOR CONSTRUCTION PERMITS. THE CONTRACTOR SHALL POST ALL BONDS, PAY ALL FEES, PROVIDE PROOF OF INSURANCE AND PROVIDE TRAFFIC CONTROL NECESSARY FOR THIS WORK.
4. REFER TO PLANS, DETAILS AND REPORTS PREPARED BY ALL-POINTS TECHNOLOGY CORPORATION FOR ADDITIONAL INFORMATION. THE CONTRACTOR SHALL VERIFY ALL SITE CONDITIONS IN THE FIELD AND CONTACT THE PROJECT DEVELOPER IF THERE ARE ANY QUESTIONS OR CONFLICTS REGARDING THE CONSTRUCTION DOCUMENTS AND/OR FIELD CONDITIONS SO THAT APPROPRIATE REVISIONS CAN BE MADE PRIOR TO BIDDING/CONSTRUCTION. ANY CONFLICT BETWEEN THE DRAWINGS AND SPECIFICATIONS SHALL BE CONFIRMED WITH THE PROJECT DEVELOPER'S CONSTRUCTION MANAGER PRIOR TO CONSTRUCTION.
5. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS OF ALL PRODUCTS, MATERIALS PER PLANS, AND SPECIFICATIONS TO THE PROJECT DEVELOPER FOR REVIEW AND APPROVAL PRIOR TO FABRICATION OR DELIVERY TO THE SITE. ALLOW A MINIMUM OF 14 WORKING DAYS FOR REVIEW.
6. SHOULD ANY UNKNOWN OR INCORRECTLY LOCATED EXISTING PIPING OR OTHER UTILITY BE UNCOVERED DURING EXCAVATION, CONSULT THE PROJECT DEVELOPER IMMEDIATELY FOR DIRECTIONS BEFORE PROCEEDING FURTHER WITH WORK IN THIS AREA.
7. DO NOT INTERRUPT EXISTING UTILITIES SERVICING FACILITIES OCCUPIED AND USED BY THE PROJECT DEVELOPER OR OTHERS DURING OCCUPIED HOURS, EXCEPT WHEN SUCH INTERRUPTIONS HAVE BEEN AUTHORIZED IN WRITING BY THE PROJECT DEVELOPER AND THE OWNER. INTERRUPTIONS SHALL ONLY OCCUR AFTER ACCEPTABLE TEMPORARY SERVICE HAS BEEN PROVIDED.
8. THE CONTRACT LIMIT IS THE PROPERTY LINE UNLESS OTHERWISE SPECIFIED OR SHOWN ON THE CONTRACT DRAWINGS.
9. THE CONTRACTOR SHALL ABIDE BY ALL OSHA, FEDERAL, STATE AND LOCAL REGULATIONS WHEN OPERATING CRANES, BOOMS, HOISTS, ETC. IN CLOSE PROXIMITY TO OVERHEAD ELECTRIC LINES. IF CONTRACTOR MUST OPERATE EQUIPMENT CLOSE TO ELECTRIC LINES, CONTACT POWER COMPANY TO MAKE ARRANGEMENTS FOR PROPER SAFEGUARDS. ANY UTILITY COMPANY FEES SHALL BE PAID FOR BY THE CONTRACTOR.
10. THE CONTRACTOR SHALL COMPLY WITH OSHA CFR 29 PART 1926 FOR EXCAVATION TRENCHING AND TRENCH PROTECTION REQUIREMENTS.
11. THE ENGINEER IS NOT RESPONSIBLE FOR SITE SAFETY MEASURES TO BE EMPLOYED DURING CONSTRUCTION. THE ENGINEER HAS NO CONTRACTUAL DUTY TO CONTROL THE SAFEST METHODS OR MEANS OF THE WORK, JOB SITE RESPONSIBILITIES, SUPERVISION OF PERSONNEL OR TO SUPERVISE SAFETY AND DO NOT VOLUNTARILY ASSUME ANY SUCH DUTY OR RESPONSIBILITY.
12. THE CONTRACTOR SHALL RESTORE ANY DRAINAGE STRUCTURE, PIPE, CONDUIT, PAVEMENT, CURBING, SIDEWALKS, LANDSCAPED AREAS OR SIGNAGE DISTURBED DURING CONSTRUCTION TO THEIR ORIGINAL CONDITION OR BETTER, AS APPROVED BY THE PROJECT DEVELOPER OR SOUTH WINDSOR.
13. THE CONTRACTOR SHALL PROVIDE AS-BUILT RECORDS OF ALL CONSTRUCTION (INCLUDING UNDERGROUND UTILITIES) TO THE PROJECT DEVELOPER AT THE END OF CONSTRUCTION.
14. ALTERNATIVE METHODS AND PRODUCTS, OTHER THAN THOSE SPECIFIED, MAY BE USED IF REVIEWED AND APPROVED BY THE PROJECT DEVELOPER, ENGINEER, AND APPROPRIATE REGULATORY AGENCY PRIOR TO INSTALLATION DURING THE BIDDING/CONSTRUCTION PROCESS.
15. INFORMATION ON EXISTING UTILITIES AND STORM DRAINAGE SYSTEMS HAS BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY PROVIDER AND MUNICIPAL RECORD MAPS AND/OR FIELD SURVEY AND IS NOT GUARANTEED CORRECT OR COMPLETE. UTILITIES AND STORM DRAINAGE SYSTEMS ARE SHOWN TO ALERT THE CONTRACTOR TO THEIR PRESENCE AND THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES AND STORM DRAINAGE SYSTEMS INCLUDING SERVICES. PRIOR TO DEMOLITION OR CONSTRUCTION, THE CONTRACTOR SHALL CONTACT "CALL BEFORE YOU DIG" 72 HOURS BEFORE COMMENCEMENT OF WORK AT "811" AND VERIFY ALL UTILITY AND STORM DRAINAGE SYSTEM LOCATIONS.
16. NO CONSTRUCTION OR DEMOLITION SHALL BEGIN UNTIL APPROVAL OF THE FINAL PLANS AND PERMITS ARE GRANTED BY ALL GOVERNING AND REGULATORY AGENCIES.

SITE PLAN NOTES

1. THE SURVEY WAS PROVIDED BY MARTIN SURVEY ASSOCIATES, LLC. DATED NOVEMBER 30, 2022.
2. THERE ARE BORDERING VEGETATED WETLANDS (BVW/S) LOCATED ON THE SITE AS INDICATED ON THE PLANS. BVW BOUNDARIES WERE FLAGGED AND LOCATED BY COMPANY NAME, IN MONTH 2019.
3. THERE WILL BE GRADING ON SITE TO COMPLY WITH APPENDIX I SLOPE REQUIREMENTS WHICH INCLUDE MINOR CLEARING. THE PROPOSED GRADING WILL ENSURE THAT PROPER DRAINAGE IS MAINTAINED.
4. THE CONTRACTOR SHALL FOLLOW THE RECOMMENDED SEQUENCE OF CONSTRUCTION NOTES PROVIDED ON THE EROSION CONTROL PLAN OR SUBMIT AN ALTERNATE PLAN FOR APPROVAL BY THE ENGINEER AND/OR PERMITTING AGENCIES PRIOR TO THE START CONSTRUCTION. ALLOW A MINIMUM OF 14 WORKING DAYS FOR REVIEW.
5. PROPER CONSTRUCTION PROCEDURES SHALL BE FOLLOWED ON ALL IMPROVEMENTS WITHIN THIS PARCEL SO AS TO PREVENT THE SILTING OF ANY WATERCOURSE OR BVWS IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS. IN ADDITION, THE CONTRACTOR SHALL ADHERE TO THE "EROSION CONTROL PLAN" CONTAINED HEREIN. THE CONTRACTOR SHALL BE RESPONSIBLE TO POST ALL BONDS AS REQUIRED BY GOVERNMENT AGENCIES WHICH WOULD GUARANTEE THE PROPER IMPLEMENTATION OF THE PLAN.
6. ALL SITE WORK, MATERIALS OF CONSTRUCTION, AND CONSTRUCTION METHODS FOR EARTHWORK AND STORM DRAINAGE WORK, SHALL CONFORM TO THE SPECIFICATIONS AND DETAILS AND APPLICABLE SECTIONS OF THE PROJECT SPECIFICATIONS MANUAL. OTHERWISE THIS WORK SHALL CONFORM TO THE STATE OF CONNECTICUT DEPARTMENT OF TRANSPORTATION AND PROJECT GEOTECHNICAL REPORT IF THERE IS NO PROJECT SPECIFICATIONS MANUAL. ALL FILL MATERIAL UNDER STRUCTURES AND PAVED AREAS SHALL BE PER THE ABOVE STATED APPLICABLE SPECIFICATIONS, AND/OR PROJECT GEOTECHNICAL REPORT, AND SHALL BE PLACED IN ACCORDANCE WITH THE APPLICABLE SPECIFICATIONS UNDER THE SUPERVISION OF A QUALIFIED PROFESSIONAL ENGINEER. MATERIAL SHALL BE COMPACTED IN 8" LIFTS TO 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D 1557 AT 95% PERCENT OF OPTIMUM MOISTURE CONTENT.
7. ALL DISTURBANCE INCURRED TO PUBLIC, MUNICIPAL AND STATE PROPERTY DUE TO CONSTRUCTION SHALL BE RESTORED TO ITS PREVIOUS CONDITION OR BETTER, TO THE SATISFACTION OF THE SOUTH WINDSOR AND STATE OF CONNECTICUT SPECIFICATIONS.
8. IF IMPACTED OR CONTAMINATED SOIL IS ENCOUNTERED BY THE CONTRACTOR, THE CONTRACTOR SHALL SUSPEND EXCAVATION WORK OF IMPACTED SOIL AND NOTIFY THE PROJECT DEVELOPER AND/OR PROJECT DEVELOPERS ENVIRONMENTAL CONSULTANT PRIOR TO PROCEEDING WITH FURTHER WORK IN THE IMPACTED SOIL LOCATION UNTIL FURTHER INSTRUCTED BY THE PROJECT DEVELOPER AND/OR PROJECT DEVELOPER'S ENVIRONMENTAL CONSULTANT.

UTILITY NOTES

1. CONTRACTOR IS RESPONSIBLE FOR CONTACTING THE TOWN OF SOUTH WINDSOR TO SECURE CONSTRUCTION PERMITS AND FOR PAYMENT OF FEES FOR STREET CUTS AND CONNECTIONS TO EXISTING UTILITIES.
2. REFER TO DRAWINGS BY PROJECT DEVELOPER FOR THE ONSITE ELECTRICAL DRAWINGS AND INTERCONNECTION TO EXISTING ELECTRICAL GRID. SITE CONTRACTOR SHALL SUPPLY AND INSTALL PIPE ADAPTERS AS NECESSARY AT BUILDING CONNECTION POINT OR AT EXISTING UTILITY OR PIPE CONNECTION POINT. THESE DETAILS ARE NOT INCLUDED IN THESE PLANS.
3. UTILITY LOCATIONS AND PENETRATIONS ARE SHOWN FOR THE CONTRACTOR'S INFORMATION AND SHALL BE VERIFIED WITH PROJECT DEVELOPER'S CONSTRUCTION MANAGER AND THE ELECTRICAL ENGINEER PRIOR TO THE START OF CONSTRUCTION.
4. THE CONTRACTOR SHALL VISIT THE SITE AND VERIFY THE ELEVATION AND LOCATION OF ALL UTILITIES BY VARIOUS MEANS PRIOR TO BEGINNING ANY EXCAVATION. TEST PITS SHALL BE DUG AT ALL LOCATIONS WHERE PROP. SANITARY SEWERS AND WHERE PROP. STORM PIPING WILL CROSS EXISTING UTILITIES, AND THE HORIZONTAL AND VERTICAL LOCATIONS OF THE UTILITIES SHALL BE DETERMINED. THE CONTRACTOR SHALL CONTACT THE PROJECT DEVELOPER IN THE EVENT OF ANY DISCOVERED OR UNFORESEEN CONFLICTS BETWEEN EXISTING AND PROPOSED SANITARY SEWERS, STORM PIPING AND UTILITIES SO THAT AN APPROPRIATE MODIFICATION MAY BE MADE.
5. UTILITY CONNECTION DESIGN AS REFLECTED ON THE PLAN MAY CHANGE SUBJECT TO UTILITY PROVIDER AND GOVERNING AUTHORITY STAFF REVIEW.
6. THE CONTRACTOR SHALL ENSURE THAT ALL UTILITY PROVIDERS AND GOVERNING AUTHORITY STANDARDS FOR MATERIALS AND CONSTRUCTION METHODS ARE MET. THE CONTRACTOR SHALL PERFORM PROPER COORDINATION WITH THE RESPECTIVE UTILITY PROVIDER.
7. THE CONTRACTOR SHALL ARRANGE FOR AND COORDINATE WITH THE RESPECTIVE UTILITY PROVIDERS FOR SERVICE INSTALLATIONS AND CONNECTIONS. THE CONTRACTOR SHALL COORDINATE WORK TO BE PERFORMED BY THE VARIOUS UTILITY PROVIDERS AND SHALL PAY ALL FEES FOR CONNECTIONS, DISCONNECTIONS, RELOCATIONS, INSPECTIONS, AND DEMOLITION UNLESS OTHERWISE STATED IN THE PROJECT SPECIFICATIONS MANUAL AND/OR GENERAL CONDITIONS OF THE CONTRACT.
8. ALL EXISTING PAVEMENT WHERE UTILITY PIPING IS TO BE INSTALLED SHALL BE SAW CUT. AFTER UTILITY INSTALLATION IS COMPLETED, THE CONTRACTOR SHALL INSTALL TEMPORARY AND/OR PERMANENT PAVEMENT REPAIR AS DETAILED ON THE DRAWINGS OR AS REQUIRED BY THE TOWN OF SOUTH WINDSOR.
9. ALL PIPES SHALL BE LAID ON STRAIGHT ALIGNMENTS AND EVEN GRADES USING A PIPE LASER OR OTHER ACCURATE METHOD.
10. RELOCATION OF UTILITY PROVIDER FACILITIES, SUCH AS POLES, SHALL BE DONE IN ACCORDANCE WITH THE REQUIREMENTS OF THE UTILITY PROVIDER.
11. THE CONTRACTOR SHALL COMPACT PIPE BACKFILL IN 8" LIFTS ACCORDING TO THE PIPE BEDDING DETAILS. TRENCH BOTTOM SHALL BE STABLE IN HIGH GROUNDWATER AREAS. A PIPE FOUNDATION SHALL BE USED PER THE TRENCH DETAILS AND IN AREAS OF ROCK EXCAVATION.
12. CONTRACTOR TO PROVIDE STEEL SLEEVES AND ANNULAR SPACE SAND FILL FOR UTILITY PIPE AND CONDUIT CONNECTIONS UNDER FOOTINGS.
13. ALL UTILITY CONSTRUCTION IS SUBJECT TO INSPECTION FOR APPROVAL PRIOR TO BACKFILLING, IN ACCORDANCE WITH THE APPROPRIATE UTILITY PROVIDER REQUIREMENTS.
14. A ONE-FOOT MINIMUM VERTICAL CLEARANCE BETWEEN WATER, GAS, ELECTRICAL, AND TELEPHONE LINES AND STORM PIPING SHALL BE PROVIDED. A SIX-INCH MINIMUM CLEARANCE SHALL BE MAINTAINED BETWEEN STORM PIPING AND SANITARY SEWER. A 6-INCH TO 18-INCH VERTICAL CLEARANCE BETWEEN SANITARY SEWER PIPING AND STORM PIPING SHALL REQUIRE CONCRETE ENCASEMENT OF THE SANITARY PIPING.
15. THE CONTRACTOR SHALL RESTORE ANY UTILITY STRUCTURE, PIPE, CONDUIT, PAVEMENT, CURBING, SIDEWALKS, DRAINAGE STRUCTURE, SWALE OR LANDSCAPED AREAS DISTURBED DURING CONSTRUCTION, TO THEIR ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE PROJECT DEVELOPER AND TOWN OF SOUTH WINDSOR.
16. INFORMATION ON EXISTING UTILITIES AND STORM DRAINAGE HAS BEEN COMPILED FROM AVAILABLE INFORMATION INCLUDING UTILITY PROVIDER AND MUNICIPAL RECORD MAPS AND/OR FIELD SURVEY, AND IS NOT GUARANTEED CORRECT OR COMPLETE. UTILITIES AND STORM DRAINAGE ARE SHOWN TO ALERT THE CONTRACTOR TO THEIR PRESENCE. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR DETERMINING ACTUAL LOCATIONS AND ELEVATIONS OF ALL UTILITIES AND STORM DRAINAGE INCLUDING SERVICES. CONTACT "CALL BEFORE YOU DIG" AT 811 72 HOURS PRIOR TO CONSTRUCTION AND VERIFY ALL UNDERGROUND AND OVERHEAD UTILITY AND STORM DRAINAGE LOCATIONS. THE CONTRACTOR SHALL EMPLOY THE USE OF A UTILITY LOCATING COMPANY TO PROVIDE SUBSURFACE UTILITY ENGINEERING CONSISTING OF DESIGNATING UTILITIES AND STORM PIPING ON PRIVATE PROPERTY WITHIN THE CONTRACT LIMIT AND CONSISTING OF DESIGNATING AND LOCATING WHERE PROP. UTILITIES AND STORM PIPING CROSS EXISTING UTILITIES WITHIN THE CONTRACT LIMITS.
17. THE CONTRACTOR SHALL ARRANGE AND COORDINATE WITH UTILITY PROVIDERS FOR WORK TO BE PERFORMED BY UTILITY PROVIDERS. THE CONTRACTOR SHALL PAY ALL UTILITY FEES UNLESS OTHERWISE STATED IN THE PROJECT SPECIFICATION MANUAL AND GENERAL CONDITIONS, AND REPAIR PAVEMENTS AS NECESSARY.
18. ELECTRIC DRAWINGS AND REQUIREMENTS ARE NOT INCLUDED AS PART OF THIS DRAWING SET AND SHOULD BE OBTAINED FROM THE PROJECT DEVELOPER.
19. ALTERNATIVE METHODS AND PRODUCTS OTHER THAN THOSE SPECIFIED MAY BE USED IF REVIEWED AND APPROVED BY THE PROJECT DEVELOPER, ENGINEER, AND APPROPRIATE REGULATORY AGENCIES PRIOR TO INSTALLATION.
20. THE CONTRACTOR SHALL MAINTAIN ALL FLOWS AND UTILITY CONNECTIONS TO EXISTING BUILDINGS WITHOUT INTERRUPTION UNLESS/UNTIL AUTHORIZED TO DISCONNECT BY THE PROJECT DEVELOPER, TOWN OF SOUTH WINDSOR, UTILITY PROVIDERS AND GOVERNING AUTHORITIES.

GENERAL LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
BUILDING SETBACK		
SOLAR SETBACK		
EASEMENT		
TREE LINE		
WETLAND	V V V	
WETLAND BUFFER		
VERNAL POOL		
VERNAL POOL BUFFER		
WATERCOURSE		
WATERCOURSE BUFFER		
MAJOR CONTOUR		
MINOR CONTOUR		
UNDERGROUND ELECTRIC		E E
OVERHEAD ELECTRIC		OH OH
GAS LINE		GAS
WATER LINE		W W
BASIN		
SWALE		> >
FENCE		X X X
LIMIT OF DISTURBANCE		LOD
LIMIT OF CLEARING AND GRUBBING		LCG
FILTER SOCK		FS FS
SILT FENCE		SF SF
BAFFLE		

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CSC PERMIT SET

NO	DATE	REVISION
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DESIGN PROFESSIONAL OF RECORD

PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: HELEN K. GALLIVAN

ADDRESS: 186 FOSTER STREET, SOUTH WINDSOR, CT

FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

DRAWN BY: TEL

DATE: 10/20/2023 CHECKED BY: SMC

SHEET TITLE:

GENERAL NOTES

SHEET NUMBER:

GN-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

1 OP-1 **OVERALL LOCUS MAP**
SCALE : 1" = 80'-0"

80 0 40 80 160
(IN FEET) 1 inch = 80 ft.

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SHEET TITLE:
OVERALL LOCUS MAP

SHEET NUMBER:
OP-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

EROSION CONTROL NOTES

1. THE CONTRACTOR SHALL CONSTRUCT ALL SEDIMENT AND EROSION CONTROLS IN ACCORDANCE WITH THE 2024 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, LATEST EDITION, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, AND AS DIRECTED BY THE CT DEEP REPRESENTATIVE, PERMITTEE, AND/OR SWPCP MONITOR. ALL PERIMETER SEDIMENTATION AND EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF CLEARING AND GRUBBING AND DEMOLITION OPERATIONS.

2. THESE DRAWINGS ARE ONLY INTENDED TO DESCRIBE THE SEDIMENT AND EROSION CONTROL MEASURES FOR THIS SITE. SEE CONSTRUCTION SEQUENCE FOR ADDITIONAL INFORMATION. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN ARE SHOWN AS REQUIRED BY THE ENGINEER. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT ALL EROSION CONTROL MEASURES ARE CONFIGURED AND CONSTRUCTED IN A MANNER THAT WILL MINIMIZE EROSION OF SOILS AND PREVENT THE TRANSPORT OF SEDIMENTS AND OTHER POLLUTANTS TO STORM DRAINAGE SYSTEMS AND/OR WATERCOURSES. ACTUAL SITE CONDITIONS OR SEASONAL AND CLIMATIC CONDITIONS MAY WARRANT ADDITIONAL CONTROLS OR CONFIGURATIONS, AS REQUIRED, AND AS DIRECTED BY THE PERMITTEE AND/OR SWPCP MONITOR. REFER TO SITE PLAN FOR GENERAL INFORMATION AND OTHER CONTRACT PLANS FOR APPROPRIATE INFORMATION.

3. A BOND OR LETTER OF CREDIT MAY BE REQUIRED TO BE POSTED WITH THE GOVERNING AUTHORITY FOR THE EROSION CONTROL INSTALLATION AND MAINTENANCE.

4. THE CONTRACTOR SHALL APPLY THE MINIMUM EROSION & SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN IN CONJUNCTION WITH CONSTRUCTION SEQUENCING, SUCH THAT ALL ACTIVE WORK ZONES ARE PROTECTED. ADDITIONAL AND/OR ALTERNATIVE SEDIMENT AND EROSION CONTROL MEASURES MAY BE INSTALLED DURING THE CONSTRUCTION PERIOD IF FOUND NECESSARY BY THE CONTRACTOR, OWNER, SITE ENGINEER, MUNICIPAL OFFICIALS, OR ANY GOVERNING AGENCY. THE CONTRACTOR SHALL CONTACT THE OWNER AND APPROPRIATE GOVERNING AGENCIES FOR APPROVAL IF ALTERNATIVE CONTROLS OTHER THAN THOSE SHOWN ON THE PLANS ARE PROPOSED BY THE CONTRACTOR.

5. THE CONTRACTOR SHALL TAKE EXTREME CARE DURING CONSTRUCTION SO AS NOT TO DISTURB UNPROTECTED WETLAND AREAS OR INSTALLED SEDIMENTATION AND EROSION CONTROL MEASURES. THE CONTRACTOR SHALL INSPECT ALL SEDIMENT AND EROSION CONTROLS WEEKLY AND WITHIN 24 HOURS OF A STORM WITH A RAINFALL AMOUNT OF 0.25 INCHES OR GREATER TO VERIFY THAT THE CONTROLS ARE OPERATING PROPERLY AND MAKE REPAIRS AS NECESSARY IN A TIMELY MANOR.

6. THE CONTRACTOR SHALL KEEP A SUPPLY OF EROSION CONTROL MATERIAL (SILT FENCE, COMPOST FILTER SOCK, EROSION CONTROL BLANKET, ETC.) ON-SITE FOR PERIODIC MAINTENANCE AND EMERGENCY REPAIRS.

7. ALL FILL MATERIAL PLACED ADJACENT TO ANY WETLAND AREA SHALL BE GOOD QUALITY, WITH LESS THAN 5% FINES PASSING THROUGH A #200 SIEVE (BANK RUN), SHALL BE PLACED IN MAXIMUM ONE FOOT LIFTS, AND SHALL BE COMPACTED TO 95% MAX. DRY DENSITY MODIFIED PROCTOR OR AS SPECIFIED IN THE CONTRACT SPECIFICATIONS.

8. PROTECT EXISTING TREES THAT ARE TO BE SAVED BY FENCING, ORANGE SAFETY FENCE, CONSTRUCTION TAPE, OR EQUIVALENT FENCING/TAPE. ANY LIMB TRIMMING SHOULD BE DONE AFTER CONSULTATION WITH AN ARBORIST AND BEFORE CONSTRUCTION BEGINS IN THAT AREA; FENCING SHALL BE MAINTAINED AND REPAIRED DURING CONSTRUCTION.

9. CONSTRUCTION ENTRANCES (ANTI-TRACKING PADS) SHALL BE INSTALLED PRIOR TO ANY SITE EXCAVATION OR CONSTRUCTION ACTIVITY AND SHALL BE MAINTAINED THROUGHOUT THE DURATION OF ALL CONSTRUCTION IF REQUIRED. THE LOCATION OF THE TRACKING PADS MAY CHANGE AS VARIOUS PHASES OF CONSTRUCTION ARE COMPLETED. CONTRACTOR SHALL ENSURE THAT ALL VEHICLES EXITING THE SITE ARE PASSING OVER THE ANTI-TRACKING PADS PRIOR TO EXITING.

10. ALL CONSTRUCTION SHALL BE CONTAINED WITHIN THE LIMIT OF DISTURBANCE, WHICH SHALL BE MARKED WITH SILT FENCE, SAFETY FENCE, HAY BALES, RIBBONS, OR OTHER MEANS PRIOR TO CLEARING. CONSTRUCTION ACTIVITY SHALL REMAIN ON THE UPHILL SIDE OF THE SEDIMENT BARRIER UNLESS WORK IS SPECIFICALLY CALLED FOR ON THE DOWNHILL SIDE OF THE BARRIER.

11. NO CUT OR FILL SLOPES SHALL EXCEED 2:1 EXCEPT WHERE STABILIZED BY ROCK FACED EMBANKMENTS OR EROSION CONTROL BLANKETS. ALL SLOPES SHALL BE SEEDED AND BANKS WILL BE STABILIZED IMMEDIATELY UPON COMPLETION OF FINAL GRADING UNTIL TURF IS ESTABLISHED.

12. DIRECT ALL DEWATERING PUMP DISCHARGE TO A SEDIMENT CONTROL DEVICE CONFORMING TO THE GUIDELINES WITHIN THE APPROVED LIMIT OF DISTURBANCE IF REQUIRED. DISCHARGE TO STORM DRAINS OR SURFACE WATERS FROM SEDIMENT CONTROLS SHALL BE CLEAR AND APPROVED BY THE PERMITTEE OR MUNICIPALITY.

13. THE CONTRACTOR SHALL MAINTAIN A CLEAN CONSTRUCTION SITE AND SHALL NOT ALLOW THE ACCUMULATION OF RUBBISH OR CONSTRUCTION DEBRIS ON THE SITE. PROPER SANITARY DEVICES SHALL BE MAINTAINED ON-SITE AT ALL TIMES AND SECURED APPROPRIATELY. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO AVOID THE SPILLAGE OF FUEL OR OTHER POLLUTANTS ON THE CONSTRUCTION SITE AND SHALL ADHERE TO ALL APPLICABLE POLICIES AND REGULATIONS RELATED TO SPILL PREVENTION AND RESPONSE/CONTAINMENT.

14. MINIMIZE LAND DISTURBANCES. SEED AND MULCH DISTURBED AREAS WITH TEMPORARY MIX AS SOON AS PRACTICABLE (2 WEEK MAXIMUM UNSTABILIZED PERIOD) USING PERENNIAL RYEGRASS AT 40 LBS PER ACRE. MULCH ALL CUT AND FILL SLOPES AND SWALES WITH LOOSE HAY AT A RATE OF 2 TONS PER ACRE. IF NECESSARY, REPLACE LOOSE HAY ON SLOPES WITH EROSION CONTROL BLANKETS OR JUTE CLOTH. MODERATELY GRADED AREAS, ISLANDS, AND TEMPORARY CONSTRUCTION STAGING AREAS MAY BE HYDROSEEDED WITH TACKIFIER.

15. SWEEP AFFECTED PORTIONS OF OFF SITE ROADS ONE OR MORE TIMES A DAY (OR LESS FREQUENTLY IF TRACKING IS NOT A PROBLEM) DURING CONSTRUCTION. FOR DUST CONTROL, PERIODICALLY MOISTEN EXPOSED SOIL SURFACES WITH WATER ON UNPAVED TRAVELWAYS TO KEEP THE TRAVELWAYS DAMP. CALCIUM CHLORIDE MAY ALSO BE APPLIED TO ACCESS ROADS. DUMP TRUCK LOADS EXITING THE SITE SHALL BE COVERED.

16. VEGETATIVE ESTABLISHMENT SHALL OCCUR ON ALL DISTURBED SOIL, UNLESS THE AREA IS UNDER ACTIVE CONSTRUCTION, IT IS COVERED IN STONE OR SCHEDULED FOR PAVING WITHIN 30 DAYS. TEMPORARY SEEDING OR NON-LIVING SOIL PROTECTION OF ALL EXPOSED SOILS AND SLOPES SHALL BE INITIATED WITHIN THE FIRST 7 DAYS OF SUSPENDING WORK IN AREAS TO BE LEFT LONGER THAN 30 DAYS.

17. MAINTAIN ALL PERMANENT AND TEMPORARY SEDIMENT CONTROL DEVICES IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD. UPON COMPLETION OF WORK SWEEP CONCRETE PADS, CLEAN THE STORMWATER MANAGEMENT SYSTEMS AND REMOVE ALL TEMPORARY SEDIMENT CONTROLS ONCE THE SITE IS FULLY STABILIZED AND APPROVAL HAS BEEN RECEIVED FROM PERMITTEE OR THE MUNICIPALITY.

18. THE SITE WAS DESIGNED TO COMPLY WITH FEDERAL, STATE, AND, IF APPLICABLE, LOCAL STANDARDS, PLUS CURRENT ACCEPTED PRACTICES FOR THE INDUSTRY. ADDITIONAL CONTROLS AND ACTIVITIES MAY BE DEEMED NECESSARY BY THE SWPCP MONITOR DURING CONSTRUCTION AS A RESULT OF UNFORESEEN CONDITIONS AND/OR MEANS AND METHODS. SUCH ITEMS MAY INCLUDE, BUT ARE NOT LIMITED TO: ADDITIONAL FOREBAYS, BASINS, OR UPSTREAM STRUCTURAL CONTROLS, THE USE OF FLOCCULANTS OF FLOCK LOGS TO DECREASE SEDIMENT, DISCHARGE MANAGEMENT SUCH AS ADDITIONAL ARMORING AND FILTERING MEASURES (I.E. STRAW BALES, WATTLES, ETC.), AND HYDROSEEDING WITH RAPIDLY GERMINATING SEED.

19. SEEDING MIXTURES SHALL BE FUZZ & BUZZ MIX - PREMIUM - ERNMX-147, OR APPROVED EQUAL. NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR DETENTION BASINS & MOIST SITES, OR APPROVED EQUAL, SHALL BE UTILIZED ON THE BOTTOM OF THE BASIN & FUZZ & BUZZ MIX - PREMIUM - ERNMX-147, OR APPROVED EQUAL, ON THE SIDE SLOPES OF THE BASIN. SEE SHEET DN-2 FOR ALL SEED MIXTURES.

CONSTRUCTION OPERATION AND MAINTENANCE PLAN - BY CONTRACTOR

E&S MEASURE	INSPECTION SCHEDULE	MAINTENANCE REQUIRED
CONSTRUCTION ENTRANCE	DAILY	PLACE ADDITIONAL STONE, EXTEND THE LENGTH OR REMOVE AND REPLACE THE STONE. CLEAN PAVED SURFACES OF TRACKED SEDIMENT.
COMPOST FILTER SOCK	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED.
SILT FENCE	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED. REMOVE SILT WHEN IT REACHES 1/2 THE HEIGHT OF THE FENCE.
TOPSOIL/BORROW STOCKPILES	DAILY	REPAIR/REPLACE SEDIMENT BARRIERS AS NECESSARY.
TEMPORARY SEDIMENT BASIN (W/ BAFFLES)	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.5"	REMOVE SEDIMENT ONCE IT HAS ACCUMULATED TO ONE HALF OF MINIMUM REQUIRED VOLUME OF THE WET STORAGE, DEWATERING AS NEEDED. RESTORE TRAP TO ORIGINAL DIMENSIONS. REPAIR/REPLACE BAFFLES WHEN FAILURE OR DETERIORATION IS OBSERVED.
TEMPORARY SEDIMENT TRAP (W/ BAFFLES)	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.5"	REMOVE SEDIMENT ONCE IT HAS ACCUMULATED TO ONE HALF OF MINIMUM REQUIRED VOLUME OF THE WET STORAGE, DEWATERING AS NEEDED. RESTORE TRAP TO ORIGINAL DIMENSIONS. REPAIR/REPLACE BAFFLES WHEN FAILURE OR DETERIORATION IS OBSERVED.
TEMPORARY SOIL PROTECTION	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR ERODED OR BARE AREAS IMMEDIATELY. RESEED AND MULCH.

SEDIMENT & EROSION CONTROL NARRATIVE

1. THE PROJECT INVOLVES THE CONSTRUCTION OF A GROUND MOUNTED SOLAR PANEL FACILITY WITH ASSOCIATED EQUIPMENT, INCLUDING THE GRADING OF APPROXIMATELY 14.91± ACRES OF EXISTING LOT.

THE PROPOSED PROJECT INVOLVES THE FOLLOWING CONSTRUCTION:

A. CLEARING, GRUBBING, AND GRADING OF EXISTING LOT.
B. CONSTRUCTION OF 3,680 GROUND MOUNTED SOLAR PANELS AND ASSOCIATED EQUIPMENT.
B. THE STABILIZATION OF DISTURBED AREAS WITH PERMANENT VEGETATIVE TREATMENTS.

2. FOR THIS PROJECT, THERE ARE APPROXIMATELY 14.91± ACRES OF THE SITE BEING DISTURBED WITH NEGLIGIBLE INCREASE IN THE IMPERVIOUS AREA OF THE SITE, AS ALL ACCESS THOUGH THE SITE WILL BE GRAVEL. IMPERVIOUS AREAS ARE LIMITED TO THE CONCRETE PADS FOR ELECTRICAL EQUIPMENT.

3. THE PROJECT SITE, AS MAPPED IN THE SOIL SURVEY OF STATE OF CONNECTICUT (NRCS, VERSION 18, DEC 6, 2018), CONTAINS (2 HYDROLOGIC SOIL GROUP A), 37C AND 37E (3 HYDROLOGIC SOIL GROUP B/D), 12, 53A, AND 702A (4 HYDROLOGIC SOIL GROUP B), 63B, 64B, 66B AND 704B. A GEOTECHNICAL REPORT HAS BEEN COMPLETED.

4. IT IS ANTICIPATED THAT CONSTRUCTION WILL BE COMPLETED IN APPROXIMATELY 3-4 MONTHS.

5. REFER TO THE CONSTRUCTION SEQUENCING AND EROSION AND SEDIMENTATION NOTES FOR INFORMATION REGARDING SEQUENCING OF MAJOR OPERATIONS IN THE ON-SITE CONSTRUCTION PHASES.

6. STORMWATER MANAGEMENT DESIGN CRITERIA UTILIZES THE APPLICABLE SECTIONS OF THE 2024 CONNECTICUT STORMWATER QUALITY MANUAL AND APPENDIX I OF THE GENERAL PERMIT FOR THE DISCHARGE OF STORMWATER AND DEWATERING WASTEWATERS FROM CONSTRUCTION ACTIVITIES, TO THE EXTENT POSSIBLE AND PRACTICABLE FOR THIS PROJECT ON THIS SITE. EROSION AND SEDIMENTATION MEASURES ARE BASED UPON ENGINEERING PRACTICE, JUDGEMENT AND THE APPLICABLE SECTIONS OF THE 2024 CONNECTICUT EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS.

7. DETAILS FOR THE TYPICAL STORMWATER MANAGEMENT AND EROSION AND SEDIMENTATION MEASURES ARE SHOWN ON THE PLAN SHEETS OR PROVIDED AS SEPARATE SUPPORT DOCUMENTATION FOR REVIEW IN THIS PLAN.

8. CONSERVATION PRACTICES TO BE USED DURING CONSTRUCTION:
   A. STAGED CONSTRUCTION;
   B. MINIMIZE THE DISTURBED AREAS TO THE EXTENT PRACTICABLE DURING CONSTRUCTION;
   C. STABILIZE DISTURBED AREAS WITH TEMPORARY OR PERMANENT MEASURES AS SOON AS POSSIBLE, BUT NO LATER THAN 7-DAYS FOLLOWING DISTURBANCE;
   D. MINIMIZE IMPERVIOUS AREAS;
   E. UTILIZE APPROPRIATE CONSTRUCTION EROSION AND SEDIMENTATION MEASURES.

9. THE FOLLOWING SEPARATE DOCUMENTS ARE TO BE CONSIDERED A PART OF THE EROSION AND SEDIMENTATION PLAN:
   A. STORMWATER MANAGEMENT REPORT DATED JANUARY 2024.
   B. SWPCP DATED JANUARY 2024.

SUGGESTED CONSTRUCTION SEQUENCE

THE FOLLOWING SUGGESTED SEQUENCE OF CONSTRUCTION ACTIVITIES IS PROJECTED BASED UPON ENGINEERING JUDGEMENT AND BEST MANAGEMENT PRACTICES. THE CONTRACTOR MAY ELECT TO ALTER THE SEQUENCING TO BEST MEET THE CONSTRUCTION SCHEDULE, THE EXISTING SITE ACTIVITIES AND WEATHER CONDITIONS. SHOULD THE CONTRACTOR ALTER THE CONSTRUCTION SEQUENCE OR ANY EROSION AND SEDIMENTATION CONTROL MEASURES THEY SHALL MODIFY THE STORMWATER POLLUTION CONTROL PLAN ("SWPCP") AS REQUIRED BY THE GENERAL PERMIT. MAJOR CHANGES IN SEQUENCING AND/OR METHODS MAY REQUIRE REGULATORY APPROVAL PRIOR TO IMPLEMENTATION.

1. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING. PHYSICALLY FLAG THE LIMITS OF DISTURBANCE IN THE FIELD AS NECESSARY TO FACILITATE THE PRE-CONSTRUCTION MEETING.

2. CONDUCT A PRE-CONSTRUCTION MEETING TO DISCUSS THE PROPOSED WORK AND EROSION AND SEDIMENTATION CONTROL MEASURES. THE MEETING SHOULD BE ATTENDED BY THE OWNER, THE OWNER'S REPRESENTATIVE(S), THE GENERAL CONTRACTOR, DESIGNATED SUB-CONTRACTORS AND THE PERSON, OR PERSONS, RESPONSIBLE FOR THE IMPLEMENTATION, OPERATION, MONITORING AND MAINTENANCE OF THE EROSION AND SEDIMENTATION MEASURES. THE CONSTRUCTION PROCEDURES FOR THE ENTIRE PROJECT SHALL BE REVIEWED AT THIS MEETING.

3. NOTIFY CALL BEFORE YOU DIG AT 811, AS REQUIRED, PRIOR TO THE START OF CONSTRUCTION.

EROSION & SEDIMENT CONTROL SEQUENCE

4. REMOVE EXISTING IMPEDIMENTS AS NECESSARY AND PROVIDE MINIMAL CLEARING AND GRUBBING TO INSTALL THE REQUIRED CONSTRUCTION ENTRANCE/S.

5. CLEAR ONLY AS NEEDED TO INSTALL THE PERIMETER EROSION AND SEDIMENTATION CONTROL MEASURES AND, IF APPLICABLE, TREE PROTECTION. ALL WETLAND AREAS SHALL BE PROTECTED BEFORE MAJOR CONSTRUCTION BEGINS.

6. INSTALL PERIMETER EROSION CONTROL.

7. INSTALL GRAVEL ACCESS ROAD, DIVERSION SWALE & ASSOCIATED CULVERT AS SHOWN ON EC-4

8. INSTALL DIVERSION BERM TO THE SOUTH AND STABILIZE AS SHOWN ON EC-4.

9. (A) INSTALL TEMPORARY SEDIMENT BASIN 1 AND ASSOCIATED UPSTREAM DIVERSION SWALE . UPON COMPLETION OF THE INSTALLATION AND STABILIZATION OF THE BASIN AND SWALE, UP GRADIENT WORK CAN PROCEED.

9. (B) INSTALL COMPOST FILER SOCK UP GRADIENT AS DEPICTED ON THE PLANS. ONCE INSTALLED,THE AREAS IDENTIFIED FOR REGRADING CAN COMMENCE.

10. UPON COMPLETION OF THE INSTALLATION OF EACH OF THE TEMPORARY SEDIMENT BASINS; REMOVE CUT WOOD AND STOCKPILE FOR FUTURE USE OR REMOVE OFF-SITE. REMOVE AND DISPOSE OF DEMOLITION DEBRIS OFF-SITE IN ACCORDANCE WITH APPLICABLE LAWS.

11. TEMPORARILY SEED DISTURBED AREAS NOT UNDER CONSTRUCTION FOR THIRTY (30) DAYS OR MORE.

12. INSTALL REMAINING ELECTRICAL CONDUIT.

13. INSTALL RACKING POSTS FOR GROUND MOUNTED SOLAR PANELS.

14. INSTALL GROUND MOUNTED SOLAR PANELS AND COMPLETE ELECTRICAL INSTALLATION.

15. AFTER SUBSTANTIAL COMPLETION OF THE INSTALLATION OF THE SOLAR PANELS, COMPLETE REMAINING SITE WORK, INCLUDING ANY REQUIRED LANDSCAPE SCREENING, AND STABILIZE ALL DISTURBED AREAS.

16. FINE GRADE, RAKE, SEED AND MULCH ALL REMAINING DISTURBED AREAS.

17. AFTER THE SITE IS STABILIZED AND WITH THE APPROVAL OF THE PERMITTEE AND CT DEEP AGENT, REMOVE PERIMETER EROSION AND SEDIMENTATION CONTROLS.

18. MONITOR THE SITE FOR TWO FULL GROWING SEASONS (APRIL-OCTOBER), THEN ISSUE NOTICE OF TERMINATION.

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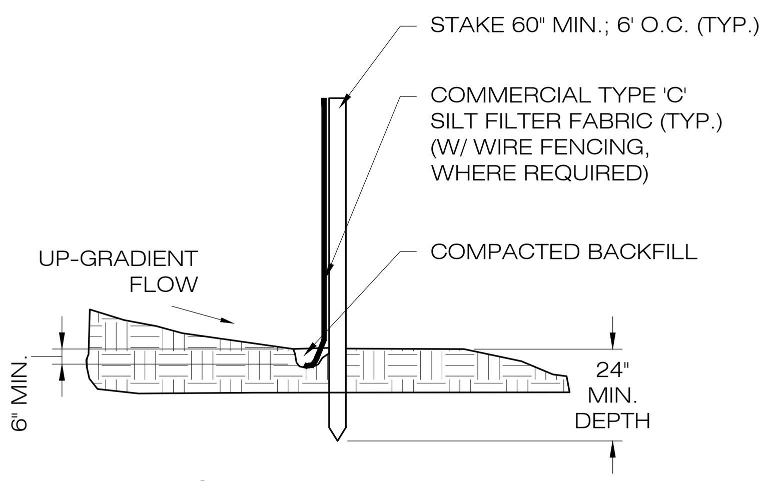
SEDIMENTATION & EROSION CONTROL NOTES

SHEET NUMBER:

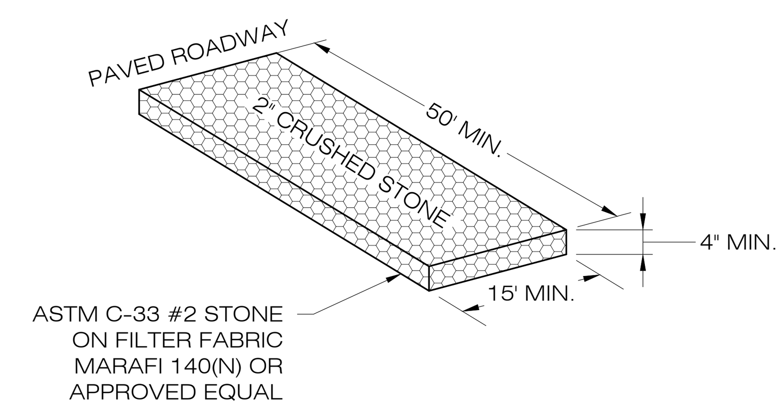
EC-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

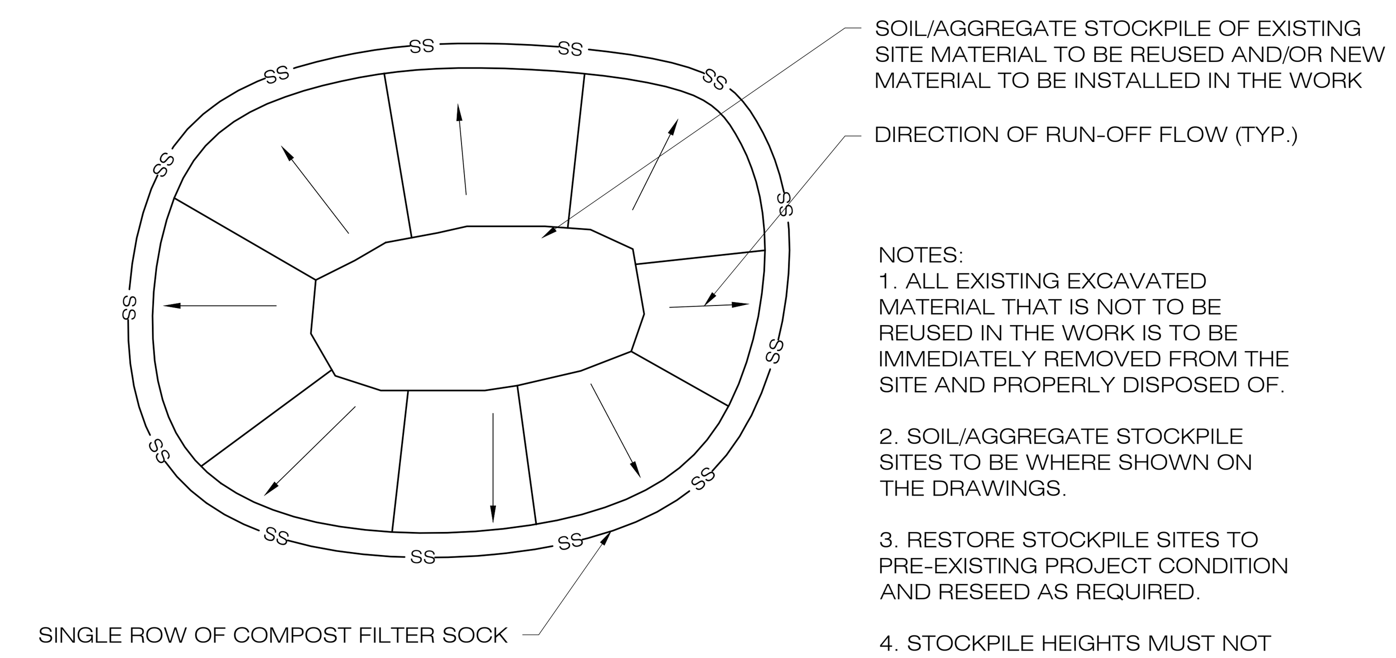


NOTE:
SILT FENCE SHALL BE LAPPED ONLY WHEN NECESSARY PER THE MANUFACTURER RECOMMENDATIONS.

1 SILT FENCE DETAIL
EC-2 SCALE : N.T.S.

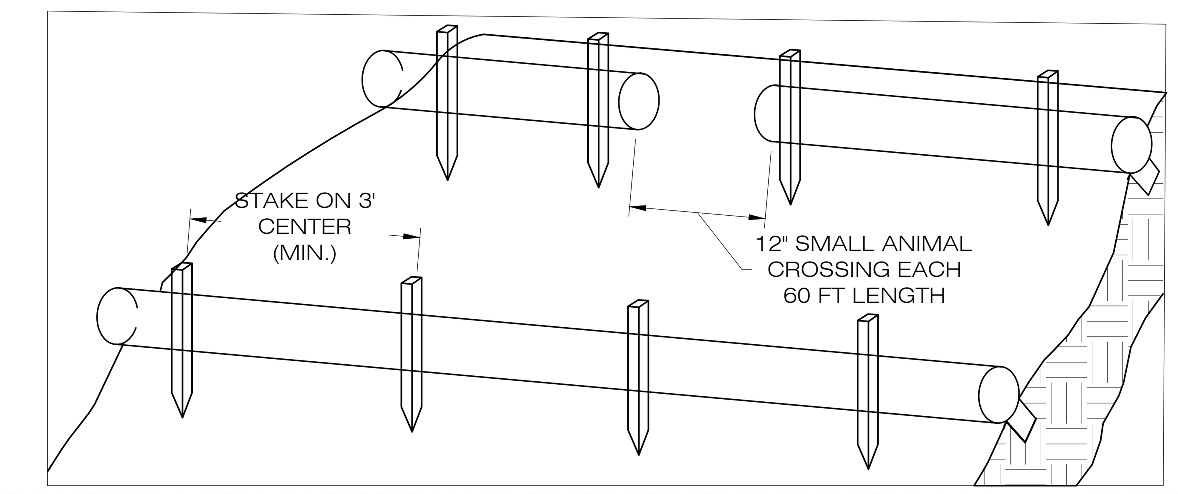


2 CONSTRUCTION ENTRANCE DETAIL
EC-2 SCALE : N.T.S.



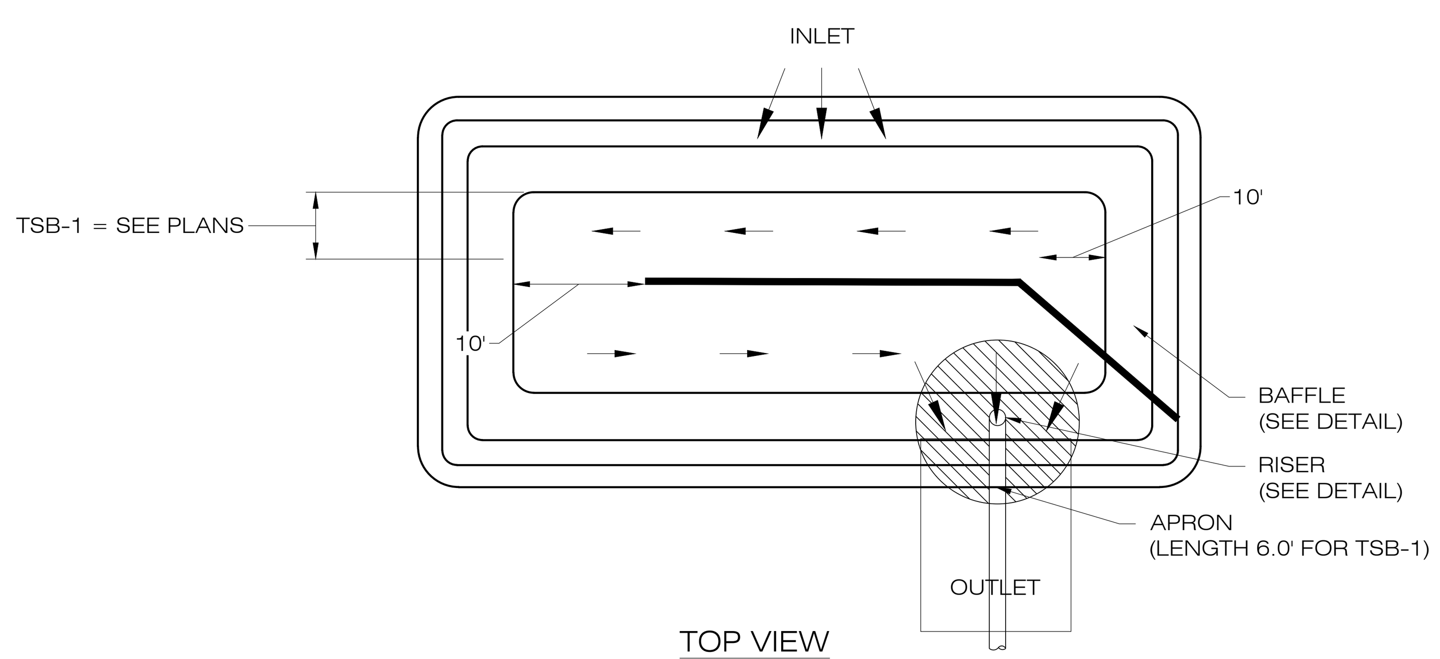
NOTES:
1. ALL EXISTING EXCAVATED MATERIAL THAT IS NOT TO BE REUSED IN THE WORK IS TO BE IMMEDIATELY REMOVED FROM THE SITE AND PROPERLY DISPOSED OF.
2. SOIL/AGGREGATE STOCKPILE SITES TO BE WHERE SHOWN ON THE DRAWINGS.
3. RESTORE STOCKPILE SITES TO PRE-EXISTING PROJECT CONDITION AND RESEED AS REQUIRED.
4. STOCKPILE HEIGHTS MUST NOT EXCEED 35'. STOCKPILE SLOPES MUST BE 2:1 OR FLATTER.

3 MATERIALS STOCKPILE DETAIL
EC-2 SCALE : N.T.S.

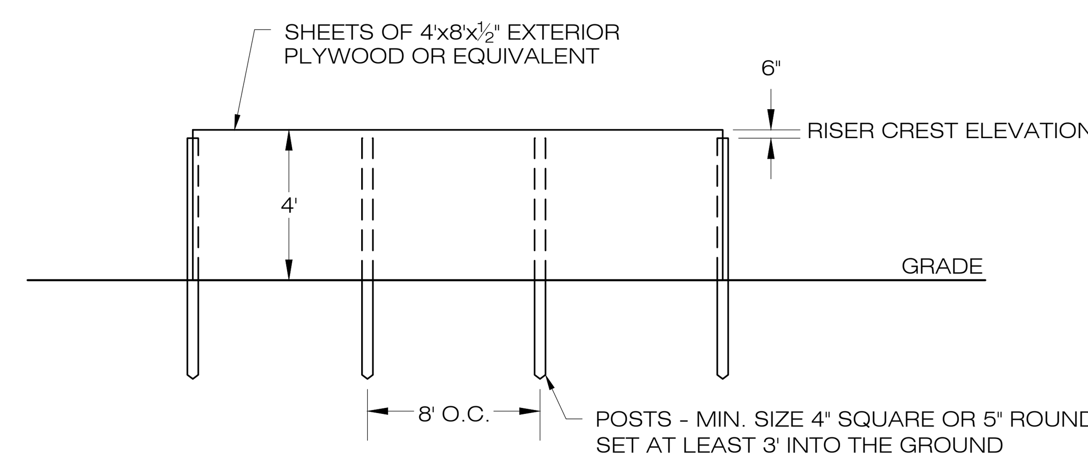


1. BEGIN AT THE LOCATION WHERE THE SOCK IS TO BE INSTALLED BY EXCAVATING A 2-3" (5-7.5 CM) DEEP X 9" (22.9 CM) WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UP SLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE SOCK IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL FROM THE EXCAVATED TRENCH AGAINST THE SOCK ON THE UPHILL SIDE. SOCKS SHALL BE INSTALLED IN 60 FT CONTINUOUS LENGTHS WITH ADJACENT SOCKS TIGHTLY ABUT. EVERY 60 FT THE SOCK ROW SHALL BE SPACED 12 INCHES CLEAR, END TO END, FOR AMPHIBIAN AND REPTILE TRAVEL. THE OPEN SPACES SHALL BE STAGGERED MID LENGTH OF THE NEXT DOWN GRADIENT SOCK.
3. SECURE THE SOCK WITH 18-24" (45.7-61 CM) STAKES EVERY 3-4' (0.9 -1.2 M) AND WITH A STAKE ON EACH END. STAKES SHOULD BE DRIVEN THROUGH THE MIDDLE OF THE SOCK LEAVING AT LEAST 2-3" (5-7.5 CM) OF STAKE EXTENDING ABOVE THE SOCK. STAKES SHOULD BE DRIVEN PERPENDICULAR TO THE SLOPE FACE.

4 COMPOST FILTER SOCK SEDIMENTATION CONTROL BARRIER
EC-2 SCALE : N.T.S.

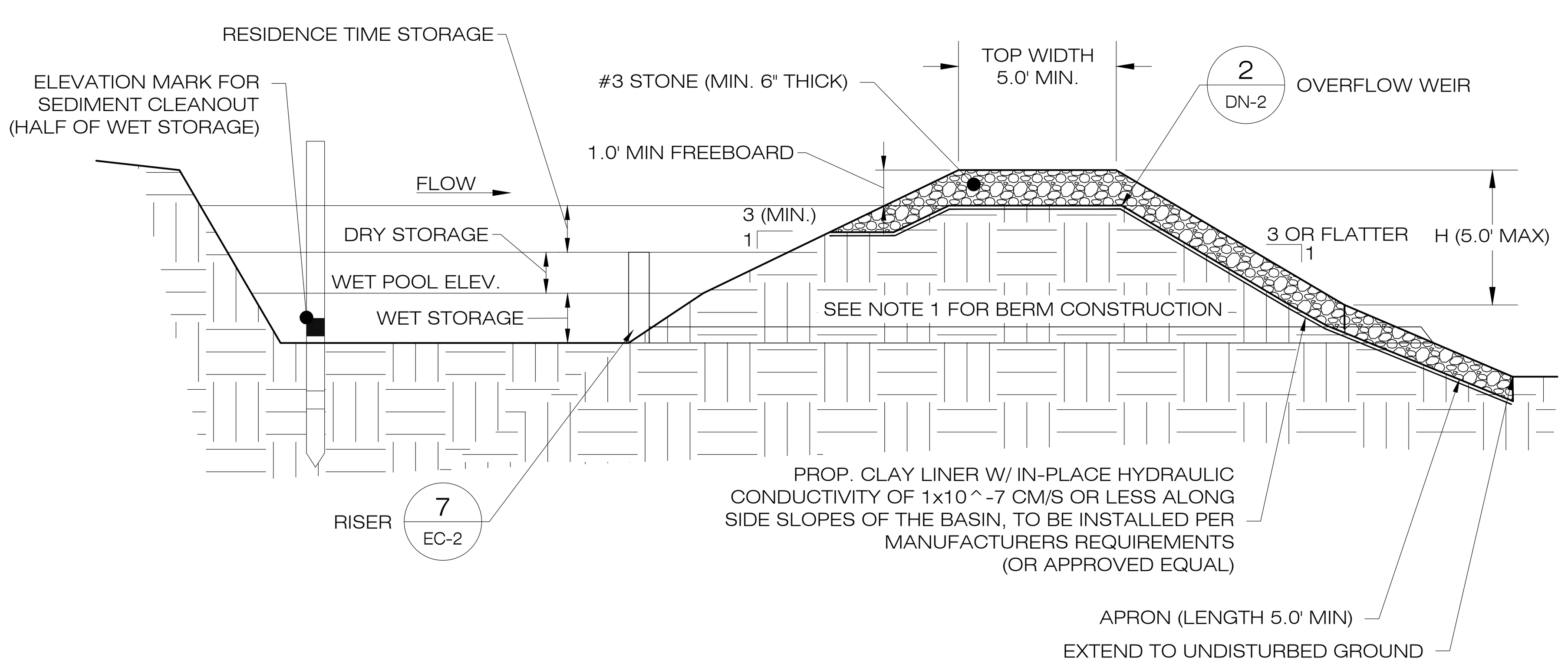


TOP VIEW

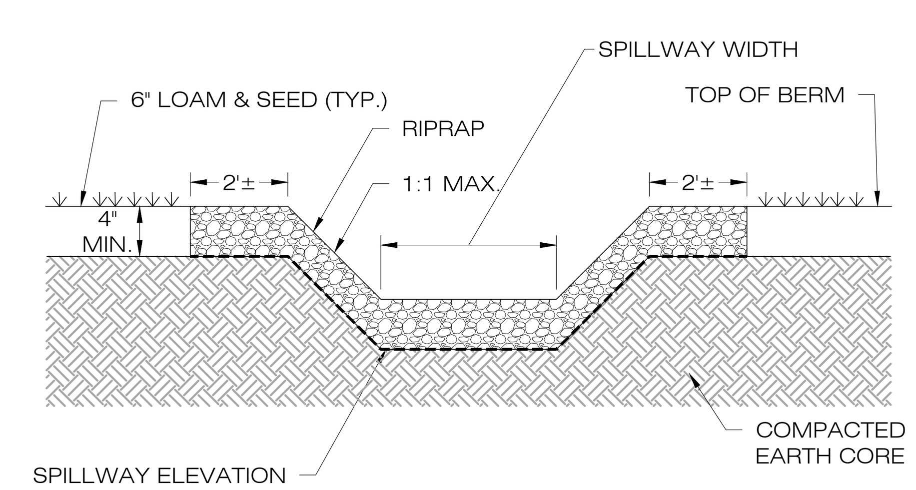


NOTES:
1. FILL ANY VOIDS BETWEEN THE BOTTOM OF THE BASIN AND BAFFLE.

6 SEDIMENT TRAP BAFFLE
EC-2 SCALE : N.T.S.



CROSS SECTION



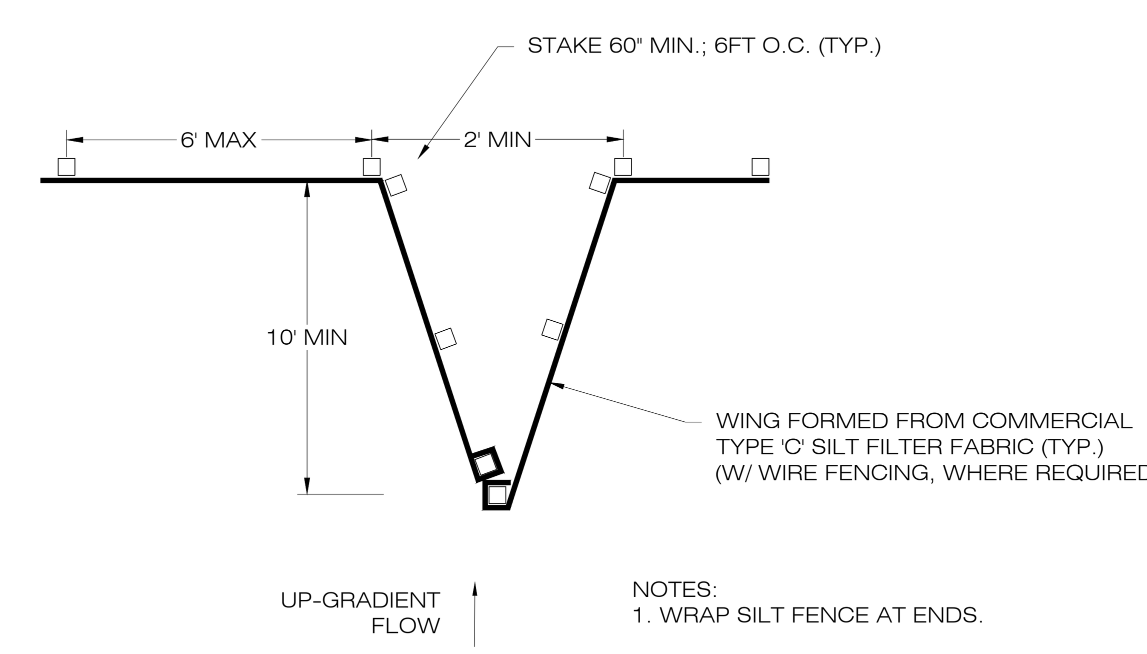
OUTLET ELEVATION

NOTES:
1. BERMS SHALL BE TEMPORARILY SEEDED AND STABILIZED WITH EROSION CONTROL PLAN.
2. SEDIMENT BAFFLES SHALL BE INSTALLED AS SHOWN ON EC-4.
3. SEE TEMPORARY SEDIMENT BASIN SIZING TABLE FOR WET AND DRY STORAGE VOLUMES.
4. ALL ORIFICES TO REMAIN PLUGGED UNTIL AFTER INFILTRATION BASIN CONVERSION.

TEMPORARY SEDIMENT BASIN SIZING TABLE

NAME	DRAINAGE AREA (AC)	SEDIMENT VOLUME/ACRE AREA (CY)	REQ. VOLUME (CY)	REQ. WET VOLUME (CY)	PROP. BTM. ELEV. (FT)	PROP. SPILLWAY CREST ELEV. (FT)	PROP. TOP ELEV. (FT)	WET VOL. PROVIDED (CY)	TOTAL VOL. PROVIDED. (CY)
TSB-1	8.91 AC	1,000 CYD	333.3 CY	666.7 CYD	242.5'	246.5'	247.5'	701.1 CY	1,479.6 CY

5 TEMPORARY SEDIMENT BASIN
EC-2 SCALE : N.T.S.



NOTES:
1. WRAP SILT FENCE AT ENDS.
2. NO JOINING FENCE SECTIONS SHALL BE INSTALLED WITHIN 30 FEET OF WING.

7 SILT FENCE WING DETAIL
EC-2 SCALE : N.T.S.

CTEC SOLAR
1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
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DESIGN PROFESSIONAL OF RECORD
PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385
OWNER: HELEN K. GALLIVAN
ADDRESS: 186 FOSTER STREET, SOUTH WINDSOR, CT

FOSTER SOLAR
SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT
APT FILING NUMBER: CT481620
DRAWN BY: TEL
DATE: 10/20/2023
CHECKED BY: SMC

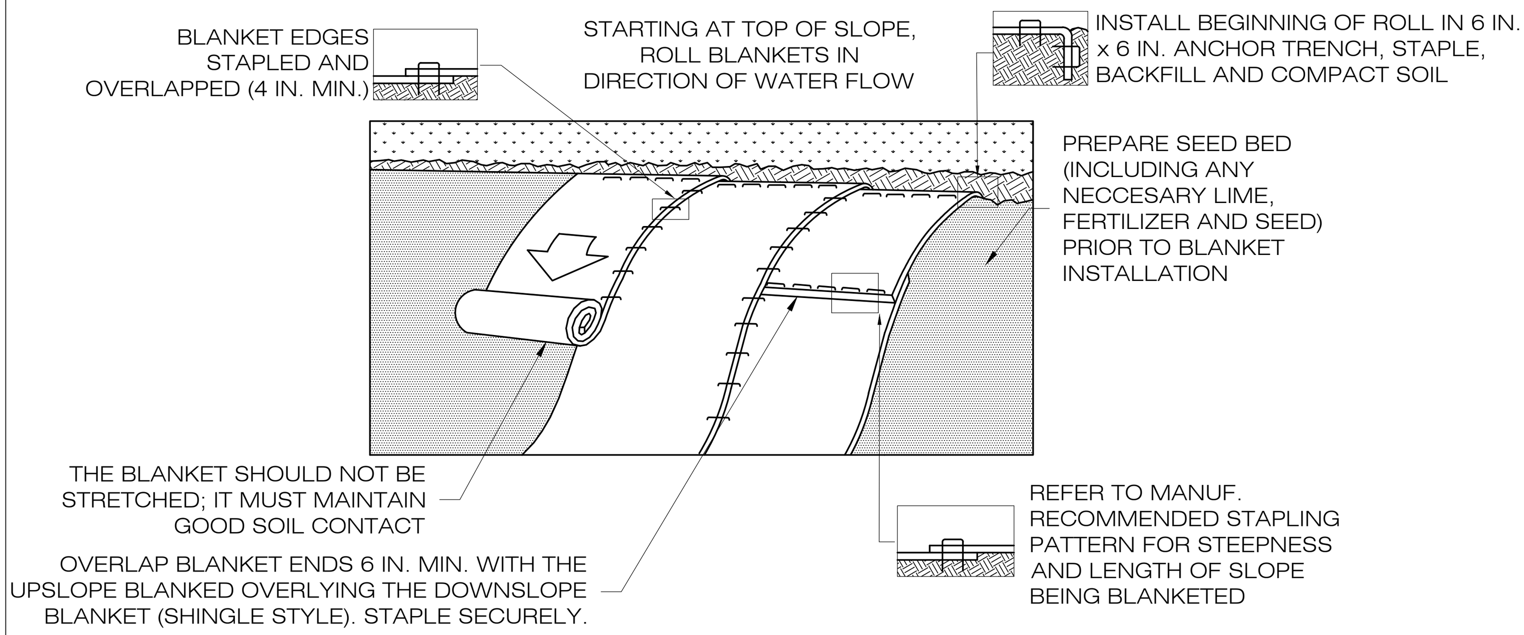
SHEET TITLE:
SEDIMENTATION & EROSION CONTROL DETAILS

SHEET NUMBER:
EC-2

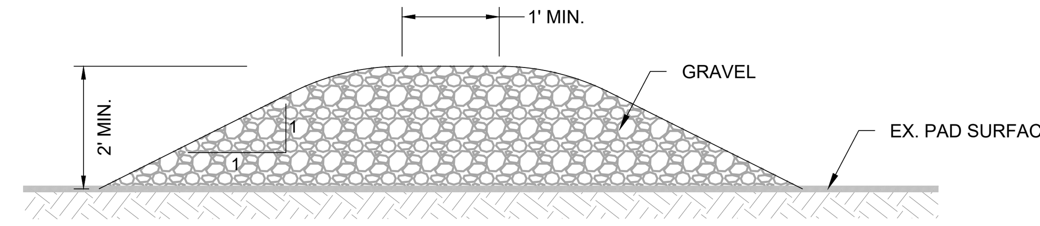
STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

EROSION CONTROL BLANKET INSTALLATION
1. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPS), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECPS IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF RECPS EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE RECPS WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO THE COMPACTED SOIL AND FOLD THE REMAINING 12" PORTION OF RECPS BACK OVER THE SEED AND COMPACTED SOIL. SECURE RECPS OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE RECPS.
3. ROLL THE RECPS DOWN HORIZONTALLY ACROSS THE SLOPE. RECPS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE.
4. THE EDGES OF PARALLEL RECPS MUST BE STAPLED WITH APPROXIMATELY 2" - 5" OVERLAP DEPENDING ON THE RECPS TYPE.
5. CONSECUTIVE RECPS SPLICED DOWN THE SLOPE MUST BE END OVER END (SHINGLE STYLE) WITH AN APPROXIMATE 3" OVERLAP. STAPLE THROUGH OVERLAPPED AREA, APPROXIMATELY 12" APART ACROSS ENTIRE RECPS WIDTH.

NOTES:
1. PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.
2. SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.
3. BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.
4. THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
5. BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.



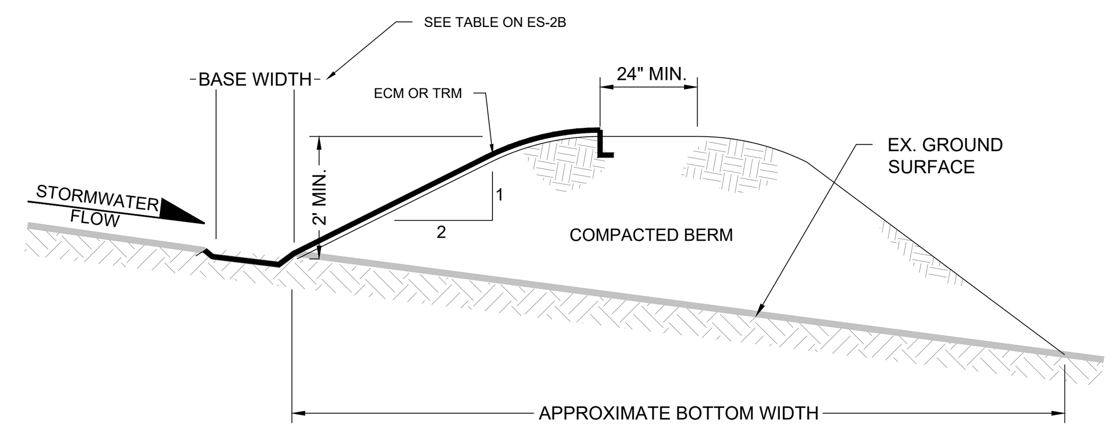
1 EC-3 **EROSION CONTROL BLANKET STEEP SLOPES**
SCALE : N.T.S.



NOTES:

1. BERM WILL BE CONSTRUCTED OF 2A GRAVEL.
2. BERM WILL BECOME A 4" HIGH SAFTEY BUMP IN AREAS WHERE TRAFFIC MAY ENTER/EXIT.

TOP OF SLOPE BERM DETAIL
N.T.S.



NOTES:

1. DIVERSION BERM WILL BE CONSTRUCTED OF COMPACTED SOIL AND STABILIZED WITH EROSION CONTROL MATTING OR TURF REINFORCEMENT MATTING.

2. A MINIMUM OF 4" OF TOPSOIL SHALL BE PLACED ON TOP OF COMPACTED GROUND.

3 EC-3 **DIVERSION BERM DETAIL**
SCALE : N.T.S.

CTEC SOLAR
1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
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DESIGN PROFESSIONAL OF RECORD

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COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: HELEN K. GALLIVAN

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FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

DRAWN BY: TEL

DATE: 10/20/2023 | CHECKED BY: SMC

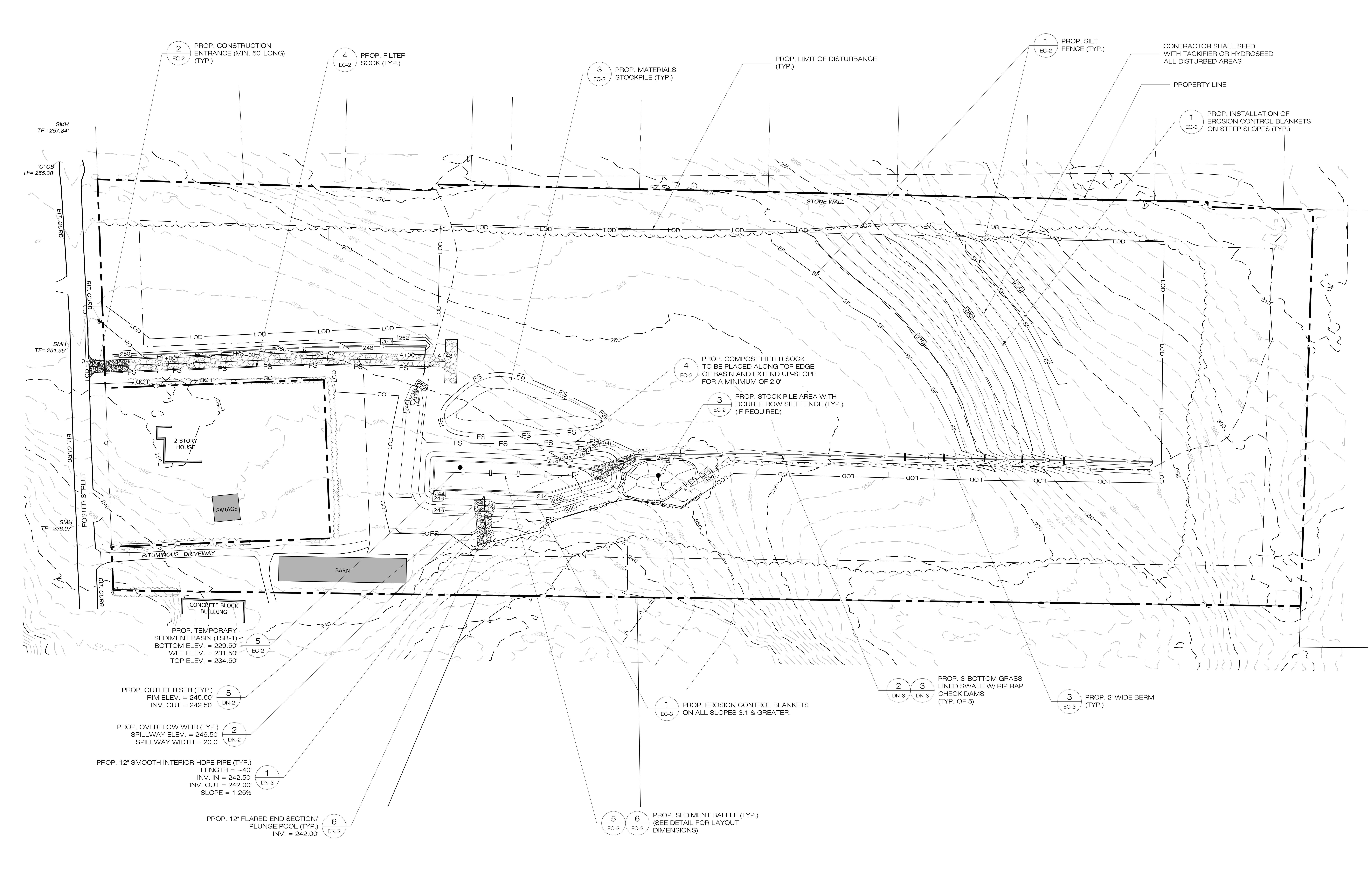
SHEET TITLE:

SEDIMENTATION & EROSION CONTROL DETAILS

SHEET NUMBER:

EC-3

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER



1 EC-3 SEDIMENTATION & EROSION CONTROL PLAN

SCALE : 1" = 60'-0"

(IN FEET) 1 inch = 60 ft.

CTEC SOLAR
1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

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567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
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CHECKED BY: SMC

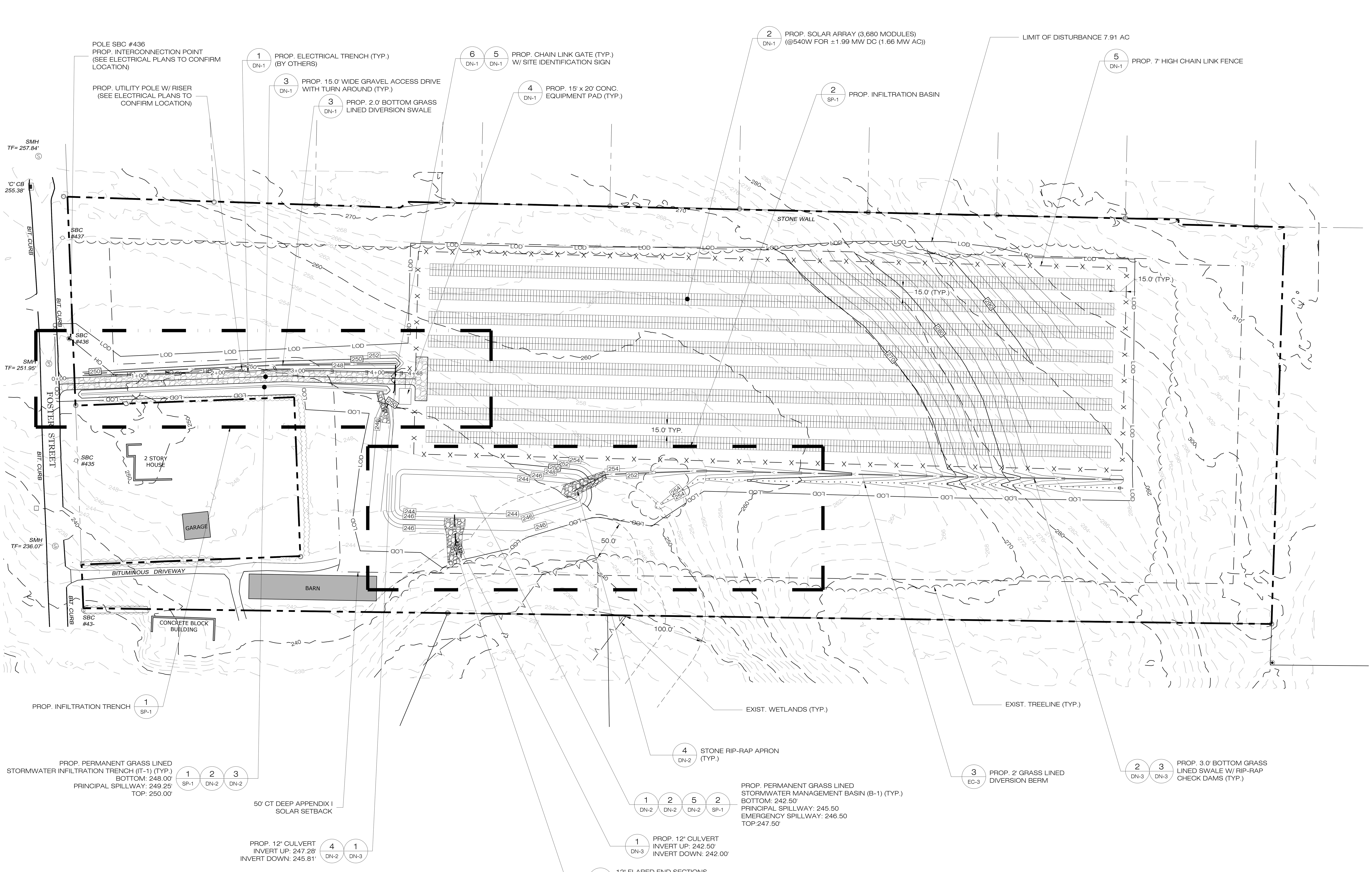
SHEET TITLE:

SEDIMENTATION & EROSION CONTROL PLAN

SHEET NUMBER:

EC-4

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER



NOTES:
1. GRADE/SHAPE AREA TO MAINTAIN EXIST. DRAINAGE PATTERNS.
2. CONTRACTOR SHALL REMOVE ALL BAFFLES AND CONVERT SEDIMENT BASINS TO INFILTRATION BASINS.
3. CONTRACTOR SHALL REPLACE TEMPORARY SEDIMENT BASIN OUTLET WITH GRAVEL OVERFLOW WEIR UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.
4. CONTRACTOR SHALL MODIFY/REPLACE THE TEMPORARY SEDIMENT BASIN RISER AS NEEDED UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.
5. CONTRACTOR SHALL INSTALL INFILTRATION SWALE ALONG ACCESS ROAD.

1 SP-1 **SITE GRADING & UTILITY PLAN**
SCALE : 1" = 60'-0"

60 0 30 60 120
(IN FEET) 1 inch = 60 ft.

CTEC SOLAR
1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
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FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

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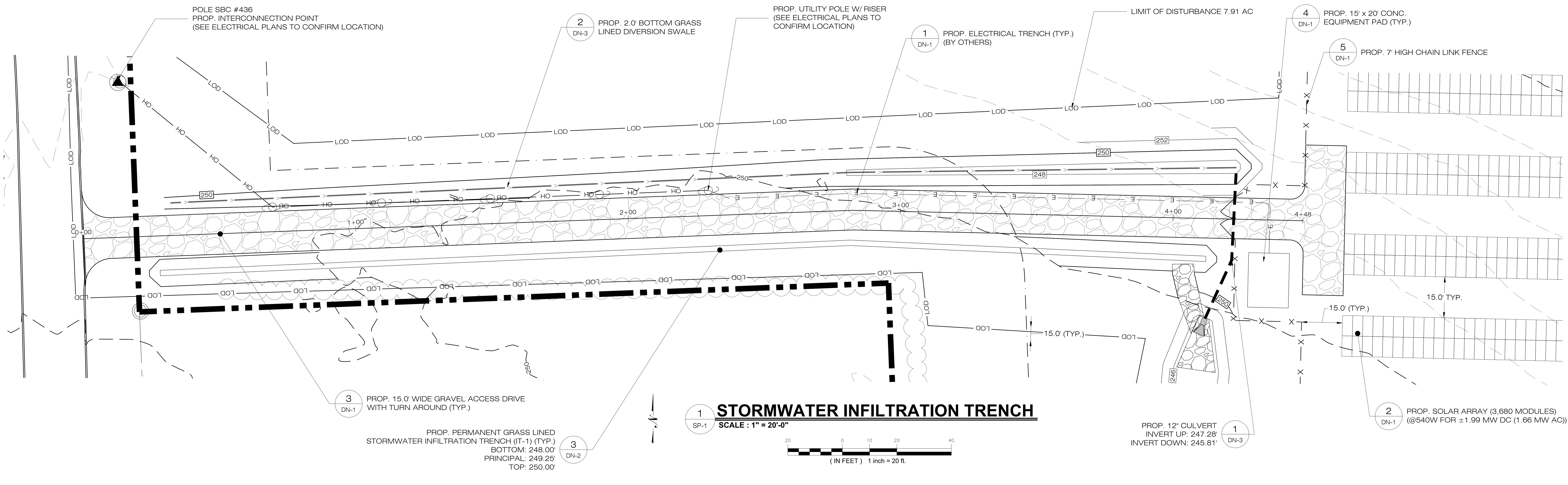
SHEET TITLE:

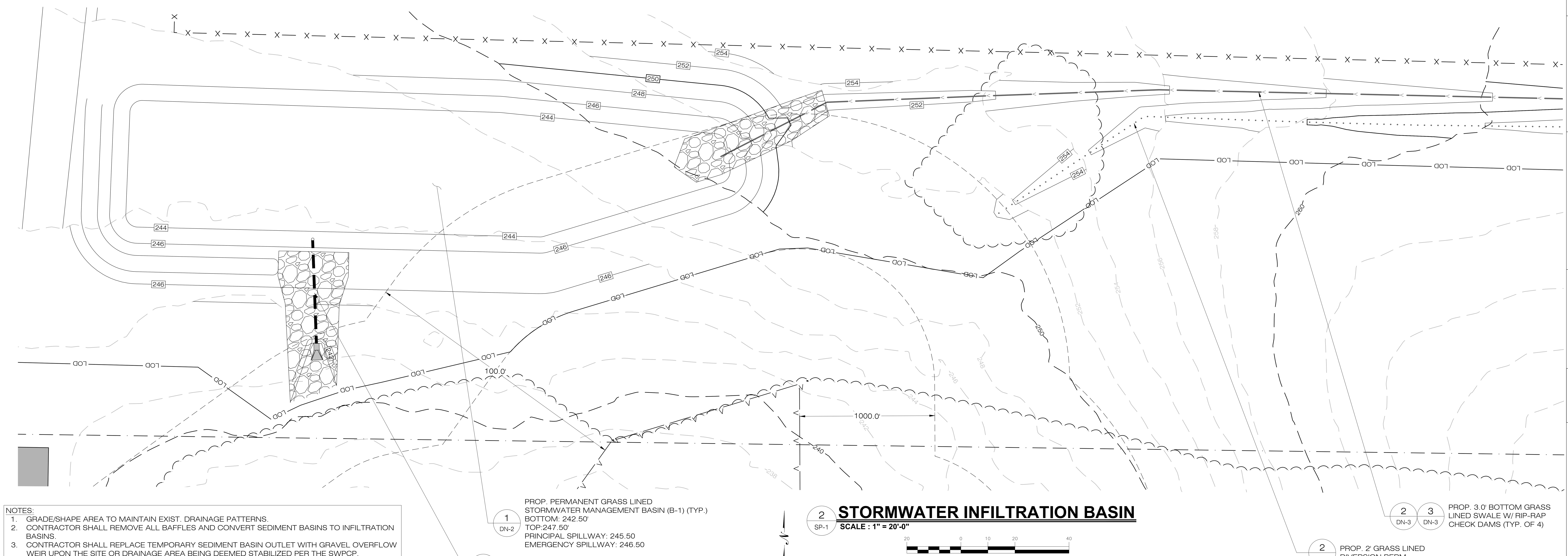
OVERALL SITE & UTILITY PLAN

SHEET NUMBER:

SP-0

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER





NOTES:
1. GRADE/SHAPE AREA TO MAINTAIN EXIST. DRAINAGE PATTERNS.
2. CONTRACTOR SHALL REMOVE ALL BAFFLES AND CONVERT SEDIMENT BASINS TO INFILTRATION BASINS.
3. CONTRACTOR SHALL REPLACE TEMPORARY SEDIMENT BASIN OUTLET WITH GRAVEL OVERFLOW WEIR UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.
4. CONTRACTOR SHALL MODIFY/REPLACE THE TEMPORARY SEDIMENT BASIN RISER AS NEEDED UPON THE SITE OR DRAINAGE AREA BEING DEEMED STABILIZED PER THE SWPCP.
5. CONTRACTOR SHALL INSTALL INFILTRATION SWALE ALONG ACCESS ROAD.

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FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

DRAWN BY: TEL
DATE: 10/20/2023
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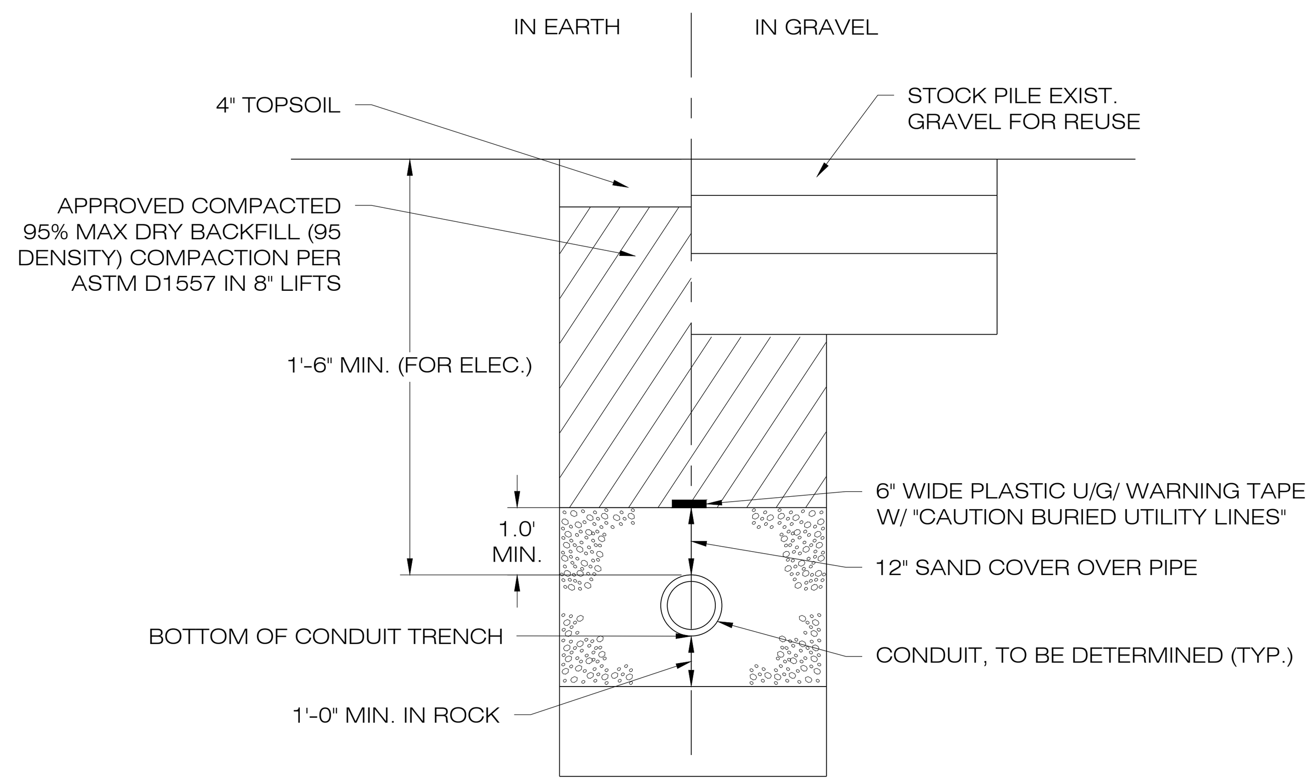
SHEET TITLE:
FINAL GRADING & DRAINAGE PLAN (SWM FEATURES)

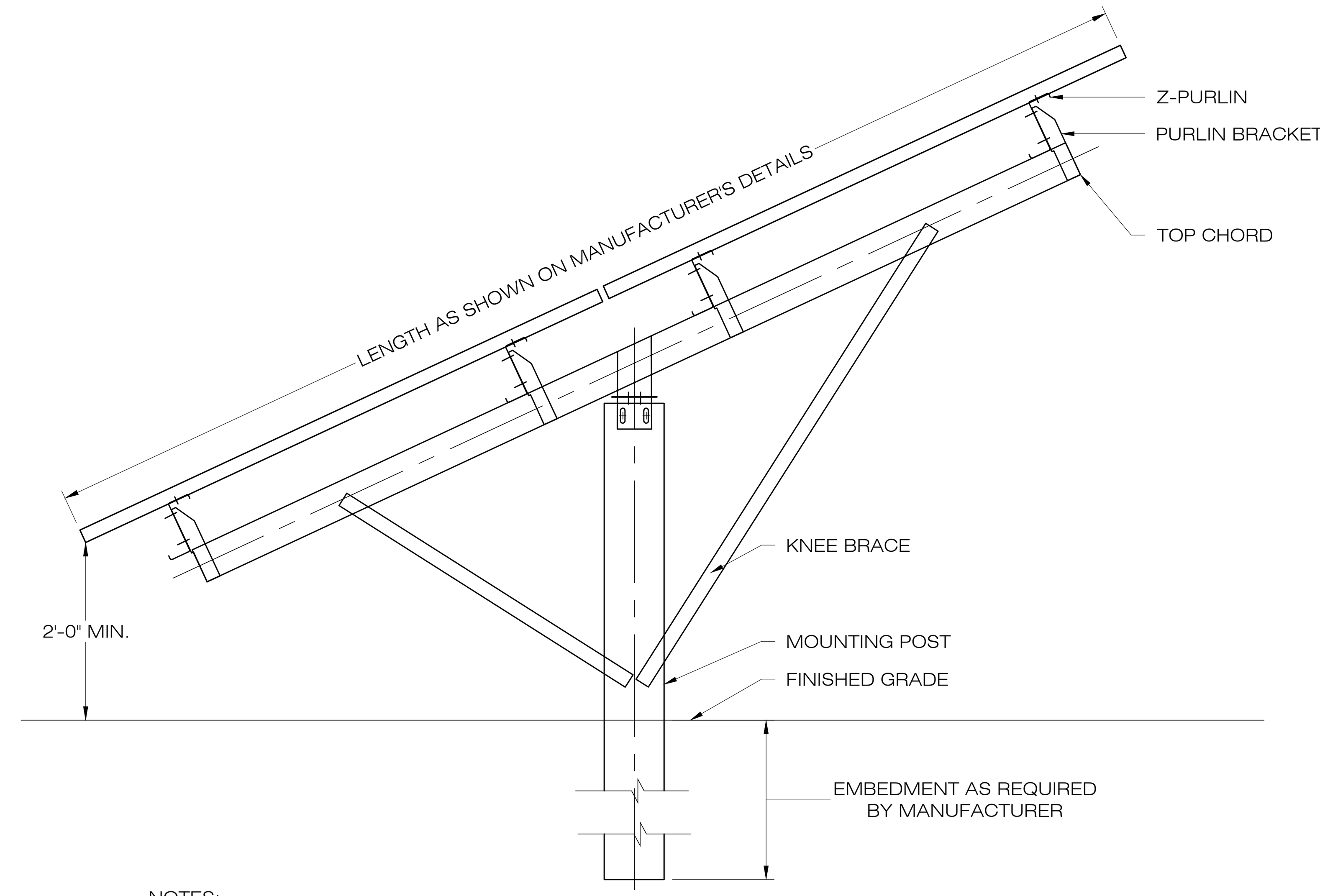
SHEET NUMBER:
SP-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER



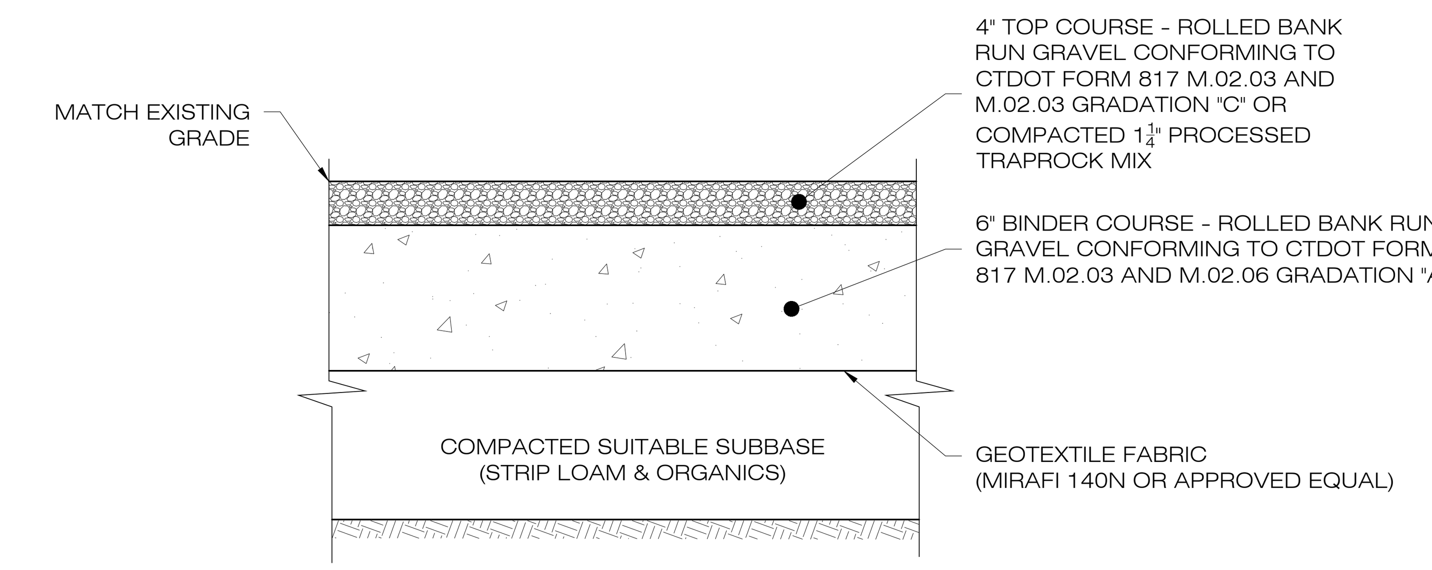
NOTES:
SEE ELECTRICAL DRAWINGS FOR ADDITIONAL DETAILS.

1 ELECTRICAL TRENCH DETAIL
DN-1 SCALE : N.T.S.



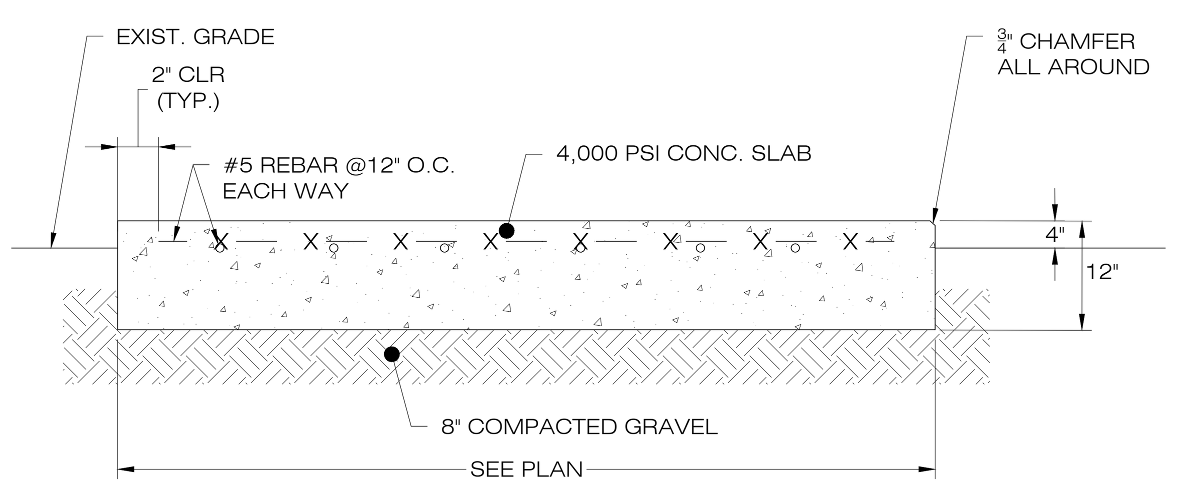
NOTES:
SEE MANUFACTURER'S DETAIL SHEETS FOR ADDITIONAL INFORMATION REGARDING RACKING SYSTEM REQUIREMENTS AND INSTALLATION PROCEDURES. RACKING SYSTEM TO BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS.

2 TYPICAL POST MOUNTED RACKING SYSTEM
DN-1 SCALE : N.T.S.



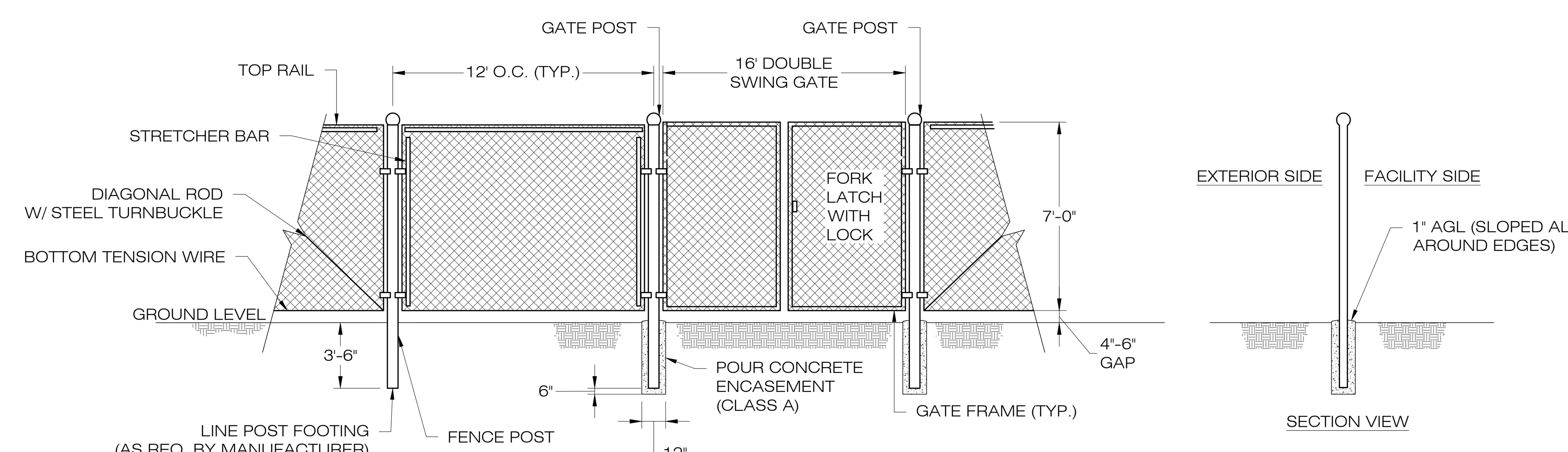
NOTES:
1. SUBBASE MAY CONSIST OF NATIVE MATERIALS IF FOUND ACCEPTABLE BY THE ENGINEER. SUBBASE TO BE COMPACTED TO 95% MAX DRY DENSITY.
2. SUBBASE IS TO BE FREE FROM DEBRIS AND UNSUITABLE MATERIALS.

3 GRAVEL ACCESS DRIVE SECTION
DN-1 SCALE : N.T.S.



NOTES:
SEE ELECTRICAL DRAWINGS FOR ADDITIONAL DETAILS.

4 CONCRETE EQUIPMENT PAD
DN-1 SCALE : N.T.S.



5 CHAIN-LINK FENCE & GATE DETAIL
DN-1 SCALE : N.T.S.

FOSTER SOLAR
FARM LLC

IN CASE OF EMERGENCY
CALL T.B.D.

NOTES:
EMERGENCY CALL NUMBER TO BE PROVIDED ONCE DETERMINED.

6 NOTIFICATION SIGN DETAIL
DN-1 SCALE : N.T.S.

ERNST SEEDS

Ernst Conservation Seeds
8884 Mercer Pike
Meadville, PA 16335
(800) 873-3321 Fax (814) 336-5191
www.ernstseed.com

Date: April 14, 2021

Fuzz & Buzz Mix - Premium - ERNMX-147

	Botanical Name	Common Name	Price/lb
24.20 %	*Lolium perenne, 'Crave', Tetraploid*	Perennial Ryegrass, 'Crave', Tetraploid	3.48
17.70 %	*Dactylis glomerata, 'Pennlate'*	Orchardgrass, 'Pennlate'	3.00
17.70 %	*Festuca elatior*	Meadow Fescue	4.80
17.70 %	*Poa pratensis, 'Ginger'*	Kentucky Bluegrass, 'Ginger' (pasture type)	3.36
5.40 %	*Trifolium hybridum*	Alsike Clover	3.90
4.90 %	*Trifolium incarnatum, Variety Not Stated*	Crimson Clover, Variety Not Stated	1.92
4.50 %	*Trifolium pratense, Medium, Variety Not Stated*	Red Clover, Medium, Variety Not Stated	3.00
2.00 %	*Lotus corniculatus, 'Leo'*	Bird's Foot Trefoil, 'Leo'	7.50
1.30 %	*Chrysanthemum leucanthemum*	Oxeye Daisy	33.60
1.30 %	*Cichorium intybus*	Blue Chicory	19.20
0.80 %	*Chamaecrista fasciculata, PA Ecotype*	Partridge Pea, PA Ecotype	7.20
0.40 %	*Aster oblongifolius, PA Ecotype*	Aromatic Aster, PA Ecotype	336.00
0.40 %	*Aster prenanthoides, PA Ecotype*	Zigzag Aster, PA Ecotype	432.00
0.40 %	*Coreopsis lanceolata*	Lanceleaf Coreopsis	28.80
0.40 %	*Tradescantia ohiensis, PA Ecotype*	Ohio Spiderwort, PA Ecotype	192.00
0.40 %	*Zizia aurea*	Golden Alexanders	288.00
0.30 %	*Solidago nemoralis, PA Ecotype*	Gray Goldenrod, PA Ecotype	336.00
0.10 %	*Asclepias syriaca*	Common Milkweed	163.20
0.10 %	*Penstemon hirsutus*	Hairy Beardtongue	480.00
100.00 %		**Mix Price/lb Bulk:**	**$10.91**

Seeding Rate: Expect to apply about 42 lbs per acre with a cover crop of annual ryegrass at 12 lbs/acre.

Forage & Pasture Sites; Solar Sites

7 FUZZ & BUZZ MIX
DN-1 SCALE : N.T.S.

CTEC SOLAR
1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
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DESIGN PROFESSIONAL OF RECORD

PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

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FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

DRAWN BY: TEL

DATE: 10/20/2023 CHECKED BY: SMC

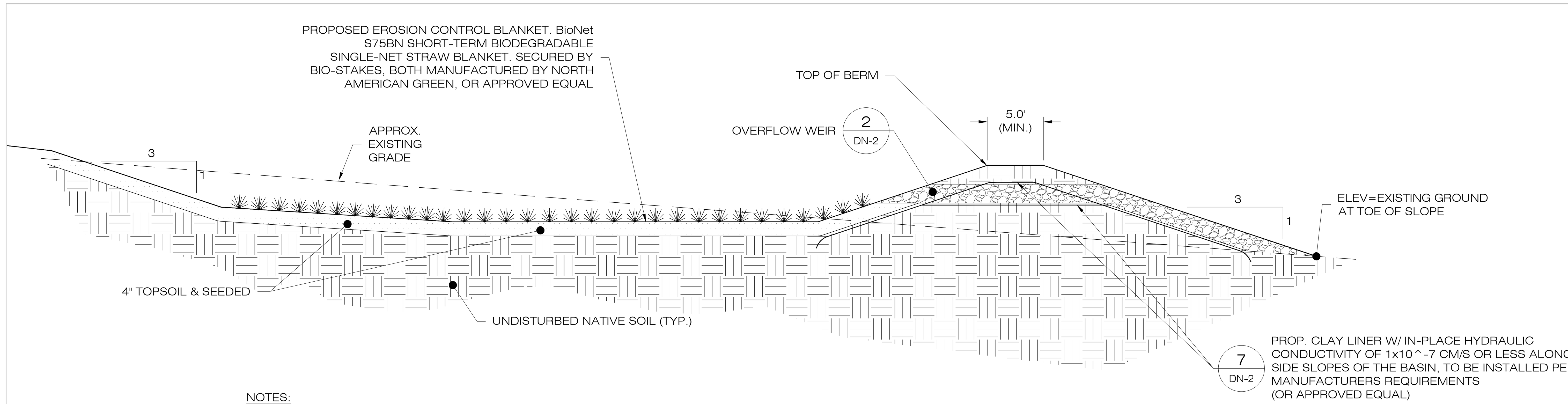
SHEET TITLE:

SITE DETAILS

SHEET NUMBER:

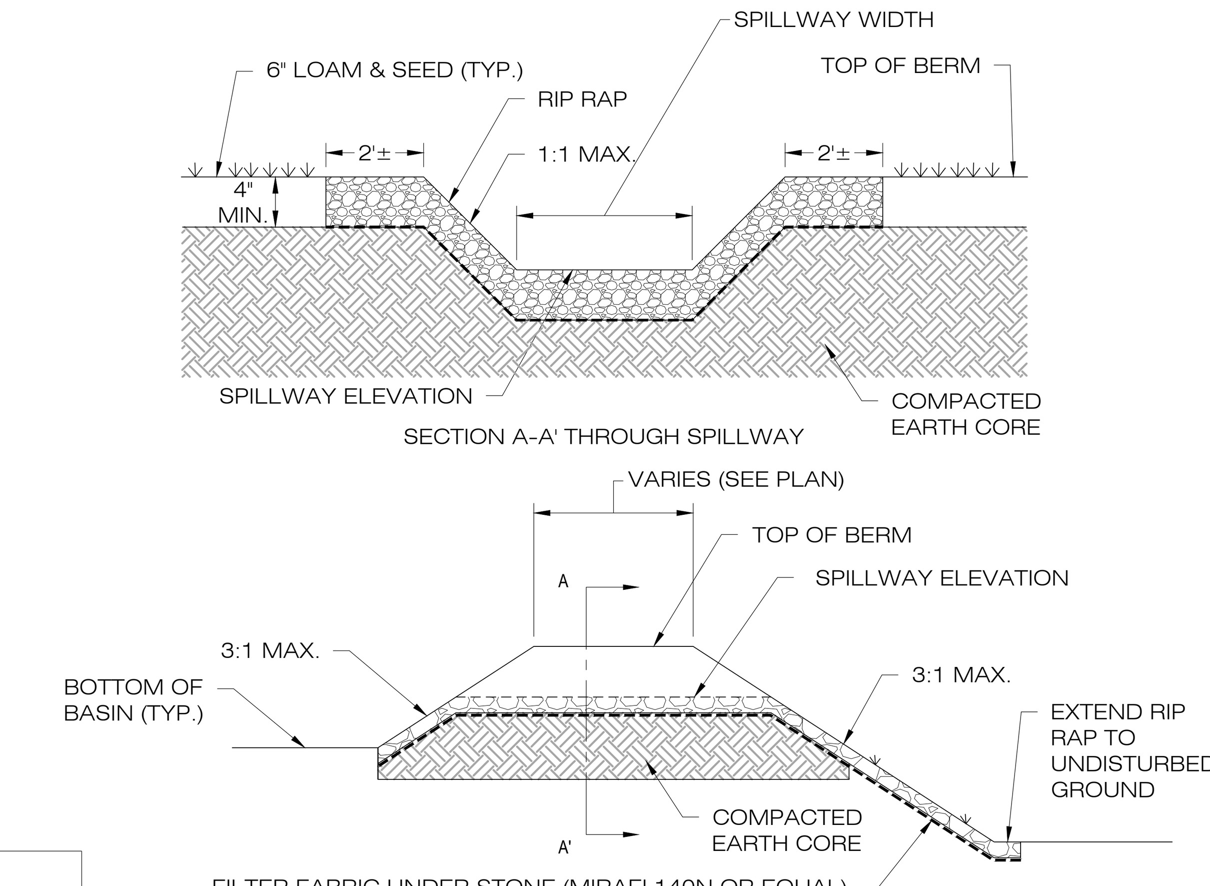
DN-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER



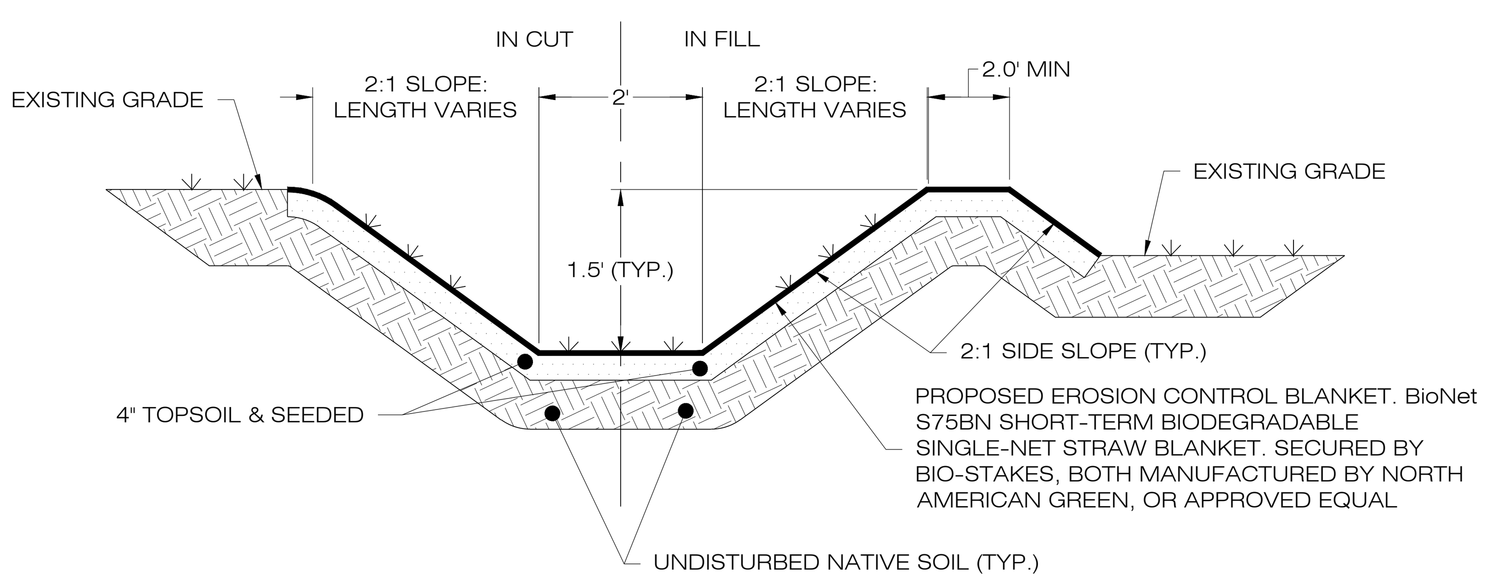
NOTES:
- SEED MIX TO BE NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR MOIST SITES ON THE BOTTOM OF THE BASIN AND NEW ENGLAND EROSION/RESTORATION MIX FOR DRY SITES ON THE SIDE SLOPES.
- FOR CONVERTING TEMPORARY SEDIMENT BASIN TO INFILTRATION BASIN, REMOVE BAFFLES, CLEAN OUT SEDIMENT, RESHAPE AS REQUIRED. SEE PLANS FOR BASIN DEPTHS AND ELEVATIONS.
- INSPECT AND CLEAN PIPES.

1 GRASS LINED INFILTRATION BASIN
DN-2 SCALE : N.T.S.



2 OVERFLOW WEIR DETAIL
DN-2 SCALE : N.T.S.

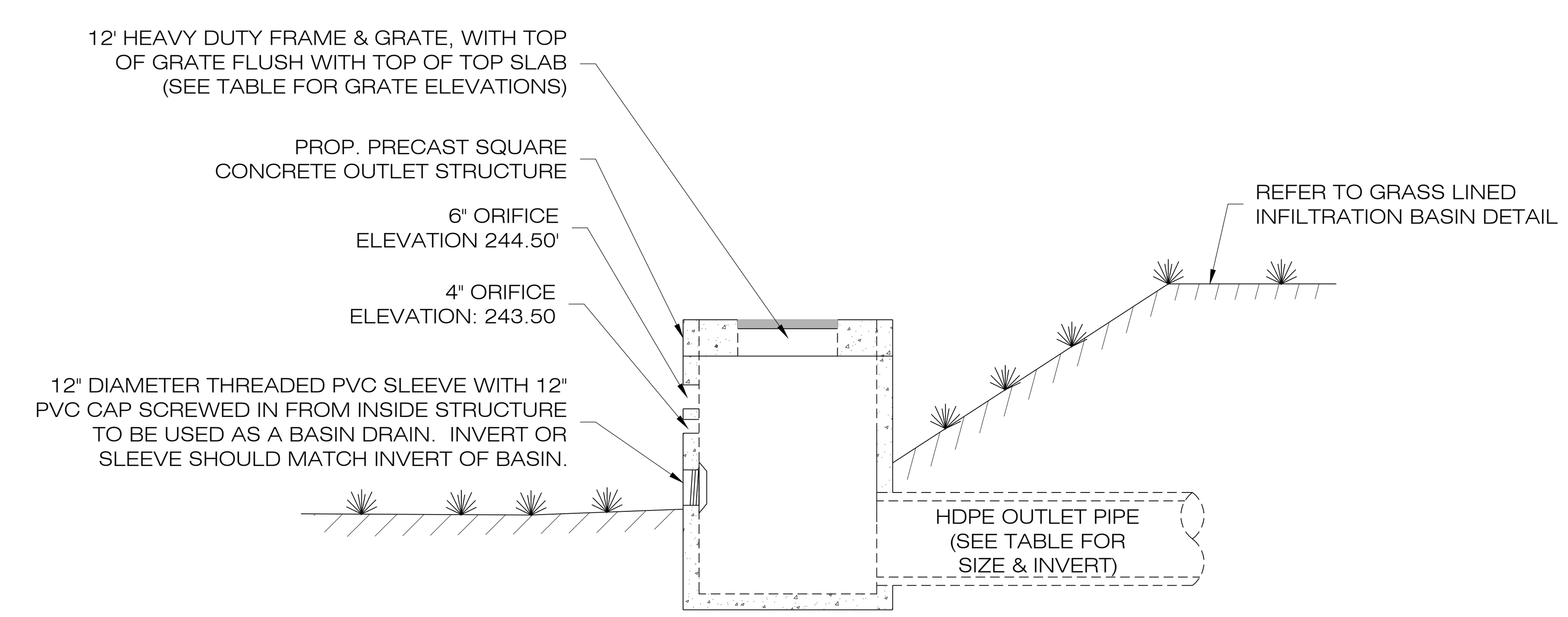
INFILTRATION BASIN & TRENCH TABLE								
BASIN	TOP OF BERM ELEV.	EMERGENCY SPILLWAY ELEVATION	EMERGENCY SPILLWAY WIDTH	BASIN BOTTOM ELEVATION	OUTFALL INV. ELEVATION	6" HDPE PIPE INV.	TOP OF RISER ELEVATION	RISER ORFICCE SIZE/ELEVATION (IN)
TSB-1/IB-1	247.50'	246.50'	20'	242.50'	242.00	242.0'	245.50	SEE DETAIL
IT-1	250.00'	249.25'	5'	248.00'	N/A	N/A	N/A	N/A



NOTES:
1. SEED MIX TO BE NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR MOIST SITES ON THE BOTTOM OF THE BASIN AND NEW ENGLAND EROSION/RESTORATION MIX FOR DRY SITES ON THE SIDE SLOPES.
2. SEE TABLE FOR ELEVATIONS.

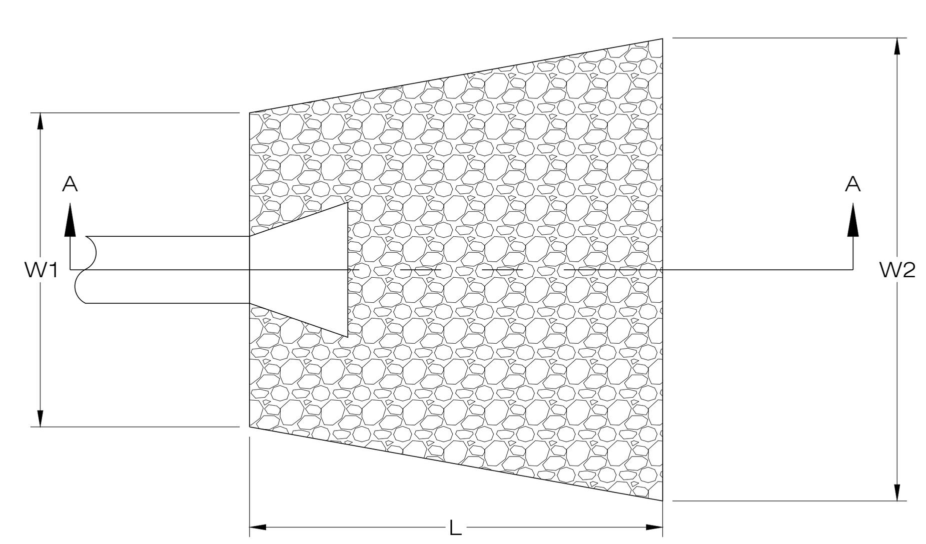
3 GRASS LINED INFILTRATION TRENCH
DN-2 SCALE : N.T.S.

HDPE OUTLET PIPE SIZING TABLE						
BASIN	GRATE ELEV. (FT)	OUTLET PIPE SIZE (IN.)	OUTLET PIPE LENGTH (FT)	OUTLET PIPE SLOPE (%)	OUTLET PIPE INV. ELEV. AT STRUCTURE (FT)	OUTLET PIPE INV. AT OUTFALL (FT)
TSB-1/IT-1	245.50	12"	40.0'	1.25%	242.50	242.0



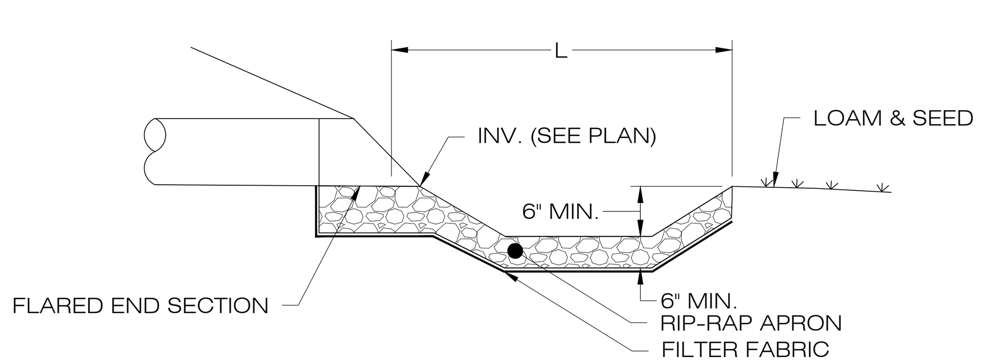
NOTES:
1. PLUG & COVER GRATE AND ORIFICES UNTIL SITE IS STABILIZED.
2. CONTRACTOR TO FIELD VERIFY ALL DIMENSIONS.

5 OUTLET CONTROL STRUCTURE
DN-2 SCALE : N.T.S.



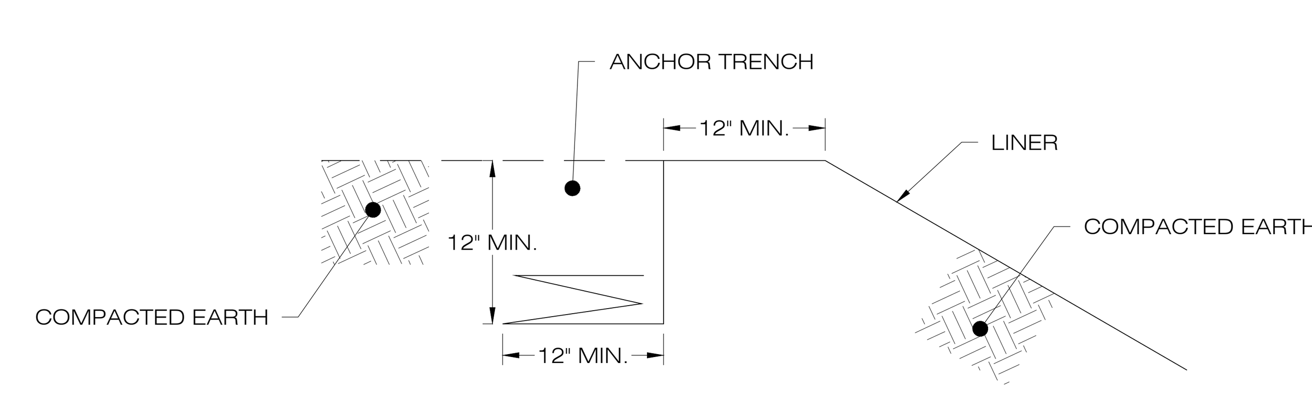
FLARED END SECTION SIZING			
BASIN	MIN. L (FT)	MIN. W1 (FT)	MIN W2 (FT)
TSB-1/IB-1	14.36	3.75	13.80
C-1	13.15	3.0	12.20

PLAN VIEW



SECTION A-A

4 FLARED END SECTION
DN-2 SCALE : N.T.S.



6 LINER ANCHOR DETAIL
DN-2 SCALE : N.T.S.

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BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET		
NO	DATE	REVISION
0		
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD
PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385
OWNER: HELEN K. GALLIVAN
ADDRESS: 186 FOSTER STREET, SOUTH WINDSOR, CT

FOSTER SOLAR
SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT
APT FILING NUMBER: CT481620
DRAWN BY: TEL
DATE: 10/20/2023
CHECKED BY: SMC

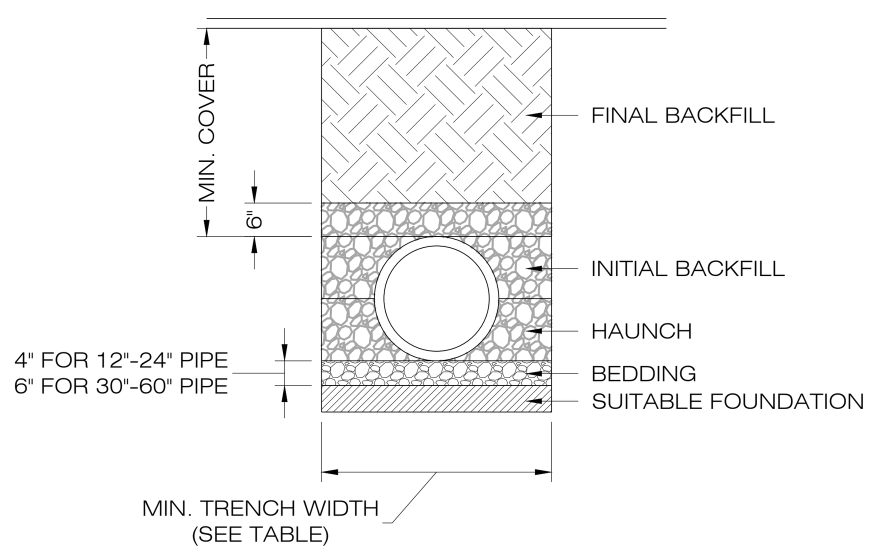
SHEET TITLE:
DRAINAGE DETAILS

SHEET NUMBER:
DN-2

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

SEEDING NOTES

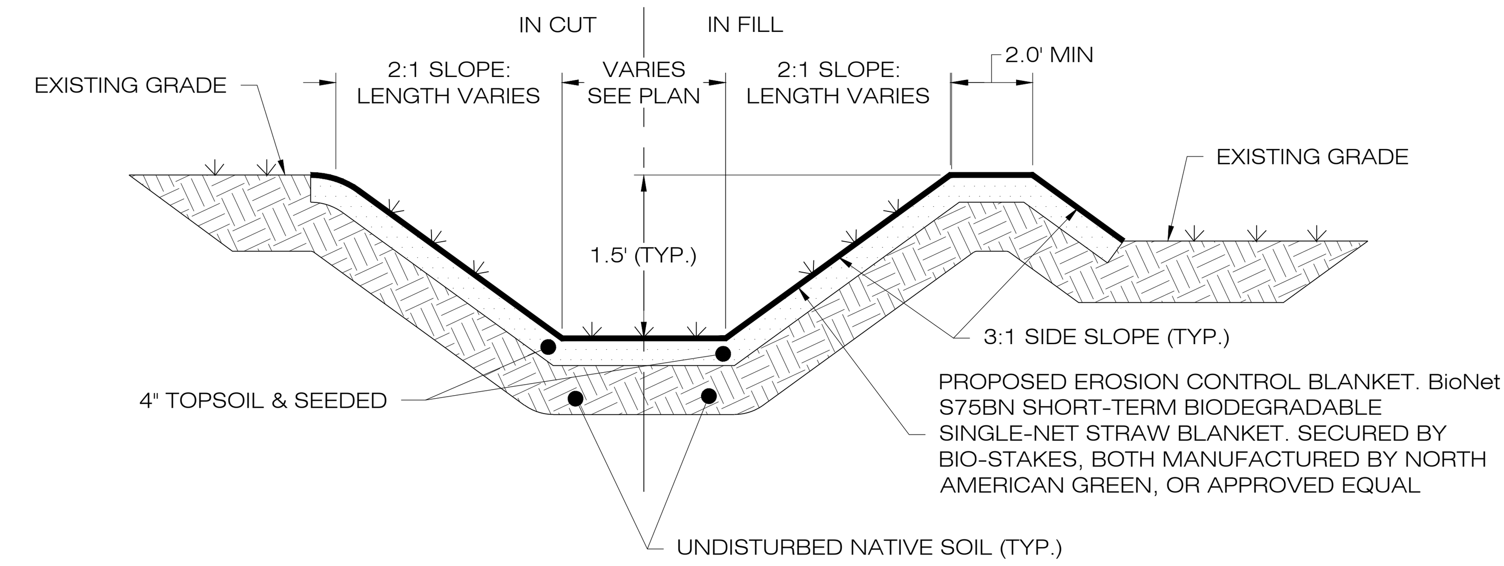
1. CONDUCT SOIL FERTILITY TESTING AND SHARE RESULTS WITH DESIGN TEAM TO CONFIRM THE FOLLOWING RECOMMENDATIONS.
2. THE NEED FOR ORGANIC MATTER SOIL AMENDMENT (E.G. COMPOST, COMPOSED LEAF LITTER, ETC.) WILL BE DEPENDENT IN PART ON SOIL FERTILITY TESTING RESULTS.
3. APPLY SLOW RELEASE OR ORGANIC FERTILIZER AND LIME AT RATES RECOMMENDED FROM SOIL FERTILITY TESTING RESULTS.
4. TILL COMPOST, FERTILIZER, AND LIME IN TO TOP 4-6 INCHES OF SOIL TO PREPARE SEED BED.
5. APPLY A HYDROSEED BLEND OF THE FOLLOWING MIXES AT THE VOLUME PERCENTAGES NOTED WITH A BONDED FIBER MATRIX MULCH TO THE AMENDED SOIL.



RECOMMENDED MIN. TRENCH WIDTH	
PIPE DIA.	MIN. TRENCH WIDTH
6"	23"
8"	26"
10"	28"
12"	30"
15"	34"
18"	39"
24"	48"
30"	56"
36"	64"
48"	80"
60"	96"

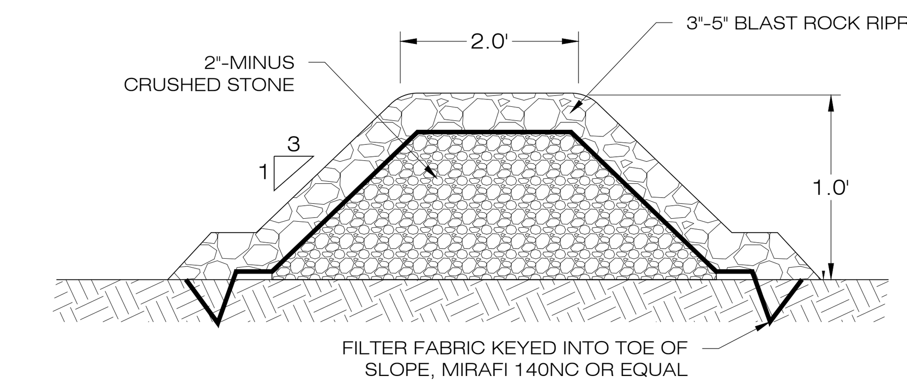
NOTES:
1. ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321 , "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST ADDITION.
2. MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
3. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
4. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
6. MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOTATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 12" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 54"-60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

1 DN-3 **HDPE STORM DRAINAGE TRENCH DETAIL**
SCALE : N.T.S.



NOTES:
1. SEED MIX TO BE NEW ENGLAND EROSION CONTROL/ RESTORATION MIX FOR MOIST SITES ON THE BOTTOM OF THE BASIN AND NEW ENGLAND EROSION/RESTORATION MIX FOR DRY SITES ON THE SIDE SLOPES.
2. IF DEPTH VARIES FROM 2.0', SEE PLAN CALLOUTS.

2 DN-3 **GRASS LINED SWALE**
SCALE : N.T.S.



NOTES:
1. STONE SHALL BE PLACED MECHANICALLY OR BY HAND. STONE SHALL NOT BE DUMPED DIRECTLY INTO SWALE.
2. SEE GRADING AND DRAINAGE PLAN.

3 DN-3 **STONE CHECK DAM**
SCALE : N.T.S.

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CSC PERMIT SET

NO	DATE	REVISION
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DESIGN PROFESSIONAL OF RECORD
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SHEET TITLE:
DRAINAGE DETAILS

SHEET NUMBER:
DN-3

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER

APPENDIX B

STORMWATER MANAGEMENT REPORT

STORMWATER MANAGEMENT REPORT

PROPOSED

FOSTER STREET

SOLAR PROJECT

186 FOSTER STREET
SOUTH WINDSOR, CONNECTICUT
HARTFORD COUNTY

Prepared for:

CTEC SOLAR, LLC
1 Griffin Road South
Suite 200
Bloomfield, CT 06002

Prepared by:

All-Points Technology Corporation, P.C.
567 Vauxhall Street Extension, Suite 311
Waterford, CT 06385

January 2024

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Tables

Appendices

Introduction

At the request of CTEC Solar, LLC, All-Points Technology Corporation, P.C. ("APT") has completed a hydrological analysis to assess potential stormwater effects from a proposed 1.99 MW direct current ("DC") (1.66 MW alternating current ("AC")) solar electric generating facility herein referred to as Foster Street Solar (the "Project") in South Windsor, Connecticut located at 186 Foster Street, in South Windsor, Connecticut (the "Site").

The purpose of this report is to provide an analysis of the potential stormwater drainage impacts associated with the Project, as well as a description of the design to mitigate such potential stormwater drainage impacts. The design is intended to be in full compliance with the CT Stormwater Quality Manual dated September 30, 2023 and while taking prevailing site conditions and practical factors into account. In addition, this report will also describe how the proposed Project adheres to the Connecticut Department of Energy & Environmental Projection ("CT DEEP") Appendix I for Stormwater Management at Solar Array Construction Projects.

Existing Site Conditions

The Site is a privately-owned irregular shaped parcel located at 186 Foster Street in South Windsor, Connecticut, that consists of approximately 16.47 acres of land. The property is owned by Helen K. Gallivan, and consists of a combination of Prime Farmland Soils, Statewide Important Farmland Soils and wooded areas near the exterior of the property. The property also contains a wood barn structure to the south.

The Northeast portion of the site is currently used as a hay field while the central portion of the site is used for farming milkweed and other low-lying plants and/or crops, and will be the location for the proposed solar arrays. The terrain has gradual slopes with the highest elevations in the northeast corner project area (~El. 307'), decreasing in elevation to the west, south, and east (~El. 241'). The Site's existing topography generally slopes from the northeast to the south by southwest. Within the specific Project area, the topography includes slopes that range from approximately 0 to 25 percent.

One unconnected wetland area is located in the southwestern portion of the property.

Developed Site Conditions

The Project will be constructed in the eastern-central portion of the Site, north of the delineated wetlands, to the west of the eastern tree line and south of the northern tree line. Access to the Site will be provided via a proposed, approximately 465' gravel access road off of Foster Street. The Project includes the installation of 3,680 solar panels (Heliene, 144HC M10 Bifacial 540W modules) and associated fencing, access road, utility and stormwater management features, within 7.87± acres of the Site. Almost the entire acreage within the Project's limits of disturbance is in existing brush/fields and will require minimal clearing.

The proposed solar panels will be installed on a post driven ground mounted racking system, with minimal changes to the existing grade other than the areas identified, where the slopes are greater than 15 percent. Areas of clearing and grubbing and any existing ground cover that is disturbed during construction will be reseeded with a low growth seed mix. To address the State's water quality requirements, grass-lined stormwater management swales are proposed along the southern side of the proposed Project area, closest to the array.

Stormwater Management

Analysis Methodology

The hydrologic analysis was performed using the HydroCAD stormwater modeling system computer program developed by HydroCAD Software Solutions, LLC.

Hydrographs for each watershed were developed using the SCS Synthetic Unit Hydrograph Method with a Type III rainfall distribution. Hydrographs were developed for the NOAA Atlas 14, Volume 10, Version 3 Precipitation 2-, 25-, 50-, and 100-year storm event with rainfall depths of 3.12, 6.05, 6.88, and 7.79 inches respectively.

The existing and proposed drainage areas used in the calculations are illustrated on the Existing and Proposed Drainage Area Plans (EDA-1 & PDA-1). These maps and the corresponding HydroCAD output are attached.

Utilizing Appendix I, Stormwater Management at Solar Array Construction Projects, , this hydrologic analysis reflects a reduction of the Hydrologic Soil Group ("HSG") present on-site by one (1) step (e.g., soils of HSG B shall be considered HSG C) where grading exceeds a two (2) foot difference between existing and proposed grades. For the remainder of the entire site, the runoff curve number associates with the Hydrologic Soil Group present on-site shall increase by one half (1/2) the difference between the Hydrologic Soil Group present on-site and the next higher Hydrologic Soil Group (e.g. half the difference between the runoff curve number for HSG B versus HSG C). This reduction, as indicated by CT DEEP, is intended to account for the compaction of soils that results from extensive machinery traffic during construction of the array. The Water Quality Volume ("WQV") for the site will be calculated assuming that the roadways, gravel surfaces, and equipment pads are effective impervious cover. See Appendix E.

Existing Drainage Patterns

The proposed Project area generally drains from the northeast corner of the site to the south and west. The wetland is receiving water with some drainage leaving the southeast portion of the project area as overland flow.

The Site was modeled at two (2) Analysis Points ("AP-1" and "AP-2"). AP-1 is tributary to the southern wetland (#1 flags). AP-2 discharges to the adjacent property south of the proposed gravel access road but ultimately discharges towards the wetland and AP-1. Peak discharges have been computed at the points of study for the 2-, 25-, 50-, and 100-year storm events.

Soils within the proposed project area as identified by the United States Department of Agriculture (USDA) Natural Resources Conservation Service consist of:

Map Unit #12—Raypol silt loam, 0 to 3 percent slopes [HSG B/D]

Map Unit #37C—Manchester gravelly sandy loam, 3 to 15 percent slopes [HSG A]
Map Unit #37E—Manchester gravelly sandy loam, 15 to 45 percent slopes [HSG A]
Map Unit #53A—Wapping very fine sandy loam, 0 to 3 percent slopes [HSG B/D]
Map Unit #63B—Cheshire fine sandy loam, 3 to 8 percent slopes [HSG B]
Map Unit #64B—Cheshire fine sandy loam, 3 to 8 percent slopes, very stony [HSG B]
Map Unit #66B—Narragansett silt loam, 2 to 8 percent slopes [HSG B]
Map Unit #66C—Narragansett silt loam, 8 to 15 percent slopes [HSG]
Map Unit #702A—Tisbury silt loam, 0 to 3 percent slopes [HSG B/D]
Map Unit #704B—Enfield silt loam, 3 to 8 percent slopes [HSG B]

Soil types with a dual rated hydrologic soil group (i.e. B/D) were modeled in their undrained condition. Time of concentration roughness coefficients and land use areas were based on existing ground cover, as assessed by site visits and review of aerial photography. Curve Numbers and Time of Concentration values for the existing conditions scenario are summarized on Sheet EDA-1. The predicted peak discharge rates at each Analysis Point are presented in Table 1, along with the site total.

Table 1

Analysis Point	**Existing Conditions Flows (cfs)**			
	2-year	**25-year**	**50-year**	**100-year**
AP-1	1.54	14.64	19.60	25.39
AP-2	1.14	4.32	5.32	6.44
Site	2.68	18.96	24.92	31.83

Proposed Drainage Patterns

The array area will not require clearing and grubbing since the project area is unforested. A few trees will need to be removed within the northern area of the Project area. The existing root structure and vegetation in the eastern side of the site outside the areas of the proposed regrading are dominated by hay fields and will be preserved to the extent practical. The western area comprised of row crops will be graded to a uniform slope and seeded with temporary seed mix for stabilization during construction. The entire area will be seeded with a low growing forbs and grass mix following installation of the necessary utilities, access road, and stormwater management features. Overall, hydrologically, the post-developed condition is designed to mimic the pre-developed condition.

No increase in post-development runoff is predicted by the initial modeling calculations, which account for a change in ground cover type, the addition of effective impervious cover, and a reduction of HSG for non-D soil areas. To account for State water quality requirements, one (1) stormwater infiltration basin along the southwestern side of the project area and an infiltration trench south of the access road are proposed in order to provide sufficient treatment volumes These are included in the final hydrologic model routing with the appropriate retention volumes.

It is assumed that these areas will infiltrate following storm events and not impound water (i.e., they will be empty at the beginning of a storm event).

Since the proposed development mimics the existing conditions, the post-development condition was modeled using the same Analysis Points. Peak discharges have been computed at the point of study for the 2-year, 25-year, 50-year, and 100-year storm events. The post-development discharges at each point of study are tabulated in Table 2, along with the site total and change compared to the existing conditions scenario.

Table 2

Analysis Point	**Post-developed Peak Storm Runoff (Q), cubic feet per second (cfs)**			
	2-year	**25-year**	**50-year**	**100-year**
AP-1	1.39	7.69	11.69	18.34
AP-2	0.01	0.07	0.10	0.27

Table 3

Analysis Point	**Peak Storm Runoff (Q) Comparison Pre- and Post-, cubic feet per second (cfs)**			
	2-year	**25-year**	**50-year**	**100-year**
AP-1	-0.15	-6.95	-7.91	-7.05
AP-2	-1.13	-4.25	-5.22	-6.17

Conclusion

The stormwater management for the proposed site has been designed such that the post-development peak discharges to the waters of the State of Connecticut for the 2-, 25-, 50-, and 100- year storm events are less than the pre-development peak discharges. As a result, the proposed solar array is not anticipated to result in adverse conditions to the surrounding areas and properties.

APPENDIX A: NRCS SOIL SURVEY

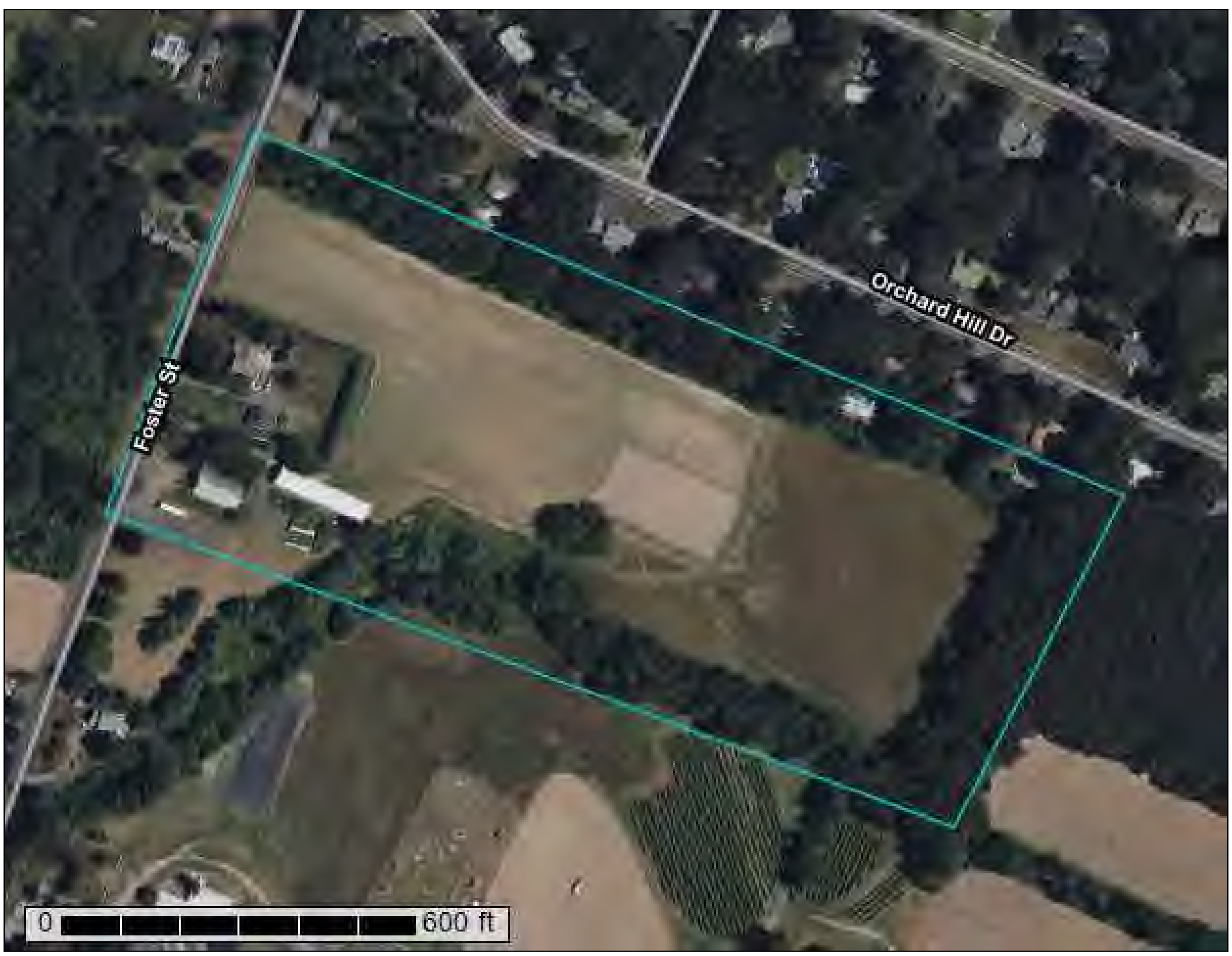
United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
State of Connecticut, Western Part

186 Foster St, South Windsor CT



November 1, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map (186 Foster St, South Windsor CT)

Map Scale: 1:3,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

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, Western Part
Survey Area Data: Version 1, Sep 15, 2023

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 (186 Foster St, South Windsor CT)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	1.9	8.2%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	2.9	12.1%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	1.9	8.1%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	0.8	3.4%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	2.4	9.9%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	0.6	2.4%
66B	Narragansett silt loam, 2 to 8 percent slopes	3.6	15.3%
66C	Narragansett silt loam, 8 to 15 percent slopes	2.9	12.4%
702A	Tisbury silt loam, 0 to 3 percent slopes	1.6	6.8%
704B	Enfield silt loam, 3 to 8 percent slopes	5.1	21.4%
Totals for Area of Interest		**23.7**	**100.0%**

Map Unit Descriptions (186 Foster St, South Windsor CT)

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, Western Part

12—Raypol silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9ljx
Elevation: 0 to 1,350 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: Farmland of statewide importance

Map Unit Composition

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

Description of Raypol

Setting

Landform: Drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
Bg1 - 8 to 12 inches: very fine sandy loam
Bg2 - 12 to 20 inches: silt loam
Bw1 - 20 to 26 inches: silt loam
Bw2 - 26 to 29 inches: very fine sandy loam
2C1 - 29 to 52 inches: stratified very gravelly coarse sand to loamy fine sand
2C2 - 52 to 65 inches: stratified very gravelly coarse sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 28 to 32 inches to abrupt textural change
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 1.42 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Ecological site: F144AY028MA - Wet Outwash
Hydric soil rating: Yes

Minor Components

Raynham

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F145XY004CT - Wet Lake Plain
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY031MA - Very Wet Outwash
Hydric soil rating: Yes

Tisbury

Percent of map unit: 5 percent
Landform: Outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Enfield

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F145XY009CT - Well Drained Outwash
Hydric soil rating: No

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: Eskers, kames, outwash plains, terraces
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

Penwood

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

Hartford

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

Branford

Percent of map unit: 3 percent
Landform: Outwash plains, terraces
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: No

Ellington

Percent of map unit: 3 percent
Landform: Outwash plains, terraces
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

37E—Manchester gravelly sandy loam, 15 to 45 percent slopes

Map Unit Setting

National map unit symbol: 9ln7
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

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: Eskers, kames, outwash plains, terraces
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: 15 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: High

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): 7e
Hydrologic Soil Group: A
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Hartford

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

Branford

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

Penwood

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

Walpole

Percent of map unit: 3 percent
Landform: Depressions on terraces, drainageways on terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scitico

Percent of map unit: 2 percent
Landform: Depressions, drainageways, terraces
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

53A—Wapping very fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9lp6
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: All areas are prime farmland

Map Unit Composition

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

Description of Wapping

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 11 inches: very fine sandy loam
Bw1 - 11 to 16 inches: very fine sandy loam
Bw2 - 16 to 20 inches: very fine sandy loam
2C1 - 20 to 28 inches: gravelly sandy loam
2C2 - 28 to 36 inches: gravelly loamy sand
2C3 - 36 to 80 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 16 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F144AY008CT - Moist Till Uplands
Hydric soil rating: No

Minor Components

Narragansett

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

Leicester

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

Wilbraham

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Menlo

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Ludlow

Percent of map unit: 2 percent
Landform: Drumlins, hills
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Watchaug

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

63B—Cheshire fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lpw
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: All areas are 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: Hills, till plains
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
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): 2e
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: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Yalesville

Percent of map unit: 3 percent
Landform: Hills, ridges
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Watchaug

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

Wethersfield

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

Unnamed, brown subsoil

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

Menlo

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Unnamed, less sloping

Percent of map unit: 2 percent
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: Farmland of statewide importance

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: Hills, till plains
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

Wethersfield

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

Yalesville

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

Wilbraham

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Watchaug

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

Menlo

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

66B—Narragansett silt loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9lq3
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: All areas are prime farmland

Map Unit Composition

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

Description of Narragansett

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 15 inches: silt loam
Bw2 - 15 to 24 inches: silt loam
Bw3 - 24 to 28 inches: gravelly silt loam
2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 8 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 1.98 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: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Charlton

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

Broadbrook

Percent of map unit: 5 percent
Landform: Drumlins, hills, till plains
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Leicester

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Canton

Percent of map unit: 2 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Unnamed, red parent material

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

Wapping

Percent of map unit: 2 percent
Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sutton

Percent of map unit: 1 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

66C—Narragansett silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9lq4
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

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

Description of Narragansett

Setting

Landform: Hills, till plains
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly melt-out till derived from gneiss and/or schist and/or sandstone and shale

Typical profile

Ap - 0 to 6 inches: silt loam
Bw1 - 6 to 15 inches: silt loam
Bw2 - 15 to 24 inches: silt loam
Bw3 - 24 to 28 inches: gravelly silt loam
2C - 28 to 60 inches: very gravelly loamy coarse sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 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: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Broadbrook

Percent of map unit: 5 percent
Landform: Drumlins, hills, till plains
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: No

Canton

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

Wapping

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

Charlton

Percent of map unit: 3 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Leicester

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, extremely stony

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

702A—Tisbury silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2y07g
Elevation: 0 to 1,260 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: All areas are prime farmland

Map Unit Composition

Tisbury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tisbury

Setting

Landform: Valley trains, outwash plains, deltas, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite, schist, and/or gneiss

Typical profile

Ap - 0 to 8 inches: silt loam
Bw1 - 8 to 18 inches: silt loam
Bw2 - 18 to 26 inches: silt loam
2C - 26 to 65 inches: extremely gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 24 to 36 inches to strongly contrasting textural stratification
Drainage class: Moderately well drained
Runoff class: Very 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: About 16 to 30 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): 2e
Hydrologic Soil Group: B/D
Ecological site: F144AY026CT - Moist Silty Outwash
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Landform: Kames, eskers, moraines, outwash terraces, outwash plains
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, crest, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Agawam

Percent of map unit: 5 percent
Landform: Kames, moraines, outwash terraces, outwash plains, kame terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope, crest, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Ninigret

Percent of map unit: 3 percent
Landform: Outwash terraces, kames, moraines, outwash plains, kame terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope, tread
Down-slope shape: Linear, convex
Across-slope shape: Concave, convex
Hydric soil rating: No

Raypol

Percent of map unit: 2 percent
Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

704B—Enfield silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2y07q
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: All areas are prime farmland

Map Unit Composition

Enfield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Enfield

Setting

Landform: Outwash terraces, outwash plains
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-silty eolian deposits over sandy and gravelly glaciofluvial deposits derived from granite, schist, and/or gneiss

Typical profile

Ap - 0 to 7 inches: silt loam
Bw1 - 7 to 15 inches: silt loam
Bw2 - 15 to 25 inches: silt loam
2C - 25 to 60 inches: stratified very gravelly coarse sand to loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 16 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 high to high (0.57 to 1.98 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: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F145XY009CT - Well Drained Outwash
Hydric soil rating: No

Minor Components

Haven

Percent of map unit: 5 percent
Landform: Outwash plains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Tisbury

Percent of map unit: 5 percent
Landform: Outwash plains, deltas, valley trains, outwash terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Agawam

Percent of map unit: 3 percent
Landform: Kames, moraines, outwash terraces, outwash plains, kame terraces
Landform position (two-dimensional): Backslope, shoulder, footslope, summit, toeslope
Landform position (three-dimensional): Side slope, crest, head slope, nose slope, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Raypol

Percent of map unit: 2 percent

Landform: Depressions, drainageways
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Saturated Hydraulic Conductivity (Ksat) (186 Foster St, South Windsor CT)

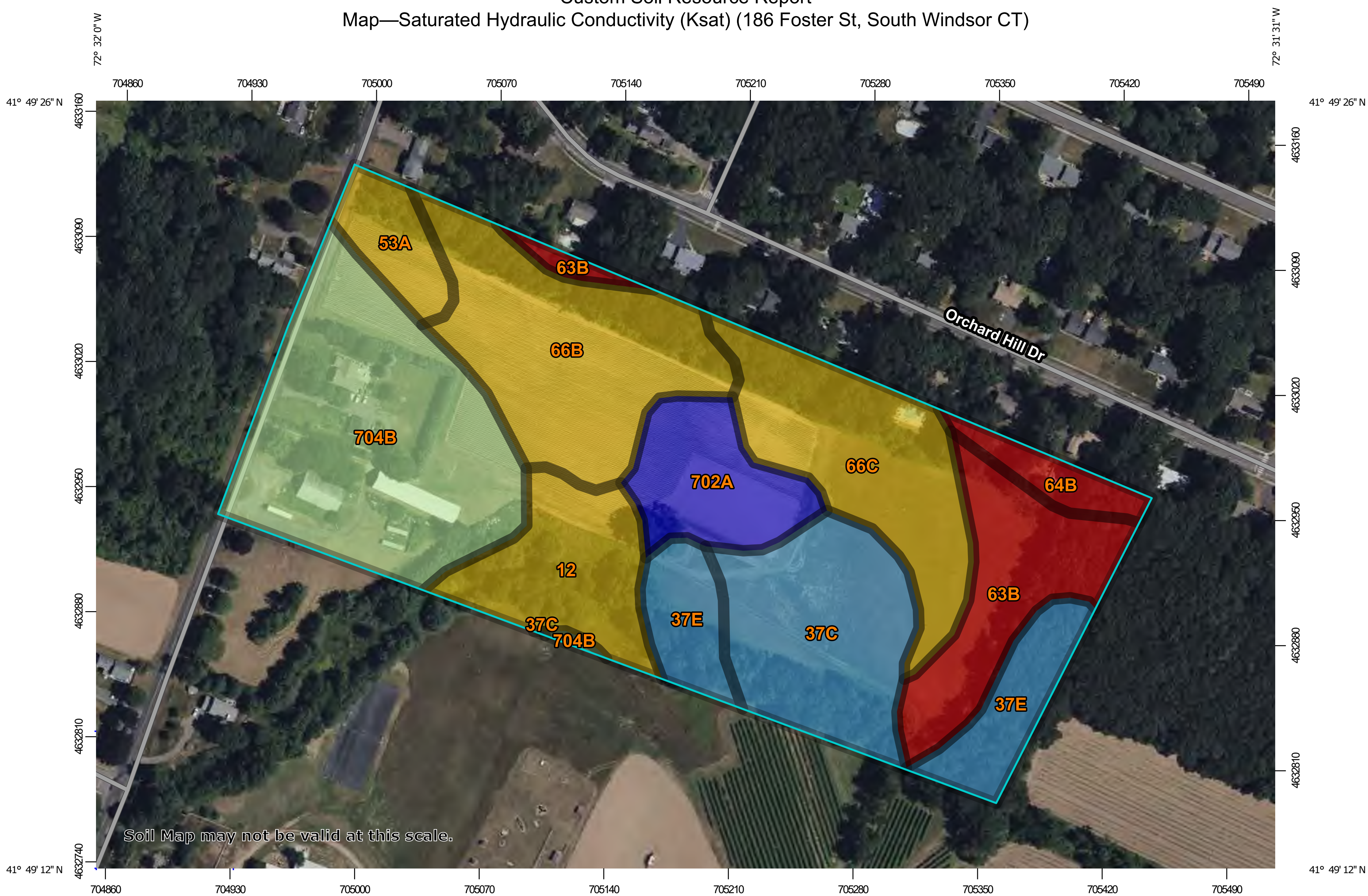
Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Custom Soil Resource Report

Map—Saturated Hydraulic Conductivity (Ksat) (186 Foster St, South Windsor CT)



Map Scale: 1:3,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 40, 80, 160, 240

Feet: 0, 100, 200, 400, 600

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

<= 21.4242

> 21.4242 and <= 57.6182

> 57.6182 and <= 85.4210

> 85.4210 and <= 134.1697

> 134.1697 and <= 245.5000

Not rated or not available

Soil Rating Lines

<= 21.4242

> 21.4242 and <= 57.6182

> 57.6182 and <= 85.4210

> 85.4210 and <= 134.1697

> 134.1697 and <= 245.5000

Not rated or not available

Soil Rating Points

<= 21.4242

> 21.4242 and <= 57.6182

> 57.6182 and <= 85.4210

> 85.4210 and <= 134.1697

> 134.1697 and <= 245.5000

Not rated or not available

Water Features

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, Western Part
Survey Area Data: Version 1, Sep 15, 2023

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 LEGEND	MAP INFORMATION
Streams and Canals	

Table—Saturated Hydraulic Conductivity (Ksat) (186 Foster St, South Windsor CT)

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	57.6182	1.9	8.2%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	134.1697	2.9	12.1%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	134.1697	1.9	8.1%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	55.7389	0.8	3.4%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	21.4242	2.4	9.9%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	21.4242	0.6	2.4%
66B	Narragansett silt loam, 2 to 8 percent slopes	45.7697	3.6	15.3%
66C	Narragansett silt loam, 8 to 15 percent slopes	45.7697	2.9	12.4%
702A	Tisbury silt loam, 0 to 3 percent slopes	245.5000	1.6	6.8%
704B	Enfield silt loam, 3 to 8 percent slopes	85.4210	5.1	21.4%
Totals for Area of Interest			**23.7**	**100.0%**

Rating Options—Saturated Hydraulic Conductivity (Ksat) (186 Foster St, South Windsor CT)

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Slowest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Depth to Bedrock (186 Foster St, South Windsor CT)

The term bedrock in soil survey refers to a continuous root and water restrictive layer of rock that occurs within the soil profile.

There are many types of restrictions that can occur within the soil profile but this theme only includes the three restrictions that use the term bedrock. These are:

1) Lithic Bedrock

2) Paralithic Bedrock

3) Densic Bedrock

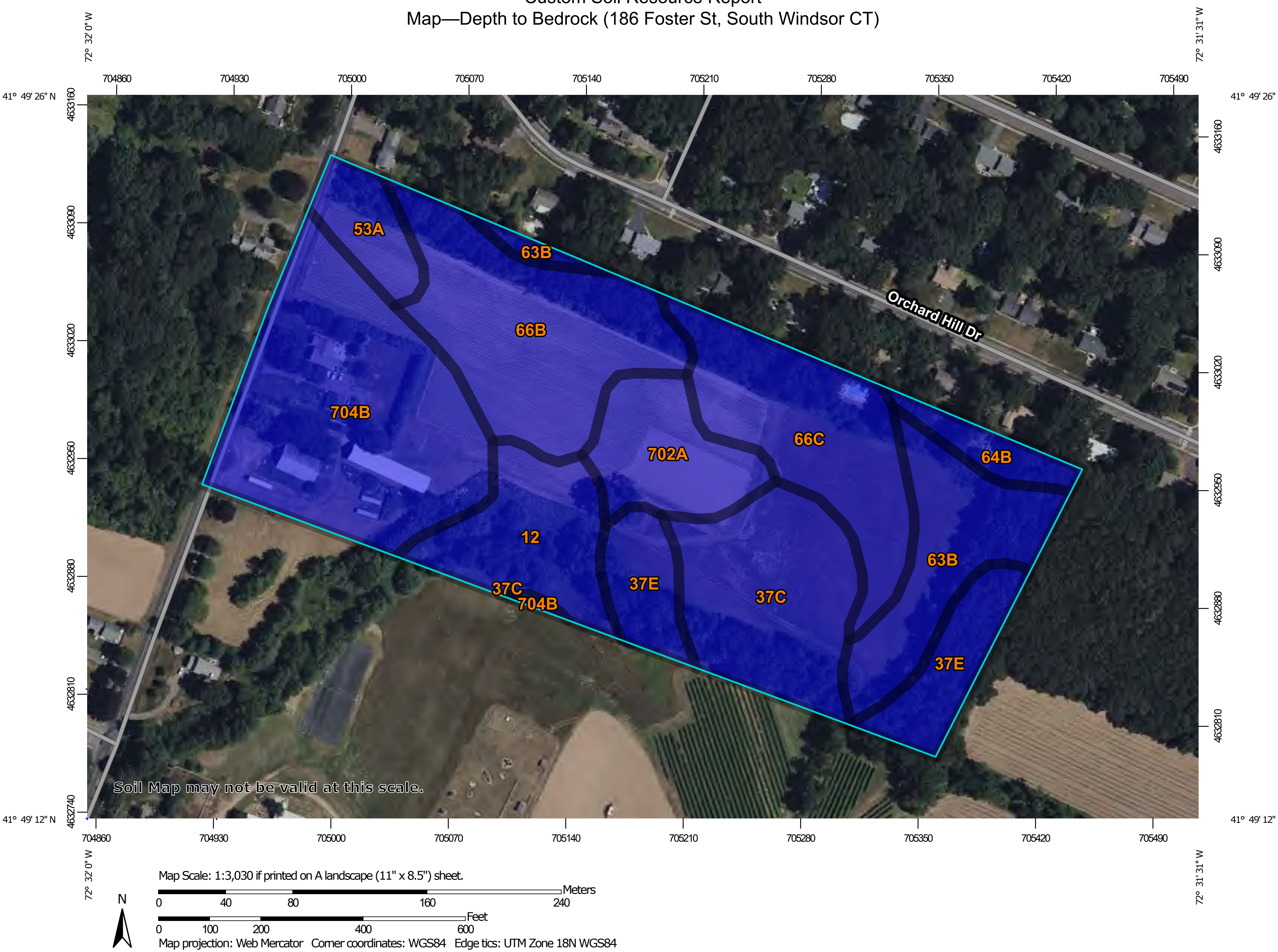
Lithic bedrock and paralithic bedrock are comprised of igneous, metamorphic, and sedimentary rocks, which are coherent and consolidated into rock through pressure, heat, cementation, or fusion. Lithic bedrock represents the hardest type of bedrock, with a hardness of strongly coherent to indurated. Paralithic bedrock has a hardness of extremely weakly coherent to moderately coherent. It can occur as a thin layer of weathered bedrock above harder lithic bedrock. Paralithic bedrock can also be much thicker, extending well below the soil profile.

Densic bedrock represents a unique kind of bedrock recognized within the soil survey. It is non-coherent and consolidated, dense root restrictive material, formed by pressure, heat, and dewatering of earth materials or sediments. Densic bedrock differs from densic materials, which formed under the compaction of glaciers, mudflows, and or human-caused compaction.

If more than one type of bedrock is described for an individual soil type, the depth to the shallowest one is given. If no bedrock is described in a map unit, it is represented by the "greater than 200" depth class.

Depth to bedrock is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Depth to Bedrock (186 Foster St, South Windsor CT)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

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)

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Survey Area Data: Version 1, Sep 15, 2023

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

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Table—Depth to Bedrock (186 Foster St, South Windsor CT)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	>200	1.9	8.2%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	>200	2.9	12.1%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	>200	1.9	8.1%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	>200	0.8	3.4%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	>200	2.4	9.9%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	>200	0.6	2.4%
66B	Narragansett silt loam, 2 to 8 percent slopes	>200	3.6	15.3%
66C	Narragansett silt loam, 8 to 15 percent slopes	>200	2.9	12.4%
702A	Tisbury silt loam, 0 to 3 percent slopes	>200	1.6	6.8%
704B	Enfield silt loam, 3 to 8 percent slopes	>200	5.1	21.4%
Totals for Area of Interest			**23.7**	**100.0%**

Rating Options—Depth to Bedrock (186 Foster St, South Windsor CT)

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Hydrologic Soil Group (186 Foster St, South Windsor CT)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group (186 Foster St, South Windsor CT)

Map Scale: 1:3,030 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

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

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

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)

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Survey Area Data: Version 1, Sep 15, 2023

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

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Table—Hydrologic Soil Group (186 Foster St, South Windsor CT)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	B/D	1.9	8.2%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	A	2.9	12.1%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	A	1.9	8.1%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	B/D	0.8	3.4%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	B	2.4	9.9%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	B	0.6	2.4%
66B	Narragansett silt loam, 2 to 8 percent slopes	B	3.6	15.3%
66C	Narragansett silt loam, 8 to 15 percent slopes	B	2.9	12.4%
702A	Tisbury silt loam, 0 to 3 percent slopes	B/D	1.6	6.8%
704B	Enfield silt loam, 3 to 8 percent slopes	B	5.1	21.4%
Totals for Area of Interest			**23.7**	**100.0%**

Rating Options—Hydrologic Soil Group (186 Foster St, South Windsor CT)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

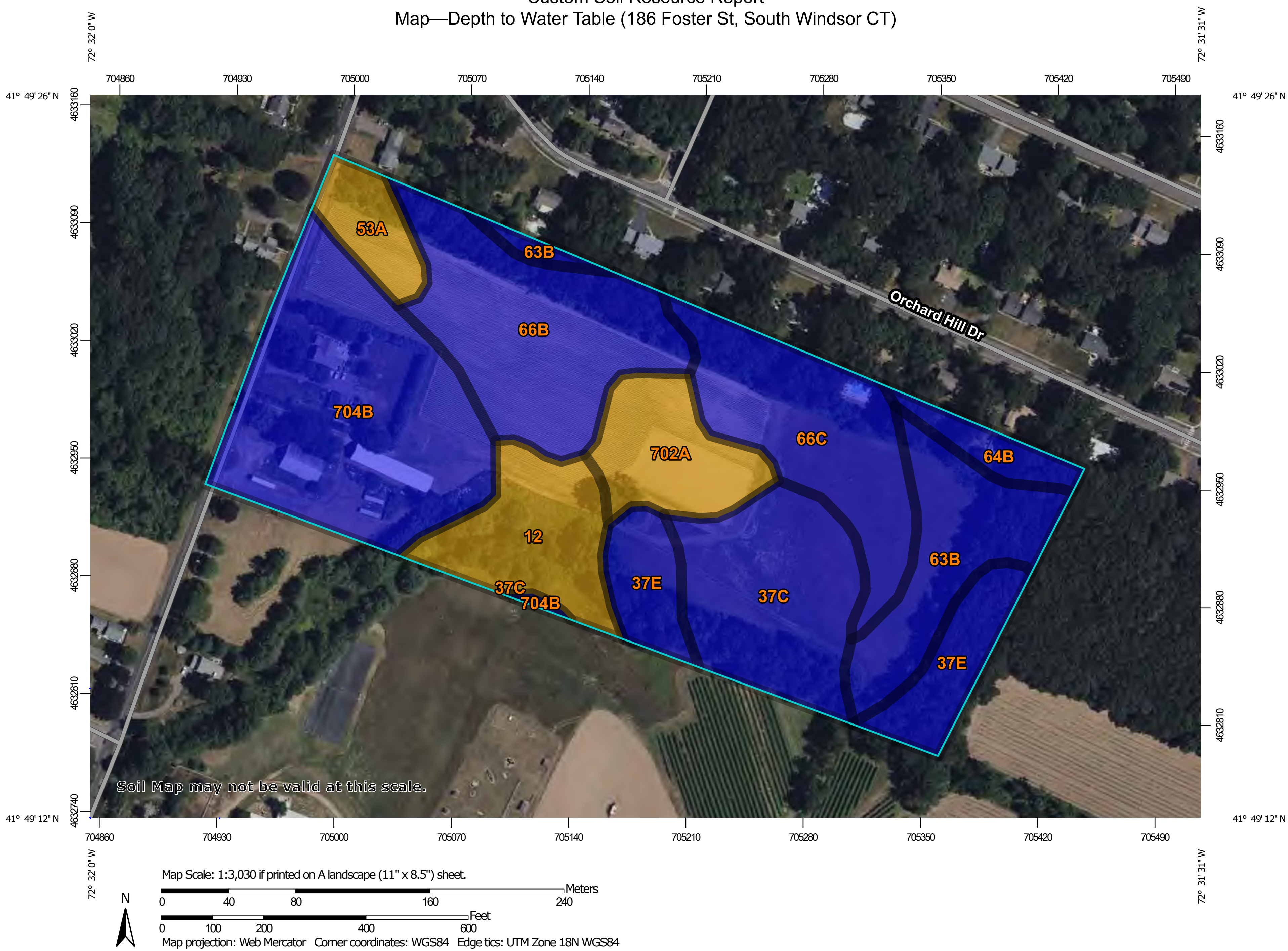
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table (186 Foster St, South Windsor CT)

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Depth to Water Table (186 Foster St, South Windsor CT)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

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.

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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)

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Table—Depth to Water Table (186 Foster St, South Windsor CT)

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
12	Raypol silt loam, 0 to 3 percent slopes	50	1.9	8.2%
37C	Manchester gravelly sandy loam, 3 to 15 percent slopes	>200	2.9	12.1%
37E	Manchester gravelly sandy loam, 15 to 45 percent slopes	>200	1.9	8.1%
53A	Wapping very fine sandy loam, 0 to 3 percent slopes	41	0.8	3.4%
63B	Cheshire fine sandy loam, 3 to 8 percent slopes	>200	2.4	9.9%
64B	Cheshire fine sandy loam, 3 to 8 percent slopes, very stony	>200	0.6	2.4%
66B	Narragansett silt loam, 2 to 8 percent slopes	>200	3.6	15.3%
66C	Narragansett silt loam, 8 to 15 percent slopes	>200	2.9	12.4%
702A	Tisbury silt loam, 0 to 3 percent slopes	46	1.6	6.8%
704B	Enfield silt loam, 3 to 8 percent slopes	>200	5.1	21.4%
Totals for Area of Interest			**23.7**	**100.0%**

Rating Options—Depth to Water Table (186 Foster St, South Windsor CT)

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

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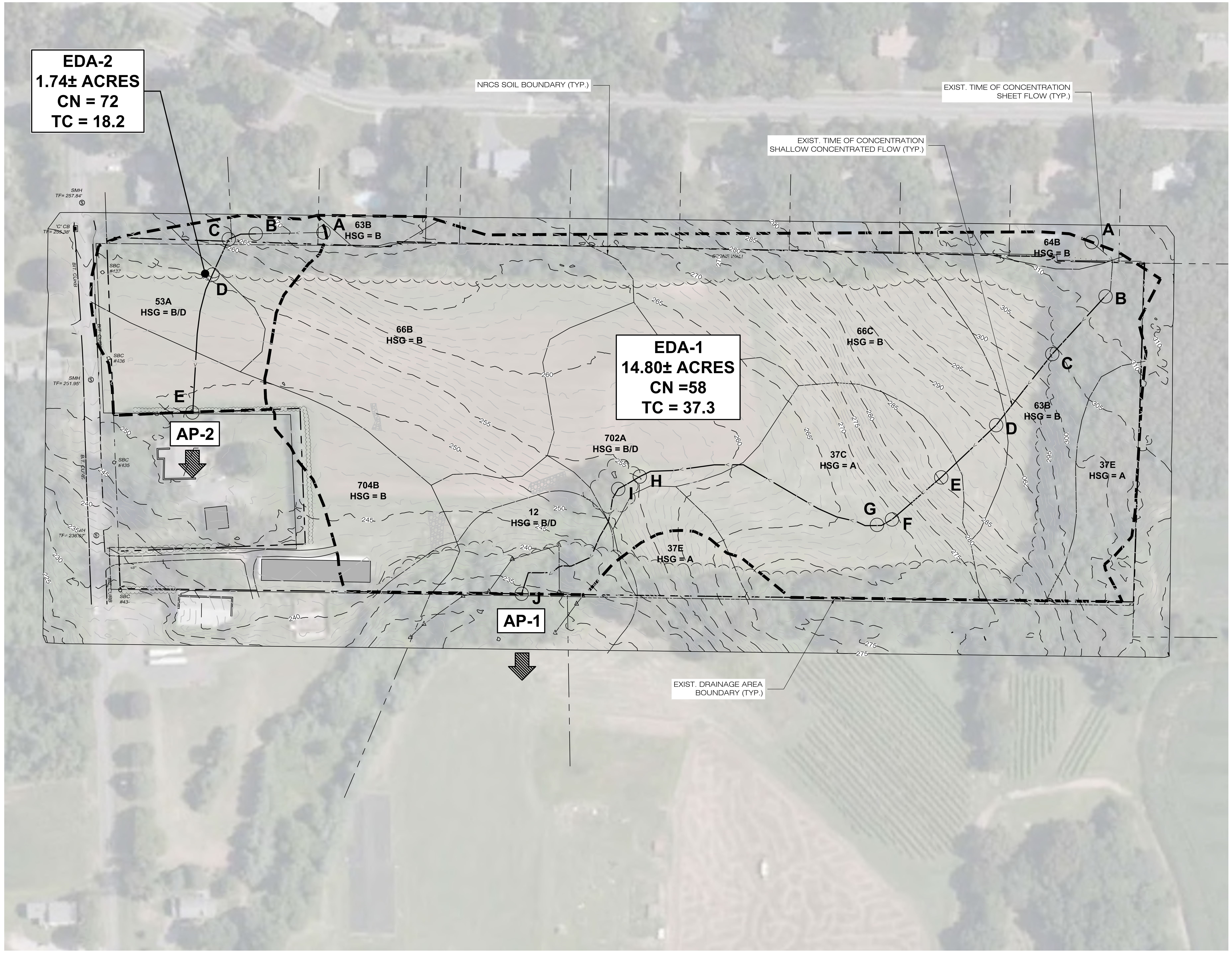
APPENDIX B: EXISTING DRAINAGE AREA MAP (EDA-1) & HYDROLOGIC COMPUTATION (HYDROCAD)

EXISTING DRAINAGE AREAS

	TOTAL AREA (ACRES)	COMPOSITE CN	TC (MINS.)
EDA-1	14.80	58	37.3
EDA-2	1.74	72	18.2

EXISTING CONDITION PEAK FLOWS

ANALYSIS POINT	2-YEAR (CFS)	25-YEAR (CFS)	50-YEAR (CFS)	100-YEAR (CFS)
AP-1	1.54	14.64	19.60	25.39
AP-2	1.14	4.32	5.32	6.44



EXISTING DRAINAGE AREA MAP

1 EDA-1

SCALE : 1" = 80'-0"

80 0 40 80 160

(IN FEET) 1 inch = 80 ft.

CTEC SOLAR

1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION

567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CONCEPT

NO	DATE	REVISION
0		
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: HELEN K. GALLIVAN

ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT 06074

FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT 06074

APT FILING NUMBER: CT481620

DRAWN BY: TEL

DATE: 10/30/23 CHECKED BY: SMC

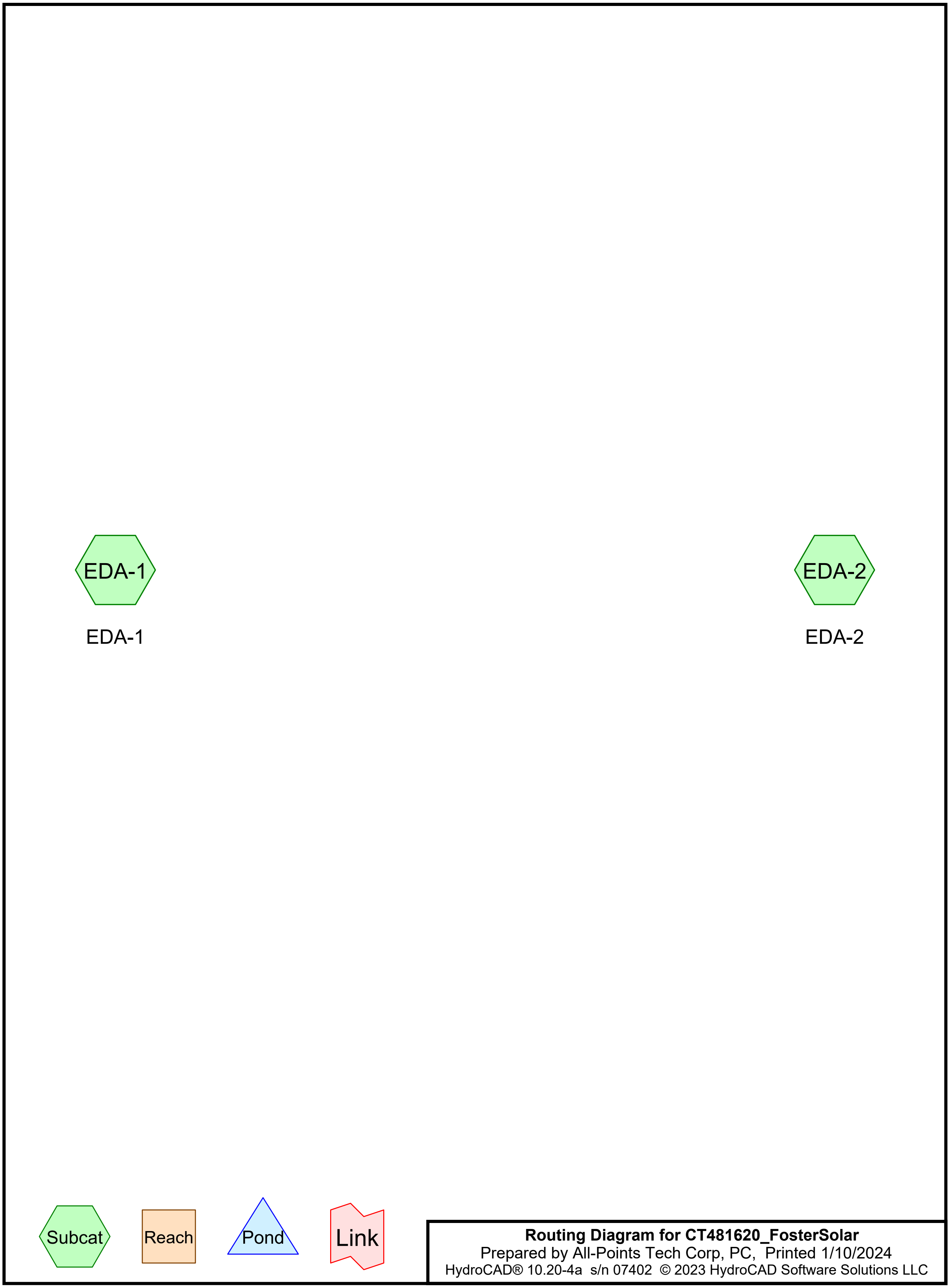
SHEET TITLE:

EXISTING DRAINAGE AREA MAP

SHEET NUMBER:

EDA-1

STATE OF CONNECTICUT THOMAS E. LITTLE 33443 LICENSED PROFESSIONAL ENGINEER



Routing Diagram for CT481620_FosterSolar
Prepared by All-Points Tech Corp, PC, Printed 1/10/2024

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 YR	Type III 24-hr		Default	24.00	1	3.12	2
2	25 YR	Type III 24-hr		Default	24.00	1	6.05	2
3	50 YR	Type III 24-hr		Default	24.00	1	6.88	2
4	100 YR	Type III 24-hr		Default	24.00	1	7.79	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.122	30	Meadow, non-grazed, HSG A (EDA-1)
3.723	58	Meadow, non-grazed, HSG B (EDA-1, EDA-2)
0.358	78	Meadow, non-grazed, HSG B/D (EDA-1, EDA-2)
0.007	64	Row crops, SR + CR, Good, HSG A (EDA-1)
3.633	75	Row crops, SR + CR, Good, HSG B (EDA-1, EDA-2)
1.770	85	Row crops, SR + CR, Good, HSG B/D (EDA-1, EDA-2)
0.192	60	Woods, Fair, HSG B (EDA-1)
0.961	30	Woods, Good, HSG A (EDA-1)
3.221	55	Woods, Good, HSG B (EDA-1, EDA-2)
0.205	77	Woods, Good, HSG B/ D (EDA-2)
0.346	77	Woods, Good, HSG B/D (EDA-1)
16.539	**60**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.091	HSG A	EDA-1
13.448	HSG B	EDA-1, EDA-2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
16.539		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
2.122	4.081	0.000	0.000	0.000	6.203	Meadow, non-grazed	EDA-1, EDA-2
0.007	5.403	0.000	0.000	0.000	5.410	Row crops, SR + CR, Good	EDA-1, EDA-2
0.000	0.192	0.000	0.000	0.000	0.192	Woods, Fair	EDA-1
0.961	3.772	0.000	0.000	0.000	4.733	Woods, Good	EDA-1, EDA-2
3.091	**13.448**	**0.000**	**0.000**	**0.000**	**16.539**	**TOTAL AREA**	

Summary for Subcatchment EDA-1: EDA-1

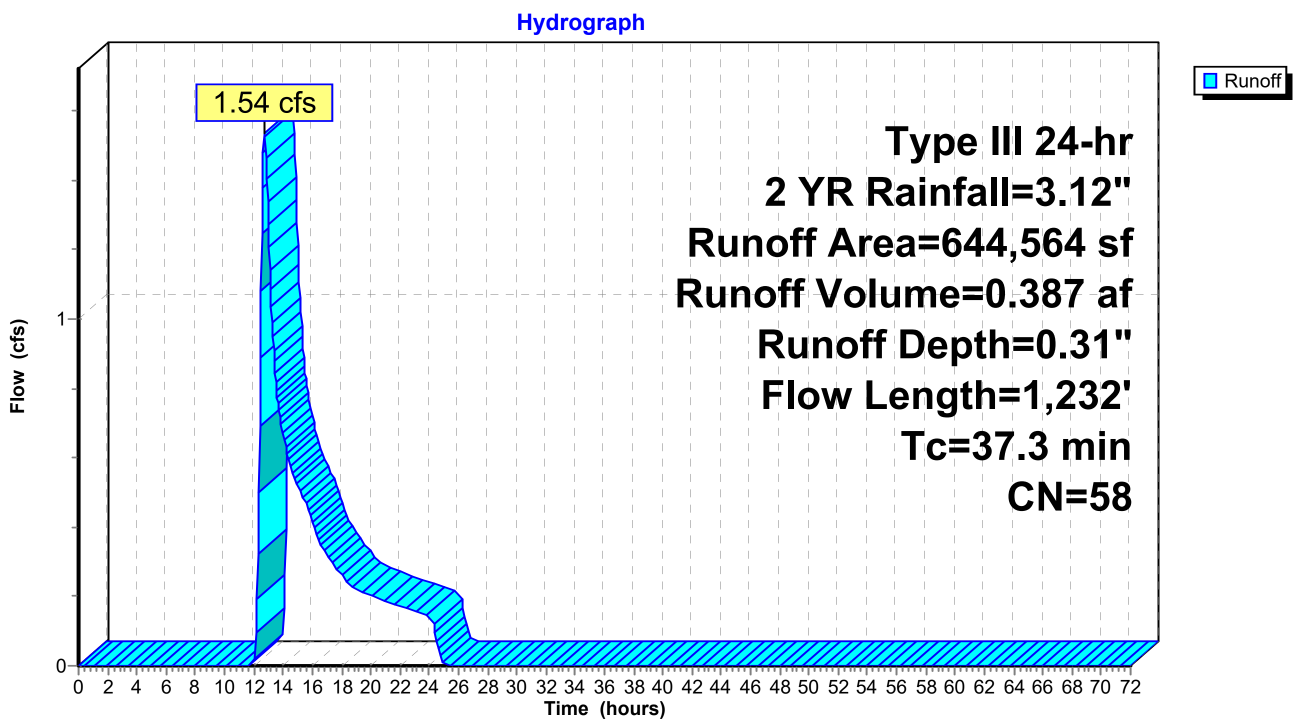
Runoff = 1.54 cfs @ 12.74 hrs, Volume= 0.387 af, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
	28,705	30	Woods, Good, HSG A
	58,752	55	Woods, Good, HSG B
	13,165	30	Woods, Good, HSG A
*	15,063	77	Woods, Good, HSG B/D
	4,508	55	Woods, Good, HSG B
	8,382	60	Woods, Fair, HSG B
	31,670	55	Woods, Good, HSG B
	29,797	55	Woods, Good, HSG B
*	56,296	85	Row crops, SR + CR, Good, HSG B/D
	304	64	Row crops, SR + CR, Good, HSG A
*	5,695	75	Row crops, SR + CR, Good, HSG B
*	12,709	75	Row crops, SR + CR, Good, HSG B
*	15,780	75	Row crops, SR + CR, Good, HSG B
*	103,199	75	Row crops, SR + CR, Good, HSG B
*	13,456	78	Meadow, non-grazed, HSG B/D
	83,459	30	Meadow, non-grazed, HSG A
*	20,679	58	Meadow, non-grazed, HSG B
*	27,127	58	Meadow, non-grazed, HSG B
*	8,993	30	Meadow, non-grazed, HSG A
*	35,854	58	Meadow, non-grazed, HSG B
*	2,289	58	Meadow, non-grazed, HSG B
*	68,682	58	Meadow, non-grazed, HSG B
	644,564	58	Weighted Average
	644,564		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0126	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
1.5	113	0.0605	1.23		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.4	134	0.0971	5.02		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
1.2	112	0.0512	1.58		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.6	96	0.1713	2.90		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
0.2	25	0.0863	2.06		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
5.0	375	0.0325	1.26		**Shallow Concentrated Flow, G-H** Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0561	1.66		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
1.8	240	0.0961	2.17		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
37.3	1,232	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

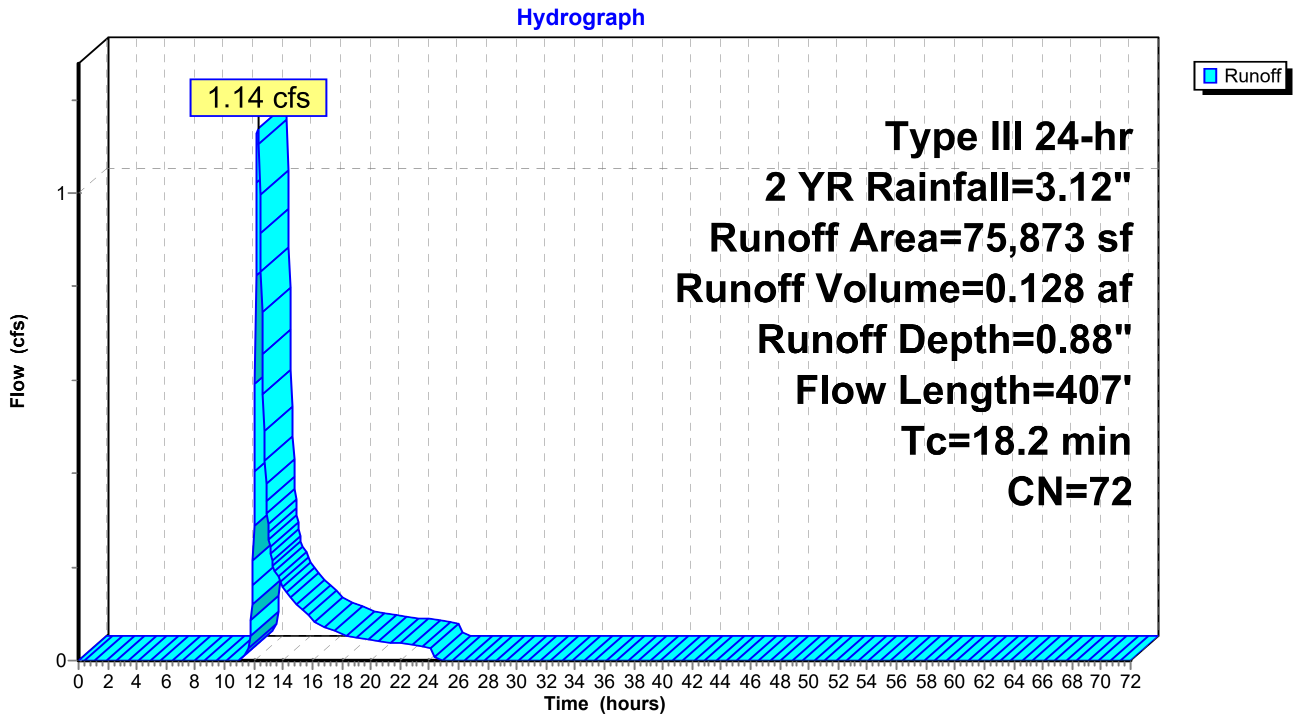
Runoff = 1.14 cfs @ 12.28 hrs, Volume= 0.128 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
*	8,915	77	Woods, Good, HSG B/ D
*	15,592	55	Woods, Good, HSG B
	16,083	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	4,806	75	Row crops, SR + CR, Good, HSG B
	7,020	58	Meadow, non-grazed, HSG B
*	2,134	78	Meadow, non-grazed, HSG B/D
*	528	58	Meadow, non-grazed, HSG B
	75,873	72	Weighted Average
	75,873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.3	208	0.0270	1.48		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
18.2	407	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-1: EDA-1

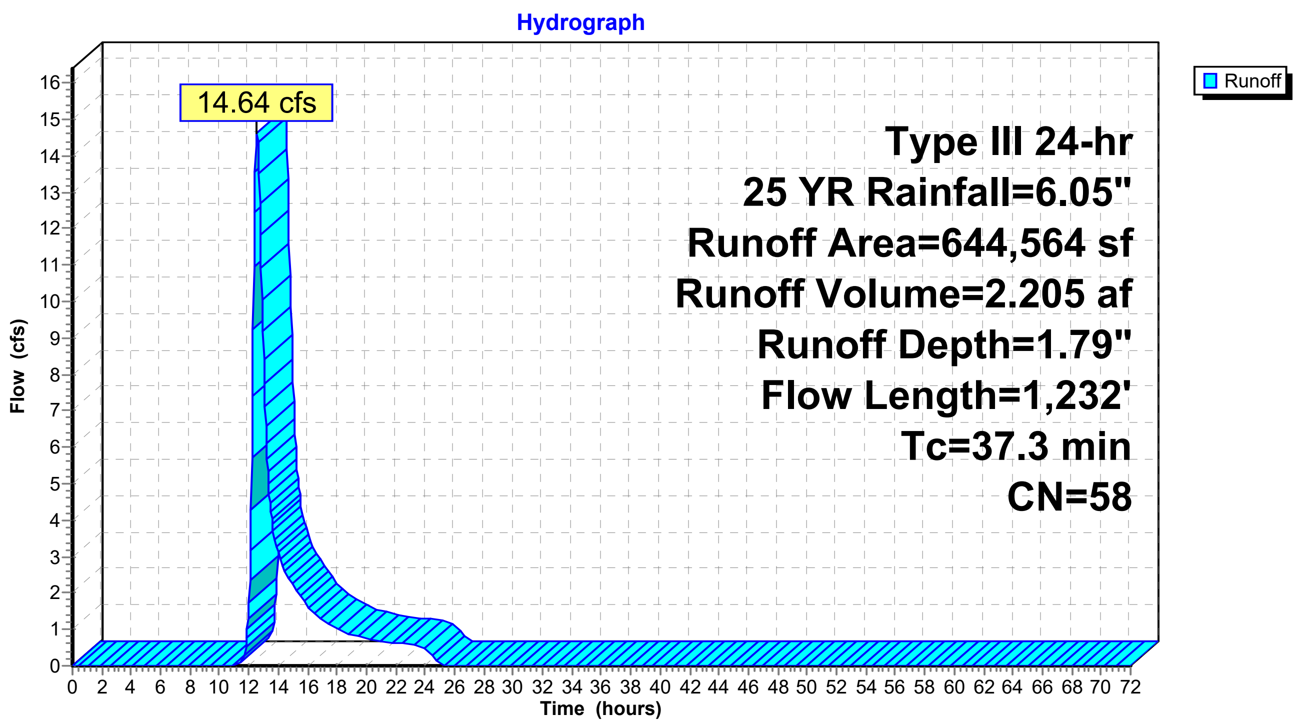
Runoff = 14.64 cfs @ 12.57 hrs, Volume= 2.205 af, Depth= 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
	28,705	30	Woods, Good, HSG A
	58,752	55	Woods, Good, HSG B
	13,165	30	Woods, Good, HSG A
*	15,063	77	Woods, Good, HSG B/D
	4,508	55	Woods, Good, HSG B
	8,382	60	Woods, Fair, HSG B
	31,670	55	Woods, Good, HSG B
	29,797	55	Woods, Good, HSG B
*	56,296	85	Row crops, SR + CR, Good, HSG B/D
	304	64	Row crops, SR + CR, Good, HSG A
*	5,695	75	Row crops, SR + CR, Good, HSG B
*	12,709	75	Row crops, SR + CR, Good, HSG B
*	15,780	75	Row crops, SR + CR, Good, HSG B
*	103,199	75	Row crops, SR + CR, Good, HSG B
*	13,456	78	Meadow, non-grazed, HSG B/D
	83,459	30	Meadow, non-grazed, HSG A
*	20,679	58	Meadow, non-grazed, HSG B
*	27,127	58	Meadow, non-grazed, HSG B
*	8,993	30	Meadow, non-grazed, HSG A
*	35,854	58	Meadow, non-grazed, HSG B
*	2,289	58	Meadow, non-grazed, HSG B
*	68,682	58	Meadow, non-grazed, HSG B
	644,564	58	Weighted Average
	644,564		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0126	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
1.5	113	0.0605	1.23		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.4	134	0.0971	5.02		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
1.2	112	0.0512	1.58		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.6	96	0.1713	2.90		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
0.2	25	0.0863	2.06		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
5.0	375	0.0325	1.26		**Shallow Concentrated Flow, G-H** Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0561	1.66		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
1.8	240	0.0961	2.17		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
37.3	1,232	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

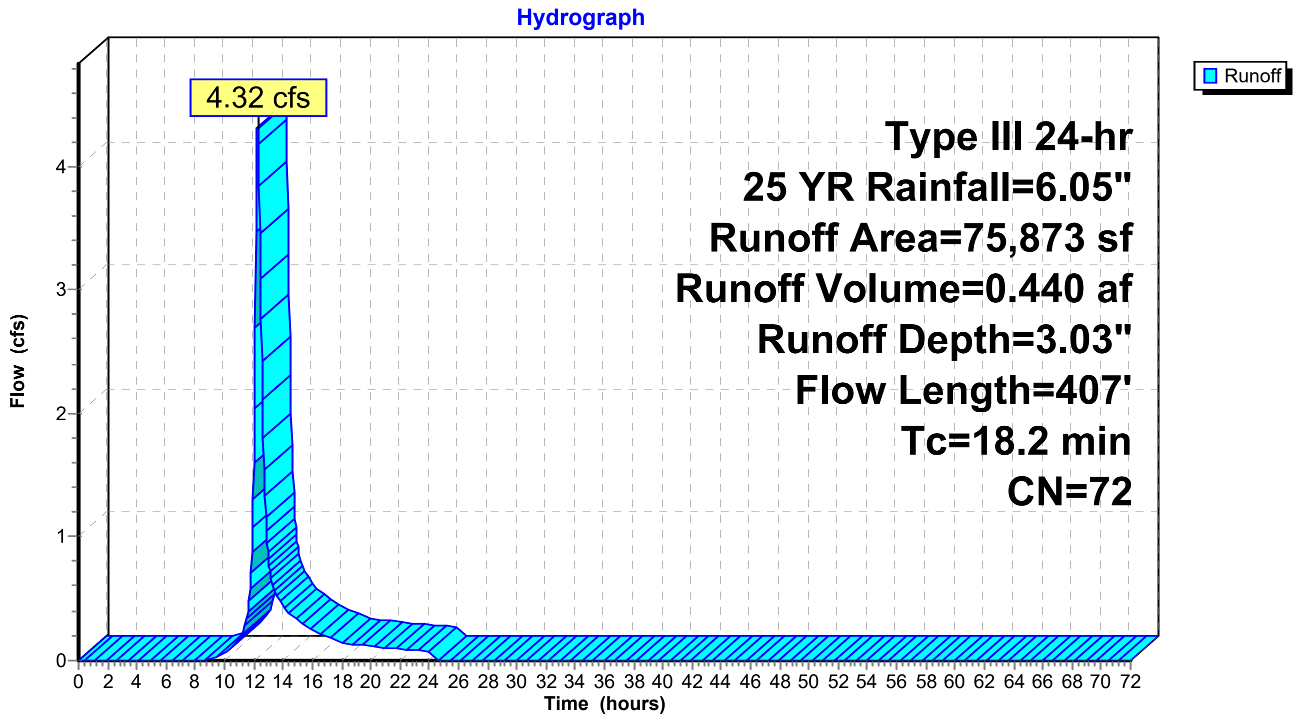
Runoff = 4.32 cfs @ 12.26 hrs, Volume= 0.440 af, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
*	8,915	77	Woods, Good, HSG B/ D
*	15,592	55	Woods, Good, HSG B
	16,083	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	4,806	75	Row crops, SR + CR, Good, HSG B
	7,020	58	Meadow, non-grazed, HSG B
*	2,134	78	Meadow, non-grazed, HSG B/D
*	528	58	Meadow, non-grazed, HSG B
	75,873	72	Weighted Average
	75,873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.3	208	0.0270	1.48		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
18.2	407	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-1: EDA-1

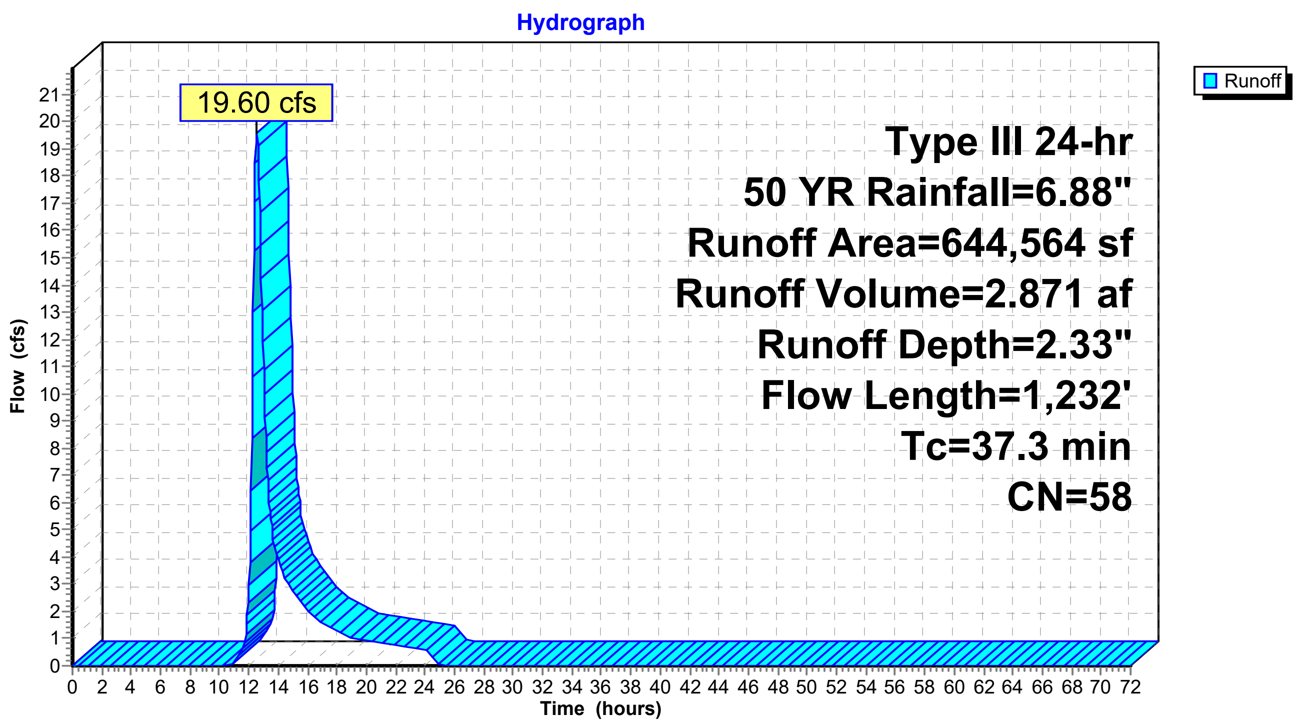
Runoff = 19.60 cfs @ 12.56 hrs, Volume= 2.871 af, Depth= 2.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
	28,705	30	Woods, Good, HSG A
	58,752	55	Woods, Good, HSG B
	13,165	30	Woods, Good, HSG A
*	15,063	77	Woods, Good, HSG B/D
	4,508	55	Woods, Good, HSG B
	8,382	60	Woods, Fair, HSG B
	31,670	55	Woods, Good, HSG B
	29,797	55	Woods, Good, HSG B
*	56,296	85	Row crops, SR + CR, Good, HSG B/D
	304	64	Row crops, SR + CR, Good, HSG A
*	5,695	75	Row crops, SR + CR, Good, HSG B
*	12,709	75	Row crops, SR + CR, Good, HSG B
*	15,780	75	Row crops, SR + CR, Good, HSG B
*	103,199	75	Row crops, SR + CR, Good, HSG B
*	13,456	78	Meadow, non-grazed, HSG B/D
	83,459	30	Meadow, non-grazed, HSG A
*	20,679	58	Meadow, non-grazed, HSG B
*	27,127	58	Meadow, non-grazed, HSG B
*	8,993	30	Meadow, non-grazed, HSG A
*	35,854	58	Meadow, non-grazed, HSG B
*	2,289	58	Meadow, non-grazed, HSG B
*	68,682	58	Meadow, non-grazed, HSG B
	644,564	58	Weighted Average
	644,564		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0126	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
1.5	113	0.0605	1.23		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.4	134	0.0971	5.02		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
1.2	112	0.0512	1.58		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.6	96	0.1713	2.90		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
0.2	25	0.0863	2.06		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
5.0	375	0.0325	1.26		**Shallow Concentrated Flow, G-H** Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0561	1.66		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
1.8	240	0.0961	2.17		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
37.3	1,232	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

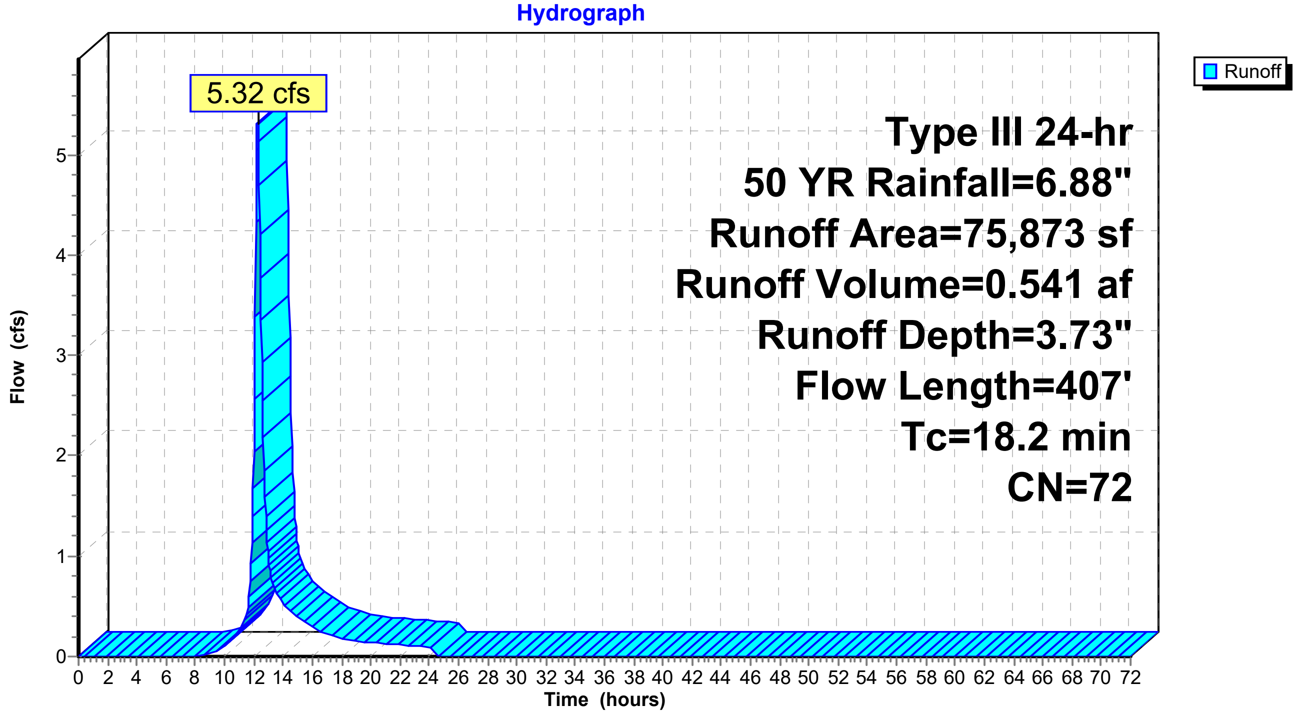
Runoff = 5.32 cfs @ 12.25 hrs, Volume= 0.541 af, Depth= 3.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
*	8,915	77	Woods, Good, HSG B/ D
*	15,592	55	Woods, Good, HSG B
	16,083	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	4,806	75	Row crops, SR + CR, Good, HSG B
	7,020	58	Meadow, non-grazed, HSG B
*	2,134	78	Meadow, non-grazed, HSG B/D
*	528	58	Meadow, non-grazed, HSG B
	75,873	72	Weighted Average
	75,873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.3	208	0.0270	1.48		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
18.2	407	Total			

Subcatchment EDA-2: EDA-2



Summary for Subcatchment EDA-1: EDA-1

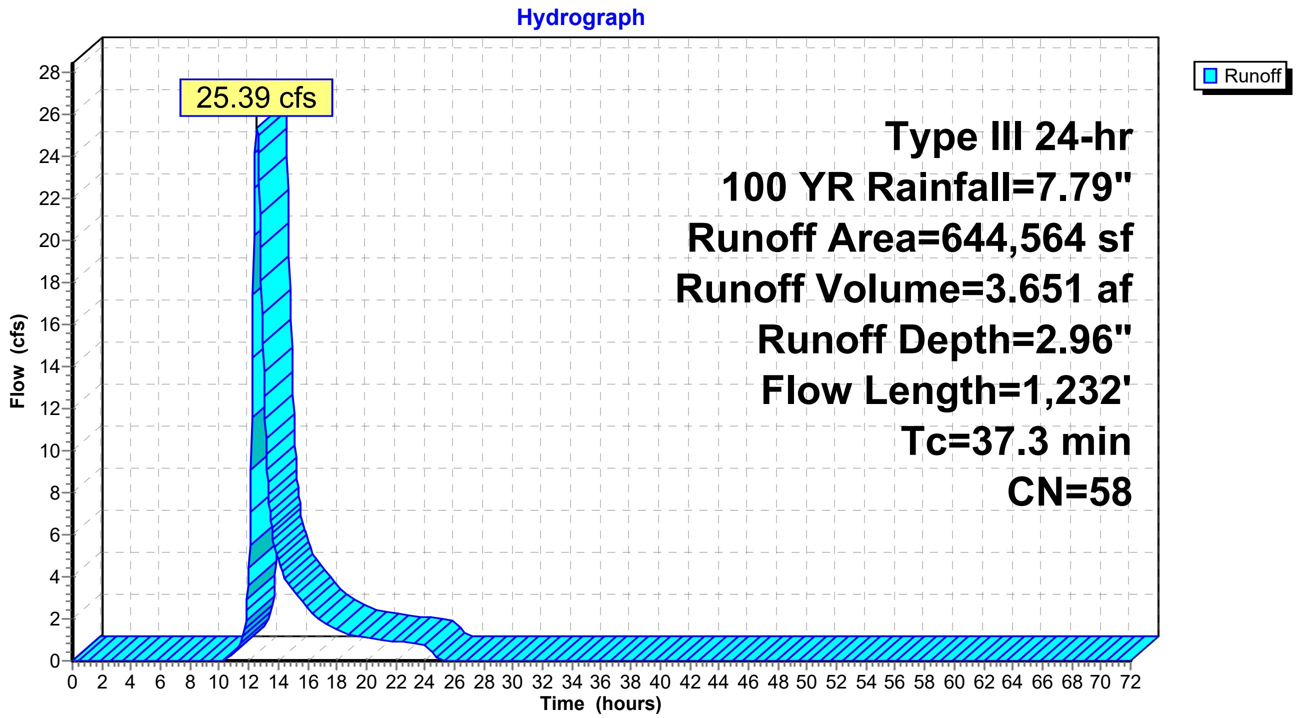
Runoff = 25.39 cfs @ 12.55 hrs, Volume= 3.651 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
	28,705	30	Woods, Good, HSG A
	58,752	55	Woods, Good, HSG B
	13,165	30	Woods, Good, HSG A
*	15,063	77	Woods, Good, HSG B/D
	4,508	55	Woods, Good, HSG B
	8,382	60	Woods, Fair, HSG B
	31,670	55	Woods, Good, HSG B
	29,797	55	Woods, Good, HSG B
*	56,296	85	Row crops, SR + CR, Good, HSG B/D
	304	64	Row crops, SR + CR, Good, HSG A
*	5,695	75	Row crops, SR + CR, Good, HSG B
*	12,709	75	Row crops, SR + CR, Good, HSG B
*	15,780	75	Row crops, SR + CR, Good, HSG B
*	103,199	75	Row crops, SR + CR, Good, HSG B
*	13,456	78	Meadow, non-grazed, HSG B/D
	83,459	30	Meadow, non-grazed, HSG A
*	20,679	58	Meadow, non-grazed, HSG B
*	27,127	58	Meadow, non-grazed, HSG B
*	8,993	30	Meadow, non-grazed, HSG A
*	35,854	58	Meadow, non-grazed, HSG B
*	2,289	58	Meadow, non-grazed, HSG B
*	68,682	58	Meadow, non-grazed, HSG B
	644,564	58	Weighted Average
	644,564		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.2	100	0.0126	0.06		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
1.5	113	0.0605	1.23		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.4	134	0.0971	5.02		**Shallow Concentrated Flow, C-D** Unpaved Kv= 16.1 fps
1.2	112	0.0512	1.58		**Shallow Concentrated Flow, D-E** Short Grass Pasture Kv= 7.0 fps
0.6	96	0.1713	2.90		**Shallow Concentrated Flow, E-F** Short Grass Pasture Kv= 7.0 fps
0.2	25	0.0863	2.06		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
5.0	375	0.0325	1.26		**Shallow Concentrated Flow, G-H** Short Grass Pasture Kv= 7.0 fps
0.4	37	0.0561	1.66		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
1.8	240	0.0961	2.17		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
37.3	1,232	Total			

Subcatchment EDA-1: EDA-1



Summary for Subcatchment EDA-2: EDA-2

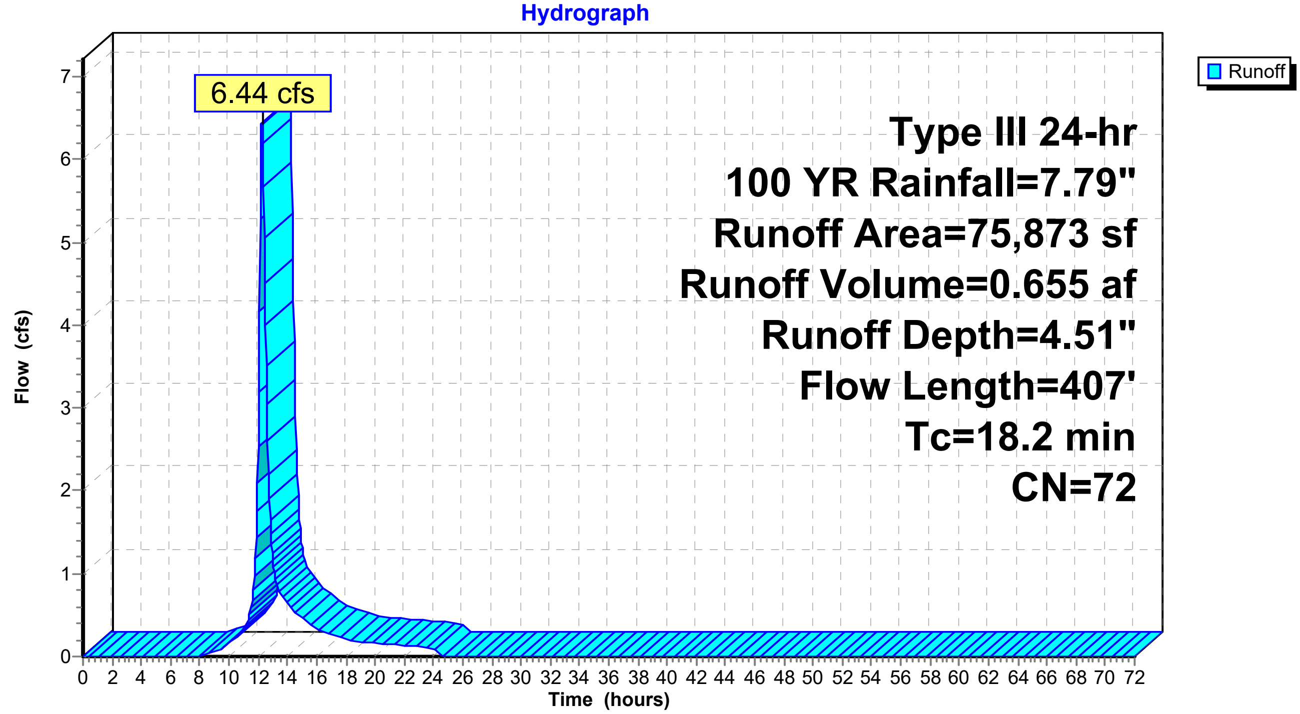
Runoff = 6.44 cfs @ 12.25 hrs, Volume= 0.655 af, Depth= 4.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
*	8,915	77	Woods, Good, HSG B/ D
*	15,592	55	Woods, Good, HSG B
	16,083	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	4,806	75	Row crops, SR + CR, Good, HSG B
	7,020	58	Meadow, non-grazed, HSG B
*	2,134	78	Meadow, non-grazed, HSG B/D
*	528	58	Meadow, non-grazed, HSG B
	75,873	72	Weighted Average
	75,873		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
2.3	208	0.0270	1.48		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
18.2	407	Total			

Subcatchment EDA-2: EDA-2



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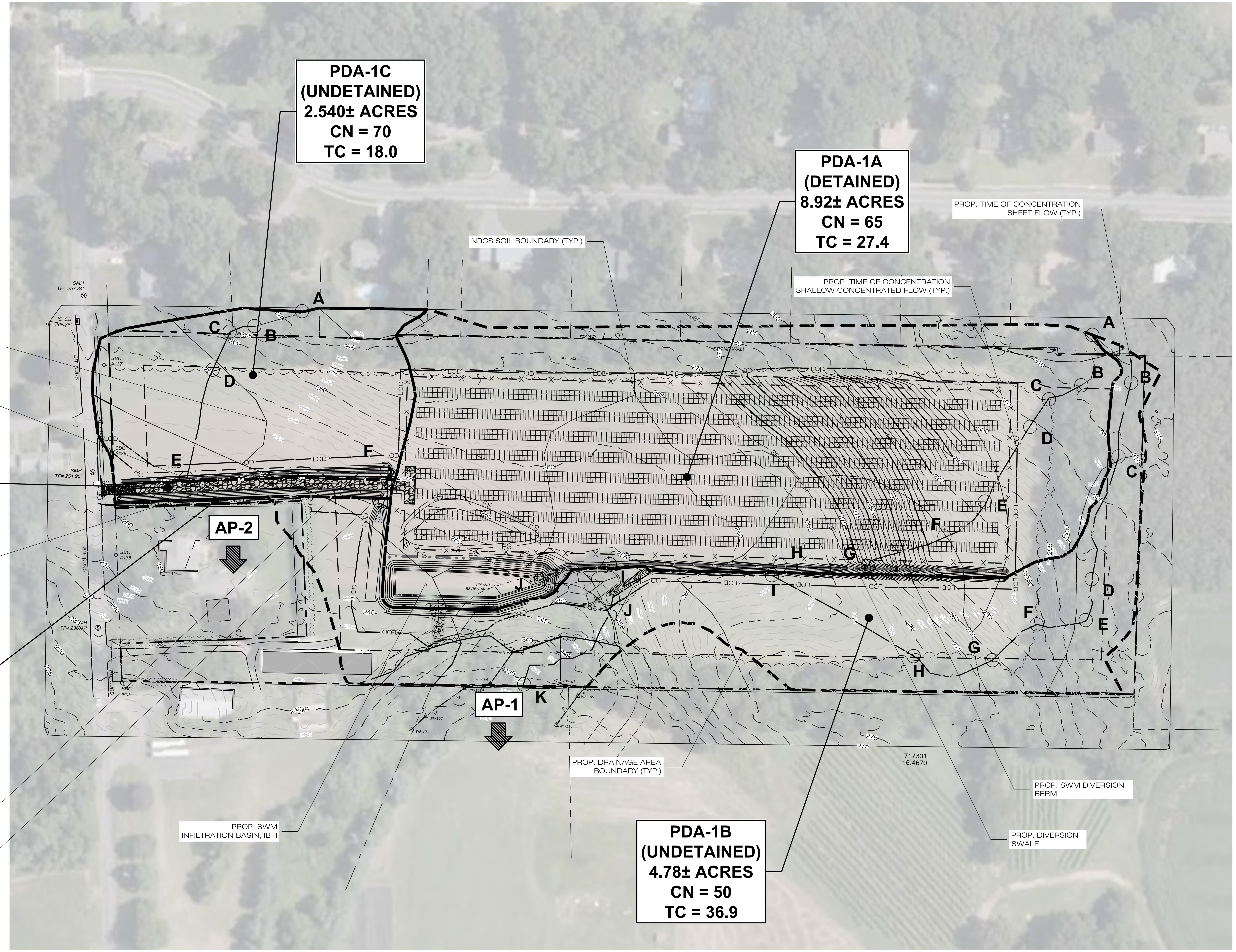
APPENDIX C: PROPOSED DRAINAGE AREA MAP (PDA-1) & HYDROLOGIC COMPUTATION (HYDROCAD)

PROPOSED DRAINAGE AREAS

	TOTAL AREA (ACRES)	COMPOSITE CN	TC (MINS.)
PDA-1A	8.92	65	27.4
PDA-1B	4.78	50	36.9
PDA-1C	2.54	70	18.0
PDA-2A	0.26	83	6.0
PDA-2B	0.04	58	6.0

PROPOSED CONDITION PEAK FLOWS

ANALYSIS POINT	2-YEAR (CFS)	25-YEAR (CFS)	50-YEAR (CFS)	100-YEAR (CFS)
AP-1	1.39	7.69	11.69	18.34
AP-2	0.01	0.07	0.10	0.27



1
PDA-1

PROPOSED DRAINAGE AREA MAP

SCALE : 1" = 80'-0"

80 0 40 80 160

(IN FEET) 1 inch = 80 ft.

CTEC SOLAR

1 GRIFFIN ROAD S, SUITE 200
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION

567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CONCEPT

NO	DATE	REVISION
0		
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD

PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION, P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: HELEN K. GALLIVAN

ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT 06074

FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT 06074

APT FILING NUMBER: CT481620

DRAWN BY: TEL

DATE: 10/30/23

CHECKED BY: SMC

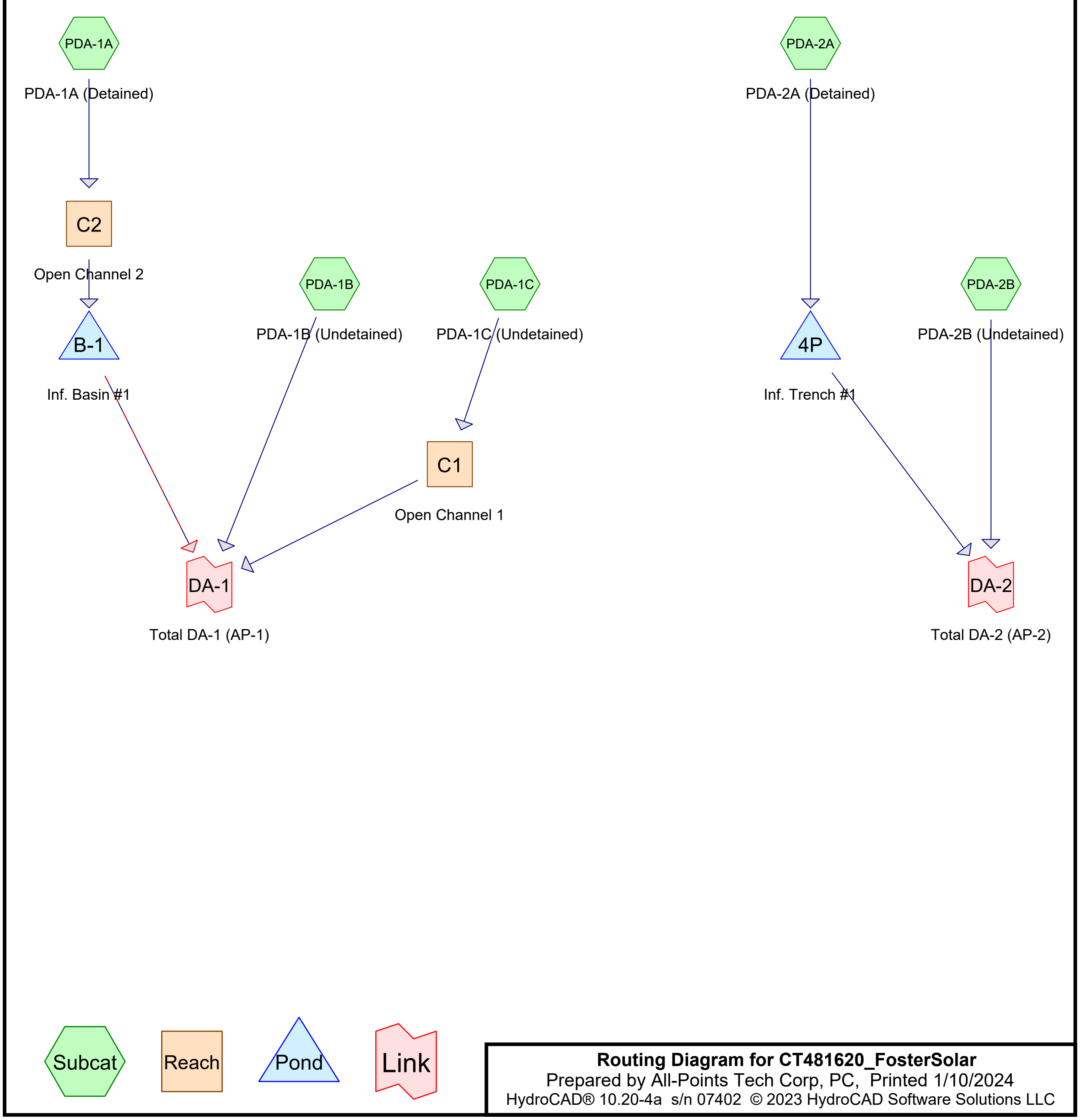
SHEET TITLE:

PROPOSED DRAINAGE AREA MAP

SHEET NUMBER:

PDA-1

STATE OF CONNECTICUT
THOMAS E. LITTLE
33443
LICENSED
PROFESSIONAL ENGINEER



Routing Diagram for CT481620_FosterSolar
Prepared by All-Points Tech Corp, PC, Printed 1/10/2024
HydroCAD® 10.20-4a s/n 07402 © 2023 HydroCAD Software Solutions LLC

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 YR	Type III 24-hr		Default	24.00	1	3.12	2
2	25 YR	Type III 24-hr		Default	24.00	1	6.05	2
3	50 YR	Type III 24-hr		Default	24.00	1	6.88	2
4	100 YR	Type III 24-hr		Default	24.00	1	7.79	2

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.007	98	Concrete Equipment Pad (PDA-1A)
0.142	98	Gravel Access Road (PDA-2A)
0.025	98	Gravel surface (PDA-1A)
1.150	30	Meadow, non-grazed, HSG A (PDA-1B)
1.267	58	Meadow, non-grazed, HSG B (PDA-1A, PDA-1B, PDA-1C, PDA-2B)
4.546	65	Meadow, non-grazed, HSG B/C (PDA-1A, PDA-1C, PDA-2A)
0.508	78	Meadow, non-grazed, HSG B/D (PDA-1B, PDA-1C)
0.789	71	Meadow, non-grazed, HSG C (PDA-1A, PDA-1B)
1.749	78	Meadow, non-grazed, HSG D (PDA-1A)
1.030	75	Row crops, SR + CR, Good, HSG B (PDA-1B, PDA-1C)
0.477	85	Row crops, SR + CR, Good, HSG B/D (PDA-1C)
0.958	30	Woods, Good, HSG A (PDA-1A, PDA-1B)
3.338	55	Woods, Good, HSG B (PDA-1A, PDA-1B, PDA-1C)
0.553	77	Woods, Good, HSG B/D (PDA-1B, PDA-1C)
16.539	**62**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
2.108	HSG A	PDA-1A, PDA-1B
11.719	HSG B	PDA-1A, PDA-1B, PDA-1C, PDA-2A, PDA-2B
0.789	HSG C	PDA-1A, PDA-1B
1.749	HSG D	PDA-1A
0.174	Other	PDA-1A, PDA-2A
16.539		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	0.000	0.000	0.007	0.007	Concrete Equipment Pad	PDA-1A
0.000	0.000	0.000	0.000	0.142	0.142	Gravel Access Road	PDA-2A
0.000	0.000	0.000	0.000	0.025	0.025	Gravel surface	PDA-1A
1.150	6.321	0.789	1.749	0.000	10.009	Meadow, non-grazed	PDA-1A, PDA-1B, PDA-1C, PDA-2A, PDA-2B
0.000	1.507	0.000	0.000	0.000	1.507	Row crops, SR + CR, Good	PDA-1B, PDA-1C
0.958	3.891	0.000	0.000	0.000	4.850	Woods, Good	PDA-1A, PDA-1B, PDA-1C
2.108	**11.719**	**0.789**	**1.749**	**0.174**	**16.539**	**TOTAL AREA**	

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	B-1	242.50	242.00	40.0	0.0125	0.013	0.0	12.0	0.0	

Summary for Subcatchment PDA-1A: PDA-1A (Detained)

Runoff = 2.69 cfs @ 12.48 hrs, Volume= 0.418 af, Depth= 0.56"
Routed to Reach C2 : Open Channel 2

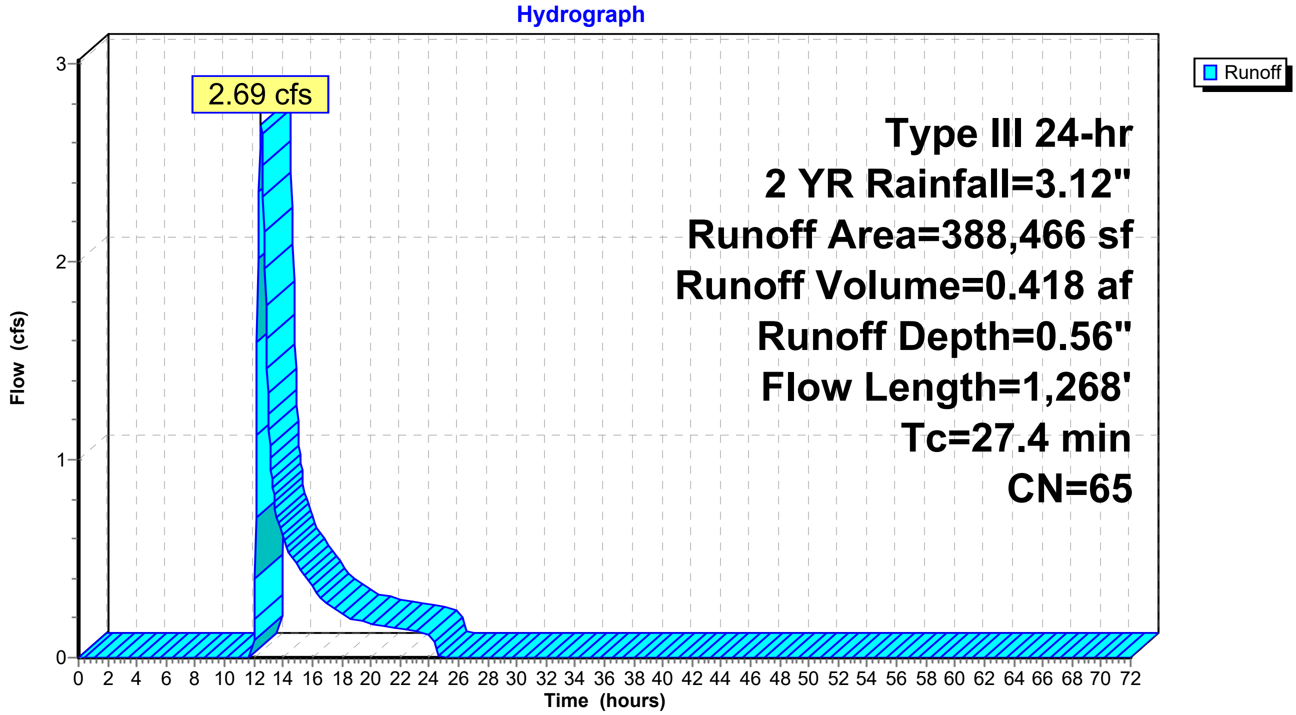
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
*	1,139	30	Woods, Good, HSG A
*	32,943	55	Woods, Good, HSG B
*	7,723	55	Woods, Good, HSG B
	30,167	55	Woods, Good, HSG B
*	21,016	55	Woods, Good, HSG B
	65,261	78	Meadow, non-grazed, HSG D
*	29,208	65	Meadow, non-grazed, HSG B/C
*	6,046	71	Meadow, non-grazed, HSG C
	10,920	78	Meadow, non-grazed, HSG D
*	5,769	65	Meadow, non-grazed, HSG B/C
*	11,310	65	Meadow, non-grazed, HSG B/C
	13,479	58	Meadow, non-grazed, HSG B
*	68,974	65	Meadow, non-grazed, HSG B/C
*	64,248	65	Meadow, non-grazed, HSG B/C
*	18,308	71	Meadow, non-grazed, HSG C
*	559	58	Meadow, non-grazed, HSG B
*	1,096	98	Gravel surface
*	300	98	Concrete Equipment Pad
	388,466	65	Weighted Average
	387,070		99.64% Pervious Area
	1,396		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0450	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.9	55	0.0437	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.8	147	0.0948	3.08		**Shallow Concentrated Flow, C-D** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0551	2.35		**Shallow Concentrated Flow, D-E** Nearly Bare & Untilled Kv= 10.0 fps
0.3	79	0.1480	3.85		**Shallow Concentrated Flow, E-F** Nearly Bare & Untilled Kv= 10.0 fps
1.2	154	0.0728	2.17	48.82	**Channel Flow, G-H** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
3.6	320	0.0335	1.47	33.12	**Channel Flow, H-I** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
4.3	278	0.0168	1.07	26.97	**Channel Flow, H-J** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.240 Sheet flow over Dense Grass

0.0	48	0.1899	21.15	530.82	**Channel Flow, J-K** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.041 Riprap, 2-inch
27.4	1,268	Total			

Subcatchment PDA-1A: PDA-1A (Detained)



Summary for Subcatchment PDA-1B: PDA-1B (Undetained)

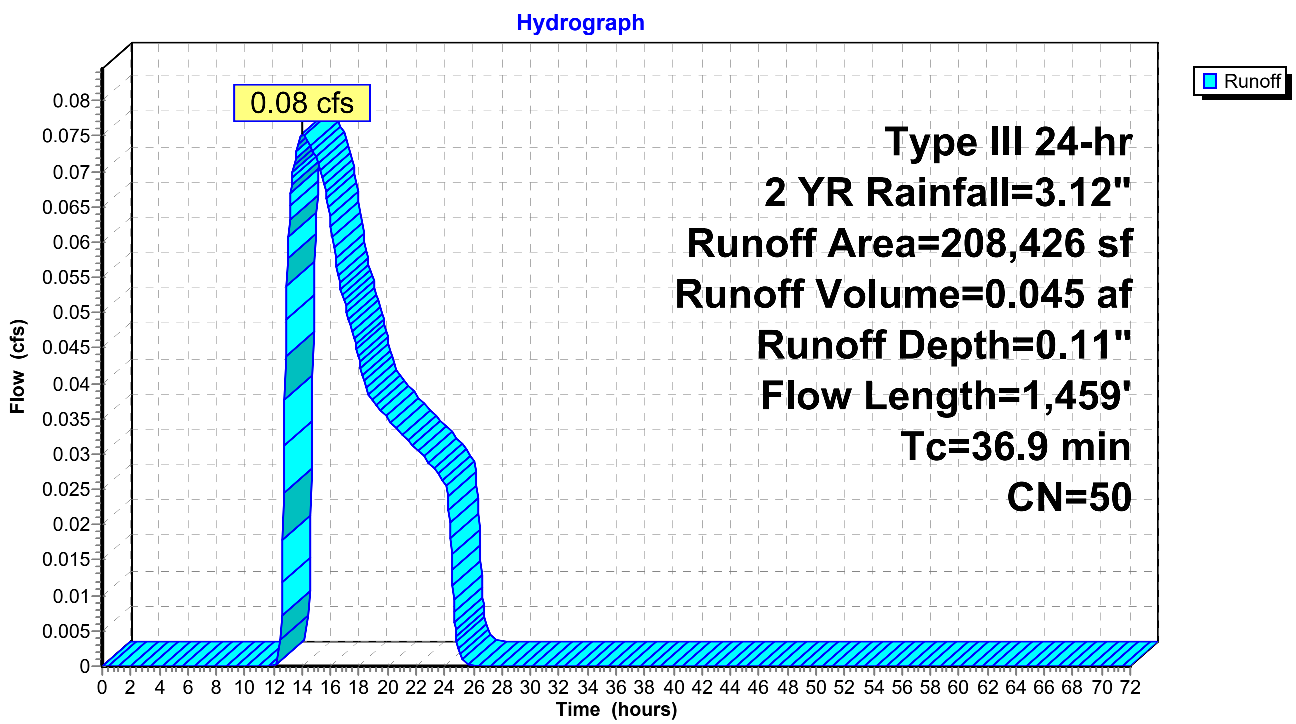
Runoff = 0.08 cfs @ 14.05 hrs, Volume= 0.045 af, Depth= 0.11"
Routed to Link DA-1 : Total DA-1 (AP-1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
	27,431	30	Woods, Good, HSG A
	20,927	55	Woods, Good, HSG B
	13,171	30	Woods, Good, HSG A
*	15,069	77	Woods, Good, HSG B/D
	4,514	55	Woods, Good, HSG B
	541	55	Woods, Good, HSG B
	8,033	75	Row crops, SR + CR, Good, HSG B
	1,682	75	Row crops, SR + CR, Good, HSG B
*	4,233	78	Meadow, non-grazed, HSG B/D
*	373	78	Meadow, non-grazed, HSG B/D
	7,091	58	Meadow, non-grazed, HSG B
	41,458	30	Meadow, non-grazed, HSG A
*	5,616	78	Meadow, non-grazed, HSG B/D
*	9,852	78	Meadow, non-grazed, HSG B/D
	7,745	71	Meadow, non-grazed, HSG C
*	16,892	58	Meadow, non-grazed, HSG B
*	359	58	Meadow, non-grazed, HSG B
*	8,647	30	Meadow, non-grazed, HSG A
*	519	71	Meadow, non-grazed, HSG C
*	10,561	58	Meadow, non-grazed, HSG B
*	929	71	Meadow, non-grazed, HSG C
*	816	71	Meadow, non-grazed, HSG C
*	1,967	58	Meadow, non-grazed, HSG B
	208,426	50	Weighted Average
	208,426		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0286	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
2.6	107	0.0191	0.69		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.8	198	0.0569	1.19		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	69	0.0158	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.6	66	0.1228	1.75		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
0.8	111	0.1218	2.44		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
1.4	105	0.0641	1.27		**Shallow Concentrated Flow, G-H** Woodland Kv= 5.0 fps
3.1	243	0.0349	1.31		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
3.3	243	0.0300	1.21		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
1.7	217	0.0961	2.17		**Shallow Concentrated Flow, J-K** Short Grass Pasture Kv= 7.0 fps
36.9	1,459	Total			

Subcatchment PDA-1B: PDA-1B (Undetained)



Summary for Subcatchment PDA-1C: PDA-1C (Undetained)

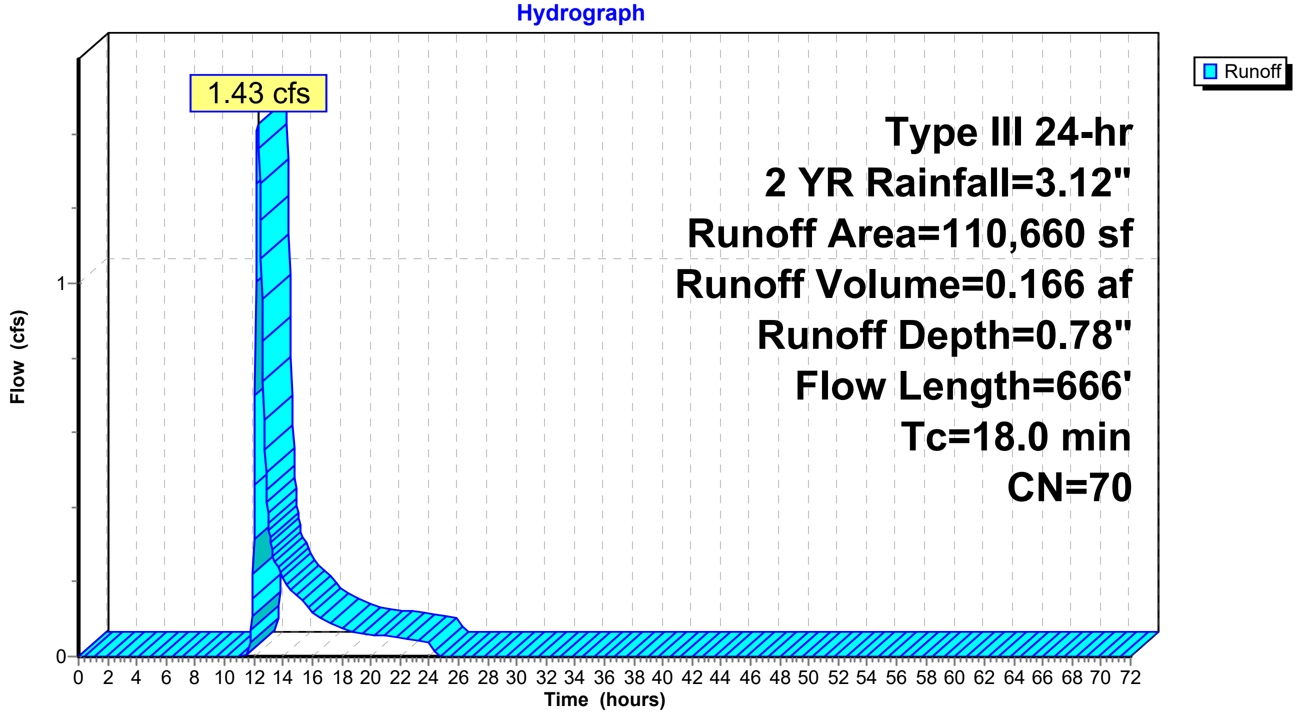
Runoff = 1.43 cfs @ 12.29 hrs, Volume= 0.166 af, Depth= 0.78"
Routed to Reach C1 : Open Channel 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
	4,799	55	Woods, Good, HSG B
*	9,011	77	Woods, Good, HSG B/D
*	22,795	55	Woods, Good, HSG B
	8,150	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	26,995	75	Row crops, SR + CR, Good, HSG B
*	5,920	65	Meadow, non-grazed, HSG B/C
*	1,273	58	Meadow, non-grazed, HSG B
*	2,035	78	Meadow, non-grazed, HSG B/D
*	7,568	65	Meadow, non-grazed, HSG B/C
	1,319	58	Meadow, non-grazed, HSG B
	110,660	70	Weighted Average
	110,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B**
					Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C**
					Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D**
					Woodland Kv= 5.0 fps
1.8	170	0.0314	1.59		**Shallow Concentrated Flow, D-E**
					Cultivated Straight Rows Kv= 9.0 fps
0.3	297	0.0500	19.79	89.06	**Channel Flow, E-F**
					Area= 4.5 sf Perim= 3.0' r= 1.50'
					n= 0.022 Earth, clean & straight
18.0	666	Total			

Subcatchment PDA-1C: PDA-1C (Undetained)



Summary for Subcatchment PDA-2A: PDA-2A (Detained)

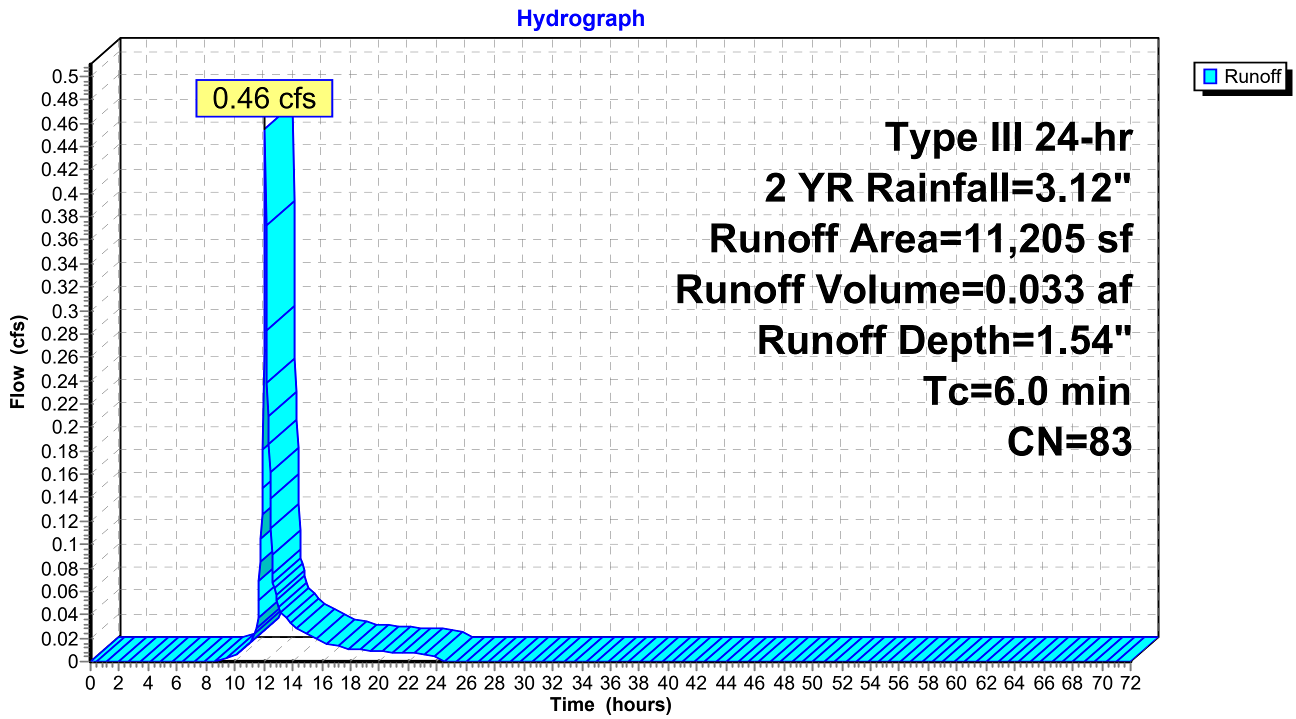
Runoff = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af, Depth= 1.54"
Routed to Pond 4P : Inf. Trench #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
*	6,167	98	Gravel Access Road
*	1,464	65	Meadow, non-grazed, HSG B/C
*	3,574	65	Meadow, non-grazed, HSG B/C
	11,205	83	Weighted Average
	5,038		44.96% Pervious Area
	6,167		55.04% Impervious Area

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

Subcatchment PDA-2A: PDA-2A (Detained)



Summary for Subcatchment PDA-2B: PDA-2B (Undetained)

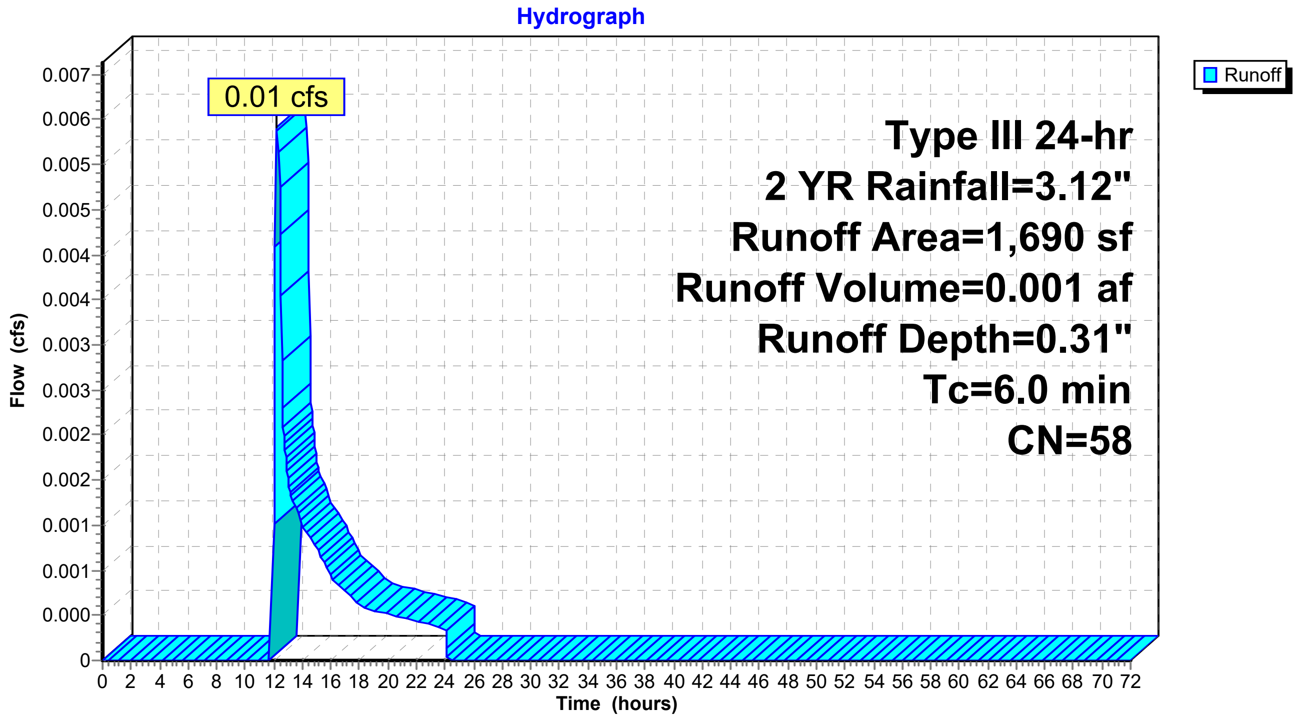
Runoff = 0.01 cfs @ 12.15 hrs, Volume= 0.001 af, Depth= 0.31"
Routed to Link DA-2 : Total DA-2 (AP-2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.12"

	Area (sf)	CN	Description
*	1,690	58	Meadow, non-grazed, HSG B
	1,690		100.00% Pervious Area

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

Subcatchment PDA-2B: PDA-2B (Undetained)



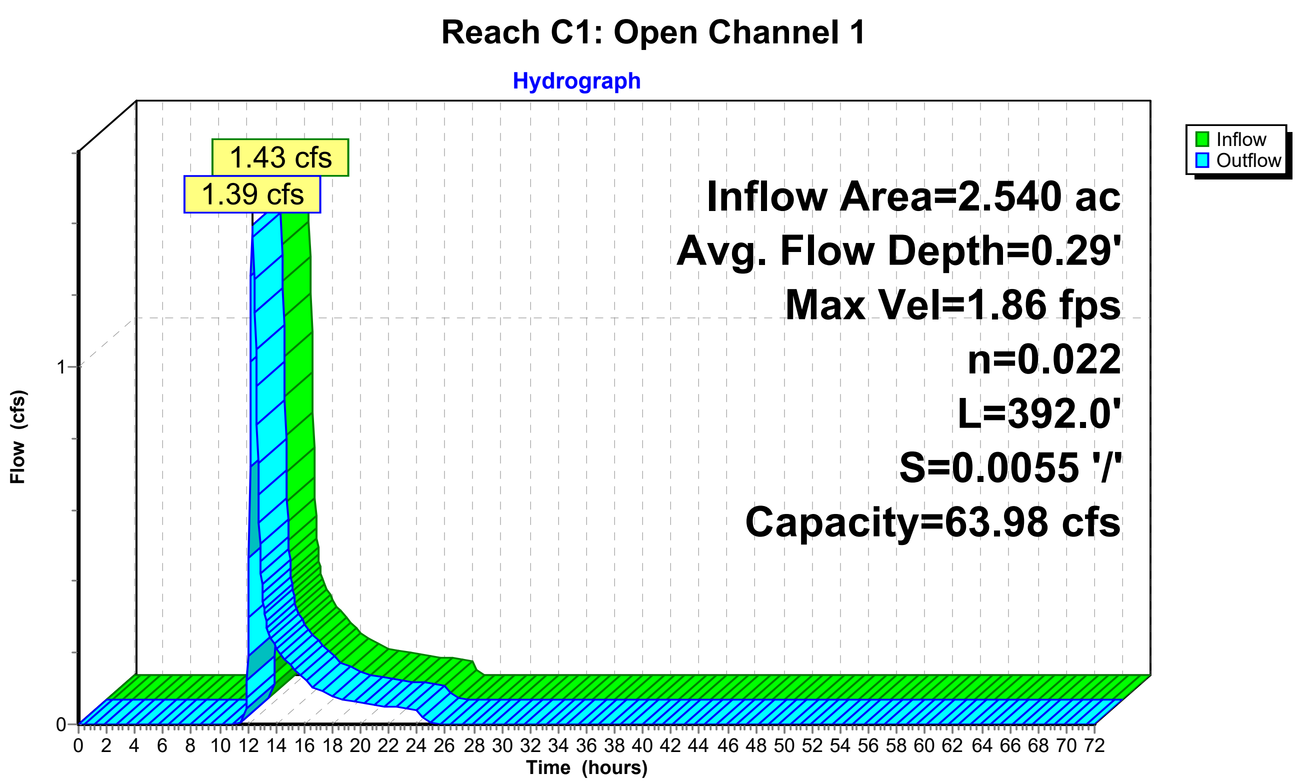
Summary for Reach C1: Open Channel 1

Inflow Area = 2.540 ac, 0.00% Impervious, Inflow Depth = 0.78" for 2 YR event
Inflow = 1.43 cfs @ 12.29 hrs, Volume= 0.166 af
Outflow = 1.39 cfs @ 12.33 hrs, Volume= 0.166 af, Atten= 2%, Lag= 2.9 min
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.86 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 0.72 fps, Avg. Travel Time= 9.0 min

Peak Storage= 293 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.29' , Surface Width= 3.16'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 63.98 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 392.0' Slope= 0.0055 '/'
Inlet Invert= 249.44', Outlet Invert= 247.28'



Stage-Area-Storage for Reach C1: Open Channel 1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
249.44	0.0	0	250.50	4.4	1,712
249.46	0.0	16	250.52	4.5	1,761
249.48	0.1	33	250.54	4.6	1,811
249.50	0.1	50	250.56	4.7	1,862
249.52	0.2	68	250.58	4.9	1,913
249.54	0.2	86	250.60	5.0	1,964
249.56	0.3	105	250.62	5.1	2,017
249.58	0.3	125	250.64	5.3	2,070
249.60	0.4	146	250.66	5.4	2,123
249.62	0.4	167	250.68	5.6	2,178
249.64	0.5	188	250.70	5.7	2,233
249.66	0.5	210	250.72	5.8	2,288
249.68	0.6	233	250.74	6.0	2,344
249.70	0.7	257	250.76	6.1	2,401
249.72	0.7	281	250.78	6.3	2,458
249.74	0.8	306	250.80	6.4	2,516
249.76	0.8	331	250.82	6.6	2,575
249.78	0.9	357	250.84	6.7	2,634
249.80	1.0	384	250.86	6.9	2,694
249.82	1.0	411	250.88	7.0	2,755
249.84	1.1	439	250.90	7.2	2,816
249.86	1.2	468	250.92	7.3	2,878
249.88	1.3	497	250.94	7.5	2,940
249.90	1.3	527	250.96	7.7	3,003
249.92	1.4	557	250.98	7.8	3,067
249.94	1.5	588	251.00	8.0	3,131
249.96	1.6	620	251.02	8.2	3,196
249.98	1.7	652	251.04	8.3	3,261
250.00	1.7	685	251.06	8.5	3,328
250.02	1.8	718	251.08	8.7	3,394
250.04	1.9	753	251.10	8.8	3,462
250.06	2.0	787	251.12	9.0	3,530
250.08	2.1	823	251.14	9.2	3,599
250.10	2.2	859	251.16	9.4	3,668
250.12	2.3	896	251.18	9.5	3,738
250.14	2.4	933	251.20	9.7	3,808
250.16	2.5	971	251.22	9.9	3,880
250.18	2.6	1,009	251.24	10.1	3,951
250.20	2.7	1,049	251.26	10.3	4,024
250.22	2.8	1,089	251.28	10.5	4,097
250.24	2.9	1,129	251.30	10.6	4,171
250.26	3.0	1,170	251.32	10.8	4,245
250.28	3.1	1,212	251.34	11.0	4,320
250.30	3.2	1,254	251.36	11.2	4,395
250.32	3.3	1,297	251.38	11.4	4,472
250.34	3.4	1,341	251.40	11.6	4,548
250.36	3.5	1,385	251.42	11.8	4,626
250.38	3.6	1,430	251.44	**12.0**	**4,704**
250.40	3.8	1,475			
250.42	3.9	1,521			
250.44	4.0	1,568			
250.46	4.1	1,615			
250.48	4.2	1,663			

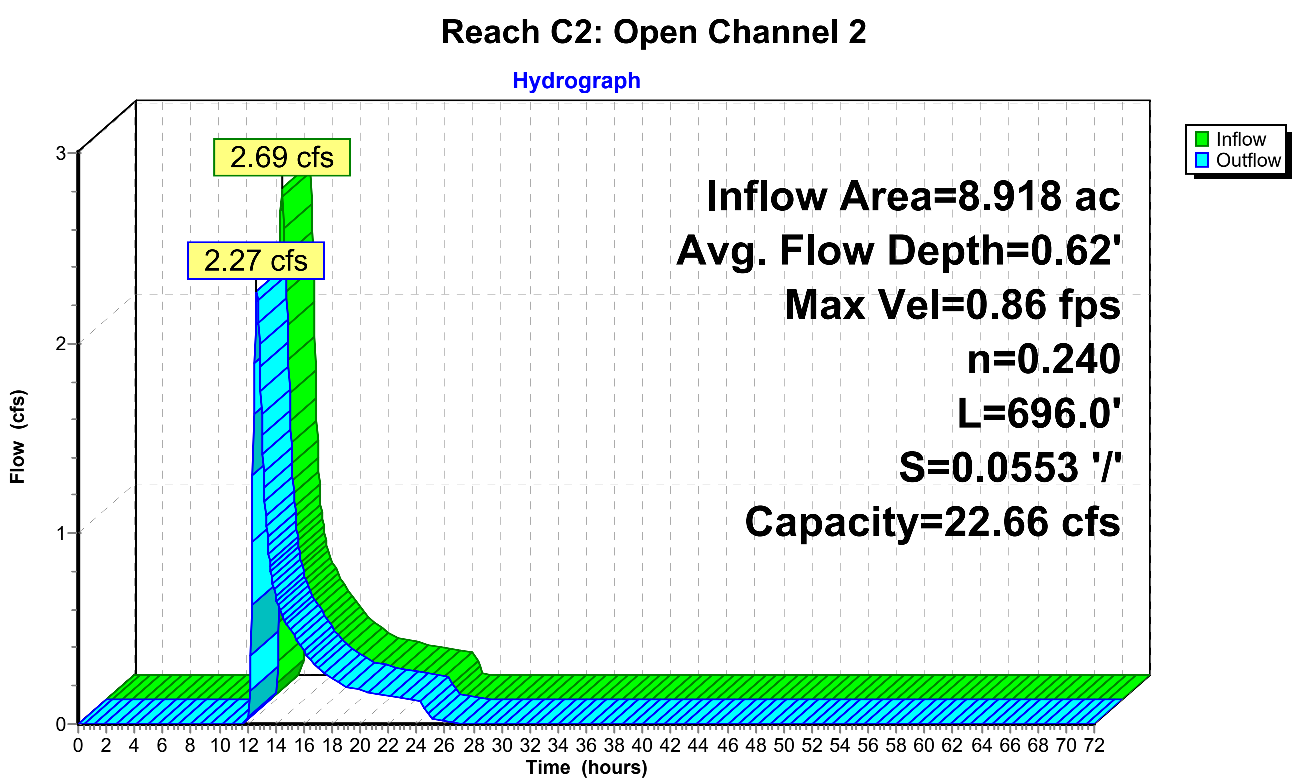
Summary for Reach C2: Open Channel 2

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 0.56" for 2 YR event
Inflow = 2.69 cfs @ 12.48 hrs, Volume= 0.418 af
Outflow = 2.27 cfs @ 12.67 hrs, Volume= 0.418 af, Atten= 15%, Lag= 11.3 min
Routed to Pond B-1 : Inf. Basin #1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.86 fps, Min. Travel Time= 13.5 min
Avg. Velocity = 0.28 fps, Avg. Travel Time= 42.1 min

Peak Storage= 1,834 cf @ 12.67 hrs
Average Depth at Peak Storage= 0.62' , Surface Width= 5.48'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 22.66 cfs

3.00' x 2.00' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 696.0' Slope= 0.0553 '/'
Inlet Invert= 286.00', Outlet Invert= 247.50'



Stage-Area-Storage for Reach C2: Open Channel 2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
286.00	0.0	0	287.06	5.4	3,777
286.02	0.1	42	287.08	5.6	3,879
286.04	0.1	86	287.10	5.7	3,981
286.06	0.2	130	287.12	5.9	4,085
286.08	0.3	176	287.14	6.0	4,189
286.10	0.3	223	287.16	6.2	4,295
286.12	0.4	271	287.18	6.3	4,402
286.14	0.5	320	287.20	6.5	4,510
286.16	0.5	370	287.22	6.6	4,619
286.18	0.6	421	287.24	6.8	4,729
286.20	0.7	473	287.26	7.0	4,841
286.22	0.8	527	287.28	7.1	4,953
286.24	0.8	581	287.30	7.3	5,067
286.26	0.9	637	287.32	7.4	5,182
286.28	1.0	694	287.34	7.6	5,297
286.30	1.1	752	287.36	7.8	5,414
286.32	1.2	811	287.38	7.9	5,532
286.34	1.3	871	287.40	8.1	5,652
286.36	1.3	932	287.42	8.3	5,772
286.38	1.4	994	287.44	8.5	5,893
286.40	1.5	1,058	287.46	8.6	6,016
286.42	1.6	1,123	287.48	8.8	6,139
286.44	1.7	1,188	287.50	9.0	6,264
286.46	1.8	1,255	287.52	9.2	6,390
286.48	1.9	1,323	287.54	9.4	6,517
286.50	2.0	1,392	287.56	9.5	6,645
286.52	2.1	1,462	287.58	9.7	6,774
286.54	2.2	1,533	287.60	9.9	6,904
286.56	2.3	1,606	287.62	10.1	7,036
286.58	2.4	1,679	287.64	10.3	7,168
286.60	2.5	1,754	287.66	10.5	7,302
286.62	2.6	1,830	287.68	10.7	7,437
286.64	2.7	1,906	287.70	10.9	7,572
286.66	2.9	1,984	287.72	11.1	7,709
286.68	3.0	2,064	287.74	11.3	7,848
286.70	3.1	2,144	287.76	11.5	7,987
286.72	3.2	2,225	287.78	11.7	8,127
286.74	3.3	2,307	287.80	11.9	8,268
286.76	3.4	2,391	287.82	12.1	8,411
286.78	3.6	2,476	287.84	12.3	8,555
286.80	3.7	2,561	287.86	12.5	8,699
286.82	3.8	2,648	287.88	12.7	8,845
286.84	3.9	2,736	287.90	12.9	8,992
286.86	4.1	2,825	287.92	13.1	9,140
286.88	4.2	2,915	287.94	13.3	9,290
286.90	4.3	3,007	287.96	13.6	9,440
286.92	4.5	3,099	287.98	13.8	9,591
286.94	4.6	3,193	288.00	**14.0**	**9,744**
286.96	4.7	3,287			
286.98	4.9	3,383			
287.00	5.0	3,480			
287.02	5.1	3,578			
287.04	5.3	3,677			

Summary for Pond 4P: Inf. Trench #1

Inflow Area = 0.257 ac, 55.04% Impervious, Inflow Depth = 1.54" for 2 YR event
Inflow = 0.46 cfs @ 12.09 hrs, Volume= 0.033 af
Outflow = 0.01 cfs @ 23.42 hrs, Volume= 0.026 af, Atten= 99%, Lag= 679.8 min
Discarded = 0.01 cfs @ 23.42 hrs, Volume= 0.026 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DA-2 : Total DA-2 (AP-2)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 248.83' @ 23.42 hrs Surf.Area= 2,050 sf Storage= 1,164 cf

Plug-Flow detention time= 1,585.3 min calculated for 0.026 af (77% of inflow)
Center-of-Mass det. time= 1,501.8 min (2,335.9 - 834.1)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	4,654 cf	**Infiltration Trench Contours (Prismatic)** Listed below (Recalc)

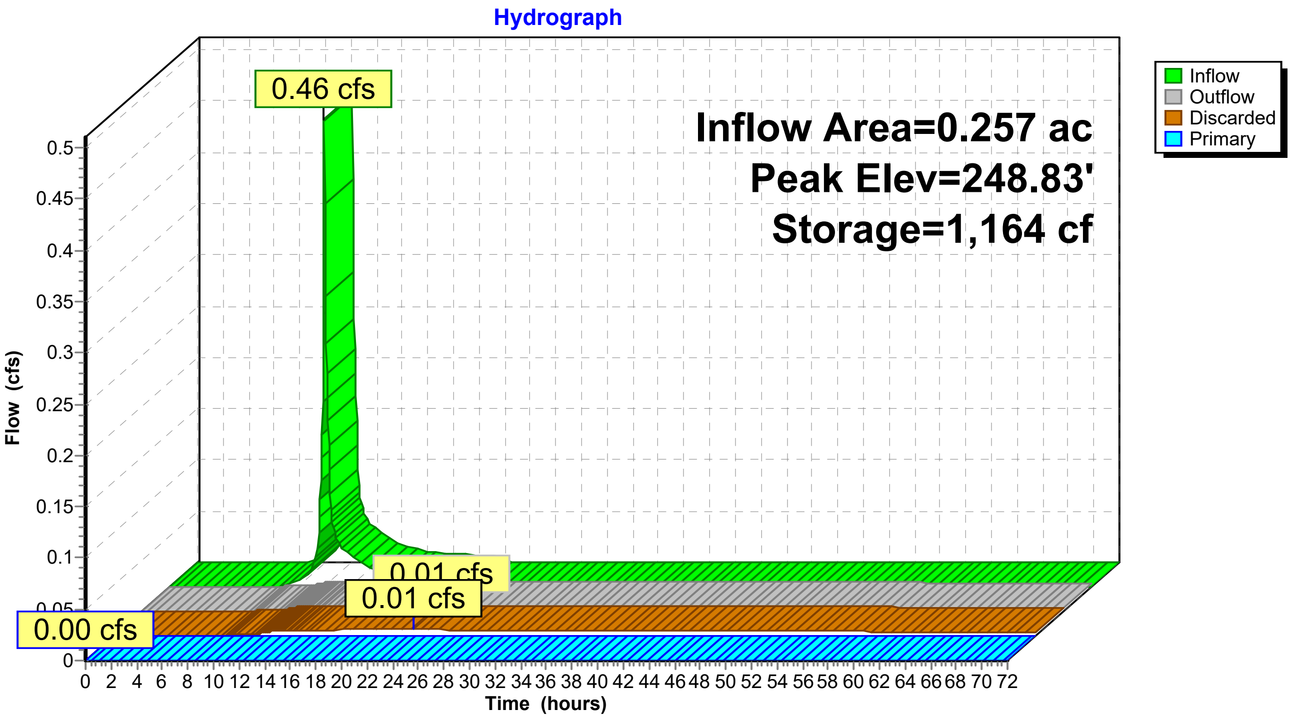
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	768	0	0
249.00	2,320	1,544	1,544
250.00	3,900	3,110	4,654

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.00'	**0.120 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 240.00'
#2	Primary	249.50'	**5.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.01 cfs @ 23.42 hrs HW=248.83' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=248.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 4P: Inf. Trench #1



Stage-Area-Storage for Pond 4P: Inf. Trench #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
248.00	768	0	249.06	2,415	1,686
248.02	799	16	249.08	2,446	1,735
248.04	830	32	249.10	2,478	1,784
248.06	861	49	249.12	2,510	1,834
248.08	892	66	249.14	2,541	1,884
248.10	923	85	249.16	2,573	1,935
248.12	954	103	249.18	2,604	1,987
248.14	985	123	249.20	2,636	2,040
248.16	1,016	143	249.22	2,668	2,093
248.18	1,047	163	249.24	2,699	2,146
248.20	1,078	185	249.26	2,731	2,201
248.22	1,109	207	249.28	2,762	2,256
248.24	1,140	229	249.30	2,794	2,311
248.26	1,172	252	249.32	2,826	2,367
248.28	1,203	276	249.34	2,857	2,424
248.30	1,234	300	249.36	2,889	2,482
248.32	1,265	325	249.38	2,920	2,540
248.34	1,296	351	249.40	2,952	2,598
248.36	1,327	377	249.42	2,984	2,658
248.38	1,358	404	249.44	3,015	2,718
248.40	1,389	431	249.46	3,047	2,778
248.42	1,420	459	249.48	3,078	2,840
248.44	1,451	488	249.50	3,110	2,902
248.46	1,482	517	249.52	3,142	2,964
248.48	1,513	547	249.54	3,173	3,027
248.50	1,544	578	249.56	3,205	3,091
248.52	1,575	609	249.58	3,236	3,155
248.54	1,606	641	249.60	3,268	3,220
248.56	1,637	673	249.62	3,300	3,286
248.58	1,668	706	249.64	3,331	3,352
248.60	1,699	740	249.66	3,363	3,419
248.62	1,730	774	249.68	3,394	3,487
248.64	1,761	809	249.70	3,426	3,555
248.66	1,792	845	249.72	3,458	3,624
248.68	1,823	881	249.74	3,489	3,693
248.70	1,854	918	249.76	3,521	3,764
248.72	1,885	955	249.78	3,552	3,834
248.74	1,916	993	249.80	3,584	3,906
248.76	1,948	1,032	249.82	3,616	3,978
248.78	1,979	1,071	249.84	3,647	4,050
248.80	2,010	1,111	249.86	3,679	4,123
248.82	2,041	1,152	249.88	3,710	4,197
248.84	2,072	1,193	249.90	3,742	4,272
248.86	2,103	1,234	249.92	3,774	4,347
248.88	2,134	1,277	249.94	3,805	4,423
248.90	2,165	1,320	249.96	3,837	4,499
248.92	2,196	1,363	249.98	3,868	4,576
248.94	2,227	1,408	250.00	**3,900**	**4,654**
248.96	2,258	1,452			
248.98	2,289	1,498			
249.00	2,320	1,544			
249.02	2,352	1,591			
249.04	2,383	1,638			

Summary for Pond B-1: Inf. Basin #1

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 0.56" for 2 YR event
Inflow = 2.27 cfs @ 12.67 hrs, Volume= 0.418 af
Outflow = 0.23 cfs @ 18.22 hrs, Volume= 0.243 af, Atten= 90%, Lag= 333.1 min
Discarded = 0.00 cfs @ 18.22 hrs, Volume= 0.016 af
Primary = 0.22 cfs @ 18.22 hrs, Volume= 0.227 af
Routed to Link DA-1 : Total DA-1 (AP-1)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 243.95' @ 18.22 hrs Surf.Area= 9,109 sf Storage= 11,635 cf

Plug-Flow detention time= 606.1 min calculated for 0.243 af (58% of inflow)
Center-of-Mass det. time= 464.9 min (1,404.8 - 939.9)

Volume	Invert	Avail.Storage	Storage Description
#1	242.50'	53,943 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
242.50	6,973	477.2	0	0	6,973
243.00	7,698	491.0	3,666	3,666	8,063
244.00	9,188	509.0	8,432	12,098	9,581
245.00	10,734	527.0	9,951	22,049	11,152
246.00	12,338	545.9	11,527	33,576	12,853
247.00	13,998	564.5	13,159	46,735	14,588
247.50	14,837	571.4	7,208	53,943	15,273

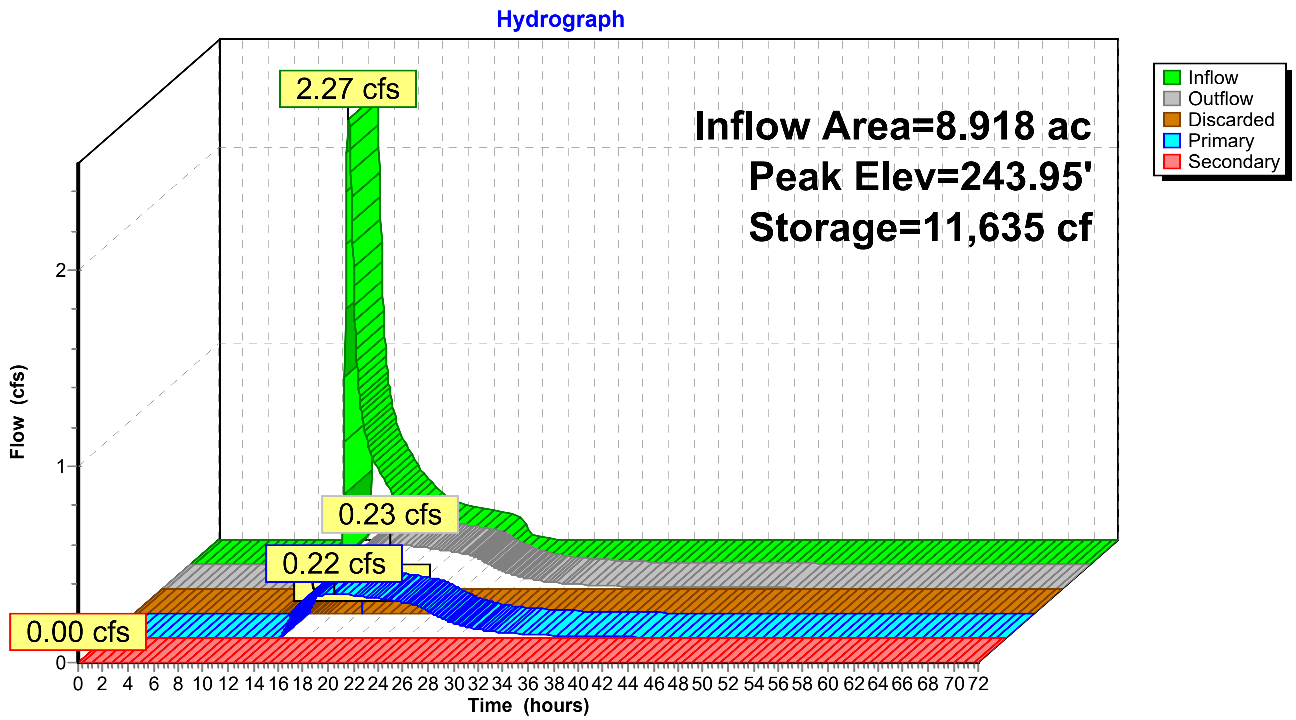
Device	Routing	Invert	Outlet Devices
#1	Primary	242.50'	**12.0" Round Culvert Barrel** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.50' / 242.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	243.50'	**4.0" Vert. Side Opening A** C= 0.600 Limited to weir flow at low heads
#3	Device 1	244.50'	**6.0" Vert. Side Opening B** C= 0.600 Limited to weir flow at low heads
#4	Device 1	245.50'	**24.0" Horiz. Top of Riser** C= 0.600 Limited to weir flow at low heads
#5	Secondary	246.50'	**20.0' long x 12.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#6	Discarded	242.50'	**0.015 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 232.00'

Discarded OutFlow Max=0.00 cfs @ 18.22 hrs HW=243.95' (Free Discharge)
└**6=Exfiltration** (Controls 0.00 cfs)

Primary OutFlow Max=0.22 cfs @ 18.22 hrs HW=243.95' TW=0.00' (Dynamic Tailwater)
└**1=Culvert Barrel** (Passes 0.22 cfs of 2.91 cfs potential flow)
  ├**2=Side Opening A** (Orifice Controls 0.22 cfs @ 2.56 fps)
  ├**3=Side Opening B** (Controls 0.00 cfs)
  └**4=Top of Riser** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=242.50' TW=0.00' (Dynamic Tailwater)
└**5=Emergency Spillway** (Controls 0.00 cfs)

Pond B-1: Inf. Basin #1



Stage-Area-Storage for Pond B-1: Inf. Basin #1

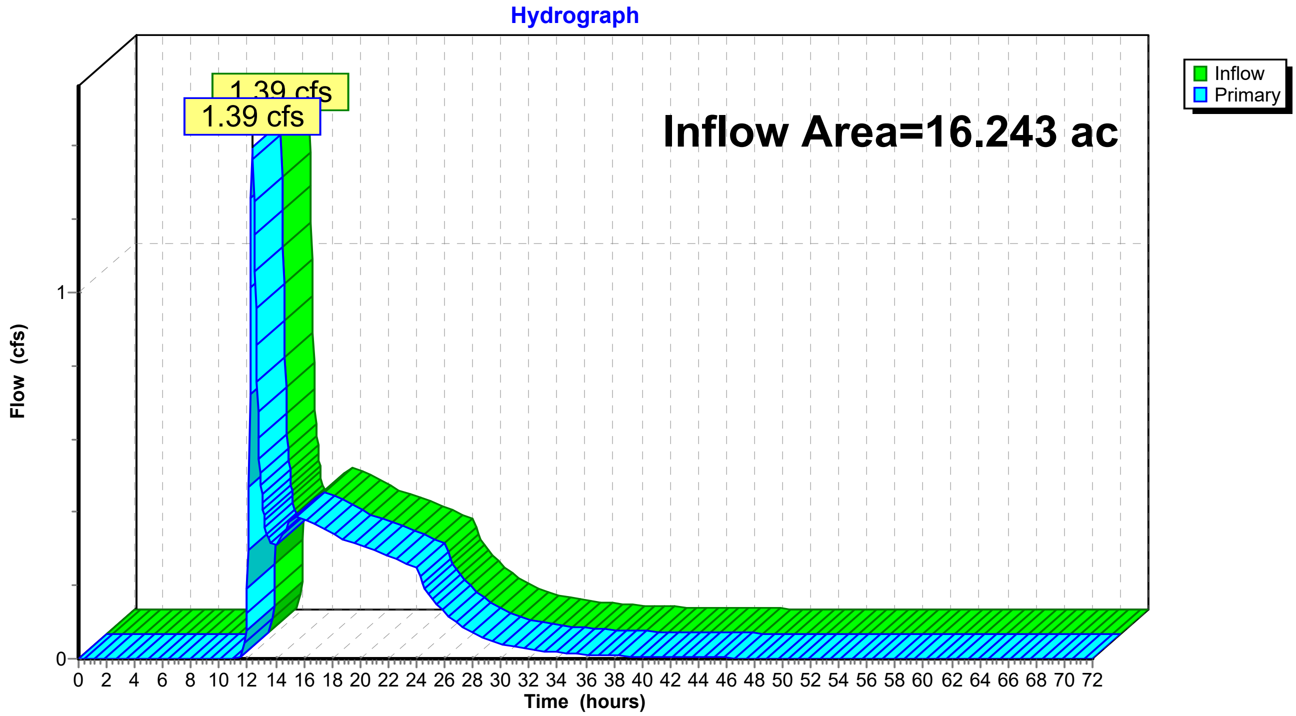
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
242.50	6,973	0	245.15	10,967	23,677
242.55	7,044	350	245.20	11,046	24,227
242.60	7,115	704	245.25	11,125	24,781
242.65	7,187	1,062	245.30	11,203	25,340
242.70	7,259	1,423	245.35	11,283	25,902
242.75	7,331	1,788	245.40	11,362	26,468
242.80	7,404	2,156	245.45	11,442	27,038
242.85	7,477	2,528	245.50	11,522	27,612
242.90	7,550	2,904	245.55	11,602	28,190
242.95	7,624	3,283	245.60	11,683	28,772
243.00	7,698	3,666	245.65	11,764	29,359
243.05	7,769	4,053	245.70	11,845	29,949
243.10	7,841	4,443	245.75	11,927	30,543
243.15	7,913	4,837	245.80	12,008	31,141
243.20	7,985	5,235	245.85	12,090	31,744
243.25	8,058	5,636	245.90	12,173	32,350
243.30	8,131	6,040	245.95	12,255	32,961
243.35	8,205	6,449	246.00	12,338	33,576
243.40	8,278	6,861	246.05	12,419	34,195
243.45	8,352	7,277	246.10	12,499	34,818
243.50	8,427	7,696	246.15	12,580	35,445
243.55	8,501	8,119	246.20	12,662	36,076
243.60	8,576	8,546	246.25	12,743	36,711
243.65	8,652	8,977	246.30	12,825	37,350
243.70	8,727	9,411	246.35	12,907	37,993
243.75	8,803	9,850	246.40	12,989	38,641
243.80	8,879	10,292	246.45	13,072	39,292
243.85	8,956	10,738	246.50	13,155	39,948
243.90	9,033	11,187	246.55	13,238	40,608
243.95	9,110	11,641	246.60	13,321	41,272
244.00	9,188	12,098	246.65	13,405	41,940
244.05	9,262	12,560	246.70	13,489	42,612
244.10	9,337	13,025	246.75	13,573	43,289
244.15	9,412	13,493	246.80	13,658	43,970
244.20	9,488	13,966	246.85	13,742	44,655
244.25	9,563	14,442	246.90	13,827	45,344
244.30	9,639	14,922	246.95	13,913	46,037
244.35	9,715	15,406	247.00	13,998	46,735
244.40	9,792	15,894	247.05	14,081	47,437
244.45	9,869	16,385	247.10	14,164	48,143
244.50	9,946	16,881	247.15	14,247	48,854
244.55	10,023	17,380	247.20	14,331	49,568
244.60	10,101	17,883	247.25	14,414	50,287
244.65	10,179	18,390	247.30	14,498	51,009
244.70	10,258	18,901	247.35	14,583	51,737
244.75	10,336	19,416	247.40	14,667	52,468
244.80	10,415	19,934	247.45	14,752	53,203
244.85	10,494	20,457	247.50	**14,837**	**53,943**
244.90	10,574	20,984			
244.95	10,654	21,515			
245.00	10,734	22,049			
245.05	10,812	22,588			
245.10	10,889	23,130			

Summary for Link DA-1: Total DA-1 (AP-1)

Inflow Area =	16.243 ac,	0.20% Impervious,	Inflow Depth = 0.32"	for 2 YR event
Inflow =	1.39 cfs @	12.33 hrs, Volume=	0.437 af	
Primary =	1.39 cfs @	12.33 hrs, Volume=	0.437 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DA-1: Total DA-1 (AP-1)

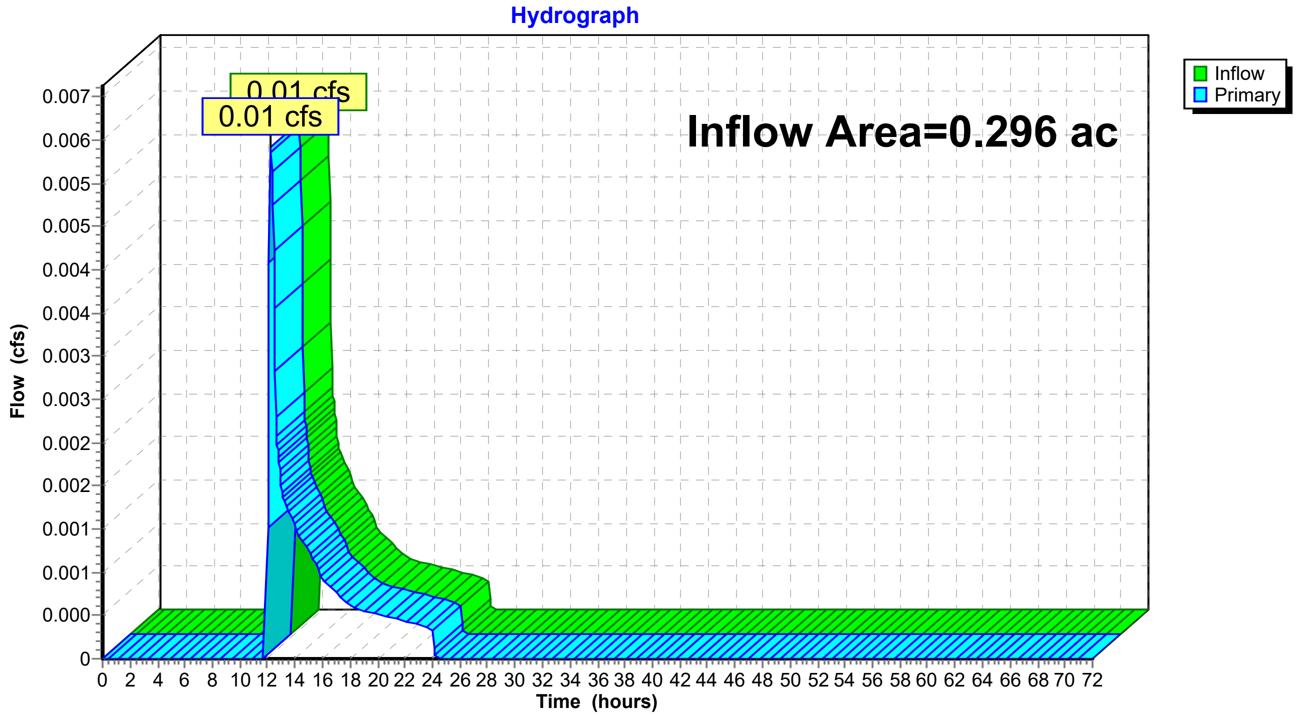


Summary for Link DA-2: Total DA-2 (AP-2)

Inflow Area =	0.296 ac, 47.82% Impervious, Inflow Depth = 0.04"	for 2 YR event
Inflow =	0.01 cfs @ 12.15 hrs, Volume=	0.001 af
Primary =	0.01 cfs @ 12.15 hrs, Volume=	0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DA-2: Total DA-2 (AP-2)



Summary for Subcatchment PDA-1A: PDA-1A (Detained)

Runoff = 14.31 cfs @ 12.40 hrs, Volume= 1.774 af, Depth= 2.39"
Routed to Reach C2 : Open Channel 2

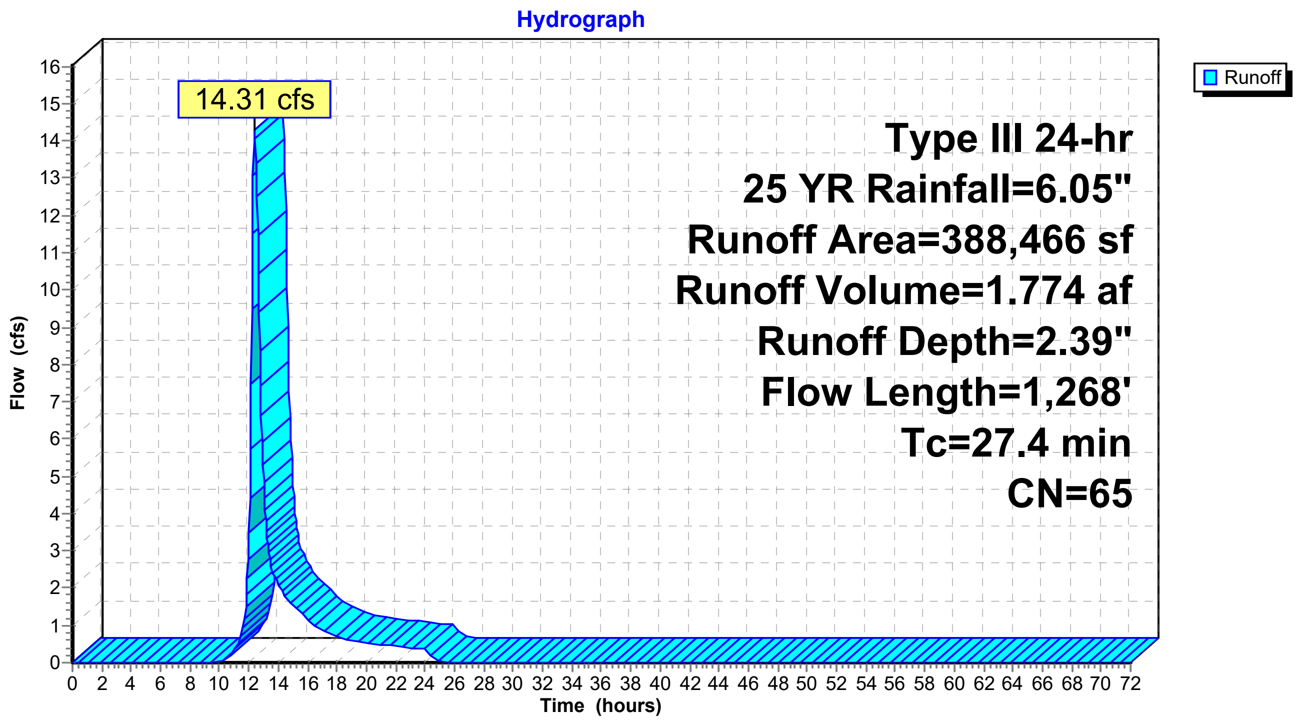
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
*	1,139	30	Woods, Good, HSG A
*	32,943	55	Woods, Good, HSG B
*	7,723	55	Woods, Good, HSG B
	30,167	55	Woods, Good, HSG B
*	21,016	55	Woods, Good, HSG B
	65,261	78	Meadow, non-grazed, HSG D
*	29,208	65	Meadow, non-grazed, HSG B/C
*	6,046	71	Meadow, non-grazed, HSG C
	10,920	78	Meadow, non-grazed, HSG D
*	5,769	65	Meadow, non-grazed, HSG B/C
*	11,310	65	Meadow, non-grazed, HSG B/C
	13,479	58	Meadow, non-grazed, HSG B
*	68,974	65	Meadow, non-grazed, HSG B/C
*	64,248	65	Meadow, non-grazed, HSG B/C
*	18,308	71	Meadow, non-grazed, HSG C
*	559	58	Meadow, non-grazed, HSG B
*	1,096	98	Gravel surface
*	300	98	Concrete Equipment Pad
	388,466	65	Weighted Average
	387,070		99.64% Pervious Area
	1,396		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0450	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.9	55	0.0437	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.8	147	0.0948	3.08		**Shallow Concentrated Flow, C-D** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0551	2.35		**Shallow Concentrated Flow, D-E** Nearly Bare & Untilled Kv= 10.0 fps
0.3	79	0.1480	3.85		**Shallow Concentrated Flow, E-F** Nearly Bare & Untilled Kv= 10.0 fps
1.2	154	0.0728	2.17	48.82	**Channel Flow, G-H** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
3.6	320	0.0335	1.47	33.12	**Channel Flow, H-I** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
4.3	278	0.0168	1.07	26.97	**Channel Flow, H-J** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.240 Sheet flow over Dense Grass

0.0	48	0.1899	21.15	530.82	**Channel Flow, J-K** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.041 Riprap, 2-inch
27.4	1,268	Total			

Subcatchment PDA-1A: PDA-1A (Detained)



Summary for Subcatchment PDA-1B: PDA-1B (Undetained)

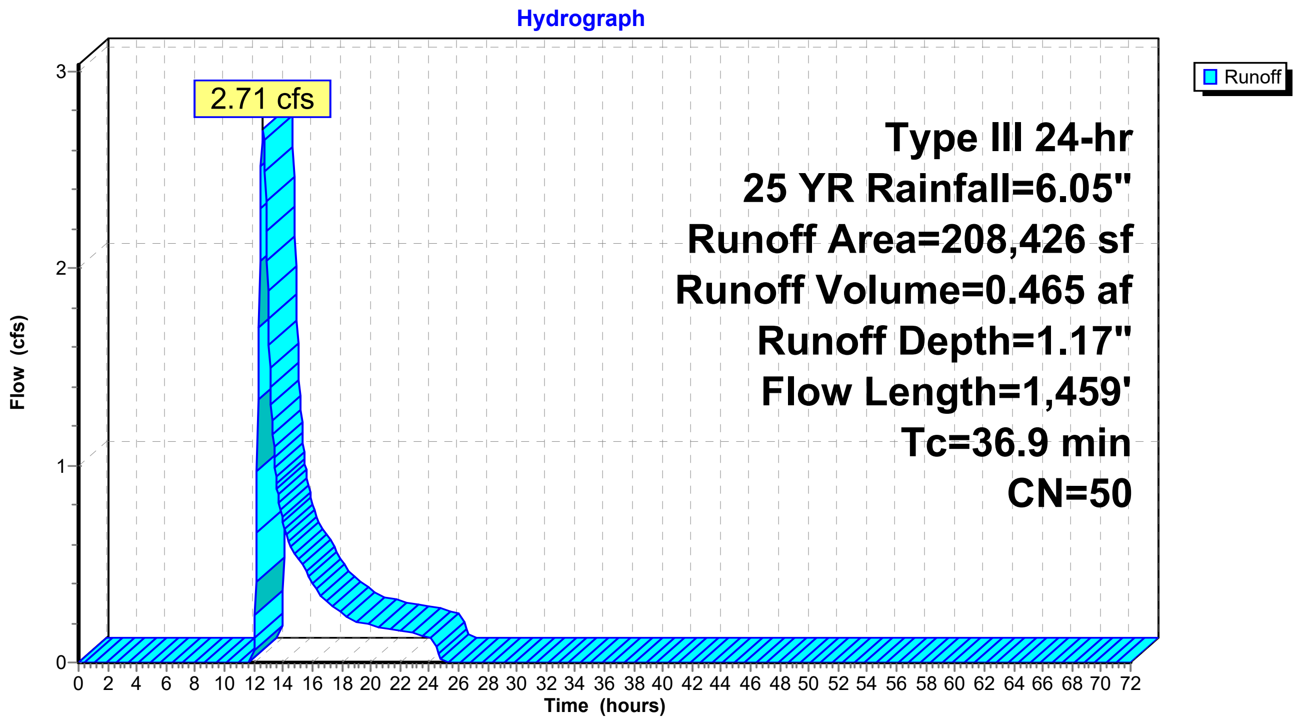
Runoff = 2.71 cfs @ 12.62 hrs, Volume= 0.465 af, Depth= 1.17"
Routed to Link DA-1 : Total DA-1 (AP-1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
	27,431	30	Woods, Good, HSG A
	20,927	55	Woods, Good, HSG B
	13,171	30	Woods, Good, HSG A
*	15,069	77	Woods, Good, HSG B/D
	4,514	55	Woods, Good, HSG B
	541	55	Woods, Good, HSG B
	8,033	75	Row crops, SR + CR, Good, HSG B
	1,682	75	Row crops, SR + CR, Good, HSG B
*	4,233	78	Meadow, non-grazed, HSG B/D
*	373	78	Meadow, non-grazed, HSG B/D
	7,091	58	Meadow, non-grazed, HSG B
	41,458	30	Meadow, non-grazed, HSG A
*	5,616	78	Meadow, non-grazed, HSG B/D
*	9,852	78	Meadow, non-grazed, HSG B/D
	7,745	71	Meadow, non-grazed, HSG C
*	16,892	58	Meadow, non-grazed, HSG B
*	359	58	Meadow, non-grazed, HSG B
*	8,647	30	Meadow, non-grazed, HSG A
*	519	71	Meadow, non-grazed, HSG C
*	10,561	58	Meadow, non-grazed, HSG B
*	929	71	Meadow, non-grazed, HSG C
*	816	71	Meadow, non-grazed, HSG C
*	1,967	58	Meadow, non-grazed, HSG B
	208,426	50	Weighted Average
	208,426		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0286	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
2.6	107	0.0191	0.69		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.8	198	0.0569	1.19		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	69	0.0158	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.6	66	0.1228	1.75		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
0.8	111	0.1218	2.44		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
1.4	105	0.0641	1.27		**Shallow Concentrated Flow, G-H** Woodland Kv= 5.0 fps
3.1	243	0.0349	1.31		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
3.3	243	0.0300	1.21		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
1.7	217	0.0961	2.17		**Shallow Concentrated Flow, J-K** Short Grass Pasture Kv= 7.0 fps
36.9	1,459	Total			

Subcatchment PDA-1B: PDA-1B (Undetained)



Summary for Subcatchment PDA-1C: PDA-1C (Undetained)

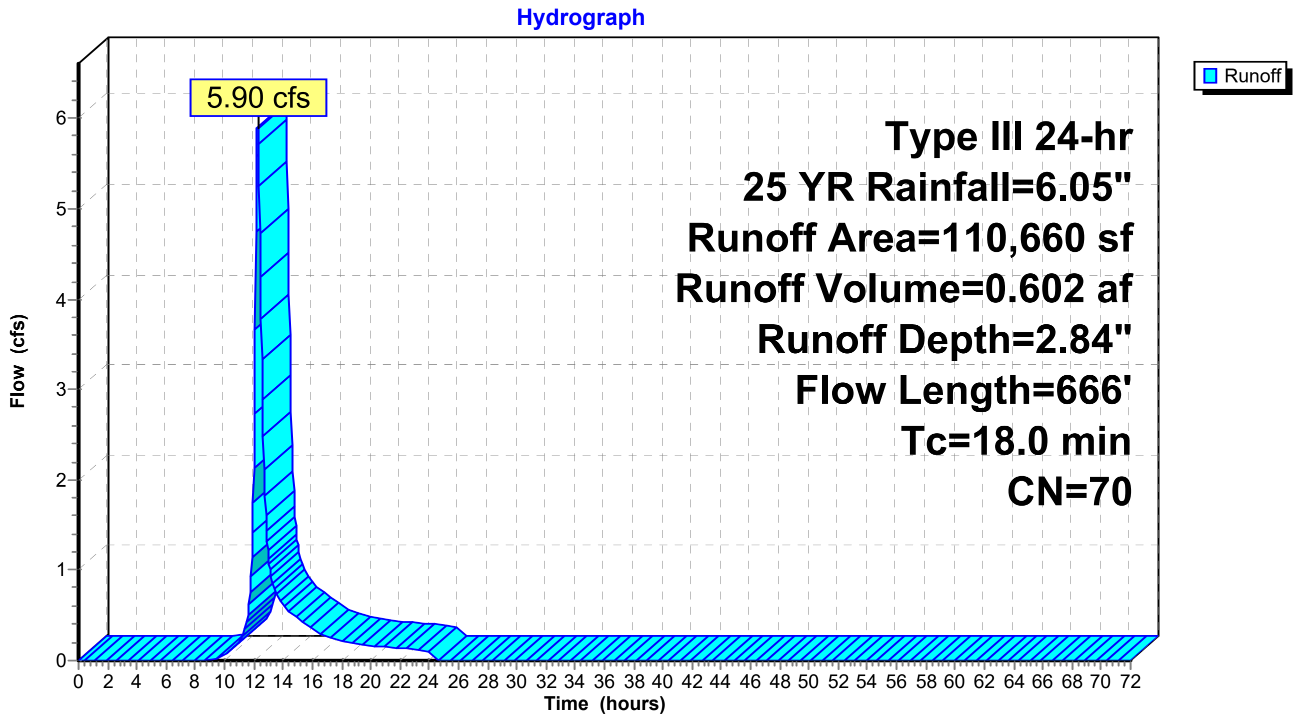
Runoff = 5.90 cfs @ 12.26 hrs, Volume= 0.602 af, Depth= 2.84"
Routed to Reach C1 : Open Channel 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
	4,799	55	Woods, Good, HSG B
*	9,011	77	Woods, Good, HSG B/D
*	22,795	55	Woods, Good, HSG B
	8,150	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	26,995	75	Row crops, SR + CR, Good, HSG B
*	5,920	65	Meadow, non-grazed, HSG B/C
*	1,273	58	Meadow, non-grazed, HSG B
*	2,035	78	Meadow, non-grazed, HSG B/D
*	7,568	65	Meadow, non-grazed, HSG B/C
	1,319	58	Meadow, non-grazed, HSG B
	110,660	70	Weighted Average
	110,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	170	0.0314	1.59		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
0.3	297	0.0500	19.79	89.06	**Channel Flow, E-F** Area= 4.5 sf Perim= 3.0' r= 1.50' n= 0.022 Earth, clean & straight
18.0	666	Total			

Subcatchment PDA-1C: PDA-1C (Undetained)



Summary for Subcatchment PDA-2A: PDA-2A (Detained)

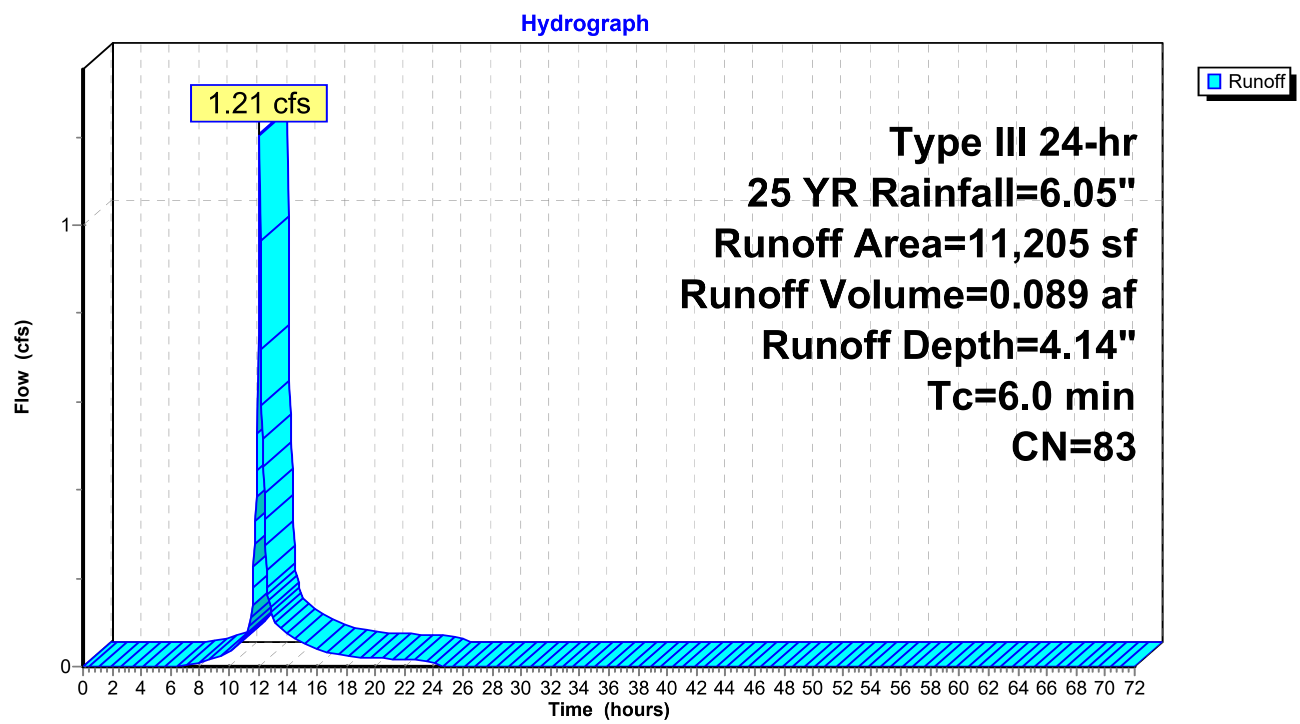
Runoff = 1.21 cfs @ 12.09 hrs, Volume= 0.089 af, Depth= 4.14"
Routed to Pond 4P : Inf. Trench #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
*	6,167	98	Gravel Access Road
*	1,464	65	Meadow, non-grazed, HSG B/C
*	3,574	65	Meadow, non-grazed, HSG B/C
	11,205	83	Weighted Average
	5,038		44.96% Pervious Area
	6,167		55.04% Impervious Area

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

Subcatchment PDA-2A: PDA-2A (Detained)



Summary for Subcatchment PDA-2B: PDA-2B (Undetained)

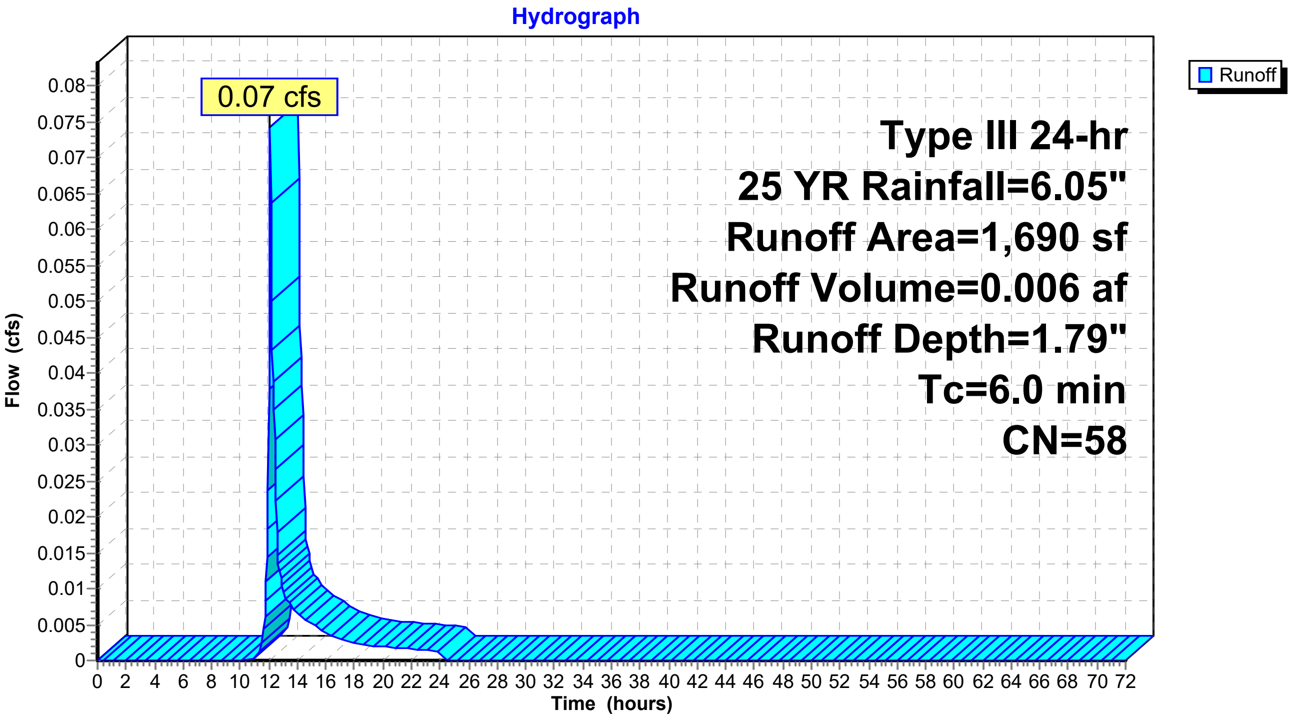
Runoff = 0.07 cfs @ 12.10 hrs, Volume= 0.006 af, Depth= 1.79"
Routed to Link DA-2 : Total DA-2 (AP-2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=6.05"

	Area (sf)	CN	Description
*	1,690	58	Meadow, non-grazed, HSG B
	1,690		100.00% Pervious Area

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

Subcatchment PDA-2B: PDA-2B (Undetained)



Summary for Reach C1: Open Channel 1

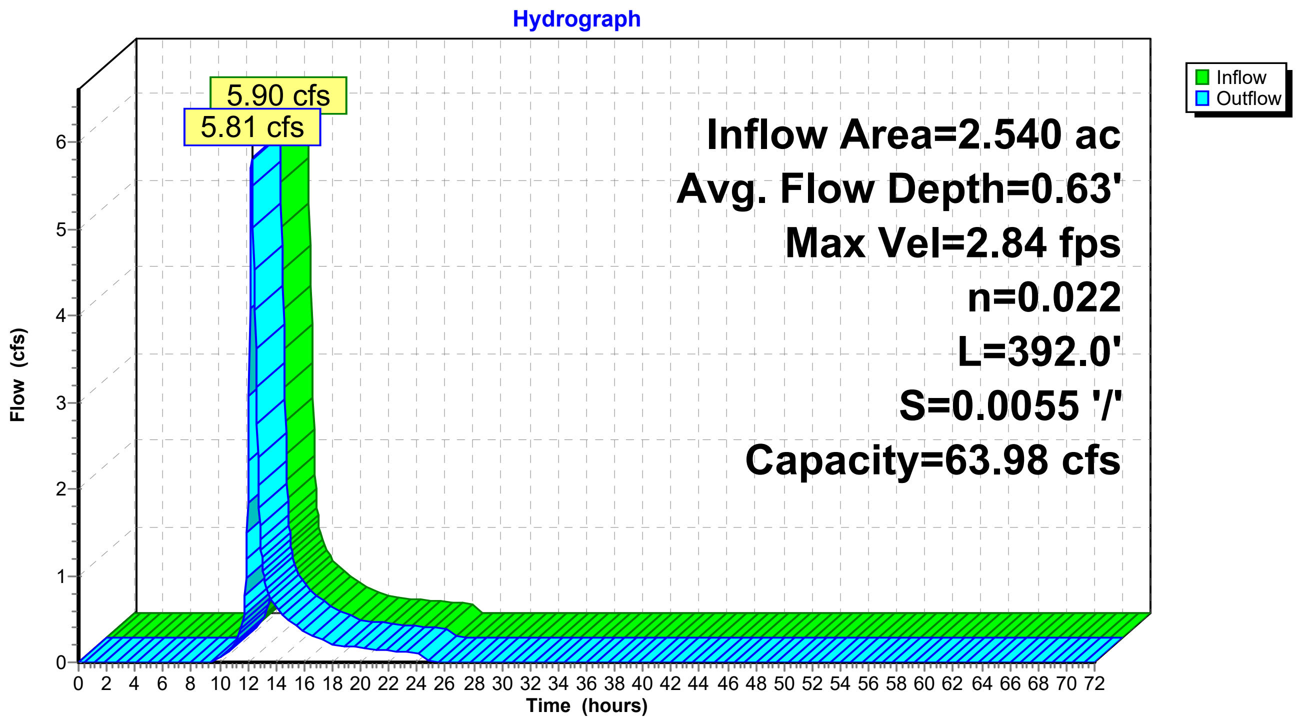
Inflow Area = 2.540 ac, 0.00% Impervious, Inflow Depth = 2.84" for 25 YR event
Inflow = 5.90 cfs @ 12.26 hrs, Volume= 0.602 af
Outflow = 5.81 cfs @ 12.29 hrs, Volume= 0.602 af, Atten= 1%, Lag= 1.9 min
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.84 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 1.01 fps, Avg. Travel Time= 6.5 min

Peak Storage= 803 cf @ 12.29 hrs
Average Depth at Peak Storage= 0.63' , Surface Width= 4.51'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 63.98 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 392.0' Slope= 0.0055 '/'
Inlet Invert= 249.44', Outlet Invert= 247.28'

Reach C1: Open Channel 1



Stage-Area-Storage for Reach C1: Open Channel 1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
249.44	0.0	0	250.50	4.4	1,712
249.46	0.0	16	250.52	4.5	1,761
249.48	0.1	33	250.54	4.6	1,811
249.50	0.1	50	250.56	4.7	1,862
249.52	0.2	68	250.58	4.9	1,913
249.54	0.2	86	250.60	5.0	1,964
249.56	0.3	105	250.62	5.1	2,017
249.58	0.3	125	250.64	5.3	2,070
249.60	0.4	146	250.66	5.4	2,123
249.62	0.4	167	250.68	5.6	2,178
249.64	0.5	188	250.70	5.7	2,233
249.66	0.5	210	250.72	5.8	2,288
249.68	0.6	233	250.74	6.0	2,344
249.70	0.7	257	250.76	6.1	2,401
249.72	0.7	281	250.78	6.3	2,458
249.74	0.8	306	250.80	6.4	2,516
249.76	0.8	331	250.82	6.6	2,575
249.78	0.9	357	250.84	6.7	2,634
249.80	1.0	384	250.86	6.9	2,694
249.82	1.0	411	250.88	7.0	2,755
249.84	1.1	439	250.90	7.2	2,816
249.86	1.2	468	250.92	7.3	2,878
249.88	1.3	497	250.94	7.5	2,940
249.90	1.3	527	250.96	7.7	3,003
249.92	1.4	557	250.98	7.8	3,067
249.94	1.5	588	251.00	8.0	3,131
249.96	1.6	620	251.02	8.2	3,196
249.98	1.7	652	251.04	8.3	3,261
250.00	1.7	685	251.06	8.5	3,328
250.02	1.8	718	251.08	8.7	3,394
250.04	1.9	753	251.10	8.8	3,462
250.06	2.0	787	251.12	9.0	3,530
250.08	2.1	823	251.14	9.2	3,599
250.10	2.2	859	251.16	9.4	3,668
250.12	2.3	896	251.18	9.5	3,738
250.14	2.4	933	251.20	9.7	3,808
250.16	2.5	971	251.22	9.9	3,880
250.18	2.6	1,009	251.24	10.1	3,951
250.20	2.7	1,049	251.26	10.3	4,024
250.22	2.8	1,089	251.28	10.5	4,097
250.24	2.9	1,129	251.30	10.6	4,171
250.26	3.0	1,170	251.32	10.8	4,245
250.28	3.1	1,212	251.34	11.0	4,320
250.30	3.2	1,254	251.36	11.2	4,395
250.32	3.3	1,297	251.38	11.4	4,472
250.34	3.4	1,341	251.40	11.6	4,548
250.36	3.5	1,385	251.42	11.8	4,626
250.38	3.6	1,430	251.44	**12.0**	**4,704**
250.40	3.8	1,475			
250.42	3.9	1,521			
250.44	4.0	1,568			
250.46	4.1	1,615			
250.48	4.2	1,663			

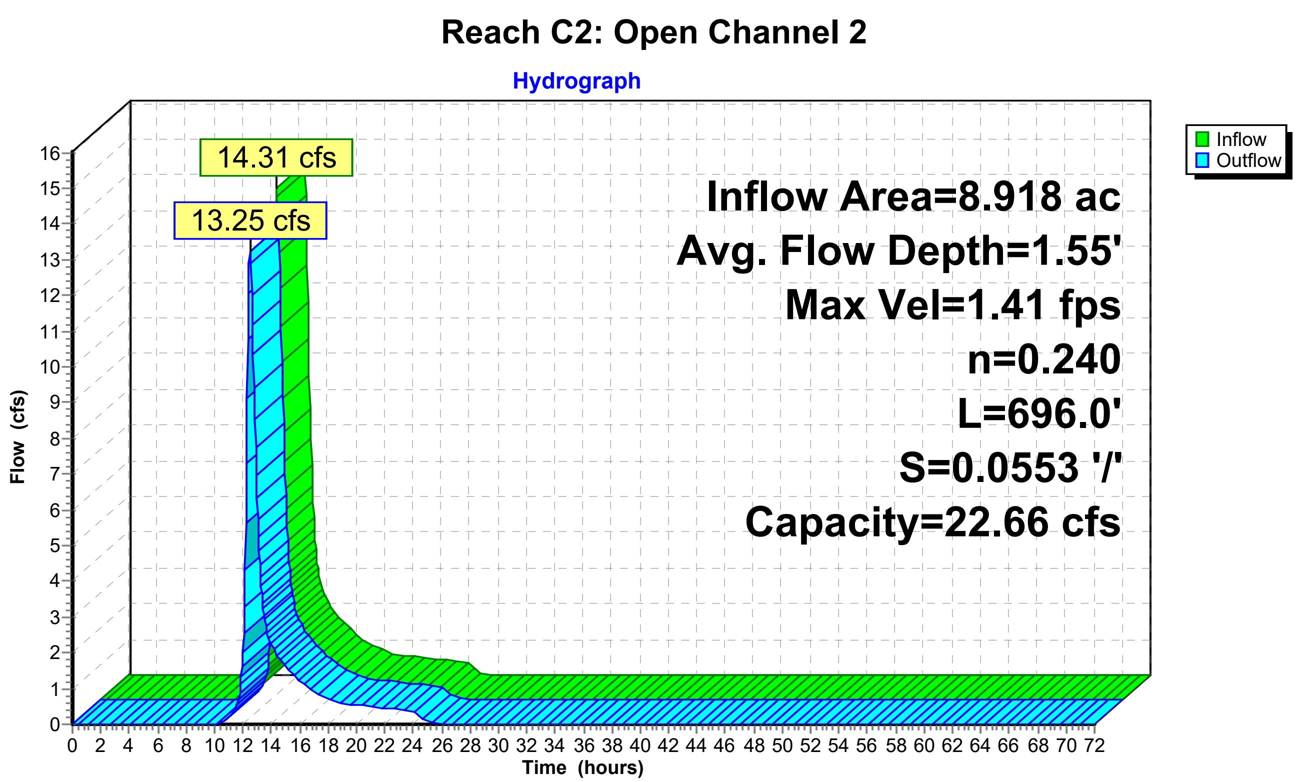
Summary for Reach C2: Open Channel 2

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 2.39" for 25 YR event
Inflow = 14.31 cfs @ 12.40 hrs, Volume= 1.774 af
Outflow = 13.25 cfs @ 12.51 hrs, Volume= 1.774 af, Atten= 7%, Lag= 6.6 min
Routed to Pond B-1 : Inf. Basin #1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.41 fps, Min. Travel Time= 8.2 min
Avg. Velocity = 0.38 fps, Avg. Travel Time= 30.1 min

Peak Storage= 6,554 cf @ 12.51 hrs
Average Depth at Peak Storage= 1.55' , Surface Width= 9.18'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 22.66 cfs

3.00' x 2.00' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 696.0' Slope= 0.0553 '/'
Inlet Invert= 286.00', Outlet Invert= 247.50'



Stage-Area-Storage for Reach C2: Open Channel 2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
286.00	0.0	0
286.02	0.1	42
286.04	0.1	86
286.06	0.2	130
286.08	0.3	176
286.10	0.3	223
286.12	0.4	271
286.14	0.5	320
286.16	0.5	370
286.18	0.6	421
286.20	0.7	473
286.22	0.8	527
286.24	0.8	581
286.26	0.9	637
286.28	1.0	694
286.30	1.1	752
286.32	1.2	811
286.34	1.3	871
286.36	1.3	932
286.38	1.4	994
286.40	1.5	1,058
286.42	1.6	1,123
286.44	1.7	1,188
286.46	1.8	1,255
286.48	1.9	1,323
286.50	2.0	1,392
286.52	2.1	1,462
286.54	2.2	1,533
286.56	2.3	1,606
286.58	2.4	1,679
286.60	2.5	1,754
286.62	2.6	1,830
286.64	2.7	1,906
286.66	2.9	1,984
286.68	3.0	2,064
286.70	3.1	2,144
286.72	3.2	2,225
286.74	3.3	2,307
286.76	3.4	2,391
286.78	3.6	2,476
286.80	3.7	2,561
286.82	3.8	2,648
286.84	3.9	2,736
286.86	4.1	2,825
286.88	4.2	2,915
286.90	4.3	3,007
286.92	4.5	3,099
286.94	4.6	3,193
286.96	4.7	3,287
286.98	4.9	3,383
287.00	5.0	3,480
287.02	5.1	3,578
287.04	5.3	3,677
287.06	5.4	3,777
287.08	5.6	3,879
287.10	5.7	3,981
287.12	5.9	4,085
287.14	6.0	4,189
287.16	6.2	4,295
287.18	6.3	4,402
287.20	6.5	4,510
287.22	6.6	4,619
287.24	6.8	4,729
287.26	7.0	4,841
287.28	7.1	4,953
287.30	7.3	5,067
287.32	7.4	5,182
287.34	7.6	5,297
287.36	7.8	5,414
287.38	7.9	5,532
287.40	8.1	5,652
287.42	8.3	5,772
287.44	8.5	5,893
287.46	8.6	6,016
287.48	8.8	6,139
287.50	9.0	6,264
287.52	9.2	6,390
287.54	9.4	6,517
287.56	9.5	6,645
287.58	9.7	6,774
287.60	9.9	6,904
287.62	10.1	7,036
287.64	10.3	7,168
287.66	10.5	7,302
287.68	10.7	7,437
287.70	10.9	7,572
287.72	11.1	7,709
287.74	11.3	7,848
287.76	11.5	7,987
287.78	11.7	8,127
287.80	11.9	8,268
287.82	12.1	8,411
287.84	12.3	8,555
287.86	12.5	8,699
287.88	12.7	8,845
287.90	12.9	8,992
287.92	13.1	9,140
287.94	13.3	9,290
287.96	13.6	9,440
287.98	13.8	9,591
288.00	**14.0**	**9,744**

Summary for Pond 4P: Inf. Trench #1

Inflow Area = 0.257 ac, 55.04% Impervious, Inflow Depth = 4.14" for 25 YR event
Inflow = 1.21 cfs @ 12.09 hrs, Volume= 0.089 af
Outflow = 0.04 cfs @ 15.69 hrs, Volume= 0.054 af, Atten= 96%, Lag= 216.1 min
Discarded = 0.01 cfs @ 15.69 hrs, Volume= 0.043 af
Primary = 0.03 cfs @ 15.69 hrs, Volume= 0.011 af
Routed to Link DA-2 : Total DA-2 (AP-2)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 249.52' @ 15.69 hrs Surf.Area= 3,140 sf Storage= 2,961 cf

Plug-Flow detention time= 1,397.1 min calculated for 0.054 af (61% of inflow)
Center-of-Mass det. time= 1,295.6 min (2,101.5 - 805.9)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	4,654 cf	**Infiltration Trench Contours (Prismatic)** Listed below (Recalc)

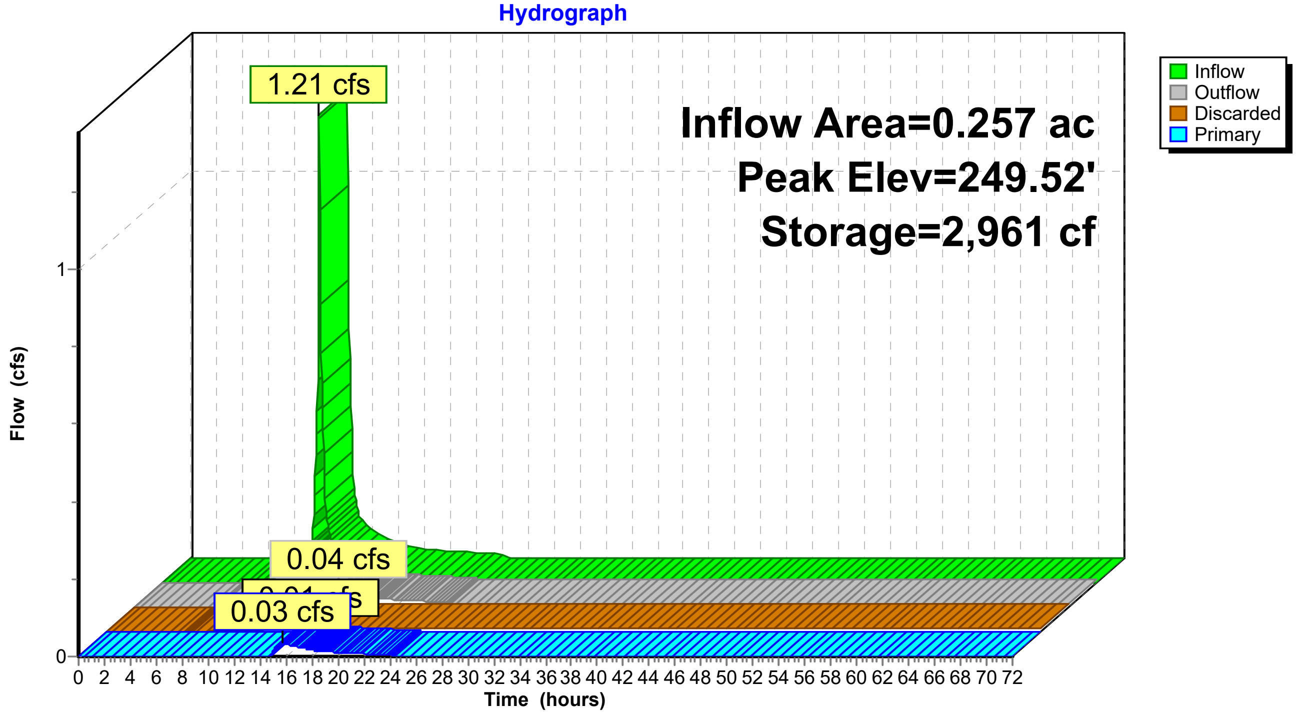
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	768	0	0
249.00	2,320	1,544	1,544
250.00	3,900	3,110	4,654

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.00'	**0.120 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 240.00'
#2	Primary	249.50'	**5.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.01 cfs @ 15.69 hrs HW=249.52' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.03 cfs @ 15.69 hrs HW=249.52' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.03 cfs @ 0.36 fps)

Pond 4P: Inf. Trench #1



Stage-Area-Storage for Pond 4P: Inf. Trench #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
248.00	768	0	249.06	2,415	1,686
248.02	799	16	249.08	2,446	1,735
248.04	830	32	249.10	2,478	1,784
248.06	861	49	249.12	2,510	1,834
248.08	892	66	249.14	2,541	1,884
248.10	923	85	249.16	2,573	1,935
248.12	954	103	249.18	2,604	1,987
248.14	985	123	249.20	2,636	2,040
248.16	1,016	143	249.22	2,668	2,093
248.18	1,047	163	249.24	2,699	2,146
248.20	1,078	185	249.26	2,731	2,201
248.22	1,109	207	249.28	2,762	2,256
248.24	1,140	229	249.30	2,794	2,311
248.26	1,172	252	249.32	2,826	2,367
248.28	1,203	276	249.34	2,857	2,424
248.30	1,234	300	249.36	2,889	2,482
248.32	1,265	325	249.38	2,920	2,540
248.34	1,296	351	249.40	2,952	2,598
248.36	1,327	377	249.42	2,984	2,658
248.38	1,358	404	249.44	3,015	2,718
248.40	1,389	431	249.46	3,047	2,778
248.42	1,420	459	249.48	3,078	2,840
248.44	1,451	488	249.50	3,110	2,902
248.46	1,482	517	249.52	3,142	2,964
248.48	1,513	547	249.54	3,173	3,027
248.50	1,544	578	249.56	3,205	3,091
248.52	1,575	609	249.58	3,236	3,155
248.54	1,606	641	249.60	3,268	3,220
248.56	1,637	673	249.62	3,300	3,286
248.58	1,668	706	249.64	3,331	3,352
248.60	1,699	740	249.66	3,363	3,419
248.62	1,730	774	249.68	3,394	3,487
248.64	1,761	809	249.70	3,426	3,555
248.66	1,792	845	249.72	3,458	3,624
248.68	1,823	881	249.74	3,489	3,693
248.70	1,854	918	249.76	3,521	3,764
248.72	1,885	955	249.78	3,552	3,834
248.74	1,916	993	249.80	3,584	3,906
248.76	1,948	1,032	249.82	3,616	3,978
248.78	1,979	1,071	249.84	3,647	4,050
248.80	2,010	1,111	249.86	3,679	4,123
248.82	2,041	1,152	249.88	3,710	4,197
248.84	2,072	1,193	249.90	3,742	4,272
248.86	2,103	1,234	249.92	3,774	4,347
248.88	2,134	1,277	249.94	3,805	4,423
248.90	2,165	1,320	249.96	3,837	4,499
248.92	2,196	1,363	249.98	3,868	4,576
248.94	2,227	1,408	250.00	**3,900**	**4,654**
248.96	2,258	1,452			
248.98	2,289	1,498			
249.00	2,320	1,544			
249.02	2,352	1,591			
249.04	2,383	1,638			

Summary for Pond B-1: Inf. Basin #1

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 2.39" for 25 YR event
Inflow = 13.25 cfs @ 12.51 hrs, Volume= 1.774 af
Outflow = 5.01 cfs @ 13.13 hrs, Volume= 1.598 af, Atten= 62%, Lag= 37.0 min
Discarded = 0.01 cfs @ 13.13 hrs, Volume= 0.018 af
Primary = 5.00 cfs @ 13.13 hrs, Volume= 1.580 af
Routed to Link DA-1 : Total DA-1 (AP-1)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 245.81' @ 13.13 hrs Surf.Area= 12,022 sf Storage= 31,243 cf

Plug-Flow detention time= 294.8 min calculated for 1.598 af (90% of inflow)
Center-of-Mass det. time= 245.0 min (1,128.1 - 883.1)

Volume	Invert	Avail.Storage	Storage Description
#1	242.50'	53,943 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
242.50	6,973	477.2	0	0	6,973
243.00	7,698	491.0	3,666	3,666	8,063
244.00	9,188	509.0	8,432	12,098	9,581
245.00	10,734	527.0	9,951	22,049	11,152
246.00	12,338	545.9	11,527	33,576	12,853
247.00	13,998	564.5	13,159	46,735	14,588
247.50	14,837	571.4	7,208	53,943	15,273

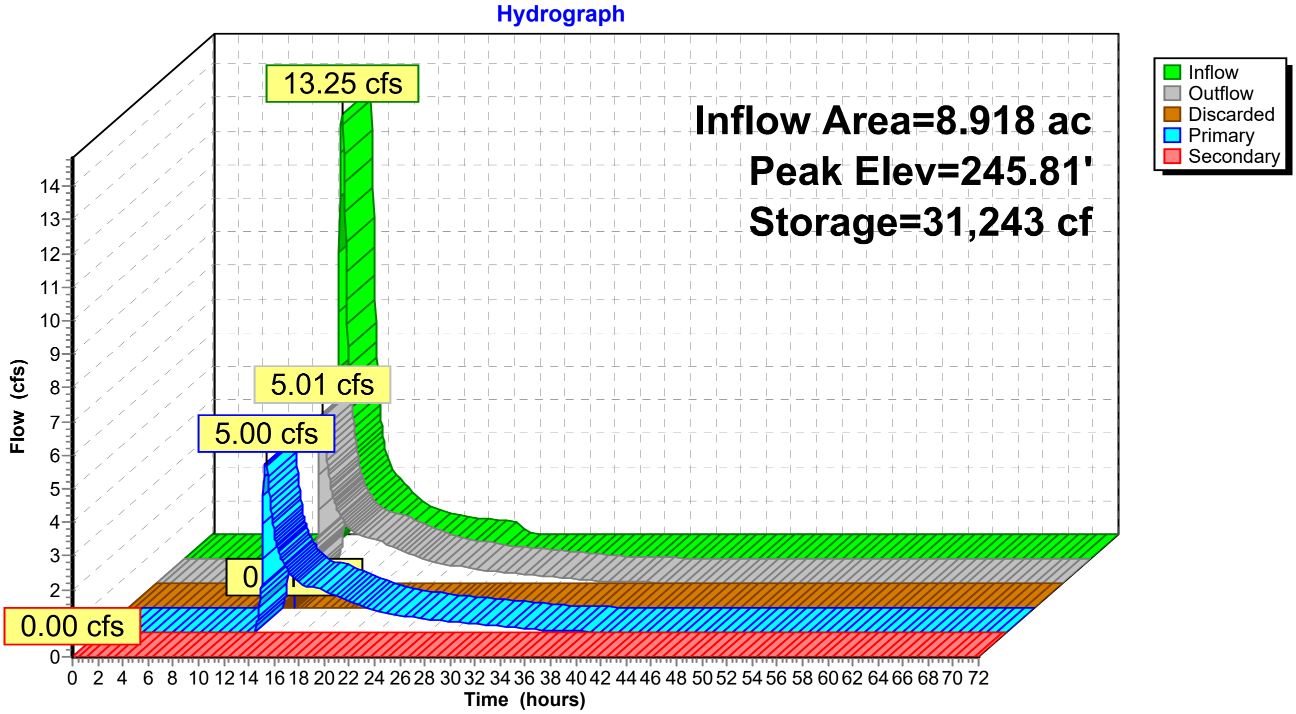
Device	Routing	Invert	Outlet Devices
#1	Primary	242.50'	**12.0" Round Culvert Barrel** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.50' / 242.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	243.50'	**4.0" Vert. Side Opening A** C= 0.600 Limited to weir flow at low heads
#3	Device 1	244.50'	**6.0" Vert. Side Opening B** C= 0.600 Limited to weir flow at low heads
#4	Device 1	245.50'	**24.0" Horiz. Top of Riser** C= 0.600 Limited to weir flow at low heads
#5	Secondary	246.50'	**20.0' long x 12.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#6	Discarded	242.50'	**0.015 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 232.00'

Discarded OutFlow Max=0.01 cfs @ 13.13 hrs HW=245.81' (Free Discharge)
└─**6=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=5.00 cfs @ 13.13 hrs HW=245.81' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert Barrel** (Inlet Controls 5.00 cfs @ 6.37 fps)
  ├─**2=Side Opening A** (Passes < 0.61 cfs potential flow)
  ├─**3=Side Opening B** (Passes < 0.97 cfs potential flow)
  └─**4=Top of Riser** (Passes < 3.51 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=242.50' TW=0.00' (Dynamic Tailwater)
└─**5=Emergency Spillway** (Controls 0.00 cfs)

Pond B-1: Inf. Basin #1



Stage-Area-Storage for Pond B-1: Inf. Basin #1

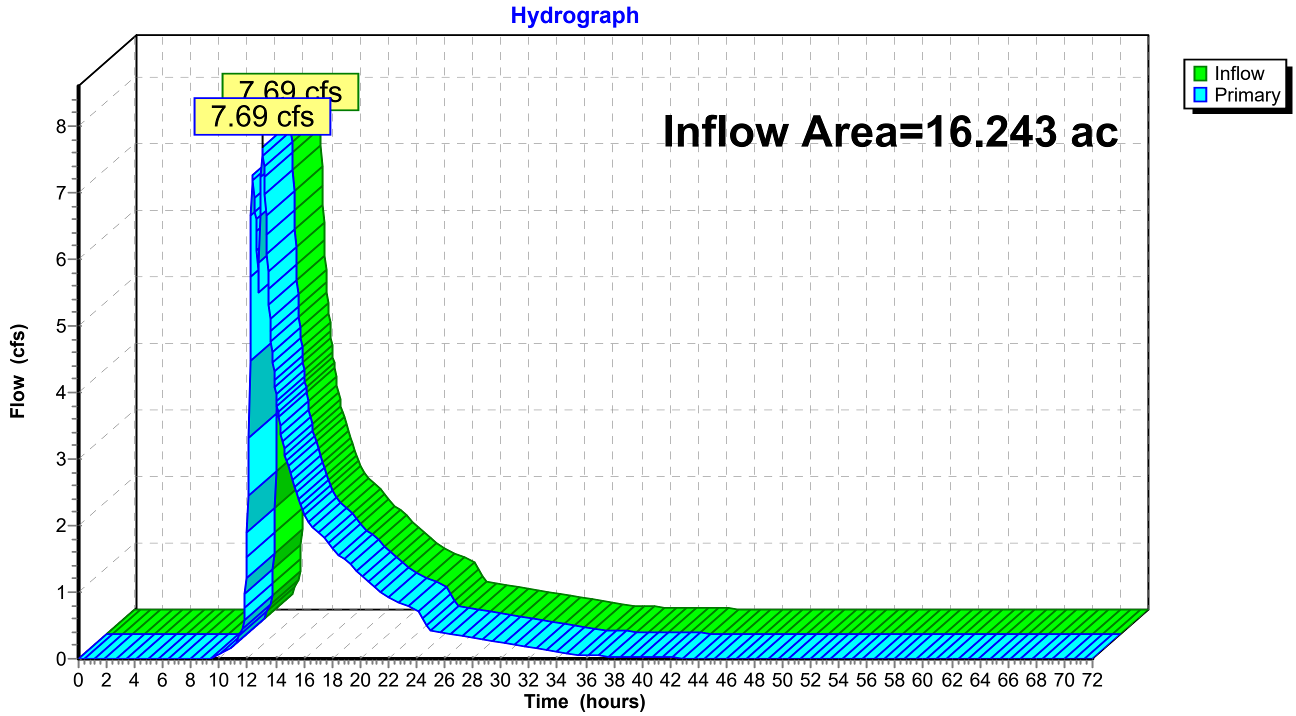
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
242.50	6,973	0	245.15	10,967	23,677
242.55	7,044	350	245.20	11,046	24,227
242.60	7,115	704	245.25	11,125	24,781
242.65	7,187	1,062	245.30	11,203	25,340
242.70	7,259	1,423	245.35	11,283	25,902
242.75	7,331	1,788	245.40	11,362	26,468
242.80	7,404	2,156	245.45	11,442	27,038
242.85	7,477	2,528	245.50	11,522	27,612
242.90	7,550	2,904	245.55	11,602	28,190
242.95	7,624	3,283	245.60	11,683	28,772
243.00	7,698	3,666	245.65	11,764	29,359
243.05	7,769	4,053	245.70	11,845	29,949
243.10	7,841	4,443	245.75	11,927	30,543
243.15	7,913	4,837	245.80	12,008	31,141
243.20	7,985	5,235	245.85	12,090	31,744
243.25	8,058	5,636	245.90	12,173	32,350
243.30	8,131	6,040	245.95	12,255	32,961
243.35	8,205	6,449	246.00	12,338	33,576
243.40	8,278	6,861	246.05	12,419	34,195
243.45	8,352	7,277	246.10	12,499	34,818
243.50	8,427	7,696	246.15	12,580	35,445
243.55	8,501	8,119	246.20	12,662	36,076
243.60	8,576	8,546	246.25	12,743	36,711
243.65	8,652	8,977	246.30	12,825	37,350
243.70	8,727	9,411	246.35	12,907	37,993
243.75	8,803	9,850	246.40	12,989	38,641
243.80	8,879	10,292	246.45	13,072	39,292
243.85	8,956	10,738	246.50	13,155	39,948
243.90	9,033	11,187	246.55	13,238	40,608
243.95	9,110	11,641	246.60	13,321	41,272
244.00	9,188	12,098	246.65	13,405	41,940
244.05	9,262	12,560	246.70	13,489	42,612
244.10	9,337	13,025	246.75	13,573	43,289
244.15	9,412	13,493	246.80	13,658	43,970
244.20	9,488	13,966	246.85	13,742	44,655
244.25	9,563	14,442	246.90	13,827	45,344
244.30	9,639	14,922	246.95	13,913	46,037
244.35	9,715	15,406	247.00	13,998	46,735
244.40	9,792	15,894	247.05	14,081	47,437
244.45	9,869	16,385	247.10	14,164	48,143
244.50	9,946	16,881	247.15	14,247	48,854
244.55	10,023	17,380	247.20	14,331	49,568
244.60	10,101	17,883	247.25	14,414	50,287
244.65	10,179	18,390	247.30	14,498	51,009
244.70	10,258	18,901	247.35	14,583	51,737
244.75	10,336	19,416	247.40	14,667	52,468
244.80	10,415	19,934	247.45	14,752	53,203
244.85	10,494	20,457	247.50	**14,837**	**53,943**
244.90	10,574	20,984			
244.95	10,654	21,515			
245.00	10,734	22,049			
245.05	10,812	22,588			
245.10	10,889	23,130			

Summary for Link DA-1: Total DA-1 (AP-1)

Inflow Area =	16.243 ac,	0.20% Impervious,	Inflow Depth = 1.96"	for 25 YR event	
Inflow =	7.69 cfs @	13.05 hrs,	Volume=	2.648 af	
Primary =	7.69 cfs @	13.05 hrs,	Volume=	2.648 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

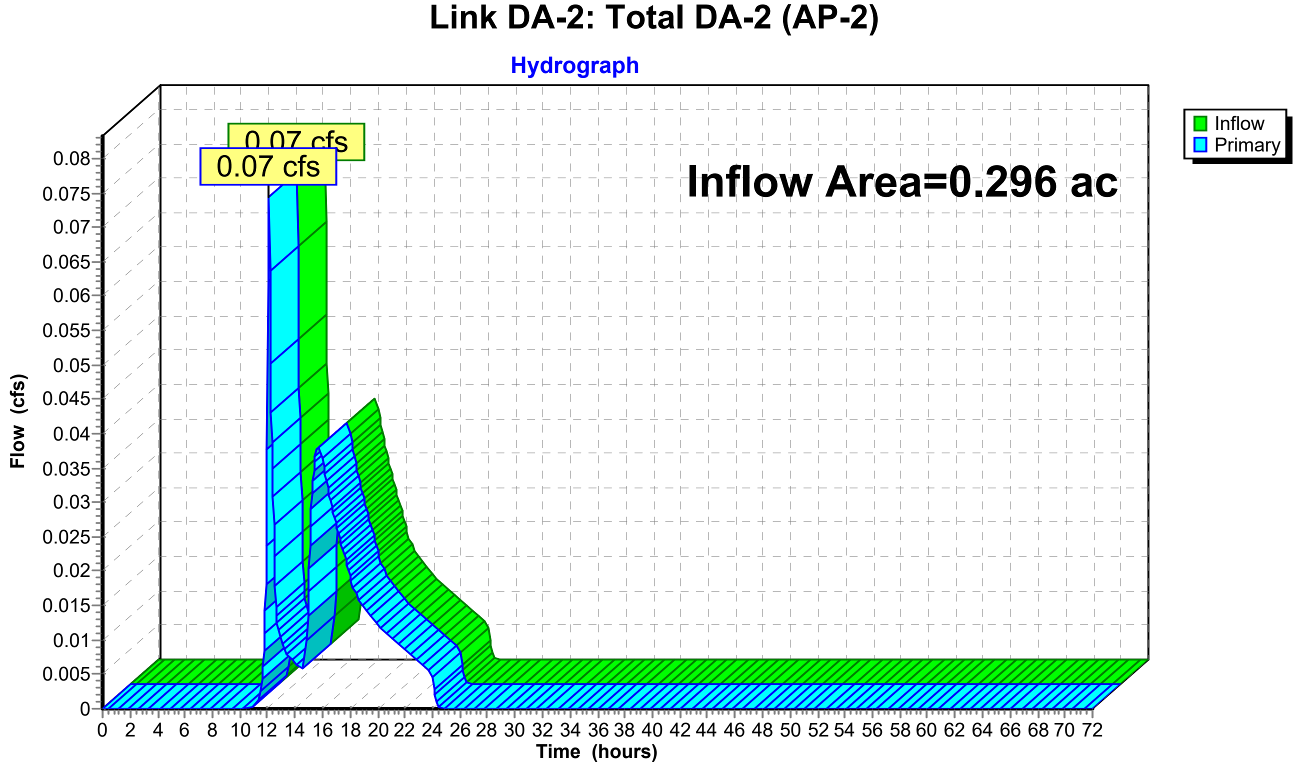
Link DA-1: Total DA-1 (AP-1)



Summary for Link DA-2: Total DA-2 (AP-2)

Inflow Area =	0.296 ac,	47.82% Impervious,	Inflow Depth = 0.68"	for 25 YR event
Inflow =	0.07 cfs @	12.10 hrs, Volume=	0.017 af	
Primary =	0.07 cfs @	12.10 hrs, Volume=	0.017 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs



Summary for Subcatchment PDA-1A: PDA-1A (Detained)

Runoff = 18.26 cfs @ 12.40 hrs, Volume= 2.237 af, Depth= 3.01"
Routed to Reach C2 : Open Channel 2

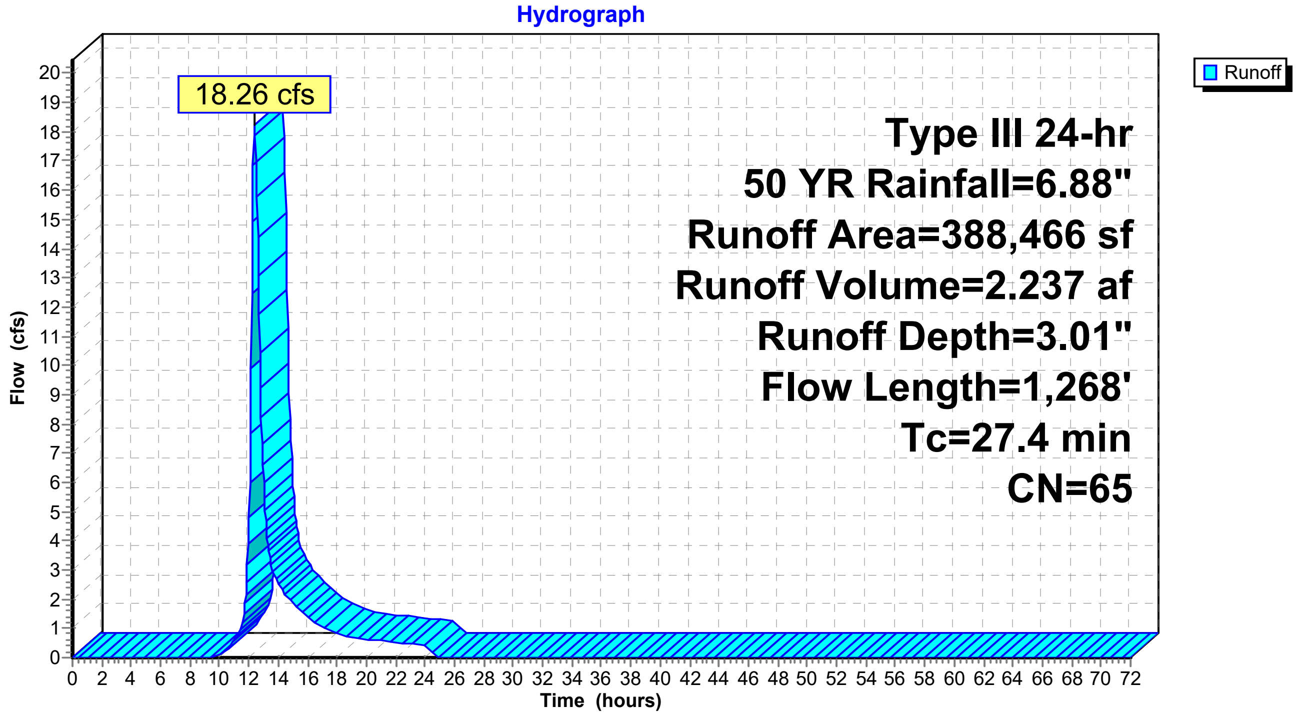
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
*	1,139	30	Woods, Good, HSG A
*	32,943	55	Woods, Good, HSG B
*	7,723	55	Woods, Good, HSG B
	30,167	55	Woods, Good, HSG B
*	21,016	55	Woods, Good, HSG B
	65,261	78	Meadow, non-grazed, HSG D
*	29,208	65	Meadow, non-grazed, HSG B/C
*	6,046	71	Meadow, non-grazed, HSG C
	10,920	78	Meadow, non-grazed, HSG D
*	5,769	65	Meadow, non-grazed, HSG B/C
*	11,310	65	Meadow, non-grazed, HSG B/C
	13,479	58	Meadow, non-grazed, HSG B
*	68,974	65	Meadow, non-grazed, HSG B/C
*	64,248	65	Meadow, non-grazed, HSG B/C
*	18,308	71	Meadow, non-grazed, HSG C
*	559	58	Meadow, non-grazed, HSG B
*	1,096	98	Gravel surface
*	300	98	Concrete Equipment Pad
	388,466	65	Weighted Average
	387,070		99.64% Pervious Area
	1,396		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0450	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.9	55	0.0437	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.8	147	0.0948	3.08		**Shallow Concentrated Flow, C-D** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0551	2.35		**Shallow Concentrated Flow, D-E** Nearly Bare & Untilled Kv= 10.0 fps
0.3	79	0.1480	3.85		**Shallow Concentrated Flow, E-F** Nearly Bare & Untilled Kv= 10.0 fps
1.2	154	0.0728	2.17	48.82	**Channel Flow, G-H** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
3.6	320	0.0335	1.47	33.12	**Channel Flow, H-I** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
4.3	278	0.0168	1.07	26.97	**Channel Flow, H-J** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.240 Sheet flow over Dense Grass

0.0	48	0.1899	21.15	530.82	**Channel Flow, J-K** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.041 Riprap, 2-inch
27.4	1,268	Total			

Subcatchment PDA-1A: PDA-1A (Detained)



Summary for Subcatchment PDA-1B: PDA-1B (Undetained)

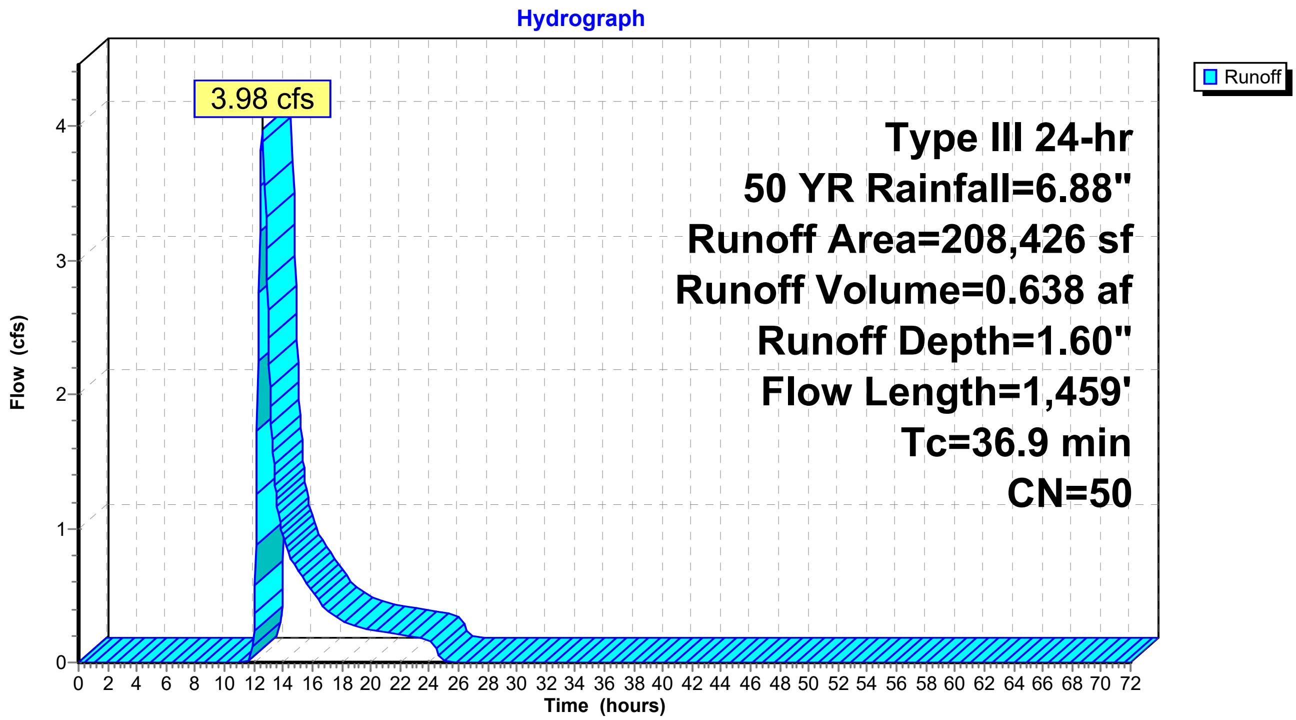
Runoff = 3.98 cfs @ 12.59 hrs, Volume= 0.638 af, Depth= 1.60"
Routed to Link DA-1 : Total DA-1 (AP-1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
	27,431	30	Woods, Good, HSG A
	20,927	55	Woods, Good, HSG B
	13,171	30	Woods, Good, HSG A
*	15,069	77	Woods, Good, HSG B/D
	4,514	55	Woods, Good, HSG B
	541	55	Woods, Good, HSG B
	8,033	75	Row crops, SR + CR, Good, HSG B
	1,682	75	Row crops, SR + CR, Good, HSG B
*	4,233	78	Meadow, non-grazed, HSG B/D
*	373	78	Meadow, non-grazed, HSG B/D
	7,091	58	Meadow, non-grazed, HSG B
	41,458	30	Meadow, non-grazed, HSG A
*	5,616	78	Meadow, non-grazed, HSG B/D
*	9,852	78	Meadow, non-grazed, HSG B/D
	7,745	71	Meadow, non-grazed, HSG C
*	16,892	58	Meadow, non-grazed, HSG B
*	359	58	Meadow, non-grazed, HSG B
*	8,647	30	Meadow, non-grazed, HSG A
*	519	71	Meadow, non-grazed, HSG C
*	10,561	58	Meadow, non-grazed, HSG B
*	929	71	Meadow, non-grazed, HSG C
*	816	71	Meadow, non-grazed, HSG C
*	1,967	58	Meadow, non-grazed, HSG B
	208,426	50	Weighted Average
	208,426		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0286	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
2.6	107	0.0191	0.69		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.8	198	0.0569	1.19		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	69	0.0158	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.6	66	0.1228	1.75		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
0.8	111	0.1218	2.44		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
1.4	105	0.0641	1.27		**Shallow Concentrated Flow, G-H** Woodland Kv= 5.0 fps
3.1	243	0.0349	1.31		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
3.3	243	0.0300	1.21		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
1.7	217	0.0961	2.17		**Shallow Concentrated Flow, J-K** Short Grass Pasture Kv= 7.0 fps
36.9	1,459	Total			

Subcatchment PDA-1B: PDA-1B (Undetained)



Summary for Subcatchment PDA-1C: PDA-1C (Undetained)

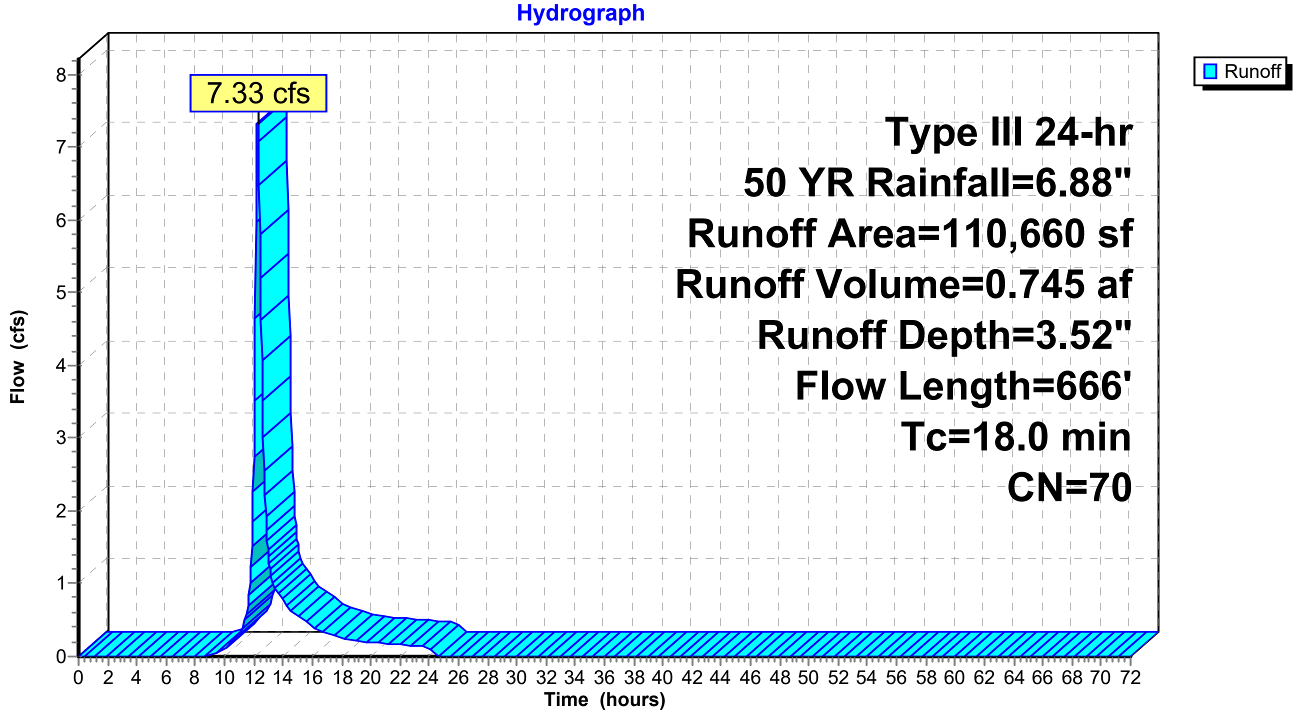
Runoff = 7.33 cfs @ 12.25 hrs, Volume= 0.745 af, Depth= 3.52"
Routed to Reach C1 : Open Channel 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
	4,799	55	Woods, Good, HSG B
*	9,011	77	Woods, Good, HSG B/D
*	22,795	55	Woods, Good, HSG B
	8,150	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	26,995	75	Row crops, SR + CR, Good, HSG B
*	5,920	65	Meadow, non-grazed, HSG B/C
*	1,273	58	Meadow, non-grazed, HSG B
*	2,035	78	Meadow, non-grazed, HSG B/D
*	7,568	65	Meadow, non-grazed, HSG B/C
	1,319	58	Meadow, non-grazed, HSG B
	110,660	70	Weighted Average
	110,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	170	0.0314	1.59		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
0.3	297	0.0500	19.79	89.06	**Channel Flow, E-F** Area= 4.5 sf Perim= 3.0' r= 1.50' n= 0.022 Earth, clean & straight
18.0	666	Total			

Subcatchment PDA-1C: PDA-1C (Undetained)



Summary for Subcatchment PDA-2A: PDA-2A (Detained)

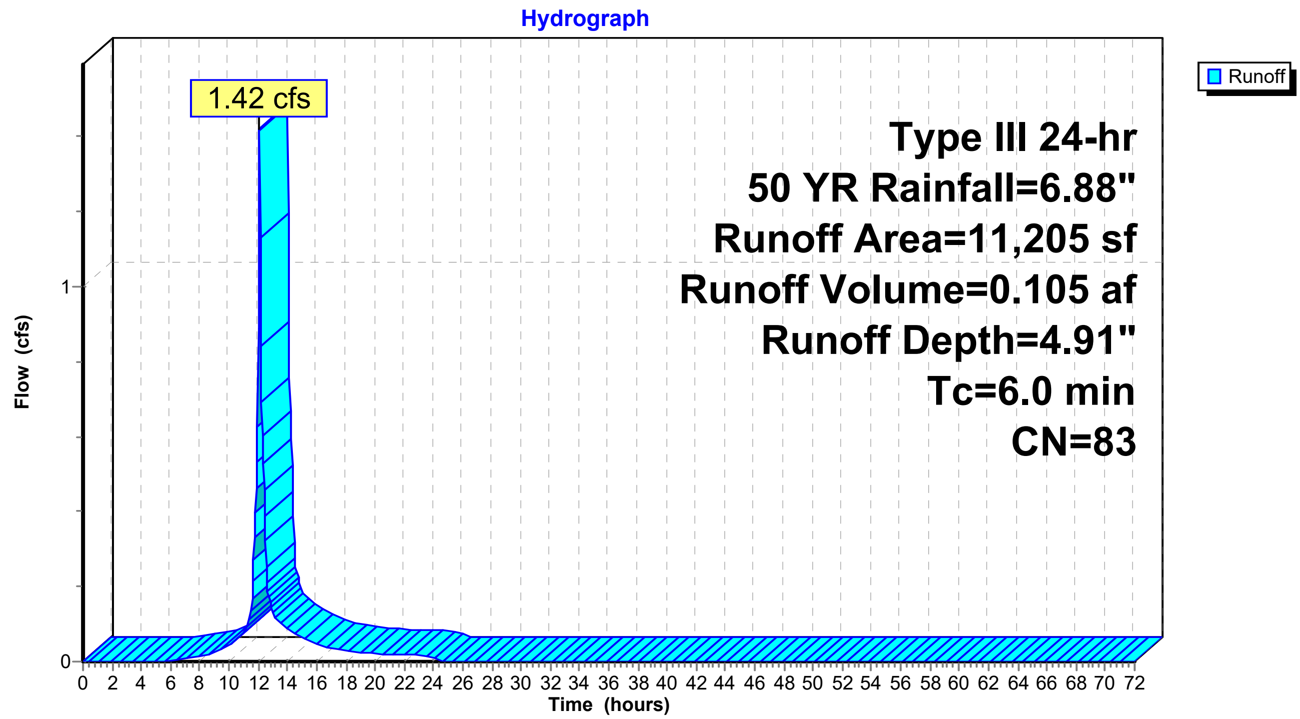
Runoff = 1.42 cfs @ 12.09 hrs, Volume= 0.105 af, Depth= 4.91"
Routed to Pond 4P : Inf. Trench #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
*	6,167	98	Gravel Access Road
*	1,464	65	Meadow, non-grazed, HSG B/C
*	3,574	65	Meadow, non-grazed, HSG B/C
	11,205	83	Weighted Average
	5,038		44.96% Pervious Area
	6,167		55.04% Impervious Area

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

Subcatchment PDA-2A: PDA-2A (Detained)



Summary for Subcatchment PDA-2B: PDA-2B (Undetained)

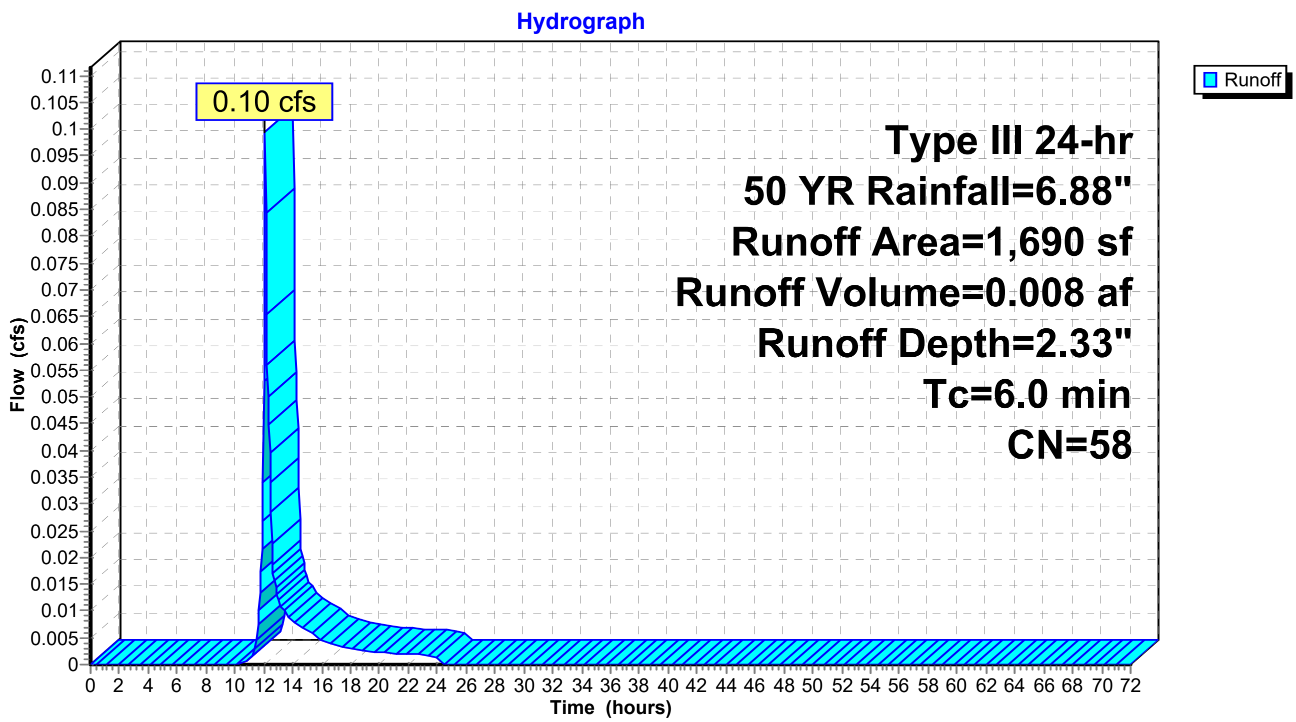
Runoff = 0.10 cfs @ 12.10 hrs, Volume= 0.008 af, Depth= 2.33"
Routed to Link DA-2 : Total DA-2 (AP-2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 YR Rainfall=6.88"

	Area (sf)	CN	Description
*	1,690	58	Meadow, non-grazed, HSG B
	1,690		100.00% Pervious Area

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

Subcatchment PDA-2B: PDA-2B (Undetained)



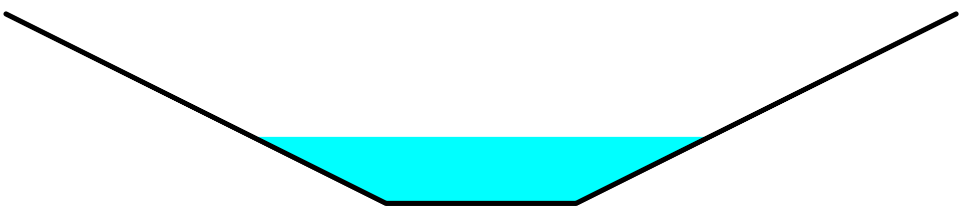
Summary for Reach C1: Open Channel 1

Inflow Area = 2.540 ac, 0.00% Impervious, Inflow Depth = 3.52" for 50 YR event
Inflow = 7.33 cfs @ 12.25 hrs, Volume= 0.745 af
Outflow = 7.23 cfs @ 12.28 hrs, Volume= 0.745 af, Atten= 1%, Lag= 1.7 min
Routed to Link DA-1 : Total DA-1 (AP-1)

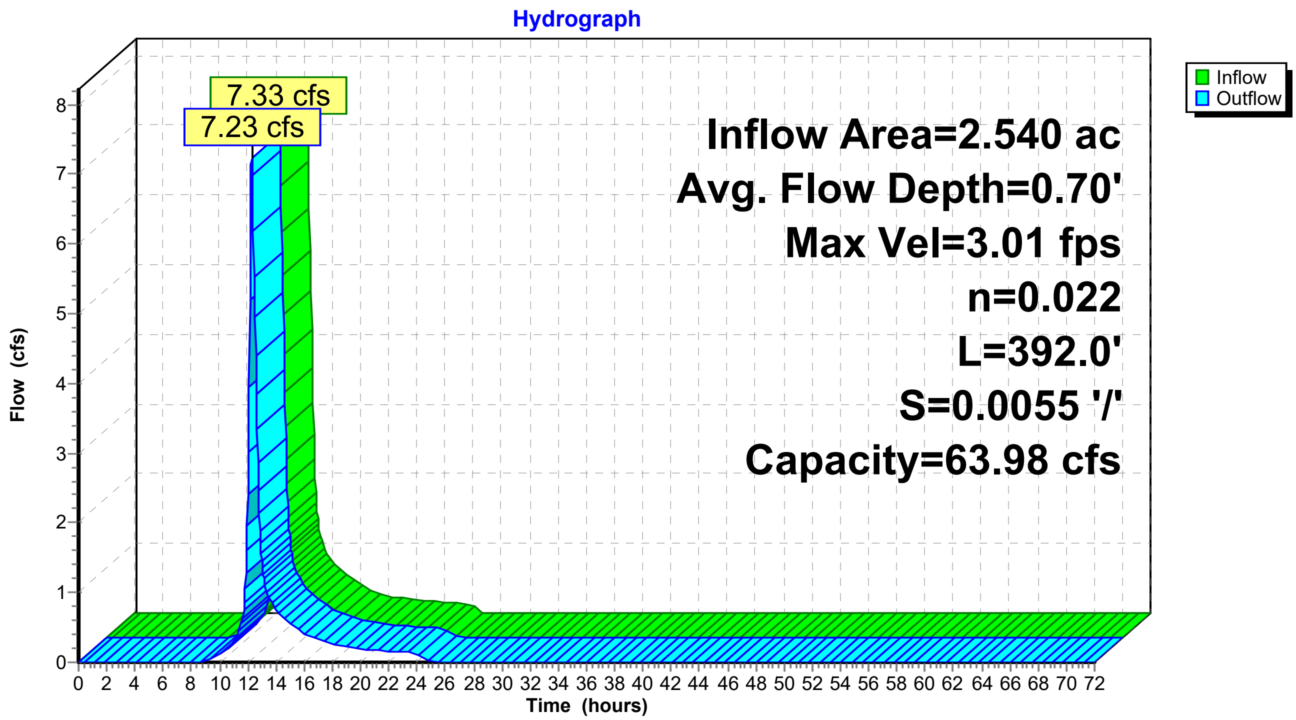
Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.01 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.06 fps, Avg. Travel Time= 6.1 min

Peak Storage= 941 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.70' , Surface Width= 4.82'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 63.98 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 392.0' Slope= 0.0055 '/'
Inlet Invert= 249.44', Outlet Invert= 247.28'



Reach C1: Open Channel 1



Stage-Area-Storage for Reach C1: Open Channel 1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
249.44	0.0	0
249.46	0.0	16
249.48	0.1	33
249.50	0.1	50
249.52	0.2	68
249.54	0.2	86
249.56	0.3	105
249.58	0.3	125
249.60	0.4	146
249.62	0.4	167
249.64	0.5	188
249.66	0.5	210
249.68	0.6	233
249.70	0.7	257
249.72	0.7	281
249.74	0.8	306
249.76	0.8	331
249.78	0.9	357
249.80	1.0	384
249.82	1.0	411
249.84	1.1	439
249.86	1.2	468
249.88	1.3	497
249.90	1.3	527
249.92	1.4	557
249.94	1.5	588
249.96	1.6	620
249.98	1.7	652
250.00	1.7	685
250.02	1.8	718
250.04	1.9	753
250.06	2.0	787
250.08	2.1	823
250.10	2.2	859
250.12	2.3	896
250.14	2.4	933
250.16	2.5	971
250.18	2.6	1,009
250.20	2.7	1,049
250.22	2.8	1,089
250.24	2.9	1,129
250.26	3.0	1,170
250.28	3.1	1,212
250.30	3.2	1,254
250.32	3.3	1,297
250.34	3.4	1,341
250.36	3.5	1,385
250.38	3.6	1,430
250.40	3.8	1,475
250.42	3.9	1,521
250.44	4.0	1,568
250.46	4.1	1,615
250.48	4.2	1,663

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
250.50	4.4	1,712
250.52	4.5	1,761
250.54	4.6	1,811
250.56	4.7	1,862
250.58	4.9	1,913
250.60	5.0	1,964
250.62	5.1	2,017
250.64	5.3	2,070
250.66	5.4	2,123
250.68	5.6	2,178
250.70	5.7	2,233
250.72	5.8	2,288
250.74	6.0	2,344
250.76	6.1	2,401
250.78	6.3	2,458
250.80	6.4	2,516
250.82	6.6	2,575
250.84	6.7	2,634
250.86	6.9	2,694
250.88	7.0	2,755
250.90	7.2	2,816
250.92	7.3	2,878
250.94	7.5	2,940
250.96	7.7	3,003
250.98	7.8	3,067
251.00	8.0	3,131
251.02	8.2	3,196
251.04	8.3	3,261
251.06	8.5	3,328
251.08	8.7	3,394
251.10	8.8	3,462
251.12	9.0	3,530
251.14	9.2	3,599
251.16	9.4	3,668
251.18	9.5	3,738
251.20	9.7	3,808
251.22	9.9	3,880
251.24	10.1	3,951
251.26	10.3	4,024
251.28	10.5	4,097
251.30	10.6	4,171
251.32	10.8	4,245
251.34	11.0	4,320
251.36	11.2	4,395
251.38	11.4	4,472
251.40	11.6	4,548
251.42	11.8	4,626
251.44	**12.0**	**4,704**

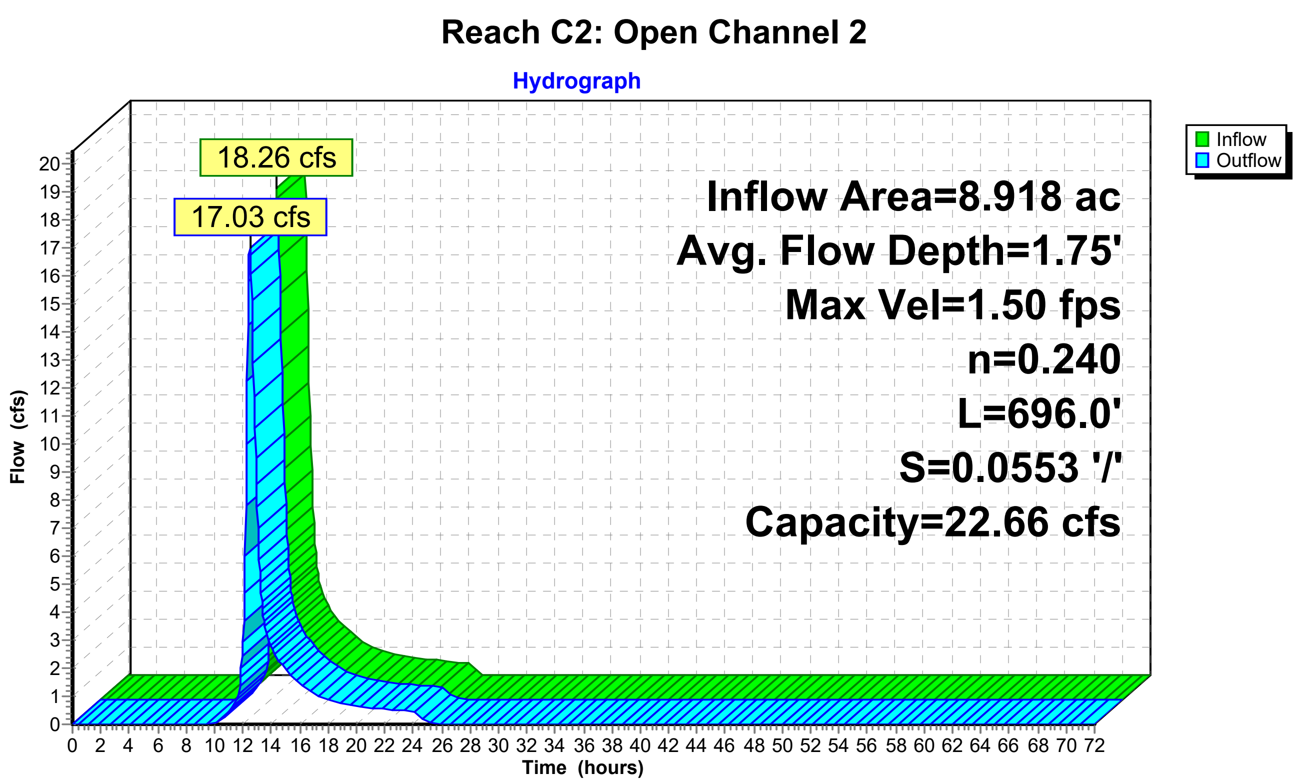
Summary for Reach C2: Open Channel 2

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 3.01" for 50 YR event
Inflow = 18.26 cfs @ 12.40 hrs, Volume= 2.237 af
Outflow = 17.03 cfs @ 12.50 hrs, Volume= 2.237 af, Atten= 7%, Lag= 6.2 min
Routed to Pond B-1 : Inf. Basin #1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.50 fps, Min. Travel Time= 7.7 min
Avg. Velocity = 0.41 fps, Avg. Travel Time= 28.5 min

Peak Storage= 7,887 cf @ 12.50 hrs
Average Depth at Peak Storage= 1.75' , Surface Width= 9.98'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 22.66 cfs

3.00' x 2.00' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 696.0' Slope= 0.0553 '/'
Inlet Invert= 286.00', Outlet Invert= 247.50'



Stage-Area-Storage for Reach C2: Open Channel 2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
286.00	0.0	0
286.02	0.1	42
286.04	0.1	86
286.06	0.2	130
286.08	0.3	176
286.10	0.3	223
286.12	0.4	271
286.14	0.5	320
286.16	0.5	370
286.18	0.6	421
286.20	0.7	473
286.22	0.8	527
286.24	0.8	581
286.26	0.9	637
286.28	1.0	694
286.30	1.1	752
286.32	1.2	811
286.34	1.3	871
286.36	1.3	932
286.38	1.4	994
286.40	1.5	1,058
286.42	1.6	1,123
286.44	1.7	1,188
286.46	1.8	1,255
286.48	1.9	1,323
286.50	2.0	1,392
286.52	2.1	1,462
286.54	2.2	1,533
286.56	2.3	1,606
286.58	2.4	1,679
286.60	2.5	1,754
286.62	2.6	1,830
286.64	2.7	1,906
286.66	2.9	1,984
286.68	3.0	2,064
286.70	3.1	2,144
286.72	3.2	2,225
286.74	3.3	2,307
286.76	3.4	2,391
286.78	3.6	2,476
286.80	3.7	2,561
286.82	3.8	2,648
286.84	3.9	2,736
286.86	4.1	2,825
286.88	4.2	2,915
286.90	4.3	3,007
286.92	4.5	3,099
286.94	4.6	3,193
286.96	4.7	3,287
286.98	4.9	3,383
287.00	5.0	3,480
287.02	5.1	3,578
287.04	5.3	3,677
287.06	5.4	3,777
287.08	5.6	3,879
287.10	5.7	3,981
287.12	5.9	4,085
287.14	6.0	4,189
287.16	6.2	4,295
287.18	6.3	4,402
287.20	6.5	4,510
287.22	6.6	4,619
287.24	6.8	4,729
287.26	7.0	4,841
287.28	7.1	4,953
287.30	7.3	5,067
287.32	7.4	5,182
287.34	7.6	5,297
287.36	7.8	5,414
287.38	7.9	5,532
287.40	8.1	5,652
287.42	8.3	5,772
287.44	8.5	5,893
287.46	8.6	6,016
287.48	8.8	6,139
287.50	9.0	6,264
287.52	9.2	6,390
287.54	9.4	6,517
287.56	9.5	6,645
287.58	9.7	6,774
287.60	9.9	6,904
287.62	10.1	7,036
287.64	10.3	7,168
287.66	10.5	7,302
287.68	10.7	7,437
287.70	10.9	7,572
287.72	11.1	7,709
287.74	11.3	7,848
287.76	11.5	7,987
287.78	11.7	8,127
287.80	11.9	8,268
287.82	12.1	8,411
287.84	12.3	8,555
287.86	12.5	8,699
287.88	12.7	8,845
287.90	12.9	8,992
287.92	13.1	9,140
287.94	13.3	9,290
287.96	13.6	9,440
287.98	13.8	9,591
288.00	**14.0**	**9,744**

Summary for Pond 4P: Inf. Trench #1

Inflow Area = 0.257 ac, 55.04% Impervious, Inflow Depth = 4.91" for 50 YR event
Inflow = 1.42 cfs @ 12.09 hrs, Volume= 0.105 af
Outflow = 0.10 cfs @ 13.59 hrs, Volume= 0.071 af, Atten= 93%, Lag= 90.0 min
Discarded = 0.01 cfs @ 13.59 hrs, Volume= 0.044 af
Primary = 0.09 cfs @ 13.59 hrs, Volume= 0.027 af
Routed to Link DA-2 : Total DA-2 (AP-2)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 249.54' @ 13.59 hrs Surf.Area= 3,168 sf Storage= 3,016 cf

Plug-Flow detention time= 1,111.2 min calculated for 0.071 af (67% of inflow)
Center-of-Mass det. time= 1,016.7 min (1,817.7 - 801.1)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	4,654 cf	**Infiltration Trench Contours (Prismatic)** Listed below (Recalc)

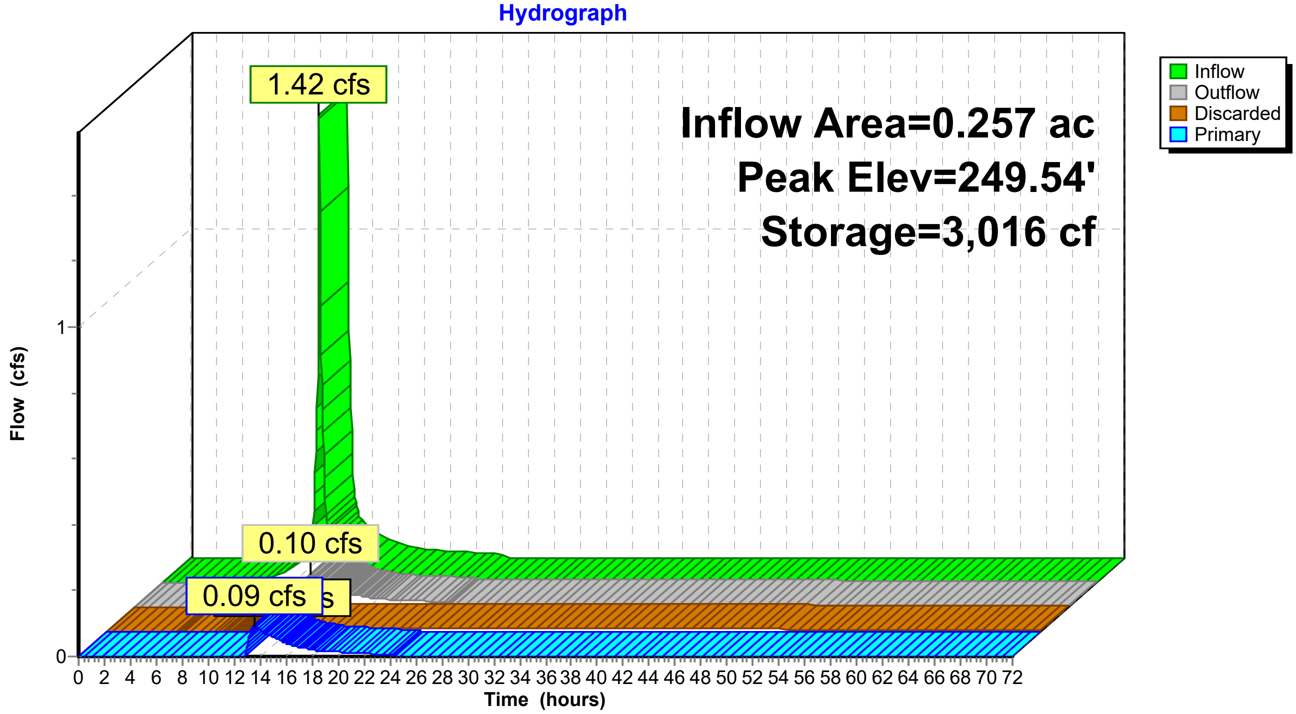
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	768	0	0
249.00	2,320	1,544	1,544
250.00	3,900	3,110	4,654

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.00'	**0.120 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 240.00'
#2	Primary	249.50'	**5.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.01 cfs @ 13.59 hrs HW=249.54' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.09 cfs @ 13.59 hrs HW=249.54' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.09 cfs @ 0.49 fps)

Pond 4P: Inf. Trench #1



Stage-Area-Storage for Pond 4P: Inf. Trench #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
248.00	768	0
248.02	799	16
248.04	830	32
248.06	861	49
248.08	892	66
248.10	923	85
248.12	954	103
248.14	985	123
248.16	1,016	143
248.18	1,047	163
248.20	1,078	185
248.22	1,109	207
248.24	1,140	229
248.26	1,172	252
248.28	1,203	276
248.30	1,234	300
248.32	1,265	325
248.34	1,296	351
248.36	1,327	377
248.38	1,358	404
248.40	1,389	431
248.42	1,420	459
248.44	1,451	488
248.46	1,482	517
248.48	1,513	547
248.50	1,544	578
248.52	1,575	609
248.54	1,606	641
248.56	1,637	673
248.58	1,668	706
248.60	1,699	740
248.62	1,730	774
248.64	1,761	809
248.66	1,792	845
248.68	1,823	881
248.70	1,854	918
248.72	1,885	955
248.74	1,916	993
248.76	1,948	1,032
248.78	1,979	1,071
248.80	2,010	1,111
248.82	2,041	1,152
248.84	2,072	1,193
248.86	2,103	1,234
248.88	2,134	1,277
248.90	2,165	1,320
248.92	2,196	1,363
248.94	2,227	1,408
248.96	2,258	1,452
248.98	2,289	1,498
249.00	2,320	1,544
249.02	2,352	1,591
249.04	2,383	1,638
249.06	2,415	1,686
249.08	2,446	1,735
249.10	2,478	1,784
249.12	2,510	1,834
249.14	2,541	1,884
249.16	2,573	1,935
249.18	2,604	1,987
249.20	2,636	2,040
249.22	2,668	2,093
249.24	2,699	2,146
249.26	2,731	2,201
249.28	2,762	2,256
249.30	2,794	2,311
249.32	2,826	2,367
249.34	2,857	2,424
249.36	2,889	2,482
249.38	2,920	2,540
249.40	2,952	2,598
249.42	2,984	2,658
249.44	3,015	2,718
249.46	3,047	2,778
249.48	3,078	2,840
249.50	3,110	2,902
249.52	3,142	2,964
249.54	3,173	3,027
249.56	3,205	3,091
249.58	3,236	3,155
249.60	3,268	3,220
249.62	3,300	3,286
249.64	3,331	3,352
249.66	3,363	3,419
249.68	3,394	3,487
249.70	3,426	3,555
249.72	3,458	3,624
249.74	3,489	3,693
249.76	3,521	3,764
249.78	3,552	3,834
249.80	3,584	3,906
249.82	3,616	3,978
249.84	3,647	4,050
249.86	3,679	4,123
249.88	3,710	4,197
249.90	3,742	4,272
249.92	3,774	4,347
249.94	3,805	4,423
249.96	3,837	4,499
249.98	3,868	4,576
250.00	**3,900**	**4,654**

Summary for Pond B-1: Inf. Basin #1

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 3.01" for 50 YR event
Inflow = 17.03 cfs @ 12.50 hrs, Volume= 2.237 af
Outflow = 5.50 cfs @ 13.19 hrs, Volume= 2.060 af, Atten= 68%, Lag= 41.6 min
Discarded = 0.01 cfs @ 13.19 hrs, Volume= 0.018 af
Primary = 5.50 cfs @ 13.19 hrs, Volume= 2.042 af
Routed to Link DA-1 : Total DA-1 (AP-1)
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 246.39' @ 13.19 hrs Surf.Area= 12,971 sf Storage= 38,493 cf

Plug-Flow detention time= 249.0 min calculated for 2.060 af (92% of inflow)
Center-of-Mass det. time= 207.8 min (1,083.2 - 875.4)

Volume	Invert	Avail.Storage	Storage Description
#1	242.50'	53,943 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
242.50	6,973	477.2	0	0	6,973
243.00	7,698	491.0	3,666	3,666	8,063
244.00	9,188	509.0	8,432	12,098	9,581
245.00	10,734	527.0	9,951	22,049	11,152
246.00	12,338	545.9	11,527	33,576	12,853
247.00	13,998	564.5	13,159	46,735	14,588
247.50	14,837	571.4	7,208	53,943	15,273

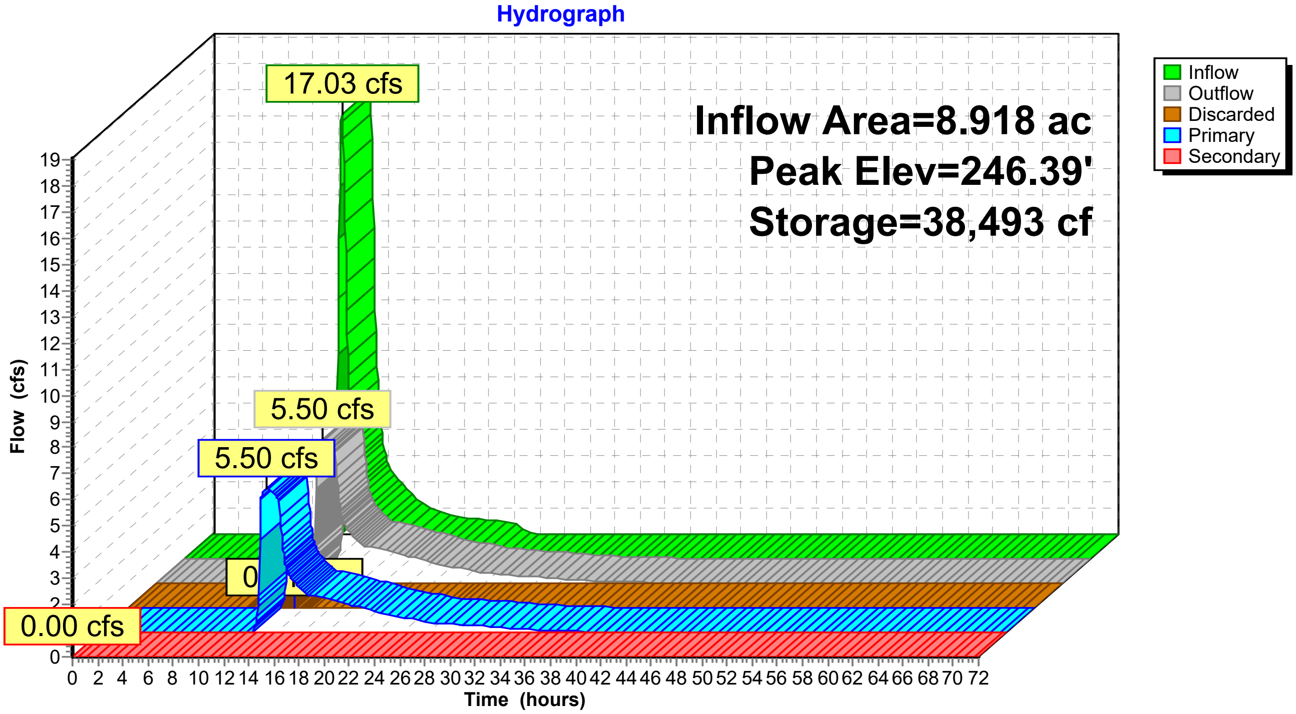
Device	Routing	Invert	Outlet Devices
#1	Primary	242.50'	**12.0" Round Culvert Barrel** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.50' / 242.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	243.50'	**4.0" Vert. Side Opening A** C= 0.600 Limited to weir flow at low heads
#3	Device 1	244.50'	**6.0" Vert. Side Opening B** C= 0.600 Limited to weir flow at low heads
#4	Device 1	245.50'	**24.0" Horiz. Top of Riser** C= 0.600 Limited to weir flow at low heads
#5	Secondary	246.50'	**20.0' long x 12.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#6	Discarded	242.50'	**0.015 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 232.00'

Discarded OutFlow Max=0.01 cfs @ 13.19 hrs HW=246.39' (Free Discharge)
└─**6=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=5.50 cfs @ 13.19 hrs HW=246.39' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert Barrel** (Inlet Controls 5.50 cfs @ 7.00 fps)
 ├─**2=Side Opening A** (Passes < 0.69 cfs potential flow)
 ├─**3=Side Opening B** (Passes < 1.21 cfs potential flow)
 └─**4=Top of Riser** (Passes < 14.26 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=242.50' TW=0.00' (Dynamic Tailwater)
└─**5=Emergency Spillway** (Controls 0.00 cfs)

Pond B-1: Inf. Basin #1



Stage-Area-Storage for Pond B-1: Inf. Basin #1

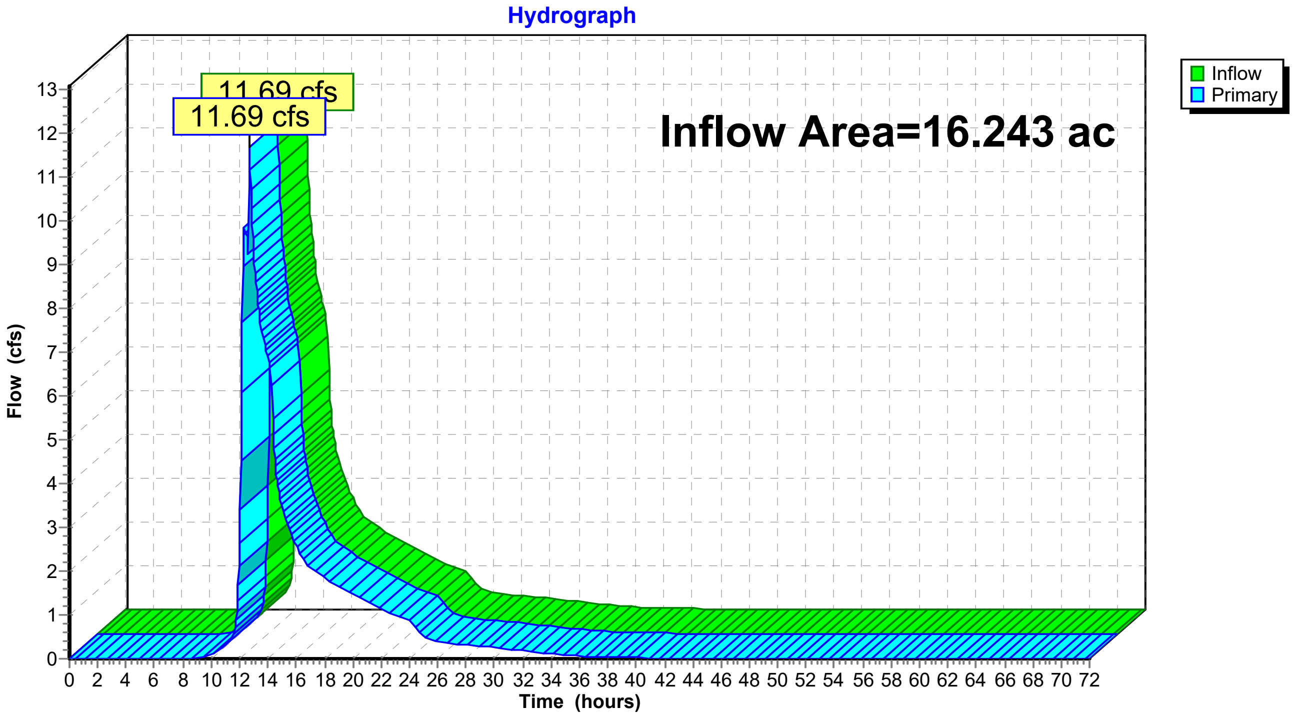
Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
242.50	6,973	0	245.15	10,967	23,677
242.55	7,044	350	245.20	11,046	24,227
242.60	7,115	704	245.25	11,125	24,781
242.65	7,187	1,062	245.30	11,203	25,340
242.70	7,259	1,423	245.35	11,283	25,902
242.75	7,331	1,788	245.40	11,362	26,468
242.80	7,404	2,156	245.45	11,442	27,038
242.85	7,477	2,528	245.50	11,522	27,612
242.90	7,550	2,904	245.55	11,602	28,190
242.95	7,624	3,283	245.60	11,683	28,772
243.00	7,698	3,666	245.65	11,764	29,359
243.05	7,769	4,053	245.70	11,845	29,949
243.10	7,841	4,443	245.75	11,927	30,543
243.15	7,913	4,837	245.80	12,008	31,141
243.20	7,985	5,235	245.85	12,090	31,744
243.25	8,058	5,636	245.90	12,173	32,350
243.30	8,131	6,040	245.95	12,255	32,961
243.35	8,205	6,449	246.00	12,338	33,576
243.40	8,278	6,861	246.05	12,419	34,195
243.45	8,352	7,277	246.10	12,499	34,818
243.50	8,427	7,696	246.15	12,580	35,445
243.55	8,501	8,119	246.20	12,662	36,076
243.60	8,576	8,546	246.25	12,743	36,711
243.65	8,652	8,977	246.30	12,825	37,350
243.70	8,727	9,411	246.35	12,907	37,993
243.75	8,803	9,850	246.40	12,989	38,641
243.80	8,879	10,292	246.45	13,072	39,292
243.85	8,956	10,738	246.50	13,155	39,948
243.90	9,033	11,187	246.55	13,238	40,608
243.95	9,110	11,641	246.60	13,321	41,272
244.00	9,188	12,098	246.65	13,405	41,940
244.05	9,262	12,560	246.70	13,489	42,612
244.10	9,337	13,025	246.75	13,573	43,289
244.15	9,412	13,493	246.80	13,658	43,970
244.20	9,488	13,966	246.85	13,742	44,655
244.25	9,563	14,442	246.90	13,827	45,344
244.30	9,639	14,922	246.95	13,913	46,037
244.35	9,715	15,406	247.00	13,998	46,735
244.40	9,792	15,894	247.05	14,081	47,437
244.45	9,869	16,385	247.10	14,164	48,143
244.50	9,946	16,881	247.15	14,247	48,854
244.55	10,023	17,380	247.20	14,331	49,568
244.60	10,101	17,883	247.25	14,414	50,287
244.65	10,179	18,390	247.30	14,498	51,009
244.70	10,258	18,901	247.35	14,583	51,737
244.75	10,336	19,416	247.40	14,667	52,468
244.80	10,415	19,934	247.45	14,752	53,203
244.85	10,494	20,457	247.50	**14,837**	**53,943**
244.90	10,574	20,984			
244.95	10,654	21,515			
245.00	10,734	22,049			
245.05	10,812	22,588			
245.10	10,889	23,130			

Summary for Link DA-1: Total DA-1 (AP-1)

Inflow Area =	16.243 ac,	0.20% Impervious, Inflow Depth =	2.53"	for 50 YR event
Inflow =	11.69 cfs @	12.71 hrs, Volume=	3.425 af	
Primary =	11.69 cfs @	12.71 hrs, Volume=	3.425 af, Atten= 0%, Lag= 0.0 min	

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DA-1: Total DA-1 (AP-1)

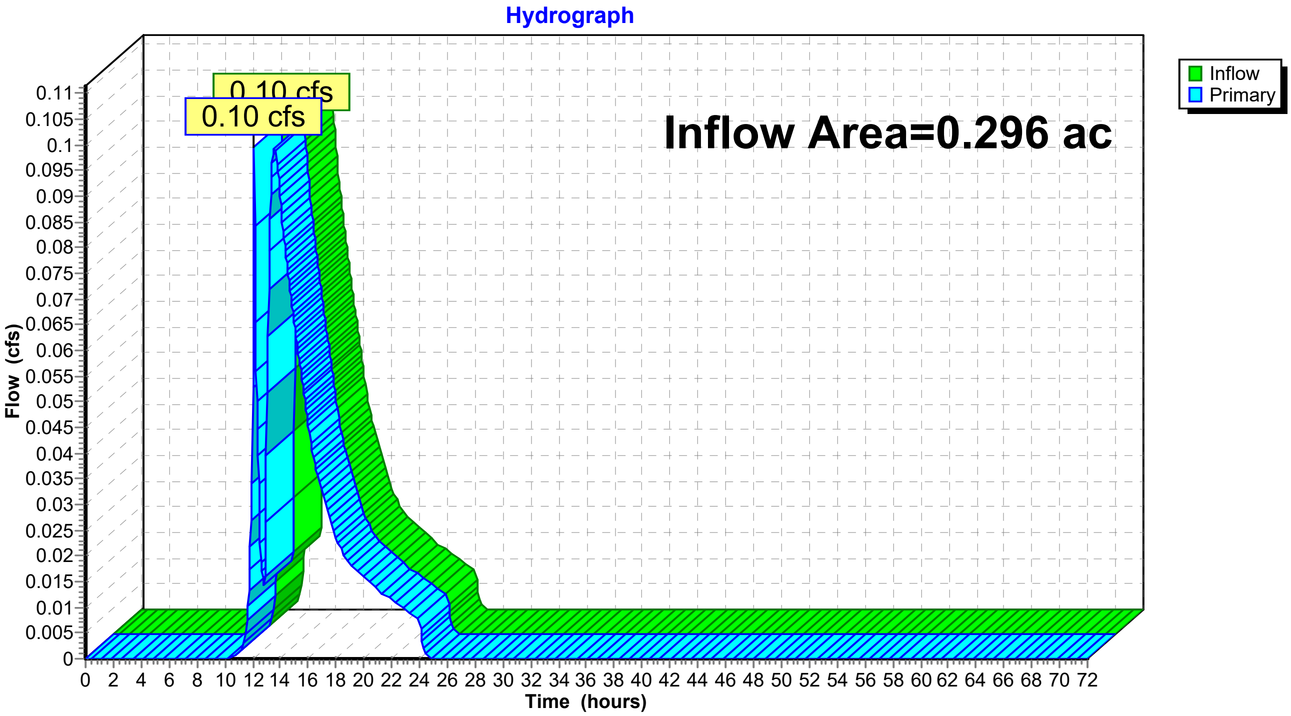


Summary for Link DA-2: Total DA-2 (AP-2)

Inflow Area =	0.296 ac, 47.82% Impervious, Inflow Depth = 1.41" for 50 YR event			
Inflow =	0.10 cfs @	12.10 hrs, Volume=	0.035 af	
Primary =	0.10 cfs @	12.10 hrs, Volume=	0.035 af,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DA-2: Total DA-2 (AP-2)



Summary for Subcatchment PDA-1A: PDA-1A (Detained)

Runoff = 22.76 cfs @ 12.39 hrs, Volume= 2.768 af, Depth= 3.73"
Routed to Reach C2 : Open Channel 2

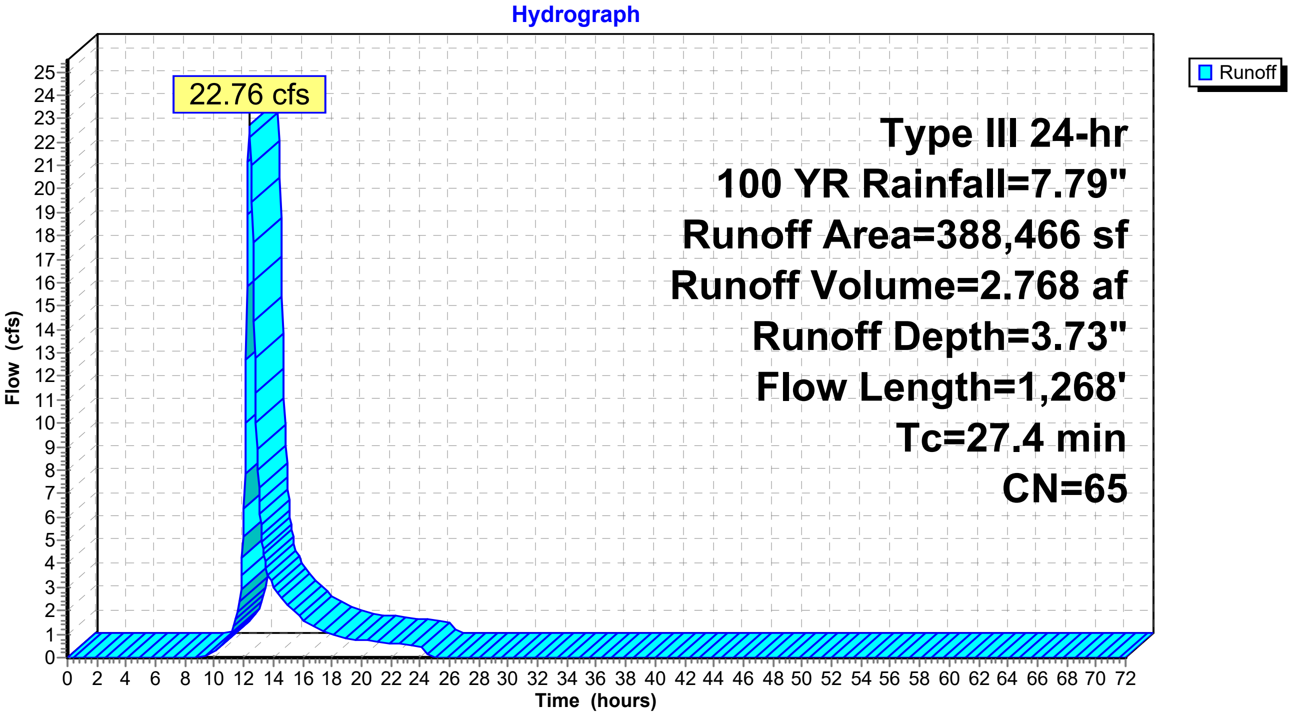
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
*	1,139	30	Woods, Good, HSG A
*	32,943	55	Woods, Good, HSG B
*	7,723	55	Woods, Good, HSG B
	30,167	55	Woods, Good, HSG B
*	21,016	55	Woods, Good, HSG B
	65,261	78	Meadow, non-grazed, HSG D
*	29,208	65	Meadow, non-grazed, HSG B/C
*	6,046	71	Meadow, non-grazed, HSG C
	10,920	78	Meadow, non-grazed, HSG D
*	5,769	65	Meadow, non-grazed, HSG B/C
*	11,310	65	Meadow, non-grazed, HSG B/C
	13,479	58	Meadow, non-grazed, HSG B
*	68,974	65	Meadow, non-grazed, HSG B/C
*	64,248	65	Meadow, non-grazed, HSG B/C
*	18,308	71	Meadow, non-grazed, HSG C
*	559	58	Meadow, non-grazed, HSG B
*	1,096	98	Gravel surface
*	300	98	Concrete Equipment Pad
	388,466	65	Weighted Average
	387,070		99.64% Pervious Area
	1,396		0.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.7	100	0.0450	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.9	55	0.0437	1.05		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.8	147	0.0948	3.08		**Shallow Concentrated Flow, C-D** Nearly Bare & Untilled Kv= 10.0 fps
0.6	87	0.0551	2.35		**Shallow Concentrated Flow, D-E** Nearly Bare & Untilled Kv= 10.0 fps
0.3	79	0.1480	3.85		**Shallow Concentrated Flow, E-F** Nearly Bare & Untilled Kv= 10.0 fps
1.2	154	0.0728	2.17	48.82	**Channel Flow, G-H** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
3.6	320	0.0335	1.47	33.12	**Channel Flow, H-I** Area= 22.5 sf Perim= 15.2' r= 1.48' n= 0.240 Sheet flow over Dense Grass
4.3	278	0.0168	1.07	26.97	**Channel Flow, H-J** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.240 Sheet flow over Dense Grass

0.0	48	0.1899	21.15	530.82	**Channel Flow, J-K** Area= 25.1 sf Perim= 16.2' r= 1.55' n= 0.041 Riprap, 2-inch
27.4	1,268	Total			

Subcatchment PDA-1A: PDA-1A (Detained)



Summary for Subcatchment PDA-1B: PDA-1B (Undetained)

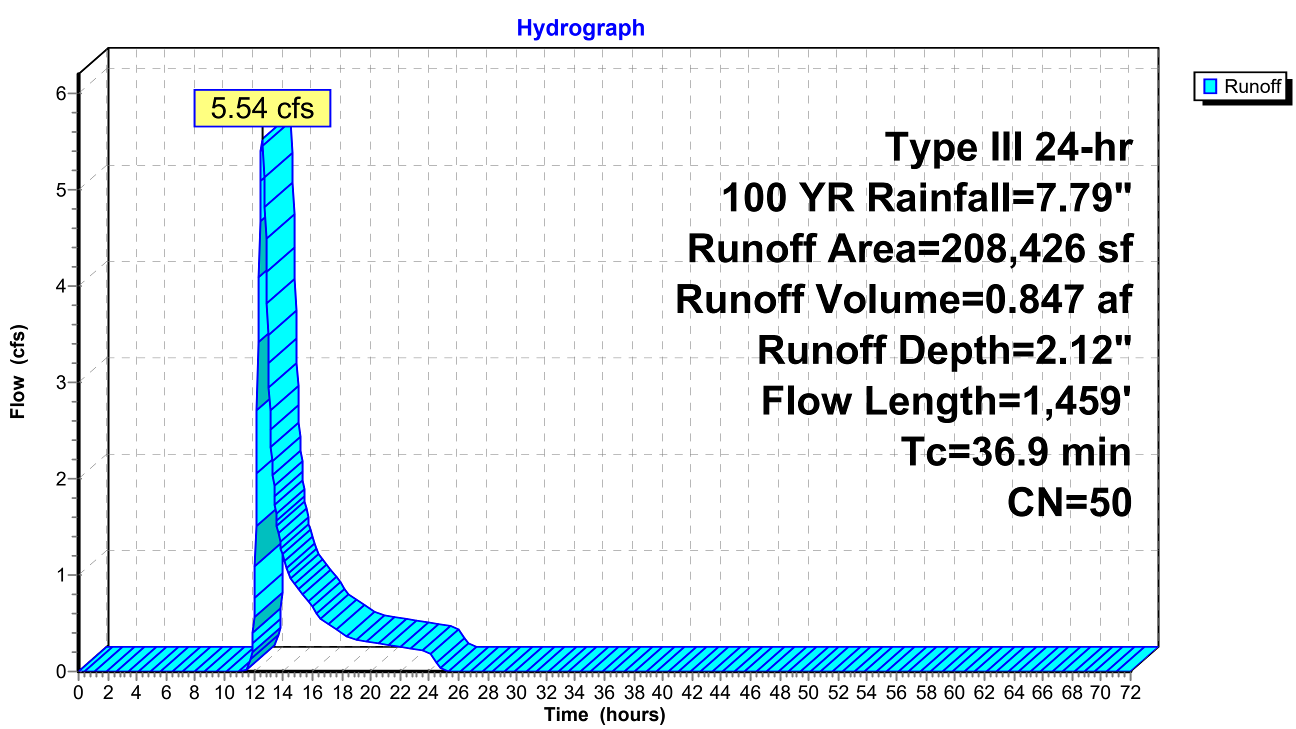
Runoff = 5.54 cfs @ 12.57 hrs, Volume= 0.847 af, Depth= 2.12"
Routed to Link DA-1 : Total DA-1 (AP-1)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
	27,431	30	Woods, Good, HSG A
	20,927	55	Woods, Good, HSG B
	13,171	30	Woods, Good, HSG A
*	15,069	77	Woods, Good, HSG B/D
	4,514	55	Woods, Good, HSG B
	541	55	Woods, Good, HSG B
	8,033	75	Row crops, SR + CR, Good, HSG B
	1,682	75	Row crops, SR + CR, Good, HSG B
*	4,233	78	Meadow, non-grazed, HSG B/D
*	373	78	Meadow, non-grazed, HSG B/D
	7,091	58	Meadow, non-grazed, HSG B
	41,458	30	Meadow, non-grazed, HSG A
*	5,616	78	Meadow, non-grazed, HSG B/D
*	9,852	78	Meadow, non-grazed, HSG B/D
	7,745	71	Meadow, non-grazed, HSG C
*	16,892	58	Meadow, non-grazed, HSG B
*	359	58	Meadow, non-grazed, HSG B
*	8,647	30	Meadow, non-grazed, HSG A
*	519	71	Meadow, non-grazed, HSG C
*	10,561	58	Meadow, non-grazed, HSG B
*	929	71	Meadow, non-grazed, HSG C
*	816	71	Meadow, non-grazed, HSG C
*	1,967	58	Meadow, non-grazed, HSG B
	208,426	50	Weighted Average
	208,426		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.8	100	0.0286	0.09		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
2.6	107	0.0191	0.69		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
2.8	198	0.0569	1.19		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	69	0.0158	0.63		**Shallow Concentrated Flow, D-E** Woodland Kv= 5.0 fps
0.6	66	0.1228	1.75		**Shallow Concentrated Flow, E-F** Woodland Kv= 5.0 fps
0.8	111	0.1218	2.44		**Shallow Concentrated Flow, F-G** Short Grass Pasture Kv= 7.0 fps
1.4	105	0.0641	1.27		**Shallow Concentrated Flow, G-H** Woodland Kv= 5.0 fps
3.1	243	0.0349	1.31		**Shallow Concentrated Flow, H-I** Short Grass Pasture Kv= 7.0 fps
3.3	243	0.0300	1.21		**Shallow Concentrated Flow, I-J** Short Grass Pasture Kv= 7.0 fps
1.7	217	0.0961	2.17		**Shallow Concentrated Flow, J-K** Short Grass Pasture Kv= 7.0 fps
36.9	1,459	Total			

Subcatchment PDA-1B: PDA-1B (Undetained)



Summary for Subcatchment PDA-1C: PDA-1C (Undetained)

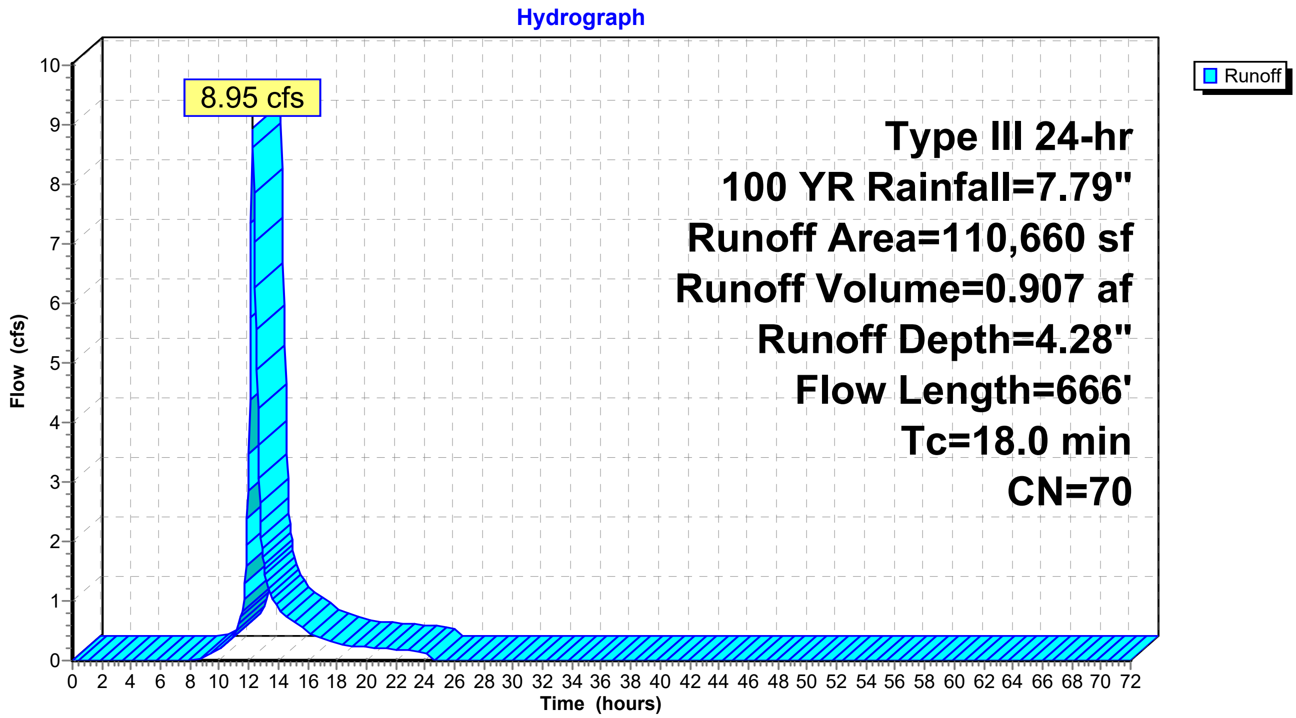
Runoff = 8.95 cfs @ 12.25 hrs, Volume= 0.907 af, Depth= 4.28"
Routed to Reach C1 : Open Channel 1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
	4,799	55	Woods, Good, HSG B
*	9,011	77	Woods, Good, HSG B/D
*	22,795	55	Woods, Good, HSG B
	8,150	75	Row crops, SR + CR, Good, HSG B
*	20,795	85	Row crops, SR + CR, Good, HSG B/D
*	26,995	75	Row crops, SR + CR, Good, HSG B
*	5,920	65	Meadow, non-grazed, HSG B/C
*	1,273	58	Meadow, non-grazed, HSG B
*	2,035	78	Meadow, non-grazed, HSG B/D
*	7,568	65	Meadow, non-grazed, HSG B/C
	1,319	58	Meadow, non-grazed, HSG B
	110,660	70	Weighted Average
	110,660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	100	0.0526	0.11		**Sheet Flow, A-B** Woods: Light underbrush n= 0.400 P2= 3.12"
0.6	41	0.0517	1.14		**Shallow Concentrated Flow, B-C** Woodland Kv= 5.0 fps
0.5	58	0.1505	1.94		**Shallow Concentrated Flow, C-D** Woodland Kv= 5.0 fps
1.8	170	0.0314	1.59		**Shallow Concentrated Flow, D-E** Cultivated Straight Rows Kv= 9.0 fps
0.3	297	0.0500	19.79	89.06	**Channel Flow, E-F** Area= 4.5 sf Perim= 3.0' r= 1.50' n= 0.022 Earth, clean & straight
18.0	666	Total			

Subcatchment PDA-1C: PDA-1C (Undetained)



Summary for Subcatchment PDA-2A: PDA-2A (Detained)

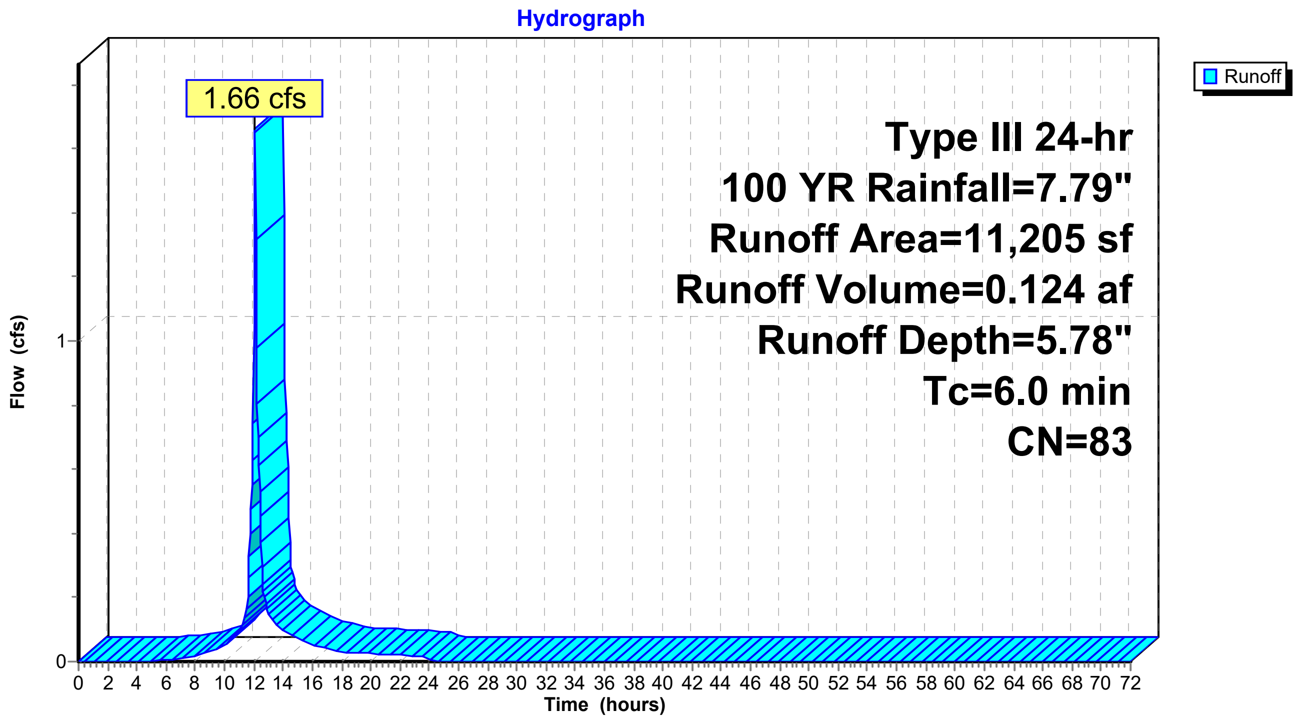
Runoff = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af, Depth= 5.78"
Routed to Pond 4P : Inf. Trench #1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
*	6,167	98	Gravel Access Road
*	1,464	65	Meadow, non-grazed, HSG B/C
*	3,574	65	Meadow, non-grazed, HSG B/C
	11,205	83	Weighted Average
	5,038		44.96% Pervious Area
	6,167		55.04% Impervious Area

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

Subcatchment PDA-2A: PDA-2A (Detained)



Summary for Subcatchment PDA-2B: PDA-2B (Undetained)

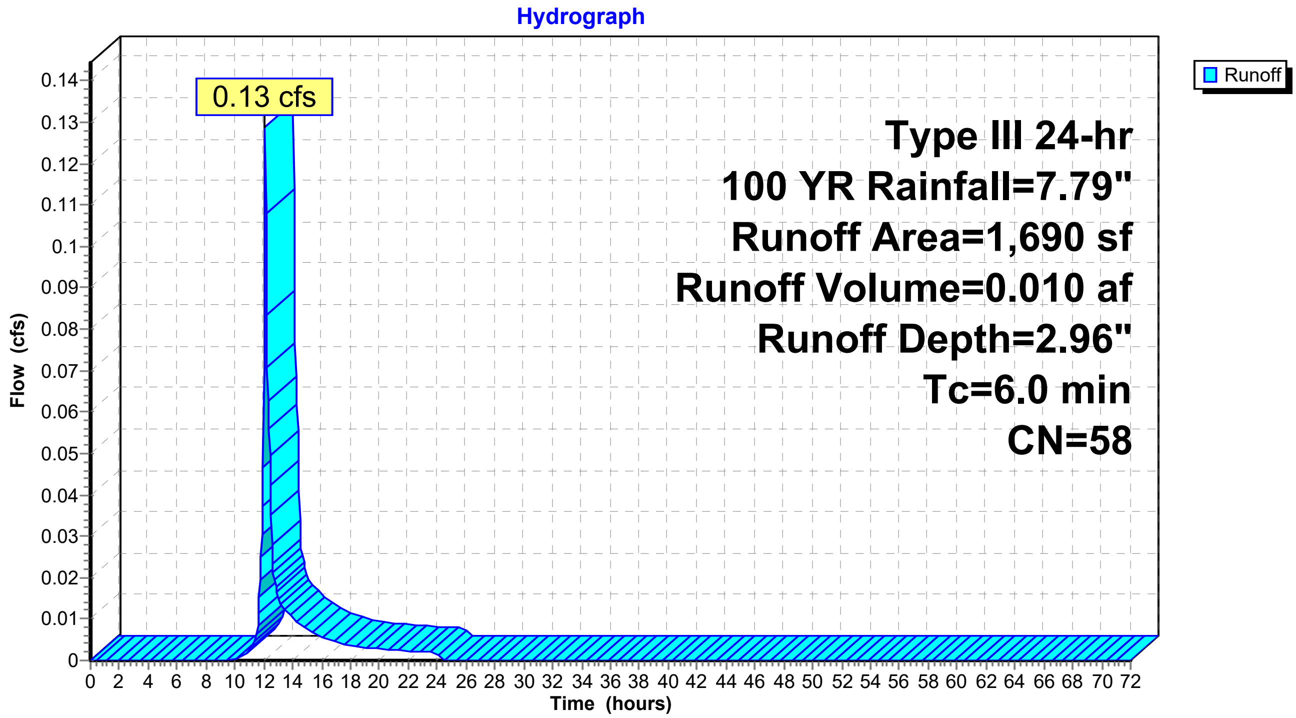
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.010 af, Depth= 2.96"
Routed to Link DA-2 : Total DA-2 (AP-2)

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 YR Rainfall=7.79"

	Area (sf)	CN	Description
*	1,690	58	Meadow, non-grazed, HSG B
	1,690		100.00% Pervious Area

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

Subcatchment PDA-2B: PDA-2B (Undetained)



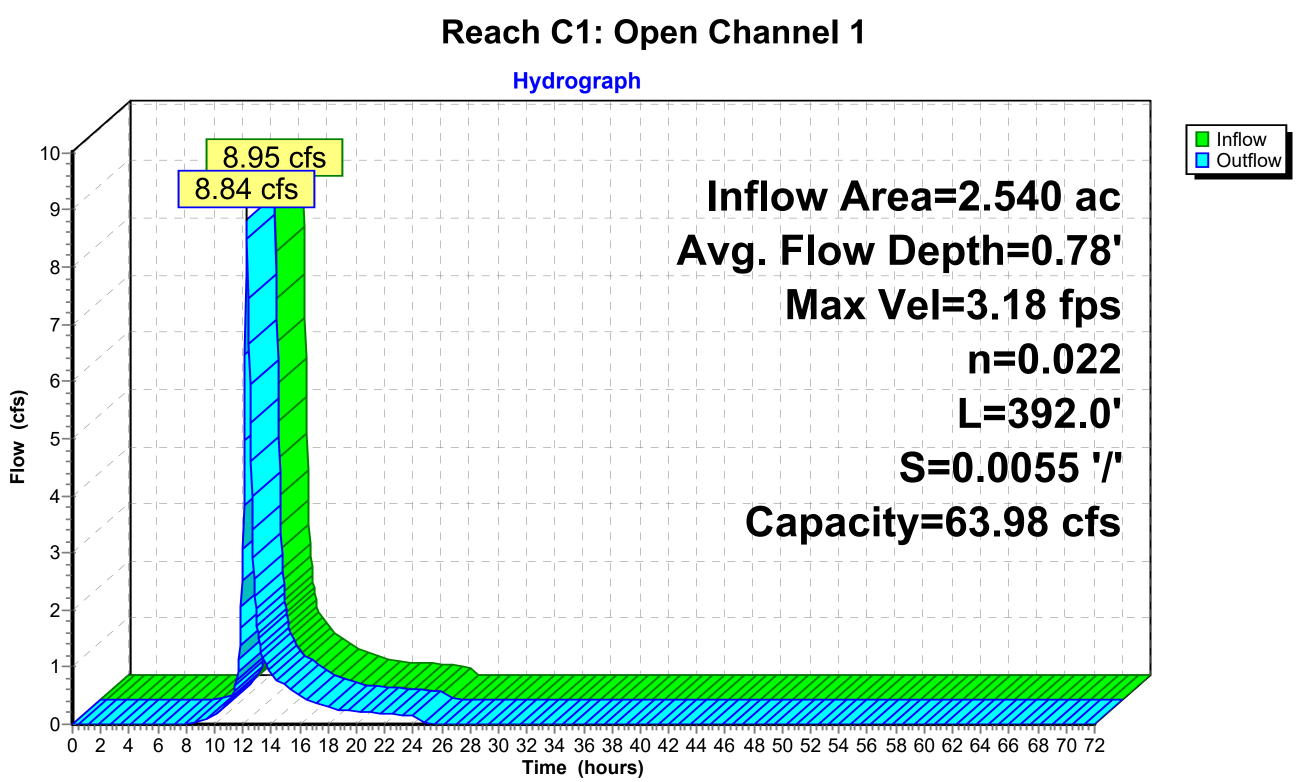
Summary for Reach C1: Open Channel 1

Inflow Area = 2.540 ac, 0.00% Impervious, Inflow Depth = 4.28" for 100 YR event
Inflow = 8.95 cfs @ 12.25 hrs, Volume= 0.907 af
Outflow = 8.84 cfs @ 12.28 hrs, Volume= 0.907 af, Atten= 1%, Lag= 1.5 min
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.18 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 5.8 min

Peak Storage= 1,088 cf @ 12.28 hrs
Average Depth at Peak Storage= 0.78' , Surface Width= 5.12'
Bank-Full Depth= 2.00' Flow Area= 12.0 sf, Capacity= 63.98 cfs

2.00' x 2.00' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 392.0' Slope= 0.0055 '/'
Inlet Invert= 249.44', Outlet Invert= 247.28'



Stage-Area-Storage for Reach C1: Open Channel 1

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)	Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
249.44	0.0	0	250.50	4.4	1,712
249.46	0.0	16	250.52	4.5	1,761
249.48	0.1	33	250.54	4.6	1,811
249.50	0.1	50	250.56	4.7	1,862
249.52	0.2	68	250.58	4.9	1,913
249.54	0.2	86	250.60	5.0	1,964
249.56	0.3	105	250.62	5.1	2,017
249.58	0.3	125	250.64	5.3	2,070
249.60	0.4	146	250.66	5.4	2,123
249.62	0.4	167	250.68	5.6	2,178
249.64	0.5	188	250.70	5.7	2,233
249.66	0.5	210	250.72	5.8	2,288
249.68	0.6	233	250.74	6.0	2,344
249.70	0.7	257	250.76	6.1	2,401
249.72	0.7	281	250.78	6.3	2,458
249.74	0.8	306	250.80	6.4	2,516
249.76	0.8	331	250.82	6.6	2,575
249.78	0.9	357	250.84	6.7	2,634
249.80	1.0	384	250.86	6.9	2,694
249.82	1.0	411	250.88	7.0	2,755
249.84	1.1	439	250.90	7.2	2,816
249.86	1.2	468	250.92	7.3	2,878
249.88	1.3	497	250.94	7.5	2,940
249.90	1.3	527	250.96	7.7	3,003
249.92	1.4	557	250.98	7.8	3,067
249.94	1.5	588	251.00	8.0	3,131
249.96	1.6	620	251.02	8.2	3,196
249.98	1.7	652	251.04	8.3	3,261
250.00	1.7	685	251.06	8.5	3,328
250.02	1.8	718	251.08	8.7	3,394
250.04	1.9	753	251.10	8.8	3,462
250.06	2.0	787	251.12	9.0	3,530
250.08	2.1	823	251.14	9.2	3,599
250.10	2.2	859	251.16	9.4	3,668
250.12	2.3	896	251.18	9.5	3,738
250.14	2.4	933	251.20	9.7	3,808
250.16	2.5	971	251.22	9.9	3,880
250.18	2.6	1,009	251.24	10.1	3,951
250.20	2.7	1,049	251.26	10.3	4,024
250.22	2.8	1,089	251.28	10.5	4,097
250.24	2.9	1,129	251.30	10.6	4,171
250.26	3.0	1,170	251.32	10.8	4,245
250.28	3.1	1,212	251.34	11.0	4,320
250.30	3.2	1,254	251.36	11.2	4,395
250.32	3.3	1,297	251.38	11.4	4,472
250.34	3.4	1,341	251.40	11.6	4,548
250.36	3.5	1,385	251.42	11.8	4,626
250.38	3.6	1,430	251.44	**12.0**	**4,704**
250.40	3.8	1,475			
250.42	3.9	1,521			
250.44	4.0	1,568			
250.46	4.1	1,615			
250.48	4.2	1,663			

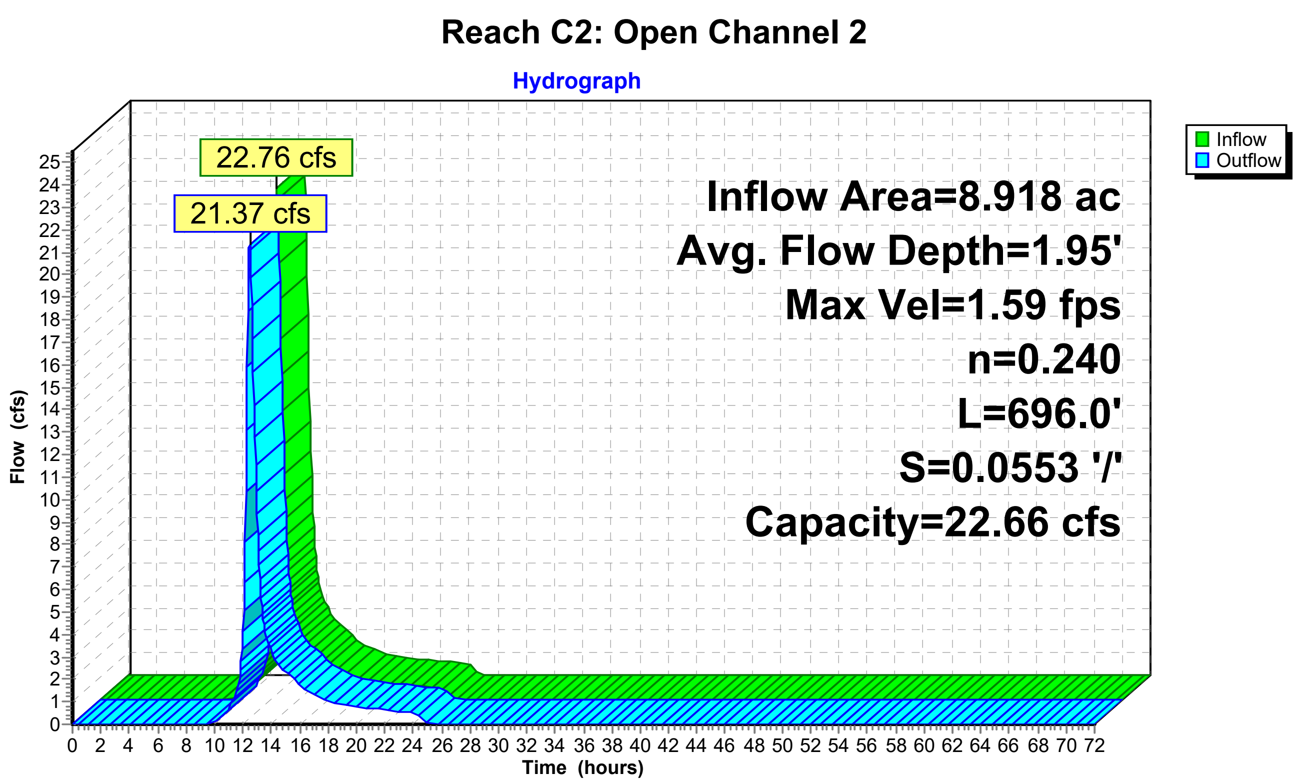
Summary for Reach C2: Open Channel 2

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 3.73" for 100 YR event
Inflow = 22.76 cfs @ 12.39 hrs, Volume= 2.768 af
Outflow = 21.37 cfs @ 12.49 hrs, Volume= 2.768 af, Atten= 6%, Lag= 5.8 min
Routed to Pond B-1 : Inf. Basin #1

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.59 fps, Min. Travel Time= 7.3 min
Avg. Velocity = 0.43 fps, Avg. Travel Time= 26.9 min

Peak Storage= 9,328 cf @ 12.49 hrs
Average Depth at Peak Storage= 1.95' , Surface Width= 10.78'
Bank-Full Depth= 2.00' Flow Area= 14.0 sf, Capacity= 22.66 cfs

3.00' x 2.00' deep channel, n= 0.240 Sheet flow over Dense Grass
Side Slope Z-value= 2.0 '/' Top Width= 11.00'
Length= 696.0' Slope= 0.0553 '/'
Inlet Invert= 286.00', Outlet Invert= 247.50'



Stage-Area-Storage for Reach C2: Open Channel 2

Elevation (feet)	End-Area (sq-ft)	Storage (cubic-feet)
286.00	0.0	0
286.02	0.1	42
286.04	0.1	86
286.06	0.2	130
286.08	0.3	176
286.10	0.3	223
286.12	0.4	271
286.14	0.5	320
286.16	0.5	370
286.18	0.6	421
286.20	0.7	473
286.22	0.8	527
286.24	0.8	581
286.26	0.9	637
286.28	1.0	694
286.30	1.1	752
286.32	1.2	811
286.34	1.3	871
286.36	1.3	932
286.38	1.4	994
286.40	1.5	1,058
286.42	1.6	1,123
286.44	1.7	1,188
286.46	1.8	1,255
286.48	1.9	1,323
286.50	2.0	1,392
286.52	2.1	1,462
286.54	2.2	1,533
286.56	2.3	1,606
286.58	2.4	1,679
286.60	2.5	1,754
286.62	2.6	1,830
286.64	2.7	1,906
286.66	2.9	1,984
286.68	3.0	2,064
286.70	3.1	2,144
286.72	3.2	2,225
286.74	3.3	2,307
286.76	3.4	2,391
286.78	3.6	2,476
286.80	3.7	2,561
286.82	3.8	2,648
286.84	3.9	2,736
286.86	4.1	2,825
286.88	4.2	2,915
286.90	4.3	3,007
286.92	4.5	3,099
286.94	4.6	3,193
286.96	4.7	3,287
286.98	4.9	3,383
287.00	5.0	3,480
287.02	5.1	3,578
287.04	5.3	3,677
287.06	5.4	3,777
287.08	5.6	3,879
287.10	5.7	3,981
287.12	5.9	4,085
287.14	6.0	4,189
287.16	6.2	4,295
287.18	6.3	4,402
287.20	6.5	4,510
287.22	6.6	4,619
287.24	6.8	4,729
287.26	7.0	4,841
287.28	7.1	4,953
287.30	7.3	5,067
287.32	7.4	5,182
287.34	7.6	5,297
287.36	7.8	5,414
287.38	7.9	5,532
287.40	8.1	5,652
287.42	8.3	5,772
287.44	8.5	5,893
287.46	8.6	6,016
287.48	8.8	6,139
287.50	9.0	6,264
287.52	9.2	6,390
287.54	9.4	6,517
287.56	9.5	6,645
287.58	9.7	6,774
287.60	9.9	6,904
287.62	10.1	7,036
287.64	10.3	7,168
287.66	10.5	7,302
287.68	10.7	7,437
287.70	10.9	7,572
287.72	11.1	7,709
287.74	11.3	7,848
287.76	11.5	7,987
287.78	11.7	8,127
287.80	11.9	8,268
287.82	12.1	8,411
287.84	12.3	8,555
287.86	12.5	8,699
287.88	12.7	8,845
287.90	12.9	8,992
287.92	13.1	9,140
287.94	13.3	9,290
287.96	13.6	9,440
287.98	13.8	9,591
288.00	**14.0**	**9,744**

Summary for Pond 4P: Inf. Trench #1

Inflow Area = 0.257 ac, 55.04% Impervious, Inflow Depth = 5.78" for 100 YR event
Inflow = 1.66 cfs @ 12.09 hrs, Volume= 0.124 af
Outflow = 0.25 cfs @ 12.60 hrs, Volume= 0.089 af, Atten= 85%, Lag= 30.5 min
Discarded = 0.01 cfs @ 12.60 hrs, Volume= 0.044 af
Primary = 0.24 cfs @ 12.60 hrs, Volume= 0.045 af
Routed to Link DA-2 : Total DA-2 (AP-2)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 249.57' @ 12.60 hrs Surf.Area= 3,222 sf Storage= 3,126 cf

Plug-Flow detention time= 907.6 min calculated for 0.089 af (72% of inflow)
Center-of-Mass det. time= 818.2 min (1,614.8 - 796.6)

Volume	Invert	Avail.Storage	Storage Description
#1	248.00'	4,654 cf	**Infiltration Trench Contours (Prismatic)** Listed below (Recalc)

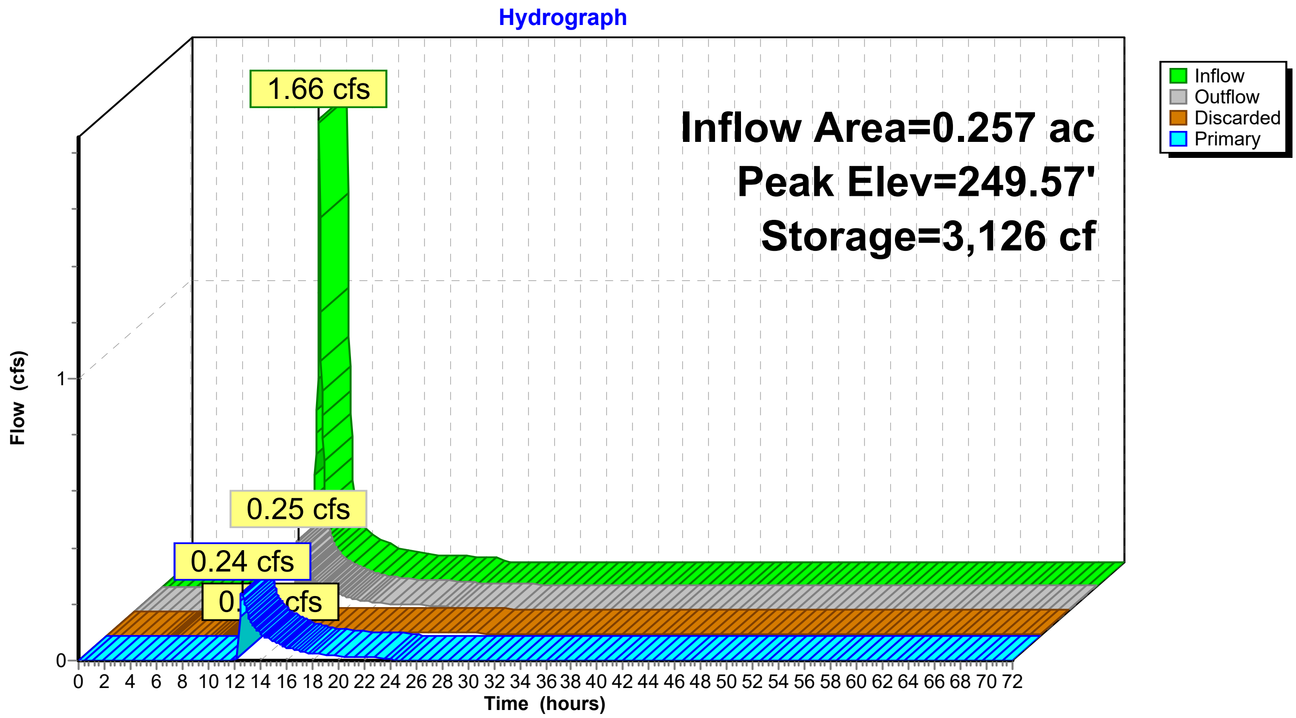
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
248.00	768	0	0
249.00	2,320	1,544	1,544
250.00	3,900	3,110	4,654

Device	Routing	Invert	Outlet Devices
#1	Discarded	248.00'	**0.120 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 240.00'
#2	Primary	249.50'	**5.0' long x 12.0' 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) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64

Discarded OutFlow Max=0.01 cfs @ 12.60 hrs HW=249.57' (Free Discharge)
└─**1=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=0.24 cfs @ 12.60 hrs HW=249.57' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.24 cfs @ 0.68 fps)

Pond 4P: Inf. Trench #1



Stage-Area-Storage for Pond 4P: Inf. Trench #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
248.00	768	0	249.06	2,415	1,686
248.02	799	16	249.08	2,446	1,735
248.04	830	32	249.10	2,478	1,784
248.06	861	49	249.12	2,510	1,834
248.08	892	66	249.14	2,541	1,884
248.10	923	85	249.16	2,573	1,935
248.12	954	103	249.18	2,604	1,987
248.14	985	123	249.20	2,636	2,040
248.16	1,016	143	249.22	2,668	2,093
248.18	1,047	163	249.24	2,699	2,146
248.20	1,078	185	249.26	2,731	2,201
248.22	1,109	207	249.28	2,762	2,256
248.24	1,140	229	249.30	2,794	2,311
248.26	1,172	252	249.32	2,826	2,367
248.28	1,203	276	249.34	2,857	2,424
248.30	1,234	300	249.36	2,889	2,482
248.32	1,265	325	249.38	2,920	2,540
248.34	1,296	351	249.40	2,952	2,598
248.36	1,327	377	249.42	2,984	2,658
248.38	1,358	404	249.44	3,015	2,718
248.40	1,389	431	249.46	3,047	2,778
248.42	1,420	459	249.48	3,078	2,840
248.44	1,451	488	249.50	3,110	2,902
248.46	1,482	517	249.52	3,142	2,964
248.48	1,513	547	249.54	3,173	3,027
248.50	1,544	578	249.56	3,205	3,091
248.52	1,575	609	249.58	3,236	3,155
248.54	1,606	641	249.60	3,268	3,220
248.56	1,637	673	249.62	3,300	3,286
248.58	1,668	706	249.64	3,331	3,352
248.60	1,699	740	249.66	3,363	3,419
248.62	1,730	774	249.68	3,394	3,487
248.64	1,761	809	249.70	3,426	3,555
248.66	1,792	845	249.72	3,458	3,624
248.68	1,823	881	249.74	3,489	3,693
248.70	1,854	918	249.76	3,521	3,764
248.72	1,885	955	249.78	3,552	3,834
248.74	1,916	993	249.80	3,584	3,906
248.76	1,948	1,032	249.82	3,616	3,978
248.78	1,979	1,071	249.84	3,647	4,050
248.80	2,010	1,111	249.86	3,679	4,123
248.82	2,041	1,152	249.88	3,710	4,197
248.84	2,072	1,193	249.90	3,742	4,272
248.86	2,103	1,234	249.92	3,774	4,347
248.88	2,134	1,277	249.94	3,805	4,423
248.90	2,165	1,320	249.96	3,837	4,499
248.92	2,196	1,363	249.98	3,868	4,576
248.94	2,227	1,408	250.00	**3,900**	**4,654**
248.96	2,258	1,452			
248.98	2,289	1,498			
249.00	2,320	1,544			
249.02	2,352	1,591			
249.04	2,383	1,638			

Summary for Pond B-1: Inf. Basin #1

Inflow Area = 8.918 ac, 0.36% Impervious, Inflow Depth = 3.73" for 100 YR event
Inflow = 21.37 cfs @ 12.49 hrs, Volume= 2.768 af
Outflow = 12.06 cfs @ 12.88 hrs, Volume= 2.592 af, Atten= 44%, Lag= 23.6 min
Discarded = 0.01 cfs @ 12.88 hrs, Volume= 0.019 af
Primary = 5.78 cfs @ 12.88 hrs, Volume= 2.367 af
Routed to Link DA-1 : Total DA-1 (AP-1)
Secondary = 6.28 cfs @ 12.88 hrs, Volume= 0.206 af
Routed to Link DA-1 : Total DA-1 (AP-1)

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 246.75' @ 12.88 hrs Surf.Area= 13,566 sf Storage= 43,228 cf

Plug-Flow detention time= 211.4 min calculated for 2.590 af (94% of inflow)
Center-of-Mass det. time= 178.8 min (1,047.2 - 868.4)

Volume	Invert	Avail.Storage	Storage Description
#1	242.50'	53,943 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
242.50	6,973	477.2	0	0	6,973
243.00	7,698	491.0	3,666	3,666	8,063
244.00	9,188	509.0	8,432	12,098	9,581
245.00	10,734	527.0	9,951	22,049	11,152
246.00	12,338	545.9	11,527	33,576	12,853
247.00	13,998	564.5	13,159	46,735	14,588
247.50	14,837	571.4	7,208	53,943	15,273

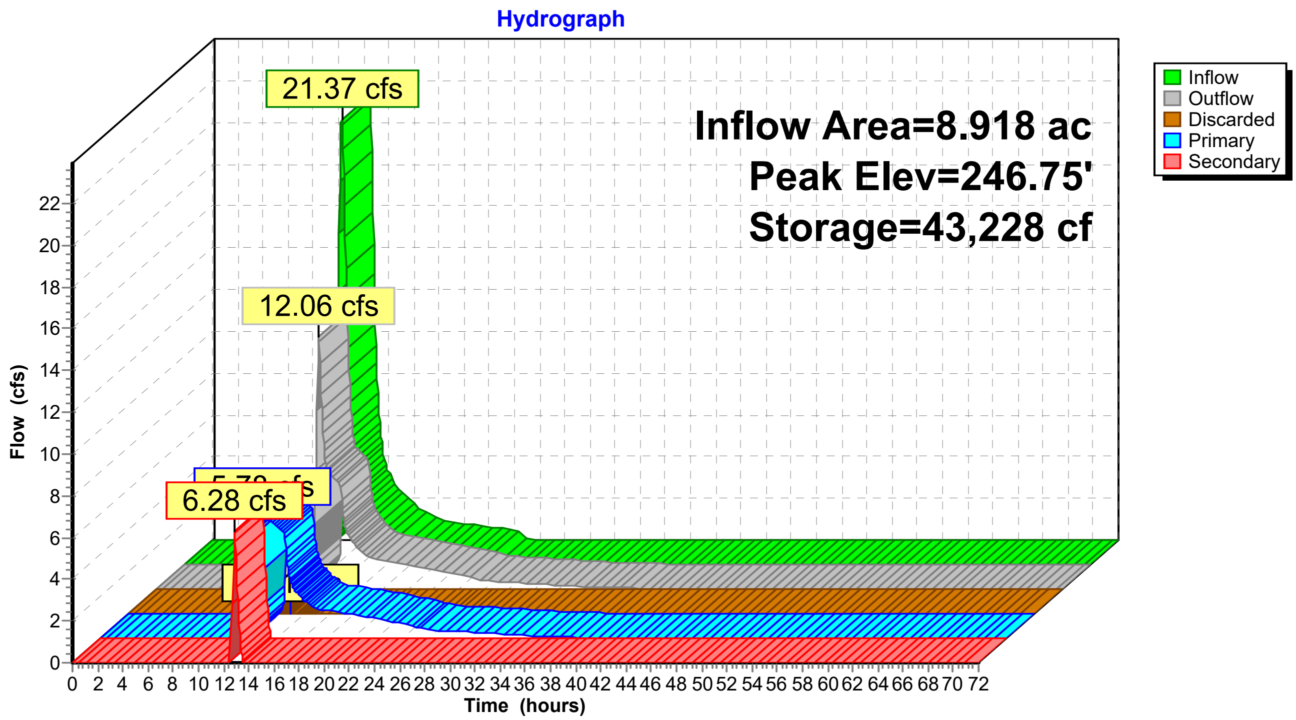
Device	Routing	Invert	Outlet Devices
#1	Primary	242.50'	**12.0" Round Culvert Barrel** L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 242.50' / 242.00' S= 0.0125 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	243.50'	**4.0" Vert. Side Opening A** C= 0.600 Limited to weir flow at low heads
#3	Device 1	244.50'	**6.0" Vert. Side Opening B** C= 0.600 Limited to weir flow at low heads
#4	Device 1	245.50'	**24.0" Horiz. Top of Riser** C= 0.600 Limited to weir flow at low heads
#5	Secondary	246.50'	**20.0' long x 12.0' breadth Emergency Spillway** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.57 2.62 2.70 2.67 2.66 2.67 2.66 2.64
#6	Discarded	242.50'	**0.015 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 232.00'

Discarded OutFlow Max=0.01 cfs @ 12.88 hrs HW=246.74' (Free Discharge)
└**6=Exfiltration** (Controls 0.01 cfs)

Primary OutFlow Max=5.78 cfs @ 12.88 hrs HW=246.74' TW=0.00' (Dynamic Tailwater)
└**1=Culvert Barrel** (Inlet Controls 5.78 cfs @ 7.36 fps)
 ├**2=Side Opening A** (Passes < 0.74 cfs potential flow)
 ├**3=Side Opening B** (Passes < 1.33 cfs potential flow)
 └**4=Top of Riser** (Passes < 16.87 cfs potential flow)

Secondary OutFlow Max=6.22 cfs @ 12.88 hrs HW=246.74' TW=0.00' (Dynamic Tailwater)
└**5=Emergency Spillway** (Weir Controls 6.22 cfs @ 1.27 fps)

Pond B-1: Inf. Basin #1



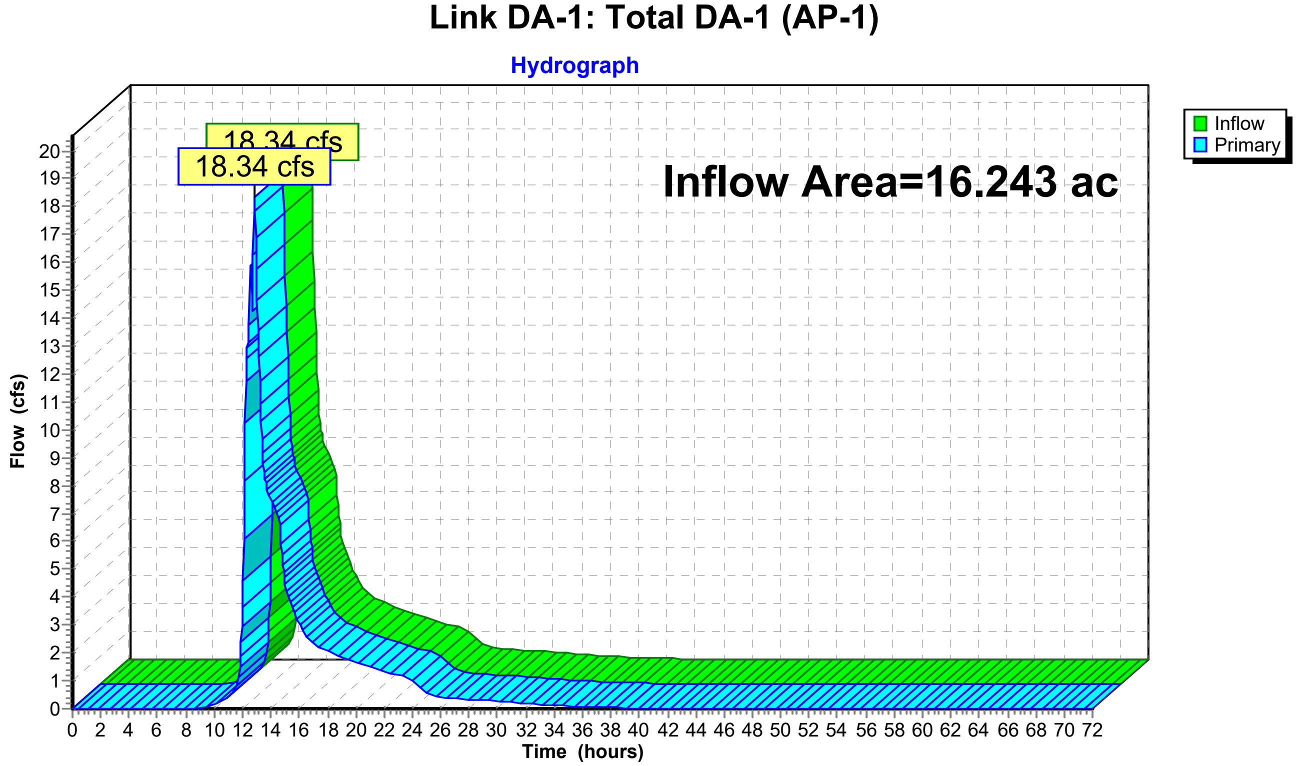
Stage-Area-Storage for Pond B-1: Inf. Basin #1

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
242.50	6,973	0	245.15	10,967	23,677
242.55	7,044	350	245.20	11,046	24,227
242.60	7,115	704	245.25	11,125	24,781
242.65	7,187	1,062	245.30	11,203	25,340
242.70	7,259	1,423	245.35	11,283	25,902
242.75	7,331	1,788	245.40	11,362	26,468
242.80	7,404	2,156	245.45	11,442	27,038
242.85	7,477	2,528	245.50	11,522	27,612
242.90	7,550	2,904	245.55	11,602	28,190
242.95	7,624	3,283	245.60	11,683	28,772
243.00	7,698	3,666	245.65	11,764	29,359
243.05	7,769	4,053	245.70	11,845	29,949
243.10	7,841	4,443	245.75	11,927	30,543
243.15	7,913	4,837	245.80	12,008	31,141
243.20	7,985	5,235	245.85	12,090	31,744
243.25	8,058	5,636	245.90	12,173	32,350
243.30	8,131	6,040	245.95	12,255	32,961
243.35	8,205	6,449	246.00	12,338	33,576
243.40	8,278	6,861	246.05	12,419	34,195
243.45	8,352	7,277	246.10	12,499	34,818
243.50	8,427	7,696	246.15	12,580	35,445
243.55	8,501	8,119	246.20	12,662	36,076
243.60	8,576	8,546	246.25	12,743	36,711
243.65	8,652	8,977	246.30	12,825	37,350
243.70	8,727	9,411	246.35	12,907	37,993
243.75	8,803	9,850	246.40	12,989	38,641
243.80	8,879	10,292	246.45	13,072	39,292
243.85	8,956	10,738	246.50	13,155	39,948
243.90	9,033	11,187	246.55	13,238	40,608
243.95	9,110	11,641	246.60	13,321	41,272
244.00	9,188	12,098	246.65	13,405	41,940
244.05	9,262	12,560	246.70	13,489	42,612
244.10	9,337	13,025	246.75	13,573	43,289
244.15	9,412	13,493	246.80	13,658	43,970
244.20	9,488	13,966	246.85	13,742	44,655
244.25	9,563	14,442	246.90	13,827	45,344
244.30	9,639	14,922	246.95	13,913	46,037
244.35	9,715	15,406	247.00	13,998	46,735
244.40	9,792	15,894	247.05	14,081	47,437
244.45	9,869	16,385	247.10	14,164	48,143
244.50	9,946	16,881	247.15	14,247	48,854
244.55	10,023	17,380	247.20	14,331	49,568
244.60	10,101	17,883	247.25	14,414	50,287
244.65	10,179	18,390	247.30	14,498	51,009
244.70	10,258	18,901	247.35	14,583	51,737
244.75	10,336	19,416	247.40	14,667	52,468
244.80	10,415	19,934	247.45	14,752	53,203
244.85	10,494	20,457	247.50	**14,837**	**53,943**
244.90	10,574	20,984			
244.95	10,654	21,515			
245.00	10,734	22,049			
245.05	10,812	22,588			
245.10	10,889	23,130			

Summary for Link DA-1: Total DA-1 (AP-1)

Inflow Area = 16.243 ac, 0.20% Impervious, Inflow Depth = 3.20" for 100 YR event
Inflow = 18.34 cfs @ 12.85 hrs, Volume= 4.327 af
Primary = 18.34 cfs @ 12.85 hrs, Volume= 4.327 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

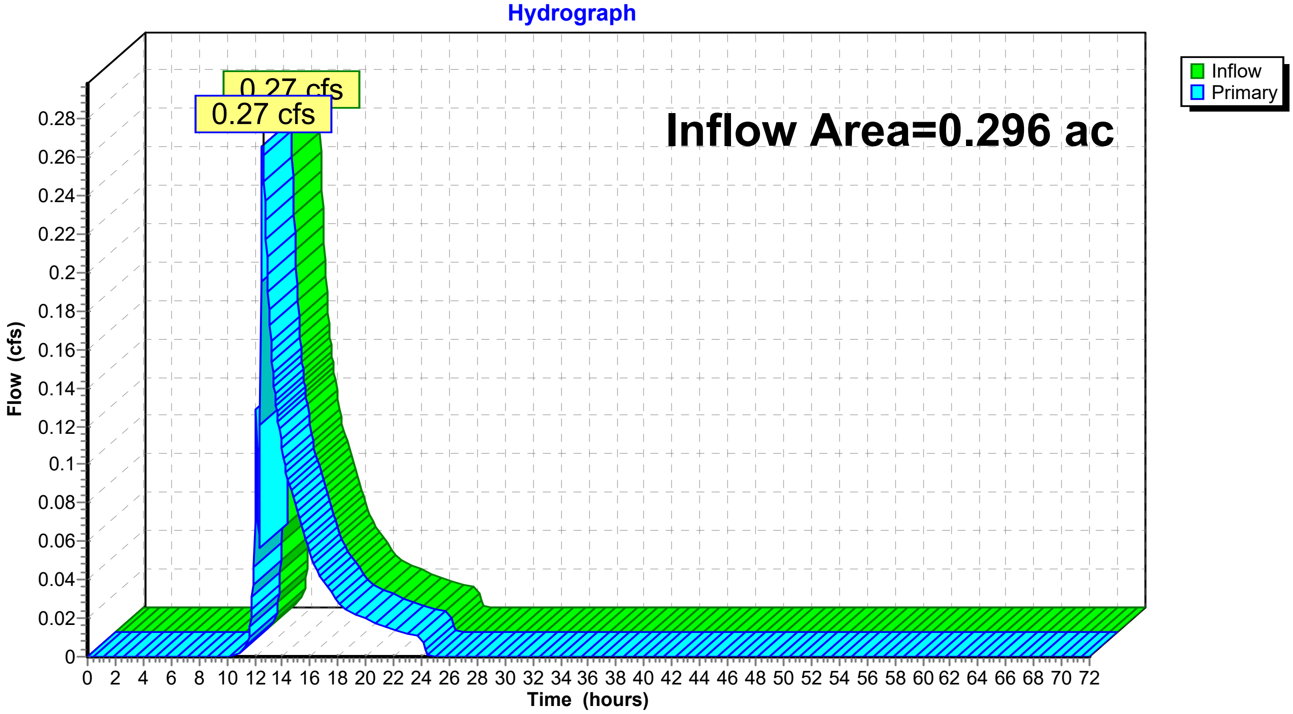


Summary for Link DA-2: Total DA-2 (AP-2)

Inflow Area = 0.296 ac, 47.82% Impervious, Inflow Depth = 2.23" for 100 YR event
Inflow = 0.27 cfs @ 12.58 hrs, Volume= 0.055 af
Primary = 0.27 cfs @ 12.58 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link DA-2: Total DA-2 (AP-2)



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100 YR Event

APPENDIX D: NOAA ATLAS 14 PRECIPITATION FREQUENCY TABLE

NOAA Atlas 14, Volume 10, Version 3
Location name: South Windsor, Connecticut, USA*
Latitude: 41.8221°, Longitude: -72.5294°
Elevation: 259 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** (0.258-0.432)	**0.405** (0.313-0.525)	**0.522** (0.401-0.679)	**0.619** (0.473-0.810)	**0.753** (0.558-1.03)	**0.854** (0.621-1.19)	**0.959** (0.679-1.39)	**1.08** (0.724-1.60)	**1.25** (0.808-1.92)	**1.39** (0.879-2.18)
10-min	**0.473** (0.365-0.612)	**0.574** (0.443-0.744)	**0.739** (0.569-0.961)	**0.877** (0.671-1.15)	**1.07** (0.791-1.46)	**1.21** (0.879-1.69)	**1.36** (0.962-1.97)	**1.53** (1.02-2.26)	**1.77** (1.14-2.72)	**1.97** (1.25-3.08)
15-min	**0.556** (0.429-0.720)	**0.675** (0.521-0.875)	**0.870** (0.669-1.13)	**1.03** (0.789-1.35)	**1.26** (0.931-1.72)	**1.42** (1.04-1.99)	**1.60** (1.13-2.32)	**1.80** (1.21-2.66)	**2.08** (1.35-3.20)	**2.32** (1.46-3.63)
30-min	**0.748** (0.578-0.969)	**0.910** (0.702-1.18)	**1.18** (0.903-1.53)	**1.40** (1.07-1.82)	**1.70** (1.26-2.32)	**1.92** (1.40-2.69)	**2.16** (1.53-3.14)	**2.43** (1.63-3.60)	**2.82** (1.82-4.33)	**3.14** (1.98-4.91)
60-min	**0.941** (0.726-1.22)	**1.14** (0.883-1.48)	**1.48** (1.14-1.92)	**1.76** (1.34-2.30)	**2.14** (1.59-2.93)	**2.43** (1.76-3.39)	**2.73** (1.93-3.96)	**3.07** (2.06-4.55)	**3.56** (2.30-5.46)	**3.96** (2.50-6.20)
2-hr	**1.21** (0.942-1.56)	**1.47** (1.14-1.89)	**1.89** (1.46-2.44)	**2.23** (1.72-2.90)	**2.71** (2.02-3.70)	**3.06** (2.25-4.28)	**3.44** (2.46-5.01)	**3.90** (2.62-5.75)	**4.58** (2.97-6.98)	**5.15** (3.27-8.02)
3-hr	**1.40** (1.09-1.80)	**1.69** (1.32-2.17)	**2.17** (1.68-2.80)	**2.56** (1.98-3.33)	**3.11** (2.33-4.24)	**3.51** (2.59-4.90)	**3.95** (2.84-5.74)	**4.48** (3.03-6.59)	**5.30** (3.44-8.06)	**6.00** (3.81-9.30)
6-hr	**1.76** (1.37-2.24)	**2.13** (1.66-2.72)	**2.74** (2.13-3.51)	**3.24** (2.51-4.19)	**3.94** (2.97-5.34)	**4.45** (3.30-6.19)	**5.01** (3.63-7.27)	**5.71** (3.87-8.34)	**6.79** (4.43-10.3)	**7.73** (4.93-11.9)
12-hr	**2.15** (1.69-2.73)	**2.63** (2.07-3.34)	**3.41** (2.67-4.36)	**4.07** (3.16-5.22)	**4.96** (3.76-6.69)	**5.62** (4.18-7.77)	**6.34** (4.62-9.16)	**7.24** (4.92-10.5)	**8.64** (5.66-13.0)	**9.86** (6.31-15.1)
24-hr	**2.52** (1.99-3.18)	**3.12** (2.46-3.95)	**4.11** (3.23-5.21)	**4.93** (3.85-6.29)	**6.05** (4.61-8.14)	**6.88** (5.15-9.48)	**7.79** (5.71-11.2)	**8.95** (6.10-12.9)	**10.8** (7.07-16.1)	**12.4** (7.95-18.8)
2-day	**2.84** (2.26-3.57)	**3.57** (2.83-4.49)	**4.76** (3.77-6.01)	**5.75** (4.52-7.30)	**7.12** (5.46-9.54)	**8.11** (6.12-11.2)	**9.22** (6.83-13.3)	**10.7** (7.30-15.3)	**13.1** (8.59-19.4)	**15.2** (9.77-22.9)
3-day	**3.09** (2.46-3.87)	**3.89** (3.10-4.88)	**5.20** (4.12-6.54)	**6.28** (4.96-7.95)	**7.78** (5.99-10.4)	**8.86** (6.72-12.2)	**10.1** (7.50-14.5)	**11.7** (8.01-16.7)	**14.4** (9.46-21.2)	**16.7** (10.8-25.2)
4-day	**3.32** (2.65-4.14)	**4.17** (3.32-5.22)	**5.56** (4.42-6.98)	**6.72** (5.31-8.48)	**8.31** (6.40-11.1)	**9.46** (7.18-13.0)	**10.8** (8.02-15.5)	**12.5** (8.56-17.8)	**15.3** (10.1-22.6)	**17.8** (11.5-26.7)
7-day	**3.93** (3.16-4.90)	**4.89** (3.92-6.09)	**6.45** (5.15-8.07)	**7.75** (6.15-9.74)	**9.54** (7.37-12.6)	**10.8** (8.24-14.7)	**12.3** (9.16-17.5)	**14.2** (9.76-20.1)	**17.3** (11.4-25.3)	**20.0** (12.9-29.8)
10-day	**4.56** (3.66-5.66)	**5.57** (4.47-6.92)	**7.22** (5.78-9.01)	**8.60** (6.84-10.8)	**10.5** (8.12-13.8)	**11.9** (9.03-16.0)	**13.4** (9.97-18.9)	**15.4** (10.6-21.7)	**18.5** (12.3-27.0)	**21.2** (13.8-31.6)
20-day	**6.55** (5.30-8.09)	**7.63** (6.16-9.43)	**9.38** (7.55-11.6)	**10.8** (8.68-13.5)	**12.9** (9.96-16.7)	**14.3** (10.9-19.1)	**15.9** (11.8-22.0)	**17.9** (12.4-25.0)	**20.7** (13.8-30.0)	**23.1** (15.0-34.1)
30-day	**8.26** (6.70-10.2)	**9.36** (7.58-11.5)	**11.2** (9.01-13.8)	**12.7** (10.2-15.7)	**14.7** (11.4-19.0)	**16.3** (12.3-21.4)	**17.9** (13.1-24.3)	**19.7** (13.7-27.4)	**22.2** (14.9-32.0)	**24.3** (15.8-35.7)
45-day	**10.4** (8.46-12.8)	**11.5** (9.38-14.2)	**13.4** (10.8-16.5)	**14.9** (12.0-18.5)	**17.0** (13.2-21.8)	**18.7** (14.2-24.4)	**20.3** (14.8-27.3)	**22.0** (15.4-30.5)	**24.1** (16.2-34.6)	**25.8** (16.8-37.8)
60-day	**12.2** (9.95-14.9)	**13.4** (10.9-16.4)	**15.3** (12.4-18.8)	**16.9** (13.6-20.8)	**19.1** (14.8-24.3)	**20.8** (15.7-26.9)	**22.4** (16.3-29.8)	**24.0** (16.8-33.1)	**25.9** (17.4-37.0)	**27.2** (17.8-39.8)

[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.

APPENDIX E: Water Quality Volume Calculations

WATER QUALITY VOLUME CALCULATIONS
FOR
FOSTER SOLAR
186 FOSTER STREET, SOUTH WINDSOR CT

$$WQV = \frac{(P)(R)(A)}{12}$$

where:

WQV = water quality volume (cubic feet)
P = 1.3 inches (90th percentile rainfall event)
R = volumetric runoff coefficient = 0.05+0.009(I)
I = post- development impervious area (percent) after application of non-structural LID site planning and design strategies and before application of structural stormwater BMPs
A = post-development total drainage area of site or design point (square feet)

$V=WQV+((P)(A_b)/12)$

V=required basin storage volume (ac
WQV=Water Quality Volume (ac-ft)
P= design water quality precipitation
A_b=basin surface area (ac)

	Area (ac)	Pervious (ac)	Imperv. (ac)	I	R	WQV (ac-ft)	P (in)	A_b (ac)	V (ac-ft)	Total V Req. (cf)	V Provided (cf)
Overall Site	9.175	9.003	0.172	1.87%	0.07	0.07	n/a	n/a	n/a	2,895.39	-
IB-1	8.918	8.888	0.030	0.34%	0.05	0.05	1.3	0.160078	0.07	2,987.02	3,666.00
IT-1	0.257	0.115	0.142	55.20%	0.55	0.02	1.3	0.017631	0.02	746.98	2,173.00

1.3 INCHES IS NEW P, PER 2024 STORMWATER MANUAL

Overall Total V Required = 3,734.00 cf
Overall Total V Provided = 5,839.00 cf

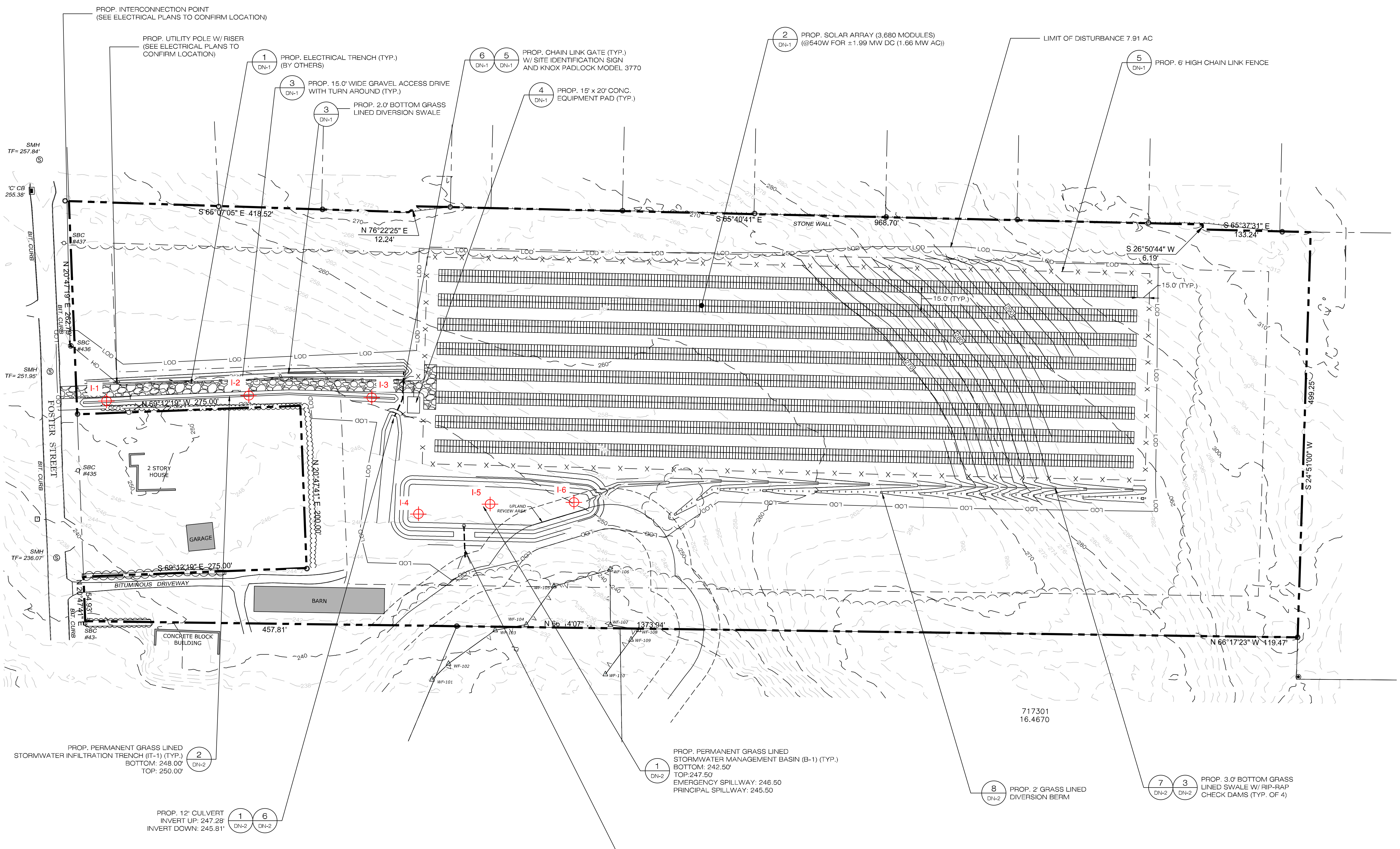
APPENDIX F: ADDITIONAL CALCULATIONS

OUTLET PIPE CALCS AND APRON SIZING
FOR
FOSTER SOLAR
186 FOSTER STREET, SOUTH WINDSOR CT

OUTLET PIPE	PIPE DIAMETER (IN)	LENGTH (FT)	INV. IN (FT)	INV. OUT (FT)	SLOPE (FT/FT)	N VALUE	MAX VELOCITY (FT/SEC)
C-1	12	58.0	247.28	245.54	0.0300	0.0130	7.82
IB-1	12	43.0	242.50	241.20	0.0302	0.0130	7.85

APRON SIZING			MIN. LENGTH (FT)			MIN. W2 (FT)	
OUTLET PIPE	Sp (FT)	Q (CFS FOR 25YR STORM)	TYPE A	TYPE B	MIN. W1 (FT)	TYPE A	TYPE B
C-1	1.00	4.99	18.85	29.42	3.00	16.20	14.77
IB-1	1.00	3.24	13.15	19.90	3.00	12.20	10.96

APPENDIX G: Geotechnical Report & Infiltration Report



EXPLORATION LOCATION PLAN
DTE - DEC172023

1 SP-1 **SITE & UTILITY PLAN**
SCALE : 1" = 40'-0"

40 0 20 40 80
(IN FEET) 1 inch = 40 ft.

C-TECSOLAR
1 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002
OFFICE: (860)-580-7174

ALL-POINTS TECHNOLOGY CORPORATION
567 VAUXHALL STREET EXTENSION - SUITE 311
WATERFORD, CT 06385 PHONE: (860)-663-1697
WWW.ALLPOINTSTECH.COM FAX: (860)-663-0935

CSC PERMIT SET

NO	DATE	REVISION
0		
1		
2		
3		
4		
5		
6		

DESIGN PROFESSIONAL OF RECORD
PROF: THOMAS E. LITTLE, P.E.
COMP: ALL-POINTS TECHNOLOGY CORPORATION P.C.
ADD: 567 VAUXHALL STREET EXTENSION - SUITE 311 WATERFORD, CT 06385

OWNER: HELEN K. GALLIVAN
ADDRESS: 186 FOSTER STREET, SUITE 200 SOUTH WINDSOR, CT

FOSTER SOLAR

SITE ADDRESS: 186 FOSTER STREET SOUTH WINDSOR, CT

APT FILING NUMBER: CT481620

DRAWN BY: TEL
DATE: 10/20/2023
CHECKED BY: SMC

SHEET TITLE:
SITE & UTILITY PLAN

SHEET NUMBER:
SP-1

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Stormwater Management Systems
186 Foster Street
South Windsor, CT
File No. 0032-071.00

Test Location:	I-2	**Driller:**	Jim Casson
Test Type:	Falling Head	**Engineer:**	M. Fekieta
Date:	12/6/2023	**Weather:**	Sunny 40s

Ground surface El.:	250±	(ft.)
Top of Casing El.:	252.5±	(ft.)
Bottom of Casing El.:	247±	(ft.)

Total Casing Length: 6.5 (ft.)

Inside Casing Diameter: 4 (in.)

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time	t2 - t1	DTW	h1	h2	ln(h1/h2)	Kv	Kv	Kv
(min.)	(min.)	(in.)	(in.)	(in.)		(in/min)	(cm/sec)	(in/hr)
2.5	2.5	0.3	78.5	78.2	0.0032	1.5E-03	6.2E-05	8.7E-02
5	2.5	0.5	78.2	78.0	0.0032	1.5E-03	6.2E-05	8.8E-02
10	5.0	1.1	78.0	77.4	0.0080	1.8E-03	7.8E-05	1.1E-01
20	10.0	2.4	77.4	76.1	0.0163	1.9E-03	7.9E-05	1.1E-01
30	10.0	3.8	76.1	74.7	0.0182	2.1E-03	8.8E-05	1.2E-01
45	15.0	5.8	74.7	72.7	0.0271	2.1E-03	8.7E-05	1.2E-01
60	15.0	7.5	72.7	71.0	0.0244	1.9E-03	7.9E-05	1.1E-01
90	30.0	10.9	71.0	67.6	0.0487	1.9E-03	7.9E-05	1.1E-01
120	30.0	14.5	67.6	64.0	0.0551	2.1E-03	8.9E-05	1.3E-01
150	30.0	18	64.0	60.5	0.0563	2.1E-03	9.1E-05	1.3E-01
180	30.0	21	60.5	57.5	0.0509	1.9E-03	8.2E-05	1.2E-01
210	30.0	24	57.5	54.5	0.0536	2.0E-03	8.6E-05	1.2E-01

DOWN TO EARTH CONSULTING, LLC
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING

Test Boring Falling Head Test
Proposed Stormwater Management Systems
186 Foster Street
South Windsor, CT
File No. 0032-071.00

Test Location:	I-5	**Driller:**	Jim Casson
Test Type:	Falling Head	**Engineer:**	M. Fekieta
Date:	12/5/2023	**Weather:**	Sunny 40s

Ground surface El.:	248±	(ft.)	Total Casing Length:	6.5	(ft.)	Inside Casing Diameter:	4	(in.)
Top of Casing El.:	249.5±	(ft.)						
Bottom of Casing El.:	243±	(ft.)						

Hydraulic Conductivity (Kv) = π [D {Ln (h1/h2) }] / 11 (t2-t1)

Elapsed Time	t2 - t1	DTW	h1	h2	ln(h1/h2)	Kv	Kv	Kv
(min.)	(min.)	(in.)	(in.)	(in.)		(in/min)	(cm/sec)	(in/hr)
60	60	6	78.5	72.5	0.0795	1.5E-03	6.4E-05	9.1E-02
120	60	12	72.5	66.5	0.0864	1.6E-03	7.0E-05	9.9E-02
180	60	28.8	66.5	49.7	0.2913	5.5E-03	2.3E-04	3.3E-01
1200	1020	39	49.7	39.5	0.2298	2.6E-04	1.1E-05	1.5E-02

	PROJECT	
DOWN TO EARTH CONSULTING, LLC	PROPOSED STORMWATER MANAGEMENT SYSTEMS	BORING NO. I-1
	186 FOSTER STREET	SHEET 1 of 1
	SOUTH WINDSOR, CONNECTICUT	FILE NO. 0032-071.00
		CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	250+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	12/6/2023	Date End	12/6/2023

		Groundwater Readings (from ground surface)				
		Date	Time	Depth (ft)	Elev.	Stabilization Time
Hammer Type:	Lever Operated Safety Hammer					
Sampler Size:	1-3/8" I.D. Split Spoon	12/6/23	-	8	-	10 minutes
Type Drill Rig:	Backhoe Mounted Mobile B-53					
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	14/24	0 to 2	3-5-4-11		Loose, dark red-brown, fine to medium SAND and SILT, trace fine Gravel, trace (-) Roots	9"+/- Topsoil
2								FILL
3		S-2	16/16	2 to 3.3	26-30-50/4"		Very dense, red-brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	SAND & GRAVEL
4								
5		S-3	0/1	4 to 4.1	50/1"		Very dense, No Recovery	
6								
7		S-4	20/24	6 to 8	22-31-29-26		Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, trace Silt	
8								
9							END OF EXPLORATION AT 8 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC	PROJECT		
	PROPOSED STORMWATER MANAGEMENT SYSTEMS	BORING NO.	I-2
	186 FOSTER STREET	SHEET	1 of 1
	SOUTH WINDSOR, CONNECTICUT	FILE NO.	0032-071.00
		CHKD. BY	RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	250+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	12/6/2023	Date End	12/6/2023

		Groundwater Readings (from ground surface)				
Hammer Type:	Lever Operated Safety Hammer					
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted Mobile B-53	12/6/23	-	-	-	Not Encountered
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	16/24	0 to 2	2-4-5-8		Loose, dark red-brown, SILT and fine to medium SAND, trace (-) Roots	9"+/- Topsoil
2								FILL
3		S-2	20/24	2 to 4	24-40-47-43		Very dense, red-brown, fine to coarse SAND and fine to coarse Gravel, little Silt	
4								
5		S-3	20/24	4 to 6	40-39-49-48		Very dense, red-brown, fine to coarse SAND, some Silt, some fine to coarse Gravel	TILL
6								
7		S-4	20/24	6 to 8	39-38-42-36		Very dense, red-brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
8								
9							END OF EXPLORATION AT 8 FEET BELOW GROUND SURFACE	
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

	PROJECT	
	PROPOSED STORMWATER MANAGEMENT SYSTEMS	BORING NO. I-3
	186 FOSTER STREET	SHEET 1 of 1
	SOUTH WINDSOR, CONNECTICUT	FILE NO. 0032-071.00
		CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan
Driller	Jim Casson	Ground Surface El.	250+/- Datum Not Available
Logged By	Mateusz Fekieta	Date Start	12/6/2023 Date End 12/6/2023

		Groundwater Readings (from ground surface)				
Hammer Type:	Lever Operated Safety Hammer					
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted Mobile B-53	12/4/23	-	-	-	Not Encountered
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	15/24	0 to 2	1-3-6-4		Loose, dark brown, fine to coarse SAND and SILT, trace fine Gravel, trace (-) Roots	12"+/- Topsoil
2								FILL
3		S-2	9/15	2 to 3.3	8-23-50/3"		Very dense, red-brown, fine to coarse SAND and SILT, some fine Gravel	TILL
4								
5		S-3	19/24	4 to 6	13-23-43-67		Very dense, red-brown, fine to coarse SAND, some fine to coarse Gravel, some Silt	
6								
7		S-4	18/24	6 to 7.8	55-49-38-50/3"		Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt	
8								
9							END OF EXPLORATION AT 7.8 FEET BELOW GROUND SURFACE	
10								
11								
12								
13								
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

	PROJECT	
DOWN TO EARTH CONSULTING, LLC	PROPOSED STORMWATER MANAGEMENT SYSTEMS	BORING NO. I-4
	186 FOSTER STREET	SHEET 1 of 1
	SOUTH WINDSOR, CONNECTICUT	FILE NO. 0032-071.00
		CHKD. BY RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan
Driller	Jim Casson	Ground Surface El.	246+/- Datum Not Available
Logged By	Mateusz Fekieta	Date Start	12/5/2023 Date End 12/5/2023

		Groundwater Readings (from ground surface)				
Hammer Type:	Lever Operated Safety Hammer					
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted Mobile B-53	12/4/23	-	-	-	Not Encountered
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	18/24	0 to 2	1-3-5-5		Loose, dark red-brown, fine to coarse SAND and SILT, trace fine Gravel, trace (-) Roots	9"+/- Topsoil FILL
2								
3		S-2	14/24	2 to 4	3-5-19-50		Medium dense, red-brown, fine to coarse SAND, little Silt, little fine Gravel	
4								SAND & GRAVEL
5		S-3	19/24	4 to 6	37-32-29-30		Very dense, red-brown, fine to coarse GRAVEL and fine to coarse SAND, little Silt	
6								
7		S-4	16/24	6 to 8	26-25-22-28		Dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt	TILL
8								
9		S-5	19/24	8 to 10	21-30-23-23		Very dense, red-brown, fine to coarse GRAVEL and fine to coarse SAND, little Silt	
10								
11							END OF EXPLORATION AT 10 FEET BELOW GROUND SURFACE	
12								
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SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

DOWN TO EARTH CONSULTING, LLC	**PROJECT**	BORING NO.	I-5
	PROPOSED STORMWATER MANAGEMENT SYSTEMS	SHEET	1 of 1
	186 FOSTER STREET	FILE NO.	0032-071.00
	SOUTH WINDSOR, CONNECTICUT	CHKD. BY	RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan				
Driller	Jim Casson	Ground Surface El.	248+/-	Datum	Not Available		
Logged By	Mateusz Fekieta	Date Start	12/5/2023	Date End	12/5/2023		

		Groundwater Readings (from ground surface)				
Hammer Type:	Lever Operated Safety Hammer					
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted Mobile B-53	12/4/23	-	9	239'+/-	15min
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	20/24	0 to 2	1-2-4-4		Loose, dark brown, SILT and fine to medium SAND, trace (-) Roots	24"+/- Topsoil
2								
3		S-2	20/24	2 to 4	4-5-7-4		Medium dense, dark gray-brown, fine to medium SAND, some Silt	FILL
4								
5		S-3	19/24	4 to 6	28-24-24-35		Dense, red-brown, fine to coarse SAND, some fine Gravel, little Silt	
6								
7		S-4	18/24	6 to 8	25-31-36-36		Very dense, red-brown, fine to coarse SAND and fine to coarse GRAVEL, little Silt	TILL
8								
9		S-5	19/24	8 to 10	16-25-20-35		Very dense, red-brown, fine to coarse SAND, some fine to coarse Gravel, little Silt	
10								
11							END OF EXPLORATION AT 10 FEET BELOW GROUND SURFACE	
12								
13								
14								
15								
16								
17								
18								
19								
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21								
22								
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31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

	PROJECT		
DOWN TO EARTH CONSULTING, LLC	PROPOSED STORMWATER MANAGEMENT SYSTEMS	BORING NO.	I-6
	186 FOSTER STREET	SHEET	1 of 1
	SOUTH WINDSOR, CONNECTICUT	FILE NO.	0032-071.00
		CHKD. BY	RPJ

Boring Co.	General Borings, Inc.	Boring Location	See Boring Location Plan		
Driller	Jim Casson	Ground Surface El.	250+/-	Datum	Not Available
Logged By	Mateusz Fekieta	Date Start	12/5/2023	Date End	12/5/2023

		Groundwater Readings (from ground surface)				
Hammer Type:	Lever Operated Safety Hammer					
Sampler Size:	1-3/8" I.D. Split Spoon	Date	Time	Depth (ft)	Elev.	Stabilization Time
Type Drill Rig:	Track Mounted Mobile B-53	12/4/23	-	8	242'+/-	21 hours
Drilling Method:	3.25-inch I.D. Hollow-Stem Augers					

DEPTH	Casing Blows (ft)	SAMPLE INFORMATION: Type & No.	REC/PEN (inches)	DEPTH (feet)	BLOWS PER 6 INCHES	Core Time (min./ft)	SAMPLE DESCRIPTION	STRATA
1		S-1	12/14	0 to 2	1-2-4-11		Loose, dark red-brown, fine to coarse SAND, some Silt, trace (-) Roots	6"+/- Topsoil
2								FILL
3		S-2	17/24	2 to 4	13-14-25-27		Dense, red-brown, fine to medium SAND, little Silt	SAND & GRAVEL
4								
5		S-3	16/24	4 to 6	21-26-33-35		Dense, red-brown, fine to coarse SAND, some fine Gravel, little Silt	
6								
7		S-4	13/24	6 to 8	32-31-19-20		Dense, red-brown, fine to coarse SAND, some fine to coarse Gravel, some Silt	TILL
8								
9		S-5	2/24	8 to 10	23-26-24-28		Dense, gray/red-brown, COBBLE fragments	
10								
11							END OF EXPLORATION AT 10 FEET BELOW GROUND SURFACE	
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
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27								
28								
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30								
31								
32								
33								
34								
35								
36								
37								
38								
39								
40								

SPT N-Values	SPT N-Values	Proportions	SYMBOL KEY	
0 to 4 - Very Loose	0 to 2 - Very Soft	Trace = 0 to 10%	1. S denotes split-barrel sampler.	7. WH denotes weight of hammer
5 to 10 - Loose	3 to 4 - Soft	Little = 10 to 20%	2. ST denotes 3-inch O.D. undisturbed sample.	8. WR denotes weight of rods
11 to 30 - Medium Dense	5 to 8 - Medium Stiff	Some = 20 to 35%	3. UO denotes 3-inch Osterberg undisturbed sample.	9. PP denotes Pocket Penetrometer.
31 to 50 - Dense	9 to 15 - Stiff	And = 35 to 50%	4. PEN denotes penetration length of sampler.	10. FVST denotes field vane shear test.
Over 50 - Very Dense	16 to 30 - Very Stiff		5. REC denotes recovered length of sample.	11. RQD denotes Rock Quality Designation.
	Over 30 - Hard		6. SPT denotes Standard Penetration Test.	12. C denotes core run number.

FIELD NOTES: 1) Stratification lines represent approximate boundaries between soil types, transitions may be gradual.
2) Water level readings have been made at times and under conditions stated, fluctuations may occur due to other factors.

WELTI GEOTECHNICAL, P.C.

227 Williams Street · P.O. Box 397
Glastonbury, CT 06033-0397

(860) 633-4623 / FAX (860) 657-2514

November 6, 2023

Mr. Michael Morrison
Commercial Project Coordinator
CTEC Solar
1 Griffin Road, Suite 200
Bloomfield, CT 06002

Re: Geotechnical Study for Proposed Solar Arrays in Field at 186 Foster Street, South Windsor, CT

Dear Michael:

1.0 Herewith are the data from the eight test borings taken at the subject site. The borings were drilled to a maximum depth 20 feet below the existing grades. The boring locations are shown on the attached plan. *The borings were drilled by Clarence Welti Associates, Inc. and sampling was conducted by this firm solely to obtain indications of subsurface conditions as part of a geotechnical exploration program. No services were performed to evaluate subsurface environmental conditions.*

2.0 The **Subject Project** will include the construction of a ground fixed solar array in the field at 186 Foster Street In South Windsor, CT . The array will cover a footprint of about 250,000 sf. There is about 55 feet of topographic relief across the arrays (Elev. 245± to Elev.300±). No proposed grading plan was available at the time of this study. It is assumed that the development will require minimal changes to the existing site grades.

2.1 It is understood that the gravity loads from the array panels and supporting frames will be relatively low. The governing design load case on the frame and foundations will largely be from lateral wind forces on the panels. The construction is assumed to include pad mounted electrical equipment.

3.0 The **Geologic Origin** of the natural inorganic soils at the site and environs is from glacial moraine deposits. These deposits overlie hard bedrock at 13 to 20+ feet below the existing grades. The rock is part of the Arkosic Sandstone formation.

3.1 The **Soils Cross Section** from the borings is generally as follows:

Borings B-1, B-2, B-4, B-6 &B-7 (west half of site, located below about Elev.265)

Topsoil to 3" to 7"

Locally Subsoil; fine SAND and SILT to 1 to 2.5 feet, loose

Fine to coarse SAND, little to some Silt and Gravel to 10 to 20+ feet, medium compact to very dense

Locally (see borings B-1 & B-4); strata of fine SAND and SILT; or fine SAND, little Silt to 8.0 to 15.5 feet, medium compact

Borings B-3, B-5 & B-8 (east half of site, ranges from about Elev.265 to Elev.300)

Topsoil to 5" to 7"

Locally Subsoil; fine SAND and SILT to 2.5 feet, loose

Locally; fine to coarse SAND, little Silt, trace Gravel to 2.5 feet, medium compact

Fine to coarse SAND, little to some Silt and Gravel top of rock at 2.5 to 14.0 feet, dense to very dense

Locally (see borings B-5 & B-8); Weathered/Decomposed Rock or Cemented Moraine to auger refusal on hard rock at 13 to 15 feet, very dense

3.2 The **Water Table**, where evident in the boreholes at the completion of the borings, was at 3 to 10 feet below the existing grades. In general, it should be assumed that the water table can be within 6 feet of the existing grades during wet periods. The capillary water in the natural soils can be to 2 feet above the static water table.

4.0 The **Criteria for Foundation Type and Loading** were not provided for this project and have been assumed by the writer as follows:

1. The total settlement should not exceed a maximum of 1.0". The different settlement should not exceed ½" in a horizontal distance of 25 feet.

2. The foundation top under lateral loading (transient) should not deflect horizontally more than 3/4".

3. The solar array and foundations typically would not be subject to the seismic provisions of the Connecticut Building Code (IBC with CT supplements).

The above criteria appear to address the normal criteria for solar panels. If the owner or the engineers find the criteria as unacceptable, the writer shall be informed to permit additional geotechnical input.

4.1 Regarding item 3 above, the seismic site soil profile classification is **"C".** The mapped MCE spectral response acceleration values for South Windsor, CT are $S_1 = 0.055$ for one second period and $S_S = 0.183$ for short periods. The subject site and environs have not experienced measurable seismic events in recent history.

5.0 Based on boring data the foundations are assumed to be either in the dense moraine or locally in a medium compact moraine. On similar projects in similar soils (i.e., medium compact to dense moraine deposits), driven 6"x6" WF sections or 8" I sections have been used to support the panels. Where weathered rock or very dense moraine deposit are encountered, there may be a requirement to pre-drill holes prior to driving. For driven "I" or "WF" beams or short piles, in the natural soils or weathered/decomposed rock , the following properties would apply for the Lpile program or other similar programs used to evaluate deflections of laterally loaded piers.

Depth of applicable Property	Unit Weight (pcf)	Angle of Internal Friction	Sub-grade Modulus (k) (pci) above/below water	Ultimate bearing capacity at 4+ feet below grade (Tons/sf)
All borings to 2 feet below grade	120	30°	25/20	-
Borings B-5 & B-6 - medium compact natural soils to 4.5 to 10+ feet	125	32°	90/60	6
Borings B-1 thru B-5 & B-7 - dense natural soils from 2.5 to 4.5 feet to 10+ feet	130	34°	225/100	9
Boring B-8; Decomposed Rock or Cemented Moraine from 2.5 feet to top of hard rock at 13 feet	135	36°	225/100	15

The geotechnical parameters can be assumed to be generally uniform over the short pile lengths. The "I" or "H" piles should be oriented with strong axis generally parallel with the expected direction of maximum lateral load. Plates and brackets can be attached to the pile heads as means to connect the solar panel support framing.

5.1 The anticipated lateral performance of the piles under wind or seismic load cases can be evaluated based on the LPILE computer program, or other acceptable methods.

5.2 Regarding the electrical equipment, the loads are assumed to be light distributed loads. The equipment can be supported on concrete pads (mats) bearing directly on the natural inorganic soils at least 2 feet below the existing grades, or on a controlled fill placed after the removal of any topsoil, subsoils and existing fills. The allowable bearing pressure on the natural inorganic soils or on a controlled fill can be 4,000 psf. While the pads are not a code type structure requiring foundations at frost depth of 3.5 feet, the frost susceptible soils on the site must be addressed with the pad underlays. It is recommended that there be at least 2 feet of crushed 3/8" stone beneath pads to exclude frost effects.

6.0 Regarding **Controlled (structural) Fill and Backfill of Excavations for Footings and Trenches,** the material should conform to the following gradation or be 3/8" crushed stone:

Percent Passing	Sieve Size
100	3.5"
50 - 100	3/4"
25 - 75	No.4

The fraction, passing the No.4 sieve should have less than 20% passing the No. 200 sieve.

All controlled fill and backfill must be compacted to at least 95% of modified optimum density in accordance with ASTM D-1557.

6.1 Gravel topping for access roads with 3/4" minus processed stone should conform to the following gradation:

Percent Passing	Grain Size
100	1.25"
90 - 100	1"
75 - 100	3/4"
25 - 60	1/4"
10 - 35	No. 40
3 - 12	No.100
0 - 5	No. 200

7.0 Regarding **Earthwork**, open excavations (for utilities and related structures) in the natural soils on the site will fall in OSHA Type B, which will require sloping of unshored excavations exceeding 5 feet in height to slopes less than 45°.

7.1 Access roads will presumably support pickup truck loading or similar light utility vehicles. The subgrades will fall in the silty moraine soil cuts or fills. Typical CBR values for saturated silty moraine would be 4 to 5. The access roads should have at least 12" of gravel subbase conforming to CTDOT M.02.06, Grading A and overlain with 6" of the 3/4" minus processed stone base cited above.

7.2 Bedding Material for underground utility trenches should conform to Section 6.0 material above or to the CTDOT Form 816, section M.08.01-21.

8.0 This report has been prepared for specific a application to the subject project in accordance with generally accepted soil and foundation engineering practices. No other warranty, express or implied, is made. In the event that any changes in the nature, design and location of structures are planned, the conclusions and recommendations contained in this report should not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

The analyses and recommendations submitted in this report are based in part upon data obtained from referenced explorations. The extent of variations between explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.

Welti Geotechnical, P.C., should perform a general review of the final design and specifications in order that geotechnical design recommendations may be properly interpreted and implemented as they were intended.

If you have any questions, please call me.

Very truly yours,

Max Welti

Max Welti, P. E.
President, Welti Geotechnical, P.C.

APPENDIX

TEST BORING LOCATION PLAN
+
TEST BORING DATA

Detailed Layout

TEST BORING LOCATIONS
CLARENCE WELTI ASSOCIATES, INC.
10/25/23

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033	CLIENT CTE SOLAR	PROJECT NAME PROPOSED SOLAR ARRAYS LOCATION 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET

LINE & STA.

N. COORDINATE

E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-1**

GROUND WATER OBSERVATIONS

AT none FT. AFTER 0 HOURS

AT FT. AFTER HOURS

START DATE 10/25/23

FINISH DATE 10/25/23

DEPTH	SAMPLE NO.	BLOWS/6"	DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	3-11-22-36	0.0'-2.0'		TOPSOIL	
					0.25	
					RED/BR.FINE-CRS.SAND, LITTLE SILT & GRAVEL	
5	2	24-24-24-24	5.0'-7.0'			
10	3	41-31-31	10.0'-11.5'			
					13.5	
					RED/BR.FINE-CRS.SAND, SOME SILT & GRAVEL	
15	4	60	15.0'-15.2'			
20	5	60	20.0'-20.2'		20.2	
					BOTTOM OF BORING @ 20.2'	
25						
30						
35						

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J . BREWER

INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-1**

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT: CTE SOLAR

PROJECT NAME: PROPOSED SOLAR ARRAYS

LOCATION: 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET

LINE & STA.

N. COORDINATE

E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-2**

GROUND WATER OBSERVATIONS
AT none FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 10/25/23
FINISH DATE 10/25/23

DEPTH	SAMPLE NO.	BLOWS/6"	SAMPLE DEPTH	A
0	1	2-3-4-5	0.0'-2.0'	
	2	5-16-23-24	2.0'-4.0'	
	3	14-16-16-22	4.0'-6.0'	
5				
10	4	15-30-31	10.0'-11.5'	
15				
20				
25				
30				
35				

STRATUM DESCRIPTION + REMARKS		ELEV.
TOPSOIL	0.50	
LIGHT BR.FINE SAND AND SILT	2.5	
RED/BR.FINE-CRS.SAND, LITTLE SILT & GRAVEL	5.5	
RED/BR.FINE SAND, LITTLE SILT	8.0	
RED/BR.FINE-CRS.SAND, SOME SILT & GRAVEL	11.5	
BOTTOM OF BORING @ 11.5'		

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. BREWER
INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-2**

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033	CLIENT CTE SOLAR	PROJECT NAME PROPOSED SOLAR ARRAYS LOCATION 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET

LINE & STA.

N. COORDINATE

E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-3**

GROUND WATER OBSERVATIONS
AT none FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 10/25/23

FINISH DATE 10/25/23

DEPTH	SAMPLE NO.	BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	2-3-4-5	0.0'-2.0'		TOPSOIL	
					0.40	
					BR.FINE SAND AND SILT, TRACE ROOTS & GRAVEL	
	2	4-10-60	2.0'-3.3'		2.5	
					RED/BR.FINE-CRS.SAND, SOME SILT, LITTLE GRAVEL	
5	3	25-30-28	5.0'-6.5'			
10	4	40-60	10.0'-11.0'			
					11.0	
					BOTTOM OF BORING @ 11.0'	
15						
20						
25						
30						
35						

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. BREWER

INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-3**

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033	CLIENT CTE SOLAR	PROJECT NAME PROPOSED SOLAR ARRAYS LOCATION 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET	
LINE & STA.	
N. COORDINATE	
E. COORDINATE	
SURFACE ELEV.	
HOLE NO.	**B-4**

GROUND WATER OBSERVATIONS		
AT 7.5 FT. AFTER 0 HOURS	START DATE	10/25/23
AT FT. AFTER HOURS	FINISH DATE	10/25/23

DEPTH	SAMPLE NO.	BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	2-5-5-14	0.0'-2.0'		TOPSOIL (0.50) BR.FINE SAND AND SILT (1.5) RED/BR.FINE-CRS.SAND, SOME GRAVEL, LITTLE SILT	
	2	60	2.0'-2.5'			
5	3	60	5.0'-5.5'			
					8.0 RED/BR.FINE SAND AND SILT	
10	4	10-12-15	10.0'-11.5'			
15	5	60	15.0'-15.5'		15.5 RED/BR.FINE-CRS.SAND, SOME SILT & GRAVEL	
20	6	60	20.0'-20.5'		20.5 BOTTOM OF BORING @ 20.5'	
25						
30						
35						

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. BREWER

INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-4**

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033	CLIENT CTE SOLAR	PROJECT NAME PROPOSED SOLAR ARRAYS LOCATION 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET	
LINE & STA.	
N. COORDINATE	
E. COORDINATE	
SURFACE ELEV.	
HOLE NO.	**B-5**
GROUND WATER OBSERVATIONS	AT 10.0 FT. AFTER 0 HOURS
	AT FT. AFTER HOURS
START DATE	10/26/23
FINISH DATE	10/26/23

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS		ELEV.
0	1	1-2-2-3	0.0'-2.0'		TOPSOIL	0.50	
					LIGHT BR.SILT		
	2	14-13-13-22	2.0'-4.0'			2.5	
					RED/BR.FINE SAND, SOME SILT		
	3	13-25-60	4.0'-5.5'			4.5	
5					RED/BR.FINE-CRS.SAND, SOME SILT, LITTLE GRAVEL		
10	4	60	10.0'-10.5'				
						14.0	
					WEATHERED ROCK		
15						15.0	
					BOTTOM OF BORING @ 15.0' (AUGER REFUSAL)		
20							
25							
30							
35							

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: K. CHRISTIANA

INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-5**

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033	CLIENT CTE SOLAR	PROJECT NAME PROPOSED SOLAR ARRAYS LOCATION 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.		
					OFFSET	SURFACE ELEV. / HOLE NO. B-6
TYPE	HSA		SS		LINE & STA.	GROUND WATER OBSERVATIONS: AT none FT. AFTER 0 HOURS; AT FT. AFTER HOURS
SIZE I.D.	3.75"		1.375"		N. COORDINATE	START DATE 10/25/23
HAMMER WT.			140lbs			
HAMMER FALL			30"		E. COORDINATE	FINISH DATE 10/25/23

DEPTH	SAMPLE NO.	BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS	ELEV.
0	1	4-4-18-20	0.0'-2.0'		TOPSOIL — 0.40 BR.FINE SAND AND SILT — 1.0 RED/BR.FINE-CRS.SAND, LITTLE TO SOME SILT & GRAVEL	
	2	20-40-29-26	2.0'-4.0'			
	3	18-6-6-6	4.0'-6.0'			
5						
10	4	3-5-6	10.0'-11.5'			
					11.5 BOTTOM OF BORING @ 11.5'	
15						
20						
25						
30						
35						

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: J. BREWER
INSPECTOR:

SHEET 1 OF 1 HOLE NO. B-6

CLARENCE WELTI ASSOC., INC.
P.O. BOX 397
GLASTONBURY, CONN 06033

CLIENT	PROJECT NAME	LOCATION
CTE SOLAR	PROPOSED SOLAR ARRAYS	186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET

LINE & STA.

N. COORDINATE

E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-7**

GROUND WATER OBSERVATIONS
AT 3.0 FT. AFTER 0 HOURS
AT FT. AFTER HOURS

START DATE 10/26/23
FINISH DATE 10/26/23

DEPTH	SAMPLE NO.	BLOWS/6"	DEPTH	A	STRATUM DESCRIPTION + REMARKS		ELEV.
0	1	2-5-5-7	0.0'-2.0'		TOPSOIL	0.40	
					BR.FINE-MED.SAND, SOME SILT, TRACE ROOTS & GRAVEL	2.0	
	2	30-60	2.0'-2.7'		RED/BR.FINE-CRS.SAND, LITTLE SILT & GRAVEL		
5	3	18-35-35-33	5.0'-7.0'			8.0	
					RED/BR.FINE-CRS.SAND, SOME SILT, LITTLE GRAVEL	10.5	
10	4	60	10.0'-10.5'		BOTTOM OF BORING @ 10.5'		
15							
20							
25							
30							
35							

LEGEND: COL. A:
SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON
PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: K. CHRISTIANA
INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-7**

CLARENCE WELTI ASSOC., INC. P.O. BOX 397 GLASTONBURY, CONN 06033	CLIENT CTE SOLAR	PROJECT NAME PROPOSED SOLAR ARRAYS LOCATION 186 FOSTER STREET, SOUTH WINDSOR, CT

	AUGER	CASING	SAMPLER	CORE BAR.
TYPE	HSA		SS	
SIZE I.D.	3.75"		1.375"	
HAMMER WT.			140lbs	
HAMMER FALL			30"	

OFFSET

LINE & STA.

N. COORDINATE

E. COORDINATE

SURFACE ELEV.

HOLE NO. **B-8**

GROUND WATER OBSERVATIONS

AT none FT. AFTER 0 HOURS

AT FT. AFTER HOURS

START DATE 10/25/23

FINISH DATE 10/25/23

DEPTH	SAMPLE NO.	SAMPLE BLOWS/6"	SAMPLE DEPTH	A	STRATUM DESCRIPTION + REMARKS		ELEV.
0	1	2-3-9-15	0.0'-2.0'		TOPSOIL		
					BR.FINE-CRS.SAND, LITTLE SILT, TRACE GRAVEL	0.56	
	2	60	2.0'-2.2'				
	3	60	3.0'-3.2'		POSSIBLE WEATHERED/DECOMPOSED ROCK OR CEMENTED MORAINE	2.5	
5							
10	4	60	10.0'-10.2'				
					BOTTOM OF BORING @ 13.0' (AUGER REFUSAL)	13.0	
15							
20							
25							
30							
35							

LEGEND: COL. A:

SAMPLE TYPE: D=DRY A=AUGER C=CORE U=UNDISTURBED PISTON S=SPLIT SPOON

PROPORTIONS USED: TRACE=0-10% LITTLE=10-20% SOME=20-35% AND=35-50%

DRILLER: K. CHRISTIANA

INSPECTOR:

SHEET 1 OF 1 HOLE NO. **B-8**

APPENDIX C

NDDB AND USFWS

COMPLIANCE STATEMENT

USFWS & NDDB COMPLIANCE

December 9, 2023

Mr. Michael Morrision
Commercial Project Coordinator
C-TEC Solar
1 Griffin Road S, Suite 200
Bloomfield, Connecticut 06002

Re: 186 Foster Street, South Windsor, Connecticut
APT Job No: CT481620

On behalf of C-TEC Solar, All-Points Technology Corporation, P.C. ("APT") performed an evaluation with respect to possible Federally- and State-listed, Threatened, Endangered or Special Concern species in order to determine if the proposed referenced solar energy generation facility (the "Facility" or "Project") would result in a potential adverse effect to listed species.

APT understands that C-TEC Solar proposes the construction of a solar energy generation facility in the central portion of property located at 186 Foster Street in South Windsor, Connecticut ("Subject Property").

USFWS

The federal consultation was completed in accordance with Section 7 of the Endangered Species Act through the U.S. Fish and Wildlife Service's ("USFWS") Information, Planning, and Conservation System ("IPaC"). Based on the results of the IPaC review, one federally listed[1] threatened species is known to occur in the vicinity of the Property documented as the northern long-eared bat ("NLEB"; *Myotis septentrionalis*). Please refer to the enclosed official species list.[2] As a result of this preliminary finding, APT performed an evaluation to determine if the proposed referenced Facility would result in a likely adverse effect to NLEB.

The proposed Facility would be located within mostly cleared agricultural fields with minimal tree clearing along the north and south boundaries is anticipated; trees potentially provide NLEB habitat. A review of the Connecticut Department of Energy & Environmental Protection ("CTDEEP") Wildlife Division Natural Diversity Data Base ("NDDB") NLEB habitat map[3] revealed that the proposed Facility is not within 150 feet of a known occupied NLEB maternity roost tree and is not within 0.25 mile of a known NLEB hibernaculum. The nearest NLEB habitat resource to the proposed Facility is located ±13.4 miles to the northwest in East Granby.

[1] Listing under the federal Endangered Species Act

[2] Monarch butterfly (*Danaus plexippus*), a Candidate species, is also listed for the Property. Candidate species have no current protections under the ESA and there is no requirement to consider project impacts.

[3] *Northern long-eared bat areas of concern in Connecticut to assist with Federal Endangered Species Act Compliance* map. February 1, 2016.

NLEB has been reclassification as Endangered under the ESA. The reclassification now eliminates use of the previous 4(d) rule for NLEB; 4(d) rules may only be applied to Threatened species. A NLEB Interim Consultation Framework has been developed by USFWS for projects that are reasonably certain to occur before April 1, 2024 (date on which the NLEB Interim Consultation Framework expires) to facilitate transition from the 4(d) rule to typical ESA consultation procedures for Endangered species. APT submitted the effects determination using the new NLEB Determination Key ("DKey") within the IPaC system for this Facility and determined it would have "No Effect" on NLEB. No further consultation/coordination for this project is required with USFWS. Please refer to the enclosed USFWS July 21, 2023 letter confirming the NLEB "No Effect" determination and ESA compliance for the Facility.

NDDB

No known areas of State-listed species are currently depicted on the most recent CTDEEP NDDB Maps in the location or vicinity of the proposed Facility or Subject Property. Please refer to the enclosed NDDB Map which depicts the nearest NDDB buffer ±0.63-mile south of the Subject Property. Since the proposed Facility and Subject Property are not located within a NDDB buffer area, consultation with DEEP is not required in accordance with their review policy[4].

Therefore, the proposed Facility is not anticipated to adversely impact any Federal or State Threatened, Endangered or species of Special Concern.

Sincerely,
All-Points Technology Corporation, P.C.

Dean Gustafson

Dean Gustafson
Senior Biologist

Enclosures

[4] DEEP Requests for NDDB State Listed Species Reviews. https://portal.ct.gov/DEEP/NDDB/Requests-for-NDDB-Environmental-Reviews

USFWS Letters

- Species List
- NLEB Determination Key Letter

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: July 21, 2023
Project Code: 2023-0107547
Project Name: CTEC Solar: Foster Street, South Windsor

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

Updated 4/12/2023 - Please review this letter each time you request an Official Species List, we will continue to update it with additional information and links to websites may change.

About Official Species Lists

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Federal and non-Federal project proponents have responsibilities under the Act to consider effects on listed species.

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested by returning to an existing project's page in IPaC.

Endangered Species Act Project Review

Please visit the "**New England Field Office Endangered Species Project Review and Consultation**" website for step-by-step instructions on how to consider effects on listed species and prepare and submit a project review package if necessary:

https://www.fws.gov/office/new-england-ecological-services/endangered-species-project-review

NOTE Please do not use the **Consultation Package Builder** tool in IPaC except in specific situations following coordination with our office. Please follow the project review guidance on our website instead and reference your **Project Code** in all correspondence.

Northern Long-eared Bat - (**Updated 4/12/2023**) The Service published a final rule to reclassify the northern long-eared bat (NLEB) as endangered on November 30, 2022. The final rule went into effect on March 31, 2023. You may utilize the **Northern Long-eared Bat Rangewide Determination Key** available in IPaC. More information about this Determination Key and the Interim Consultation Framework are available on the northern long-eared bat species page:

https://www.fws.gov/species/northern-long-eared-bat-myotis-septentrionalis

For projects that previously utilized the 4(d) Determination Key, the change in the species' status may trigger the need to re-initiate consultation for any actions that are not completed and for which the Federal action agency retains discretion once the new listing determination becomes effective. If your project was not completed by March 31, 2023, and may result in incidental take of NLEB, please reach out to our office at newengland@fws.gov to see if reinitiation is necessary.

Additional Info About Section 7 of the Act

Under section 7(a)(2) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether projects may affect threatened and endangered species and/or designated critical habitat. If a Federal agency, or its non-Federal representative, determines that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Federal agency also may need to consider proposed species and proposed critical habitat in the consultation. 50 CFR 402.14(c)(1) specifies the information required for consultation under the Act regardless of the format of the evaluation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/service/section-7-consultations

In addition to consultation requirements under Section 7(a)(2) of the ESA, please note that under sections 7(a)(1) of the Act and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Please contact NEFO if you would like more information.

Candidate species that appear on the enclosed species list have no current protections under the ESA. The species' occurrence on an official species list does not convey a requirement to consider impacts to this species as you would a proposed, threatened, or endangered species. The ESA does not provide for interagency consultations on candidate species under section 7, however, the Service recommends that all project proponents incorporate measures into projects to benefit candidate species and their habitats wherever possible.

Migratory Birds

In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see:

https://www.fws.gov/program/migratory-bird-permit

https://www.fws.gov/library/collections/bald-and-golden-eagle-management

Please feel free to contact us at **newengland@fws.gov** with your **Project Code** in the subject line if you need more information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat.

Attachment(s): Official Species List

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
(603) 223-2541

PROJECT SUMMARY

Project Code: 2023-0107547
Project Name: CTEC Solar: Foster Street, South Windsor
Project Type: Power Gen - Solar
Project Description: We understand that the Client intends to lease a portion of the ±16.48-acre Property for development of a ±1.88 (AC) megawatt solar photovoltaic electric generating facility.
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.8219505,-72.52943265399472,14z

Counties: Hartford County, Connecticut

ENDANGERED SPECIES ACT SPECIES

There is a total of 2 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Ecological Services Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5094
Phone: (603) 223-2541 Fax: (603) 223-0104

In Reply Refer To: July 21, 2023
Project code: 2023-0107547
Project Name: CTEC Solar: Foster Street, South Windsor

Federal Action Agency (if applicable):

Subject: Record of project representative’s no effect determination for 'CTEC Solar: Foster Street, South Windsor'

Dear Deborah Gustafson:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on July 21, 2023, for 'CTEC Solar: Foster Street, South Windsor' (here forward, Project). This project has been assigned Project Code 2023-0107547 and all future correspondence should clearly reference this number. **Please carefully review this letter.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species’ determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into IPaC must accurately represent the full scope and details of the Project.

Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter. ***Answers to certain questions in the DKey commit the project proponent to implementation of conservation measures that must be followed for the ESA determination to remain valid.***

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis, your project has reached the determination of “No Effect” on the northern long-eared bat. To make a no effect determination, the full scope of the proposed project implementation (action) should not have any effects (either positive or negative), to a federally listed species or designated critical habitat. Effects of the action are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur. Effects of the action may occur later in time and may include consequences occurring outside the immediate area involved in the action. (See § 402.17).

Under Section 7 of the ESA, if a federal action agency makes a no effect determination, no consultation with the Service is required (ESA §7). If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required except when the Service concurs, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat [50 CFR §402.02, 50 CFR§402.13].

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Candidate

You may coordinate with our Office to determine whether the Action may affect the animal species listed above and, if so, how they may be affected.

Next Steps

Based upon your IPaC submission, your project has reached the determination of “No Effect” on the northern long-eared bat. If there are no updates on listed species, no further consultation/ coordination for this project is required with respect to the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place to ensure compliance with the Act.

If you have any questions regarding this letter or need further assistance, please contact the New England Ecological Services Field Office and reference Project Code 2023-0107547 associated with this Project.

Action Description
You provided to IPaC the following name and description for the subject Action.

1. Name

CTEC Solar: Foster Street, South Windsor

2. Description

The following description was provided for the project 'CTEC Solar: Foster Street, South Windsor':

> We understand that the Client intends to lease a portion of the ±16.48-acre Property for development of a ±1.88 (AC) megawatt solar photovoltaic electric generating facility.

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@41.8219505,-72.52943265399472,14z

DETERMINATION KEY RESULT

Based on the information you provided, you have determined that the Proposed Action will have no effect on the Endangered northern long-eared bat (Myotis septentrionalis). Therefore, no consultation with the U.S. Fish and Wildlife Service pursuant to Section 7(a)(2) of the Endangered Species Act of 1973 (87 Stat. 884, as amended 16 U.S.C. 1531 *et seq.*) is required for those species.

QUALIFICATION INTERVIEW

1. Does the proposed project include, or is it reasonably certain to cause, intentional take of the northern long-eared bat or any other listed species?

   Note: Intentional take is defined as take that is the intended result of a project. Intentional take could refer to research, direct species management, surveys, and/or studies that include intentional handling/encountering, harassment, collection, or capturing of any individual of a federally listed threatened, endangered or proposed species?

   No

2. The proposed action does not intersect an area where the northern long-eared bat is likely to occur, based on the information available to U.S. Fish and Wildlife Service as of the most recent update of this key. If you have data that indicates that northern long-eared bats <u>are</u> likely to be present in the action area, answer "NO" and continue through the key.

   Do you want to make a no effect determination?

   Yes

NDDB Map

C:\Users\mkope\Dropbox (APT GIS)\APT GIS Team Folder\Projects\C-TEC Solar\South Windsor Foster Street\mxd\South Windsor NDDB Attachment A.mxd

Legend

- Site
- Natural Diversity Database (updated June 2023)
- Municipal Boundary

Attachment A: Overview Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Map, Manchester, CT (1992)
Map Scale: 1:24,000
Map Date: July 2023

N

1,000 500 0 1,000
Feet

APPENDIX D

CULTURAL RESOURCES

RECONNAISSANCE SURVEY REPORT

January 2024

Phase IA Cultural Resources Reconnaissance Survey a Proposed Solar Facility at 186 Foster Street in South Windsor, Connecticut

Prepared For:

All-Points Technology Corporation

567 Vauxhall Street Extension – Suite 311
Waterford, Connecticut 06385

Prepared By:

830 Berlin Turnpike
Berlin, Connecticut 06037

ABSTRACT

This report presents the results of a Phase IA Cultural Resources Assessment survey for a proposed solar Facility at 186 Foster Street in South Windsor, Connecticut. The project will include the construction of a solar array, access road, stormwater management basin, and associated infrastructure situated on approximately 8 acres of a larger 16.68 acre parcel of land. Heritage Consultants, LLC completed the Phase IA cultural resources assessment survey of the project area on behalf of All-Points technology Corporation, P.C. in December of 2023. The Phase IA survey revealed that the proposed Project parcel is largely characterized by fallow agricultural fields, manicured lawns, small sections of wooded land, and gentle slopes. Although a small portion of the project parcel's southwestern corner contains a delineated wetland, it does not lie within the area of potential effect and will not be affected by construction. The desktop portion of the survey resulted in the identification of a precontact era site (Site 132-31) near the southeast corner of the parcel and 14 recorded standing structures within 0.8 kilometers (0.5 miles) of the project area. The proposed area of impact, as well as the larger project parcel, were determined to retain moderate/high potential to yield intact archaeological deposits.

The pedestrian survey also led to the identification of a tobacco barn dating from ca., 1940 located on the project parcel, as well as two early-nineteenth century residences and an agricultural building dating from ca., 1940 abutting the parcel. These structures, as well as the other standing structures over 50 year old, located within 0.81 kilometers (0.5 miles) of the parcel were documented through photography, mapping, and pedestrian survey to assess the potential viewshed impact by the proposed facility. Due to the gently rolling topography of the surrounding landscape and the wooded vegetation throughout the area, no viewshed impact will occur for all resources not located on or within the immediate vicinity of the Project parcel. In addition, although the tobacco barn on the project parcel meets the requirement of being 50 years or older, it has had numerous repairs and a modern standing seam metal roof added to it. It is not eligible for listing on the National Register of Historic Places applying the criteria for evaluation (36 CFR 60.4 [a-d).

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CHAPTER I
INTRODUCTION

This report presents the results of a Phase IA cultural resources assessment survey of a proposed solar facility (the Facility) at 186 Foster Street in South Windsor, Connecticut. The proposed area of impact associated with the Facility encompasses approximately 8 acres of land within a larger 16.68 acre parcel; it is located to the east of Foster Street and to the south of Orchard Hill Drive in South Windsor, Connecticut (Figure 1). All-Points Technology Corporation, P.C. (All-Points), requested that Heritage Consultants, LLC (Heritage) complete the Phase IA assessment survey as part of the planning process for the proposed Facility. Heritage completed this investigation in December of 2023. All work associated with this project was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987) promulgated by the Connecticut State Historic Preservation Office (CT-SHPO).

Project Description and Methods Overview

The proposed Facility will consist of a solar array, utility poles, a gravel access road, a storm water retention basin, and associated infrastructure (Figure 2). The project parcel is situated at elevations ranging between 74 to 106.9 meters (243 to 350 feet) NGVD. It is located on the eastern side of Foster Street and the southern side of Orchard Hill Drive in South Windsor, Connecticut. The parcel is bounded by residential development to the north and west, as well as forested land and agricultural fields to the east and south. The Phase IA cultural resources assessment survey of the Facility area consisted of the completion of the following tasks: 1) a contextual overview of the region's precontact era, post-European Contact period, and natural settings (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously recorded cultural resources in the region encompassing the Facility; 3) a review of readily available maps and aerial imagery depicting the project parcel in order to identify potential post-European Contact period resources and/or areas of past disturbance; and 4) pedestrian survey and photo-documentation of the project parcel and Facility area in order to assess their archaeological sensitivity.

Project Results and Management Recommendations Overview

The review of maps and aerial images depicting the project parcel and files maintained by the CT-SHPO resulted in the identification of two precontact era archaeological sites located within 1.6 kilometers (1 mile) of the Project area (132-31 and 132-33). Of these, Site 132-31, which is described as a precontact era Terminal Archaic camp site, is located near the southeastern corner of the project parcel. This site was initially identified by PAST during a surface collection survey in 1978 and was reported to the CT-SHPO by Dr. Kevin McBride later that year. The precontact era assemblage collected during the surface collection consisted of flint flakes (n=2), quartz debitage (n=8), and a flint Susquehanna Broadspear. In addition, post-European Contact period ceramic sherds were recovered during the survey. No further investigation of this site has occurred since 1978; however, McBride suggested that it may provide information on subsistence and Terminal period settlement patterns.

In addition, two structures listed on both the State Register of Historic Places (SRHP) properties and identified ins Historic Resources Inventory forms, as well as 12 previously recorded standing structures over 50 years in age were identified within 0.8 kilometers (0.5 mile) of the Facility. Of these, three buildings are situated within, directly adjacent, or immediately across the street from proposed Facility.

These three resources include residences and agricultural buildings that date from the early-nineteenth through the mid-twentieth century. The presence of these historical buildings, as well as the gently sloping nature of the Facility area and its proximity to fresh water sources indicate that portions of are may have been the location of precontact era and/or post-European Contact period settlement and use.

After completion of the above-referenced desktop review, the project parcel and the Facility were subjected to pedestrian survey This revealed that all 8 acres of the proposed Facility were comprised of fallow agricultural fields, manicured lawns, small sections of wooded land, and gentle slopes. Although a small portion of southwestern corner of the project parcel contains a delineated wetland, it does not lie within the proposed Facility area and will not be impacted by construction. The results of the pedestrian survey, combined with the presence of precontact era site and several historic structures within close vicinity to the parcel, indicated the entirety of the proposed Facility retains a moderate/high potential to yield intact archaeological deposits. It is recommended that the impact area be subjected to a Phase IB cultural reconnaissance survey and that the southeastern corner of the parcel containing the previously identified archaeological site be fenced off and protected during the development of the proposed Facility.

The pedestrian survey also led to the identification of a tobacco barn dating from ca., 1940 located on the project parcel, as well as two early-nineteenth century residences and an agricultural building dating from ca., 1940 abutting the parcel. These structures, as well as the other standing structures over 50 year old, located within 0.81 kilometers (0.5 miles) of the parcel were documented through photography, mapping, and pedestrian survey to assess the potential viewshed impact by the proposed facility. Due to the gently rolling topography of the surrounding landscape and the wooded vegetation throughout the area, no viewshed impact will occur for all resources not located within or in the immediate vicinity of the Project parcel. In addition, although the tobacco barn on the project parcel meets the requirement of being 50 years or older, it has had numerous repairs and a modern standing seam metal roof added to it. It is not eligible for listing on the National Register of Historic Places applying the criteria for evaluation (36 CFR 60.4 [a-d).

Project Personnel

Key personnel who worked on this project included David R. George, M.A., RPA, (Principal Investigator); Linda Seminario, M.A. (Project Archaeologist); Tony Medina, B.A. (Operations Manager); Nita Vitaliano, M.A. (Historian); and Tevin Jourdain, B.A. (GIS Specialist).

CHAPTER II
NATURAL SETTING

Introduction

This chapter provides a brief overview of the natural setting of the region containing the proposed Facility in South Windsor, Connecticut. Previous archaeological research has documented that specific environmental factors can be associated with both precontact era and post-European Contact period site selection. These include general ecological conditions, as well as types of fresh water sources present, degree of slopes, and soils situated within a given study area. The remainder of this chapter provides a brief overview of the ecology, hydrological resources, and soils present within the project parcel and Facility area and the larger region in general.

Ecoregions of Connecticut

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

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

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

<u>Northcentral Lowlands Ecoregion</u>

The North-Central Lowlands ecoregion consists of a broad valley located between 40.2 and 80.5 km (25 and 50 mi) to the north of Long Island Sound (Dowhan and Craig 1976). It is characterized by extensive floodplains, backwater swamps, and lowland areas situated near large rivers and tributaries. Physiography in this region is composed of a series of north-trending ridge systems, the easternmost of which is referred to as the Bolton Range (Bell 1985:45). These ridge systems comprise portions of the terraces that overlook the larger rivers such as the Connecticut and Farmington Rivers. The bedrock of the region is composed of Triassic sandstone, interspersed with very durable basalt or "traprock" (Bell 1985). Soils found in the upland portion of this ecoregion are developed on red, sandy to clayey glacial till, while those soils situated nearest to the rivers are situated on widespread deposits of stratified sand, gravel, silt, and alluvium resulting from the impoundment of glacial Lake Hitchcock.

Hydrology of the Study Region

The Project parcel is located within close proximity of several streams, ponds and wetlands. The major fresh water sources in this area include the Tankerhoosen and Hockanum Rivers, Wells Brook, Averys

Brook, Farm Brook, Plum Gulley Brook, and the Podunk River. Previously completed archaeological investigations in Connecticut have demonstrated that streams, rivers, and wetlands were focal points for precontact era occupations because they provided access to transportation routes, sources of freshwater, and abundant faunal and floral resources. These water sources also provided the impetus for the construction of water powered mill facilities during the eighteenth and nineteenth centuries.

Soils Comprising the Project Parcel

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

A total of seven soil types were identified within the project parcel and Facility area (Figure 3). The most ubiquitous of these soils were Narragansett Silt Loam and Manchester Gravelly Sandy Loam; however, Wapping Silt Loam and Haven and Enfield Soils dominate the northwestern edge. In addition, Raypol Silt Loam and Ninigret and Tisbury soils are located in the southern-central portion of the area. The eastern corner of the parcel is characterized by Cheshire Fine Sandy soils. These soil types fall into two categories of well-to-excessively drained and poorly drained soil types. When well drained soils such as Narragansett, Manchester, Wapping, Haven and Enfield, Ninigret and Tisbury, and Cheshire soils remain undisturbed and on less than eight percent slope, they are generally well correlated with precontact era and post-European Contact period site locations and are considered to have higher archaeological sensitivity. In contrast, Raypol Soils are characterized as poorly drained soils and are not likely to contain archaeological deposits. Below is a summary of each specific soil type identified within the Project parcel.

<u>Narragansett Soils (Soil Codes 66B and 66C)</u>

The Narragansett series consists of very deep, well drained loamy soils formed in a mantle of medium-textured deposits overlying till. They are nearly level to moderately steep soils on till plains, low ridges and hills. Slope ranges from 0 to 25 percent. A typical profile associated with Narragansett soils is as follows: **Ap**--0 to 6 inches; dark brown (10YR 3/3) silt loam; weak medium granular structure; very friable; common medium roots; very strongly acid; clear wavy boundary; **Bw1**--6 to 15 inches; dark yellowish brown (10YR 4/6) silt loam; weak medium subangular blocky structure; very friable; common medium roots; very strongly acid; gradual wavy boundary; **Bw2**--15 to 24 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; very friable; common medium roots; strongly acid; clear wavy boundary; **Bw3**--24 to 28 inches; yellowish brown (10YR 5/6) gravelly silt loam; weak medium subangular blocky structure; very friable; few fine roots; 15 percent gravel; strongly acid; clear wavy boundary; and **2C**--28 to 60 inches; light olive brown (2.5Y 5/4) very gravelly loamy coarse sand; single grain; loose; 45 percent gravel and cobbles; strongly acid.

<u>Manchester Soils (Soil Code 37 C and 37E)</u>

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. A typical soil profile is as follows: **Ap**--0 to 9 inches; dark brown (7.5YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; many fine and common medium roots; 20 percent gravel; strongly acid; clear smooth boundary; **Bw**--9 to 18 inches; reddish brown (5YR 4/3) gravelly loamy sand; very weak fine and medium granular structure; very friable; few fine roots; 25 percent gravel; strongly acid; clear wavy boundary; and **C**--18 to 65 inches; reddish brown (5YR 4/4) very gravelly sand; single grain; loose; 50 percent gravel; very strongly acid.

<u>Wapping Soils (Soil Code 53A)</u>
The Wapping series consists of very deep, moderately well drained loamy soils formed in silty mantled friable or firm till on uplands. They are nearly level to gently sloping soils on till plains, low ridges and hills, typically on lower slopes and in slight depressions. Slope ranges from 0 to 8 percent. A typical profile associated with Wapping soils is as follows: **Oi**--0 to 3 inches; slightly decomposed plant material; **A1**--3 to 5 inches; very dark brown (7.5YR 2/2) silt loam; weak fine granular structure; friable; many fine roots; very strongly acid; clear wavy boundary; **A2**--5 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak fine granular structure; friable; many fine roots; very strongly acid; clear wavy boundary. **Bw1**--8 to 13 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; very strongly acid; gradual wavy boundary; **Bw2**--13 to 22 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent gravel; very strongly acid; gradual wavy boundary; **Bw3**--22 to 33 inches; brown (10YR 4/3) silt loam; massive; friable; few fine roots; 5 percent gravel; common medium faint yellowish brown (10YR 5/4) masses of iron accumulation and common medium faint grayish brown (10YR 5/2) iron depletions; very strongly acid; clear wavy boundary; **2C1**--33 to 40 inches; brown (10YR 5/3) sandy loam; massive; friable; 10 percent gravel; common fine distinct reddish brown (5YR 5/3) masses of iron accumulation and common medium faint grayish brown (10YR 5/2) iron depletions; strongly acid; clear wavy boundary; and **2C2**--40 to 63 inches; dark yellowish brown (10YR 4/4) very gravelly loamy sand; massive; friable; 35 percent gravel and 5 percent cobbles; strongly acid.

<u>Haven and Enfield Soils (Soil Code 32B)</u>
The Haven series consists of very deep, well drained soils formed in loamy over sandy and gravelly outwash. They are nearly level through moderately sloping soils on outwash plains, valley trains, terraces, and water-sorted moraine deposits. Saturated hydraulic conductivity is moderately high or high in the mineral solum and very high in the substratum. Slope ranges from 0 through 15 percent. A typical profile associated with Haven soils is as follows: **Oi**--0 to 2 inches (0 to 5 centimeters); slightly decomposed plant material derived from loose pine needles, leaves and twigs; **Oa**--2 to 3 inches (5 to 8 centimeters); black (5YR 2/1) highly decomposed plant material; **A**--3 to 6 inches (8 to 15 centimeters); dark grayish brown (10YR 4/2) loam; weak fine and medium granular structure; friable; many fine and coarse roots; very strongly acid; abrupt smooth boundary; **Bw1**--6 to 13 inches (15 to 33 centimeters); brown (7.5YR 4/4) loam; weak fine and medium subangular blocky structure; friable; common fine roots; many fine pores; very strongly acid; clear wavy boundary; **Bw2**--13 to 22 inches (33 to 56 centimeters); strong brown (7.5YR 5/6) loam; weak fine and medium subangular blocky structure; friable; common fine roots; many fine pores; 5 percent fine gravel; very strongly acid; gradual wavy boundary; **BC**--22 to 31 inches (56 to 79 centimeters); yellowish brown (10YR 5/6) gravelly loam; weak medium and fine subangular blocky structure; friable; few fine roots; common fine pores; 20 percent fine gravel; very strongly acid; clear wavy boundary; and **2C**--31 to 65 inches (79 to 165 centimeters); yellowish brown (10YR 5/4) to brownish yellow (10YR 6/6) stratified gravelly sand; single grained; loose; 30 percent fine gravel; very strongly acid.

The Enfield series consists of very deep, well drained loamy soils formed in a silty mantle overlying glacial outwash. They are nearly level to sloping soils on outwash plains and terraces. Slope ranges from 0 to 15 percent. A typical profile associated with Enfield soils is as follows: **Ap**--0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; moderate fine granular structure; friable; many very fine and fine roots; 5 percent fine gravel; strongly acid; abrupt smooth boundary; **Bw1**--7 to 16 inches; strong brown (7.5YR 5/6) silt loam; weak medium subangular blocky structure; friable; common very fine and many fine roots; 5 percent fine gravel; strongly acid; clear wavy boundary; **Bw2**--16 to 25 inches; light olive brown (2.5Y 5/4) silt loam; weak medium subangular blocky structure; friable, few very fine and common fine roots; 5 percent fine gravel; strongly acid; abrupt wavy boundary; and **2C**--25 to 60 inches; brown (10YR 5/3) very gravelly sand; single grain; loose; stratified; 45 percent gravel and 5 percent cobbles; strongly acid.

<u>Raypol Soils (Soil Code 12)</u>
The Raypol series consists of very deep, poorly drained soils formed in loamy over sandy and gravelly outwash. They are nearly level to gently sloping soils in shallow drainageways and low-lying positions on terraces and plains. Slope ranges from 0 to 5 percent. A typical soil profile is as follows: **Ap**--0 to 8 inches; very dark brown (10YR 2/2) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; common very fine, fine and medium roots; strongly acid; **Bg1**--8 to 12 inches; grayish brown (10YR 5/2) very fine sandy loam; weak medium subangular blocky structure; friable; common very fine, fine and medium roots; common medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; strongly acid; **Bg2**--12 to 20 inches; grayish brown (10YR 5/2) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; common medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; strongly acid; **Bw1**--20 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; few fine roots; common medium prominent yellowish brown (10YR 5/8) and common medium distinct light brownish gray (10YR 6/2) masses of iron accumulation; strongly acid; **Bw2**--26 to 29 inches; olive brown (2.5Y 4/4) very fine sandy loam; massive; friable; 5 percent gravel; common medium prominent yellowish brown (10YR 5/8) masses of iron accumulation and common medium distinct light brownish gray (10YR 6/2) iron depletions; strongly acid; **2C1**--29 to 52 inches; light olive brown (2.5Y 5/4) gravelly sand; single grain; loose; 25 percent gravel; few medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; and **2C2**--52 to 65 inches; dark grayish brown (2.5Y 4/2) very gravelly sand; single grain; loose; 35 percent gravel and 5 percent cobbles; few medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; strongly acid.

<u>Ninigret and Tisbury Soils (Soil Code 21 A)</u>
The Ninigret series consists of very deep, moderately well drained soils formed in loamy over sandy and gravelly glacial outwash. They are nearly level to strongly sloping soils on glaciofluvial landforms, typically in slight depressions and broad drainage ways. Slope ranges from 0 through 15 percent. A typical soil profile is as follows: **Ap**--0 to 8 inches; very dark grayish brown (10YR 3/2) fine sandy loam; pale brown (10YR 6/3) dry; weak medium granular structure; very friable; many fine roots; strongly acid; **Bw1**--8 to 16 inches; yellowish brown (10YR 5/6) fine sandy loam; weak coarse granular structure; very friable; few fine roots; strongly acid; **Bw2**--16 to 26 inches; yellowish brown (10YR 5/4) fine sandy loam; very weak coarse granular structure; very friable; very few fine roots; common medium distinct light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6) redoximorphic features; strongly acid; and **2C**--26 to 65 inches; pale brown (10YR 6/3) loamy sand and few lenses of loamy fine sand; single grain; loose; many medium distinct light olive gray (5Y 6/2) and many prominent yellowish brown (10YR 5/8) redoximorphic features; strongly acid.

The Tisbury series consists of very deep, moderately well drained loamy soils formed in silty eolian deposits overlying outwash. They are nearly level and gently sloping soils on outwash plains and terraces, typically in slight depressions and broad drainageways. Slope ranges from 0 to 3 percent. A typical soil profile is as follows: **Ap**--0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam; weak coarse granular structure; friable; many very fine and fine roots; few scattered pebbles; strongly acid; abrupt smooth boundary; **Bw1**--8 to 18 inches; yellowish brown (10YR 5/6) silt loam; weak medium and coarse subangular blocky structure; very friable; common very fine and fine roots; few scattered pebbles; strongly acid; clear wavy boundary; **Bw2**--18 to 26 inches; brownish yellow (10YR 6/6) silt loam; massive; very friable; few fine roots; few scattered pebbles; common medium prominent grayish brown (2.5Y 5/2) iron depletions and common medium distinct strong brown (7.5YR 5/6) masses of iron accumulation; strongly acid; clear wavy boundary; and **2C**--26 to 60 inches; grayish brown (10YR 5/2) extremely gravelly sand; single grain; loose; 60 percent gravel; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation and common medium faint light brownish gray (10YR 6/2) iron depletions; strongly acid.

<u>Cheshire Soils (Soil Code 63B)</u>
The Cheshire series consists of very deep, well drained loamy soils formed in supraglacial till on uplands. They are nearly level through very steep soils on till plains and hills. Slope ranges from 0 through 60 percent. A typical soil profile is as follows: **Ap**--0 to 8 inches; dark brown (7.5YR 3/2) fine sandy loam, pinkish gray (7.5YR 6/2) dry; weak medium granular structure; friable; common fine roots; 5 percent gravel; strongly acid; **Bw1**--8 to 16 inches; reddish brown (5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent gravel; strongly acid; **Bw2**--16 to 26 inches; reddish brown (5YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; 10 percent gravel; strongly acid; and **C**-- 26 to 65 inches; reddish brown (2.5YR 4/4) gravelly sandy loam; massive; very friable with firm lenses; 20 percent gravel and cobbles; strongly acid.

Summary
A review of mapping, geological data, ecological conditions, soils, slopes, and proximity to freshwater suggests that portions of the Project area appear to be amenable to both precontact era and post-European Contact period occupations. This includes areas of low to moderate slopes with well-drained soil located near freshwater sources. The types of precontact sites that may be contained in these areas include task specific, temporary, or seasonal base camps, which may include areas of lithic tool manufacturing, hearths, post-molds, and storage pits.

CHAPTER III
PRECONTACT ERA SETTING

Introduction

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

Paleo-Indian Period (12,000 to 10,000 Before Present [B.P.])

The earliest inhabitants of the area encompassing the State of Connecticut, who have been referred to as Paleo-Indians, arrived in the area by ca., 13,000 B.P. (Gramly and Funk 1990; Snow 1980). Due to the presence of large Pleistocene mammals at that time and the ubiquity of large fluted projectile points in archaeological deposits of this age, Paleo-Indians often have been described as big-game hunters (Ritchie and Funk 1973; Snow 1980); however, as discussed below, it is more likely that they hunted a broad spectrum of animals. While there have been over 50 surface finds of Paleo-Indian projectile points throughout the State of Connecticut (Bellantoni 1995), only three sites, the Templeton Site (6-LF-21) in Washington, Connecticut, the Hidden Creek Site (72-163) in Ledyard, Connecticut, and the Brian D. Jones Site (4-10B) in Avon, Connecticut have been studied in detail and dated using the radiocarbon method (Jones 1997; Moeller 1980; Singer 2017a; Leslie et al. 2020).

The Templeton Site (6-LF-21) is in Washington, Connecticut and was occupied between 10,490 and 9,890 years ago (Moeller 1980). In addition to a single large and two small, fluted points, the Templeton Site produced a stone tool assemblage consisting of gravers, drills, core fragments, scrapers, and channel flakes, which indicates that the full range of stone tool production and maintenance took place at the site (Moeller 1980). Moreover, the use of both local and non-local raw materials was documented in the recovered tool assemblage, suggesting that not only did the site's occupants spend some time in the area, but they also had access to distant stone sources, the use of which likely occurred during movement from region to region. More recently, the site has undergone re-investigation by Singer (2017a and 2017b), who has determined that most tools and debitage are exotic and were quarried directly from the Hudson River Valley. Recent research has focused on task-specific loci at the Templeton Site, particularly the production of numerous Michaud-Neponset projectile points, as identified through remnant channel flakes.

The Hidden Creek Site (72-163) is situated on the southeastern margin of the Great Cedar Swamp on the Mashantucket Pequot Reservation in Ledyard, Connecticut (Jones 1997). While excavation of the Hidden Creek Site produced evidence of Terminal Archaic and Woodland Period components (see below) in the upper soil horizons, the lower levels of the site yielded artifacts dating from the Paleo-Indian era.

Recovered Paleo-Indian artifacts included broken bifaces, side-scrapers, a fluted preform, gravers, and end-scrapers. Based on the types and number of tools present, Jones (1997:77) has hypothesized that the Hidden Creek Site represented a short-term occupation, and that separate stone tool reduction and rejuvenation areas were present.

The Brian D. Jones Site (4-10B) was identified in a Pleistocene levee on the Farmington River in Avon, Connecticut; it was buried under 1.5 m (3.3 ft) of alluvium (Leslie et al. 2020). The Brian D. Jones Site was identified by Archaeological and Historical Services, Inc., in 2019 during a survey for the Connecticut Department of Transportation preceding a proposed bridge construction project. It is now the oldest known archaeological site in Connecticut at +12,500 years old. The site also provides a rare example of a Paleo-Indian site on a river rather than the more common upland areas or on the edges of wetlands. Ground-penetrating radar survey revealed overbank flooding and sedimentation that resulted in the creating of a stable ancient river levee with gentle, low-energy floods. Archaeological deposits on the levee were therefore protected.

Excavations at the Brian D. Jones Site revealed 44 soil anomalies, 27 of which were characterized as cultural features used as hearths and post holes, among other uses. One hearth has been dated thus far (10,520 ± 30 14C yr BP; charred Pinus; 2-sigma 12,568 to 12,410 CAL BP) (Leslie et al. 2020:4). Further radiocarbon testing will be completed in the future. Artifact concentrations surrounded these features and were separated in two stratigraphic layers represented at least two temporally discrete Paleo-Indian occupations. The recovered lithic artifacts are fashioned from Normanskill chert, Hardyston jasper, Jefferson/Mount Jasper rhyolite, chalcedony, siltstone, and quartz (Leslie 2023). They include examples of a fluted point base, preforms, channel flakes, pièces esquillées, end scrapers, side scrapers, grinding stones, bifaces, utilized flakes, gravers, and a drilled stone pendant fragment. Lithic tools numbered over 100, while toolmaking debris was in the thousands. The channel flakes represent the production of spear points used in hunting. Scrapers, perforators, and grinding stones indicate animal butchering, plant food grinding, the production of wood and bone tools, and the processing of animal skins for clothing and tents. Other collected cultural materials included charred botanicals and calcined bone. Botanicals recovered in hearth features included burned remains of cattail, pin cherry, strawberry, acorn, sumac, water lily, and dogwood (Leslie 2023). Approximately 15,000 artifacts were collected from the site.

The scarcity of identified Paleo-Indian sites suggests a low population density during this period. The small size of most Paleo-Indian sites, their likely inundation by rising sea levels, and the high degree of landscape disturbance over the past 10,000 years likely contribute to poor site visibility, although the presence of two deeply alluvially buried Paleo-Indian sites in Connecticut suggests that other sites may be located along stable rivers (Leslie et al. 2021).

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

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

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

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

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

Another localized cultural tradition, the Gulf of Maine Archaic, which lasted from ca. 9,500 to 6,000 14C BP, is beginning to be recognized in Southern New England (Petersen and Putnam 1992). It is distinguished by its microlithic industry, which may be associated with the production of compound tools (Robinson and Peterson 1993). Assemblages from Maine (Petersen et al. 1986; Petersen 1991; Sanger et al. 1992), Massachusetts (Strauss 2017; Leslie et al. 2022), and Connecticut (Forrest 1999) reflect the selection of local, coarse-grained stones. Large choppers and hoe-like forms from southeastern Connecticut's Sandy Hill Site likely functioned as digging implements. Woodworking tools, including adzes, celts, and gull-channeled gouges recovered at the Brigham and Sharrow sites in Maine (Robinson and Petersen 1993:68) may have been used for dugout canoe manufacture. The deeply stratified Sandy Hill (Forrest 1999; Jones and Forrest 2003) and Sharrow sites (Petersen 1991), with their overlapping lenses of "black sand" floor deposits, suggest intensive site re-occupations according to an adaptation that relied, in part, on seasonally available wetland resources. Thus far, sites from this tradition have only been identified within coastal and near-coastal territories along the Gulf of Maine, in southeastern Connecticut, and in Massachusetts.

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

By the onset of the Middle Archaic Period modern deciduous forests had developed in the region (Davis 1969). Increased numbers and types of sites associated with this period are noted in Connecticut (McBride 1984). The most well-known Middle Archaic site in New England is the Neville Site in Manchester, New Hampshire studied by Dincauze (1976). Careful analysis of the Neville Site indicated that the Middle Archaic occupation dated from between 7,700 and 6,000 years ago. In fact, Dincauze obtained several radiocarbon dates from the Middle Archaic component of the Neville Site associated with the then-newly named Neville type projectile point, ranging from 7,740±280 and 7,015±160 B.P. (Dincauze 1976).

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

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

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

In terms of settlement and subsistence patterns, archaeological evidence in southern New England suggests that Laurentian Tradition populations consisted of groups of mobile hunter-gatherers. While a few large Laurentian Tradition occupations have been studied, sites of this age generally encompass less than 500 m^2 (5,383 ft^2). These base camps reflect frequent movements by small groups of people in search of seasonally abundant resources. The overall settlement pattern of the Laurentian Tradition was dispersed in nature, with base camps located in a wide range of microenvironments, including riverine as well as upland zones (McBride 1978, 1984:252). Finally, subsistence strategies of Laurentian Tradition focused on hunting and gathering of wild plants and animals from multiple ecozones.

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

The Narrow-Stemmed Tradition also marks one of the most prevalent manifestations of the archaeological record in southern New England, narrow-stemmed projectile points, often untyped, or typed as Lamoka, Wading River, or Squibnocket Stemmed forms. These are generally attributed to a form of projectile technology, but some (Boudreau 2008), have suggested that these tool forms might not be related to projectile technology, and may instead relate to graver or drill functions. Boudreau (2008) also drew important connections to the forms of these narrow-stemmed points with later Woodland era forms, such as Rossville points, which are nearly identical. Others (Lavin 2013; Zoto 2019) have similarly suggested a continuation of the Narrow-Stemmed Tradition into the Woodland era, with most of this evidence originating at coastal sites in southern New England. The vast majority of Narrow-Stemmed projectile points that are associated with cultural features suitable for radiocarbon dating, particularly Lamoka style projectile points, are associated with Late Archaic date ranges (Lavin 2013).

The Terminal Archaic Period (3,700 to 2,700 B.P.)

The Terminal Archaic, which lasted from ca., 3,700 to 2,700 BP, is perhaps the most interesting, yet confusing of the Archaic Periods in southern New England precontact periods. Originally termed the "Transitional Archaic" by Witthoft (1953) and recognized by the introduction of technological innovations, e.g., broadspear projectile points and soapstone bowls, the Terminal Archaic has long posed problems for regional archaeologists. While the Narrow-Stemmed Tradition persisted through the Terminal Archaic and into the Early Woodland Period, the Terminal Archaic is coeval with what appears to be a different technological adaptation, the Susquehanna Tradition (McBride 1984; Ritchie 1969b). The Susquehanna Tradition is recognized in southern New England by the presence of a new stone tool industry that was based on the use of high-quality raw materials for stone tool production and a settlement pattern different from the "coeval" Narrow-Stemmed Tradition.

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

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

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

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

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

Early Woodland Period (ca., 2,700 to 2,000 B.P.)

The Early Woodland Period of the northeastern United States dates from ca., 2,700 to 2,000 B.P., and was thought to have been characterized by the advent of farming, the initial use of ceramic vessels, and increasingly complex burial ceremonialism (Griffin 1967; Ritchie 1969a and 1969b; Snow 1980). In the

Northeast, the earliest ceramics of the Early Woodland Period are thick walled, cord marked on both the interior and exterior, and possess grit temper. Archaeological investigations of Early Woodland sites in southern New England resulted in the recovery of narrow stemmed projectile points in association with ceramic sherds and subsistence remains, including specimens of white-tailed deer, soft and hard-shell clams, and oyster shells (Lavin and Salwen: 1983; McBride 1984:296-297; Pope 1952). McBride (1984) has argued that the combination of the subsistence remains and the recognition of multiple superimposed cultural features at various sites indicate that Early Woodland Period settlement patterns were characterized by multiple re-use of the same sites on a seasonal basis by small co-residential groups.

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

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

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

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

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

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

Summary of Connecticut Precontact Period

The precontact period of Connecticut spans from ca. 13,000 to 350 B.P., and it is characterized by numerous changes in tool types, subsistence patterns, and land use strategies. Much of this era is characterized by local Native American groups who practiced a subsistence pattern based on a mixed economy of hunting and gathering plant and animal resources. It is not until the Late Woodland Period that incontrovertible evidence for the use of domesticated species is available. Further, settlement patterns throughout the precontact period shifted from seasonal occupations of small co-residential groups to large aggregations of people in riverine, estuarine, and coastal ecozones. In terms of the region that includes the proposed Project area, a variety of precontact site types may be expected, ranging from seasonal camps utilized by Paleo-Indian and Archaic populations to temporary and task-specific sites of the Woodland era.

CHAPTER IV
POST-EUROPEAN CONTACT
PERIOD OVERVIEW

Introduction

The proposed Facility will be located at 186 Foster Street in South Windsor, which is in Hartford County, Connecticut. This chapter provides an overview of Hartford County history followed by a documentary overview of the town of South Windsor and data more specific to the location of the proposed Facility. Most Connecticut towns, including South Windsor originated as Indigenous settlements and later became English colonial villages. Originally founded as a part of Windsor, and then East Windsor, South Windsor was incorporated as an independent town in 1845. Throughout the eighteenth and nineteenth centuries, South Windsor was a central Connecticut hub for trade and agriculture, with access to the Connecticut River. Today, South Windsor is considered a residential suburb.

<u>Hartford County</u>

Hartford was one of the four original counties established in 1666 following the merger of Connecticut Colony and Hartford Colony (Van Dusen 1961). Located in central-northern Connecticut, Hartford County is bounded to the north by the State of Massachusetts, to the east by Tolland County, to the south by Windham, Middlesex, and New Haven Counties and to the west by New Haven and Litchfield Counties. Bisected by the Connecticut River, it is also the location of the City of Hartford, the capital of Connecticut. Although Hartford has the highest population in the county (an estimated 122,105 as of 2021), Glastonbury has the largest land area (52.3 sq. mi.) (Connecticut 2021). Hartford County is in the lower central Connecticut River Valley and the land rises in the western portion of the county on a low mountain range known as the Metacomet Range (Bell 1985). The landscape varies from densely populated urban areas in most of the county to rich farmland regions in its northern bounds and includes a long stretch of the Connecticut River as well as other significant freshwater rivers. Important waterways associated with Hartford County include the Connecticut, Farmington, Hockanum, Podunk, and Scantic Rivers (Trumbull 1886). The county's three largest cities are Hartford, New Britain, and West Hartford while other important population centers are located at Bristol, Manchester, East Hartford, and Glastonbury (Connecticut 2023).

<u>Woodland Period to Seventeenth Century</u>

During the Woodland Period of northeastern North American history (ca., 3000 to 500 years ago) the indigenous peoples of the lower Connecticut River Valley were part of the greater Algonquian culture of northeastern North America (Lavin 2013). They spoke local variations of Southern New England Algonquian (SNEA) languages and resided in extended kinship groups on lands they maintained for a variety of horticultural and resource extraction purposes (Goddard 1978). Native people in the region practiced subsistence activities including hunting, fowling, and fishing, along with the cultivation of various crops such as maize, squash, and beans. They supplemented these foods seasonally by collecting shellfish, fruits, and plants during warmer periods, and gathering nuts, roots, and tubers during colder times (Lavin 2013). In addition, these communities came together in large groups to conduct deer hunts in the fall and winter. Indigenous peoples lived with their immediate or extended families in large settlements often concentrated along rivers and/or wetlands. Some villages were fortified by wooden palisades. Their habitations, known as a *weetu* or *wigwam,* were generally constructed of a tree sapling frame and covered in reed matting during warm months and tree bark throughout the winter. These varied in size from a small, individual dwelling to an expansive "long house" which could accommodate several families. Native communities commonly traded among both their immediate neighbors and often maintained long-distance networks as well (Lavin 2013).

Seventeenth Century through Eighteenth Century

As Indigenous communities maintained oral tradition rather than a written record, most surviving information of the Indigenous people of present-day Connecticut was recorded by European observers (Lavin 2013). At the time of the arrival of Europeans, the Native people who lived on the east side of the Connecticut River in the areas that included the present-day South Windsor were known as the Podunks (Stiles 1892). Multiple Podunk villages were recorded along the bank of the Connecticut River, and upland camps and seasonal villages have been found throughout the area. The primary Podunk village site during the contact period appears to have been situated beside the Connecticut River near the border between South Windsor and East Hartford (Goodwin 1886, 1879; Spiess 1937). These lands were claimed by the sachem Aramamet, who also claimed parts of the future Hartford and Windsor lands on the river's west side (Stiles 1892).

The earliest Europeans known to have sailed along Long Island Sound and the Connecticut River were the Dutch in ca., 1614 (Love 1903). The Dutch developed trade relationships with local Native communities, and they may have interacted with Podunk leaders, or *sachems* Waghinicut and Arramament*,* who resided near present-day South Windsor (DeForest 1852). By the early 1620s, Dutch traders entered into an agreement with the Pequot of present-day southeastern Connecticut in which the Pequot supplied wampum (polished shells) and furs in return for European goods. In 1624, the Dutch West India Company formally established New Netherland Colony centered around Manhattan and the Hudson River with its eastern bounds extending as far as Cape Cod, including much of present-day Connecticut (Jacobs 2009). Through their relationship with the Dutch, the Pequot accessed a variety of trade goods they distributed to tributaries and traded with other groups in the region. The Pequot extended their dominance over the region, bringing all the Native nations in the area into a tributary relationship under their leadership (Hauptman and Wherry 2009; McBride 2013).

In 1633, the Pequot allowed the Dutch to build a fortified trading post, the *Huys de Hoop,* on the Connecticut River at the site of present-day Hartford to further cement both parties' domination over the flow of wampum, fur, and trade goods. To break from the Pequot, several Connecticut River sachems invited the English to the valley who then settled Windsor (1633), Wethersfield (1634), and Hartford (1635), as well as Saybrook Colony (1635) at the mouth of the river (Trumbull 1886; Van Dusen 1961). Increased European interaction resulted in exposure to diseases and epidemics Indigenous people had never encountered and to which they had no natural immunity. Illnesses such as smallpox, measles, tuberculosis, and cholera devastated Native communities. In 1633, an epidemic spread from Plimoth Colony to Connecticut, impacting the Pequot and the people of the Connecticut River Valley in 1634 (Trumbull 1886). Tensions between Native and European groups in the region resulted in the death of several English traders in 1634 and 1636, which were blamed on the Pequot. In retaliation, English forces from Massachusetts Bay destroyed Pequot and Niantic villages on the Pequot (Thames) River in August of 1636, which began the Pequot War. The Pequot laid siege to Saybrook Fort at the mouth of the Connecticut River during the winter of 1636-1637 and attacked Wethersfield in April of 1637. The Connecticut Colony declared war on the Pequot and was joined by Native warriors from the Connecticut River and Mohegans under the Sachem Uncas (Oberg 2006). In May of 1637, English allied forces destroyed the fortified Pequot village at Mistick and in July they pursued refugees west. The Pequot were defeated in present-day Fairfield and the war soon came to an end (Cave 1996). Afterwards, the English considered Pequot territory, including land in the Connecticut River Valley, to be conquered lands and they were claimed by Connecticut Colony (Trumbull 1886).

The Podunk maintained their homelands across the river from the growing English settlements at Hartford and Windsor. Their leaders and communities appear in English accounts throughout the 1650s and 1660s, most often regarding conflicts with the Mohegan and their sachem, Uncas, which the Connecticut Commissioners attempted to mediate (DeForest 1852). In 1672, the Podunk leader, Sougonosk, who was the daughter of Arramamett, married a man named Attawanhood who was the sachem of the Western Niantic and third son of Uncas (Ives 2001). Through this marriage, Podunk land rights in what is now South Windsor belonged to Attawanhood. These lands were gradually conferred to Windsor proprietors in Windsor, with the last Podunk land claim recorded in 1722. Podunk peoples joined other Indigenous communities in the river valley, including the Tunxis, Wangunk, and Western Niantic (Ives 2001). At the time of King Philip's War (1675 through 1676), the Podunks were believed to be quite numerous; however, because they took the side of King Philip, who did not secure a victory, many of them fled from colonial retribution after the war and they lost their land, although a few remained behind. The last mention of a Podunk Native American in the colonial records was in 1722, but local records mentioned small numbers as late as 1745 and even 1879 (Spiess 1937; Goodwin 1879; De Forest 1852).

Early European settlers in the Connecticut River Valley were primarily farmers who raised various grain crops, agricultural produce, some livestock and tobacco as early as 1640 (Kremidas 1981). By the eighteenth century, farmers in the region increasingly turned to raising livestock on grazing lands. During this time, early forms of industry became common such as water-powered gristmills, sawmills, and fulling mills (Van Dusen 1961). Situated on the Connecticut River, Windsor (South Windsor's parent town) served as an important port from which merchants shipped various products, including timber, bricks, livestock, and tobacco to the West Indies. On their return, these merchants imported sugar, salt, British-made textiles, and ceramics, among other things, back to Connecticut. Shipbuilding was another significant industry fueled by the Connecticut River that took place in what is now South Windsor (Stiles 1891). During the first Connecticut census in 1756, Windsor's population was recorded at 4,220 residents (Connecticut 2023a). By 1761, the village of Wapping (now in South Windsor) became a church parish, with a new degree of self-governance (Barber 1836). In 1768, Windsor became significantly smaller with the separation of East Windsor, which was situated on the eastern side of the Connecticut River and included modern-day South Windsor and Ellington (Connecticut 2021).

Slavery existed in the region since the seventeenth century and by the eighteenth century it was primarily practiced by wealthy families, merchants, and ministers in larger towns. In 1774, on the eve of the Revolutionary War East Windsor, of which present-day South Windsor was a part, 2,999 residents lived in town, of which six were Native Americans and 32 were African Americans (Hoadley 1887). During the Revolutionary War, South Windsor maintained two military companies at Wapping and the South Parish. These troops responded to the Lexington Alarm and men continued to serve in the Connecticut militia and Continental Line throughout the War. In addition to troops, the town also supplied food stores, lead shot, and clothing during the war. In the spring of 1778, General Lafayette made his headquarters at the house of Nathaniel Porter in South Windsor (Kremidas 1981). In 1784, the State passed a gradual manumission law, but slavery was not fully abolished until 1848 (Normen 2013). Following the war, on January 9, 1788, Connecticut ratified the U.S. Constitution to become the fifth state and by 1790, the population had risen to 3,237 residents (Van Dusen 1961; Connecticut 2023a).

Nineteenth Century to Present

At the start of the nineteenth century, present-day South Windsor was still a small agricultural town that benefited greatly from maritime trade connected to the Connecticut River. The maritime opportunities changed after the Hartford Bridge was built in 1808 which obstructed navigation on the river (Kremidas 1981). In the 1830s, the town produced a variety of crops, including corn, potatoes, and rye. Tobacco cultivation increased in the south-central part of town, in the Wapping parish (Barber 1836). Railroad construction on the western shore of the Connecticut River in the 1830s resulted in significant industrial and residential development across from East Windsor. In 1845, South Windsor became incorporated as a separate town and as of 1850, the town had 1,628 residents (Connecticut 2021, 2023b).

South Windsor, like many Connecticut towns, provided men and resources for the Union forces during the Civil War. A total of 123 men from South Windsor served in the Union Army (Hines 2002). In the post-Civil War era, the importance of agriculture to the local economy continued. In the late 1870s, the New York & New England Railroad was built in central Connecticut and through South Windsor but, despite its arrival, the town did not experience a notable growth in industry or population. By the late 1800s, South Windsor's principal industry was still agriculture and the number of residents had not yet surpassed 2,000 (Connecticut 1895, 2023b, 2023c). As neighboring Hartford and Windsor developed commercially and industrially, South Windsor remained primarily a residential community in addition to its farmlands.

At the beginning of the twentieth century South Windsor maintained an economic focus on agrarian pursuits. In 1901, the first shade grown tobacco was produced on Rye Street in South Windsor, which grew a thinner, smoother leaf suitable for cigar wrappers (Kremidas 1981; Van Dusen 1961). The production of tobacco became an increasingly lucrative industry and the town's largest crop was shade-grown tobacco as of 1930 (Connecticut 1930). The Hurricane of 1938 inflicted significant damage to South Windsor, however, including to the harvested tobacco crop from that year, which was destroyed (Daley 1998). After World War II, South Windsor began to change dramatically, as people moved out of cities and into the surrounding towns due to the prevalence of automobiles and the construction of new highways. During this time, South Windsor's economy shifted away from farming and a few manufacturers established themselves in town and residential development increased. In 1950, South Windsor had 4,066 residents and by 1970, the number had grown to 15,553 (Table 1; Connecticut 2023c, 2023d). At that time, brickmaking had become a prominent industry, in addition to agriculture (Connecticut 1970). The population continued to increase and as of 2021, South Windsor's inhabitants numbered 25,898. The town's largest industries were healthcare and social assistance, professional and scientific services, and retail trade (AdvanceCT and CTData Collaborative 2023). Key employers as of 2023 were the Town of South Windsor, Broadridge, and New England Mechanical. In the early twenty-first century South Windsor produced a number of items, including drafting machines, digitizers, graphics systems, CAD/CAM systems and controls for aircraft and missile field modular power supplies (Connecticut 2023). Despite the prominence of industry, town officials intended to control development in order to preserve South Windsor's suburban residential character (South Windsor 2014).

Table 1: Population of South Windsor, Connecticut, Hartford County 1890-2020 (Connecticut 2023b-d; USCB 2023)

Town	1890	1900	1910	1920	1930	1940	1950
Town of South Windsor, Hartford County, Connecticut	1,736	2,014	2,251	2,142	2,535	2,863	4,066
	1960	**1970**	**1980**	**1990**	**2000**	**2010**	**2020**
	9,460	15,553	17,198	22,090	24,412	25,709	26,918

<u>History of the Project Area</u>

The proposed Facility will be located at 186 Foster Street in the southeastern part of South Windsor, Connecticut, near the town's borders with Vernon and Manchester. Woodford's 1855 map shows the location of the proposed Facility along an established road in town in the Wapping district. The nearest property owner at that time was Samuel Stiles, a farmer (Figure 4; USCB 1860). The property to the north of the Facility area belonged to E. Foster and the properties to the south, on the same side of the road, belonged to “W. & R. Foster” and what appears to be “O. R. Crane.” Baker and Tilden’s 1869 map of South Windsor depicts the project parcel as within the Joint District of town (Figure 5). Many of the property owners remained the same, including S. Stiles, E. Foster, and R. Foster. It is of note that the present-day Foster Farm, which is located adjacent to the proposed solar facility, was a dairy farm in 1869; it was run by the Foster Family, who first worked the land in 1791 (Foster Farm 2023; FreshPoint 2023).

Aerial photography taken in 1934, the first year in which such photos were available, shows that the project parcel was maintained farmland with associated farm buildings amongst other parcels of agricultural land, with the exception of the land directly to the north which was forested at the time (Figure 6). The general agricultural character of the land continued through the 1950s and is visible in the 1951 aerial photograph. By this time, a tobacco shed had been built within the project parcel; it was one of a few buildings added to the landscape since 1934 (Figure 7). By 1970, significant suburbanization had taken place in South Windsor near the project parcel. The aerial map from 1970 shows the forested land to the north of the parcel had been developed into a neighborhood of single-family homes in addition to neighborhoods to the east of the parcel (Figure 8). The project parcel itself, however, remained agricultural. Additional aerial photography taken in 1990 shows further suburbanization of the area. Numerous neighborhoods of single-family homes were built to the west of the proposed Facility, yet the project parcel remained unchanged (Figure 9). These neighborhoods continued to expand, as seen in the photography from 2004 (Figure 10). Few additional changes were evident in 2019 (Figure 11).

<u>Conclusion</u>
The documentary review indicates that the proposed Facility, as well as the remainder of the parcel surrounding it, has the potential to be associated with cultural resources. In the portion that was agricultural fields, there is the possibility of encountering evidence of post-European Contact period farming activities that may be important as a component of a rural historic landscape (*sensu* McClelland et al. 1999).

CHAPTER V
PREVIOUS INVESTIGATIONS

Introduction

This chapter presents an overview of previously identified cultural resources in the vicinity of the project parcel and the Facility area in South Windsor, Connecticut. This discussion provides the comparative data necessary for assessing the results of the current Phase IA cultural resources assessment survey, and it ensures that the potential impacts to all previously recorded cultural resources located within and adjacent to the proposed Facility are taken into consideration. Specifically, this chapter reviews previously identified archaeological sites, National/State Register of Historic Places properties (NRHP/SRHP), and previously identified standing structures over 50 years in age within 0.8 kilometers (0.5 miles) of the area of impact. The discussions presented below are based on information currently on file at the Connecticut State Historic Preservation Office (CT-SHPO) in Hartford, Connecticut. In addition, the electronic site files maintained by Heritage were examined during this investigation. Both the quantity and quality of the information contained in the original cultural resources survey reports and State of Connecticut archaeological site forms are reflected below.

Previously Recorded Archaeological Sites and National/State Register of Historic Places Districts/Properties in the Vicinity of the Project Area

A review of data currently on file at the CT-SHPO, as well as the electronic files maintained by Heritage resulted in the identification of two precontact era archaeological sites (132-31 and 132-33) situated within 1.6 km (1 mi) of the proposed Facility (Figure 12). In addition, two SRHP properties and 14 previously identified standing structure in excess or 50 years in age were identified within 0.8 kilometers (0.5 miles) of the Project area (Figure 13). These resources are reviewed below and they provide context with which to assess the Facility area for containing additional intact cultural resources.

<u>Site 132-31</u>

Site 132-31 was identified and recorded during a surface collection conducted in 1978 by Dr. Kevin McBride of Public Archaeology Survey Team, Inc., (PAST) (Figure 12). It was described as a Terminal Archaic period camp that yielded a flint Susquehanna Broadspear, as well as 2 flint flakes, 3 quartz flakes, 5 pieces of quartz debitage, and 2 post-European Contact period ceramics. The site area was identified in a woodland area located approximately 523 meters (1716 feet) from Farm Brook, and soils in this area were described as Ninigret fine silty loam. Site 132-31 was not assessed applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]); however, McBride suggested that the site may provide information on subsistence and Terminal period settlement patterns to create a predictive model. Site 132-31 is located in the southeastern corner of the project parcel and immediately adjacent to the area of impact associated with the proposed Facility. Due to a lack of testing, the full extent of this site is unknown and thus, has the potential to be impacted by Facility development.

<u>Site 132-33</u>

Site 132-33, which is also known as the Cascade Pulsifer Site, is a precontact village or campsite dating from the Middle to Late Archaic and unspecified Woodland period in South Windsor, Connecticut. The site was reported in 1978 by PAST, Inc. Cultural material was collected from the surface of the site over a number of years by the landowner, Mr. Harry L. Welles. According to PAST archaeologists, Mr. Welles was in possession of a number of unspecified projectile points, some of which were found on this site. Site 132-

33 has not been assessed applying the National Register of Historic Places criteria for evaluation (36 CR 60.4 [a-d]). The site is located approximately 1.1 kilometers (0.68 miles) to the northeast of the proposed Facility. No impact to the site will occur as a result of the proposed project.

Milmar (SR 133-9)

"Milmar" is a late-eighteenth century side-gabled house located at 359 Avery Street in South Windsor, Connecticut (Figure 13). The name "Milmar" is probably a combination of two family names. The residence is a two-and-a-half story frame and clapboard structure with a single-story wing extending to the west. The house was originally owned by the Avery Family. The interior plan of the house likely conforms to the original type and period. The window styles are also likely original to the period. This property was added to the SRHP in October of 1968. The property is located approximately 0.5 kilometer (0.31 mile) to the east of the project parcel.

SR 133-10

This SRHP property is a residence located at 728 Oakland Street in South Windsor, Connecticut. The house was listed on the SRHP in 1968; however, since its listing, the address has changed and is now 16 Shares Lane. The building is a one-and-a-half-story frame and clapboard structure capped with a gambrel roof that is pierced by a notably off-center chimney. The house was moved to its present site 25 to 30 years before the it was recorded in 1968. The lean-to shaped wing at the rear is an early-twentieth century addition that dates from when the building was moved to its current location. This property was also recorded as a historic resource in 2011 by Dr. James Sexton. The property is located approximately 0.7 kilometer (0.44 mile) to the south of the project parcel.

Previously Identified Standing Structures over 50 Years Old Near the Project Parcel

An additional 12 previously recorded standing structures over 50 years old have been identified within 0.8 kilometer (0.5 mile) of the proposed Facility area (Table 2). These resources range in date from the mid-eighteenth century through the mid-twentieth century. In addition, these properties represent a variety of architectural styles, including agricultural vernacular, residential vernacular, Georgian, Cape Cod Cottage, Greek Revival, New England Farmhouse, and Colonial. Of these, the William Foster House has been previously assessed as potentially eligible for listing on the NRHP. A total of three of these resources (Resource Numbers 43, 476, 48, and 49) directly abut, are located within, or are situated near the proposed Facility. It is possible that their viewsheds may be impacted by the proposed project. The remaining resources are located distant from the Facility and are separated by intervening vegetation and topographical features. They will not be impacted by the proposed project.

Table 2. Previously Inventoried Historic Standing Structures within 0.81 km (0.5 mi) of the Facility Area

Resource Number	SRHP Number	Name	Address	Type	Year Built	Style	NR Eligibility
6	-	-	229 Avery Street	Residence	c. 1860	Vernacular	Not Assessed
7	-	-	255 Avery Street	Residence	c. 1900	Vernacular	Not Assessed
8	133-9	-	359 Avery Street	Residence	c. 1740	Georgian	Not Assessed
9	-	-	370 Avery Street	Residence	c.1800	Cape Cod Cottage	Not Assessed
43	-	-	160 Foster Street	Agriculture	c. 1940	Vernacular	Not Assessed
44	-	-	63 Foster Street	Residence	c.1850	Greek Revival Style	Not Assessed
45	-	William Foster House	90 Foster Street	Residence	c.1822	New England Farmhouse	Potentially Eligible
46	-	-	117 Foster Street	Residence	c. 1850	Vernacular	Not Assessed
47	-	-	178 Foster Street	Residence	c. 1800	Vernacular	Not Assessed

48	-	Nathaniel Strong House	179 Foster Street	Residence	c. 1802	New England Farmhouse	Not Assessed
49*	-	-	186 Foster Street	Agricultural	c. 1940	Tobacco Shed	Not Assessed
50	-	-	341 Foster Street	Residence	c. 1700	Cape Cod cottage/ Greek revival	Not Assessed
-	-	-	496 Oakland Road	Residence	1706	Vernacular/Cape	Not Assessed
-	133-10	-	16 Shares Lane	Residence	1780	Colonial	Not Assessed

* = Structure located on project parcel.

CHAPTER VI
METHODS

Introduction

This chapter describes the research design and field methods used to complete the Phase IA cultural resources assessment survey of the proposed Facility in South Windsor, Connecticut. The following tasks were completed during this investigation: 1) study of the region's precontact era, post-European Contact period, and natural settings, as presented in Chapters II through IV; 2) a literature search to identify and discuss previously recorded cultural resources in the region; 3) a review of historical maps, topographic quadrangles, and aerial imagery depicting the Facility in order to identify potential historical resources and/or areas of past disturbance; and 4) pedestrian survey and photo-documentation of the project parcel and Facility area in order to determine their archaeological sensitivity.

Research Design

The current Phase IA cultural resources reconnaissance survey was designed to identify all precontact and post-European Contact period cultural resources located within and near the Facility area in South Windsor, Connecticut. The undertaking was comprehensive in nature, and planning considered the distribution of previously recorded cultural resources located within the larger region, local soil conditions, and a visual assessment of the proposed project parcel and Facility area. The methods used to complete this investigation were designed to provide coverage of all portions of the project area and considered both below and above ground resources. The fieldwork portion of this undertaking entailed pedestrian survey, photo-documentation, and mapping.

Archival Research & Literature Review

Background research for this survey included a review of a variety of maps depicting the proposed preject parcel and Facility area; an examination of USGS 7.5' series topographic quadrangles; an examination of aerial images dating from 1934 through 2019; and a review of all archaeological sites and NRHP/SHRP properties/districts, and previously identified standing structures over 50 years old on file with the CT-SHPO, as well as electronic cultural resources data maintained by Heritage. The intent of this review was to identify all previously recorded cultural resources situated within and immediately adjacent to the project parcel, and to provide a natural and cultural context for the proposed Facility. This information then was used to develop the archaeological context of the Facility area, and to assess its sensitivity with respect to the potential for producing intact cultural resources.

Background research materials, including maps, aerial imagery, and information related to previous archaeological investigations, were gathered from the CT-SHPO. Finally, electronic databases and Geographic Information System files maintained by Heritage were employed during the course of this survey, and they provided valuable data related to the project region, as well as data concerning previously identified archaeological sites, NRHP/SHRP properties/districts, and previously identified standing structures over 50 years old within the general vicinity of the development area.

Field Methodology and Data Synthesis

Heritage personnel performed pedestrian survey, photo-documentation, and mapping of the proposed project parcel and Facility area, as well as the surrounding region. During the pedestrian survey, Heritage staff members visually reconnoitered the project parcel and Facility area, and noted the locations of all above-ground cultural features, standing structures over 50 years old, previous disturbances, wetlands, topographic relief, and locations of freshwater sources within and immediately adjacent to the project parcel and Facility area. These natural and cultural landscape features were recorded on a project base map. Any identified cultural resources were recorded using a GPS unit so that their locations could be transferred into the project GIS. In addition, during the pedestrian survey, the field crew photo-documented the proposed development area and the surrounding, including previously identified standing structures over 50 years old and any other historic buildings on the property. The locations from which all photos were taken, as well as directional indications, were recorded on a base map of the Project area. The photo-documentation portion of the survey was completed using color digital media. The pedestrian survey was useful to stratify the project parcel and Facility area into zones of no/low and moderate/high archaeological sensitivity.

CHAPTER VII
RESULTS OF THE INVESTIGATION & MANAGEMENT RECOMMENDATIONS

Introduction

This chapter presents the results of the Phase IA cultural resources assessment survey associated with the proposed Facility at 186 Foster Street in South Windsor, Connecticut (Figure 14 and Photos 1 through 35). As stated in the introductory section of this report, the goals of the investigation included completion of the following tasks: 1) a contextual overview of the region's precontact era, post-European contact period, and natural settings (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously recorded cultural resources in the Project region; 3) a review of readily available maps and aerial imagery depicting the project parcel and Facility area to identify potential post-European Contact period resources and/or areas of past disturbance; and 4) pedestrian survey and photo-documentation of the project parcel and Facility area to determine its depositional integrity, historical associations, and archaeological sensitivity.

Determining Archaeological Sensitivity

The field data associated with soils, slopes, aspect, distance to water, and previous disturbance collected during the pedestrian survey and presented above was used in conjunction with the analysis of maps, aerial images, and data regarding previously identified archaeological sites NRHP/SRHP properties/districts, and previously identified standing structures over 50 years old to stratify the project parcel into zones of no/low and/or moderate/high archaeological sensitivity. In general, post-European Contact period archaeological sites are relatively easy to identify on the current landscape because the features associated with them tend to be relatively permanent constructions that extend above the ground surface (i.e., stone foundations, pens, wells, privies, etc.). Archaeological sites dating from the precontact era, on the other hand, are less often identified during pedestrian survey because they are buried, and predicting their locations relies more on the analysis and interpretation of environmental factors that would have informed Native American site choices.

With respect to the potential for identifying precontact archaeological sites, the project area was divided into areas of no/low and/or moderate/high archaeological potential by analyzing the landform types, slope, aspect, soils contained within them, and their distance to water. In general, areas located less than 300 m (1,000 ft) from a freshwater source and that contain slopes of less than 8 percent and well-drained soils possess a high potential for producing precontact archaeological deposits. Those areas located between 300 and 600 m (1,000 and 2,000 ft) from a freshwater source and well drained soils are considered moderate probability areas. This is in keeping with broadly based interpretations of precontact settlement and subsistence models that are supported by decades of previous archaeological research throughout the region. It is also expected that there may be variability of precontact site types found in the moderate/high sensitivity zones. For example, large Woodland period village sites and Archaic period seasonal camps may be expected along large river floodplains and near stream/river confluences, while smaller temporary or task specific sites may be expected on level areas with well-drained soils that are situated more than 300 m (1,000 ft) but less than 600 m (2,000 ft) from a water source. Finally, steeply sloping areas, poorly drained soils, or areas of previous disturbance are generally deemed to retain a no/low archaeological sensitivity with respect to their potential to contain precontact archaeological sites.

In addition, the potential for a given area to yield evidence of post-European Contact period archaeological deposits is based not only on the above-defined landscape features but also on the presence or absence of previously identified post-European Contact period archaeological resources as identified during previous archaeological surveys, recorded on historical maps, or captured in aerial images of the region under study. In this case, portions of a proposed project area that are situated within 100 m (328 ft) of a previously identified post-European Contact period archaeological site or a National or State Register of Historic Places district/individually listed property also may be deemed to retain a moderate/high archaeological sensitivity. In contrast, those areas situated over 100 m (328 ft) from any of the above-referenced properties would be considered to retain a no/low post-European Contact period archaeological sensitivity.

Results of Phase IA Survey and Management Summary

As noted above, the proposed Facility will encompass approximately 8 acres of a larger 16.68 acre parcel located on the eastern side of Foster Street and the southern side of Orchard Hill Drive in South Windsor, Connecticut. The development parcel is positioned to the east of Farm Brook, to the west of Avery Brook and the Hockanum River. The area is situated at elevations ranging between 74 to 106.9 meters (243 to 350 feet) NGVD. The desktop portion of the Phase IA survey revealed that a single previously identified precontact era site is located at the southeastern corner of the project parcel. Site 132-31 was identified and recorded during a surface collection conducted by Dr. Kevin McBride of PAST in 1978 (Figure 12). It was described as a Terminal Archaic period camp site that yielded a flint Susquehanna Broadspear, as well as 2 flint flakes, 3 quartz flakes, 5 pieces of quartz debitage, and 2 post-European Contact period ceramics. The actual extent of the site is unknown because it has not been subjected to a professional survey since its original identification. Further, Site 132-31 was not assessed applying the NRHP criteria for evaluation (36 CFR 60.4 [a-d]); however, McBride suggested that the site may provide information on subsistence and Terminal period settlement patterns to create a predictive model. Site 132-31 may extend into the limits of the proposed Facility. Finally, a second archaeological site, 132-33, was identified to the northeast of the Facility. It is precontact era occupation dating from the Middle to Late Archaic and Woodland periods; however, it is situated well away from the project parcel and will not be impacted by construction of the proposed Facility.

In addition, the desktop review revealed that there are 14 previously identified standing structures over 50 years in age within 0.8 kilometers (0.5 mile) of the Facility area, with four of these located within, abutting, or directly across the street from the project parcel. These 14 buildings, two of which are listed on the SRHP (see Table 2 in Chapter V), range in date from the mid-eighteenth century to the mid-twentieth century. In addition, they represent a variety of architectural styles, such as agricultural vernacular, residential vernacular, Georgian, Cape Cod Cottage, Greek Revival, New England Farmhouse, and Colonial. The identification of these previously identified cultural resources suggested that the project area may have had the potential to yield intact archaeological deposits from both the precontact era and post-European Contact period prior to completion of the pedestrian survey (see below for pedestrian survey results).

Pedestrian survey of the project parcel and Facility area, which was completed in December of 2023 confirmed the findings of the desktop portion of the Phase IA survey. During the walkover investigation, it became clear that the project parcel and the Facility area were characterized primarily by a fallow agricultural field that was covered with weedy vegetation and was surrounded by gently sloping hills along the eastern and southern edges (Photos 1 through 4). A small portion of the southernmost edge of the project parcel contained a wetland; however, this area is located outside of the Facility footprint and will not be affected by construction (Photo 5).

The pedestrian survey also revealed that the project parcel is bounded by residential development to the north and west, as well as wooded areas to the south and east. Due to the gentle sloping topography and well drained soils identified during the pedestrian survey, as well as the close proximity of Avery and Farm Brooks, as well as Site 132-31, the entirety of the project parcel and the Facility area were determined to retain moderate/high potential to yield intact archaeological deposits. It is recommended that the entire project area be subjected to a Phase IB cultural reconnaissance survey prior to construction. In addition, it is recommended that the southeastern corner of the parcel be fenced off during construction to protect Site 131-32.

A viewshed analysis was also conducted during the pedestrian survey to consider potential impacts that the project development may have on previously identified standing structures over 50 years old within 0.8 kilometers (0.5 miles) of the proposed Facility. The pedestrian survey revealed that 10 of the 14 previously identified historic buildings were not located within immediate proximity to the development area. These structures include Resource Numbers 6, 7, 8, 9, 44, 45, 46, and 50, as well as the residences located at 496 Oakland Road and 16 Shares Lane (see Table 2; Figure 13). Due to the presence of dense and tall vegetation, as well as intervening topographical features, the proposed Facility will not be visible from these structures and will have no impact on them (Photos 6 through 26).

The remaining four structures (Resource Numbers 43, 47, 48, and 49 in Table 2) directly abut, are located within, or are situated immediately across the street from the project parcel. Resource Number 49 is located in the southwestern portion of the parcel; this tobacco shed measures approximately 48.8 meters (160 feet) by 10.1 meters (33 feet) in size (Photos 27 and 28). According to the submitted Historic Resource Inventory form, this barn was constructed in ca., 1940. The building is a one-and-a half-story tall, wood frame structure with vertical siding. It has a front-gabled pitched roof with asphalt shingles. The structure is centered on a central double barn door entrance on both its gable ends with three ventilators evenly spaced along its ridgeline. The interior framing of the structure is exposed and is a combination of original and modern wood (Photo 29). The original roof of the shed and its footings have been replaced with standing seam metal and concrete, respectively. The building remains in fair condition, but has been deteriorated over the years from the elements. The tobacco shed meets the requirement of being 50 years or older, but it has lost a fair amount of its original architectural and historical integrity. Nevertheless, this building will not be affected by the proposed construction and will remain in place.

Resource Numbers 43, 47, and 48 are also located in close proximity to the project parcel. Resource Number 43 is a semi-subterranean potato barn that abuts the southwestern corner of the project parcel; it is located in close proximity to the above-referenced tobacco shed (Photos 30 and 31). Resource Number 47, which is a heavily modified historical residence dating from the nineteenth century, is situated immediately to the west of the proposed Facility and abutting the project parcel (Photos 32 and 33). Resource Number 48 is a well maintained and largely intact historical residence located on the western side of Foster Street and facing directly toward the proposed Facility; it is known as the Nathanial Strong House (Photos 34 and 35). Of these two buildings, Resource Number 47 is surrounded by evergreen vegetation that will mitigate the impact on its viewshed by the proposed Facility, where area Resource Number 48 is in an open area.

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APPENDIX A

FIGURES

Figure 1. Excerpt from a USGS 7.5' series topographic quadrangle image showing the location of the project parcel in South Windsor, Connecticut.

Figure 2. Digital map depicting the client's project plans for the solar facility in South Windsor, Connecticut.

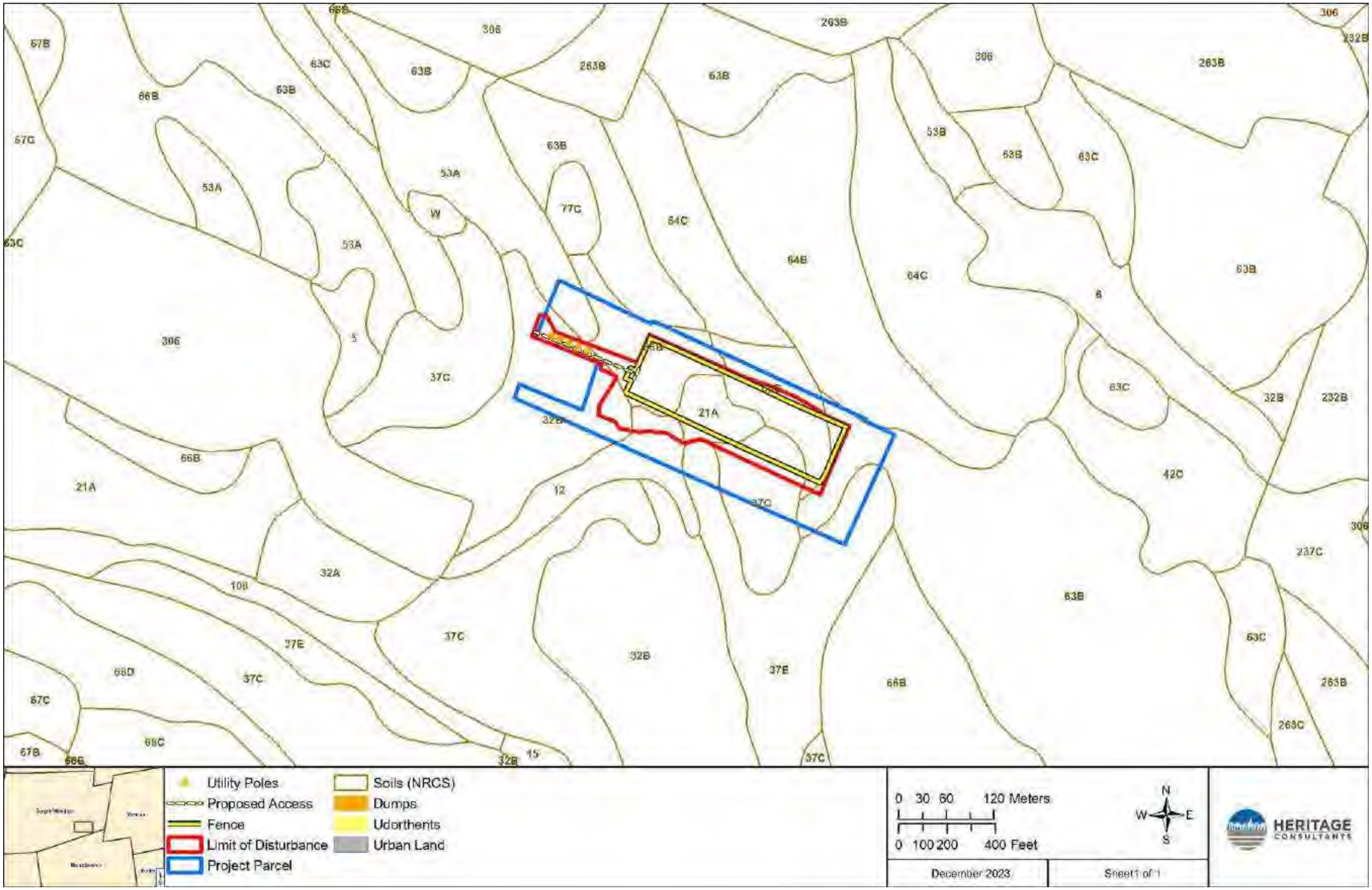


Figure 3. Digital map depicting the soil types present in the vicinity of the project parcel in South Windsor, Connecticut.

Figure 4. Excerpt from an 1855 map showing the location of the project parcel in South Windsor, Connecticut.

Figure 5. Excerpt from an 1869 map showing the location of the project parcel in South Windsor, Connecticut.

Figure 6. Excerpt from a 1934 aerial photograph showing the location of the project parcel in South Windsor, Connecticut.

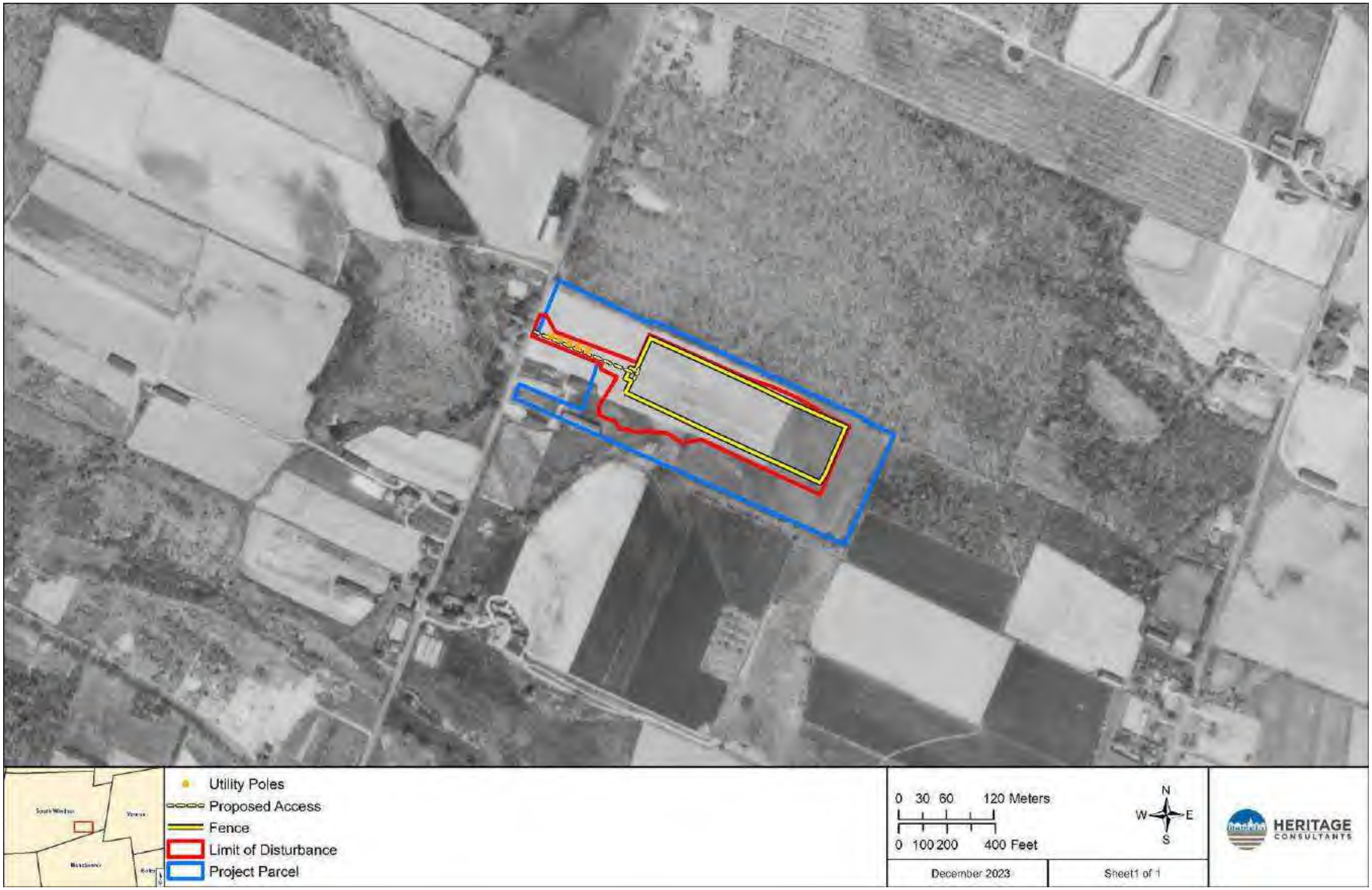


Figure 7. Excerpt from a 1951 aerial photography showing the location of the project parcel in South Windsor, Connecticut.

Figure 8. Excerpt of a 1970 aerial photograph showing the location of the project parcel in South Windsor, Connecticut.

Figure 9. Excerpt of a 1990 aerial photograph showing the location of the project parcel in South Windsor, Connecticut.

Figure 10. Excerpt of a 2004 aerial photograph showing the location of the project parcel in South Windsor, Connecticut.

Figure 11. Excerpt of a 2019 aerial photograph showing the location of the project parcel in South Windsor, Connecticut.

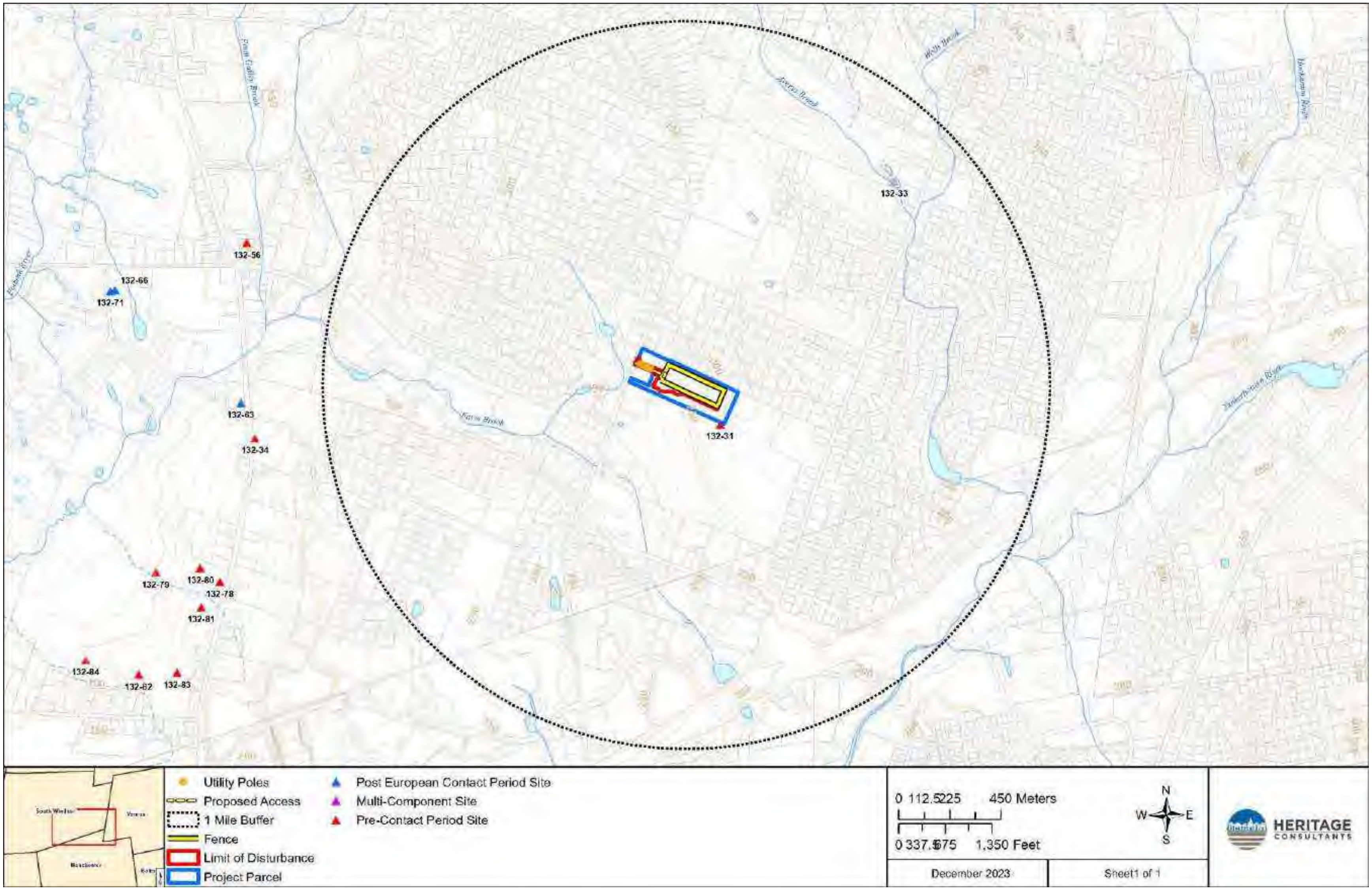


Figure 12. Digital map depicting the locations of the previously identified archaeological sites in the vicinity of the project parcel in South Windsor, Connecticut.

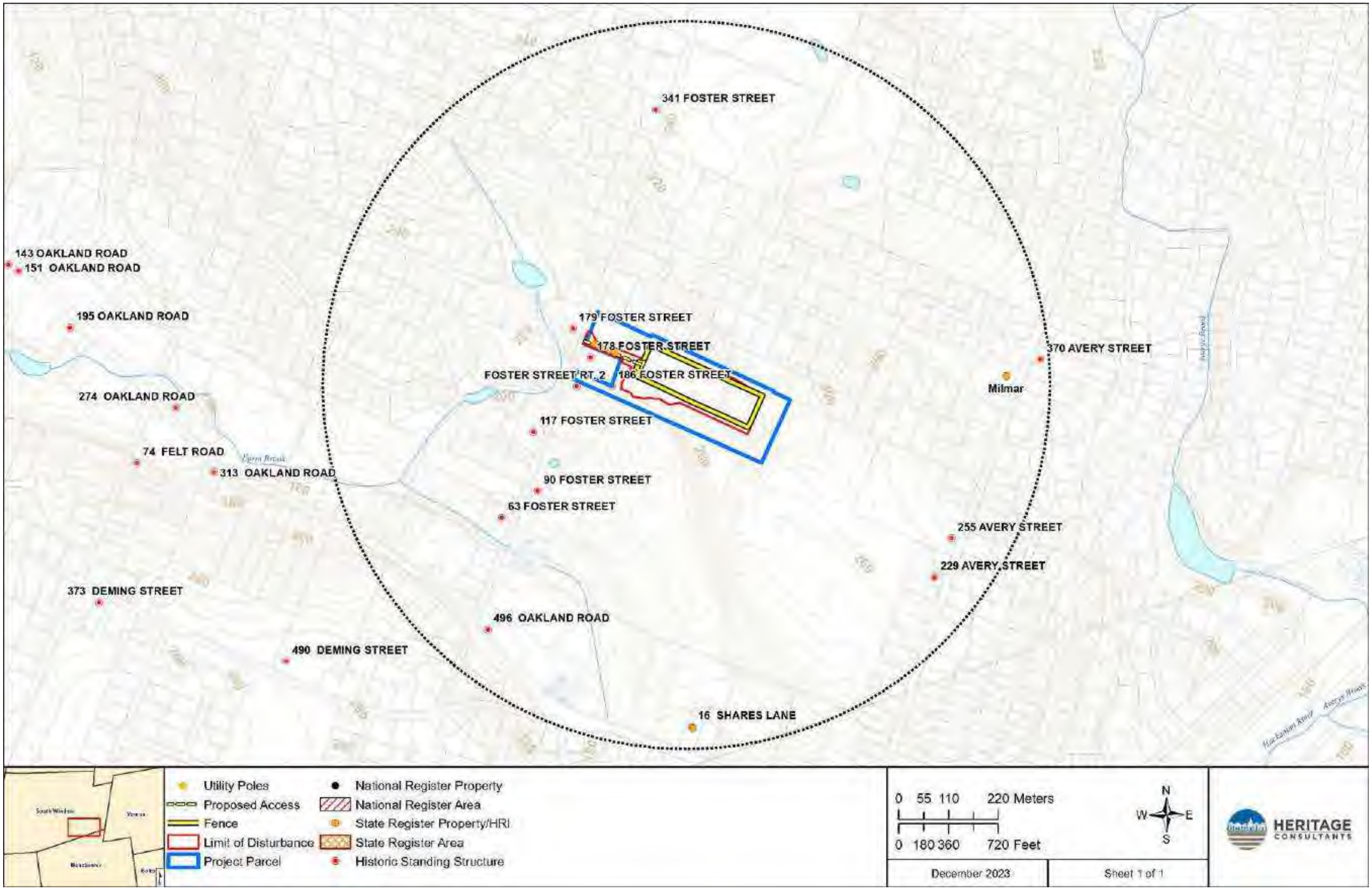


Figure 13. Digital map depicting the locations of the previously identified National Register of Historic Places and State Register of Historic Places properties in the vicinity of the project parcel in South Windsor, Connecticut.

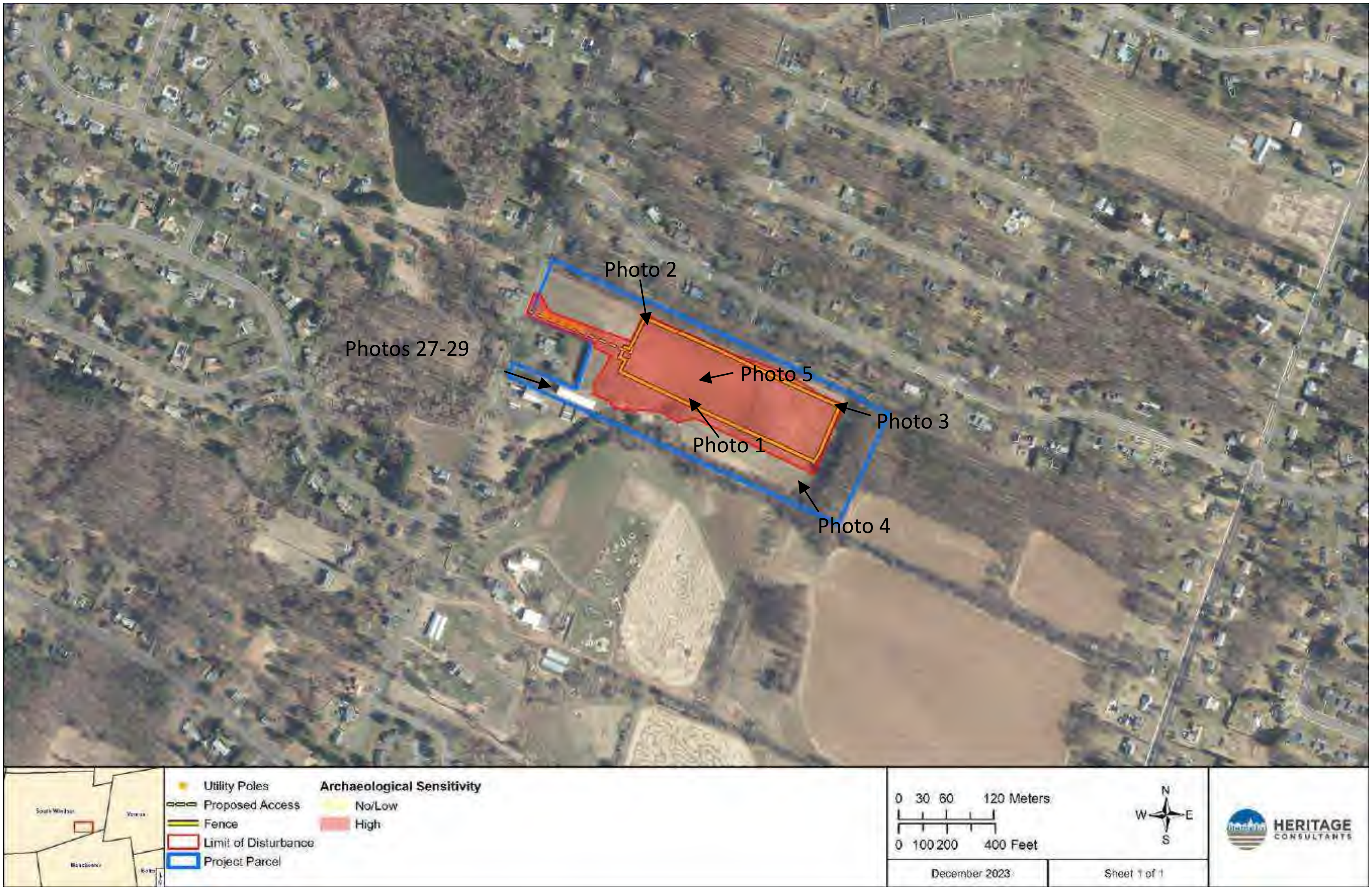


Figure 14. Digital map illustrating areas of finalized Moderate/High archaeological sensitivity (Red) and areas of No/Low Archaeological Sensitivity (Yellow) with directional arrows of photo points taken for the proposed development in South Windsor, Connecticut.

APPENDIX B

PHOTOS

Photo 1. Overview of an agricultural field within the Project area. Photo facing to northwest.

Photo 2. Overview of the Project area. Photo facing to the south.

Photo 3. Overview of the project area taken from the northeastern corner. Photo facing to the northwest.

Photo 4. Overview of gently rolling topography within the project area. Photo facing to the northwest.

Photo 5. Overview of wetland and Tobacco Barn on the southern edge of the project parcel. Photo facing to the west.

Photo 6. Overview of southeastern elevation of 359 Avery Street (Resource 8). Photo facing to the northwest

Photo 7. 3/4 view of southeastern elevation of 359 Avery Street (Resource 8). Photo facing to the northwest.

Photo 8. Overview of southeastern elevation of 255 Avery Street (Resource 7). Photo facing to the northwest.

Photo 9. 3/4 of southeastern elevation of 255 Avery Street (Resource 7). Photo facing to the west.

Photo 10. Photo taken from 255 Avery Street facing in direction of Project parcel depicting dense vegetation. Photo facing to the northwest.

Photo 11. Overview of southeastern elevation of 229 Avery Street (Resource 6). Photo facing to the northwest.

Photo 12. 3/4 view of southeastern elevation of 229 Avery Street (Resource 6). Photo facing to the northwest.

Photo 13. Photo taken from 229 Avery Street facing in direction of Project parcel depicting gentle slope obstructing view. Photo facing to the northwest.

Photo 14. Overview of southwestern elevation of 16 Shares Lane. Photo facing to the northeast.

Photo 15. 3/4 view of southwestern elevation of 16 Shares Lane. Photo facing to the northeast.

Photo 16. Overview of southwestern elevation of 496 Oakland Road. Photo facing to the northeast.

Photo 17. 3/4 view of southwestern elevation of 496 Oakland Road. Photo facing to the northeast.

Photo 18. Overview of southeastern elevation of 63 Foster Street (Resource 44). Photo facing to the northwest.

Photo 19. 3/4 view of southeastern elevation of 63 Foster Street (Resource 44). Photo facing to the northwest.

Photo 20. Photo taken from 63 Foster Street facing in direction of Project parcel depicting dense vegetation. Photo facing to the northeast.

Photo 21. Overview of northwestern elevation of 90 Foster Street (Resource 45). Photo facing to the southeast.

Photo 22. 3/4 view of northwestern elevation of 90 Foster Street (Resource 45). Photo facing to the southeast.

Photo 23. Overview of southeastern elevation of 117 Foster Street (Resource 46). Photo facing to the northwest.

Photo 24. 3/4 view of southeastern elevation of 117 Foster Street (Resource 46). Photo facing to the northwest.

Photo 25. Photo taken from 117 Foster Street facing in direction of Project parcel depicting dense vegetation. Photo facing to the northeast.

Photo 26. Overview of southeastern elevation of 341 Foster Street (Resource 50). Photo facing to the northwest.

Photo 27. Overview of northwestern elevation of 186 Foster Street (Resource 49). Photo facing to the southeast.

Photo 28. 3/4 view of northwestern elevation of 186 Foster Street (Resource 49). Photo facing to the southeast.

Photo 29. Interior of tobacco barn at 186 Foster Street (Resource 49). Photo facing to the southeast.

Photo 30. Overview of northwestern elevation of R002 Foster Street (Resource 43). Photo facing to the southeast.

Photo 31. 3/4 view of northwestern elevation of R002 Foster Street (Resource 43). Photo facing to the northeast.

Photo 32. Overview of northwestern elevation of 178 Foster Street (Resource 47). Photo facing to the southeast.

Photo 33. 3/4 view of northwestern elevation of 178 Foster Street (Resource 47). Photo facing to the southeast.

Photo 34. Overview of southeastern elevation of 179 Foster Street (Resource 48). Photo facing to the northwest.

Photo 35. 3/4 view of southeastern elevation of 179 Foster Street (Resource 48). Photo facing to the northwest.

APPENDIX E

VIEWSHED MAPS AND PHOTO-
SIMULATIONS

ALL-POINTS
TECHNOLOGY CORPORATION

PHOTOGRAPHIC DOCUMENTATION & SIMULATIONS

FOSTER SOLAR
186 FOSTER STREET
SOUTH WINDSOR, CT

PREPARED FOR:

CTEC SOLAR

PREPARED BY:

All-Points Technology Corporation, P.C.
567 Vauxhall Street Extension – Suite 311
Waterford, CT 06320

PHOTO LOG

Legend

- Property
- Limit of Disturbance
- Photographic Location
- Utility Pole
- Grass Berm
- Stormwater Swale
- Interconnection Path
- Underground Electrical Utility
- Stone Trench
- Solar Modules
- Concrete Equipment Pad
- Gravel Access Drive
- Stormwater Structure

N S W E

1 inch = 200 feet

200 100 0 200 Feet

ALL-POINTS TECHNOLOGY CORPORATION

CTEC SOLAR

EXISTING

PHOTOGRAPHED ON 11/15/2023

PHOTO	LOCATION	ORIENTATION
1	**ORCHARD HILL DRIVE**	**SOUTHWEST**

ALL-POINTS TECHNOLOGY CORPORATION

CTEC SOLAR

PROPOSED

PHOTO	LOCATION	ORIENTATION
1	**ORCHARD HILL DRIVE**	**SOUTHWEST**

ALL-POINTS TECHNOLOGY CORPORATION

CTEC SOLAR

EXISTING

PHOTOGRAPHED ON 11/15/2023

PHOTO	LOCATION	ORIENTATION
2	**FOSTER STREET**	**SOUTHEAST**

ALL-POINTS TECHNOLOGY CORPORATION

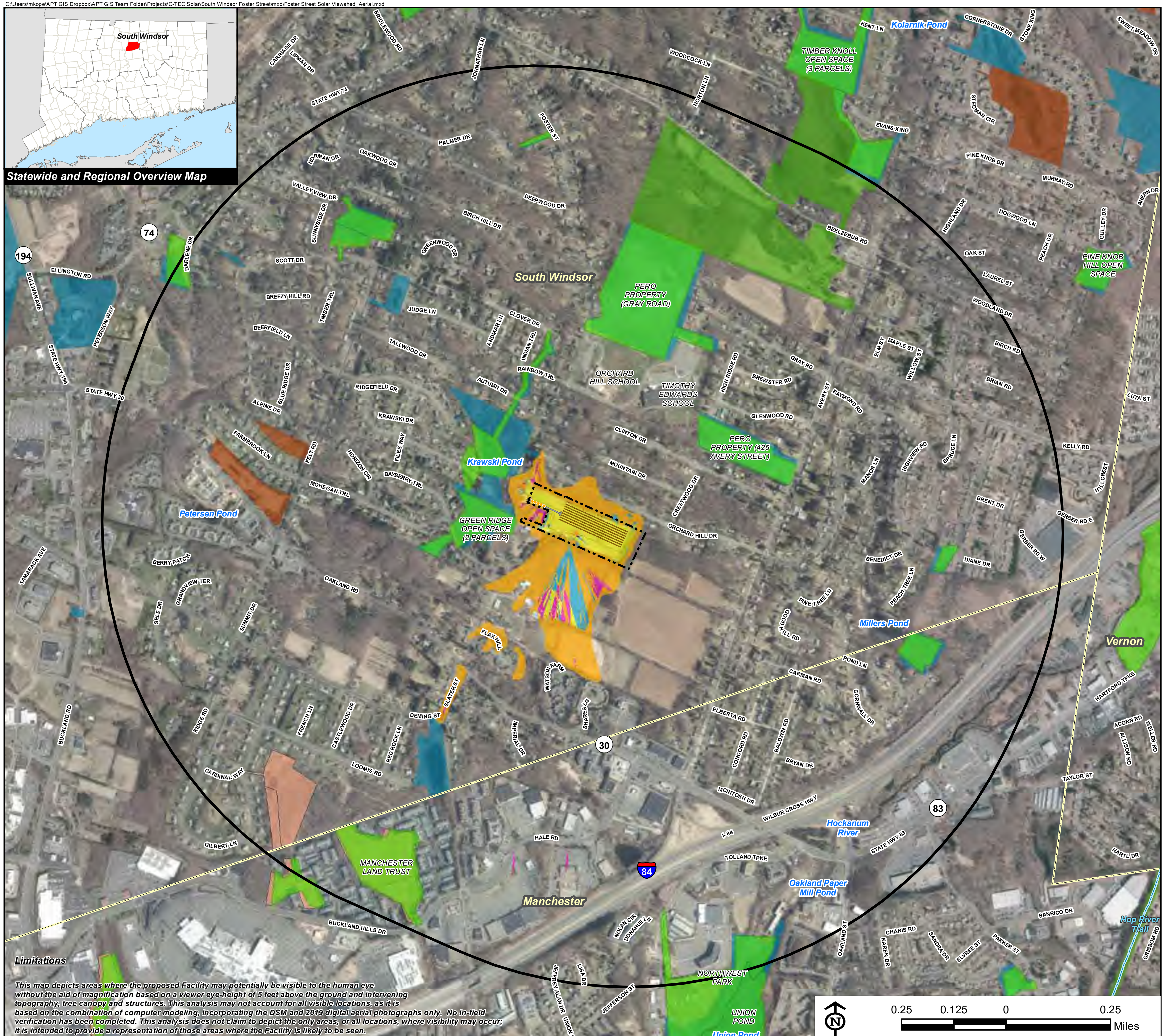
CTEC SOLAR

PROPOSED

PHOTO	LOCATION	ORIENTATION
2	**FOSTER STREET**	**SOUTHEAST**

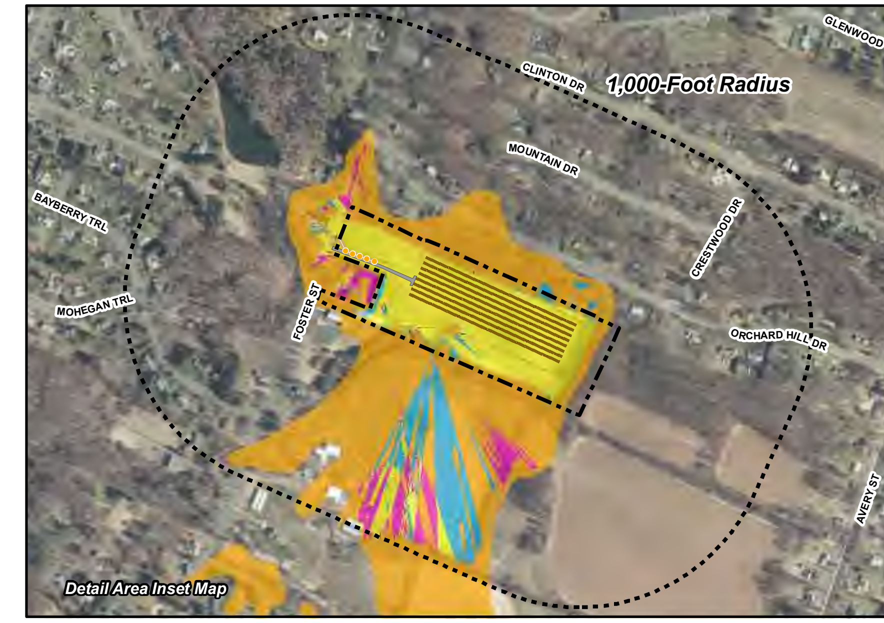
ALL-POINTS TECHNOLOGY CORPORATION

CTEC SOLAR



Limitations

This map depicts areas where the proposed Facility may potentially be visible to the human eye without the aid of magnification based on a viewer eye-height of 5 feet above the ground and intervening topography, tree canopy and structures. This analysis may not account for all visible locations, as it is based on the combination of computer modeling, incorporating the DSM and 2019 digital aerial photographs only. No in-field verification has been completed. This analysis does not claim to depict the only areas, or all locations, where visibility may occur; it is intended to provide a representation of those areas where the Facility is likely to be seen.



Viewshed Analysis Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

Proposed solar modules to be mounted on approximate 10' AGL support structures.
Proposed interconnect utility poles to be approximately 40' AGL.
Forest canopy height and topographic contours are derived from LiDAR data.
Study area encompasses a 1-mile radius and includes 2,520 acres.
Information provided on this map has not been field verified.
Base Map Source: 2019 Aerial Photograph (CTECO)
Map Date: December 2023

Legend

- Property
- Utility Pole
- Interconnection Path
- Solar Modules
- Gravel Access Drive
- Limit of Disturbance
- Study Area (1-Mile Radius)
- Areas of Potential Seasonal Visibility, Proposed Utility Poles and/or Modules (44 Acres)

Predicted Year-Round Visibility (22 Acres Total)

- Proposed Modules and Utility Poles (14 Acres)
- Proposed Modules Only (5 Acres)
- Proposed Utility Poles Only 3 Acres)
- Municipal Boundary

- CT Blue Blaze Hiking Trail
- Trail
- Scenic Highway
- DEEP Boat Launches
- Municipal and Private Open Space Property
- State Forest/Park

Protected Open Space Property

- Federal
- Land Trust
- Municipal
- Private
- State

Data Sources:

Physical Geography / Background Data

A digital surface model (DSM) was created from the State of Connecticut 2016 LiDAR LAS data points. The first return LiDAR LAS values, associated with the highest feature in the landscape (such as a treetop or top of building), were used to capture the natural and built features on the Earth's surface beyond the approximate limits of clearing associated with the proposed solar facility. The "bare-earth" return values were utilized to reflect proposed conditions where vegetative clearing associated with the proposed solar facility would occur.

Municipal Open Space, State Recreation Areas, Trails, County Recreation Areas, and Town Boundary data obtained from CT DEEP.
Scenic Roads: CTDOT State Scenic Highways (2015); Municipal Scenic Roads (compiled by APT)

Dedicated Open Space & Recreation Areas

Connecticut Department of Energy and Environmental Protection (DEEP): DEEP Property (May 2007; Federal Open Space (1997); Municipal and Private Open Space (1997); DEEP Boat Launches (1994)

Connecticut Forest & Parks Association, Connecticut Walk Books East & West

Other

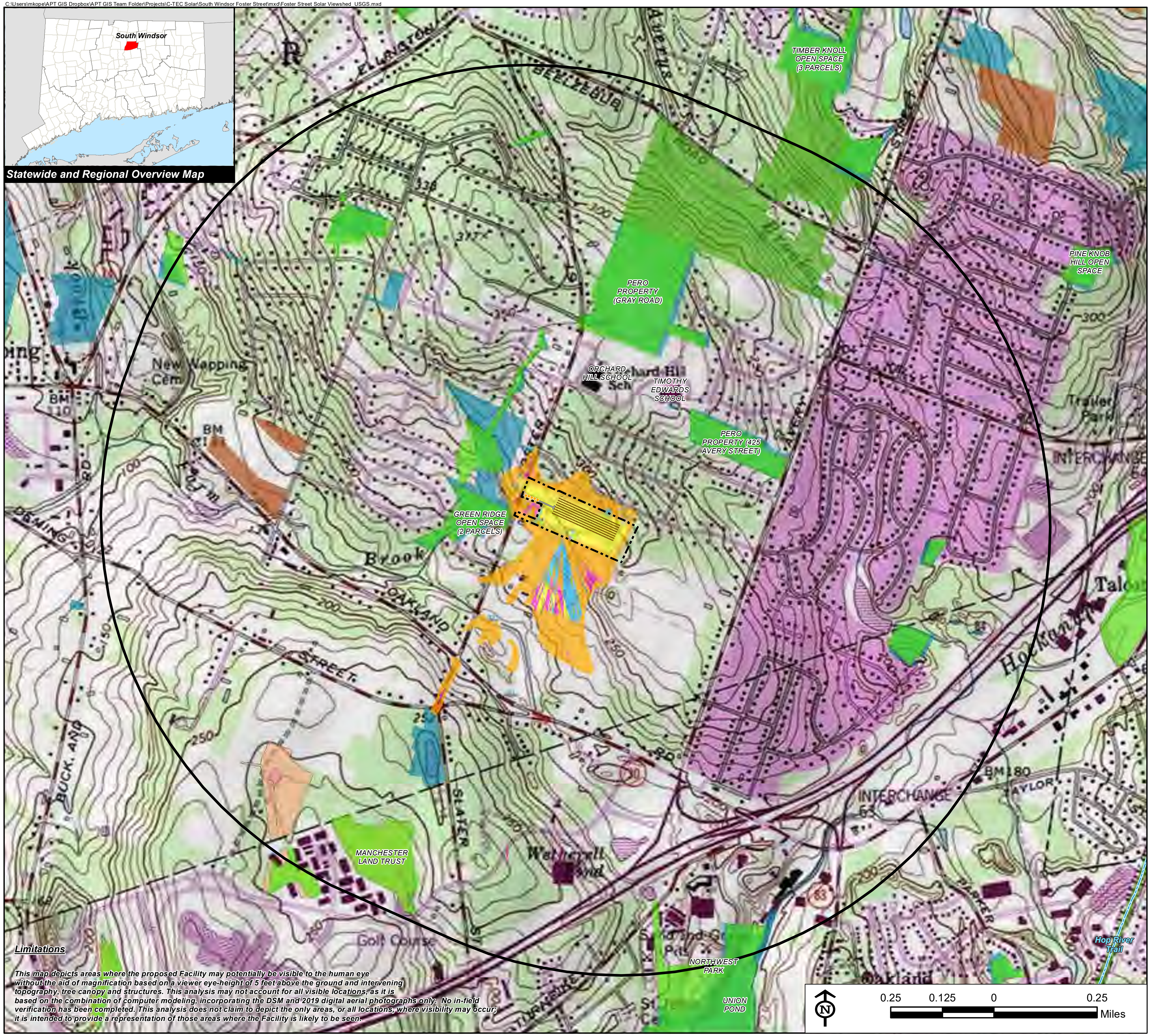
CTDOT Scenic Strips (based on Department of Transportation data)

Notes

***Not all the sources listed above appear on the Viewshed Maps. Only those features within the scale of the graphic are shown.*

ALL-POINTS TECHNOLOGY CORPORATION

C:\Users\mkope\APT GIS Dropbox\APT GIS Team Folder\Projects\C-TEC Solar\South Windsor Foster Street\mxd\Foster Street Solar Viewshed_USGS.mxd



Limitations

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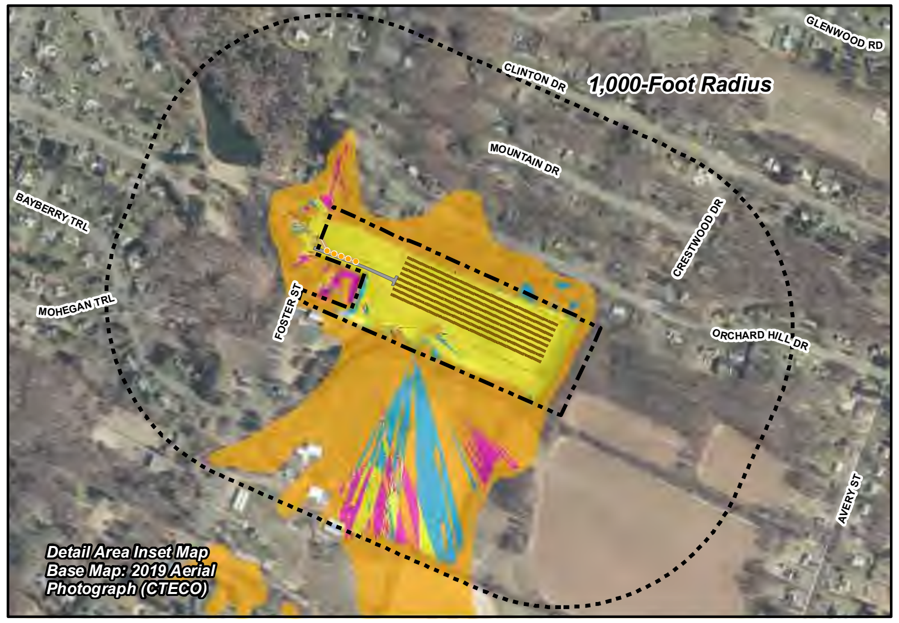

Viewshed Analysis Map

Proposed Solar Facility
186 Foster Street
South Windsor, Connecticut

Proposed solar modules to be mounted on approximate 10' AGL support structures.
Proposed interconnect utility poles to be approximately 40' AGL.
Forest canopy height and topographic contours are derived from LiDAR data.
Study area encompasses a 1-mile radius and includes 2,520 acres.
Information provided on this map has not been field verified.
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Map, Manchester, CT (1992)
Map Date: December 2023

Legend

- Property
- Quads
- Utility Pole
- Interconnection Path
- Solar Modules
- Gravel Access Drive
- Limit of Disturbance
- Study Area (1-Mile Radius)
- Areas of Potential Seasonal Visibility, Proposed Utility Poles and/or Modules (44 Acres)

Predicted Year-Round Visibility (22 Acres Total)

- Proposed Modules and Utility Poles (14 Acres)
- Proposed Modules Only (5 Acres)
- Proposed Utility Poles Only 3 Acres)

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- Trail
- Scenic Highway
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- Municipal
- Private
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Data Sources:

Physical Geography / Background Data

A digital surface model (DSM) was created from the State of Connecticut 2016 LiDAR LAS data points. The first return LiDAR LAS values, associated with the highest feature in the landscape (such as a treetop or top of building), were used to capture the natural and built features on the Earth's surface beyond the approximate limits of clearing associated with the proposed solar facility. The "bare-earth" return values were utilized to reflect proposed conditions where vegetative clearing associated with the proposed solar facility would occur.

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Connecticut Forest & Parks Association, Connecticut Walk Books East & West

Other

CTDOT Scenic Strips (based on Department of Transportation data)

Notes

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ALL-POINTS TECHNOLOGY CORPORATION

APPENDIX F

NOISE STUDY

December 22, 2023

Michael Morrison
Commercial Project Coordinator
CTEC Solar, LLC
1 Griffin Road South
Bloomfield, CT 06002
Email: michael.morrison@ctecsolar.com

Subject: **Environmental & Community Noise Assessment**
Foster Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC – Bloomfield, CT

Dear Mr. Morrison,

WSP USA Environment & Infrastructure, Inc ("WSP") is pleased to submit the following environmental and community noise assessment for the Foster Solar project to CTEC Solar, LLC ("CTEC") for the proposed solar photovoltaic energy generating facility to be located at 186 Foster Street, South Windsor, CT (herein the "Facility" and/or "Site").

This environmental noise assessment report is provided to summarize our findings to the Connecticut Siting Council ("CSC") in support of CTEC's petition for the Foster Solar facility. The future operational sound pressure levels at the nearby sensitive residential receptors have been estimated using an industry standard approach to demonstrate that the Facility will not produce excessive noise and there were no feasible sound attenuation opportunities deemed necessary for this project.

The report concludes that the proposed Facility, as designed and considered, will be in compliance with the requirements of the Regulations of Connecticut State Agencies ("RCSA") Department of Energy & Environmental Protection ("CT DEEP") Noise Control Regulations (i.e., RCSA §22a-69) and the Town of South Windsor Noise Control Ordinance No. 145, Performance Standards (i.e., §50-65). The noise levels projected to be generated by the Facility will not significantly impact the surrounding residential neighborhoods.

BACKGROUND

CTEC proposes to construct, operate, and maintain a 1.66 megawatt ("MW") solar photovoltaic electric generating facility located at 186 Foster Street, South Windsor, CT.

In accordance with CT General Statutes §4-176 and §16-50(k), CTEC is required to submit a petition for site approval to the CSC. Part of this submittal package must include documentation to demonstrate that the proposed solar Facility, will be in compliance with the requirements of the CT DEEP Noise Control Regulations (i.e., RCSA §22a-69), and local noise ordinances. The purpose of this assessment is to evaluate the predicted sound levels from the Site and determine the potential impact the Facility will have on the existing community sound environment.

WSP was contracted by CTEC for professional consulting services related to acoustical assessment of the proposed photovoltaic solar energy system. The goals of this assessment were to better understand the sound environment (i.e., background community sound levels) in the area, quantify the sound levels associated with the Facility, evaluate the predicted sound levels at the property lines surrounding the Site due to the daytime operation of the solar array, and identify potential opportunities for sound attenuation, if deemed necessary.

Throughout this report there are numerous methods and terminology used to quantify and describe community sound levels. All of them use a logarithmic-scaled unit of measure known as the 'decibel' (i.e., dB). The 'decibel' is an essential scale for understanding perception of sound levels. Attachment A of this report provides a broad technical summary of the various sound terminology and acoustical engineering methods used throughout this report.

APPLICABLE NOISE REGULATIONS

The CT DEEP prohibits the emission of continuous excessive noise beyond the boundaries of one's property such that the noise exceeds the following:

Table 1 – CT DEEP Noise Control Regulation – Excessive Noise Values

Source Property Land Use Class	Receptor Property Land Use Class Excessive Noise Values (dBA)			
	Class A (daytime) [1]	Class A (nighttime) [2]	Class B (all-day)	Class C (all-day)
Class A	55	45	55	62
Class B	55	45	62	62
Class C [3]	**61 [4]**	51	66	70

[1] CT DEEP daytime hours are between 7:00 AM and 10:00 PM
[2] CT DEEP nighttime hours are between 10:00 PM and 7:00 AM
[3] Photovoltaic installations are not explicitly classified in the definition of Class C Land Use Category (see RCSA §22.a-69-2.5). However, agricultural, and other resource production and extraction (not elsewhere classified) land uses are deemed to be Class C. Therefore, it is assumed that the Foster Solar facility (i.e., source) must adhere to Class C requirements in terms of noise control.
[4] All residential property lines are to be considered Class A land use, and photovoltaic system is expected to operate only during the daytime. Therefore, the Site shall not generate a sound level in excess of 61 dBA at abutters' property lines.

Additionally, the CT DEEP specifies that noise sources which demonstrate one (1) or more discrete tones are subject to noise limits five (5) A-weighted decibels ("dBA") below the levels specified in the table above.

It should be noted that the *Land Use Classes* listed in the table above do not necessarily correspond to Town zoning districts. Noise zone classifications in the CT DEEP Noise Regulation are defined by actual land use. For example, the Facility is to be located on a property that is currently zoned as rural residential (i.e., zoning code RR) with much of the property used as farmland. The proposed usage of the land will be for a photovoltaic solar energy production, which is most appropriately defined as: "Other Resource Production and Extraction (not elsewhere classified, N.E.C.)," which is expected to be considered a Class C source property. The properties immediately surrounding the Site are assumed to fit the category of Class A (i.e., residential) receptor properties with the closest sensitive receptor located approximately 150 feet (46 m) to the northeast of the center of the proposed Facility (i.e., the single-family residence located at 80 Orchard Hill Drive). Therefore, the Site must not generate a sound level in excess of 61 dBA [i.e., the Source Class C to Receptor Class A (daytime) noise limit].

The Town of South Windsor Noise Control Ordinance No. 145, Performance Standards (i.e., §50-65) are closely aligned with the CT DEEP Noise Control Regulations (i.e., RCSA §22a-69) for this type of facility.

EXISTING SOUND ENVIRONMENT

Although it is not required by the CT DEEP or the Town of South Windsor codes unless the Site is located in an area with high background sound levels, other jurisdictions commonly prohibit facility noise which exceeds the *ambient noise* level by a specified amount (i.e., typically between five (5) to ten (10) dBA) when measured at the nearest property line. The standard practice in environmental sound level measurement is to record community sound pressure levels at multiple locations surrounding the property to establish ambient (i.e., pre-construction) sound levels for the Site. The ambient sound level measurements are collected consecutively during a 20- to 30-minute sample period (i.e., observation time interval) which is conducted during a time period that is reasonably representative of "typical" community noise conditions (i.e., minimal wind, no precipitation, no snow-cover, no unusual events), and during the time of day at which a nuisance is most likely to occur at nearby sensitive receptors (i.e., daytime or nighttime). In the case of solar photovoltaic energy systems, because the systems do not operate at night, these measurements are designed to establish the daytime ambient sound level.

The Facility is to be located on a 16.5-acre parcel of farmland bounded by single-family residential properties to the west, north, and east, and agricultural properties to the south-southeast.

The Site is located near the intersection of Foster Street and Orchard Hill Drive, which are single-lane asphalt paved town roads. This Site is located immediately to the north of the Foster Family Farm (i.e., 90 Foster Street), which operates as a historic traditional farm during the planting season and as corn maze attraction during the month of October.

The Site is approximately 0.8 miles (1.25 km) away from interstate highway I-84, which is located to the southeast. Another major source of community sound in the area is the Bradley International airport ("KBDL") eastern approach corridor, as KBDL runways are located approximately 10 miles (16.2 km) to the northwest of the Site.

A locus map for the Site is shown in Figure 1 (see Attachment B).

SOUND LEVEL MONITORING

On Thursday, December 7, 2023, WSP personnel performed daytime sound level monitoring in the vicinity of four (4) property line locations at the Facility. The daytime attended measurements were collected between 11:30 AM and 2:30 PM during what is considered a typical weekday operational period – this is, midday conditions during which the solar array would be expected to operate at near full capacity. The sections below summarize the methodologies employed by WSP personnel during the sound level measurement session, describe the measurement locations, and present the results of the community sound level monitoring.

MONITORING LOCATIONS

The daytime sound level measurements were collected at four (4) locations indicated in Figure 2 (see Attachment B).

- PL-1: This residential property line location abuts the single-family residential property lines at 54 and 66 Orchard Hill Drive on the northern side of the Site. This location is approximately 200 ft (60 m) (average) to the north-northeast of the proposed location of eight (8) of the Facility's thirteen (13) DC-AC power inverters, referred to as the *west bank* of inverters.
- PL-2: This residential property line location abuts the single-family residential property lines at 80 and 94 Orchard Hill Drive on the northern side of the Site. This location is approximately 200 ft. (60 m) (average) to the north-northeast of the proposed location of five (5) of the Facility's thirteen (13) DC-AC power inverters, referred to as the *east bank* of inverters.
- PL-3: This residential property line location abuts the single-family residential property line at 178 Foster Street on the western side of the Site. This location is approximately 150 ft (45 m) from the proposed location of the Facility's pad-mounted transformer.
- PL-4: This non-residential property line location is near the southern side of the Site. The location is approximately 310 ft (95 m) to the south-southwest of the proposed location of the Facility's DC-AC west bank of power inverters, and approximately 280 ft (85 m) to the south of the transformer. The location abuts the Foster Family Farm property at 90 Foster Street.

The monitoring locations were selected to capture various sound level micro-environments that occur along the border of the Facility property.

MONITORING METHODOLOGY

The community background sound level measurements were collected at the locations indicated in Figure 2 (see Attachment B) during the measurement session on Thursday, December 7, 2023 (11:30 PM – 2:30 PM). At the time of the monitoring surveys the weather conditions were as follows:

- The temperature was between 29°F to 31°F and the relative humidity varied between approximately 60% and 63%. There was relatively little ground level wind (0 – 3 miles per hour throughout the monitoring period). The wind was from the western direction. No precipitation was reported, and the sky was mostly cloudy during all measurements.

At each of the four (4) monitoring locations a series of six (6) short-term (i.e., 5-minute) sound level measurements periods were recorded during the monitoring session (i.e., total measurement time at each location was 30-minutes). Field notes and observations for each monitoring location are attached to this report (see Attachment C). These observations included traffic counts for vehicles driving on Foster Street and Orchard Hill Road during the monitoring session.

All sound level measurements were conducted in general accordance with American National Standards Institute ("ANSI") S12.8-1994, Outdoor Measurement of Sound Pressure Level. Each measurement was 30 minutes in duration, and the L_{eq}, L_{90}, L_{50}, and L_{10} for each period was calculated from the measurement data.

All sound level measurements were collected with a calibrated Casella CEL-633C real-time octave band analyzer, which was equipped with precision condenser microphone having an operating range of 19 dB to 140 dB, and an overall frequency range of 12.5 Hz to 20 kHz. The sound level meter used meets or exceeds all requirements set forth by the ANSI for Type 1 quality and accuracy. Prior to and following all measurement sessions, the sound analyzer was calibrated with an ANSI Type 1 calibrator, which had accuracy traceable to the National Institute of Standards and Technology ("NIST"). All instrumentation was laboratory calibrated per ANSI recommendations within the last twelve (12) months. Copy of the equipment certificate of calibrations are attached (see Attachment D).

For all measurement sessions the microphone was fitted with an environmental windscreen to minimize the effects of air movement, and tripod mounted at a height of 1.3 meters above grade. All measurements were made away from the influence of vertical reflecting surfaces in compliance with ANSI S12.9-1992, Qualities and Procedures for Description and Measurement of Environmental Sound. All data were downloaded to a computer following the measurement session for post-processing and analysis.

MONITORING RESULTS

The following table provides the broadband sound level monitoring results for all locations. These results are useful in comparing difference sound micro-environments that occur along the property line.

Table 2 – Daytime Existing Sound Monitoring Results

Location ID	Date	Start	End	Cumulative Sound Pressure Level (dBA)			
				L_{eq}	L_{10}	L_{50}	L_{90}
PL-1	12/7/23	11:37	12:07	47.3	49.7	45.9	43.8
PL-2	12/7/23	12:12	12:42	44.4	46.0	44.0	42.4
PL-3	12/7/23	12:48	13:18	47.4	48.1	44.6	42.0
PL-4	12/7/23	13:35	14:05	45.7	48.3	41.4	39.0

The L_{90} monitoring results are summarized in Figure 2 (see Attachment B), and the detailed monitoring results data summaries are provided in Attachment C. The time-series plots shown in Attachment C provide an overall summary of how the recorded sound levels varied throughout the monitoring periods on 5-minute and 1-second timescales.

Since the operative metric of the existing community sound levels to which the noise from the photovoltaic solar array operations must be compared is the L_{90}, the remainder of this analysis focuses on the L_{90} metric recorded during the monitoring session. The L_{90} metric is utilized because L_{90} sound levels are normally minimally affected by seasonal changes and variations in local conditions (e.g., roadway and airplane traffic, etc.). In other words, it is reasonable to assume that if the daytime sound levels were re-recorded the L_{90} sound level measurements would likely be indistinguishable from each other. This assumes that any follow-up study, if conducted, measured similarly 'typical' periods (i.e., relatively normal weather conditions and not during an extremely windy, extremely hot, or snowy weather conditions).

LEAF BLOWER SOUND ADJUSTMENT

During the measurement session, WSP personnel noted that a leaf blower was audible at the 281 Foster Street residence, located approximately 950 ft (290 m) to the north-northwest of PL-1, from 11:30 AM until 1:30 PM. In the monitoring notes for PL-1 and PL-3 the leaf blower was listed as the most prominent generalized sound source and it was still audible, albeit less so due to terrain screening, at PL-2 (see Attachment C). The lawn service operating the leaf blower finished their work and left the neighborhood at approximately 1:30 PM (i.e., prior to the start of the measurement at PL-4). After completing the 30-minute measurement at PL-4, WSP collected a series of supplemental 10-minute duration sound level measurements at PL-1 and PL-3 for use in approximating the increase in sound levels attributable to the leaf blower.

WSP analyzed the L_{90} frequency spectrum for each of the sound level monitoring results and concluded that the initial community sound level measurements were affected by the leaf blower. The corresponding 1/3 octave band frequency plots for the measurement periods support the conclusion that the leaf blower was a contributor to the measured sound level at the 500 Hz – 2 kHz range. For example, at PL-1 the broadband L_{90} sound level measurement was measured approximately 3 dBA lower during the supplemental 10-minute monitoring session than what was originally measured at that location when the leaf blower was operating.

Accordingly, WSP performed a series of adjustments to the 1/3 octave band frequency spectrum results to estimate the existing daytime background sound levels at each measurement position with the leaf blower noise minimized. The following table presents the adjusted sound level monitoring results with the leaf blower noise filtered / reduced. The sound spectrum adjustments were performed in accordance with standard acoustical engineering and spectrum correction techniques. Figure 3 (see Attachment B) provides a schematic summary of the spectrum adjustments that were made.

Table 3 – Daytime Existing Sound Level Results (without leaf blower)

Location ID	Date	Start	End	Background Sound Pressure Level (dBA)		
				L_{90} (w/ leaf blower)	L'_{90} (w/o leaf blower)	The following frequency adjustments were made:
PL-1	12/7/23	11:37	12:07	43.8	40.8	$L'p_{500Hz} = 0.88 \cdot Lp_{500Hz}$ $L'p_{1.0kHz} = 0.90 \cdot Lp_{1.0kHz}$ $L'p_{2.0kHz} = 0.85 \cdot Lp_{2.0kHz}$
PL-2	12/7/23	12:12	12:42	42.4	39.5	
PL-3	12/7/23	12:48	13:18	42.0	39.5	
PL-4	12/7/23	13:35	14:05	n/a	39.0	

The adjusted L_{90} monitoring results are summarized in Figure 4 (see Attachment B), and these are the sound level results that are considered most accurately representative of existing pre-construction ambient L_{90} sound levels along the Site's property lines. These baseline sound levels (i.e., L_{90} between 39 – 41 dBA) are typical of relatively rural – suburban areas with minimal local industrial and transportation activity.

CALCULATED FUTURE SOUND LEVELS

This section describes the sound impact analysis methodologies and modeling results associated with WSP's review of the proposed Foster Solar facility.

FACILITY OPERATIONS

The primary significant continuous source of Facility noise is emitted by the thirteen (13) DC-AC power inverters. These units convert the 12-volt direct current ("DC") power produced by the photovoltaic panels to the high-voltage alternating current ("AC") power used by the electrical transmission grid. When operating, the DC-AC inverters emit an electrical humming sound and have built in cooling fans which also emits some noise.

The secondary source of Facility noise is the one (1) 2,000 kVA transformer, which is used to step-up the power output from the inverters to a voltage required by the location distribution network.

Other intermittent and relatively minor sources of facility sound (e.g., low-speed motors used to adjust solar panel angle) are not considered to be capable of generating enough sound to produce a nuisance noise condition at the property line.

DC-AC INVERTER SOUND POWER

The Foster Solar facility proposes to utilize thirteen (13) CPS SCH100/125KTL-DO/US-600 high performance inverters installed at various locations throughout the Site. The site plan design calls for the west bank of eight (8) inverters to be located approximately 200 ft (60 m) (average) to the south-southwest from the PL-1 property line, and for the east bank of five (5) inverters to be located approximately 200 ft. (60 m) (average) to the south-southwest from the PL-2 property line, as shown in Figure 2 in Attachment B.

The CPS product data sheet is provided in Attachment E and specifies that the CPS inverter produces audible noise level less than 65 dBA (ea.) at 1 meter and 25 °C. Additional field sound level testing was performed on a CPS inverter by Brooks Acoustics Corporation ("BAC") on May 14, 2022. WSP reviewed the field-testing data provided in the BAC acoustical engineering study dated April 26, 2023, and determined it to be collected appropriately and in good agreement with the manufacturer's data sheet.

The following table summarizes WSP's review of the CPS inverter sound level data, and the computation of sound power level ("Lw") for input into the sound propagation models.

Table 4 – Source Specific Sound Measurement Conversion to Sound Power Level

Source Sound Parameter	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband Sound Level	
	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
BAC Measured Source Sound Pressure Level (Lp) @ 1 ft. [1]	69.3	68.7	64.0	65.1	66.4	61.5	52.1	44.1	74.4	69.2
WSP Calculated Source Sound Power Level (Lw) [2]	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	77.3	72.2
WSP Calculated Source Sound Pressure Level (Lp) @ 1 m [3]	64.2	63.6	58.9	60.0	61.3	56.4	47.0	39.0	69.3	64.2

[1] The CPS inverter near-field sound test was conducted by Brooks Acoustics Corp. (BAC) on May 14, 2022. The octave band sound pressure level values (measured at 1 ft.) are provided in BAC's East Windsor Solar Two - Acoustical Design Study dated April 26, 2023.

[2] The CPS inverter sound power level (for use in sound modeling) was computed by WSP using standard procedures specified in ISO 3740, Acoustics – Determination of Sound Power Levels of Noise Sources.

[3] The CPS inverter sound pressure level at 1 m was calculated by WSP using the sound power value (calculated above) and using the procedures specified in ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation. The calculated sound pressure level at 1 meter (i.e., 64.2 dBA) demonstrates good agreement with the sound pressure level specified by CPS in the manufacturer's data sheet (i.e., < 65 dBA @ 1 m) (see Attachment E).

Utilizing the source-specific monitoring data, WSP calculated the sound power level ("Lw") for each bank of DC-AC inverters, as follows:

Table 5 – Source Specific Sound Power Levels – Inverters

Source Sound Power (Lw)	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband Sound Level	
	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
West Bank Inverters 1-2	75.2	74.6	69.9	71.0	72.3	67.4	58.0	50.1	80.3	75.2
West Bank Inverters 3-4	75.2	74.6	69.9	71.0	72.3	67.4	58.0	50.1	80.3	75.2
West Bank Inverters 5-6	75.2	74.6	69.9	71.0	72.3	67.4	58.0	50.1	80.3	75.2
West Bank Inverters 7-8	75.2	74.6	69.9	71.0	72.3	67.4	58.0	50.1	80.3	75.2
East Bank Inverters 9-10	75.2	74.6	69.9	71.0	72.3	67.4	58.0	50.1	80.3	75.2

Source Sound Power (Lw)	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband Sound Level	
	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
East Bank Inverters 11-12	75.2	74.6	69.9	71.0	72.3	67.4	58.0	50.1	80.3	75.2
East Bank Inverter 13	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	77.3	72.2

See Attachment A for a summary of the methodology used to calculate the combined sound power level for each DC-AC inverter bank. The detailed sound power computation results are provided in Attachment F.

TRANSFORMER SOUND POWER

The Foster Solar facility proposes to utilize one (1) 2,000 kVA liquid-filled transformer. The transformer will be located on a pad at the western end of the Site and approximately 150 ft (45 m) from the PL-3 property line, as shown in the figures in Attachment B.

A product data sheet for the transformer was not available at the time of this analysis. However, it is assumed that CTEC will install a transformer that at a minimum complies with the National Electrical Manufacturers Association ("NEMA") Standards Publication No. TR1 for transformers, which specifies that liquid-filled transformers shall be designed so that the average sound level will not exceed the values in the following table.

Table 6 – NEMA TR1 Audible Sound Levels for Liquid-Immersed Transformers

Equivalent Transformer Two-Winding kVA Rating	Average Sound Level (dBA)
0-50	48
51-100	51
101-300	55
301-500	56
501-750	57
751-1,000	58
1,001-1,500	60
1,501-2,000 [1]	**61**
2,001-2,500	62
2,501-3,000	63

[1] The Facility design must include a specification to the transformer vendor that equipment noise levels comply with the NEMA TR1 standard for 2,000 kVA liquid-immersed transformers (i.e., 61 dBA).

The sound power levels resulting from the operation of the transformer were estimated using data from NEMA TR1 (2000) and typical transformer surface area data (see Appendix E). The NEMA standard provides maximum sound level values for transformers, and manufacturers routinely meet this specification. Hence, the results based on NEMA may slightly overestimate the noise impact since the actual transformer is expected to be quieter.

The octave band sound power level of the transformer was calculated using Equation 112-18 in "Handbook of Noise and Vibration Control" (excerpt provided in Appendix F):

Lw = NEMA Rating + 10 log A + C + 10

Where, NEMA Rating = A-weighted sound level of the transformer

A = total surface area of the sidewall of the transformer in m^2

C = octave band correction (as specified in Table 20)

WSP utilized methodologies detailed by NEMA to calculate the sound power level ("Lw") for the transformer, as follows:

Table 7 – Source Specific Sound Power Levels – Transformer

Source Sound Power (Lw)	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband Sound Level	
	63	125	250	500	1K	2K	4K	8K	(dB)	(dBA)
2,000 kVA Transformer	76.9	78.9	73.9	73.9	67.9	62.9	57.9	50.9	82.6	74.1

See Attachment A for a summary of the methodology used to calculate the combined sound power level for the transformer. The detailed sound power computation results are provided in Attachment F.

SOUND LEVEL MODELING ANALYSIS

The proposed Foster Solar facility's sound impacts at the property line locations were modeled using both a simplified spreadsheet model (i.e., "WSP") and the more refined SoundPLAN (i.e., "SPLAN") computer software modeling program. Both sound modeling calculations use sound propagation algorithms and attenuation methodologies that are based on ANSI S12.62 and ISO 9613-2, Acoustics - Attenuation of Sound During Propagation Outdoors - Part 2: General Method of Calculation, and other industry accepted standards.

All sound propagation losses, such as geometric spreading, air absorption, ground absorption, and barrier shielding are calculated automatically in accordance with these recognized standards. Reflection from adjacent structures and terrain effects was accounted for in the SoundPLAN modeling; however, these effects are not included in the simplified WSP spreadsheet model.

The following additional considerations were included in the models:

- The WSP and SPLAN models did not include sound propagation losses caused by vegetation (i.e., foliage).
- The WSP and SPLAN models included higher ground reflectivity effects (G = 0.5) along the propagation path corresponding to more compacted ground surface with reflective solar panels than currently exists onsite.

These considerations cause the propagation models to predict higher sound levels (i.e., more conservative results) than would otherwise be expected.

Discrete modeling receptors were chosen at the residential and non-residential property line locations corresponding to where the ambient noise monitoring was conducted in order that direct comparison to existing noise levels could be assessed. The future maximum sound levels were calculated at the four (4) property line locations based on simultaneous operation of all thirteen (13) DC-AC inverters and the one (1) transformer at maximum load.

The following table presents the modeled sound level impact results for both the WSP spreadsheet model and the SoundPLAN software model.

Table 8 – Future Facility Sound Level Impact Results

Location ID	Existing Background Sound Level (L_{90}) (dBA)	Maximum Predicted Sound Level from Facility (dBA)		Total Predicted Sound Level (dBA)		Predicted Sound Level Increase (dBA)	
		WSP	SPLAN	WSP	SPLAN	WSP	SPLAN
PL-1	40.8	37.0	37.2	42.3	42.4	+1.5	+1.6
PL-2	39.5	34.5	34.6	40.7	40.7	+1.2	+1.2
PL-3	39.5	33.6	34.3	40.5	40.6	+1.0	+1.1
PL-4	39.0	31.9	32.0	39.8	39.8	+0.8	+0.8

A noise contour map for the entire property, which also depicts the SoundPLAN results for the residential receptors evaluated, is presented in Figure 5 (see Attachment B).

A review of the data in the above table reveals that the sound generated by the Facility will be **well below** the CT DEEP and the Town of South Windsor daytime noise standard at all residential locations (i.e., 61 dBA). Slight increases in environmental and community sound levels will occur over the minimum daytime L_{90} levels, but the total property line sound level, even when added to ambient noise, will remain at or below the specified State noise standard (noting that the CT standard applies only to the source, not the total noise level). The magnitude of the increases in community sound level caused by the Facility are deemed to be **barely perceptible** (i.e., less than 3 dBA increase).

TONAL ANALYSIS

A discrete tone is a sound that consists primarily of a single pitch such that it is clearly audible against the normal broadband background sounds, even when the tone is at a lower level. Tones are generally more annoying than broadband noise. If an equipment source generates a discrete tone noise as defined in the CT DEEP standards, the allowable overall level of noise is reduced by five (5) dBA.

It is generally not possible to model the potential for discrete tones since this would require the use of propagation algorithms applied to 1/3 octave band data, which are not available. The Facility design will therefore include a specification to all equipment vendors that discrete tone noise must be controlled.

The source specific measurement data for the CPS DC-AC inverter (i.e., field sound level testing was performed on a CPS inverter by BAC on May 14, 2022) showed no prominent discrete tone present. Therefore, it is highly unlikely that such a tone will develop via constructive and/or destructive interference as the equipment sound waves propagate from the source to the property line(s).

While discrete tones associated with the operation of the Facility are not indicated based on any of the available data for the CPS DC-AC inverters, a tonal analysis using the addition of the CT DEEP 'penalty' as described above is easily conducted by adding a five (5) dBA tonal penalty to the modeled noise levels shown in Table 9.

Table 9 – Future Facility Hypothetical Discrete Tonal Impact Results

Location ID	Existing Background Sound Level (L_{90}) (dBA)	Maximum Predicted Sound Level from Facility + 5 dBA Tonal Penalty (dBA)	Total Predicted Sound Level + 5 dBA Tonal Penalty (dBA)	Predicted Sound Level Increase w/ Tonal Penalty Applied (dBA)
PL-1	40.8	42.2	44.6	+3.8
PL-2	39.5	39.6	42.6	+3.1
PL-3	39.5	39.3	42.4	+2.9
PL-4	39.0	37.0	41.1	+2.1

A review of the data in the above table reveals that the sound generated by the Facility, even if it were to produce a prominent discrete tone, will be **well below** the CT DEEP daytime noise standard at all residential locations.

CONCLUSION

An environmental and community noise modeling analysis of the proposed Foster Solar project was conducted in order to determine if operational sound levels from the proposed Facility would comply with the State of Connecticut and Town of South Windsor noise standards. Ambient background sound levels were also measured and compared to proposed Facility sound levels.

The modeling study utilized vendor obtained data and field measurement data for the major noise generating equipment sources (i.e., CPS DC-AC inverters), which were incorporated into the WSP and SoundPLAN computer propagation models. The modeling results reveal that the sound level from the proposed Facility will be in compliance with the State of Connecticut noise standards at all residential property lines. Increases in existing background (i.e., L_{90}) sound levels are expected to be minimal.

The Facility will not produce excessive noise and there were no feasible sound attenuation opportunities deemed necessary for this project.

The sound levels from the Facility are expected be in full compliance with State of Connecticut Noise Control Regulations (i.e., RCSA §22a-69) and Town of South Windsor Noise Control Ordinance No. 145, Performance Standards (i.e., §50-65) at all residences surrounding the Site.

The conclusions and calculations provided are based on the background sound level measurements collected on December 7, 2023 by WSP. The observations in this report were valid on the date and time of the investigation. Reported noise levels contained herein are a factor of operational conditions and environmental conditions present at the time of the assessment and may represent "normal" facility noise levels. Measurements and calculations in this report should be considered accurate to within one (1) decibel.

This report is intended to be used in its entirety for the purposes of CTEC Solar, LLC ("CTEC") as part of the company's petition to the Connecticut Siting Council ("CSC") for the Foster Solar project. Any use of this report, or portions thereof, out of context or any application of this report for purposes other than those explicitly expressed above is considered inappropriate and is done at the sole risk of the user.

If you have any questions, or require additional information, please contact me (860-966-4391, andy.roland@wsp.com), or Paul Richard, P.E. (781-552-9899, paul.richard2@wsp.com), at your earliest convenience.

Sincerely,

WSP

Andrew R. Roland
Senior Project Engineer

Paul G. Richard, P.E.
Principal/Senior Project Manager

Attachments:
A. Environmental Acoustics Technical Background
B. Environmental & Community Noise Assessment Figures
C. Sound Level Monitoring Field Notes and Results
D. Monitoring Equipment Certificates of Calibration
E. Manufacturers' Technical Data Sheet
F. Environmental Noise Modeling Calculations

Attachment A

Environmental Acoustics Technical Background

Decibel Scale

All sounds originate from a source. The sound energy produced by a source creates variations in air pressure which travel in all directions, much like how a wave ripples across water. The "loudness" or intensity of a sound depends on the sound pressure level, defined as the ratio of two pressures: the measured sound pressure from the source divided by a reference pressure (i.e., the minimum threshold pressure of human hearing). This measured ratio is expressed using the decibel ("dB") scale, which is a logarithmic scale designed to accommodate the wide range of sound intensities the human ear can respond to – that is, approximately 20 micropascals ("μPa") up to 100 kilopascals ("kPa"). On the decibel scale, the threshold of human hearing is equal to 0 dB, while levels above 140 dB can cause immediate hearing damage.

The following formula is used to convert a sound pressure value measured in pascals into a decibel value:

$$Lp\ [dB] = 20 \cdot \log_{10}(P_{rms} / P_0)$$

where: Lp = sound pressure level in decibels (dB)

P_{rms} = root mean square of measured sound pressure waveform in pascals (Pa)

P_0 = 0.00002 Pa, reference sound pressure in pascals (Pa)

The table below provides some examples of common sources of sound and their sound pressure levels. All sound levels in this assessment are provided in A-weighted decibels, abbreviated "dBA." The A-weighted sound level reflects how the human ear responds to sound, by deemphasizing sounds that occur in frequencies (i.e., pitch) at which the human ear is least sensitive to sound and emphasizing sounds that occur in frequencies at which the human ear is most sensitive. In the context of environmental and community sound, noise is defined as "unwanted sound."

Comparison of Sound Levels and Sensation of Loudness

Sound Pressure Level (dBA)	Example Sound Source	Perceived Loudness
140	Gun Shot at 3 ft.	Physical Pain
130	Jet Aircraft at 200 ft.	
120	Rock Band (near stage)	Deafening
110	Motorcycle at 3 ft.	
100	Lawn Mower at 3 ft.	Very Loud
90	Noisy Factory Floor	
80	Heavy Truck at 50 ft.	Loud
70	Busy Restaurant	
60	Normal Conversation	Normal
50	Quiet Office	Quiet
40	Living Room	
30	Quiet Library	Faint
20	Empty Auditorium	
10	Soundproof Room	Barely Audible
0	-	Threshold of Hearing

One property of the logarithmic nature of the decibel scale is that the combined sound levels of multiple sound sources is not simply the sum of the contributing sound decibel levels. For example, if the sound of one source measured to have a sound level of 70 dBA is added to another source of 70 dBA, the total is only 73 dBA, not a doubling to 140 dBA. Another mathematical property of the decibel scale is that is one source of sound is at least 10 dB higher than another source, then the total sound is simply the sound level of the louder source. For example, if a sound source at 80 dBA is added to a source at 65 dBA, then the total sound level is 80 dBA.

The following formula is used to combine decibel sound level values:

$L\ [dB] = 10 \cdot log_{10}(10^{L_1/10} + 10^{L_2/10})$

where: L = combined sound level of source 1 and source 2 in decibels (dB)

L_1 = sound level of sound source 1 in decibels (dB)

L_2 = sound level of sound source 2 in decibels (dB)

In terms of human perception of sound, a ±3 dB difference is considered a barely perceptible change for broadband sounds (i.e., sounds that include all frequencies). Similarly, a difference of ±10 dB is perceived as a halving or doubling of apparent sound loudness and the response that goes with it.

The tables below provide a summary comparison of sound pressure levels and loudness sensations.

Subjective Perception of Changes in Sound level

Change in Sound Level	Perceived Change in Loudness (Absolute Difference in Sound Energy)
± 3 dB	Barely Noticeable Change (2x [or 1/2] energy)
± 5 dB	Easily Noticeable Change (4x [or 1/4] energy)
± 10 dB	Double (or Half) as Loud (10x [or 1/10] energy)
± 20 dB	Very “Dramatic” Change (100x [or 1/100] energy)

Frequency / A-Weighting

Sound is transmitted by pressure variations in air – that is, the compression / release of gas pressure in air. Frequency of pressure waves is expressed in Hertz (“Hz”), which is defined as the number of complete wave cycles per second. Low frequency sound has fewer waves per second (longer wavelength) than high frequency sound (shorter wavelength) and is often described in musical terms as ‘pitch’ or ‘tone’. The frequency range of audible sound that the human ear responds to is 20 to 20,000 Hz. This range is difficult to use to express individual sounds since most sounds created within the environment are composed of multiple frequencies being emitted simultaneously (i.e., broadband). Broadband sound is therefore divided into frequency “bands” called octaves which are identified by their center frequency to make using frequency measurements easier. Octave bands are necessary to evaluate environmental noise because the human ear responds differently to each octave band.

Environmental sound is commonly expressed in terms of an A-weighted sound decibel level (“dBA”). The A-weighting is a standard frequency filter used to make measured sound levels more nearly approximate the frequency response of the human ear, which is centered at a frequency of 1,000 Hz. The table below shows the approximate adjustments made within each octave band frequency to contour un-weighted octave band sound pressure levels in decibels (“dB” or “dBZ”) to A-weighted sound pressure levels (“dBA”).

A-Weighed Octave Band Adjustments

Octave (Hz)	32	64	125	250	500	1K	2K	4K	8K	16K
A-Adj. Value (dB)	-39.4	-26.2	-16.1	-8.6	-3.6	0.0	+1.2	+1.0	-1.1	-6.6

As shown above, the A-weighting sound levels emphasize the middle frequency sounds (i.e., 1 kHz – 4 kHz), and de-emphasize low- and high-frequency sounds. A ‘broadband’ sound includes sound pressures at all octave bands expressed as a single representative value.

The A-weighted broadband value is calculated by taking the logarithmic summation of all octave band sound pressure level according to the following formula:

$$Lp\ [dBA] = 10 \cdot \log_{10}(\sum 10^{(L_x+Adj_x)/10})$$

where: Lp = broadband sound pressure level in A-weighted decibels (dBA)

L_x = sound pressure level at octave band (x) in un-weighted decibels (dB)

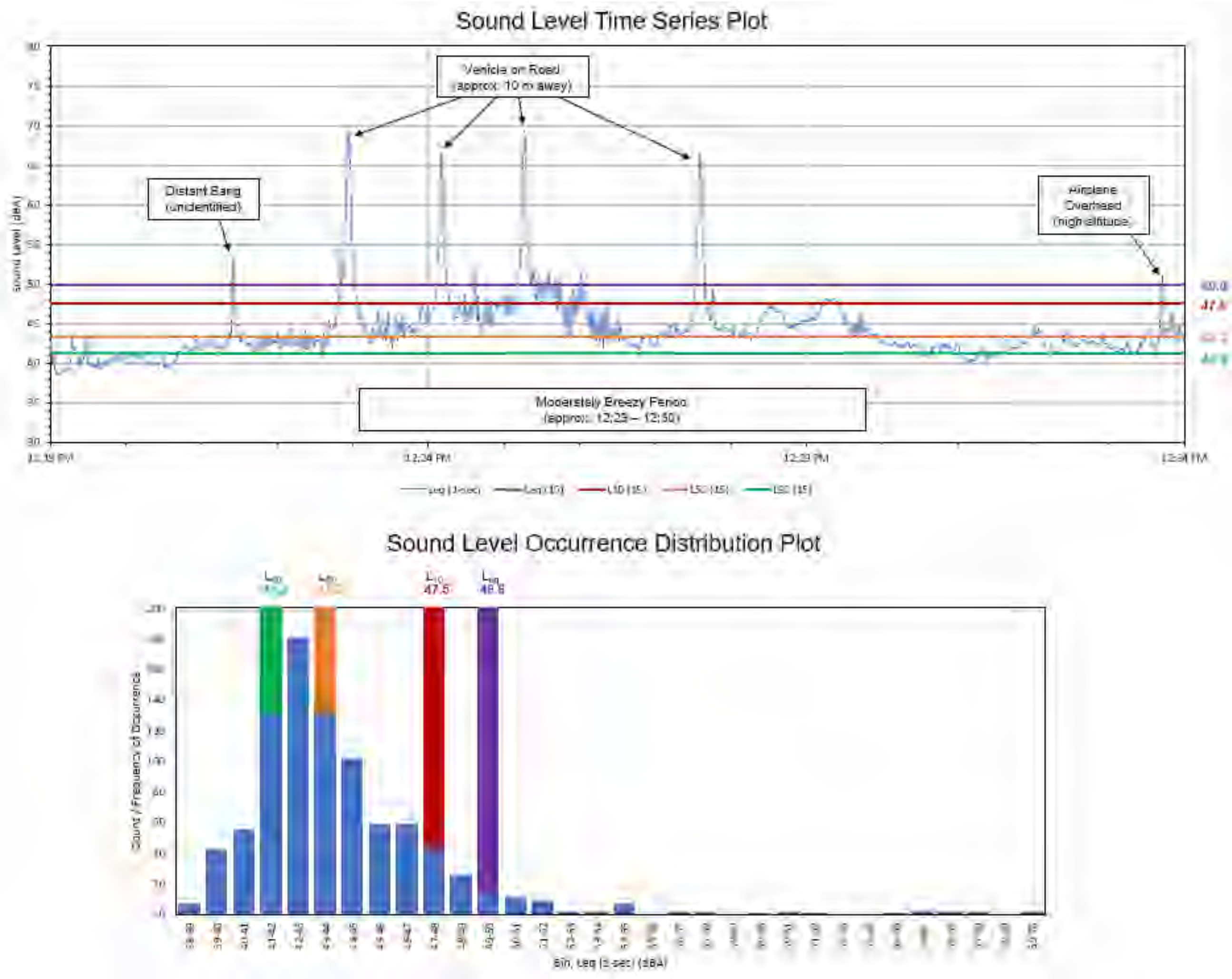
Adj_x = octave band (x) adjustment to A-weighting (±dB) (see table above)

Temporal Sound Metrics

Environmental sound levels vary from moment to moment – that is, some sounds are sharp and impulsive lasting a very short time, while others rise and fall over much longer periods of time. These are termed "temporal" sound level variations, and there are various measures (i.e., metrics) which are designed to account for various levels of temporal variation in sound. The most common in this analysis are the 90% exceedance level (i.e., L_{90}), and the equivalent sound level (i.e., L_{eq}).

- L_{90} sound metric is a statistical value that calculates the steady-state sound pressure level that is exceeded during 90% of the measurement period. In other words, the L_{90} represents the "quietest" 10% of a sound measurement period and is normally considered the background sound level. The L_{90} calculation effectively eliminates nearly all temporal variation in recorded noise and is used to set baseline and continuous background sound levels. The L_{90} can be considered the "residual" sound level, which is the ambient sound leftover when nearly all obvious intermittent noise sources are eliminated from the measurement. This is known as an exceedance value, or the percent of time (n) during a measurement period a sound level value is exceeded (L_n). Conversely, the L_{10} sound level metric is the statistical value that calculates the "loudest" 10% of the measurement period (i.e., the sound pressure level that is exceeded for only 10% of the measurement period).
- L_{50} is the median sound level – that is, the sound level value that is exceeded by 50% (i.e., half) of the data sample. The L_{50} is not skewed by a small proportion of extremely high or low sound level values, and therefore provides a good representation of the most typical sound level recorded during the sample period.
- L_{eq}, or equivalent sound level, is the steady-state sound level over a period that has the same acoustic energy as the fluctuating sound that occurred during the same period. As an example, if two (2) sounds were measured, and one (1) sound had twice (2X) the sound energy but lasted for half as long, the two (2) sounds would be characterized as having the same equivalent sound level (since the energy released is equivalent). The L_{eq} is directly related to the effects of sound on peoples' perceived intrusiveness or level of annoyance since it expresses the equivalent magnitude of the sound as a function of occurrence frequency and time. The L_{eq} is commonly referred to as the average sound pressure level, although this is not necessarily an accurate description. In certain situations, the L_{eq} sound level should be considered overly conservative as the value is more significantly affected by short-duration loud noises. This is caused by the logarithmic nature of the decibel scale and that it is a time-integrated energy average (as opposed to a simple arithmetic average). For example, a 76 dB sound level equates to 'quadruple' (i.e., four times) the sound energy produced by a 70 dB source, therefore the L_{eq} value is mostly determined by loud sounds if there are fluctuations during a measurement period.

The L_{eq} and L_{90} (L_{50} and L_{10}) values are both automatically calculated with a sound level meter in accordance with the methods define in American National Standards Institute ("ANSI") S1.4-1983. The figure below provides a visual description of how these sound level metrics are used to summarize fluctuating sound data during an example 15-minute measurement period. The figure also demonstrates how the 'skewness' of the data frequency distribution will generate a L_{eq} value which exceeds the L_{10} metric due to several loud, short-duration events.



Sound Power versus Sound Pressure

Sound power ("Lw") and sound pressure ("Lp") are two distinct and commonly confused descriptors of sound because both values are typically expressed in the decibel scale. Sound power is the acoustical energy emitted by the sound source and is an absolute value. It is not affected by the environment and is independent of distance to the source. On the other hand, sound pressure levels vary substantially with distance from the source and are diminished by other environmental factors (e.g., obstacles, barriers, air absorption, wind, etc.). Sound pressure is what human ears experience (or hear), and what sound level meters measure.

The total acoustical power emitted by a sound source is given in terms of the sound power level (Lw). The sound power level of a source is an intrinsic property of the unit for a give set of operating conditions irrespective of the orientation of the source. Sound power is a theoretical value that is not directly measured. It is a characteristic of the sound source and is an estimate of the total sound power emitting in all directions by the source. The value of sound power level is determined by the following equation:

$Lw\ (dB) = 10 \cdot \log_{10}(W / W_0)$

where: *Lw* = sound power of source in decibels (dB)

W = acoustic power radiated by the source in watts (W)

$W_0 = 10^{-12}$ W, reference power in watts (W)

The sound pressure level (Lp) is a measure of the magnitude of the acoustical pressure wave at a specific receptor location. The magnitude of the sound pressure level is a result of how the sound power is distributed and influenced by the environment between the sound source and the receiver location. Environmental influences may include distance between the source and the receiver, atmospheric attenuation of the path of propagation, reflections from surfaces, as well as sound transmission and refraction through and around fluid/solid structures. In many instances these effects are frequency dependent necessitating an analysis that can account for the change in spectral distribution of the sound power during the propagation from the source to the receiver.

Sound Level Reduction Over Distance

The calculation to estimate environmental sound pressure value at a given location from a source value at a given sound power level is detailed in ISO 9613-2: Acoustics – Attenuation of Sound During Propagation Outdoors. This is the commonly accepted procedure for 'modeling' predicted sound level impact at a receptor location due to the introduction of a sound source. As mentioned above, this calculation is influenced by numerous factors – for example, geometric divergence (i.e., wave-spreading due to distance between source and receiver), atmospheric absorption, ground and surface reflection and absorption, and screening and refraction due to obstacles between source and receiver. The following section provides an explanation of the most basic of these 'factors' – that is, geometric divergence or sound level reduction over distance.

When traveling from a source to a receptor in an outdoor environment, sound energy levels decrease with increasing distance from source to receptor. This is due to geometric divergence (or wave-spreading), and the decrease in sound level from any source normally follows the "inverse-square law". The inverse-square law generally applies to energy as it is radiated outward in three-dimensions (i.e., spherically). As the emitted energy gets farther from the source it is spread out over an area that increases in proportion to the square of the distance from the source (i.e., r^2). The attenuation value due to spherical spreading in the free field is equal to:

$$A_{div}\ (dB) = 10 \cdot \log_{10}(4 \cdot \pi \cdot r^2) = 20 \cdot \log_{10}(r) + 11$$

where: A_{div} = attenuation due to geometric divergence in decibels (dB)

r = distance from the source to the receiver in meters (m)

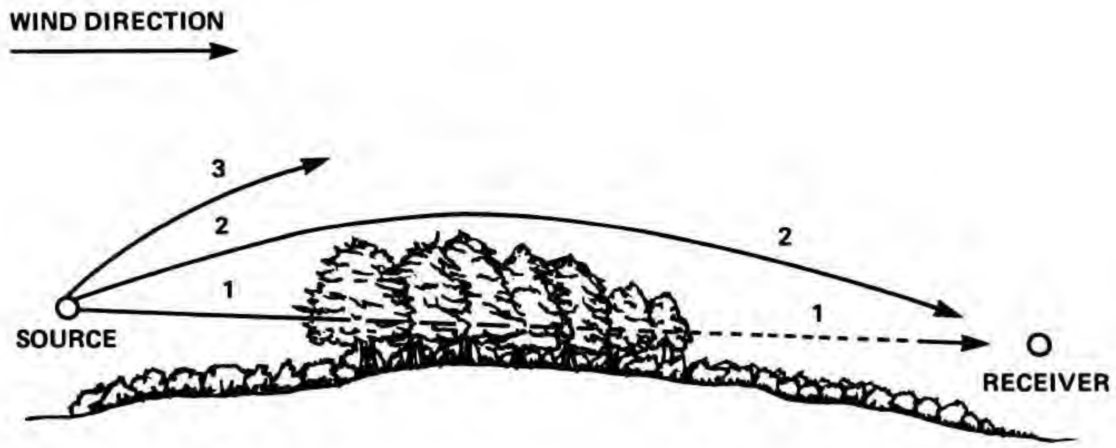
In general, at distances greater than 50 feet from a point source, every doubling of the distance between the source and the receiver produces a 6 dB reduction in sound level at the receptor. However, for heavy roadway traffic, which can be approximated as a line source, sound levels typically decrease by approximately 3 dB every time the distance between the road and the receptor is doubled due to the cylindrical spreading of the waves. In either case the actual reduction in sound levels over the distance is dependent on the characteristics of the source itself (e.g., frequency, directionality, etc.) and the conditions over which the sound travels (e.g., barriers, topography, groundcover, etc.).

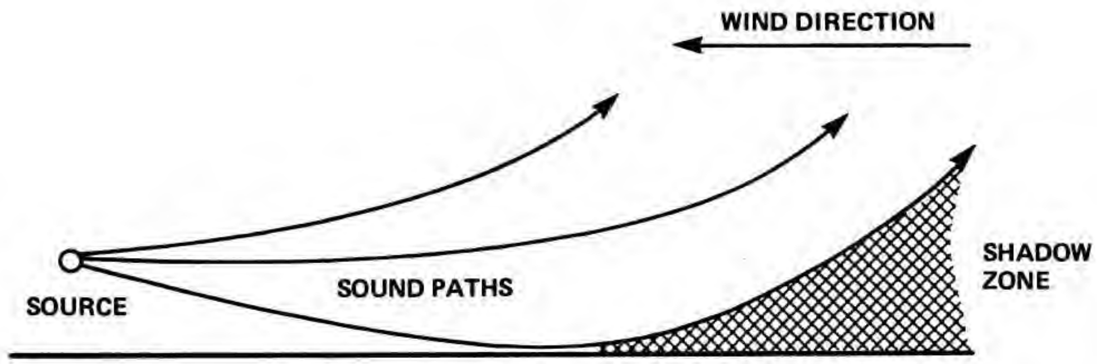
Atmospheric Effects

Wind and temperature variations can cause bending of sound waves and can influence changes in sound levels at large distances and help explain the variation that occurs in outdoor sound propagation and measurements.

A steady, smooth flow of wind, equal at all altitudes, would have no noticeable effect on sound transmission. In practice, however, wind speeds are generally higher above the ground than at the ground level, and the resulting wind speed gradients tend to "bend" sound waves over large distances. Sound traveling with the wind is bent down to earth, while sound traveling against the wind is bent upwards toward the sky.

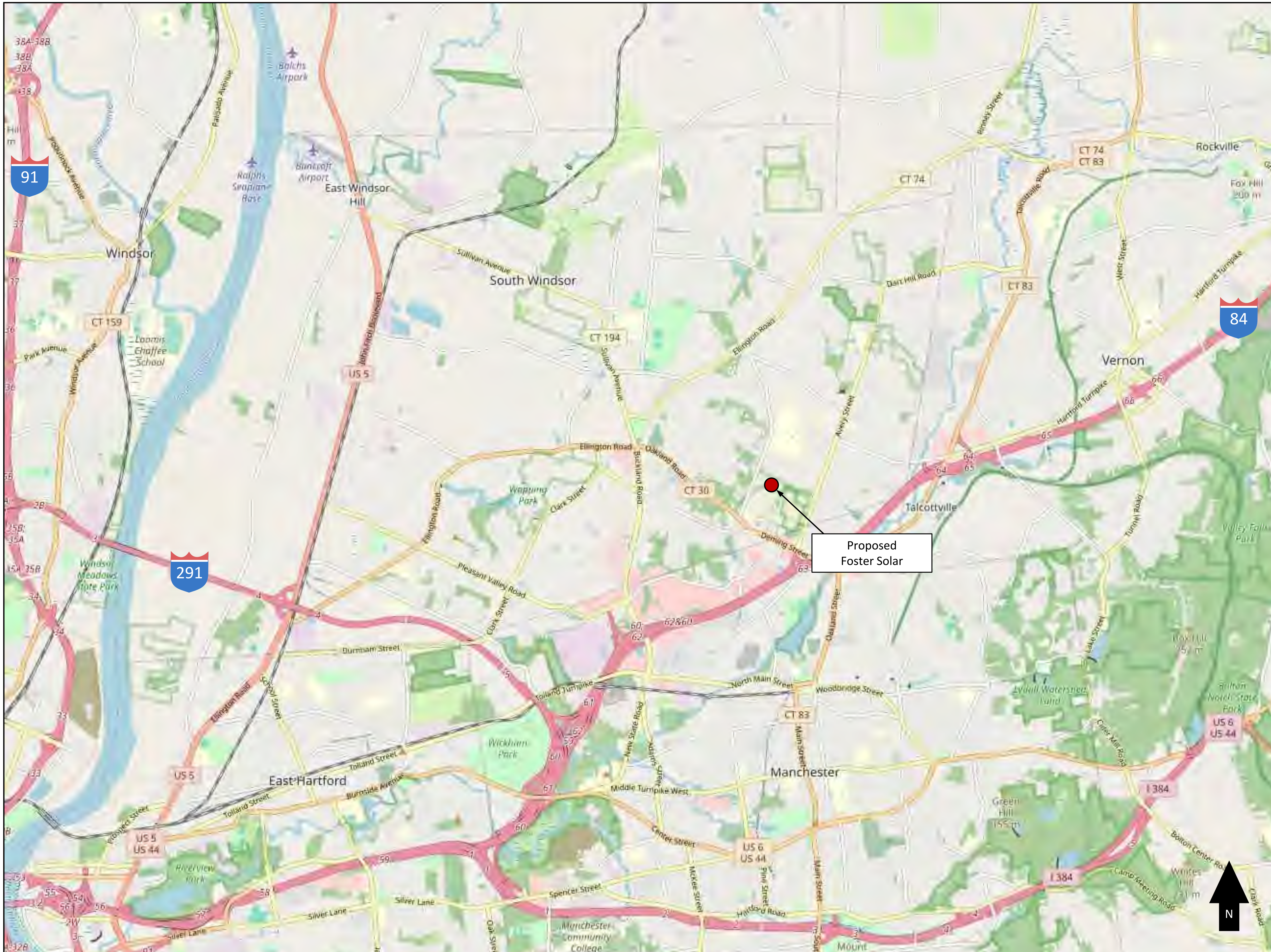
The figure below shows illustrates the influence wind can have on sound propagation:


WIND DIRECTION
3
2
2
1
1
SOURCE
RECEIVER


WIND DIRECTION
SOURCE
SOUND PATHS
SHADOW ZONE

Attachment B

Environmental & Community Noise Assessment Figures



WSP

WSP USA ENVIRONMENT & INFRASTRUCTURE, INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD, MA 01824

CLIENT:

CTEC SOLAR, LLC
1 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

PROJECT:

FOSTER SOLAR
186 FOSTER STREET
SOUTH WINDSOR, CT 06074

PROJECT NO:	3653230423
REVISION:	00
DRAWN BY:	ARR
CHECKED BY:	PGR
DATE:	12/20/2023

SCALE:

0 0.5 1.0

MILES

NOTES:

The Foster Solar facility is to be located on a 16.5-acre parcel of farmland bounded by single-family residential properties to the west, north, and east, and agricultural properties to the south-southeast.

The Site is located near the intersection of Foster Street and Orchard Hill Drive in South Windsor, CT.

This Site is located immediately to the north of the Foster Family Farm (i.e., 90 Foster Street), which operates as a historic traditional farm during the planting season and as corn maze attraction during the month of October. The Site is approximately 0.8 miles (1.25 km) away from interstate highway I-84, which is located to the southeast.

FIGURE TITLE:

SITE LOCUS MAP

FIGURE NUMBER:

1

WSP USA ENVIRONMENT & INFRASTRUCTURE, INC.
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PROJECT:

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186 FOSTER STREET
SOUTH WINDSOR, CT 06074

PROJECT NO:	3653230423
REVISION:	00
DRAWN BY:	ARR
CHECKED BY:	PGR
DATE:	12/20/2023

SCALE:

0 40 100

METERS

NOTES:

L_{90} = Residual (i.e., 90% Exceedance) Sound Pressure Level
dBA = A-Weighted Decibels

Existing ambient daytime sound level monitoring was conducted by Andy Roland (WSP):

- Thur., Dec. 7, 2023 (11:30 AM – 2:30 PM)

Sound levels were measured at each location for 30-minutes using a Casella model CEL-633C, Type1 octave band analyzer. Supplemental 10-minute sound level measurements were conducted at PL-1 and PL-3 after the initial monitoring was complete for use in evaluating the increase in sound levels attributable to a leaf blower, which operated at 281 Foster Street during the measurement session.

FIGURE TITLE:

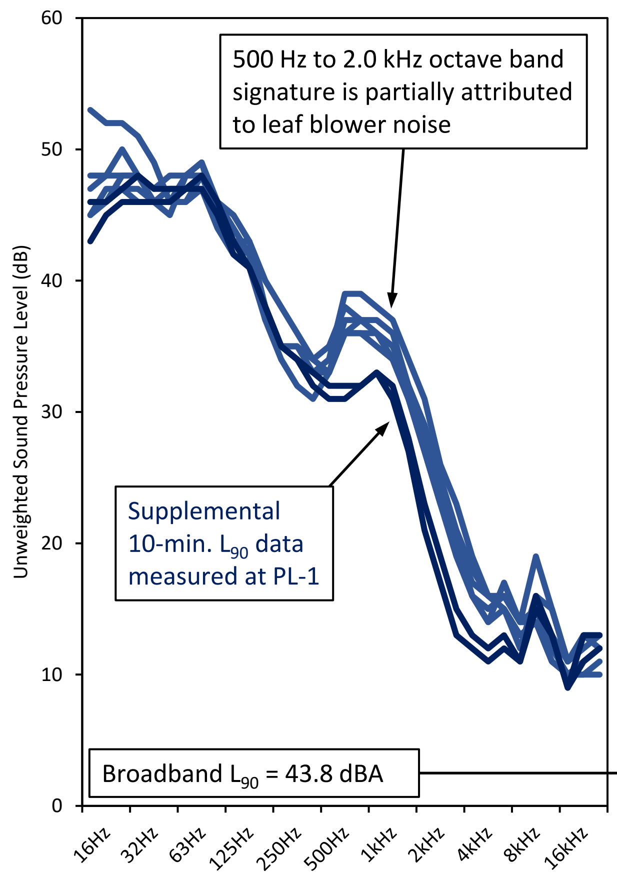
MONITORING LOCATIONS & DAYTIME RESULTS SUMMARY

FIGURE NUMBER:

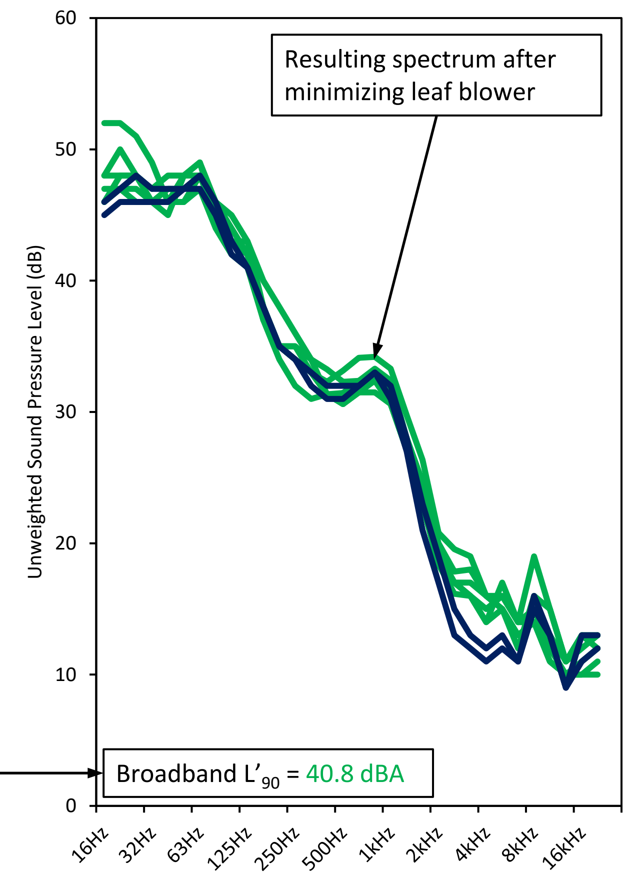
2

PL-1 – L_{90} Sound Level Adjustment (with and without leaf blower noise)

PL-1 - L_{90} 1/3 Octave Band Spectrum (unfiltered)

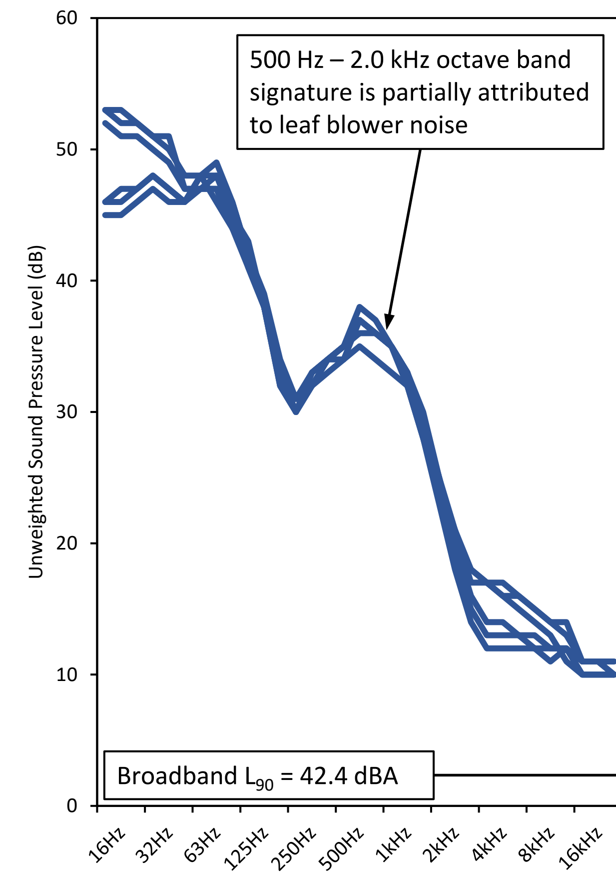


PL-1 - L_{90} 1/3 Octave Band Spectrum (filtered)

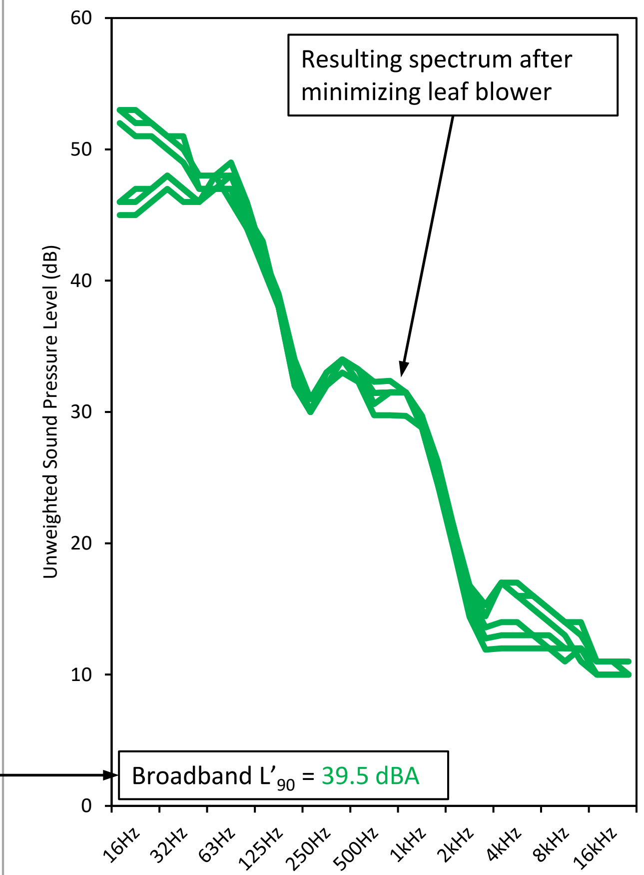


PL-2 – L_{90} Sound Level Adjustment (with and without leaf blower noise)

PL-2 - L_{90} 1/3 Octave Band Spectrum (unfiltered)

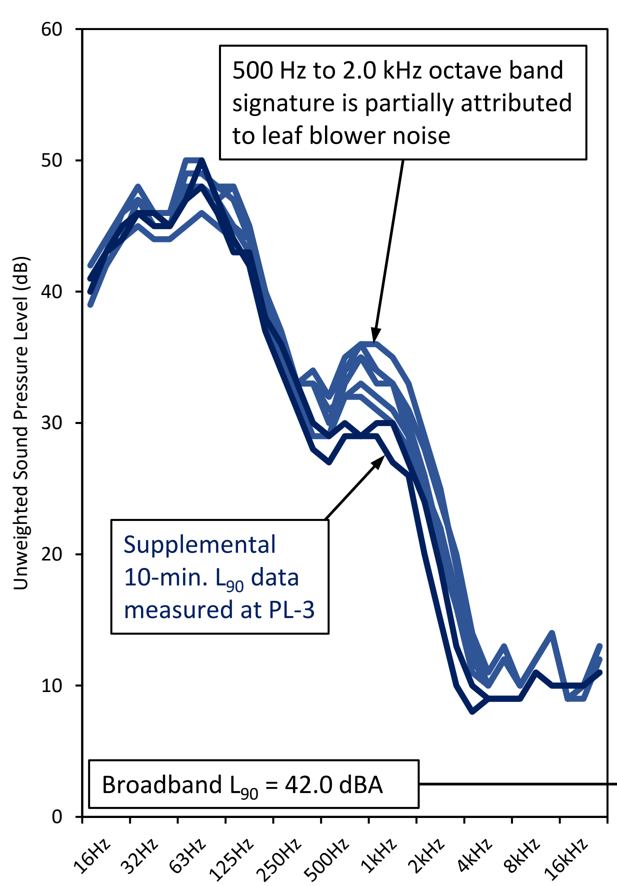


PL-2 - L_{90} 1/3 Octave Band Spectrum (filtered)

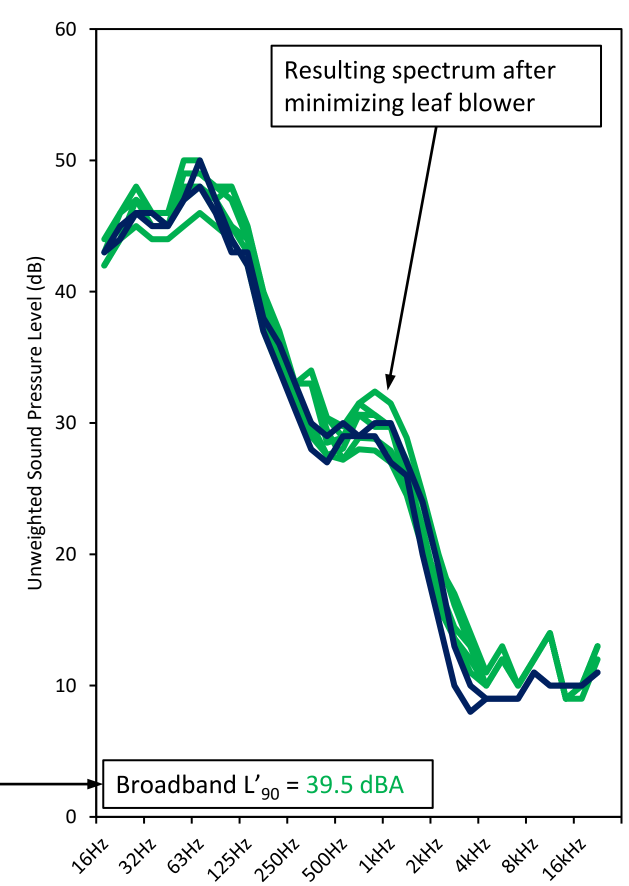


PL-3 – L_{90} Sound Level Adjustment (with and without leaf blower noise)

PL-3 - L_{90} 1/3 Octave Band Spectrum (unfiltered)



PL-3 - L_{90} 1/3 Octave Band Spectrum (filtered)

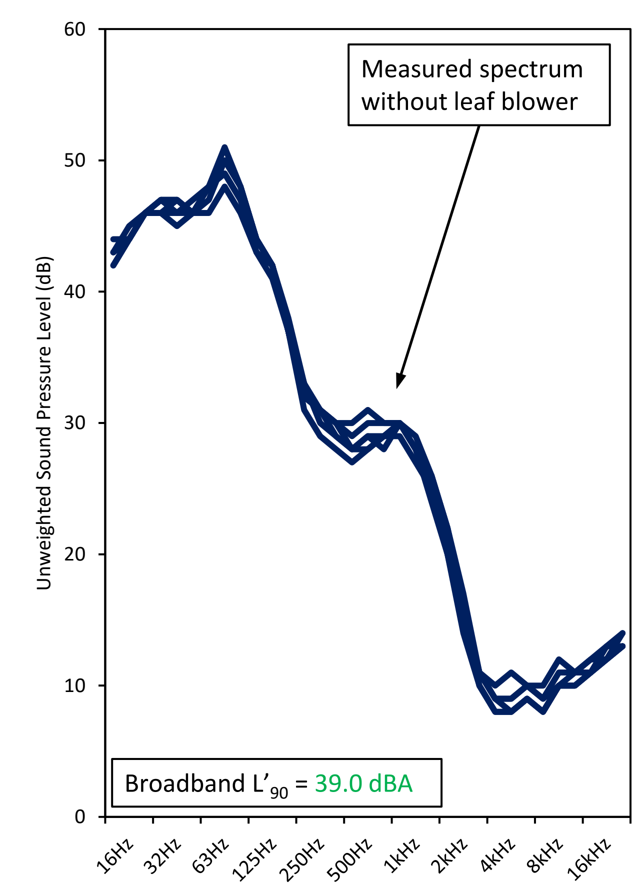


PL-4 – L_{90} Sound Level Adjustment (with and without leaf blower noise)

N/A
Leaf blower stopped operating prior to the start of PL-4 measurement.

No adjustment required.

PL-4 - L_{90} 1/3 Octave Band Spectrum (unfiltered)



WSP USA ENVIRONMENT & INFRASTRUCTURE, INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD, MA 01824

CLIENT:

CTEC SOLAR, LLC
1 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

PROJECT:

FOSTER SOLAR
186 FOSTER STREET
SOUTH WINDSOR, CT 06074

PROJECT NO:	3653230423
REVISION:	00
DRAWN BY:	ARR
CHECKED BY:	PGR
DATE:	12/20/2023

NOTES:

WSP performed a series of adjustments to the 1/3 octave band frequency spectrum results for PL-1, PL-2, and PL-3 to more accurately establish the existing daytime background sound levels at these locations with the noise from leaf blower, which operated at 281 Foster St. between 11:30 – 1:30.

Supplemental 10-minute sound level measurements were conducted at PL-1 and PL-3 after the initial monitoring was complete for use in evaluating the increase in sound levels attributable to a leaf blower.

The charts present the pre-adjustment and post-adjustment sound level results with the leaf blower noise minimized.

Broadband sound level results recomputed using standard formula:

L_p [dBA] = 10 · log10(∑10(L_x+Adj_x)/10)

where: Lp = broadband sound pressure level in A-weighted decibels (dBA), Lx = sound pressure level at 1/3 octave band (x) in un-weighted decibels (dB), Adjx = 1/3 octave band (x) adjustment to A-weighting (±dB)

FIGURE TITLE:

MONITORING RESULTS
SPECTRUM ADJUSTMENT

FIGURE NUMBER:

3

WSP USA ENVIRONMENT & INFRASTRUCTURE, INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD, MA 01824

CLIENT:

CTEC SOLAR, LLC
1 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

PROJECT:

FOSTER SOLAR
186 FOSTER STREET
SOUTH WINDSOR, CT 06074

PROJECT NO:	3653230423
REVISION:	00
DRAWN BY:	ARR
CHECKED BY:	PGR
DATE:	12/20/2023

SCALE:

0 40 100

METERS

NOTES:

Removal of leaf blower noise from measurement data adjustment results as follows:

- PL-1 L90 changed from 43.8 to 40.8 dBA
- PL-2 L90 changed from 42.4 to 39.5 dBA
- PL-3 L90 changed from 42.0 to 39.5 dBA
- PL-4 L90 unchanged from 39.0 dBA.
- PL-4 was not adjusted, as the leaf blower stopped prior to the start of measurement.

Adjustment validated using the supplemental 10-minute sound level measurements which were conducted after the initial monitoring was complete. Analysis results in establishing a more conservative (i.e., lower) existing ambient daytime sound level for the Site.

FIGURE TITLE:

MONITORING LOCATIONS & DAYTIME ADJUSTED RESULTS SUMMARY

FIGURE NUMBER:

4

WSP USA ENVIRONMENT & INFRASTRUCTURE, INC.
100 APOLLO DRIVE, SUITE 302
CHELMSFORD, MA 01824

CLIENT:

CTEC SOLAR, LLC
1 GRIFFIN ROAD SOUTH
BLOOMFIELD, CT 06002

PROJECT:

FOSTER SOLAR
186 FOSTER STREET
SOUTH WINDSOR, CT 06074

PROJECT NO:	3653230423
REVISION:	00
DRAWN BY:	ARR
CHECKED BY:	PGR
DATE:	12/20/2023

SCALE:

0 40 100

METERS

CONTOUR LEVELS (dBA):

30	
35	
40	
45	
50	
55	◄ 55 dBA = Class A Limit
60	◄ 61 dBA = Class C Limit

NOTES:

SPL = Sound Pressure Level
dBA = A-Weighted Decibels

CT DEEP Noise Control Regulation (RCSA §22a-69) prohibits excessive daytime at property line that exceeds the following:

- Class C -to- Class A = 61 dBA
- Class A -to- Class A = 55 dBA

FIGURE TITLE:

SOUNDPLAN MODELING RESULTS SUMMARY

FIGURE NUMBER:

5

Attachment C

Sound Level Monitoring Field Notes and Results

WSP USA E&I, Inc.
Environmental Noise Monitoring Field Notes

Project Name:	CTEC - Foster Solar
Performed By:	A. Roland

LOCATION INFORMATION	
Location ID:	PL-1
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	11:37:00 AM
End Time:	12:07:00 PM

WEATHER CONDITIONS	
Temperature:	31 °F
Wind Speed:	0 - 3 mph
Direction:	W
Humidity:	62%
Sky Type:	Cloudy
Precipitation:	n/a

LOCATION SKETCH

GENERAL SOUND SOURCES (order by most prominent)	
1)	Leaf blower (approx. 1,100 ft. away @ 281 Foster St.)
2)	Natural sounds (e.g., birds, geese)
3)	Distant vehicle traffic on I-84
4)	Rustling leaves from light breeze (< 5 mph)
5)	Vehicles passing on Foster Street and Orchard Hill Drive

MONITORING NOTES / EVENTS	
Event Description:	Number of Instances, Start Time, End Time:
Airplane (high altitude)	11:43, 11:44-45, 11:51-52, 11:54
Airplane (propeller)	11:46, 11:58-59, 12:03
Backup alarm (distant)	11:17
Dog barking (distant)	11:53
Light breeze (~5 mph)	12:03

TRAFFIC COUNT (nearest roadway)

Foster St.	11:37 AM	11:39 AM	11:41 AM	11:43 AM	11:45 AM	11:47 AM	11:49 AM	11:51 AM	11:53 AM	11:55 AM
	1	7	3	3	9	5	2	3	5	3
	11:57 AM	11:59 AM	12:01 PM	12:03 PM	12:05 PM					
	7	5	5	5	5					
Orchard Hill Dr.	11:37 AM	11:39 AM	11:41 AM	11:43 AM	11:45 AM	11:47 AM	11:49 AM	11:51 AM	11:53 AM	11:55 AM
	1	2	2	5	4	2	2	1	1	1
	11:57 AM	11:59 AM	12:01 PM	12:03 PM	12:05 PM					
	2	2	2	2	3					

OTHER COMMENTS

Leaf blower audible (to varying degrees) throughout the monitoring period. Additional 10-minute measurement collected at this location to allow for leaf blower sound signature to be subtracted from ambient result.

Comparison between the two (2) measurements show that 500 Hz - 2 kHz octave bands affected most noticably.

Location ambient background value established as lowest (i.e., minimum) 10-minute L90 value recorded during the second session (i.e., PL-1 L90 = 40.6 dBA)

Environmental Noise Monitoring Data Sheet

Project Name:	CTEC - Foster Solar
Project No:	3653230423

MEASUREMENT INFORMATION	
Location ID:	PL-1
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	11:37:00 AM
End Time:	12:07:00 PM

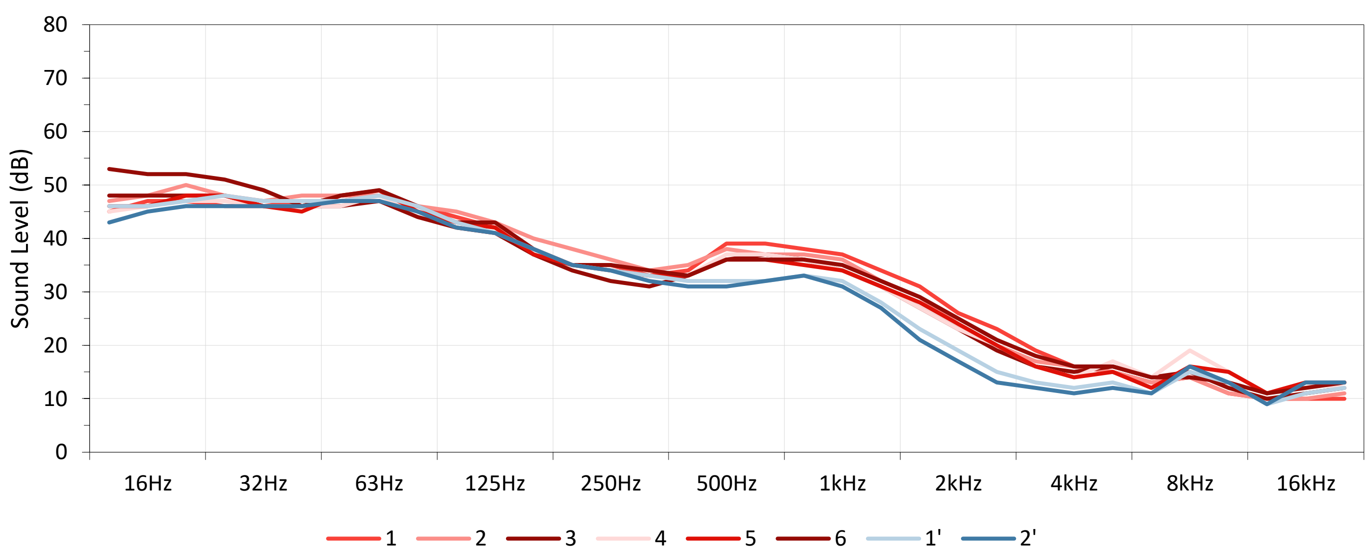
MONITOR PHOTO

SUMMARY INFORMATION	
Duration:	00:30:00
Response:	Random
Overload:	FALSE
Cal. (Before):	11:36:42 AM
Cal. (After):	12:11:26 PM
Cal. Drift:	0.4

RESULTS SUMMARY

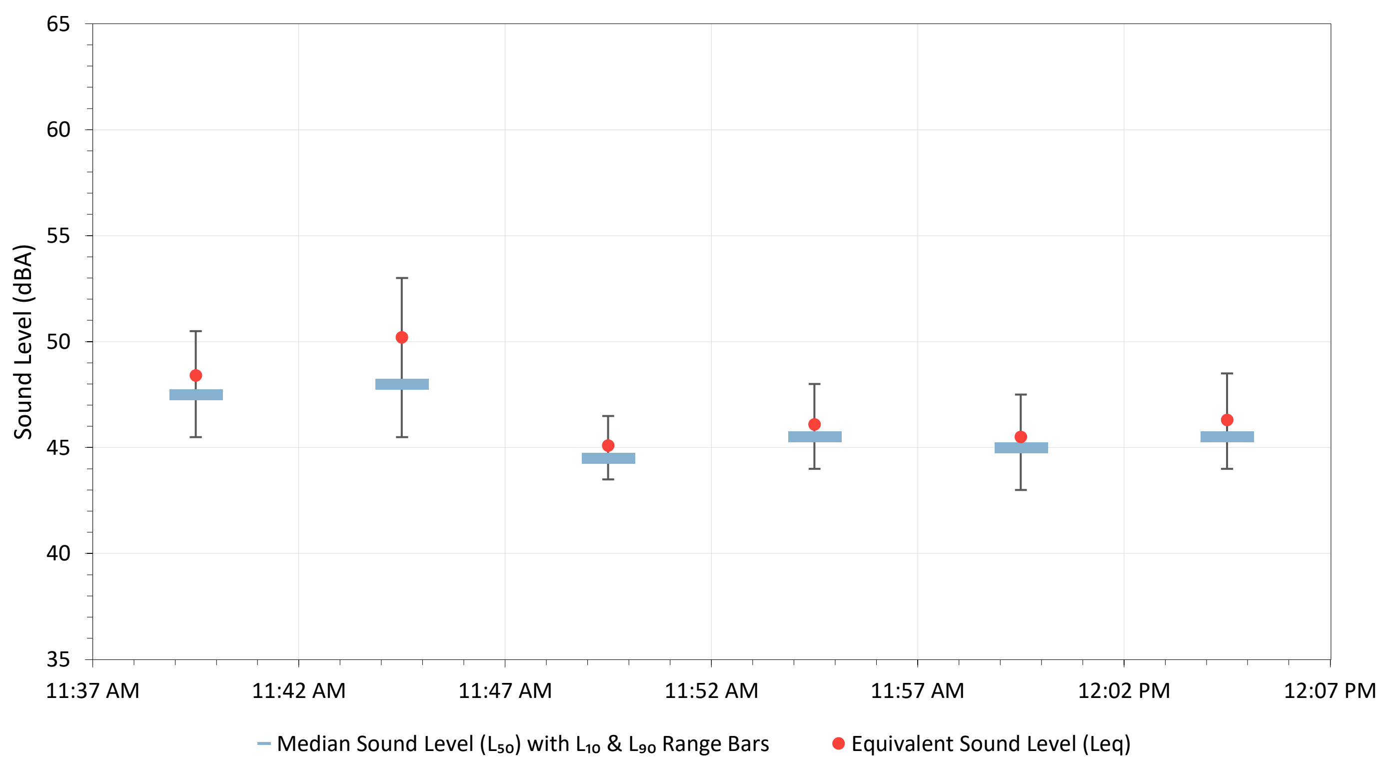
		Cumulative Results			
		L_{eq}	L_{10}	L_{50}	L_{90}
Octave Band SPL (dB)	32 Hz:	62.8	65.8	57.4	51.9
	63 Hz:	57.3	60.1	55.5	51.8
	125 Hz:	54.1	55.1	50.1	46.5
	250 Hz:	48.9	48.2	43.0	39.1
	500 Hz:	44.4	46.3	43.5	40.9
	1 kHz:	42.3	44.2	41.5	39.5
	2 kHz:	35.0	37.2	33.2	30.3
	4 kHz:	31.8	31.3	24.3	20.8
	8 kHz:	25.8	27.5	21.3	18.8
Broadband (dBA):		**47.3**	**49.7**	**45.9**	**43.8**

PL-1 / Daytime, Pre-Construction LZ90,1/3 OCTAVE BAND SOUND LEVEL SUMMARY

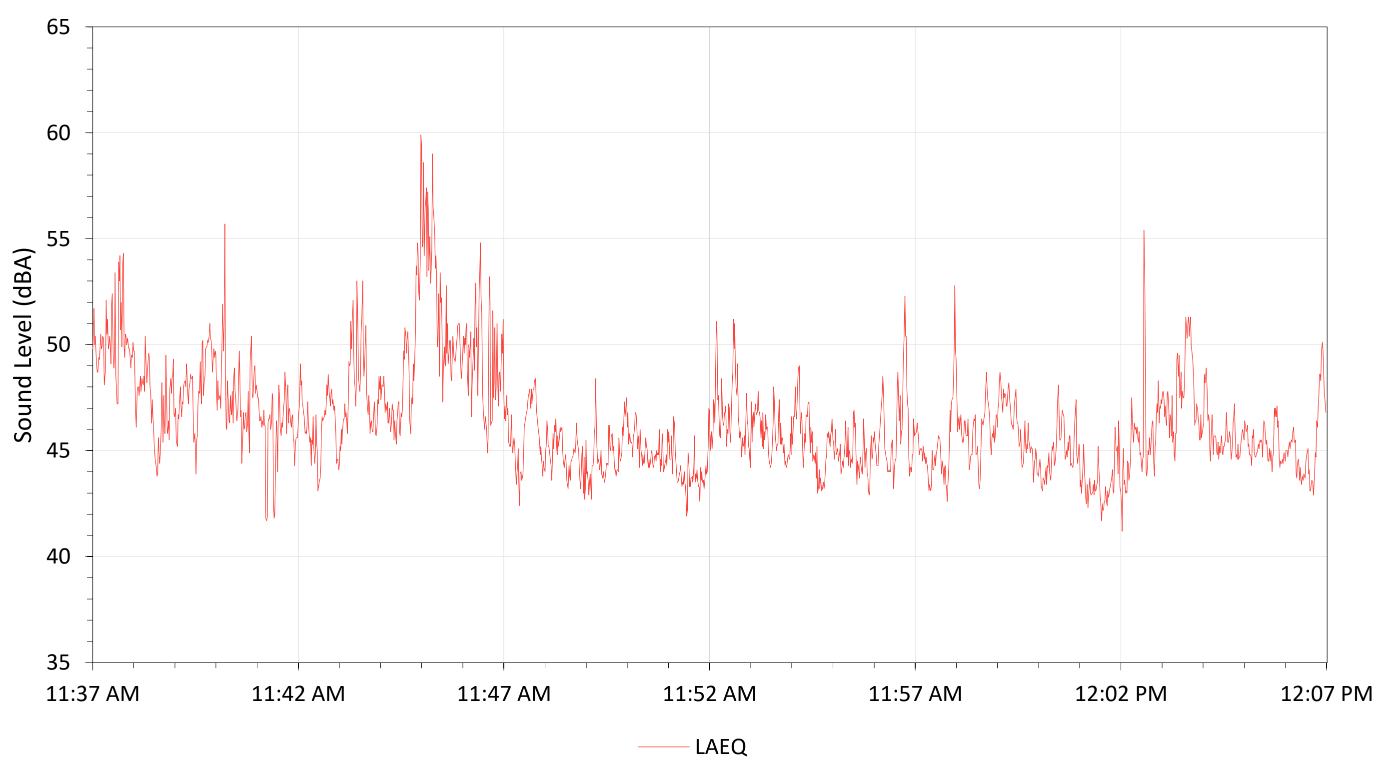


Environmental Noise Monitoring Summary Charts

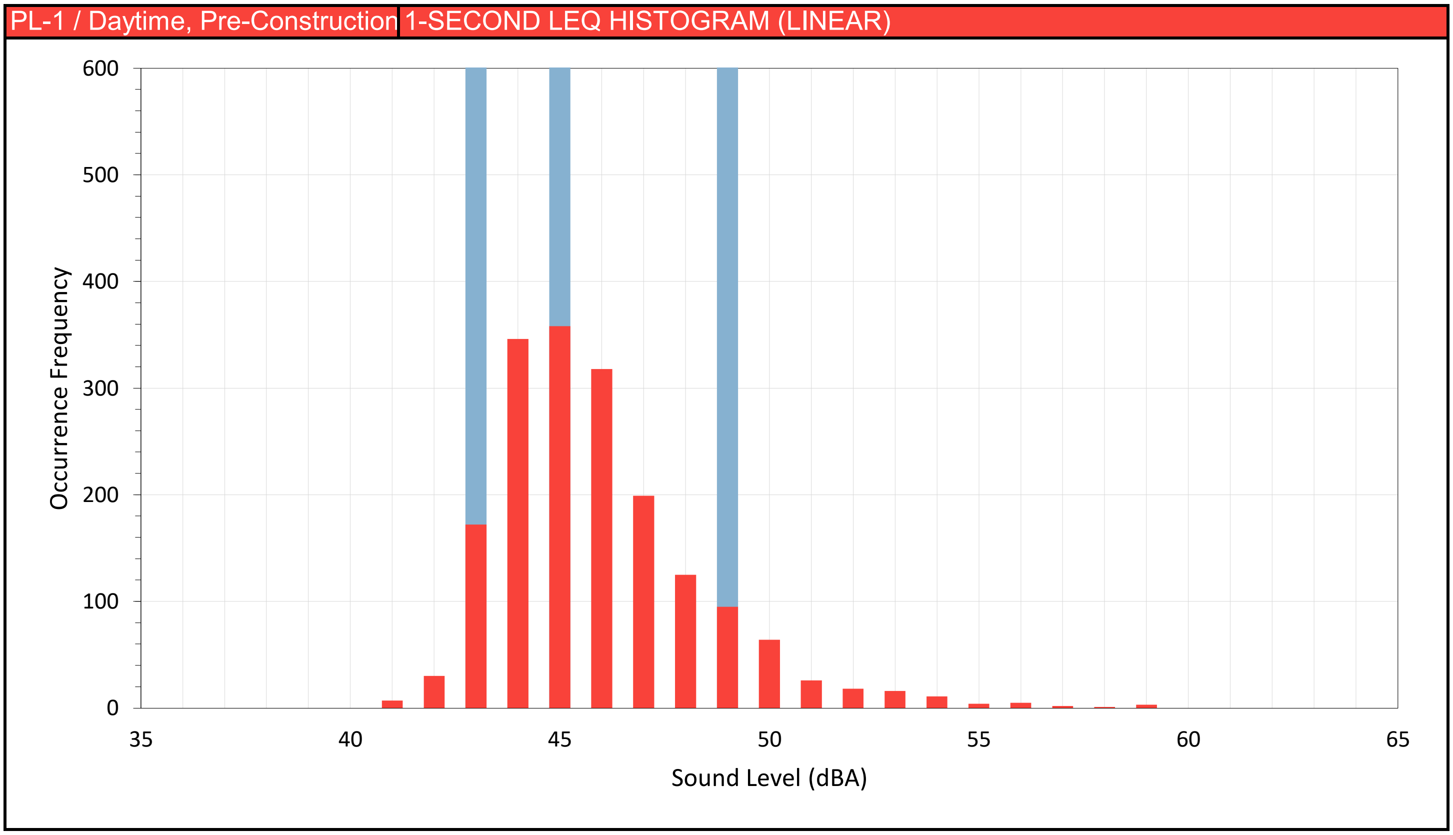
PL-1 / Daytime, Pre-Construction BROADBAND SOUND LEVEL 5-MINUTE PERIOD SUMMARY

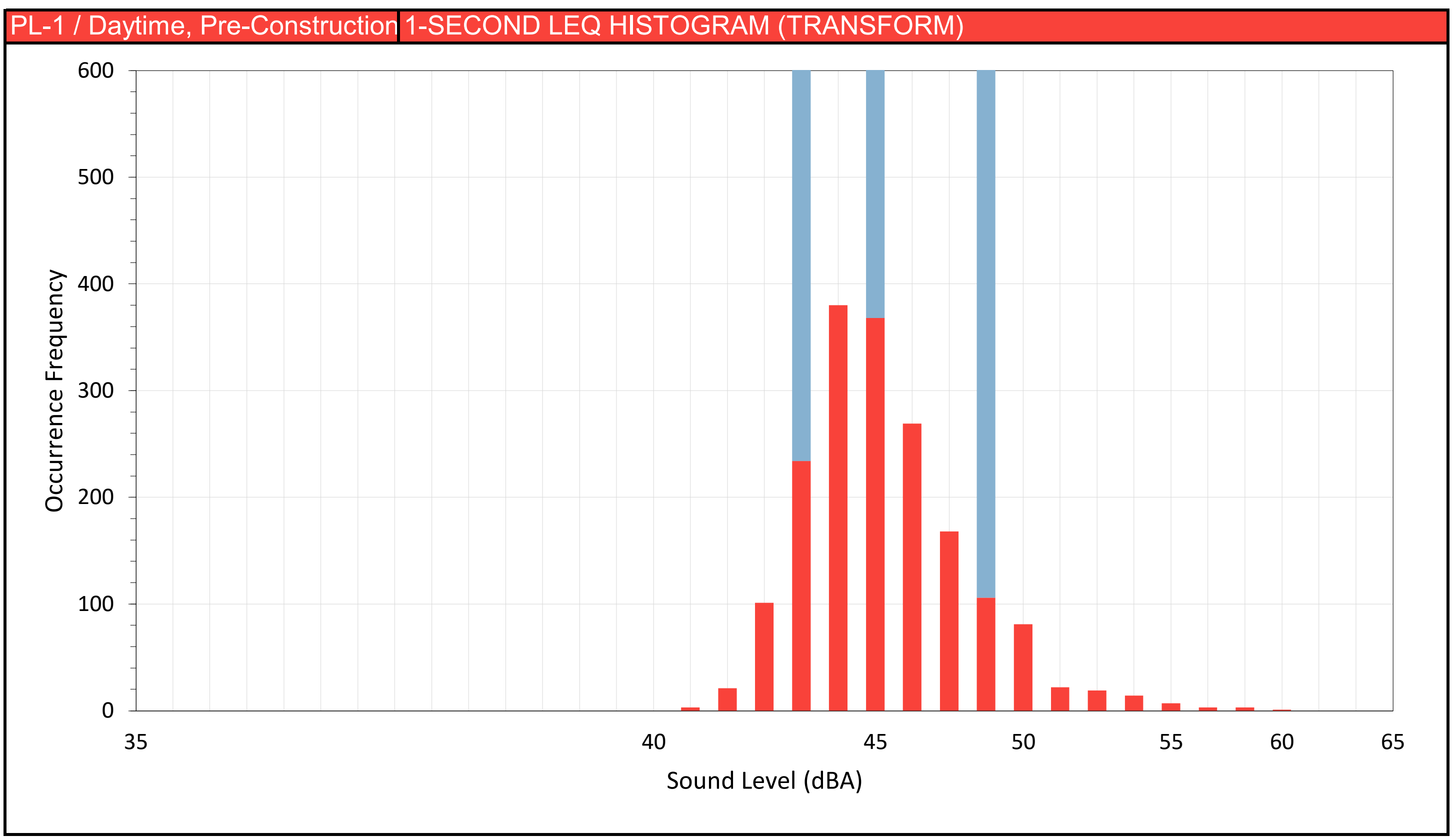


PL-1 / Daytime, Pre-Construction BROADBAND SOUND LEVEL 1-SECOND PERIOD SUMMARY



Environmental Noise Monitoring Distribution Charts





WSP USA E&I, Inc.
Environmental Noise Monitoring Field Notes

Project Name:	CTEC - Foster Solar
Performed By:	A. Roland

LOCATION INFORMATION	
Location ID:	PL-1
Description:	Daytime, Supplemental
Date:	Thu. Dec 7, 2023
Start Time:	2:21:01 PM
End Time:	2:31:01 PM

WEATHER CONDITIONS	
Temperature:	31 °F
Wind Speed:	0 mph
Direction:	n/a
Humidity:	60%
Sky Type:	Cloudy
Precipitation:	n/a

LOCATION SKETCH

GENERAL SOUND SOURCES (order by most prominent)	
1)	Natural sounds (e.g., birds, geese)
2)	Distant vehicle traffic on I-84
3)	Vehicles passing on Foster Street and Orchard Hill Drive
4)	
5)	

MONITORING NOTES / EVENTS	
Event Description:	Number of Instances, Start Time, End Time:
Airplane (high altitude)	2:21, 2:22-23, 2:25
Airplane (propeller)	2:28-29

TRAFFIC COUNT (nearest roadway)

	2:21 PM	2:22 PM	2:23 PM	2:24 PM	2:25 PM	2:26 PM	2:27 PM	2:28 PM	2:29 PM	2:30 PM
Foster St.	6	3	3	2	2	5	1	3	3	3

	2:21 PM	2:22 PM	2:23 PM	2:24 PM	2:25 PM	2:26 PM	2:27 PM	2:28 PM	2:29 PM	2:30 PM
Orchard Hill Dr.	2	2	1	1	1	1	1	3	2	3

OTHER COMMENTS

Additional 10-minute measurement collected at this location to allow for leaf blower sound signature to be subtracted from ambient result.

Environmental Noise Monitoring Data Sheet

Project Name:	CTEC - Foster Solar
Project No:	3653230423

MEASUREMENT INFORMATION	
Location ID:	PL-1
Description:	Daytime, Supplemental
Date:	Thu. Dec 7, 2023
Start Time:	2:21:01 PM
End Time:	2:31:01 PM

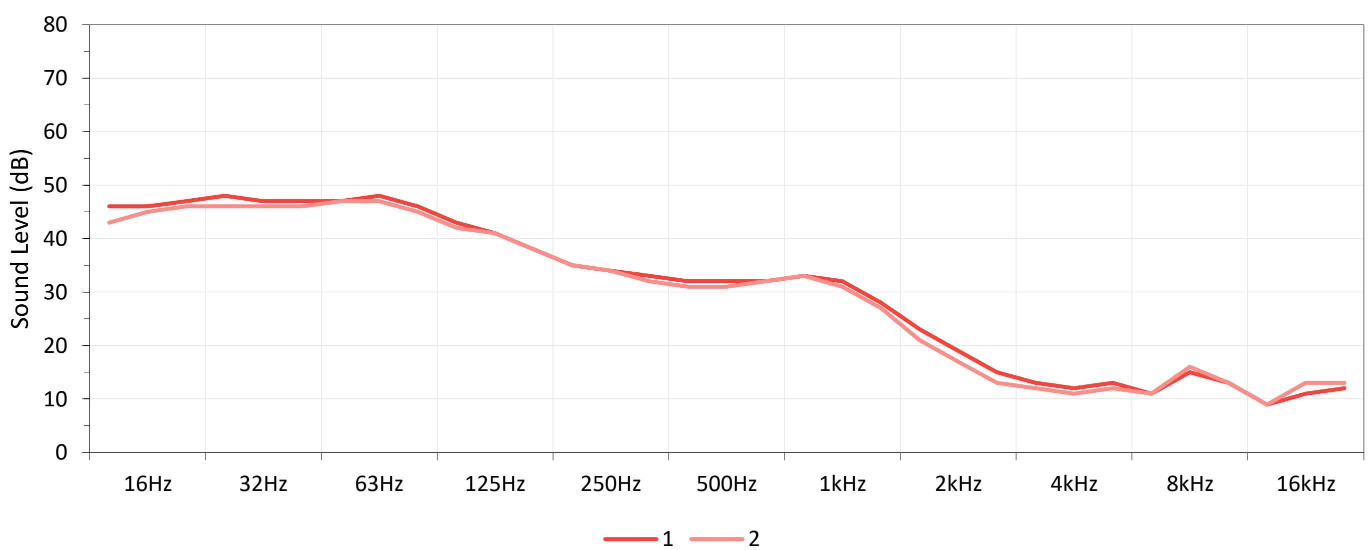
SUMMARY INFORMATION	
Duration:	00:10:00
Response:	Random
Overload:	FALSE
Cal. (Before):	2:18:47 PM
Cal. (After):	2:31:30 PM
Cal. Drift:	0.1

MONITOR PHOTO

RESULTS SUMMARY

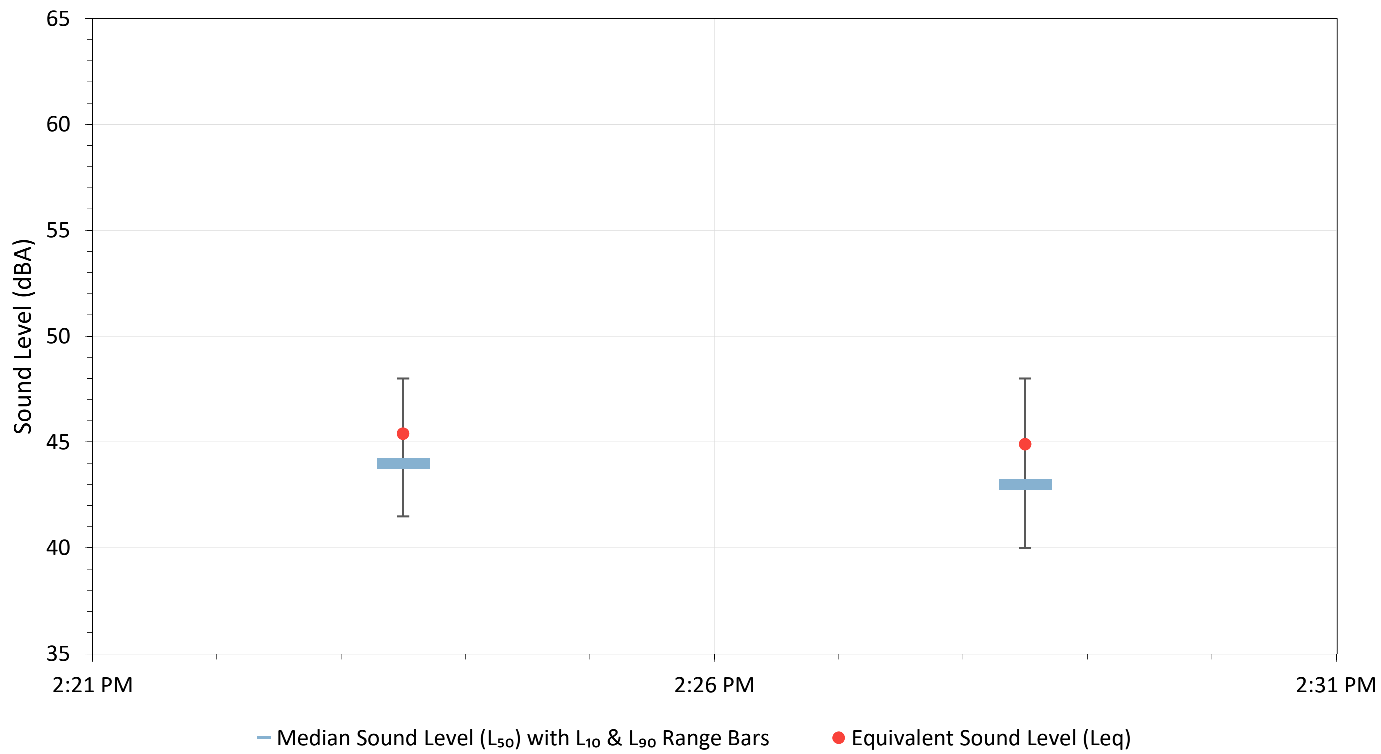
		Cumulative Results			
		L_{eq}	L_{10}	L_{50}	L_{90}
Octave Band SPL (dB)	32 Hz:	52.4	59.9	55.5	51.5
	63 Hz:	50.9	58.3	54.7	51.5
	125 Hz:	45.7	52.7	48.2	45.7
	250 Hz:	44.4	52.5	42.4	38.7
	500 Hz:	36.3	43.9	39.2	36.5
	1 kHz:	35.7	43.6	39.0	36.0
	2 kHz:	28.4	37.2	30.1	23.9
	4 kHz:	18.5	25.7	20.0	17.0
	8 kHz:	15.9	21.4	19.3	18.3
Broadband (dBA):		**40.4**	**48.2**	**43.6**	**40.6**

PL-1 / Daytime, Supplemental LZ90,1/3 OCTAVE BAND SOUND LEVEL SUMMARY

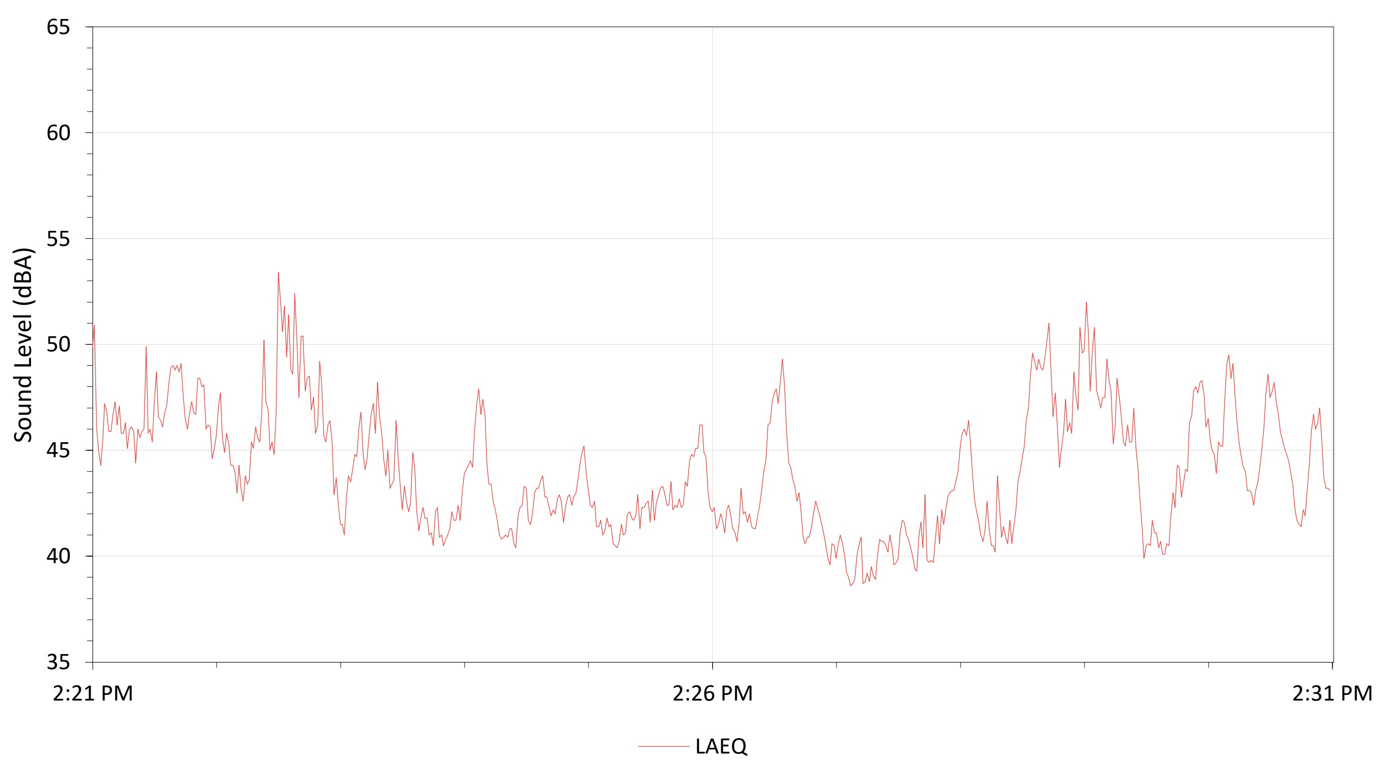


Environmental Noise Monitoring Summary Charts

PL-1 / Daytime, Supplemental	BROADBAND SOUND LEVEL 5-MINUTE PERIOD SUMMARY

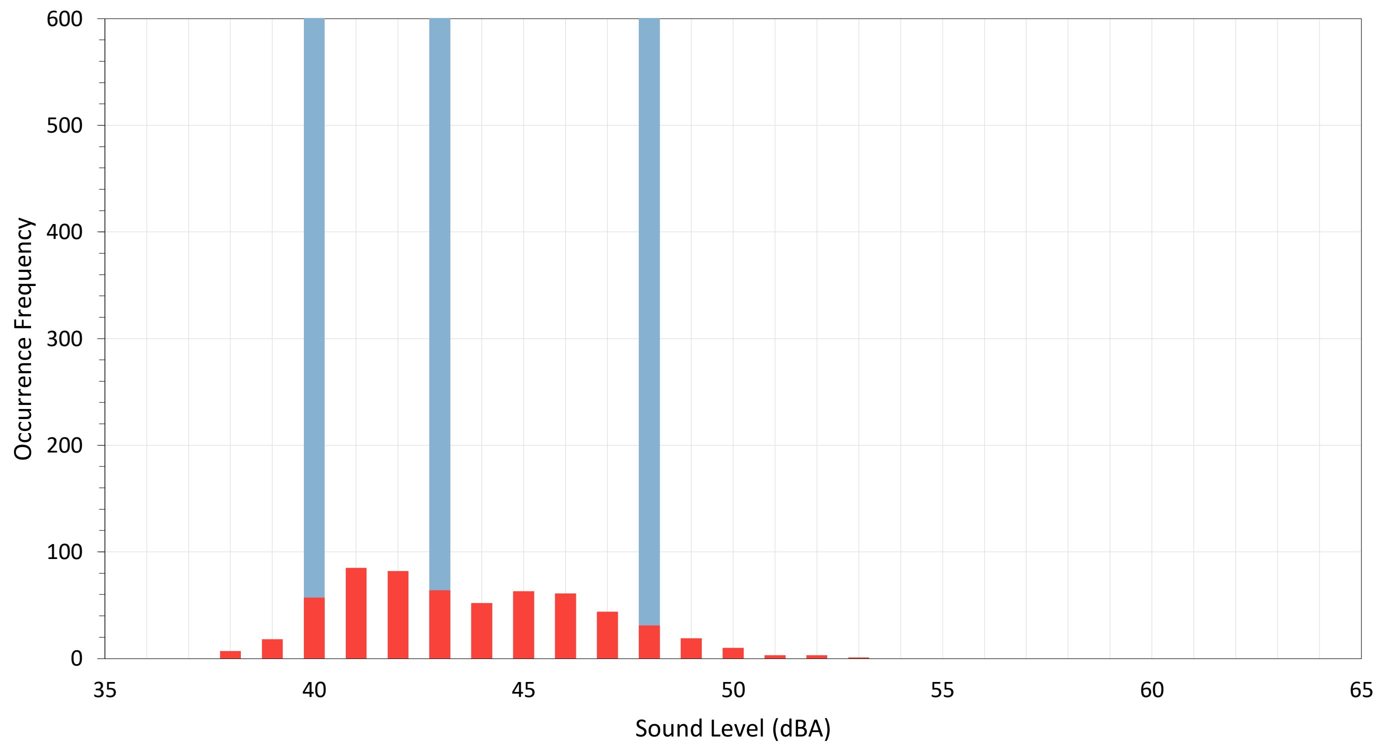


PL-1 / Daytime, Supplemental	BROADBAND SOUND LEVEL 1-SECOND PERIOD SUMMARY

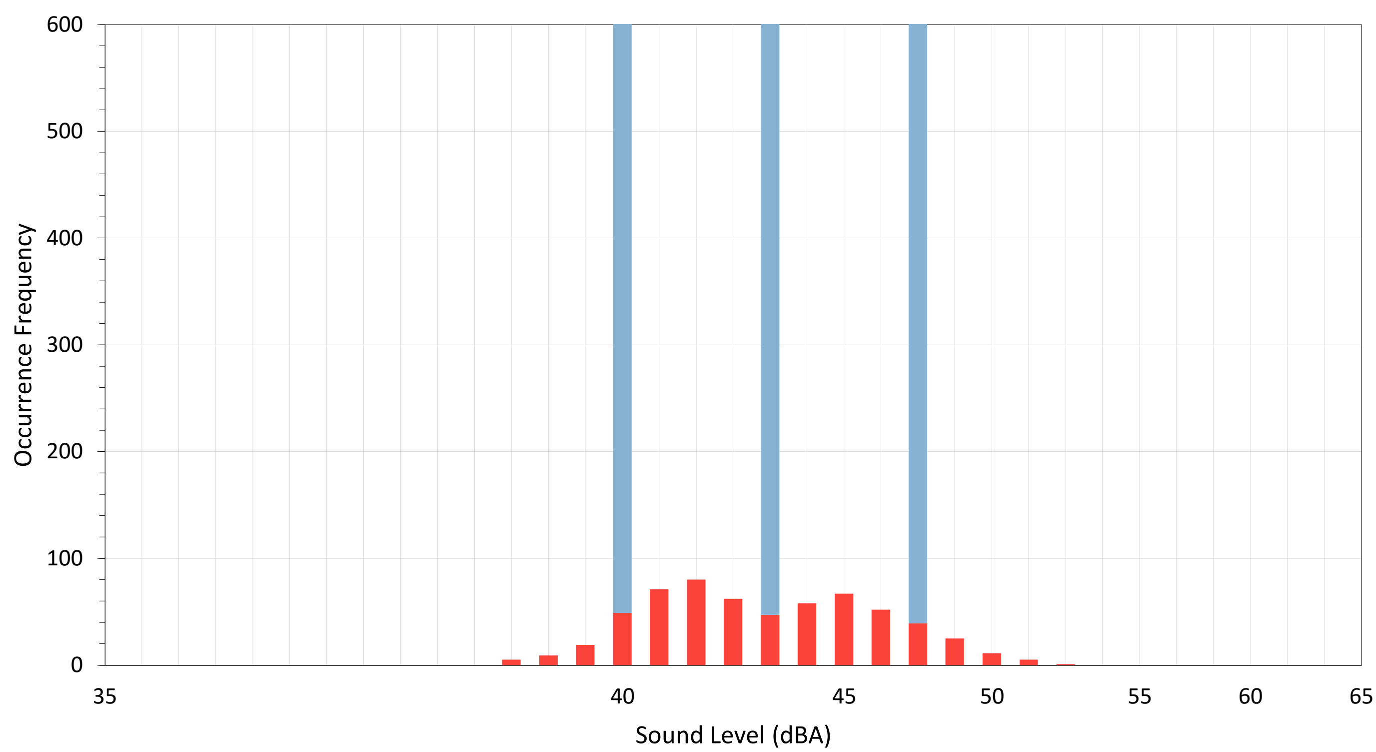


Environmental Noise Monitoring Distribution Charts

PL-1 / Daytime, Supplemental | 1-SECOND LEQ HISTOGRAM (LINEAR)



PL-1 / Daytime, Supplemental | 1-SECOND LEQ HISTOGRAM (TRANSFORM)



WSP USA E&I, Inc.
Environmental Noise Monitoring Field Notes

Project Name:	CTEC - Foster Solar
Performed By:	A. Roland

LOCATION INFORMATION	
Location ID:	PL-2
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	12:12:01 PM
End Time:	12:42:01 PM

WEATHER CONDITIONS	
Temperature:	29 °F
Wind Speed:	0 - 3 mph
Direction:	W
Humidity:	62%
Sky Type:	Cloudy
Precipitation:	n/a

LOCATION SKETCH

GENERAL SOUND SOURCES (order by most prominent)	
1)	Natural sounds (e.g., birds, geese)
2)	Distant vehicle traffic on I-84
3)	Leaf blower (approx. 1,500 ft. away @ 281 Foster St.) (well screened by terrain)
4)	Rustling leaves from light breeze (< 5 mph)
5)	Vehicles passing on Orchard Hill Drive

MONITORING NOTES / EVENTS	
Event Description:	Number of Instances, Start Time, End Time:
Breeze (~5 mph)	12:18-12:21, 12:25-12:26

TRAFFIC COUNT (nearest roadway)

Orchard Hill Dr.	12:12 PM	12:14 PM	12:16 PM	12:18 PM	12:20 PM	12:22 PM	12:24 PM	12:26 PM	12:28 PM	12:30 PM
	2	2	1	2	1	2	1	1	2	1
	12:32 PM	12:34 PM	12:36 PM	12:38 PM	12:40 PM					
	4	2	3	4	2					

OTHER COMMENTS

Leaf blower must less audible throughout the monitoring period at this location. More effective terrain screening at this location.
Nevertheless, the 500 Hz - 2 kHz octave bands appear affected. Adjustments to be made.

Environmental Noise Monitoring Data Sheet

Project Name:	CTEC - Foster Solar
Project No:	3653230423

MEASUREMENT INFORMATION	
Location ID:	PL-2
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	12:12:01 PM
End Time:	12:42:01 PM

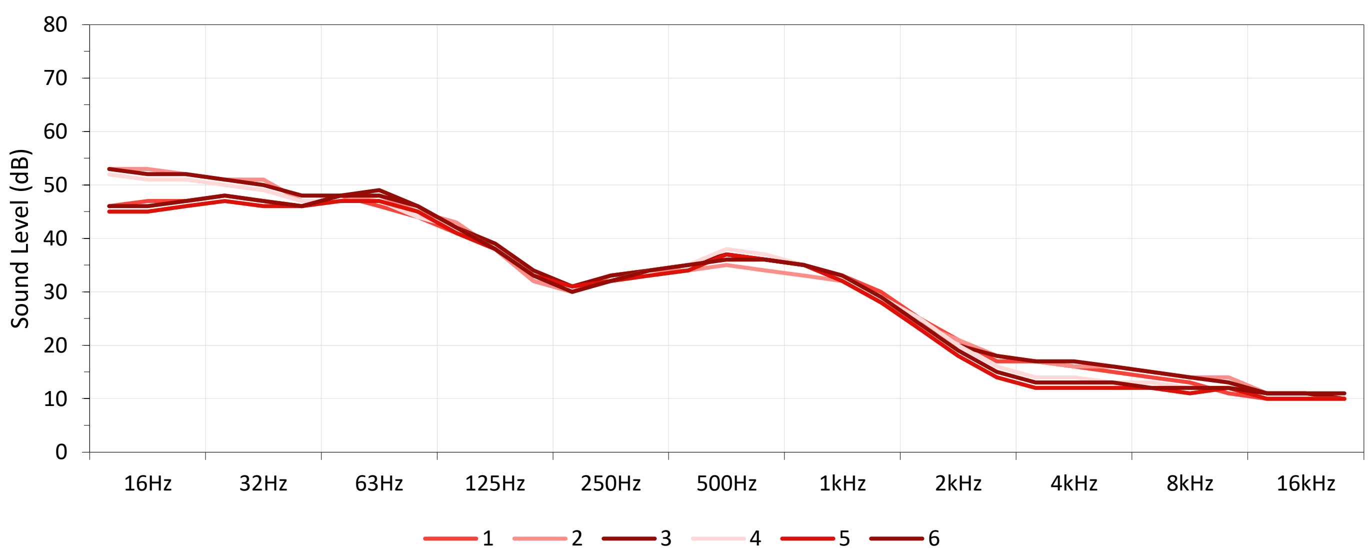
MONITOR PHOTO

SUMMARY INFORMATION	
Duration:	00:30:00
Response:	Random
Overload:	FALSE
Cal. (Before):	12:11:26 PM
Cal. (After):	12:42:32 PM
Cal. Drift:	-0.1

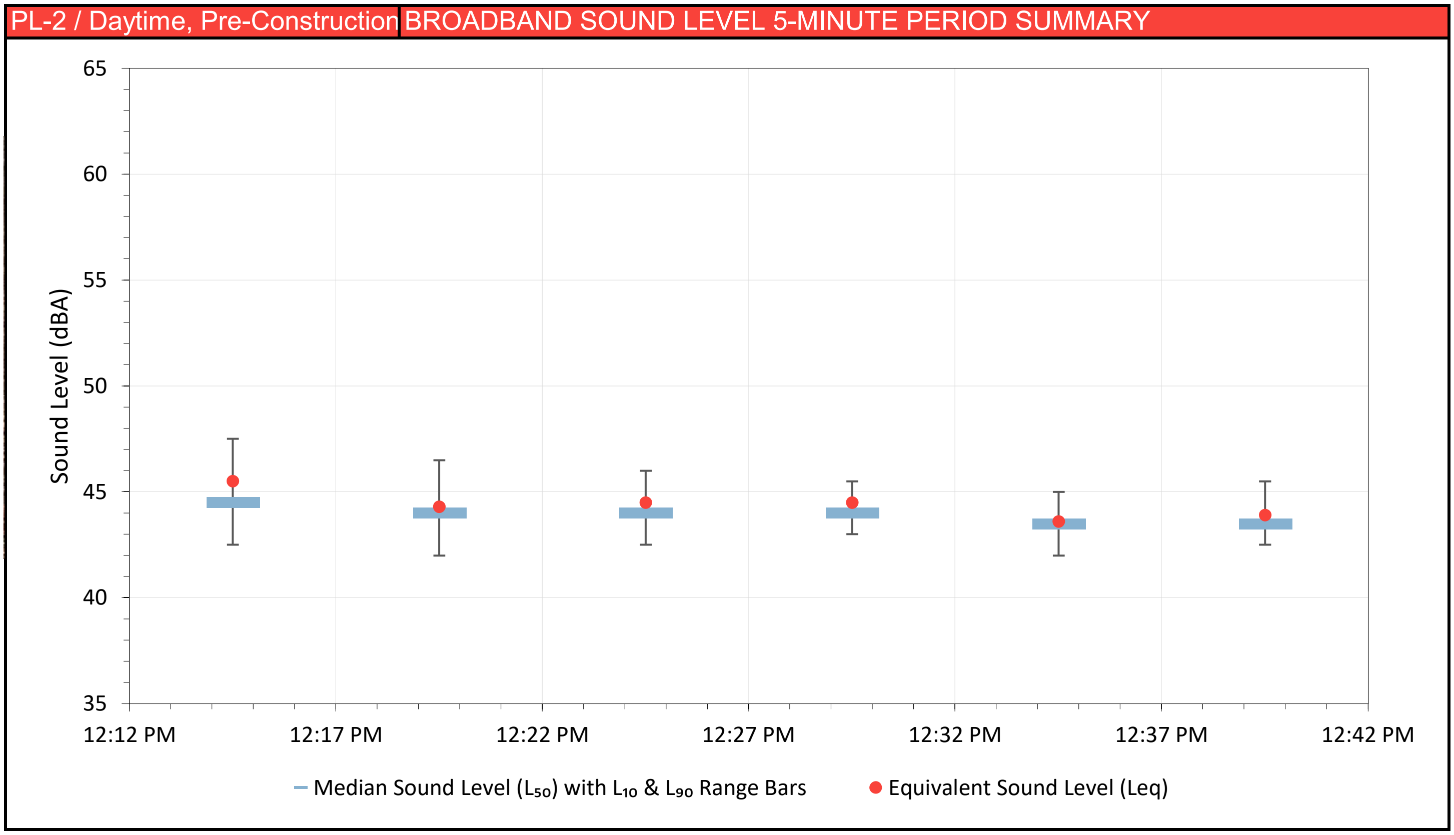
RESULTS SUMMARY

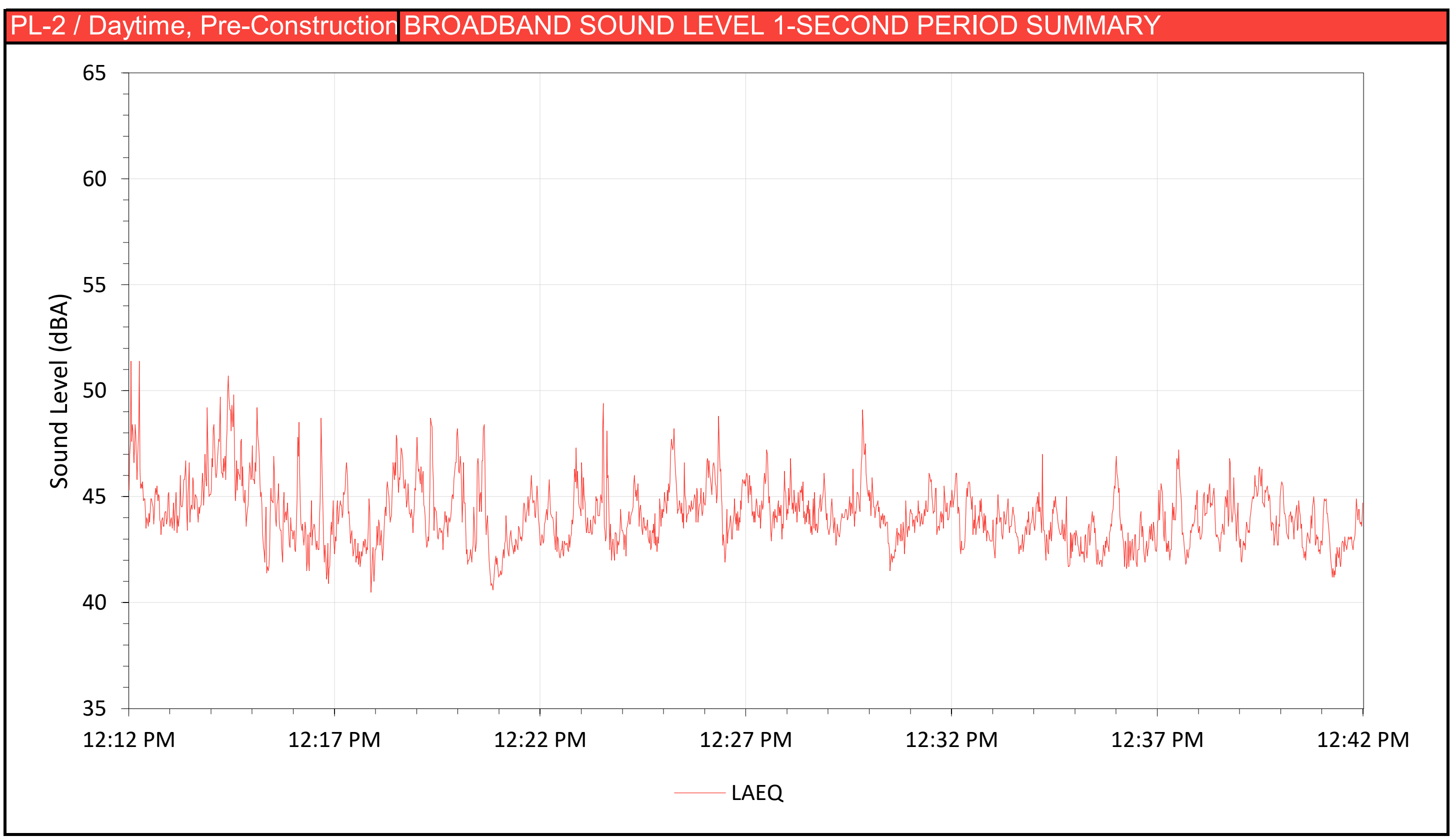
		Cumulative Results			
		L_{eq}	L_{10}	L_{50}	L_{90}
Octave Band SPL (dB)	32 Hz:	64.1	66.6	58.7	53.0
	63 Hz:	57.5	60.1	55.1	51.6
	125 Hz:	48.7	50.8	46.7	43.8
	250 Hz:	40.8	42.8	39.3	37.2
	500 Hz:	43.2	45.2	42.6	40.6
	1 kHz:	39.8	41.8	39.2	37.4
	2 kHz:	31.8	34.3	29.3	26.2
	4 kHz:	27.8	29.6	23.3	19.4
	8 kHz:	25.8	27.5	20.3	17.7
Broadband (dBA):		**44.4**	**46.0**	**44.0**	**42.4**

PL-2 / Daytime, Pre-Construction LZ90,1/3 OCTAVE BAND SOUND LEVEL SUMMARY



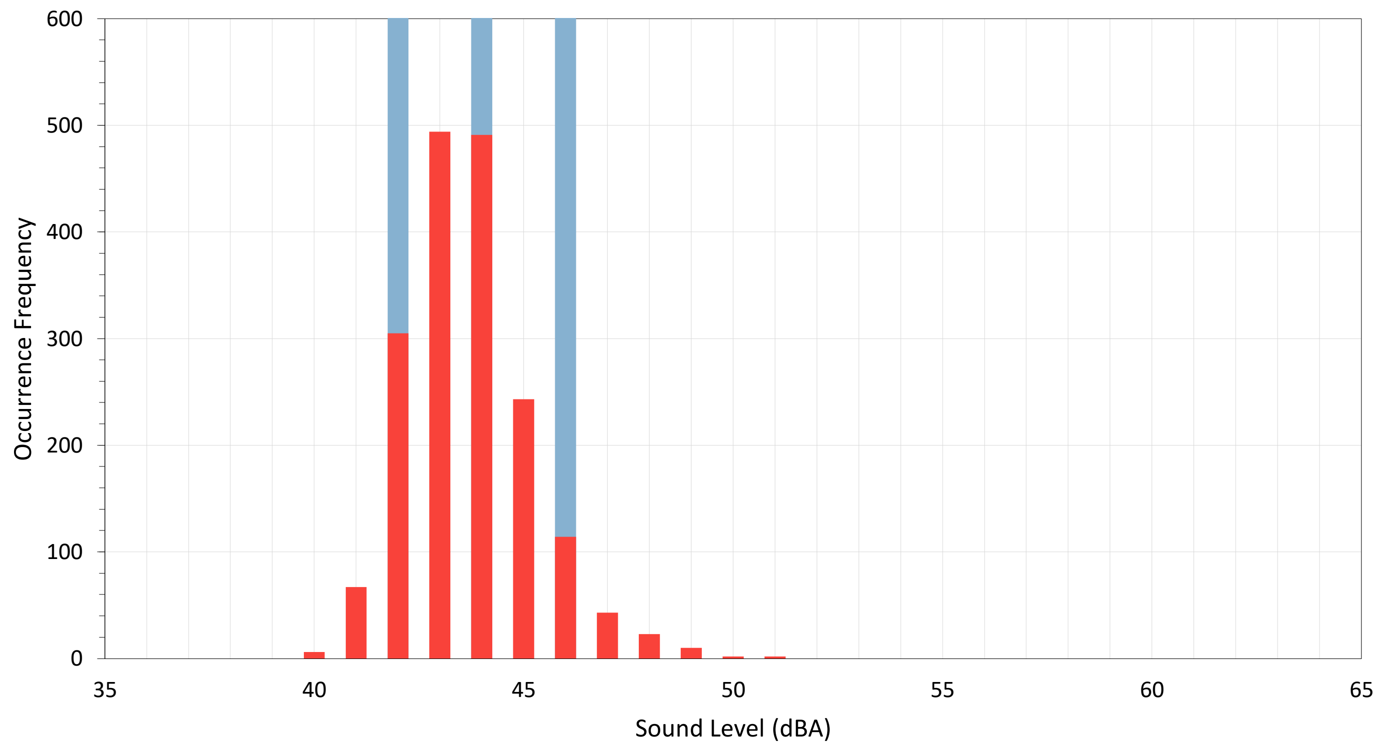
Environmental Noise Monitoring Summary Charts



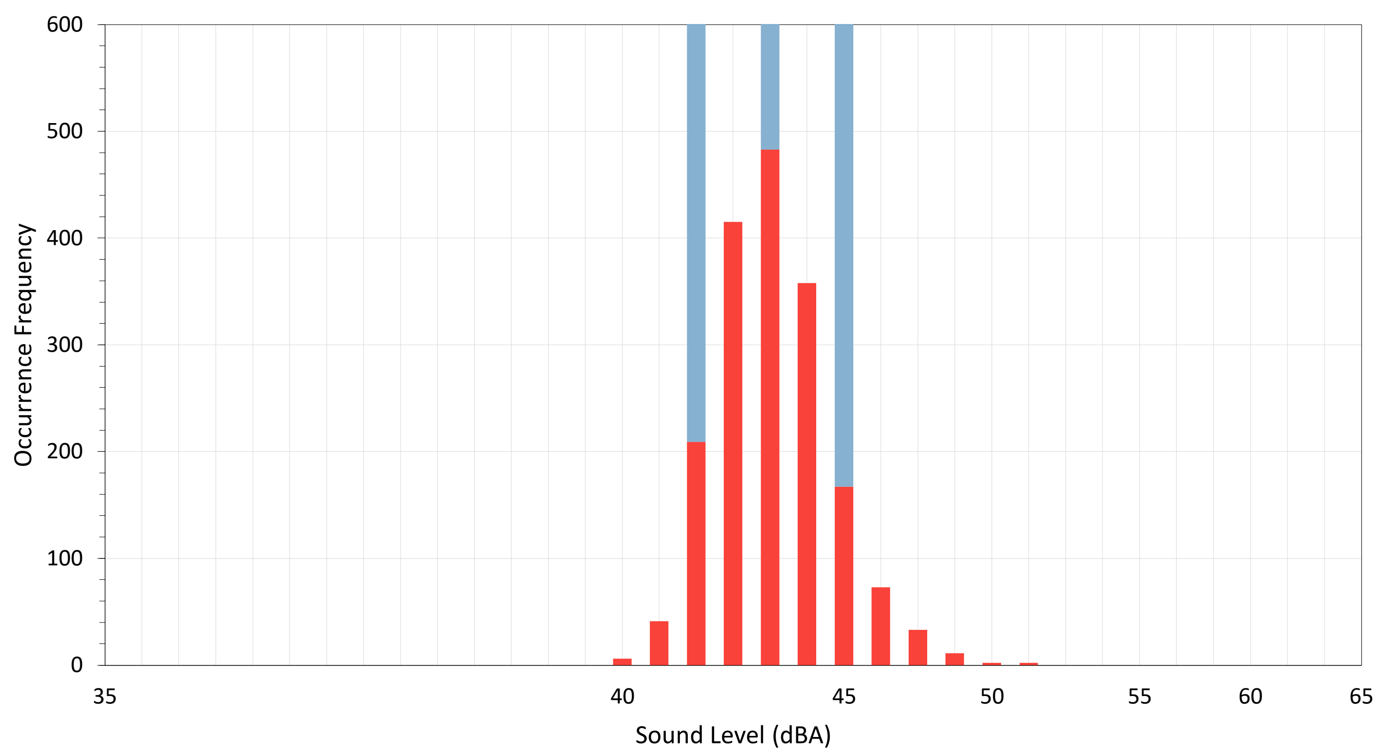


Environmental Noise Monitoring Distribution Charts

PL-2 / Daytime, Pre-Construction | 1-SECOND LEQ HISTOGRAM (LINEAR)



PL-2 / Daytime, Pre-Construction | 1-SECOND LEQ HISTOGRAM (TRANSFORM)



WSP USA E&I, Inc.
Environmental Noise Monitoring Field Notes

Project Name:	CTEC - Foster Solar
Performed By:	A. Roland

LOCATION INFORMATION	
Location ID:	PL-3
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	12:48:01 PM
End Time:	1:18:01 PM

WEATHER CONDITIONS	
Temperature:	31 °F
Wind Speed:	0 - 3 mph
Direction:	W
Humidity:	63%
Sky Type:	Cloudy
Precipitation:	n/a

LOCATION SKETCH

GENERAL SOUND SOURCES (order by most prominent)	
1)	Leaf blower (approx. 1,200 ft. away @ 281 Foster St.)
2)	Natural sounds (e.g., birds, geese)
3)	Distant vehicle traffic on I-84
4)	Vehicles passing on Foster Street
5)	

MONITORING NOTES / EVENTS	
Event Description:	Number of Instances, Start Time, End Time:
Airplane (high altitude)	12:51, 12:55, 1:02-03, 1:05
Trash Pickup	1:08-09
Airplane (propeller)	1:15-16

TRAFFIC COUNT (nearest roadway)

Foster St.	12:48 PM	12:50 PM	12:52 PM	12:54 PM	12:56 PM	12:58 PM	1:00 PM	1:02 PM	1:04 PM	1:06 PM
	4	15	5	5	5	6	5	3	7	8
	1:08 PM	1:10 PM	1:12 PM	1:14 PM	1:16 PM					
	5	5	9	7	8					

OTHER COMMENTS

Leaf blower audible (to varying degrees) throughout the monitoring period. Additional 10-minute measurement collected at this location to allow for leaf blower sound signature to be subtracted from ambient result.

Comparison between the two (2) measurements show that 500 Hz - 2 kHz octave bands primarily effected.

Location ambient background value established as lowest (i.e., minimum) 10-minute L90 value recorded during the second session (i.e., PL-3 L90 = 39.4 dBA)

Environmental Noise Monitoring Data Sheet

Project Name:	CTEC - Foster Solar
Project No:	3653230423

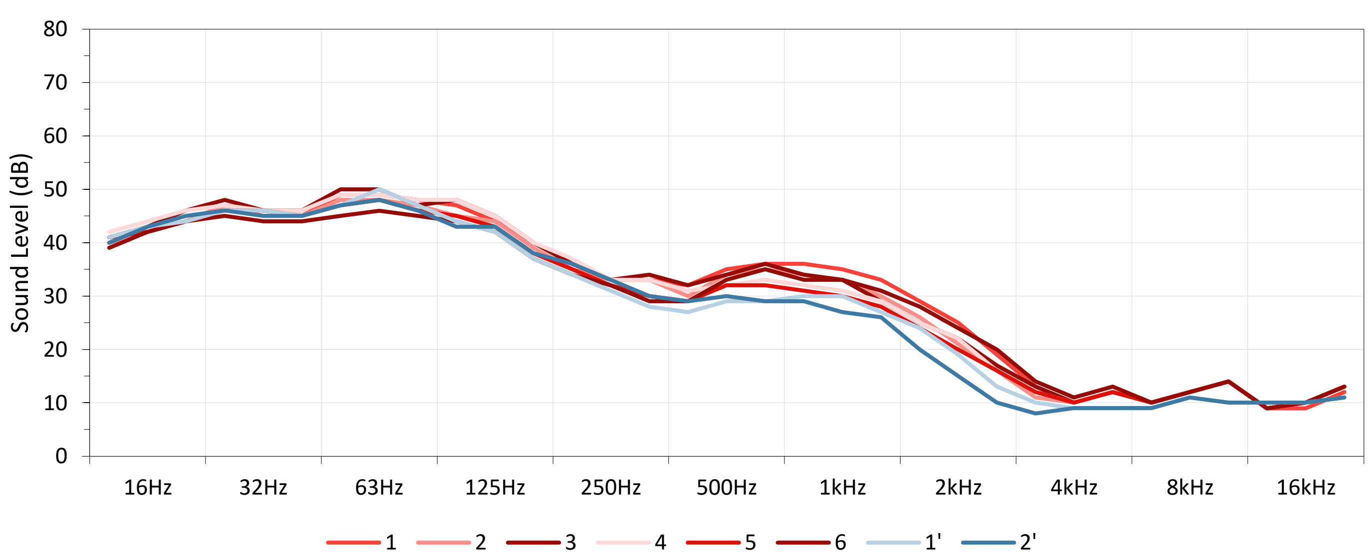
MEASUREMENT INFORMATION	
Location ID:	PL-3
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	12:48:01 PM
End Time:	1:18:01 PM

SUMMARY INFORMATION	
Duration:	00:30:00
Response:	Random
Overload:	FALSE
Cal. (Before):	12:47:36 PM
Cal. (After):	1:18:34 PM
Cal. Drift:	0.0

MONITOR PHOTO

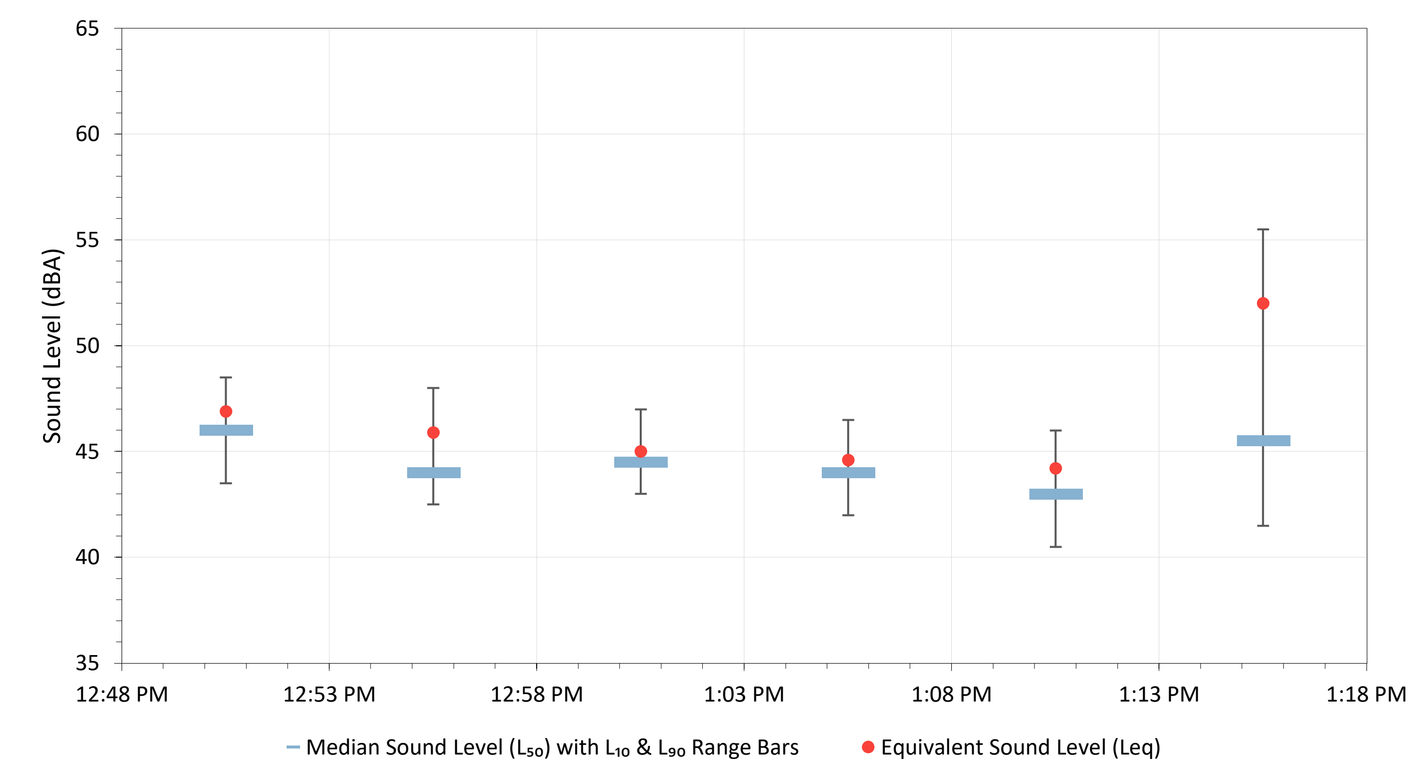
RESULTS SUMMARY					
		Cumulative Results			
		L_{eq}	L_{10}	L_{50}	L_{90}
Octave Band SPL (dB)	32 Hz:	55.7	58.4	54.5	50.6
	63 Hz:	58.4	60.2	55.9	52.6
	125 Hz:	56.8	57.8	52.7	48.7
	250 Hz:	49.0	48.2	42.0	38.5
	500 Hz:	45.1	46.1	41.3	37.9
	1 kHz:	41.3	43.1	39.9	36.9
	2 kHz:	33.8	36.0	31.8	28.1
	4 kHz:	24.1	23.2	18.9	16.5
	8 kHz:	19.4	18.2	17.4	17.1
Broadband (dBA):		**47.4**	**48.1**	**44.6**	**42.0**

PL-3 / Daytime, Pre-Construction LZ90,1/3 OCTAVE BAND SOUND LEVEL SUMMARY

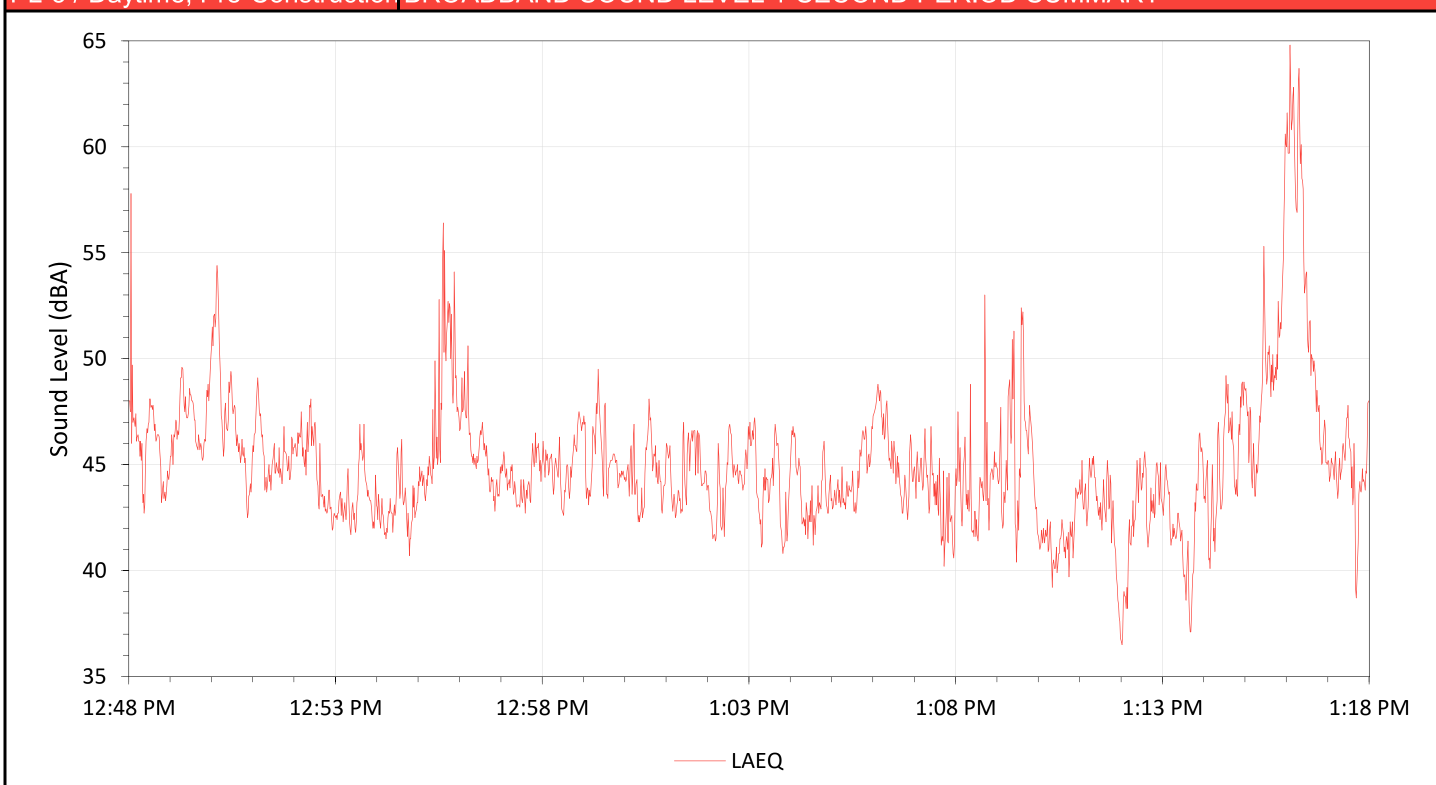


Environmental Noise Monitoring Summary Charts

PL-3 / Daytime, Pre-Construction BROADBAND SOUND LEVEL 5-MINUTE PERIOD SUMMARY

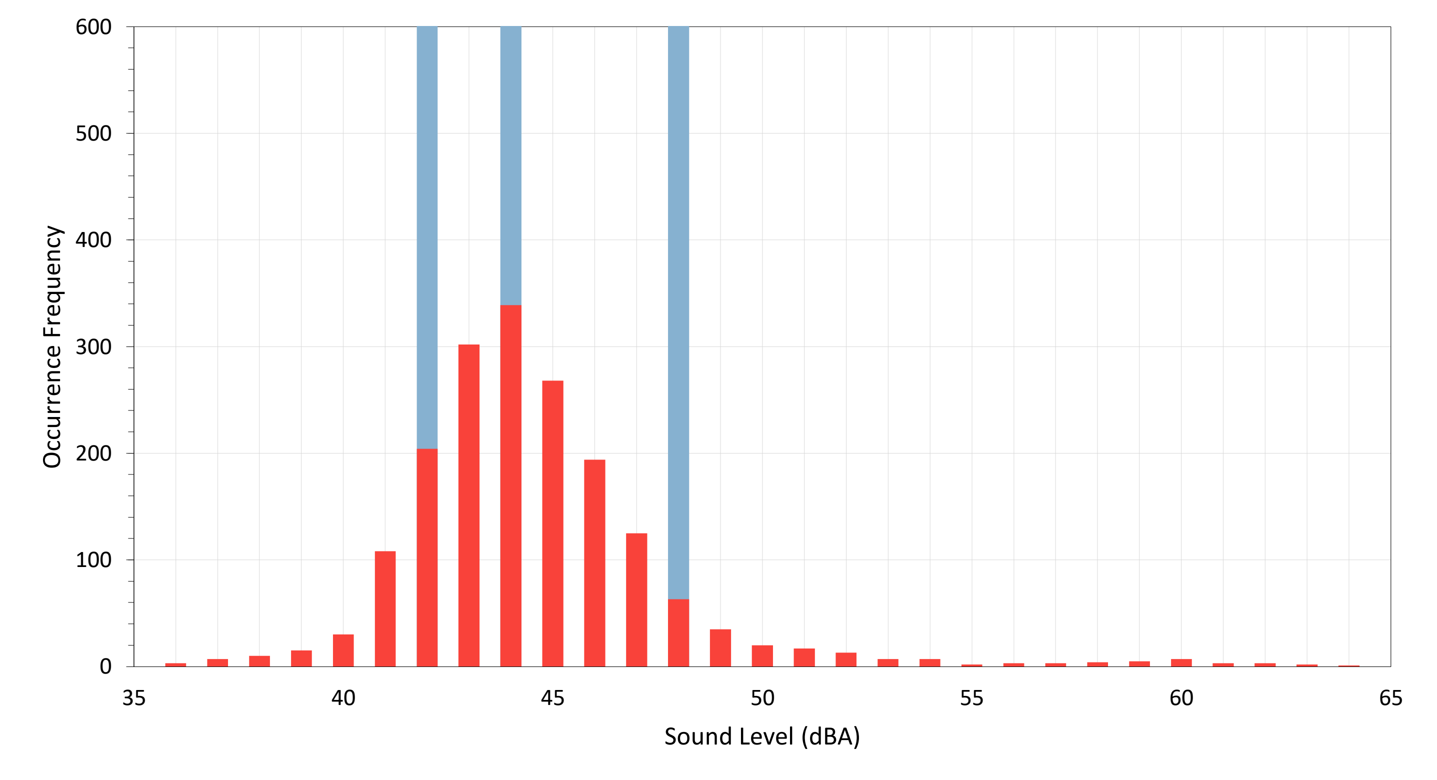


PL-3 / Daytime, Pre-Construction BROADBAND SOUND LEVEL 1-SECOND PERIOD SUMMARY

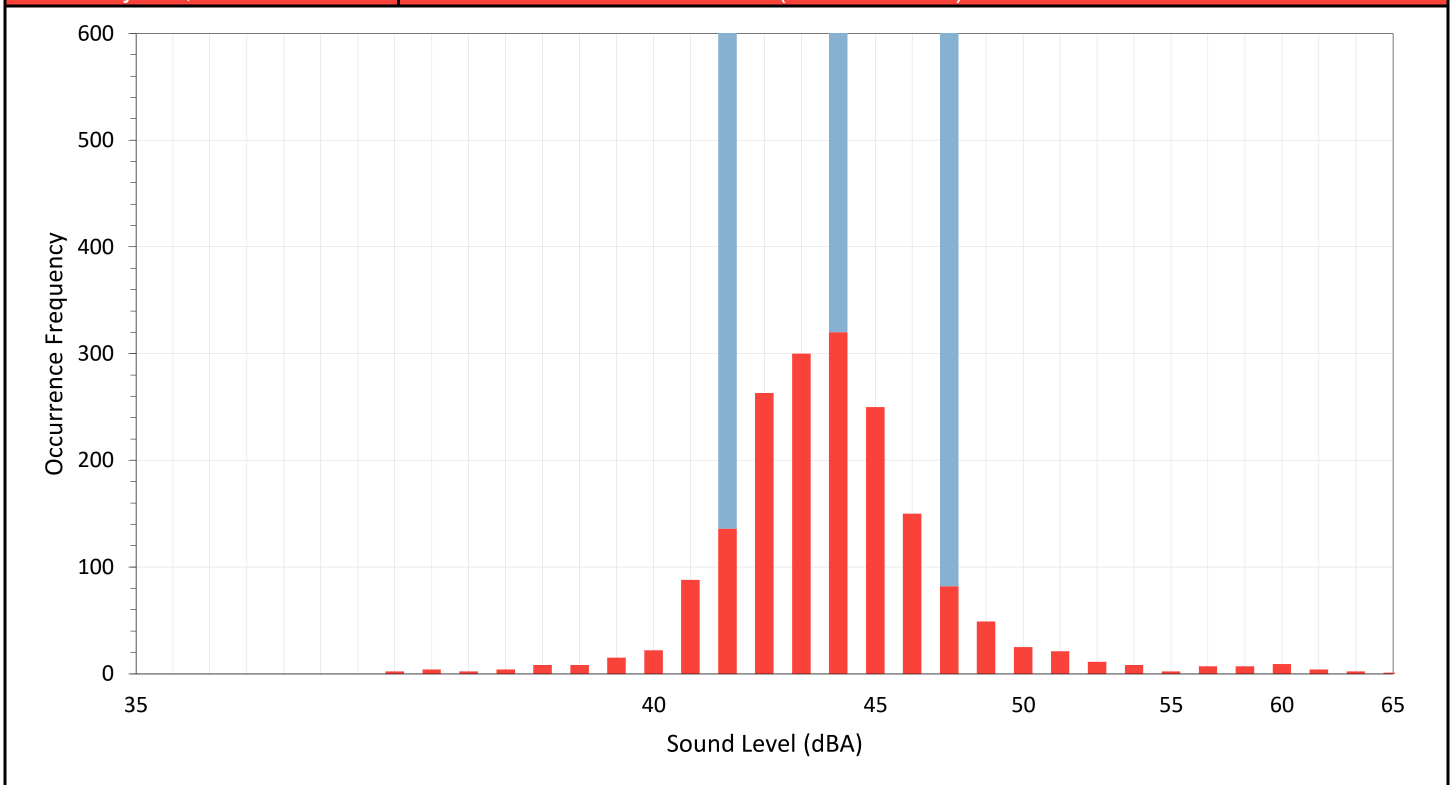


Environmental Noise Monitoring Distribution Charts

PL-3 / Daytime, Pre-Construction | 1-SECOND LEQ HISTOGRAM (LINEAR)



PL-3 / Daytime, Pre-Construction | 1-SECOND LEQ HISTOGRAM (TRANSFORM)



WSP USA E&I, Inc.
Environmental Noise Monitoring Field Notes

Project Name:	CTEC - Foster Solar
Performed By:	A. Roland

LOCATION INFORMATION	
Location ID:	PL-3
Description:	Daytime, Supplemental
Date:	Thu. Dec 7, 2023
Start Time:	2:08:02 PM
End Time:	2:18:02 PM

WEATHER CONDITIONS	
Temperature:	31 °F
Wind Speed:	0 mph
Direction:	n/a
Humidity:	60%
Sky Type:	Cloudy
Precipitation:	n/a

LOCATION SKETCH

GENERAL SOUND SOURCES (order by most prominent)	
1)	Natural sounds (e.g., birds, geese)
2)	Distant vehicle traffic on I-84
3)	Vehicles passing on Foster Street
4)	
5)	

MONITORING NOTES / EVENTS	
Event Description:	Number of Instances, Start Time, End Time:
Airplane (propeller)	2:08-09
Car in Driveway w/ Radio	2:09
Airplane (high altitude)	2:14-2:15

TRAFFIC COUNT (nearest roadway)

	2:08 PM	2:09 PM	2:10 PM	2:11 PM	2:12 PM	2:13 PM	2:14 PM	2:15 PM	2:16 PM	2:17 PM
Foster St.	1	7	2	3	0	4	4	1	1	6

OTHER COMMENTS

Additional 10-minute measurement collected at this location to allow for leaf blower sound signature to be subtracted from ambient result.

Environmental Noise Monitoring Data Sheet

Project Name:	CTEC - Foster Solar
Project No:	3653230423

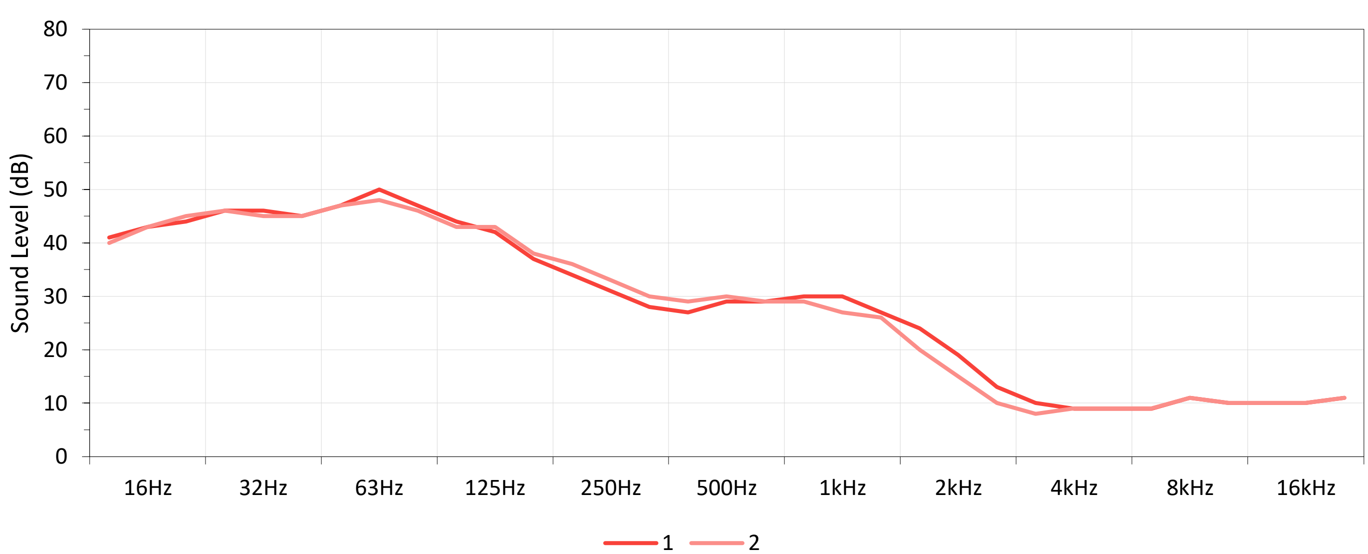
MEASUREMENT INFORMATION	
Location ID:	PL-3
Description:	Daytime, Supplemental
Date:	Thu. Dec 7, 2023
Start Time:	2:08:02 PM
End Time:	2:18:02 PM

SUMMARY INFORMATION	
Duration:	00:10:00
Response:	Random
Overload:	FALSE
Cal. (Before):	2:05:31 PM
Cal. (After):	2:18:47 PM
Cal. Drift:	-0.1

MONITOR PHOTO

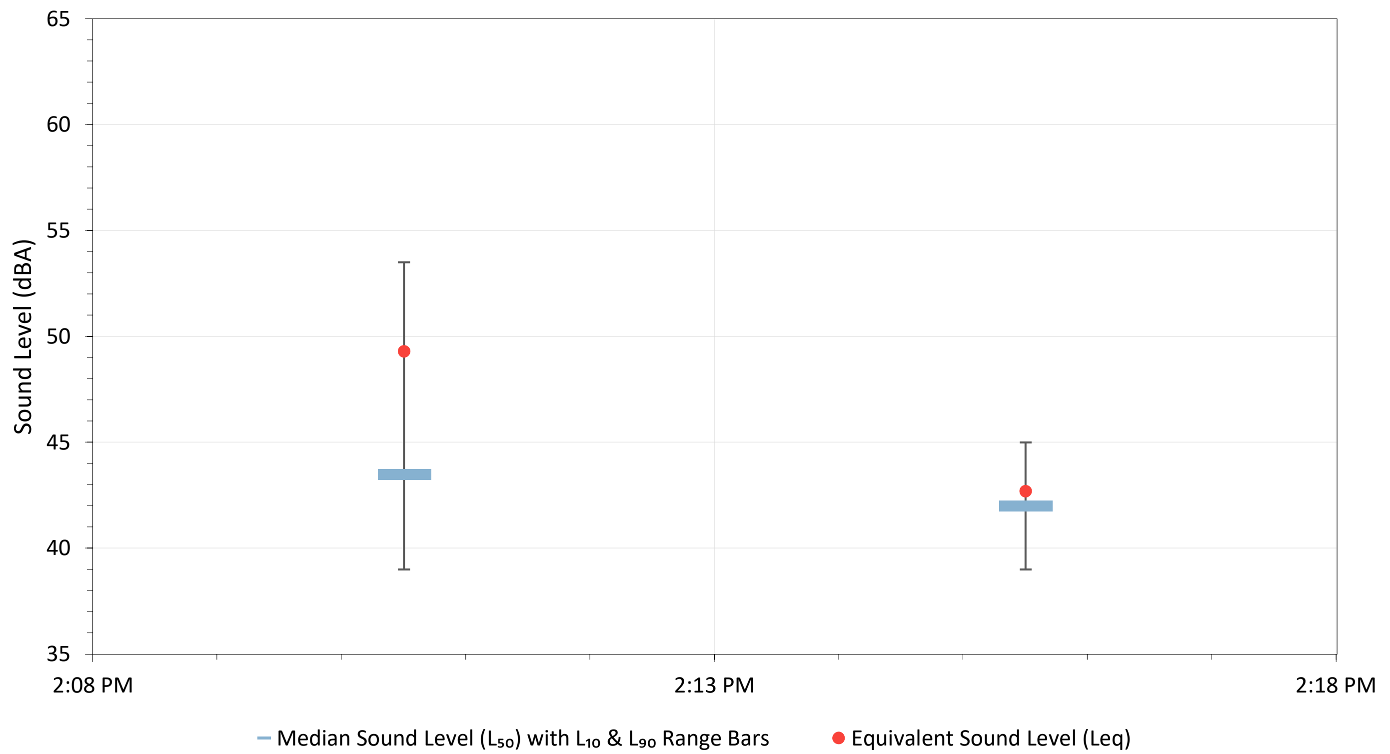
RESULTS SUMMARY					
		Cumulative Results			
		L_{eq}	L_{10}	L_{50}	L_{90}
Octave Band SPL (dB)	32 Hz:	50.4	58.0	54.1	50.3
	63 Hz:	53.2	60.5	55.8	52.4
	125 Hz:	47.9	55.3	50.0	46.6
	250 Hz:	46.7	53.1	42.2	37.4
	500 Hz:	37.4	45.5	36.8	33.7
	1 kHz:	35.3	42.5	37.3	33.1
	2 kHz:	28.7	36.2	30.2	23.5
	4 kHz:	31.1	31.3	16.9	13.8
	8 kHz:	18.1	21.8	15.4	14.8
Broadband (dBA):		**42.4**	**50.8**	**42.4**	**39.4**

PL-3 / Daytime, Supplemental — LZ90,1/3 OCTAVE BAND SOUND LEVEL SUMMARY

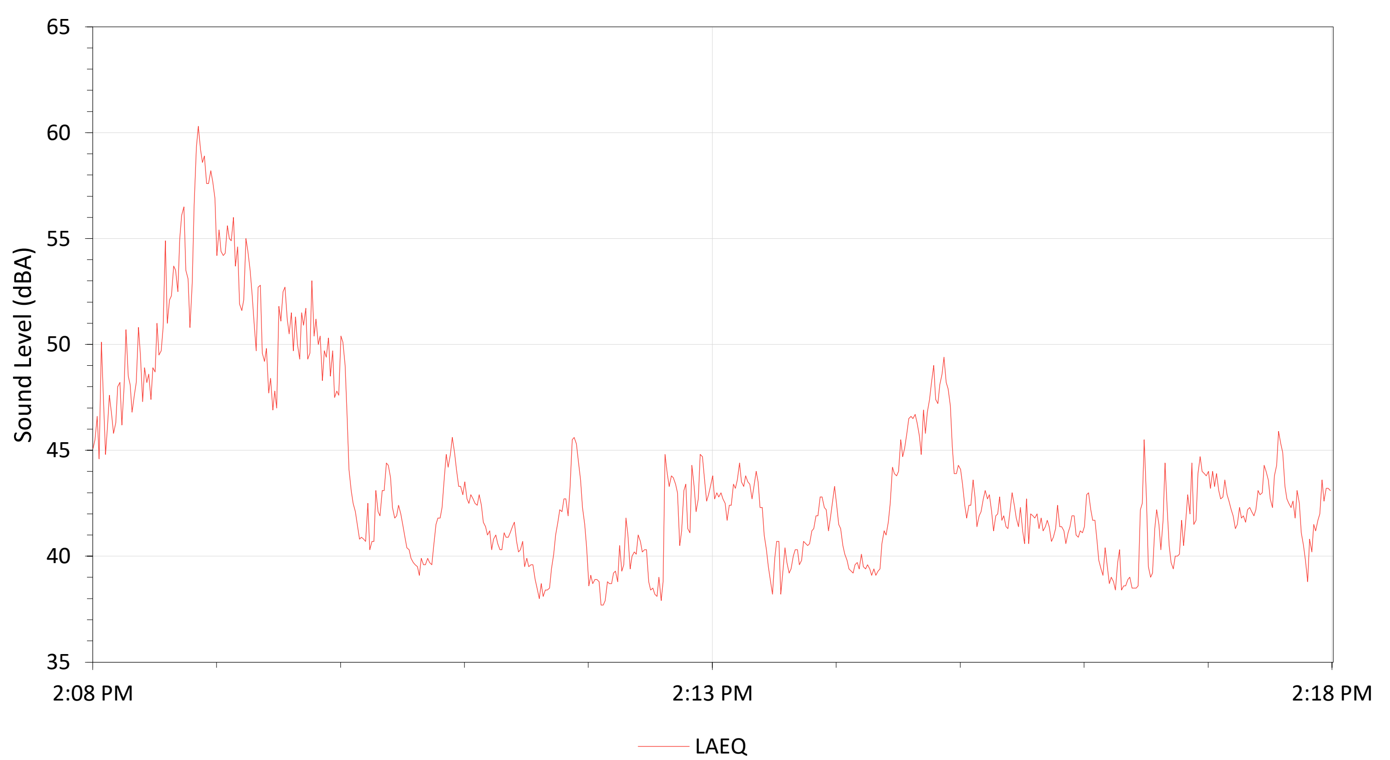


Environmental Noise Monitoring Summary Charts

PL-3 / Daytime, Supplemental	BROADBAND SOUND LEVEL 5-MINUTE PERIOD SUMMARY

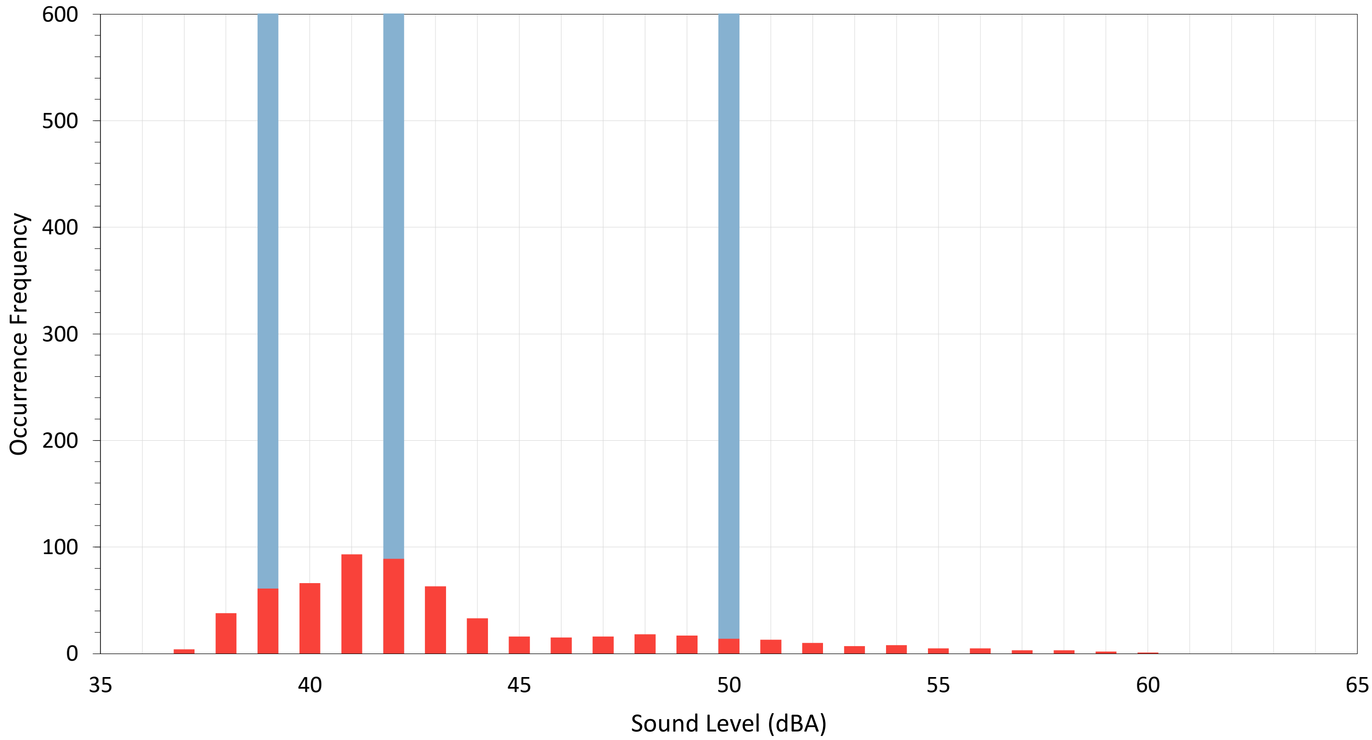


PL-3 / Daytime, Supplemental	BROADBAND SOUND LEVEL 1-SECOND PERIOD SUMMARY

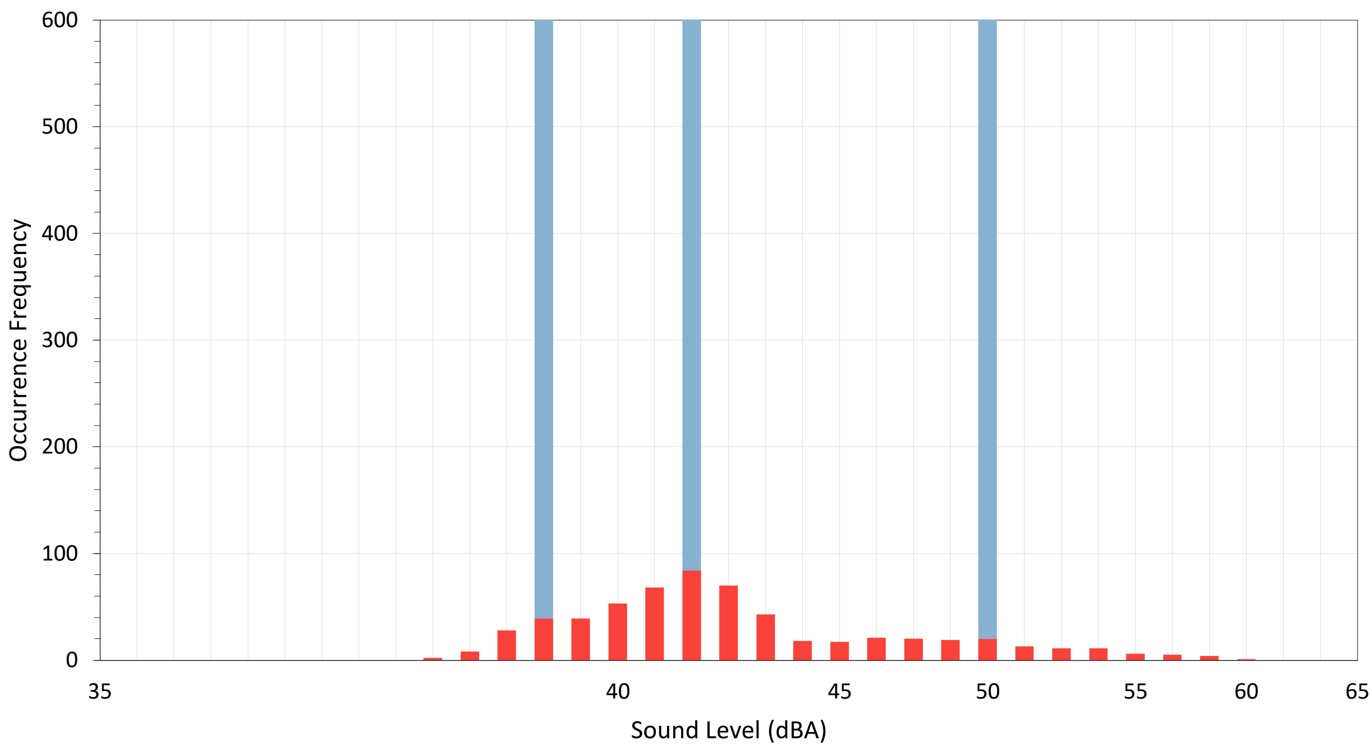


Environmental Noise Monitoring Distribution Charts

PL-3 / Daytime, Supplemental	1-SECOND LEQ HISTOGRAM (LINEAR)



PL-3 / Daytime, Supplemental	1-SECOND LEQ HISTOGRAM (TRANSFORM)



WSP USA E&I, Inc.
Environmental Noise Monitoring Field Notes

Project Name:	CTEC - Foster Solar
Performed By:	A. Roland

LOCATION INFORMATION	
Location ID:	PL-4
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	1:35:01 PM
End Time:	2:05:01 PM

WEATHER CONDITIONS	
Temperature:	30 °F
Wind Speed:	n/a
Direction:	-
Humidity:	63%
Sky Type:	Cloudy
Precipitation:	n/a

LOCATION SKETCH

GENERAL SOUND SOURCES (order by most prominent)	
1)	Natural sounds (e.g., birds, geese)
2)	Distant vehicle traffic on I-84
3)	Vehicles passing on Foster St.
4)	
5)	

MONITORING NOTES / EVENTS

Event Description:	Number of Instances, Start Time, End Time:
Airplane (high altitude)	1:36, 1:51, 1:52-1:53, 2:00-2:01, 2:04
Helicopter	1:40-1:42
Police siren (distant)	1:42
Airplane (propeller)	1:43, 1:46-1:47, 1:48-1:49
Geese	1:54-1:55, 1:57

TRAFFIC COUNT (nearest roadway)

Foster St.	1:35 PM	1:37 PM	1:39 PM	1:41 PM	1:43 PM	1:45 PM	1:47 PM	1:49 PM	1:51 PM	1:53 PM
	6	5	2	5	3	5	4	5	6	2
	1:55 PM	1:57 PM	1:59 PM	2:01 PM	2:03 PM					
	5	3	5	4	7					

OTHER COMMENTS

Leaf blower off prior to start of measurement.

Environmental Noise Monitoring Data Sheet

Project Name:	CTEC - Foster Solar
Project No:	3653230423

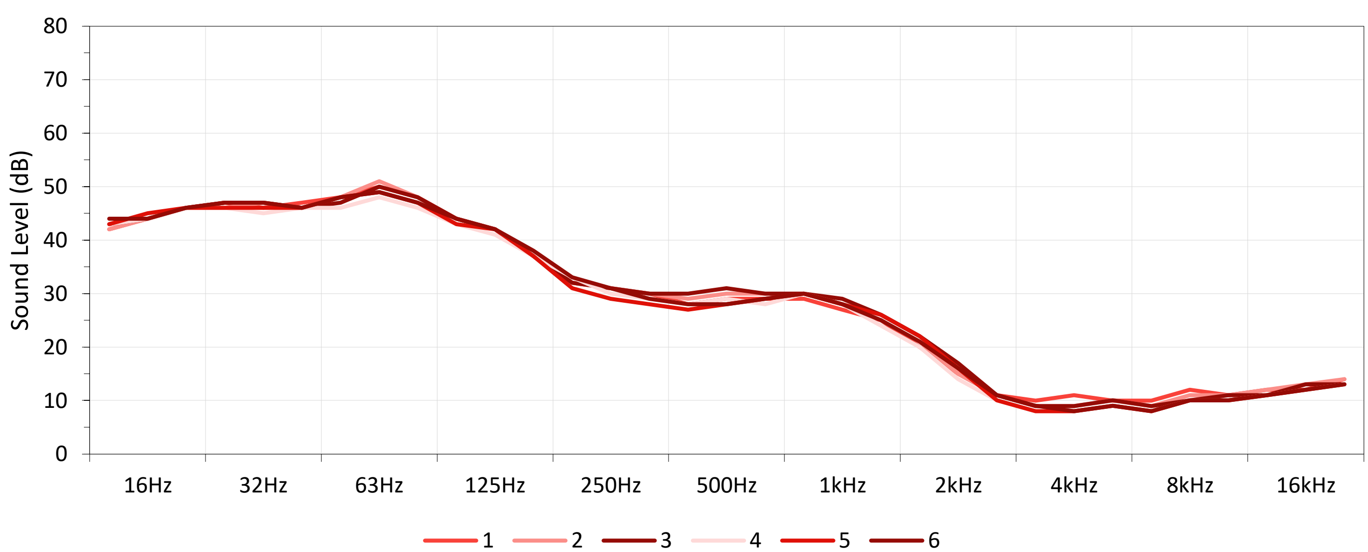
MEASUREMENT INFORMATION	
Location ID:	PL-4
Description:	Daytime, Pre-Construction
Date:	Thu. Dec 7, 2023
Start Time:	1:35:01 PM
End Time:	2:05:01 PM

SUMMARY INFORMATION	
Duration:	00:30:00
Response:	Random
Overload:	FALSE
Cal. (Before):	1:34:43 PM
Cal. (After):	2:05:31 PM
Cal. Drift:	0.4

MONITOR PHOTO

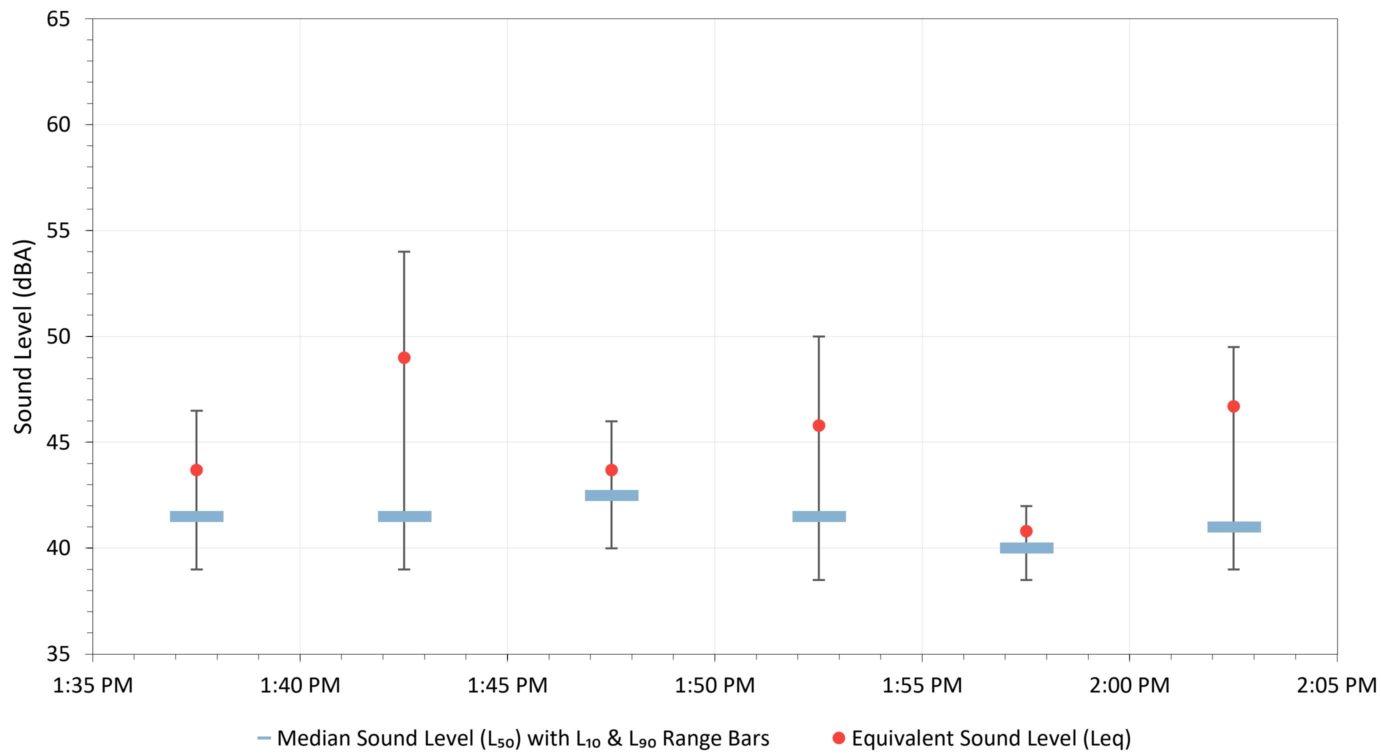
RESULTS SUMMARY					
		Cumulative Results			
		L_{eq}	L_{10}	L_{50}	L_{90}
Octave Band SPL (dB)	32 Hz:	59.7	60.5	55.1	51.1
	63 Hz:	60.2	62.1	56.8	53.0
	125 Hz:	55.0	55.7	49.5	46.4
	250 Hz:	49.3	50.3	39.5	35.6
	500 Hz:	42.3	44.0	36.1	33.7
	1 kHz:	38.3	40.3	36.0	32.8
	2 kHz:	31.3	33.0	27.6	22.4
	4 kHz:	24.6	23.9	15.5	13.9
	8 kHz:	19.5	18.7	15.4	14.7
Broadband (dBA):		**45.7**	**48.3**	**41.4**	**39.0**

PL-4 / Daytime, Pre-Construction LZ90,1/3 OCTAVE BAND SOUND LEVEL SUMMARY

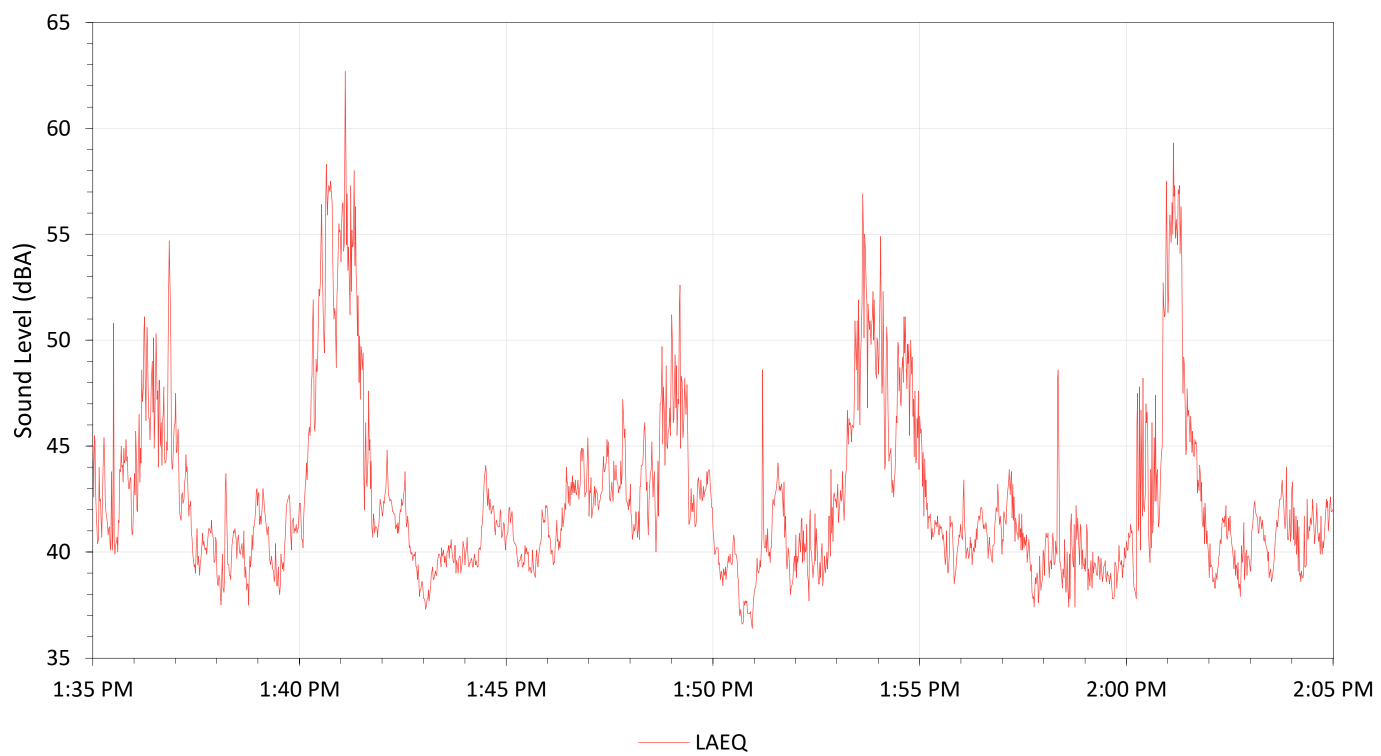


Environmental Noise Monitoring Summary Charts

PL-4 / Daytime, Pre-Construction | BROADBAND SOUND LEVEL 5-MINUTE PERIOD SUMMARY

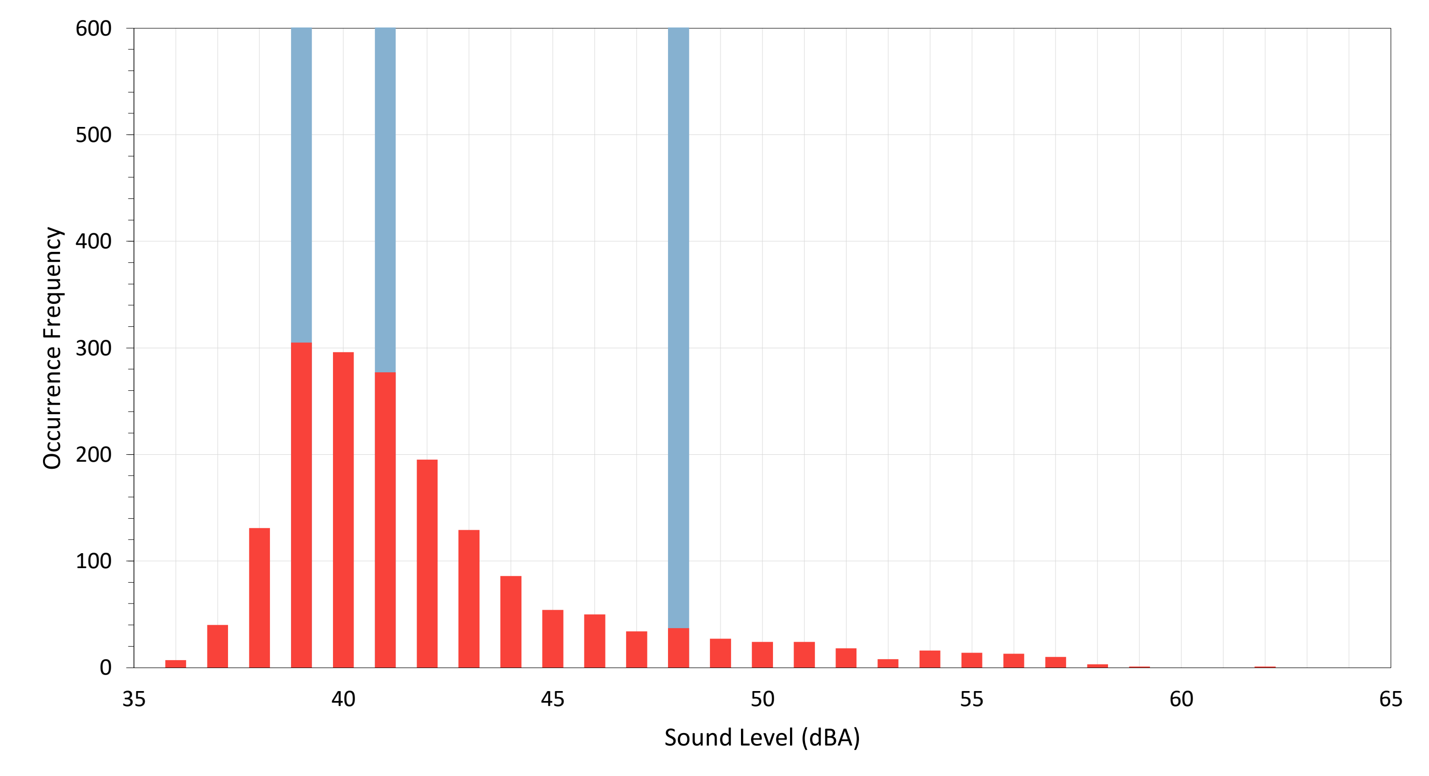


PL-4 / Daytime, Pre-Construction | BROADBAND SOUND LEVEL 1-SECOND PERIOD SUMMARY

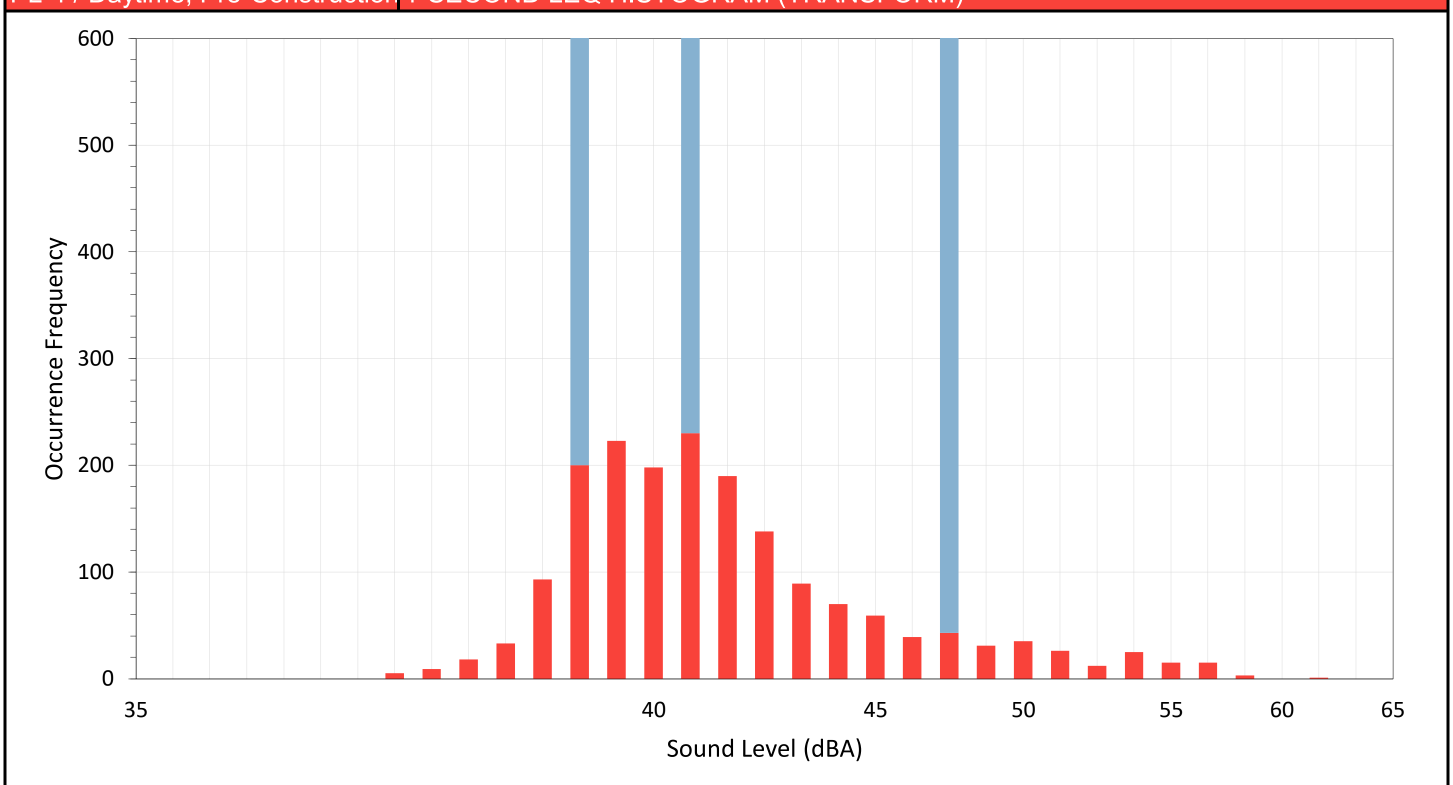


Environmental Noise Monitoring Distribution Charts

PL-4 / Daytime, Pre-Construction 1-SECOND LEQ HISTOGRAM (LINEAR)



PL-4 / Daytime, Pre-Construction 1-SECOND LEQ HISTOGRAM (TRANSFORM)



Attachment D

Monitoring Equipment Certificates of Calibration

FA05190

www.casellasolutions.com

CASELLA
A DIVISION OF TB

Certificate of Conformity and Calibration

Instrument Model:- CEL-633C

Serial Number 4210504

Firmware revision V006-05

Microphone Type:- CEL-251
Serial Number 5084

Preamplifier Type:- CEL-495
Serial Number 005056

Instrument Class/Type:- 1

Applicable standards:-

IEC 61672: 2013 / EN 60651 (Electroacoustics - Sound Level Meters)
IEC 60651 1979 (Sound Level Meters), ANSI S1.4: 1983 (Specifications For Sound Level Meters)

Note:- *The test sequences performed in this report are in accordance with the current Sound level meter Standard - IEC61672. The combination of tests performed are considered to confirm the products electro-acoustic performance to all applicable standards including superceeded Sound Level Meter Standards - IEC60651 and IEC60804.*

Test Conditions:- 23.1 °C, 44 %RH, 986.8 mBar

Test Engineer:- Chue Moua
Date of Issue:- September 22, 2023

Declaration of conformity:-

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications. Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures. This product is certified as being compliant to the requirements of the CE Directive.

Test Summary:-

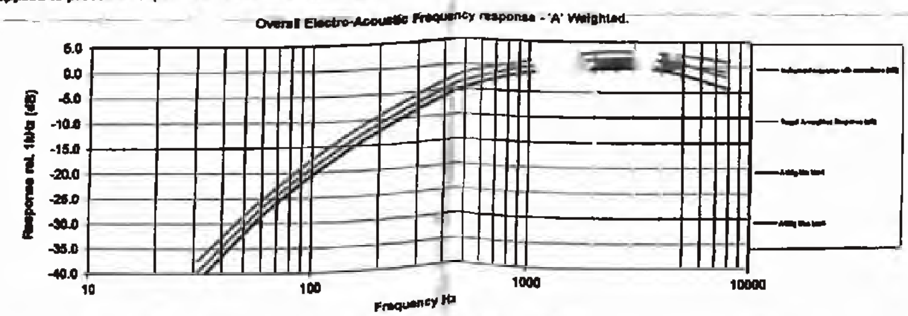
Self Generated Noise Test	All Tests Pass
Electrical Signal Test Of Frequency Weightings	All Tests Pass
Frequency & Time Weightings At 1 kHz	All Tests Pass
Level Linearity On The Reference Level Range	All Tests Pass
Toneburst Response Test	All Tests Pass
C-peak Sound Levels	All Tests Pass
Overload Indication	All Tests Pass
Acoustic Tests	All Tests Pass

Combined Electro-Acoustic Frequency Response - *A Weighted*

Combined Electro-Acoustic Frequency Response - A Weighted (IEC 61672-3:2006)

The following A-Weighted frequency response graph shows this instruments overall frequency response based upon the application of multi-frequency pressure field calibrations. The microphones Pressure to Free field correction coefficients are applied to pressure response. Reference level taken at 1kHz.

Overall Electro-Acoustic Frequency response - 'A' Weighted.



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TSI Instruments India Pvt.Ltd.
[illegible]
Tel: +91 124 4486171

Tested to CEL-63X test sheet TP444 revision 08-00

FA05190 CASELLA

Certificate of Conformity and Calibration

Customer:	5145086
Instrument:	CEL-120/1
Serial Number:	4914399
Job Number:	300539965
Date of Issue:	22-Sep-2023
Engineer:	Chue Moua
Traceable Equipment:	Reference Calibrator E011384 DVM type Fluke 45 E011386

Test Conditions:

Ambient Temperature	23.4	°C
Ambient Humidity	45.5	%RH
Ambient Pressure	987	mBar

Results:

	Level 1	Level 2	Frequency
Initial Reading	114.09 dB	94.04 dB	1.0001 kHz
Final Reading	114.01 dB	93.98 dB	1.0001 kHz

Uncertainty:

Level	±	0.15	dB
Frequency	±	0.5	Hz

This test certificate confirms that the instrument specified above has been successfully tested to comply with the manufacturer's published specifications.
Tests are performed using equipment traceable to national standards in accordance with Casella's ISO 9001:2015 quality procedures.
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a level of confidence of approximately 95%.
This certificate may not be reproduced other than in full, except with prior written approval of the issuing laboratory.

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Tel: +91 124 4495100
Email: Casella.Sales@ideal-industries.in

Attachment E

Manufacturers’ Technical Data Sheet

100/125 kW, 1500 Vdc String Inverters for North America

CPS SCH100/125KTL-DO/US-600

The 100 and 125 kW high power CPS three-phase string inverters are designed for ground mount applications. The units are high performance, advanced and reliable inverters designed specifically for the North American environment and grid. High efficiency at 99.1% peak and 98.5% CEC, wide operating voltages, broad temperature ranges and a NEMA Type 4X enclosure enable this inverter platform to operate at high performance across many applications. The CPS 100/125 kW products ship with the Standard or Centralized Wire-box, each fully integrated and separable with AC and DC disconnect switches. The Standard Wire-box includes touch-safe fusing for up to 20 strings. The CPS FlexOM Gateway enables communication, controls and remote product upgrades.

Key Features

- NFPA 70 and NEC compliant
- Touch-safe DC Fuse holders add convenience and safety
- CPS FlexOM Gateway enables remote firmware upgrades
- Integrated AC and DC disconnect switches
- 1 MPPT with 20 fused inputs for maximum flexibility
- Copper- and Aluminum-compatible AC connections
- NEMA Type 4X outdoor rated enclosure
- Advanced Smart-Grid features (CA Rule 21 certified)
- kVA headroom yields 100 kW @ 0.9 PF and 125 kW @ 0.95 PF
- Generous 1.87 (100 kW) and 1.5 (125 kW) DC/AC inverter load ratios
- Separable wire-box design for fast service
- Standard 5-year warranty with extensions to 20 years

100/125KTL Standard Wire-box

100/125KTL Centralized Wire-box

C US

This device complies with part 15 of the FCC Rules

Chint Power Systems America
1380 Presidential Drive, Suite 100, Richardson, TX 75081
Tel: 855-584-7168 Mail: AmericaSales@chintpower.com Web: www.chintpowersystems.com

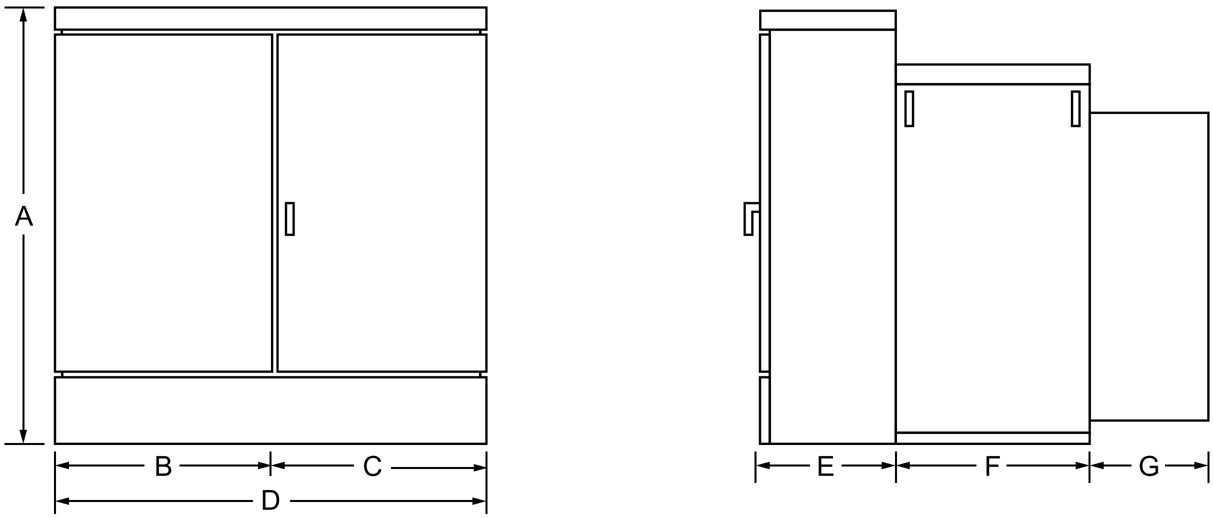
Model Name	CPS SCH100KTL-DO/US-600	CPS SCH125KTL-DO/US-600
DC Input		
Max. PV power	187.5 kW	
Max. DC input voltage	1500 V	
Operating DC input voltage range	860-1450 Vdc	
Start-up DC input voltage / power	900 V / 250 W	
Number of MPP trackers	1	
MPPT voltage range[1]	870-1300 Vdc	
Max. PV input current (Isc x 1.25)	275 A	
Number of DC inputs	Standard Wire-box: 20 PV source circuits, pos. and neg. fused Centralized Wire-box: 1 input circuit, 1-2 terminations per pole, non-fused	
DC disconnection type	Load-rated DC switch	
DC surge protection	Type II MOV (with indicator/remote signaling)	
AC Output		
Rated AC output power	100 kW	125 kW
Max. AC output power[2]	100 kVA (111 kVA @ PF>0.9)	125 kVA (132 kVA @ PF>0.95)
Rated output voltage	600 Vac	
Output voltage range[3]	528-660 Vac	
Grid connection type[4]	3Φ / PE / N (neutral optional)	
Max. AC output current @ 600 Vac	96.2 / 106.8 A	120.3 / 127.0 A
Rated output frequency	60 Hz	
Output frequency range[3]	57-63 Hz	
Power factor	>0.99 (±0.8 adjustable)	>0.99 (±0.8 adjustable)
Current THD	<3%	
Max. fault current contribution (1-cycle RMS)	41.47 A	
Max. OCPD rating	200 A	
AC disconnection type	Load-rated AC switch	
AC surge protection	Type II MOV (with indicator/remote signaling)	
System		
Topology	Transformerless	
Max. efficiency	99.1%	
CEC efficiency	98.5%	
Stand-by / night consumption	<4 W	
Environment		
Enclosure protection degree	NEMA Type 4X	
Cooling method	Variable speed cooling fans	
Operating temperature range	-22°F to +140°F / -30°C to +60°C (derating from +108°F / +42°C)	
Non-operating temperature range[5]	-40°F to +158°F / -40°C to +70°C maximum	
Operating humidity	0-100%	
Operating altitude	8202 ft / 2500 m (no derating)	
Audible noise	<65 dBA @ 1 m and 25°C	
Display and Communication		
User interface and display	LED indicators, WiFi + APP	
Inverter monitoring	Modbus RS485	
Site-level monitoring	CPS FlexOM Gateway (1 per 32 inverters)	
Modbus data mapping	SunSpec / CPS	
Remote diagnostics / firmware upgrade functions	Standard / (with FlexOM Gateway)	
Mechanical		
Dimensions (W x H x D)	Standard Wire-box: 45.28 x 24.25 x 9.84 in (1150 x 616 x 250 mm) Centralized Wire-box: 39.37 x 24.25 x 9.84 in (1000 x 616 x 250 mm)	
Weight	Inverter: 121 lbs (55 kg) Standard Wire-box: 55 lbs (25 kg) Centralized Wire-box: 33 lbs (15 kg)	
Mounting / installation angle	15 - 90 degrees from horizontal (vertical or angled)	
AC termination	M10 stud type terminal [3Φ] (wire range: 1/0 AWG - 500 kcmil CU/AL; lugs not supplied) Screw clamp terminal block [N] (#12 - 1/0 AWG CU/AL)	
DC termination	Standard Wire-box: Screw clamp fuse holder (wire range: #12 - #6 AWG CU) Centralized Wire-box: Busbar, M10 bolts (wire range: #1AWG - 500kcmil CU/AL [1 termination per pole], #1 AWG - 300 kcmil CU/AL [2 terminations per pole]; lugs not supplied)	
Fused string inputs	25 A fuses provided (fuse values up to 30 A acceptable)	
Safety		
Certifications and standards	UL 1741-SA/SB Ed. 3, CSA-C22.2 NO.107.1-01, IEEE 1547-2018, FCC PART15	
Selectable grid standard	IEEE 1547a-2014, IEEE 1547-2018[6], CA Rule 21, ISO-NE	
Smart-grid features	Volt-RideThru, Freq-RideThru, Ramp-Rate, Specified-PF, Volt-VAR, Freq-Watt, Volt-Watt	
Warranty		
Standard[7]	5 years	
Extended terms	10, 15 and 20 years	

1) See user manual for further information regarding MPPT voltage range when operating at non-unity PF.
2) "Max AC apparent power" rating valid within MPPT voltage range and temperature range of -30°C to +40°C (-22°F to +104°F) for 100 kW PF≥0.9, and 125 kW PF≥0.95.
3) The "output voltage range" and "output frequency range" may differ according to the specific grid standard.
4) Wye neutral-grounded; delta may not be corner-grounded.
5) See user manual for further requirements regarding non-operating conditions.
6) Firmware version 12.0 or later required.
7) 5-year warranty effective for units purchased after October 1, 2019.

Table 2
Audible Sound Levels for Liquid-Immersed
Network Transformers and Step-Voltage Regulators

Equivalent Two-Winding kVA	Average Sound Level Decibels
0-50	48
51-100	51
101-300	55
301-500	56
501-750	57
751-1000	58
1001-1500	60
1501-2000	61
2001-2500	62
2501-3000	63

PADMOUNT TRANSFORMER OUTLINE

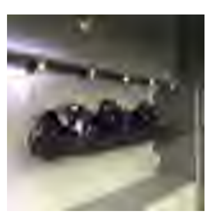


APPROXIMATE TRANSFORMER DIMENSIONS

kVA	A	B	C	D	E	F	G	Gallons	Weight (Lbs)
300	59”	29.5”	22”	51.5”	20.5”	24”	10”	196	4,056
500	59”	33”	26.5”	59.5”	24”	26.5”	10”	210	5,023
750	73”	36”	29”	65”	24”	26.5”	10”	358	7,664
1000	73”	36”	29”	65”	24”	27”	10”	354	8,530
1500	73”	36”	35.5”	71.5	24”	33.5”	10”	410	10,782
2000	75”	39.5”	28”	67.5	24”	35”	27”	433	12,490
2500	78”	39.5”	35.5”	75.5”	24”	37.5”	22.5”	545	14,246
3000	84”	30.5”	32”	62.5”	24”	37.5”	38”	550	14,014
3750	75”	50.5”	30”	80.5”	25.5”	42”	38”	730	17,785

THREE PHASE MADDOX PADMOUNT TRANSFORMER

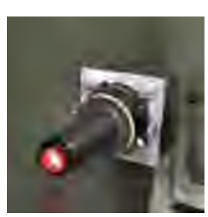
COMMON ACCESSORIES



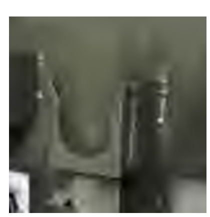
1. Bayonet Fuses

2. Loadbreak Switch

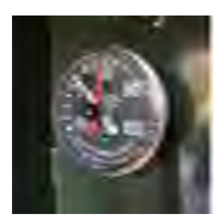
3.Tap-changer



4. Bushings



5. Parking Stand



6. Gauges

Attachment F

Environmental Noise Modeling Calculations

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Source Specific Sound Pressure Level Measurements at Reference Location										
Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
CPS 100/125 kW Inverter	**69.3**	**68.7**	**64.0**	**65.1**	**66.4**	**61.5**	**52.1**	**44.1**	**74.4 dB**	**69.2 dBA**
Notes:										
The CPS Inverter near-field sound test was conducted at the East Windsor Solar One facility by Brooks Acoustics Corp. (BAC) on May 14, 2022.										
Octave band sound pressure level un-weighed decibel values (measured at 1 ft.) are provided in BAC, East Windsor Solar Two - Acoustical Design Study dated April 26, 2023										

Converting Source Specific Sound Pressure Level (Lp) to Sound Power Level (Lw)		
Measurement Configuration		
Source Height (h_s)	1.50 m	4.92 ft
Measurement Height (h_r)	1.25 m	4.10 ft
Horizontal Offset (d_h)	0.30 m	1.00 ft
Measurement Distance (d_p)	0.39 m	1.29 ft
Boundary Condition Factor (Q)	1 -	* near-field data most appropriately modeled w/ Q = 1
Temperature (T)	25.0 °C	
Pressure (P)	101.3 kPa	
Relative Humidity (RH)	50.0 %	
Water Vapor Content (H)	15,957 ppmv	
Ground at Source (G_s)	0.00 -	
Ground at Receiver (G_r)	0.00 -	
Ground in Middle (G_m)	0.00 -	

Parameters	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Sound Pressure Level (L_p)	69.3	68.7	64.0	65.1	66.4	61.5	52.1	44.1	74.4 dB	69.2 dBA
Geometric Divergence (A_{div})	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9		
Atmospheric Absorption (A_{atm})	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Atmospheric Absorption Coefficient (α)	0.01	0.04	0.13	0.32	0.57	1.02	2.55	8.50		
Ground Absorption (A_{gr})	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
Source Region Parameters (a', b', c', d')		1.5	1.5	1.5	1.5					
Source Region Ground Attenuation (A_s)	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		
Receptor Region Parameters (a', b', c', d')		1.5	1.5	1.5	1.5					
Receptor Region Ground Attenuation (A_r)	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		
Middle Region Ground Attenuation (A_m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
A-Weighting Adjustment (ADJ_A)	26.2	16.1	8.6	3.6	0.0	-1.2	-1.0	1.1		
Sound Power Level (L_w)	**72.21**	**71.61**	**66.91**	**68.01**	**69.31**	**64.41**	**55.02**	**47.04**	**77.3 dB**	**72.2 dBA**
Notes:										
Each CPS inverter unit is expected to produce sound power level (Lw) 72.2 dBA when operating at full-load										

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Comparing Calculated Sound Power Level (Lw) with Vendor Supplied Sound Pressure Level (Lp)

Projection Configuration		
Source Height (h_s)	1.50 m	4.92 ft
Measurement Height (h_r)	1.50 m	4.92 ft
Horizontal Offset (d_h)	1.00 m	3.28 ft
Measurement Distance (d_p)	1.00 m	3.28 ft
Boundary Condition Factor (Q)	1 -	
Temperature (T)	25.0 °C	
Pressure (P)	101.3 kPa	
Relative Humidity (RH)	70.0 %	
Water Vapor Content (H)	22,484 ppmv	
Ground at Source (G_s)	0.00 -	
Ground at Receiver (G_r)	0.00 -	
Ground in Middle (G_m)	0.00 -	

* as reported in Chint Power Systems (CPS) Technical Data Sheet

* near-field data most appropriately modeled w/ Q = 1

Parameters	Octave Band Center Frequency (Hz)								Broadband Z-Weighted	Broadband A-Weighted
	63	125	250	500	1000	2000	4000	8000		
Sound Power Level (L_w)	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	77.3 dB	72.2 dBA
Geometric Divergence (A_{div})	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0		
Atmospheric Absorption (A_{atm})	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1		
Atmospheric Absorption Coefficient (α)	0.01	0.03	0.10	0.30	0.62	1.05	2.18	6.50		
Ground Absorption (A_{gr})	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0	-3.0		
Source Region Parameters (a', b', c', d')		1.5	1.6	1.6	1.5					
Source Region Ground Attenuation (A_s)	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		
Receptor Region Parameters (a', b', c', d')		1.5	1.6	1.6	1.5					
Receptor Region Ground Attenuation (A_r)	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5	-1.5		
Middle Region Ground Attenuation (A_m)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
A-Weighting Adjustment (ADJ_A)	26.2	16.1	8.6	3.6	0.0	-1.2	-1.0	1.1		
Sound Pressure Level (L_p)	**64.2**	**63.6**	**58.9**	**60.0**	**61.3**	**56.4**	**47.0**	**39.0**	**69.3 dB**	**64.2 dBA**

Notes:

CPS Technical Data Sheet specifies unit noise <65 dBA @ 1 m, which is shown to be consistent with sound level values measured by Brooks Acoustics Corp.

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Converting Transformer Specific NEMA Sound Level (Lp) to Sound Power Level (Lw)			
Source Equipment			
2000 kVA Transformer Sound Level Rating (L_p)		61.0 dBA	* NEMA TR1 rating for liquid-immersed transformers
Transformer Height (H_t)	1.91 m	6.25 ft	* dimensions estimated
Transformer Width (W_t)	1.71 m	5.63 ft	
Transformer Length (L_t)	1.50 m	4.92 ft	
Surface Area (SA_t)	12.25 m²	131.77 ft²	

Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband Z-Weighted	Broadband A-Weighted
	63	125	250	500	1000	2000	4000	8000		
NEMA Transformer Octave Band Corrections	-5.0	-3.0	-8.0	-8.0	-14.0	-19.0	-24.0	-31.0		
Sound Power Level (L_w)	**76.9**	**78.9**	**73.9**	**73.9**	**67.9**	**62.9**	**57.9**	**50.9**	**82.6 dB**	**74.1 dBA**

Notes:

Transformer supplier must certify that 2,000 kVA liquid-filled transformer complies with NEMA TR1 sound levels, or 61 dBA. Lw = NEMA rating + 10 log (SA) + C + 10, where SA = surface area and C = octave band corrections (C1 for outdoor location, per Table 20, Handbook of Noise and Vibration Control)

Propagation Model Source Sound Power Levels

Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband Z-Weighted	Broadband A-Weighted
	63	125	250	500	1000	2000	4000	8000		
Inverter West Bank 1-2 (2-units)	**75.2**	**74.6**	**69.9**	**71.0**	**72.3**	**67.4**	**58.0**	**50.1**	**80.3 dB**	**75.2 dBA**
Inverter West Bank 3-4 (2-units)	**75.2**	**74.6**	**69.9**	**71.0**	**72.3**	**67.4**	**58.0**	**50.1**	**80.3 dB**	**75.2 dBA**
Inverter West Bank 5-6 (2-units)	**75.2**	**74.6**	**69.9**	**71.0**	**72.3**	**67.4**	**58.0**	**50.1**	**80.3 dB**	**75.2 dBA**
Inverter West Bank 7-8 (2-units)	**75.2**	**74.6**	**69.9**	**71.0**	**72.3**	**67.4**	**58.0**	**50.1**	**80.3 dB**	**75.2 dBA**
Inverter East Bank 9-10 (2-units)	**75.2**	**74.6**	**69.9**	**71.0**	**72.3**	**67.4**	**58.0**	**50.1**	**80.3 dB**	**75.2 dBA**
Inverter East Bank 11-12 (2-units)	**75.2**	**74.6**	**69.9**	**71.0**	**72.3**	**67.4**	**58.0**	**50.1**	**80.3 dB**	**75.2 dBA**
Inverter East Bank 13 (1 unit)	**72.2**	**71.6**	**66.9**	**68.0**	**69.3**	**64.4**	**55.0**	**47.0**	**77.3 dB**	**72.2 dBA**
2000 kVA Transformer (1 unit)	**76.9**	**78.9**	**73.9**	**73.9**	**67.9**	**62.9**	**57.9**	**50.9**	**82.6 dB**	**74.1 dBA**

Notes:

Combined unit sound power level = $Lw_{total} = 10 \cdot \log (n \cdot 10^{Lw/10})$, where n = number of units

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Sound Propagation Modeling

Projection Configuration		
Source Height (h_s)	1.00 m	3.28 ft
Measurement Height (h_r)	1.50 m	4.92 ft
Horizontal Offset (d_h)	84.68 m	277.75 ft
Measurement Distance (d_p)	84.68 m	277.76 ft
Boundary Condition Factor (Q)	1 -	
Temperature (T)	25.0 °C	
Pressure (P)	101.3 kPa	
Relative Humidity (RH)	70.0 %	
Water Vapor Content (H)	22,484 ppmv	
Ground at Source (G_s)	0.50 -	
Ground at Receiver (G_r)	0.50 -	
Ground in Middle (G_m)	0.50 -	

Modeling Location: North Property Line - West Bank (nearest residential PL)

* Model inverter banks and transformer impact result at PL-1

	D (m)		D (m)
Inverters 1-2	31.9	Inverters 9-10	134.8
Inverters 3-4	50.3	Inverters 11-12	145.4
Inverters 5-6	78.1	Inverter 13	154.7
Inverters 7-8	87.5	Transformer	84.7

Parameters	Octave Band Center Frequency (Hz)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Sound Power Level (L_w)	76.9	78.9	73.9	73.9	67.9	62.9	57.9	50.9	82.6 dB	74.1 dBA
Geometric Divergence (A_{div})	49.5	49.5	49.5	49.5	49.5	49.5	49.5	49.5		
Atmospheric Absorption (A_{atm})	0.0	0.0	0.1	0.3	0.5	0.9	1.8	5.5		
Ground Absorption (A_{gr})	-3.3	-1.1	4.4	4.0	-0.6	-1.7	-1.7	-1.7		
A-Weighting Adjustment (ADJ_A)	26.2	16.1	8.6	3.6	0.0	-1.2	-1.0	1.1		
Sound Pressure Level (L_p)	30.7	30.4	19.8	20.1	18.4	14.1	8.2	-2.5	34.1 dB	23.0 dBA

Propagation Model Sound Impact Results (copy and paste after each model iteration)

Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Inverter West Bank 1-2 Contribution	37.1	34.8	26.8	28.1	31.9	27.5	17.8	8.4	40.6 dB	34.5 dBA
Inverter West Bank 3-4 Contribution	33.2	30.7	21.6	23.0	27.6	23.4	13.4	3.3	36.5 dB	30.2 dBA
Inverter West Bank 5-6 Contribution	29.5	26.8	16.7	18.0	23.5	19.3	9.0	-2.3	32.5 dB	26.0 dBA
Inverter West Bank 7-8 Contribution	28.8	25.9	15.6	16.9	22.5	18.4	8.0	-3.7	31.7 dB	25.0 dBA
Inverter East Bank 9-10 Contribution	26.0	22.4	11.4	12.8	18.8	14.6	3.7	-10.1	28.5 dB	21.2 dBA
Inverter East Bank 11-12 Contribution	25.4	21.7	10.7	12.0	18.1	13.9	2.8	-11.4	27.9 dB	20.5 dBA
Inverter East Bank 13 Contribution	22.0	18.2	7.1	8.4	14.6	10.3	-0.9	-15.5	24.4 dB	16.9 dBA
2000 kVA Transformer Contribution	30.7	30.4	19.8	20.1	18.4	14.1	8.2	-2.5	34.1 dB	23.0 dBA
Sound Level Impact Result	**40.4**	**38.1**	**29.2**	**30.4**	**34.4**	**30.1**	**20.3**	**10.3**	**43.7 dB**	**37.0 dBA**

Notes:

The combined sound level impact caused by (13) CPS inverters and (1) 2000 kVA transformer operating simultaneously upon the sound environment at the PL-1 nearest residential property line located to the north of the west inverter bank source is approximately 37 dBA

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Sound Propagation Modeling

Projection Configuration		
Source Height (h_s)	1.00 m	3.28 ft
Measurement Height (h_r)	1.50 m	4.92 ft
Horizontal Offset (d_h)	179.02 m	587.19 ft
Measurement Distance (d_p)	179.02 m	587.19 ft
Boundary Condition Factor (Q)	1 -	
Temperature (T)	25.0 °C	
Pressure (P)	101.3 kPa	
Relative Humidity (RH)	70.0 %	
Water Vapor Content (H)	22,484 ppmv	
Ground at Source (G_s)	0.50 -	
Ground at Receiver (G_r)	0.50 -	
Ground in Middle (G_m)	0.50 -	

Modeling Location: North Property Line - East Bank (nearest residential PL)

* Model inverter banks and transformer impact result at PL-2

	D (m)		D (m)
Inverters 1-2	128.7	Inverters 9-10	41.5
Inverters 3-4	134.3	Inverters 11-12	68.9
Inverters 5-6	146.8	Inverter 13	87.5
Inverters 7-8	152.3	Transformer	179.0

Parameters	Octave Band Center Frequency (Hz)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Sound Power Level (L_w)	76.9	78.9	73.9	73.9	67.9	62.9	57.9	50.9	82.6 dB	74.1 dBA
Geometric Divergence (A_{div})	56.1	56.1	56.1	56.1	56.1	56.1	56.1	56.1		
Atmospheric Absorption (A_{atm})	0.0	0.1	0.2	0.5	1.1	1.9	3.9	11.6		
Ground Absorption (A_{gr})	-4.7	-1.4	4.9	4.3	-1.1	-2.4	-2.4	-2.4		
A-Weighting Adjustment (ADJ_A)	26.2	16.1	8.6	3.6	0.0	-1.2	-1.0	1.1		
Sound Pressure Level (L_p)	25.6	24.2	12.8	12.9	11.8	7.3	0.3	-14.4	28.3 dB	16.2 dBA

Propagation Model Sound Impact Results (copy and paste after each model iteration)

Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Inverter West Bank 1-2 Contribution	26.3	22.8	11.9	13.2	19.2	15.0	4.2	-9.4	28.9 dB	21.6 dBA
Inverter West Bank 3-4 Contribution	26.0	22.4	11.5	12.8	18.8	14.6	3.7	-10.1	28.5 dB	21.2 dBA
Inverter West Bank 5-6 Contribution	25.3	21.7	10.6	11.9	18.0	13.8	2.7	-11.6	27.8 dB	20.4 dBA
Inverter West Bank 7-8 Contribution	25.1	21.3	10.3	11.6	17.7	13.4	2.3	-12.2	27.5 dB	20.1 dBA
Inverter East Bank 9-10 Contribution	34.9	32.4	23.8	25.1	29.4	25.1	15.3	5.5	38.2 dB	32.0 dBA
Inverter East Bank 11-12 Contribution	30.5	27.8	18.0	19.4	24.6	20.4	10.3	-0.7	33.6 dB	27.1 dBA
Inverter East Bank 13 Contribution	25.8	22.9	12.5	13.9	19.5	15.4	5.0	-6.8	28.7 dB	22.0 dBA
2000 kVA Transformer Contribution	25.6	24.2	12.8	12.9	11.8	7.3	0.3	-14.4	28.3 dB	16.2 dBA
Sound Level Impact Result	**38.1**	**35.4**	**25.9**	**27.2**	**31.9**	**27.7**	**17.6**	**7.0**	**41.1 dB**	**34.5 dBA**

Notes:

The combined sound level impact caused by (13) CPS inverters and (1) 2000 kVA transformer operating simultaneously upon the sound environment at the PL-2 nearest residential property line located to the north of the east inverter bank source is approximately 34-35 dBA

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Sound Propagation Modeling

Projection Configuration		
Source Height (h_s)	1.00 m	3.28 ft
Measurement Height (h_r)	1.50 m	4.92 ft
Horizontal Offset (d_h)	44.41 m	145.66 ft
Measurement Distance (d_p)	44.41 m	145.67 ft
Boundary Condition Factor (Q)	1 -	
Temperature (T)	25.0 °C	
Pressure (P)	101.3 kPa	
Relative Humidity (RH)	70.0 %	
Water Vapor Content (H)	22,484 ppmv	
Ground at Source (G_s)	0.50 -	
Ground at Receiver (G_r)	0.50 -	
Ground in Middle (G_m)	0.50 -	

Modeling Location: West Property Line - Transformer (nearest residential PL)

* Model inverter banks and transformer impact result at PL-3

	D (m)		D (m)
Inverters 1-2	98.8	Inverters 9-10	216.9
Inverters 3-4	89.2	Inverters 11-12	212.1
Inverters 5-6	80.8	Inverter 13	210.5
Inverters 7-8	79.6	Transformer	44.4

Parameters	Octave Band Center Frequency (Hz)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Sound Power Level (L_w)	76.9	78.9	73.9	73.9	67.9	62.9	57.9	50.9	82.6 dB	74.1 dBA
Geometric Divergence (A_{div})	43.9	43.9	43.9	43.9	43.9	43.9	43.9	43.9		
Atmospheric Absorption (A_{atm})	0.0	0.0	0.0	0.1	0.3	0.5	1.0	2.9		
Ground Absorption (A_{gr})	-3.0	-1.1	2.9	2.6	-0.7	-1.5	-1.5	-1.5		
A-Weighting Adjustment (ADJ_A)	26.2	16.1	8.6	3.6	0.0	-1.2	-1.0	1.1		
Sound Pressure Level (L_p)	35.9	36.1	27.0	27.2	24.4	20.0	14.5	5.6	39.7 dB	29.3 dBA

Propagation Model Sound Impact Results (copy and paste after each model iteration)

Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Inverter West Bank 1-2 Contribution	28.0	24.9	14.4	15.7	21.5	17.4	6.8	-5.4	30.8 dB	24.0 dBA
Inverter West Bank 3-4 Contribution	28.7	25.7	15.4	16.7	22.4	18.2	7.8	-4.0	31.6 dB	24.8 dBA
Inverter West Bank 5-6 Contribution	29.3	26.5	16.3	17.7	23.2	19.0	8.7	-2.7	32.3 dB	25.7 dBA
Inverter West Bank 7-8 Contribution	29.4	26.6	16.5	17.9	23.3	19.2	8.9	-2.5	32.4 dB	25.8 dBA
Inverter East Bank 9-10 Contribution	22.4	18.2	7.1	8.3	14.4	9.9	-1.9	-19.3	24.6 dB	16.7 dBA
Inverter East Bank 11-12 Contribution	22.6	18.4	7.3	8.5	14.6	10.2	-1.7	-18.8	24.8 dB	16.9 dBA
Inverter East Bank 13 Contribution	19.7	15.4	4.4	5.6	11.7	7.2	-4.6	-21.6	21.9 dB	14.0 dBA
2000 kVA Transformer Contribution	35.9	36.1	27.0	27.2	24.4	20.0	14.5	5.6	39.7 dB	29.3 dBA
Sound Level Impact Result	**38.7**	**37.6**	**28.2**	**28.8**	**30.4**	**26.1**	**17.5**	**7.3**	**42.1 dB**	**33.6 dBA**

Notes:

The combined sound level impact caused by (13) CPS inverters and (1) 2000 kVA transformer operating simultaneously upon the sound environment at the PL-3 nearest residential property line located to the west of the transformer source is approximately 33-34 dBA

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Sound Propagation Modeling

Projection Configuration		
Source Height (h_s)	1.00 m	3.28 ft
Measurement Height (h_r)	1.50 m	4.92 ft
Horizontal Offset (d_h)	86.28 m	283.00 ft
Measurement Distance (d_p)	86.28 m	283.00 ft
Boundary Condition Factor (Q)	1 -	
Temperature (T)	25.0 °C	
Pressure (P)	101.3 kPa	
Relative Humidity (RH)	70.0 %	
Water Vapor Content (H)	22,484 ppmv	
Ground at Source (G_s)	0.50 -	
Ground at Receiver (G_r)	0.50 -	
Ground in Middle (G_m)	0.50 -	

Modeling Location: South Property Line - West Bank (alt. residential PL)

* Model inverter banks and transformer impact result at PL-4

	D (m)		D (m)
Inverters 1-2	127.1	Inverters 9-10	189.8
Inverters 3-4	108.9	Inverters 11-12	173.9
Inverters 5-6	81.7	Inverter 13	164.7
Inverters 7-8	72.5	Transformer	86.3

Parameters	Octave Band Center Frequency (Hz)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Sound Power Level (L_w)	76.9	78.9	73.9	73.9	67.9	62.9	57.9	50.9	82.6 dB	74.1 dBA
Geometric Divergence (A_{div})	49.7	49.7	49.7	49.7	49.7	49.7	49.7	49.7		
Atmospheric Absorption (A_{atm})	0.0	0.0	0.1	0.3	0.5	0.9	1.9	5.6		
Ground Absorption (A_{gr})	-3.4	-1.1	4.4	4.0	-0.6	-1.7	-1.7	-1.7		
A-Weighting Adjustment (ADJ_A)	26.2	16.1	8.6	3.6	0.0	-1.2	-1.0	1.1		
Sound Pressure Level (L_p)	30.6	30.3	19.7	19.9	18.2	14.0	8.0	-2.7	34.0 dB	22.8 dBA

Propagation Model Sound Impact Results (copy and paste after each model iteration)

Source Equipment	Octave Band Center Frequency (Hz) Sound Level (dB)								Broadband	Broadband
	63	125	250	500	1000	2000	4000	8000	Z-Weighted	A-Weighted
Inverter West Bank 1-2 Contribution	26.4	22.9	12.0	13.3	19.3	15.1	4.3	-9.2	28.9 dB	21.7 dBA
Inverter West Bank 3-4 Contribution	27.4	24.2	13.4	14.8	20.7	16.5	5.9	-6.8	30.1 dB	23.1 dBA
Inverter West Bank 5-6 Contribution	29.2	26.4	16.2	17.6	23.1	19.0	8.6	-2.9	32.2 dB	25.6 dBA
Inverter West Bank 7-8 Contribution	30.0	27.4	17.5	18.8	24.1	20.0	9.8	-1.4	33.1 dB	26.6 dBA
Inverter East Bank 9-10 Contribution	23.5	19.4	8.3	9.5	15.7	11.3	-0.3	-16.4	25.8 dB	18.0 dBA
Inverter East Bank 11-12 Contribution	24.1	20.2	9.1	10.4	16.5	12.2	0.8	-14.7	26.5 dB	18.9 dBA
Inverter East Bank 13 Contribution	21.5	17.6	6.6	7.8	14.0	9.7	-1.6	-16.7	23.9 dB	16.4 dBA
2000 kVA Transformer Contribution	30.6	30.3	19.7	19.9	18.2	14.0	8.0	-2.7	34.0 dB	22.8 dBA
Sound Level Impact Result	**36.6**	**34.4**	**23.9**	**24.9**	**29.2**	**25.0**	**15.1**	**3.4**	**39.6 dB**	**31.9 dBA**

Notes:

The combined sound level impact caused by (13) CPS inverters and (1) 2000 kVA transformer operating simultaneously upon the sound environment at the PL-4 nearest residential property line located to the south of the west bank source is approximately 31-32 dBA

WSP USA E&I, Inc. - Environmental Noise Modeling Calculations
Foster Street Solar - 186 Foster Street, South Windsor, CT
CTEC Solar, LLC - Bloomfield, CT

Sound Modeling Summary								
Location ID	Existing Background	Facility Sound Level		Total Sound Level		Sound Level Increase		
		WSP	SPLAN	WSP	SPLAN	WSP	SPLAN	
PL-1	40.8	37.0	37.2	42.3	42.4	1.5	1.6	
PL-2	39.5	34.5	34.6	40.7	40.7	1.2	1.2	
PL-3	39.5	33.6	34.3	40.5	40.6	1.0	1.1	
PL-4	39.0	31.9	32.0	39.8	39.8	0.8	0.8	

Sound Modeling Summary (with +5 dBA discrete tone penalty)							
Location ID	Existing Background	Facility Sound Level		Total Sound Level		Sound Level Increase	
		WSP	SPLAN	WSP	SPLAN	WSP	SPLAN
PL-1	40.8	42.0	42.2	44.5	44.6	3.7	3.8
PL-2	39.5	39.5	39.6	42.5	42.6	3.0	3.1
PL-3	39.5	38.6	39.3	42.1	42.4	2.6	2.9
PL-4	39.0	36.9	37.0	41.1	41.1	2.1	2.1

Additional Model Notes

Horizontal Offset (d_h), is the distance from the center of the source to the measurement point transposed onto the x/y-plane.

Boundary Condition Factor (Q), accounts for the reflective planes or boundaries around the source of the noise. These planes act as reflectors focusing the sound into a certain direction. For general modeling, Q has the following values:

- Q = 1 -- Point source freely radiating in all directions (e.g. chimney)
- Q = 2 -- Point source with a single reflective plane (e.g. source on ground)
- Q = 4 -- Point source with two reflective planes (e.g. floor & wall)
- Q = 8 -- Point source with three reflective planes (e.g. floor corner)

Ground Effect Factor (G), introduced to represent ground reflectivity (0 = hard, 1 = soft) along the propagation path (i.e. source region, receptor region & middle region). For general modeling, G has the following values:

- G = 0 -- Pavement or Water
- G = 0.1 -- Packed Ground
- G = 0.6 - 0.8 -- Lawn or Field of Grass
- G = 0.7 - 0.9 -- Forest (w/ leaves) or Plowed Field
- G = 1.0 -- Fresh Snow

Geometric Divergence (A_{div}) = $10 \cdot \log[(4 \pi r^2) / Q]$

Atmospheric Absorption (A_{atm}) = $\alpha \cdot d_p / 100$

SoundPLAN Model
Noise Emissions of Sources

Source name	Reference	Level Day dB	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Cwall dB	CI dB	CT dB
Inverter-1	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-2	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-3	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-4	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-5	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-6	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-7	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-8	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-9	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-10	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-11	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-12	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Inverter-13	Lw/unit	-	72.2	71.6	66.9	68.0	69.3	64.4	55.0	47.0	-	-	-
Transformer	Lw/unit	-	76.9	78.9	73.9	73.9	67.9	62.9	57.9	50.9	-	-	-

SoundPLAN Model
Receiver List

No.	Receiver name	Building side	Floor	Limit Day dB(A)	Level Day dB(A)	Conflict Day dB
1	24_Orchard_Hill	-	GF	-	31.6	-
2	38_Orchard_Hill	-	GF	-	35.7	-
3	54_Orchard_Hill (PL-1)	-	GF	-	37.2	-
4	66_Orchard_Hill	-	GF	-	33.5	-
5	80_Orchard_Hill (PL-2)	-	GF	-	34.6	-
6	84_Foster	-	GF	-	32.0	-
7	84_Orchard_Hill	-	GF	-	33.8	-
8	106_Orchard_Hill	-	GF	-	30.4	-
9	118_Orchard_Hill	-	GF	-	25.6	-
10	132_Orchard_Hill	-	GF	-	19.8	-
11	160_Foster (PL-4)	-	GF	-	32.0	-
12	178_Foster (PL-3)	-	GF	-	34.3	-
13	214_Foster	-	GF	-	29.4	-

SoundPLAN Model
Spectra of the Receivers

No.	Name	Floor	Time slice	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
1	24_Orchard_Hill	GF	Day	10.1	18.0	15.0	21.4	29.0	25.8	14.6	-3.0
2	38_Orchard_Hill	GF	Day	13.0	21.0	19.0	25.6	33.1	29.9	19.2	4.5
3	54_Orchard_Hill (PL-1)	GF	Day	14.2	22.0	20.6	27.4	34.7	31.4	20.8	7.0
4	66_Orchard_Hill	GF	Day	11.2	18.7	15.8	22.6	31.0	27.9	16.4	-0.8
5	80_Orchard_Hill (PL-2)	GF	Day	11.9	19.3	17.3	24.1	32.1	28.9	17.9	3.2
6	84_Foster	GF	Day	10.0	17.9	15.3	21.8	29.3	26.3	15.0	-2.1
7	84_Orchard_Hill	GF	Day	11.2	18.5	16.5	23.2	31.3	28.2	17.0	2.1
8	106_Orchard_Hill	GF	Day	8.4	15.4	12.4	19.2	28.0	24.8	12.8	-4.9
9	118_Orchard_Hill	GF	Day	4.5	10.9	9.3	15.8	23.1	19.6	6.0	-16.5
10	132_Orchard_Hill	GF	Day	-0.4	5.5	6.7	12.5	16.8	12.8	-3.0	-32.1
11	160_Foster (PL-4)	GF	Day	10.0	18.0	15.3	22.0	29.4	26.2	15.0	-2.2
12	178_Foster (PL-3)	GF	Day	12.5	21.5	19.6	25.6	31.4	28.2	18.2	3.4
13	214_Foster	GF	Day	8.4	16.0	12.6	19.0	26.8	23.5	11.7	-8.2

Table 18 Frequency Adjustments (in dB) for DRPR Electric Motors

Octave Frequency Band (Hz)	Value Subtracted from Overall (dB)
31	9
63	9
125	7
250	7
500	6
1000	9
2000	12
4000	18
8000	27
A-weighted	4

DRPR Motors The normalized unweighted sound pressure levels for DRPR motors follow approximately the following relationships

$$L_p = 12 + 17 \log \text{kW} + 15 \log \text{rpm} \qquad (16)$$

for power ratings under 37 kW, and

$$L_p = 23 + 10 \log \text{kW} + 15 \log \text{rpm} \qquad (17)$$

for power ratings above 37 kW. For motors above 300 kW, the calculated noise value for a 300-kW motor should be used. The octave band adjustments for DRPR motors are given in Table 18.

2.9 Steam Turbines[1]

Steam turbines are sometimes used as primary or backup drivers for chillers, pumps, and air compressors. The noise levels of steam turbines are found generally to increase with increasing power rating, but it has not been possible to attribute any specific noise characteristics with speed or turbine blade passage frequency. Suggested normalized sound pressure levels for steam turbines, with a power range of 370 to 11,000 kW, are given in Table 19.

2.10 Transformers[1]

Transformer manufacturers commonly provide an average A-weighted sound pressure level for their products. Typically, this is an average of the sound pressure levels, on a reference sound producing surface space at a distance of 0.3 m from the outline of the transformer. On the basis of field studies of many transformer installations, the sound power level in octave bands has been related to the average A-weighted sound pressure level and the area of the four side walls of the unit. This relationship is expressed by

$$L_W = \text{average } L_{pA} + 10 \log A + C + 10 \qquad (18)$$

where A is the total surface of the four side walls of the transformer in the square metres and C is an octave band correction that has different values for different uses, as shown in Table 20. If the exact dimensions of the transformer are not known, an approximation will suffice. If in doubt, the area should be estimated on the high side. An error of 25% in area will produce a change of 1 dB in the sound power level. The most nearly applicable C value from Table 20 should be used. The C_1 value assumes normal radiation of sound. The C_2 value should be used in regular-shaped confined spaces where standing waves will likely occur, which typically may produce 6 dB higher sound pressure levels at the transformer harmonic frequencies of 120, 240, 360, 480, and 600 Hz (for 60-Hz line frequency; or other sound frequencies for other line frequencies). The C_3 value is an approximation of the noise of a transformer that has grown noisier (by about 10 dB) during its lifetime. This happens occasionally when the laminations or tie bolts become loose, and the transformer begins to buzz or rattle. In a highly critical location, it would be wise to use this value. Field measurements have shown that transformers may actually have A-weighted sound pressure levels that range from a few decibels (2 or 3 dB) above to as much as 5 or 6 dB below the quoted

Table 19 Normalized Sound Pressure Levels for Steam Turbines

	Sound Pressure Level (dB)		
	Steam Turbine Power [hp (kW)]		
Octave Frequency Band (Hz)	500–1500 (373–1119)	1501–5000 (1120–3730)	5001–15,000 (3731–11,190)
31	86	88	90
63	91	93	95
125	91	93	95
250	88	90	92
500	85	87	89
1000	85	88	91
2000	87	91	95
4000	84	88	92
8000	76	81	86
Overall	97	99	102
A-weighted	92	95	99

Table 20 Octave Band Corrections for Transformers

Octave Frequency Band (Hz)	Octave Band Corrections (dB) C_1[a]	C_2[b]	C_3[c]
31	−11	−11	−11
63	−5	−2	−2
125	−3	+3	+3
250	−8	−2	+2
500	−8	−2	+2
1000	−14	−11	−4
2000	−19	−19	−9
4000	−24	−24	−14
8000	−31	−31	−21

[a] Use C_1 for outdoor location or for indoor location in a large mechanical room (over 140 m^3) containing many other pieces of mechanical equipment that serve as obstacles to diffuse sound and breakup standing waves.
[b] Use C_2 for indoor locations in transformer vaults or small rooms (under 140 m^3) with parallel walls and relatively few other large-size obstacles that can diffuse sound and breakup standing waves.
[c] Use C_3 for any location where a serious noise problem would result if the transformer should become noisy following its installation and initial period of use

A-weighted sound pressure level. Quieted transformers that contain various forms of noise control treatments can be purchased at as much as 15 to 20 dB below normal A-weighted ratings.

3 PROPAGATION OF AIRBORNE NOISE FROM MECHANICAL EQUIPMENT ROOMS

The analysis of the impact of mechanical equipment, on surrounding spaces is relatively straightforward.[5] Once the sound pressure level within the mechanical equipment room has been established, the degree of transmission to adjacent spaces can be determined with knowledge of the transmission loss properties of the walls, floor, and ceiling of the mechanical room and the acoustical properties of the adjacent room.

3.1 Transmission Loss of Mechanical Room Partitions

Transmission loss data for different partitions can be found in many publications. As a general rule this information is derived from laboratory measurements (e.g., ASTM E90-04).[6] However, due to measurement limitation, transmission loss data below 100 Hz is rarely reported. Large mechanical equipment will often produce significant acoustic energy below 100 Hz. Therefore, there is a need to obtain transmission loss performance below 100 Hz, or alternatively, estimate the low-frequency performance. Quite often a single-number rating, such as the sound transmission class (STC) is provided. However, most of these single-number classifications are heavily weighted toward the 500- to 2000-Hz frequency range. While this range is suitable for the evaluation of isolation for speech, some music, and most transportation noise sources, it is not suitable for the evaluation of mechanical equipment noise sources. An alternative rating called the mechanical transmission class (MTC) may be used for rating partition transmission loss for mechanical equipment. The determination of the MTC is similar to the STC in that it uses the same reference curve and measured one-third octave band transmission loss data. The determination of the MTC rating differs from the determination of the STC rating in that:

1. No deficiencies are allowed in the 125- and 160-Hz one-third octave bands.
2. Moreover, if there are any surpluses above the STC contour in the 125- and 160-Hz one-third octave bands, the rating is increased by one-third of the sum of the surpluses.

Studies have indicated that, when the A-weighted sound pressure level within the mechanical equipment room is less than the sum of the MTC rating of the partition and the room criterion (RC) rating of the background sound within the adjacent room, the intrusive noise should be acceptable. MTC ratings are useful as a cursory evaluation technique. Final selection of partition types should be based on a more complete analysis (e.g., octave or one-third octave band analysis).

3.2 Openings in Walls

An opening, such as a door, window, or louvered vent, in an exterior wall of a noisy room will allow noise to escape from that room and perhaps be disturbing to neighbors. The sound power of the sound that passes through the opening can be estimated from

$$L_W = L_p + 10 \log A \tag{19}$$

where L_p is the sound pressure level in the room at the location of the opening and A is the area, in square metres, of the opening. For normal openings (windows or vents) without ducted connections to the noise source, it may be assumed that the sound radiates freely in all directions in front of the opening.

4 VIBRATION ISOLATION OF MECHANICAL EQUIPMENT[1]

If mechanical equipment is not provided with proper vibration isolation, acoustic energy will be transmitted into the supporting structure resulting in unwanted vibration and structure-borne sound. The isolator types and isolation guidelines presented in this chapter are based on experience with successful installation of mechanical equipment in commercial buildings.

4.1 Isolator Types and Transmissibility

A transmissibility curve is often used to indicate the general behavior of a vibration-isolated system. Transmissibility is roughly defined as the ratio of the force transmitted through the isolated system to the supporting structure to the driving force exerted by the piece of vibrating equipment. Strict interpretation

APPENDIX G

FEDERAL AVIATION ADMINISTRATION
DETERMINATIONS

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6244-OE

Issued Date: 12/06/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Crane Point 1
Location:	South Windsor, CT
Latitude:	41-49-21.97N NAD 83
Longitude:	72-31-48.76W
Heights:	266 feet site elevation (SE)
	22 feet above ground level (AGL)
	288 feet above mean sea level (AMSL)

This aeronautical study revealed that the temporary structure does not exceed obstruction standards and would not be a hazard to air navigation provided the condition(s), if any, in this letter is (are) met:

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power or the addition of other transmitters, requires separate notice to the FAA. This determination includes all previously filed frequencies and power for this structure.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of a structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this temporary structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Air Missions (NOTAM).

If you have any questions, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6244-OE

Signature Control No: 605981255-606459958 (TMP)
Stephanie Kimmel
Specialist

Additional Condition(s) or Information for ASN 2023-ANE-6244-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 288 feet above mean sea level.

Location: The structure will be located 6.67 nautical miles south of 7B6 Airport reference point.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Aeronautical study revealed that the temporary structure will not exceed any Part 77 obstruction standard. Aeronautical study confirmed that the temporary structure will have no effect on any existing or proposed arrival, departure or en route instrument/visual flight rules (IFR/VFR) operations or procedures. Additionally, aeronautical study confirmed that the temporary structure will have no physical or electromagnetic effect on the operation of air navigation and communications facilities and will not impact any airspace and routes used by the military. Based on this aeronautical study, the FAA finds that the temporary structure will have no adverse effect on air navigation and will not impact any aeronautical operations or procedures.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, marked-Chapters 3(Marked),14(Temporary),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Air Missions (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 06/06/2025 unless extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Sectional Map for ASN 2023-ANE-6244-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6245-OE

Issued Date: 12/06/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Crane Point 2 (HP)
Location:	South Windsor, CT
Latitude:	41-49-18.41N NAD 83
Longitude:	72-31-38.42W
Heights:	305 feet site elevation (SE)
	22 feet above ground level (AGL)
	327 feet above mean sea level (AMSL)

This aeronautical study revealed that the temporary structure does not exceed obstruction standards and would not be a hazard to air navigation provided the condition(s), if any, in this letter is (are) met:

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power or the addition of other transmitters, requires separate notice to the FAA. This determination includes all previously filed frequencies and power for this structure.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of a structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this temporary structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Air Missions (NOTAM).

If you have any questions, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6245-OE

Signature Control No: 605981256-606459957 (TMP)

Stephanie Kimmel
Specialist

Additional Condition(s) or Information for ASN 2023-ANE-6245-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 327 feet above mean sea level.

Location: The structure will be located 6.76 nautical miles south of 7B6 Airport reference point.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Aeronautical study revealed that the temporary structure will not exceed any Part 77 obstruction standard. Aeronautical study confirmed that the temporary structure will have no effect on any existing or proposed arrival, departure or en route instrument/visual flight rules (IFR/VFR) operations or procedures. Additionally, aeronautical study confirmed that the temporary structure will have no physical or electromagnetic effect on the operation of air navigation and communications facilities and will not impact any airspace and routes used by the military. Based on this aeronautical study, the FAA finds that the temporary structure will have no adverse effect on air navigation and will not impact any aeronautical operations or procedures.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, marked-Chapters 3(Marked),14(Temporary),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Air Missions (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 06/06/2025 unless extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Sectional Map for ASN 2023-ANE-6245-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6246-OE

Issued Date: 12/06/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Crane Point 3
Location:	South Windsor, CT
Latitude:	41-49-16.39N NAD 83
Longitude:	72-31-39.65W
Heights:	288 feet site elevation (SE)
	22 feet above ground level (AGL)
	310 feet above mean sea level (AMSL)

This aeronautical study revealed that the temporary structure does not exceed obstruction standards and would not be a hazard to air navigation provided the condition(s), if any, in this letter is (are) met:

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power or the addition of other transmitters, requires separate notice to the FAA. This determination includes all previously filed frequencies and power for this structure.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of a structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this temporary structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Air Missions (NOTAM).

If you have any questions, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6246-OE

Signature Control No: 605981257-606459959 (TMP)

Stephanie Kimmel
Specialist

Additional Condition(s) or Information for ASN 2023-ANE-6246-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 310 feet above mean sea level.

Location: The structure will be located 6.79 nautical miles south of 7B6 Airport reference point.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Aeronautical study revealed that the temporary structure will not exceed any Part 77 obstruction standard. Aeronautical study confirmed that the temporary structure will have no effect on any existing or proposed arrival, departure or en route instrument/visual flight rules (IFR/VFR) operations or procedures. Additionally, aeronautical study confirmed that the temporary structure will have no physical or electromagnetic effect on the operation of air navigation and communications facilities and will not impact any airspace and routes used by the military. Based on this aeronautical study, the FAA finds that the temporary structure will have no adverse effect on air navigation and will not impact any aeronautical operations or procedures.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, marked-Chapters 3(Marked),14(Temporary),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Air Missions (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 06/06/2025 unless extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Sectional Map for ASN 2023-ANE-6246-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6247-OE

Issued Date: 12/06/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

****DETERMINATION OF NO HAZARD TO AIR NAVIGATION FOR TEMPORARY STRUCTURE****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Crane Point 4
Location:	South Windsor, CT
Latitude:	41-49-19.92N NAD 83
Longitude:	72-31-49.94W
Heights:	248 feet site elevation (SE)
	22 feet above ground level (AGL)
	270 feet above mean sea level (AMSL)

This aeronautical study revealed that the temporary structure does not exceed obstruction standards and would not be a hazard to air navigation provided the condition(s), if any, in this letter is (are) met:

SEE ATTACHMENT FOR ADDITIONAL CONDITION(S) OR INFORMATION

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power or the addition of other transmitters, requires separate notice to the FAA. This determination includes all previously filed frequencies and power for this structure.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of a structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this temporary structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

A copy of this determination will be forwarded to the Federal Aviation Administration Flight Procedures Office if the structure is subject to the issuance of a Notice To Air Missions (NOTAM).

If you have any questions, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6247-OE

Signature Control No: 605981258-606459956 (TMP)
Stephanie Kimmel
Specialist

Additional Condition(s) or Information for ASN 2023-ANE-6247-OE

Proposal: To construct and/or operate a(n) Crane to a height of 22 feet above ground level, 270 feet above mean sea level.

Location: The structure will be located 6.69 nautical miles south of 7B6 Airport reference point.

Part 77 Obstruction Standard(s) Exceeded and Aeronautical Impacts, if any:

Aeronautical study revealed that the temporary structure will not exceed any Part 77 obstruction standard. Aeronautical study confirmed that the temporary structure will have no effect on any existing or proposed arrival, departure or en route instrument/visual flight rules (IFR/VFR) operations or procedures. Additionally, aeronautical study confirmed that the temporary structure will have no physical or electromagnetic effect on the operation of air navigation and communications facilities and will not impact any airspace and routes used by the military. Based on this aeronautical study, the FAA finds that the temporary structure will have no adverse effect on air navigation and will not impact any aeronautical operations or procedures.

Based on this aeronautical study, the structure would not constitute a substantial adverse effect on aeronautical operations or procedures because it will be temporary. The temporary structure would not be considered a hazard to air navigation provided all of the conditions specified in this determination are strictly met.

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, marked-Chapters 3(Marked),14(Temporary),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Air Missions (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

This determination expires on 06/06/2025 unless extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

Sectional Map for ASN 2023-ANE-6247-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6248-OE

Issued Date: 12/11/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel Point 1
Location:	South Windsor, CT
Latitude:	41-49-21.97N NAD 83
Longitude:	72-31-48.76W
Heights:	266 feet site elevation (SE)
	10 feet above ground level (AGL)
	276 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 06/11/2025 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6248-OE.

Signature Control No: 605982085-606850307 (DNE)
Stephanie Kimmel
Specialist

Attachment(s)
Map(s)

Sectional Map for ASN 2023-ANE-6248-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6249-OE

Issued Date: 12/11/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel Point 2 (HP)
Location:	South Windsor, CT
Latitude:	41-49-18.41N NAD 83
Longitude:	72-31-38.42W
Heights:	305 feet site elevation (SE) 10 feet above ground level (AGL) 315 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 06/11/2025 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6249-OE.

Signature Control No: 605982086-606850309 (DNE)

Stephanie Kimmel
Specialist

Attachment(s)
Map(s)

Sectional Map for ASN 2023-ANE-6249-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6250-OE

Issued Date: 12/11/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel Point 3
Location:	South Windsor, CT
Latitude:	41-49-16.39N NAD 83
Longitude:	72-31-39.65W
Heights:	288 feet site elevation (SE)
	10 feet above ground level (AGL)
	298 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 06/11/2025 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6250-OE.

Signature Control No: 605982087-606850308 (DNE)

Stephanie Kimmel
Specialist

Attachment(s)
Map(s)

Sectional Map for ASN 2023-ANE-6250-OE

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2023-ANE-6251-OE

Issued Date: 12/11/2023

Robert Burns
All-Points Technology Corporation - Engineering
3 Saddlebrook Dr
Killingworth, CT 06419

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Solar Panel Point 4
Location:	South Windsor, CT
Latitude:	41-49-19.92N NAD 83
Longitude:	72-31-49.94W
Heights:	248 feet site elevation (SE)
	10 feet above ground level (AGL)
	258 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/ lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M.

This determination expires on 06/11/2025 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.
(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO

SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (404) 305-6582, or Stephanie.Kimmel@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2023-ANE-6251-OE.

Signature Control No: 605982088-606850306 (DNE)
Stephanie Kimmel
Specialist

Attachment(s)
Map(s)

Sectional Map for ASN 2023-ANE-6251-OE