Bloomenergy

October 23, 2019

Attn: Connecticut Siting Council
10 Franklin Square
New Britain, CT 06051

RE: Petition of Bloom Energy Corporation for a Declaratory Ruling for the Location and Construction of a 10-megawatt Fuel Cell Grid-Side Distributed Resource at 160 Old Amston Road, Colchester, CT

We are submitting an original and fifteen (15) copies of the above-captioned Petition, together with the filing fee of $625.

In the Petition, Bloom Energy Corporation requests the Connecticut Siting Council approve the location and construction of a 10-megawatt fuel cell and associated equipment at 160 Old Amston Road, Colchester, Connecticut. Electricity generated by the Facility will be exported to the electric grid. The Facility will be fueled by natural gas.

Should you have any questions, concerns, or require additional information, please contact me via email (justin.adams@bloomenergy.com) or phone at (860) 839-8373.

Sincerely,
Bloom Energy

Justin Adams
Permitting Manager

Bloomenergy

STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

PETITION OF BLOOM ENERGY CORPORATION FOR A DECLARATORY RULING FOR THE LOCATION AND CONSTRUCTION OF A 10-MEGAWATT FUEL CELL GRID-SIDE DISTRIBUTED RESOURCE AT 160 OLD AMSTON ROAD, COLCHESTER, CONNECTICUT	:	PETITION NO. ____
	:	OCTOBER 23, 2019

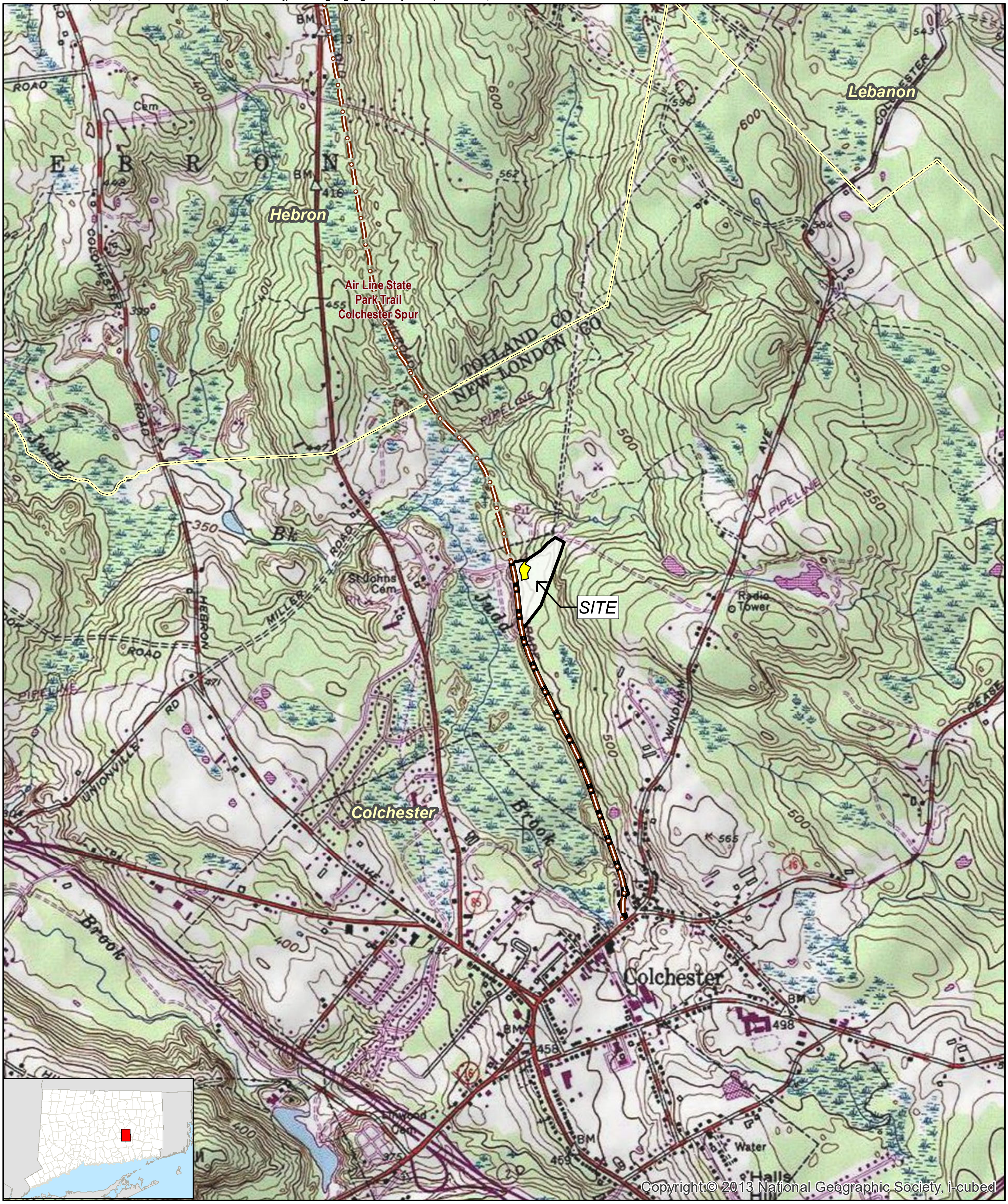
PETITION OF BLOOM ENERGY CORPORATION FOR A DECLARATORY RULING

Pursuant to Conn. Gen. Stat. §§ 4-176 and 16-50k(a) and Conn. Agencies Regs. § 16-50j-38 et seq., Bloom Energy Corporation ("Bloom") requests that the Connecticut Siting Council ("Council") approve by declaratory ruling the location and construction of a grid-side distributed resources project providing 10 megawatts ("MW") (net) of power, comprised of thirty-six (36) new ES-5 Bloom Energy Server solid oxide fuel cells and associated equipment (collectively, the "Facility"), located at 160 Old Amston Road, Colchester, CT (the "Site"). *See* Figure 1, *Project Location Map*. The Facility will be installed, maintained and operated by Bloom.

Conn. Gen. Stat. § 16-50k(a) provides, in relevant part, that:

> …Notwithstanding the provisions of this chapter or title 16a, the council shall, in the exercise of its jurisdiction over the siting of generating facilities, approve by declaratory ruling . . . (B) the construction or location of any fuel cell, unless the council finds a substantial adverse environmental effect or of any customer-side distributed resources project or facility or grid-side distributed resources project or facility with a capacity of not more than sixty-five megawatts, as long as such project meets air and water quality standards of the Department of Energy and Environmental Projection…

C:\Users\NicoleCastro\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Bloom Energy\Colchester_Fuel_Cell_410\mxd\Figure 1 Project Location Map.mxd



Legend

Site

Project Area

Trail

Municipal Boundary

Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Maps: Colchester (1984), CT
Map Scale: 1:24,000
Map Date: October 2019

2,000 1,000 0 2,000 Feet

Figure 1
Project Location Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

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The proposed Facility will be a grid-side distributed resources facility under 65 MW that complies with the air and water quality standards of the State of Connecticut Department of Energy and Environmental Projection ("DEEP"). Bloom submits that no Certificate is required because the proposed Facility would not have a substantial adverse environmental effect in the immediate vicinity of the Facility as well as in the State of Connecticut.

I. COMMUNICATIONS

Correspondence and other communication regarding this petition should be directed to the following parties:

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II. DISCUSSION

A. Project Description and Purpose

The Facility will be a 10 MW grid-side distributed resource consisting of thirty-six (36) state-of-the-art Bloom Energy Servers and associated equipment. It will be interconnected to an existing electric distribution substation ("Judd Brook Substation") located on the Site, owned and operated by the Connecticut Light and Power Company, dba Eversource Energy ("Eversource").

The proposed Facility is a "grid-side distributed resources" project because it will be "a unit with a rating of not more than sixty-five megawatts that is connected to the transmission or distribution system . . .." Conn. Gen. Stat. § 16-1(a)(37). Further, in its Final Decision in Docket

No. 12-02-09, dated September 12, 2012, the Connecticut Public Utilities Regulatory Authority ("PURA") determined that Bloom's Energy Server qualifies as a Class I renewable energy source fuel cell as defined in Conn. Gen. Stat. §16-1(a)(20)(A).

The proposed Facility was selected by DEEP though its Notice of Request for Proposals from Private Developers for Clean Energy (the "Notice of RFP"), dated January 31, 2018. As required by the Notice of RFP, the proposed Facility will help to "fulfill the requirements of the Procurement Statute[1] to secure energy resources that can provide reliable electricity that is in the interest of ratepayers, consistent with the energy policy goals set forth in the Comprehensive Energy Strategy ("CES") and the solid waste management policy goals set forth in the Comprehensive Materials Management Strategy ("CMMS")." The Facility will produce an estimated 81,524 MWh annually and over 1.6 million MWh over its 20-year project life with minimal impact on the surrounding community or local environment. In furtherance of the Connecticut CES, the Facility will provide Eversource with electricity and CT Class I Renewable Energy Certificates while also providing the local gas distribution utility with a compelling economic opportunity to invest in the gas distribution network. The Town of Colchester (the "Town") is one of fewer than fifty towns in Connecticut in which natural gas service is not available. The Facility will serve as an "anchor" gas customer for Eversource, enabling the delivery of gas to other businesses and residents in the Town.

B. The Facility

The Facility will be placed in the northwest corner of the Site within a fenced gravel compound, measuring approximately 90' x 225'. Access to the Facility will be via a new gravel

[1] Conn. Gen. Stat. § 16a3h, as amended.

drive originating off Old Amston Road approximately 230 feet east of the Air Line Trail (Colchester Railroad) ("Air Line Trail"). The Facility will consist of twenty (20) 300 kW and sixteen (16) 250 kW solid oxide fuel cell Bloom Energy Servers and associated equipment, capable of producing 10 MW of continuous, reliable electric power. The Bloom Energy Servers are enclosed, factory-assembled, and tested prior to installation. *See* Exhibit 1, *Bloom Energy Server Product Datasheets*. The Bloom Energy Servers will be configured in four (4) systems each capable of producing 2.5 MW of electricity, referred to hereinafter as Stamp(s). In addition to the Bloom Energy Servers, each Stamp will include one (1) 3750kVA, 480V/23kV, three phase step-up transformer, two (2) water deionization modules, one (1) energy monitoring cabinet, one (1) heat trace cabinet, and one (1) telemetry cabinet. The step-up transformer from each Stamp will feed one (1) 23kV, 600A pad-mounted switchgear, so that each Stamp can be isolated from the system manually or via overcurrent protection should that become necessary. The electrical interconnection point will be an Eversource-owned, fused disconnect switch located outside the Facility, from which the electrical feeder would connect to Judd Brook Substation. *See* Exhibit 2, *Site Plans*.

The Facility will be fueled by natural gas supplied by Eversource, and will require 3,456-gallons of water at start-up. Approximately 6,100 linear feet of natural gas service will be installed within the limits of the existing Air Line Trail from a future gas main on Lebanon Avenue (State Route 16) south of the Facility. Approximately 5,150 linear feet of water service will also be installed along the Air Line Trail from an existing fire hydrant approximately 950 feet north of Lebanon Avenue (State Route 16).

The operational life of the Facility is for the life of the 20-year contract and the solid oxide media in the fuel cells are exchanged at roughly five-year intervals. The Facility, the connections, and associated equipment will be installed in compliance with applicable building, plumbing, electrical, and fire codes. At the conclusion of the 20-year contract, Bloom may renew the contract, decommission the Facility, or sell into the wholesale ISO NE market. If the Facility is to be removed at the end of the contract, the Energy Servers, associated equipment and components, concrete pads, gravel, and fencing will be dismantled and removed, and the site will be restored as nearly as practicable to its effective original condition.

The Facility will have extensive hardware, software and operator safety control systems, designed in accordance with American National Standards Institute and Canadian Standards Association for Stationary Fuel Cell Power Systems ("ANSI/CSA"). It is Listed by UL as a "Stationary Fuel Cell Power System" to ANSI/CSA FC1-2014 under UL Category IRGZ and UL File Number MH45102. The Facility would be controlled remotely and have internal sensors that continuously monitor system operation. If safety circuits detect a condition outside normal operating parameters, the fuel supply is stopped and individual system components are automatically shut down. A Bloom Energy Remote Monitoring Control Center (RMCC) operator can also remotely initiate any emergency sequence. An emergency stop alarm initiates an automatic shutdown sequence that puts the system into "safe mode" and causes it to stop exporting power. Bloom operators can assess different situations and take the necessary actions to mitigate impacts on the fuel cells during maintenance work, shutdowns or outages and enable them to come back online smoothly and efficiently when the disruption is completed. In addition, Bloom will work with the Colchester Fire Department to determine and meet any additional requirements they may have for an emergency response plan and safety training. A final Emergency Response Plan will be generated once the consultation is complete.

The Facility will be installed in accordance with NFPA 853[2]. This standard provides fire prevention and fire protection requirements for safeguarding life and physical property associated with buildings or facilities that employ stationary fuel cell systems of all sizes. The risk of fire related to the operation of the Facility is therefore very low. Furthermore, in the Facility, natural gas is not burned; it is used in a chemical reaction to generate electricity. The natural gas is digested almost immediately upon entering the unit and is no longer combustible. As introduced above, any variation in heat outside of the operational parameters will trigger an automatic shutdown of the energy server. Before commissioning, the fuel lines (pipes) are cleaned in accordance with Conn. Gen. Stat. Section 16-50ii[3].

i. Natural Gas Desulfurization Process

The first step in the production of electricity in a Bloom Energy server is desulfurization – the removal of the sulfur compounds that have been added to the natural gas as an odorant by the natural gas suppliers. This step occurs in the desulfurization unit ("Desulf Unit") – a canister which contains a filter made for this purpose. Sulfur is not "produced" in this process, but is separated from the natural gas in which it was contained. In this process, trace levels of sulfur oxides and other naturally occurring elements may also absorb to the filter.

The desulfurization process takes place entirely within the Desulf Unit. Because they are built to hold natural gas, their structural integrity is essential. That integrity is assured by around

[2] Standard for the Installation of Stationary Fuel Cell Power Systems, 2015 Edition
[3] Public Act 11-101, An Act Adopting Certain Safety Recommendations of the Thomas Commission,

the clock monitoring of the Energy Servers to detect any leak. Were there a leak, the Server (including the desulfurization operation) would shut down automatically. There has never been a leak from one of the desulfurization canisters. The structural integrity and leak prevention continue after the desulfurization canisters are removed from service. At that point, the entry and exit points for the natural gas automatically seal shut. The desulfurization canister remains sealed and is not opened at the Site, or anywhere in the State of Connecticut. No gaseous substances are released or vented at any point during the desulfurization process.

The Desulf Unit contains a composite copper catalyst. This catalyst removes non-hazardous sulfur odorants from the natural gas feedstock. The sulfur, if not removed, would rapidly and irreversibly damage the fuel cells, bringing the production of electricity to a halt. Although the Desulf Unit is not intended to capture benzene or any other hazardous material, a small amount of benzene adheres to the adsorbent in the Unit.

The Desulf Units are periodically removed from service and replaced with Units containing fresh composite copper catalyst. Upon disconnection, the Desulf Unit automatically seals shut—to assure there is no release of natural gas. The Desulf Units are certified by the U.S. Department of Transportation (DOT) as meeting the hazardous waste shipment standards of the United Nations, DOT, IATA, ICAO and IMO Hazardous Materials Distribution and Packaging requirements.

The spent units are transported to ShoreMet, L.L.C. (ShoreMet) in Indiana, a facility where they are opened, the contents are removed and copper is used as an ingredient in various products. The Desulf Units are then cleaned, refilled, and sent back to the field for reuse.

The Indiana Department of Environmental Management (IDEM) reviewed ShoreMet's management of Bloom's spent desulfurization units. IDEM issued a letter concluding that the spent desulfurization units sent to ShoreMet are excluded from hazardous waste requirements because the contents (i.e., spent media) are used to make copper products (Code of Federal Regulation, title 40, section 261.2(e)(1)(i)). The US Environmental Protection reviewed IDEM's findings and agreed. The California Department of Toxic Substances Control (DTSC) reviewed these decisions and concluded that the Desulf Units are excluded recyclable material (ERM) under California Health and Safety Code, section 25143.2, subsection (b). There are number of conditions that apply to this exemption; Bloom satisfies those conditions.

C. Existing Environment

i. Site Development

The Site is a 12.7 acre parcel in the northeastern portion of the Town, within the Suburban Zone under the Town's Zoning Regulations. Eversource's Judd Brook Substation is located in the northeastern portion of the Site, with access extending from Old Amston Road. The Facility would be constructed in the northwest corner of the Site ("Project Area"). The remainder of the Site is undeveloped. The Air Line Trail runs to the west of the Site. The Colchester Dog Park is located to the north across Old Amston Road. Undeveloped forested land abuts the parcel to the east and south, with residential development lying farther south. The closest residential property is approximately 300 yards to the east of the Facility. *See* Figure 2, *Existing Conditions Map.*

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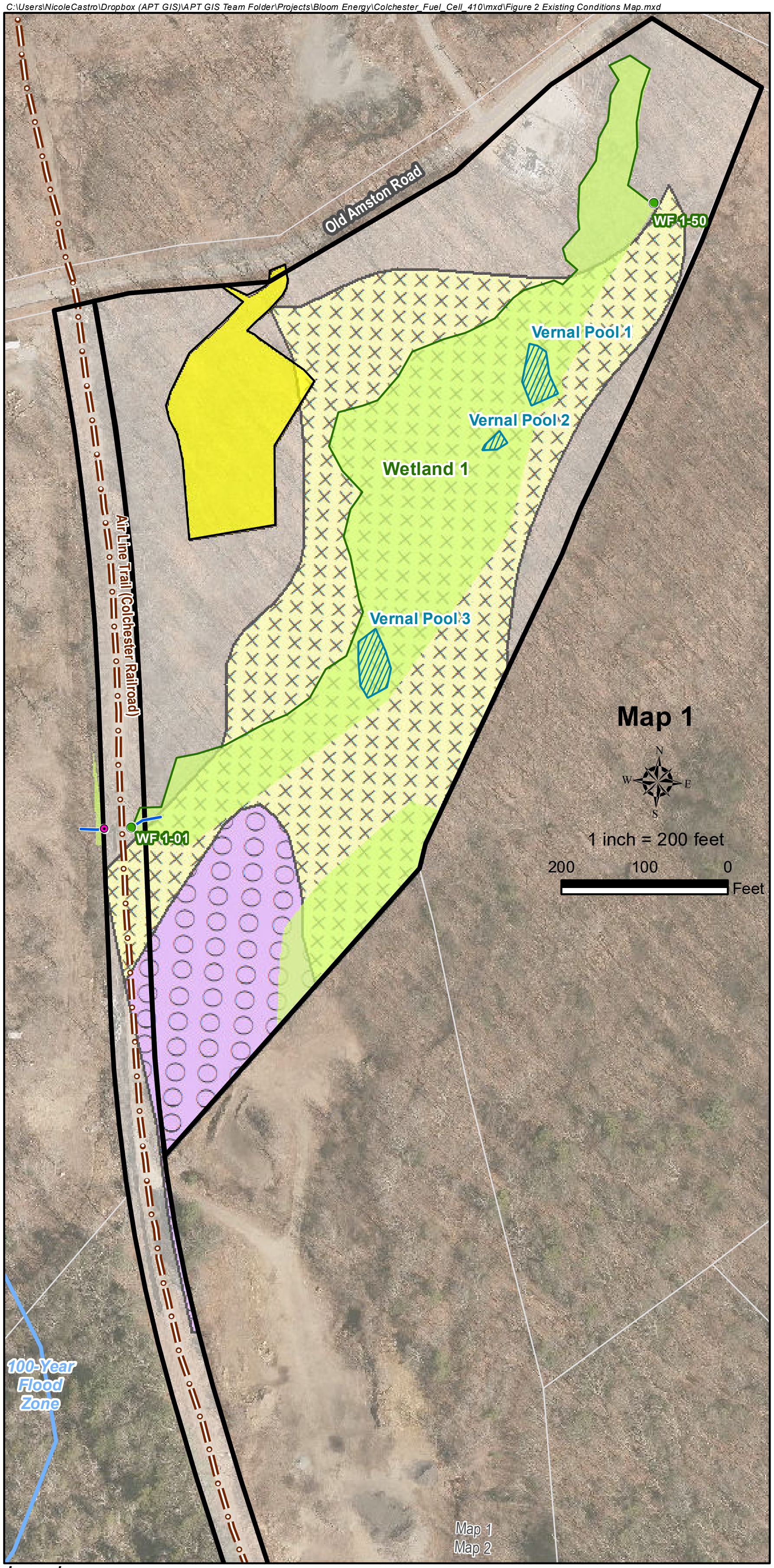

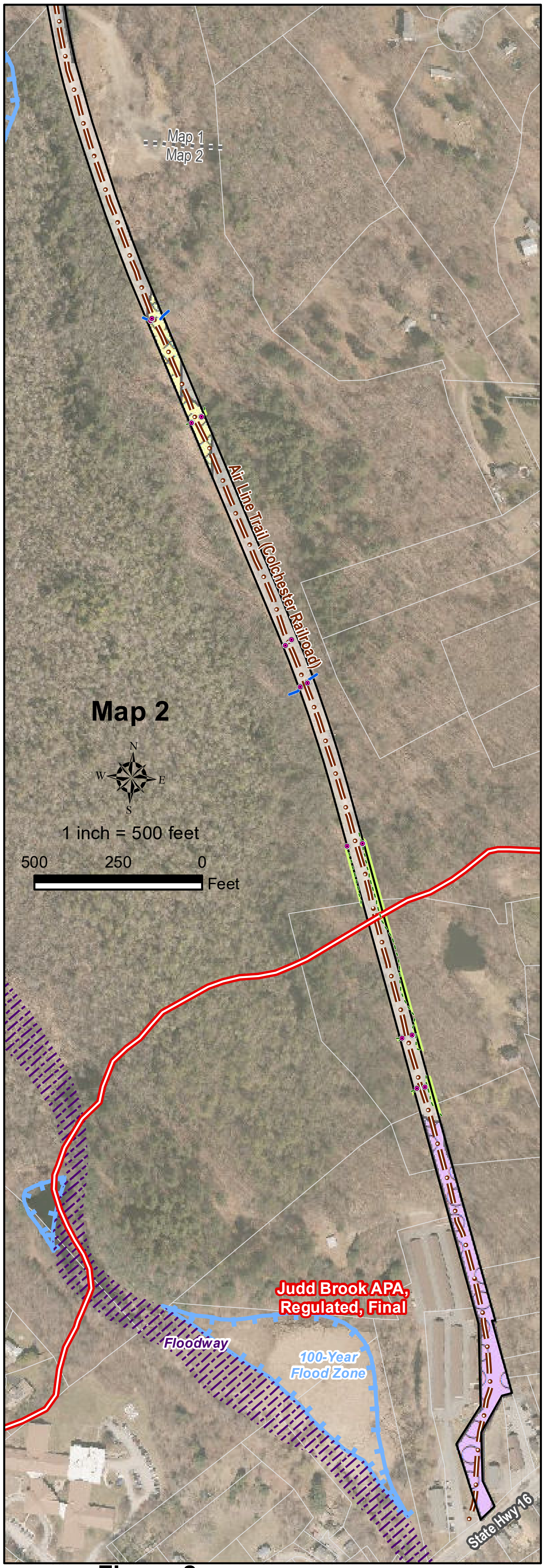

Legend

- Site
- Project Area
- Culvert
- Watercourse
- Wetland Flag
- Delineated Wetland Boundary Line
- Approximate Wetland Boundary Line
- Wetland Area
- Vernal Pool
- Approximate Parcel Boundary
- Air Line Trail (Colchester Railroad)
- Prime Farmland Soils (+/-6 acres)
- Statewide Important Farmland Soils (+/- 3 acres)
- 100-Year Flood Zone
- Floodway
- Adopted Aquifer Protection Area

Map Notes:
Base Map Source: CTECO 2016 Aerial Photograph
Map Scale: Map 1: 1 inch = 200 feet and Map 2: 1 inch = 500 feet
Map Date: October 2019

Figure 2
Existing Conditions Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

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ii. Rare, Threatened and Endangered Species and Critical Habitat

A review of publicly available Natural Diversity Database ("NDDB") mapping (June 2019) data shows that the Site and the work along the Air Line Trail are not within a NDDB Area and no portion of the Site is identified as CTDEEP Critical Habitat. The closest NDDB Area is approximately 0.84 miles to the northwest. Therefore, no request for Natural Diversity Data Base (NDDB) State Listed Species Review is required. *See* Exhibit 3, *Natural Diversity Data Base (NDDB) Overview Map*.

iii. Wetlands and Watercourses

APT performed wetland investigations on July 19, 2018 and September 11, 2019 at the Site and along the Air Line Trail to determine if the proposed development activities would impact any potential wetlands or watercourses. A large portion of the Site contains wetlands associated with an intermittent watercourse. *See* Exhibit 4, *Wetland Inspection Report* and Exhibit 5, *Overall Wetland Map* for details regarding wetlands resources. The work area along the Air Line Trail is bordered by wetlands and intermittent watercourses.

The wetland investigation along the Air Line Trail to identify the approximate location of wetland and watercourse resources was performed on September 11, 2019 by Matthew Gustafson. The methodology included identifying and locating the approximate location and extent of wetlands and watercourses within the right-of-way and bordering areas within ten (10) feet. As wetlands in proximity to the Air Line Trail are not addressed in APT's Wetland Inspection Report, a discussion of these wetlands is provided herein. Generally, these wetlands drain northeast to southwest as narrow hillside seep systems with interior watercourses, and broad bordering wetlands to Judd Brook. A large earthen embankment is present along the Air

Line Trail that confines the wetlands to the northeast side of the trail. Several corrugated plastic culverts and one stone box culvert were identified that provide cross drainage of these wetlands under the Air Line Trail. Wetlands located along the northwestern extents of the trail form larger bordering wetlands to Judd Brook. Generally, due to regular vegetation maintenance along the right-of-way, dominant vegetation consists of scrub/shrub and emergent plants. Outside the maintained limits of the right-of-way, these wetlands transition to mature forest. Dominant species identified throughout these wetland resources include spicebush (*Lindera benzoin*), jewelweed (*Impatients carpensis*), multiflora rose (*Rose multiflora*), speckled alder (*Alnus regosa*), bebb willow (*Salix bebbiana*). foxgrape (*Vitis labrusca*), elderberry (*Sambucus canadensis*), black willow (*Salix nigra*), green ash (*Fraxinus pennsylvanica*), red maple (*Acer rubrum*), and eastern hemlock (*Tsuga canadensis*).

a) <u>Vernal Pools</u>

During the wetland investigation, three depressional pockets were noted within the Site wetland that exhibited characteristics of potential seasonal flooding. These areas are identified as Vernal Pools 1, 2, and 3 (*See* Figure 2, *Existing Conditions Map*). These pools consist of discrete depressions that contain the potential hydrology to support hydrological regimes that allow for vernal pool breeding. As such, these vernal pools are classified as 'cryptic' style vernal pool habitat. At the time of the investigation Vernal Pool 1 contained approximately 2 to 4 inches of inundation, Vernal Pool 2 contained approximately 4 to 6 inches of inundation, and Vernal Pool 3 did not contain any inundation. Evidence of greater seasonal levels of inundation in the form of water markings on trees and leaves was present within each pool. Based on this evidence, seasonal inundation levels appear to reach 6-8 inches within Vernal Pool 1, 8 to 10 inches within

Vernal Pool 2, and 8 to 10 inches within Vernal Pool 3. Two (2) juvenile wood frogs (*Rhana sylvatica*) were observed in proximity to the wetland, providing evidence that one or more of these depressional pockets is supporting breeding by obligate vernal pool species.

iv. Water Quality

The Site was also reviewed for proximity to Aquifer Protection Areas. According to GIS data provided by CTDEEP, the closest Aquifer Protection Area, Judd Brook (A 31), is located in Colchester approximately one-half mile to the southeast of the Site. *See* Figure 2, *Existing Conditions Map*. According to CTDEEP mapping, the ground water classification at the Site is designated as GA/GAA. Class GAA designated uses are for existing or potential public supply of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. Class GA designated uses are for existing private and potential public or private water supplies of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. As of October 2018, the Site is located in a GA/GAA area that currently may not be meeting the GA or GAA standards. There are no surface water bodies on the Site.

v. Floodplain Areas

A review of the flood hazard mapping data from Federal Emergency Management Agency's ("FEMA") National Flood Insurance Program ("NFIP") shows the Facility would be located within an area of minimal flood hazard Zone X. *See* Figure 2, *Existing Conditions Map.*

vi. Habitat and Wildlife

Two distinct forest types occur within the Site, consisting of Upland Forest and Wetland Forest. A third cover type was observed along the Air Line Trail, consisting of disturbed edges dominated by regularly maintained herbaceous cover with scrub/shrub transitional areas. The Upland Forest habitat type is prevalent in the eastern and western extents of the Site. This habitat type consists of primarily two-aged, single story forest dominated by overstory red, black and white oak (*Quercus rubra, velutina, and alba*) with codominant or suppressed shagbark hickory (*Carya ovata*) and red maple (*Acer rubrum*). The two age classes generally range from 18 to 24 inches diameter at breast height ("DBH") and 6 to 10 inches DBH and consist of approximately 80% canopy closure. The understory of this habitat type is dominated by musclewood (*Carpinus caroliniana*), oak seedlings (*Quercus spp.*), virginia creeper (*Parthenocissus quinquefolia*), spicebush (*Lindera benzoin*), hayscented fern (*Dennstaedtia punctilobula*), Canada mayflower (*Maianthemum canadense*), and witchhazel (*Hamamelis virginiana*). This habitat type is also characterized by a moderate amount of downed coarse woody debris and a 1-inch duff layer.

The Wetland Forest occupies most of the central portion of the Site. This habitat consists of a complex of hillside seep wetlands that border an interior watercourse with pockets of seasonally flooded areas. The majority of this habitat is dominated by mature, closed canopy forest with the exception of the northern end, near the existing Substation, which contains comparatively smaller emergent and scrub-shrub vegetation.

The Disturbed Edges associated with the existing walking trail consist of gravel/stone dust surfaces with maintained edges dominated by herbaceous species typical of disturbed roadside/trailside edges. These species include mugwort (*Artemisia vulgaris*), wild strawberry (*Fragaria vesca*), deer-tongue grass (*Dichanthelium clandestinum*), goldenrod species (*Solidago sp.*), hayscented fern (*Dennstaedtia punctilobula*), red clover (*Trifolium pratense*), Japanese stiltgrass (*Microstegium vimineum*), and nodding smartweed (*Persicaria lapathifolia*).

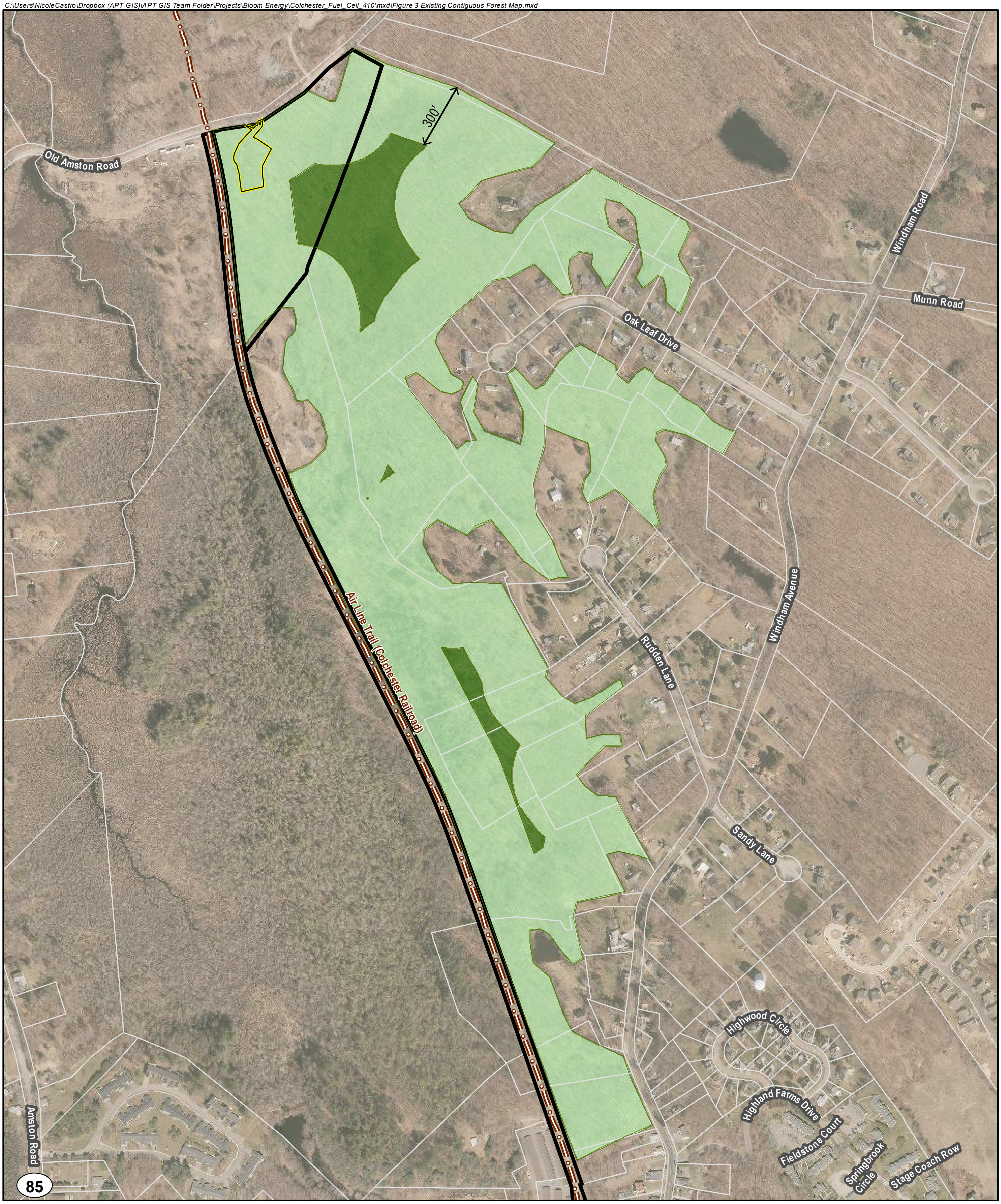
Transitional areas of scrub/shrub were also observed separating the trailside from the adjacent forested areas, consisting of Asiatic bittersweet (*Celastrus orbiculatus*), raspberry/blackberry (*Rubus spp.*), and honeysuckle (*Lonicera tatarica*). These disturbed edges are regularly maintained with mowing.

Due to the nature and size of the forested habitat located on the Site, larger species wildlife habitat is not optimal. Generalist wildlife species that are tolerant of human disturbance, such as raccoon (Procyon lotor), striped skunk (Mephitis mephitis), grey squirrel (Sciurus carolinensis), Virginia opossum (Didelphus virginiana), and eastern chipmunk (Tamias striatus) would be expected. Larger species such as coyote (Canis latrans), grey fox (Urocyon cinereoargunteus), white tailed deer (Odocoileus virginianus) and fisher (Martes pennant) also potentially take advantage of disturbed edges to forested habitat that is present at the Site.

a) Core Forest Determination

APT evaluated the size and extent of the contiguous forest block (i.e., core forest) present within and adjacent to the Site. The CTDEEP's Forestland Habitat Impact Mapping does not include the Site within an area mapped as core forest. UConn's Center for Land Use Education and Research's ("CLEAR") Forest Fragmentation Analysis ("FFA") study sets procedures for determining core forest habitat and identifying core vs. edge forest habitat. The FFA study designates "core forest" as greater than 300 feet from non-forested habitat. This 300-foot zone is referred to as the "edge width" and represents sub-optimal breeding habitat for forest-interior birds due to decreased forest quality, increased levels of disturbance, and increased rates of nest predation and brood parasitism within this transitional forest edge ("edge effect"). The FFA study identifies three categories of core forest: small (< 250 acres); medium (250-500 acres); and large (>500 acres). Using the FFA study parameters, the Site appears to contain a "small core" forest block.

In addition, APT conducted its own independent GIS analysis (based on 2016 leaf-off aerial photography) and determined that the total contiguous forest cover (including areas both on the Site and offsite) is approximately 102 acres. *See* Figure 3, *Existing Contiguous Forest Map*. Because this forest block is surrounded by existing development (local roads, Air Line Trail and residentially developed properties), the ratio of edge forest to core forest is high (94 of the 102 acres – or 92%). When factoring in forest currently influenced by edge effect (totaling approximately 94 acres), the aggregate amount of forest interior habitat is approximately eight (8) acres.



Legend

- Site
- Project Area
- Approximate Parcel Boundary
- Air Line Trail (Colchester Railroad)

Existing Forest Block (+/-102.35 Acres)

- Edge Forest (+/-94.35 Acres)
- Interior Forest (+/-8 Acres)

N W E S

600 300 0 600 Feet

Map Notes:
Base Map Source: CTECO Aerial Photograph (2016)
Map Scale: 1 inch = 600 feet
Map Date: October 2019

Figure 3
Existing Contiguous Forest Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

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vii. Soils and Geology

The Site is characterized by three well-drained soil types including Ninigret/Tisbury, Hinckley and Canton/Charlton Soils. The Site is located in the Southeast Hills Ecoregion which is described as bedrock composing of schists and gneisses and soils that have developed on top of glacial till as well as stratified deposits of sand, gravel and silt in some local valleys and upland areas.

a) Farmland Soils

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

According to the Connecticut Environmental Conditions Online Resource Guide[4], approximately six (6) acres of Prime Farmland Soils are mapped within the central portion of the Site while approximately three (3) acres of Statewide Important Farmland Soils are located in the southwest corner of the Site. *See* Figure 2, *Existing Conditions Map.* The majority of mapped Prime and Statewide Important Farmland Soils are located within the Site wetland.

viii. Scenic, Recreational and Other Areas of Interest

The nearest public recreational area is the Colchester Dog Park located approximately 500 feet to the northeast across Old Amston Road. Additional public recreation areas are located within a one-mile radius but are not near enough to be visually impacted by the proposed

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[4] Connecticut Environmental Conditions Online (CTECO) Resource Guide www.cteco.uconn.edu.

Facility. There are no State Designated Scenic Roads located within a one-mile radius. The Air Line Trail, a multi-use recreational path, borders the Site to the west and will also be used to route the natural gas interconnection. *See* Figure 4, *Surrounding Features Map*.

ix. Historical and Archaeological Resources

Heritage Consultants, LLC ("Heritage") completed a Phase IA Cultural Resources Assessment Survey at the Site. The 12.7-acre parcel includes 6.9 acres possessing either no or low potential for archaeological sensitivity, while 3.1 and 2.7 acres retain moderate and high archaeological sensitivity, respectively. The Project Area is proposed in a previously undisturbed area of potential moderate to high cultural (archaeological and historical) sensitivity. As such, a Phase 1B Cultural Resources Reconnaissance Survey of the Project Area was completed by Heritage in September of 2019. The Project Area was examined through the excavation of 72 shovel tests.[5] Prehistoric cultural material was identified from eight shovel tests. All of the recovered cultural material dates from an unknown prehistoric time period and no cultural features were identified. No additional archaeological examination was recommended by Heritage.

Heritage also determined that the Air Line Trail corridor did not require a Phase 1B survey since it has been historically disturbed and the potential is extremely low for intact soils to be present along the former railroad bed. *See* Exhibit 6, *Historical and Cultural Resources.*

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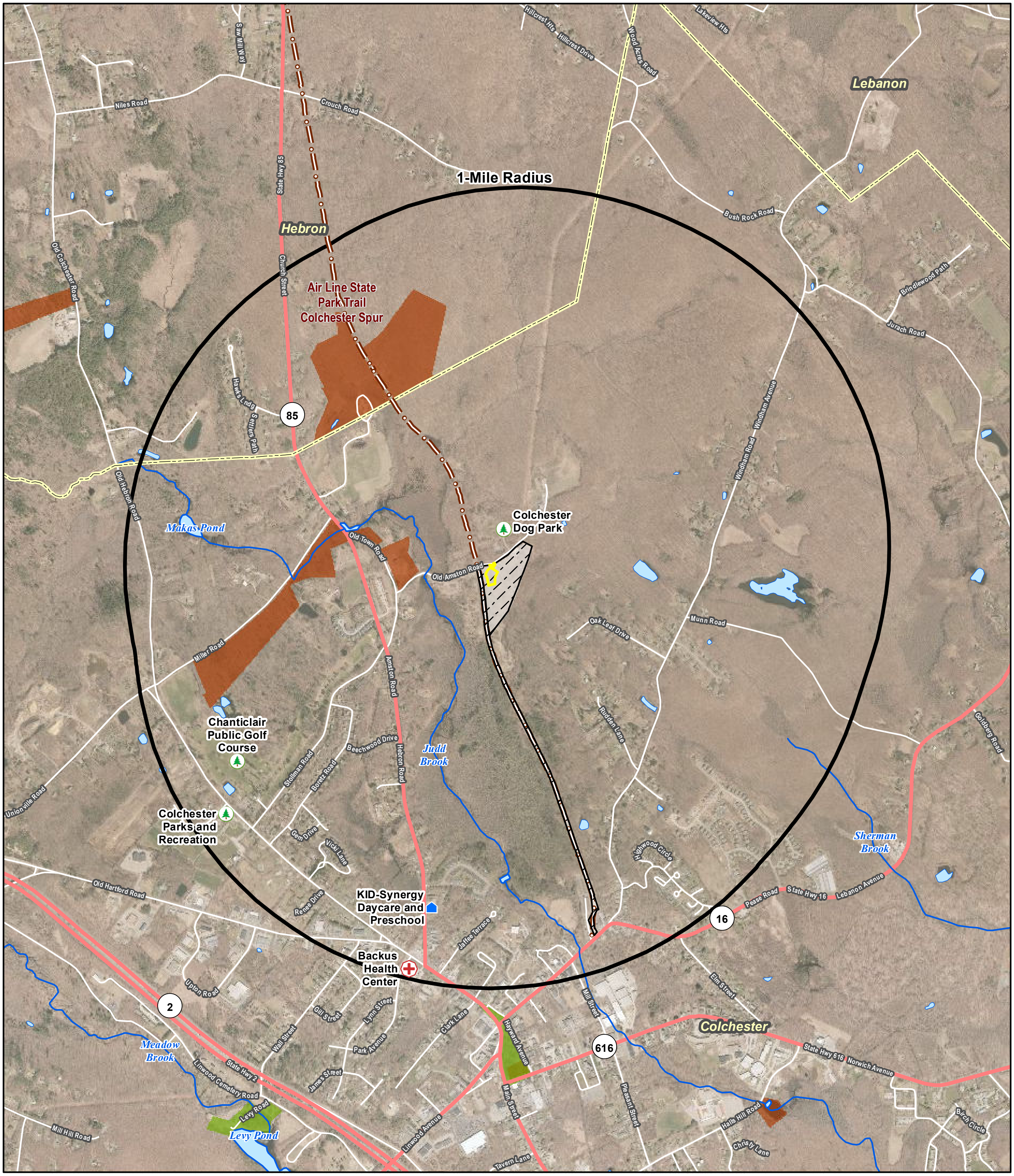
[5] A total of 73 shovel tests were originally planned. The single unexcavated shovel test was located in the vicinity of ground wasp nests and could not be completed due to safety reasons.



Legend

- Site
- Project Area
- 1-Mile Radius
- Trail

Protected Open Space Property (CTDEEP GIS)

- Private
- State

Surrounding Features (within 1-mile)

- Park/Recreation
- Health Care
- Daycare
- School (none within 1 mile)

- Municipal Boundary
- Open Water

Figure 4
Surrounding Features Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

N W E S

2,000 1,000 0 2,000 Feet

Base Map Source: 2016 CT ECO Imagery
Map Scale:1 in = 2,000 ft Map Date: October 2019

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x. Air Quality

Regulations of Connecticut State Agencies § 22a-174-42, which governs air emissions from new distributed generators, exempts fuel cells from air permitting requirements.

xi. Noise

The Town of Colchester does not have a noise regulation. In this case, the proposed project falls under the State of Connecticut Regulations for the Control of Noise for Distributed Generators, Regulations of Connecticut State Agencies § 22a-174-42 ("Noise Regulations"). The Noise Regulations, () which are enforced by CTDEEP., define sound level limits for environmental sound produced at the Site. The sound level limits are based on both emitter and receptor land use classifications and where multiple land uses exist on the same property, the least restrictive apply. Cavanaugh Tocci Associates completed an evaluation of the environmental sound impact associated with the Facility. *See* Exhibit 7, *Acoustic Review*. This evaluation found the following receptors:

- Land north of the Site is owned by the Town and is currently used as a dog park. This property boundary is classified as a Class B receptor with a limit of 62 dBA (day or night).
- Land uses east and south of the Site are residential properties (Class A receptors). The most stringent nighttime limit of 51 dBA applies at these boundaries.
- Currently the land west of the Site is vacant but zoned for potential residential use. To be conservative this evaluation considers this boundary as a class A receptor with a 51-dBA limit.

xii. Lighting

While no lighting study was completed for this Project, a review of the area found that Site lighting is limited to the Judd Brook Substation. There were no other lighting sources found in the vicinity of the Site.

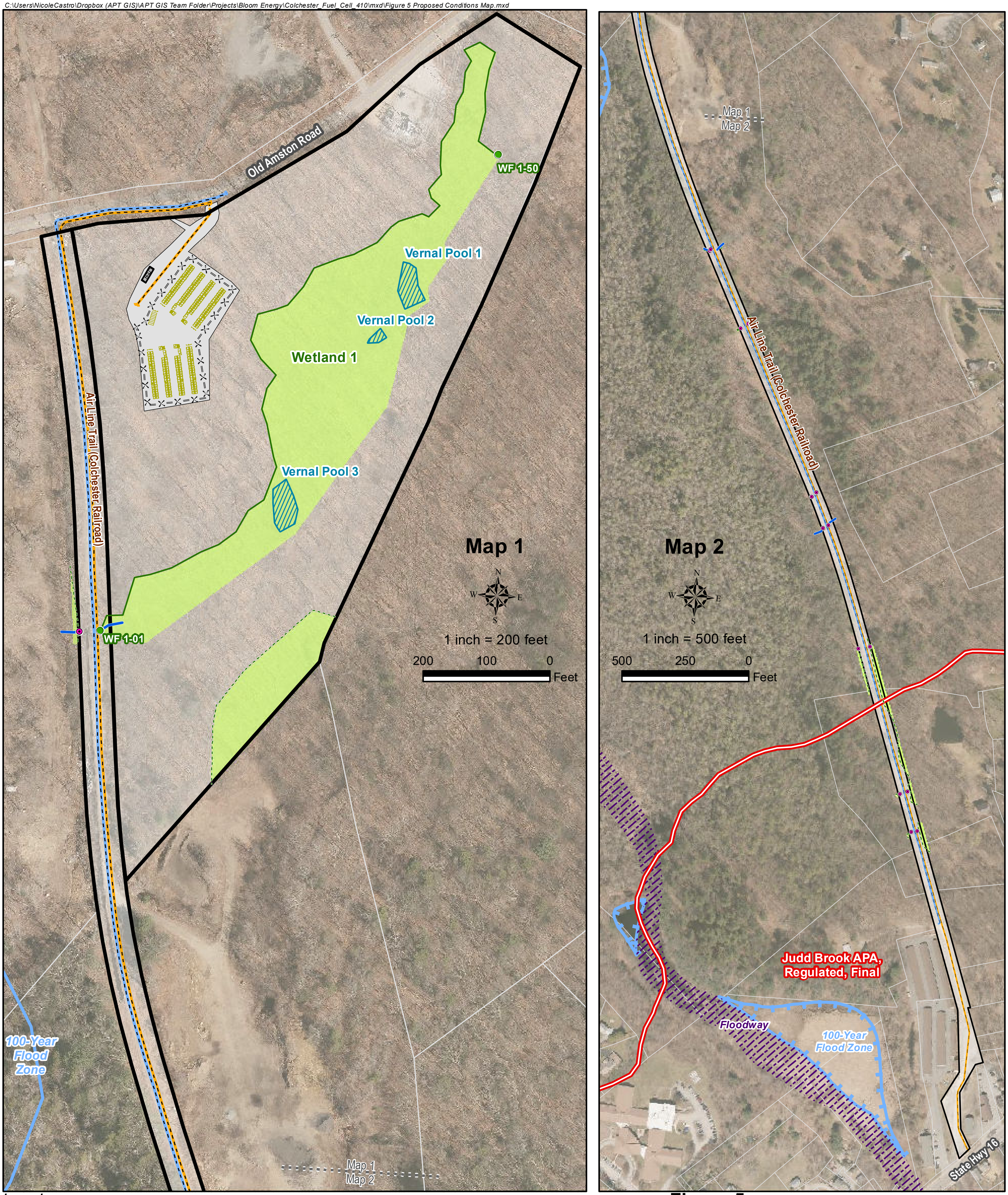
D. Environmental Effects and Mitigation

i. Site Development

The Project Area lies in an undeveloped woodland in the northwestern portion of the Site. The Judd Brook Substation is located in the northeastern corner of the property. Facility development includes the installation of an access drive, gravel pad, and chain link fence, and will require a total of approximately 1.4 acres of disturbance, including land clearing, grading, Facility construction, and trenching for utility services. Clearing and grading of the Project Area will require approximately 0.75 acres of disturbance. The grading associated with Facility development has been designed to closely balance cut and fill volumes and thus reduce the need to import to or export material from the Site. Once construction is complete all undeveloped, disturbed areas will be seeded to re-establish permanent cover.

The installation of the natural gas and water lines that will service the Facility will result in the disturbance of 0.65 acres within previously disturbed areas, mainly the Air Line Trail and Old Amston Road. Subsequent to utility installations, these areas will be restored to existing conditions. Please refer to Figure 5, *Proposed Conditions Map* and Exhibit 2, *Site Plans*. The location of the Facility has been reviewed and approved by Eversource and will have no impact on the current use of the Site or any future development that may occur.

C:\Users\NicoleCastro\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Bloom Energy\Colchester_Fuel_Cell_410\mxd\Figure 5 Proposed Conditions Map.mxd



Legend

- Site
- Project Area
- Energy Server
- Perimeter Fence
- Concrete Equipment Pad
- Underground Water Line Route
- Underground Gas Line Route
- Culvert
- Watercourse
- Wetland Flag
- Delineated Wetland Boundary Line
- Approximate Wetland Boundary Line
- Wetland Area
- Vernal Pool
- Approximate Parcel Boundary
- 100-Year Flood Zone
- Floodway
- Adopted Aquifer Protection Area

Map Notes:
Base Map Source: CTECO 2016 Aerial Photograph
Map Scale: Map 1: 1 inch = 200 feet and Map 2: 1 inch = 500 feet
Map Date: October 2019

Figure 5
Proposed Conditions Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

Bloomenergy
ALL-POINTS TECHNOLOGY CORPORATION

ii. Rare, Threatened and Endangered Species and Critical Habitat

As introduced earlier, a review of publicly available Natural Diversity Database ("NDDB") mapping (June 2019) data shows that the Site and the work along the Air Line Trail are not within a NDDB Area and no portion of the Site is identified as CTDEEP Critical Habitat. As such, there will be no effect to rare, threatened or endangered species or any Critical Habitat as a result of the Facility.

iii. Wetlands and Watercourses

No wetlands or watercourses will be directly impacted by the proposed Facility. The location of the proposed Facility is approximately 60 feet northwest from the nearest inland wetland boundary. The Facility has been located on the west side of an existing topographic knob that drains to the north and west away from the wetlands and towards Old Amston Road and the Air Line Trail. As such, stormwater generated during and post construction will be directed away from the wetland resources.

The installation of the natural gas and water service will require the replacement of one existing culvert along the Air Line Trail. The culvert replacement will be completed in accordance with the New England District of the U.S. Army Corps of Engineers General Permit 19 Stream, River & Brook Crossing.

Potential short-term temporary impacts associated with the Project's construction activities will be minimized by the proposed sedimentation and erosion controls which will be installed and maintained throughout the duration of construction in accordance with the *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*. Potential long-term secondary impacts to wetland resources are minimized by two factors. The development will be unstaffed (generating negligible traffic). Second, the gravel for the Facility and the access drive will be a combination of larger and smaller stones with 40% voids to promote infiltration from stormwater runoff.

a) Vernal Pools

Construction and operation of the Facility would not result in direct physical impact to any of the identified vernal pool habitats. The proposed Facility is located more than 172 feet from the leading edge of the nearest vernal pool habitat (Vernal Pool 3). It is widely documented that vernal pool dependent amphibians are not only solely dependent upon the actual vernal pool habitat for breeding and egg and juvenile development, but require surrounding terrestrial habitat for most of their adult lives. Recognized studies recommend protection of adjacent habitat up to 750 feet from the vernal pool edge for obligate pool-breeding amphibians.[6] Since the vernal pool habitat occurs in the vicinity of the Project Area, APT performed an evaluation of potential impacts the proposed Facility may have on this special aquatic habitat. *See* Exhibit 8, *Vernal Pools Analysis Map.*

In order to evaluate potential impacts to the vernal pools and their surrounding terrestrial habitats, the resources were assessed using methodology developed by Calhoun and Klemens (2002). This methodology assesses vernal pool ecological significance based on two parameters: 1) biological value of the vernal pool, and 2) conditions of the critical terrestrial habitat. The biological rating is based on the presence of federal or state-listed species and abundance and diversity of vernal pool indicator species. Based on the observations of these vernal pools

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6 Calhoun, A.J.K. and M.W. Klemens. 2002. Best Development Practices (BDPs): Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States. WCS/MCA Technical Paper No. 5.

collected to date, the highest biological value is assumed to be supported. The terrestrial habitat is assessed based on the integrity of the vernal pool envelope ("VPE"; within 100 feet of the pool's edge) and the critical terrestrial habitat ("CTH"; within 100 feet to 750 feet of the pool's edge). A priority rating of Tier I was assigned to all three vernal pool habitats, with Tier I considered to have relatively high breeding activity and relatively intact terrestrial habitat[7]. Pools with 25% or less developed areas in the critical terrestrial habitat are identified as having high priority for maintaining less than 25% development within this terrestrial habitat, including site clearing, grading and construction[3].

The vernal pools evaluated in this assessment were rated based on these criteria for both the existing condition and the proposed development to determine if project-related disturbances would result in a reduction in the Tier 1 ratings or reduce the terrestrial habitat integrity below the critical 75% non-development criterion. Because no direct impacts will occur within the VPE, the Facility will have no effect on the current Tier ratings of the vernal pools.

The results of the vernal pool analysis reveal that the pre-development condition does not exceed the 25% developed threshold within the CTH for each of the three (3) vernal pools. Note the CTH for each of the vernal pools includes areas that extend off the Site. Therefore, the relative ecological value of each of these vernal pool habitats has not yet been compromised.

Further, results of this analysis demonstrate that development of the proposed Facility would not result in significant degradation of the terrestrial habitat integrity of the vernal pools due to the small amount of disturbance associated with the proposed Facility (approximately 0.75 acre). The total area of the CTH associated with Vernal Pool 1 is 42.64± acres with 1.15± acres

7 Vernal Pool Assessment Sheet (source: Calhoun and Klemens 2002). Tier II and III pools represent lower amphibian productivity and fragmented terrestrial habitat.

consisting of existing development (primarily associated with Old Amston Road, the Air Line Trail and a Department of Public Works ("DPW") staging yard). This equates to approximately 10% of the CTH as being already developed. The proposed Facility, including a majority of the proposed access, would be located within the CTH, resulting in development of an additional 0.75± acre, which represents an increase of only 2% of the total CTH. The total area of the CTH associated with Vernal Pool 2 is 41.08± acres with 0.91± acres consisting of similar existing development. This equates to approximately 9% of the CTH as being already developed. Development of the proposed Facility would encroach within the CTH, resulting in an additional 0.75± acre of development, representing an increase of 2%. The CTH area associated with Vernal Pool 3 totals 42.79± acres, with 1.17± acres of pre-existing development, equating to approximately 9% of the CTH. The Facility would be located within the CTH, resulting in development of an additional 0.75± acre, representing an increase of just 1% of the total CTH.

Based on these results, the proposed Facility represents a de minimis increase in development of the CTH associated with the Site vernal pools and maintains levels of disturbance well below the 75% non-development criterion.[8] Therefore, the Facility will not result in long-term adverse impacts to the CTH of the vernal pools, considering the relatively small area of proposed development and low post-construction levels of disturbance (e.g., unstaffed, limited traffic generation). Similarly, the proposed development will not result in a likely adverse impact to existing amphibian productivity

[8] This threshold is generally used for prioritizing vernal pool conservation efforts: Calhoun, A.J.K. and M.W. Klemens. 2002. Best Development Practices (BDPs): Conserving Pool-Breeding Amphibians in Residential and Commercial Developments in the Northeastern United States. WCS/MCA Technical Paper No. 5. Pg. 10.

The potential exists for possible short-term impacts to herpetofauna associated with the nearby vernal pool habitats due to possible encounters with migrating and basking individuals that may intercept the proposed development footprint during construction. Site clearing and grading activities will not de-water the nearby vernal pool, or alter surface water drainage patterns associated with this pool. Impervious surfaces associated with the proposed project have been minimized with the use of a gravel surface for development of the Facility compound and access. The proposed development will not alter existing surface or subsurface flow conditions or directions and therefore will not alter the hydrology of the nearby vernal pool. In addition, no stormwater management features are proposed that would result in creation of a temporary pool and "sink", which could potentially affect breeding amphibians intercepted on their migration to the nearby vernal pool. Best Development Practices ("BDPs"; Calhoun and Klemens, 2002) are proposed as part of the Wetland and Vernal Pool Protection Program to avoid/minimize the potential for short-term impact to herpetofauna.

iv. Water Quality

The construction and operation of the Facility will comply with DEEP's water quality standards and will not have a substantial adverse environmental effect. With respect to water discharges, the Facility is designed to operate without water discharge under normal operating conditions. There are no connections or discharge points to the proposed Facility and it will not generate any additional stormwater on Site. Additionally, the Facility would use no water during normal operation beyond a 3,456-gallon injection at start up.

To safeguard water resources from potential impacts during construction, Bloom is committed to implementing protective measures in the form of a Stormwater Pollution Control

Plan ("SWPCP") to be finalized and submitted to the Council, pending approval by CTDEEP Stormwater Management. The SWPCP will include monitoring of established sedimentation and erosion controls that will be installed and maintained in accordance with the 2002 *Connecticut Guidelines for Soil Erosion and Sediment Control*. Bloom will also apply for a *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities* from CTDEEP. Therefore, with the incorporation of the proposed protective measures, stormwater runoff from the Project development will not result in an adverse impact to water quality associated with nearby surface water bodies.

v. Floodplain Areas

The Facility is located in an area designated as Zone X, which is defined as an area of minimal flooding. No special consideration or precautions relative to flooding are required.

vi. Habitat and Wildlife

The proposed work will occur entirely within upland forest habitat. Approximately 0.75 acres of permanent impact to this habitat will result. All proposed work occurs within 300 feet of an existing developed or degraded area. As such, impacted forested areas will occur within edge forest. While the Facility's development will result in an extension of edge effect impacts to the forested block (a decrease of interior forest habitat by roughly 1.07 acres), the increase in edge related impacts will have a de minimis effect on the larger interior forest block. Soils and Geology

No long-term adverse effects are anticipated on Site soils/geology. The grading associated with development of the Facility has been designed to closely balance cut and fill volumes to reduce the need to import or export material from the Site.

a) Farmland Soils

The construction of the proposed Facility will result in approximately 550 square feet of impact to an area mapped as Prime Farmland soils. The resultant impact of the project on approximately 6 acres of mapped Prime Farmland is less than 0.002%. This minimal intrusion will have no adverse effect on Prime Farmland soils at the Site. The Project Area does not impact any Statewide Important Farmland soils.

vii. Scenic, Recreational and Other Areas of Interest

The proposed Facility will have minimal visibility and will not reflect a significant change in the character of views currently experienced. There will be minimal, if any, impact to the Air Line Trail once the construction of the Facility and utility interconnections are complete. The Facility would be screened by existing mature trees along the western, southern and eastern property boundaries. *See* Exhibit 9 for *Photo-simulations*.

viii. Historical and Archaeological Resources

As a result of the Phase 1B Cultural Resources Reconnaissance Survey performed by Heritage, it was determined that all recovered cultural material dates from an unknown prehistoric time period and no cultural features were identified. It has been determined that the Project Area lacks substantial archaeological deposits, cultural features, research potential and/or the qualities of significance as defined by the National Register of Historic Places criteria for evaluation. Therefore, development of the Facility will have no effect on historic or archaeological resources. *See* Exhibit 6, *Historical and Cultural Resources.*

ix. Air Quality

The construction and operation of the Facility will not have a substantial adverse environmental effect as it relates to air quality standards. Conn. Agencies Regs. § 22a-174-42, which governs air emissions from new distributed generators, exempts fuel cells from air permitting requirements. Accordingly, no permits, registrations, or applications are required based on the actual emissions from the Facility[9]. Even though the fuel cell systems are exempt from the emissions requirements, Bloom Energy fuel cells do meet the emissions standards of Section 22a-174-42. Per Section 22a-174-42(e)(1)(A) a certification by the California Air Resources Board (CARB) pursuant to Title 17, sections 94200 through 94214 of the California Code of Regulations meets the requirements of Conn. Agencies Regs. § 22a-174-42. The Bloom Energy fuel cells are certified under the CARB distributed generation program. A current list of certified applications is provided on the CARB's distributed generation certification website (http://www.arb.ca.gov/energy/dg/eo/eo-current.htm).

The Facility will also meet state criteria thresholds for all greenhouse gases defined in Section 22a-174-1(49). Table 1 lists thresholds set by the Low and Zero Emissions Renewable Energy Credit (LREC/ZREC) program[10], and compares them to emissions generated from the proposed Facility. By virtue of the non-combustion process the Bloom Energy fuel cells virtually eliminate NOx, SOx, CO, VOCs and particulate matter emissions from the energy production process. Similarly, there are no CH_4, SF_6, HFC or PFC emissions. The CH_4 is broken down in the reforming process. Reforming is the type of process where if you have sufficient catalyst, the

[9] See Conn. Agencies Regs. §§ 22a-174-42(b) and (e).
[10] Sec. 16-244t

reaction can go all the way to completion. That is the case for the Bloom Energy Server. The fuel is reformed in the hot box – with a significant excess catalyst for reaction.

Table 1: Connecticut Thresholds for Greenhouse Gases

Emission Type	Bloom Output	LREC allowance
Nitrous Oxides (NOx)	<0.01 lbs/MWh	0.07 lbs/MWh
Carbon Monoxide (CO)	<0.05 lbs/MWh	0.10 lbs/MWh
Sulfur Oxides (SOx)	Negligible	Not Listed
Volatile Organic Compounds (VOCs)	<0.02 lbs/MWh	0.02 lbs/MWh
Carbon Dioxide (CO2)[11]	679-833 lbs/MWh	Not Listed

The proposed Facility will ultimately displace less efficient fossil fueled marginal generation on the ISO New England system. Based upon US Environmental Protection Agency (EPA) "eGrid" data the proposed facility is expected to reduce carbon emissions by more than 25% while essentially eliminating local air pollutants like NOx, SOx, and particulate matter.

x. Noise

Facility related sound impacts associated with the equipment at the Facility have been calculated using CadnaA environmental sound modeling software by Cavanaugh Tocci Associates,as documented in a letter dated October 15, 2019. *See* Exhibit 7, *Acoustic Review*. The Facility is classified as a Class C emitter[12] and will produce sound continuously during daytime and nighttime hours. Sound produced by the Facility is not expected to contain prominent discrete tones as defined by the Noise Regulations. The analysis was based on source sound emission data derived from measurements performed near similar fuel cell equipment located in Cambridge, Massachusetts. The analysis indicated that sound impacts associated with

[11] Carbon Dioxide is measured at Bloom's stated lifetime efficiency level of 53-60%

[12] A Class C noise zone includes uses generally of an industrial nature. State of Connecticut Noise Regulation (Section 22a-69-1 to 7.4).

the Facility are expected to fall below 50 dBA at all property boundaries, and are estimated to be below 30 dBA at the nearest existing residences. The results of the analysis demonstrate that the sound produced by the Facility will comply with the most stringent requirements of the state for emitter class C to receptor class A/night, which is 51 dBA.

xi. Lighting

No exterior lighting is planned at the Facility. Temporary lighting may be used during equipment maintenance.

E. Project Construction and Maintenance

Bloom anticipates construction to start in the second quarter of 2020 with 24 weeks of total construction time (including 17 weeks of site preparation, 4 weeks of equipment installation, and 3 weeks of commissioning). Bloom anticipates that construction will take place only during daytime hours, between the hours of 7:00 a.m. and 7:00 p.m., Monday through Saturday. If Sunday work-days are required, the construction hours will be between the hours of 9:00 a.m. and 6:00 p.m. At times during the installation of the natural gas and water service, a portion of the Air Line Trail will need to be closed to the public. Bloom will coordinate with the Town of Colchester on the closure of the Air Line Trail and will comply with any notification requirements to the general public.

During construction, appropriate erosion and sedimentation ("E&S") controls will be installed and areas of disturbance will be promptly stabilized in order to minimize the potential for soil erosion and the flow of sediments off site. Temporary E&S control measures will be maintained and inspected throughout construction to ensure their integrity and effectiveness. The temporary E&S control measures will remain in place until the work is complete and all disturbed areas have been stabilized. No effect to drainage patterns or stormwater discharges are anticipated.

Soils that are generated during construction activities would not be stored or stockpiled inside of wetlands or adjacent to a watercourse, and appropriate E&S control measures would be employed and maintained for any temporary soil stockpiles. Any excavated soils compatible for reuse will be used as backfill in proximity to the same excavation area from where it originated. At this time, all soils excavated are expected to be suitable for reuse. Rock, concrete and other debris would be removed and trucked off-site.

Areas affected by construction would be re-graded as practical and stabilized using revegetation or other measures before removing temporary E&S controls. Construction-related impacts will therefore be minimal.

III. MUNICIPAL CONSULTATION

Representatives of Bloom have discussed the proposed Facility with the Town's First Selectman. The Town's First Selectman sent a letter of support, dated October 2, 2018, to both Eversource Energy and UIL Holdings.[13] *See* Exhibit 10, *Municipal Documents.* The Facility's presence would provide an incentive for expansion of natural gas service within the Town, consistent with the Town's 2015 Plan of Conservation & Development. The Town Board of Selectmen has set a Town meeting for October 30, 2019 for a vote on a 20-year tax stabilization agreement for Bloom. *See* Exhibit 10, *Municipal Documents.*

[13] At the time it was uncertain whether Eversource or UIL Holdings would be providing gas distribution to the area

Bloom has provided notice of this petition via certificate of mailing to all persons and appropriate municipal officials and governmental agencies to whom notice is required to be given pursuant to Conn. Agencies Regs. § 16-50j-40(a)[14]. A copy of the notice letter and a service list are provided in Exhibit 11 and the corresponding abutters map is provided in Exhibit 12.

IV. BASIS FOR GRANTING OF THE PETITION

Under Conn. Gen. Stat. § 16-50k(a), the Council is required to approve by declaratory ruling the construction or location of a grid-side distributed resources project or facility with a capacity of not more than 65 MW, as long as the facility meets DEEP air and water quality standards. The proposed Facility meets each of these criteria. The Facility is a "grid-side distributed resources" project, as defined in Conn. Gen. Stat. § 16-1(a)(34)(A), because the Facility is "a unit with a rating of not more than sixty-five megawatts that is connected to the transmission or distribution system…" and, as demonstrated herein, will meet DEEP air and water quality standards. In addition, as demonstrated above, the construction and operation of the Facility will not have a substantial adverse environmental effect in the State of Connecticut.

[14] Conn. Agencies Regs. § 16-50j-40(a) requires that "[p]rior to submitting a petition for a declaratory ruling to the Council, the petitioner shall, where applicable, provide notice to each person other than the petitioner appearing of record as an owner of property which abuts the proposed primary or alternative sites of the proposed facility, each person appearing of record as an owner of the property or properties on which the primary or alternative proposed facility is to be located, and the appropriate municipal officials and government agencies [listed in Section 16-50*l* of the Connecticut General Statutes]."

V. CONCLUSION

For the reasons stated above, Bloom respectfully requests that the Council approve the location and construction of the Facility by declaratory ruling.

Respectfully submitted,
Bloom Energy Corporation

By:____________________________

Justin Adams
Bloom Energy Corporation
4353 North First Street
San Jose, CA 95134
Telephone: (408) 543-1500
Email: justin.adams@bloomenergy.com

Bloomenergy

EXHIBITS

Exhibit 1:	Bloom Energy Server Product Datasheets
Exhibit 2:	Site Plans
Exhibit 3:	Natural Diversity Data Base (NDDB) Overview Map
Exhibit 4:	Wetland Inspection Report
Exhibit 5:	Overall Wetland Map
Exhibit 6:	Historical and Cultural Resources
Exhibit 7:	Acoustic Review
Exhibit 8:	Vernal Pool Analysis Map
Exhibit 9:	Photo-Simulations
Exhibit 10:	Municipal Documents
Exhibit 11:	Notice Pursuant to Conn. Agencies Regs. § 16-50j-40(a)
Exhibit 12:	Abutters Map

Bloomenergy

Exhibit 1

Bloomenergy®

Energy Server 5

Clean, Reliable, Affordable Energy

CLEAN, RELIABLE POWER ON DEMAND

The Energy Server 5 delivers clean power that reduces emissions and energy costs. The modular architecture enables the installation to be tailored to the actual electricity demand, with a flexibility to add servers as the load increases. The Energy Server 5 actively communicates with Bloom Energy's network operations centers so system performance can be monitored 24 hours per day, 365 days per year.

INNOVATIVE TECHNOLOGY

Utilizing solid oxide fuel cell (SOFC) technology first developed for NASA's Mars program, the Energy Server 5 produces clean power at unprecedented efficiencies, meaning it consumes less fuel and produces less CO_2 than competing technologies. Additionally, no water is needed under normal operating conditions.

ALL-ELECTRIC POWER

The Energy Server 5, which operates at a very high electrical efficiency, eliminates the need for complicated and costly CHP systems. Combining the standard electrical and fuel connections along with a small footprint and sleek design, the Energy Server 5 is the most deployable fuel cell solution on the market.

CONTROLLED AND PREDICTABLE COST

By providing efficient on-site power generation, the economic and environmental benefits are central to the Energy Server 5 value proposition. Bloom Energy customers can lock in their long term energy costs and mitigate the risk of electricity rate increases. The Energy Server 5 has been designed in compliance with a variety of safety standards and is backed by a comprehensive warranty.

About Bloom Energy

Bloom Energy is making clean, reliable energy affordable. Our unique on-site power generation systems utilize an innovative fuel cell technology with roots in NASA's Mars program. By leveraging breakthrough advances in materials science, Bloom Energy systems are among the most efficient energy generators, providing for significantly reduced operating costs and dramatically lower greenhouse gas emissions. Bloom Energy Servers are currently producing power for many Fortune 500 companies including Apple, Google, NSA, Walmart, AT&T, eBay, Staples, as well as notable non-profit organizations such as Caltech and Kaiser Permanente.

Headquarters:
Sunnyvale, California

For More Information:
www.bloomenergy.com

Energy Server 5

Technical Highlights (ES5-AA2AAA)	
Outputs	
Nameplate power output (net AC)	262.5 kW
Base load output (net AC)	250 kW
Electrical connection	480 V, 3-phase, 60 Hz
Inputs	
Fuels	Natural gas, directed biogas
Input fuel pressure	10-18 psig (15 psig nominal)
Water	None during normal operation
Efficiency	
Cumulative electrical efficiency (LHV net AC)*	65-53%
Heat rate (HHV)	5,811-7,127 Btu/kWh
Emissions	
NOx	< 0.01 lbs/MWh
SOx	Negligible
CO	< 0.05 lbs/MWh
VOCs	< 0.02 lbs/MWh
CO_2 @ stated efficiency	679-833 lbs/MWh on natural gas; carbon neutral on directed biogas
Physical Attributes and Environment	
Weight	13.6 tons
Dimensions (variable layouts)	14' 9" x 8' 8" x 7' 0" or 29' 4" x 4' 5" x 7' 5"
Temperature range	-20° to 45° C
Humidity	0% - 100%
Seismic vibration	IBC site class D
Location	Outdoor
Noise	< 70 dBA @ 6 feet
Codes and Standards	
Complies with Rule 21 interconnection and IEEE1547 standards	
Exempt from CA Air District permitting; meets stringent CARB 2007 emissions standards	
An Energy Server is a Stationary Fuel Cell Power System. It is Listed by Underwriters Laboratories, Inc. (UL) as a 'Stationary Fuel Cell Power System' to ANSI/CSA FC1-2014 under UL Category IRGZ and UL File Number MH45102.	
Additional Notes	
Access to a secure website to monitor system performance & environmental benefits	
Remotely managed and monitored by Bloom Energy	
Capable of emergency stop based on input from the site	

* 65% LHV efficiency verified by ASME PTC 50 Fuel Cell Power Systems Performance Test

Bloomenergy®

Bloom Energy Corporation
1299 Orleans Drive
Sunnyvale CA 94089
T 408 543 1500
www.bloomenergy.com

Exhibit 2

EVERSOURCE

160 OLD AMSTON ROAD
COLCHESTER, CT 06415

Bloomenergy

SITE INFORMATION

PARCEL INFORMATION

PROPERTY OWNER	EVERSOURCE
COUNTY	NEW LONDON
TAX MAP #	06–06

PROPERTY DESCRIPTION

PROPERTY AREA	12.7 ACRES
DISTURBED AREA	39,097 S.F.

PARKING INFORMATION

EXISTING PARKING*	0
REQUIRED PARKING*	0
REMOVED PARKING	0
ADDED PARKING	0
FINAL PARKING COUNT	0

*BASED ON PLAN ENTITLED "PROPERTY & TOPOGRAPHIC SURVEY, LAND OF CONNECTICUT LIGHT & POWER", PREPARED BY MARTIN SURVEY ASSOCIATES, LLC, DATED 09/25/2018.

PERMITTING INFORMATION

MUNICIPAL

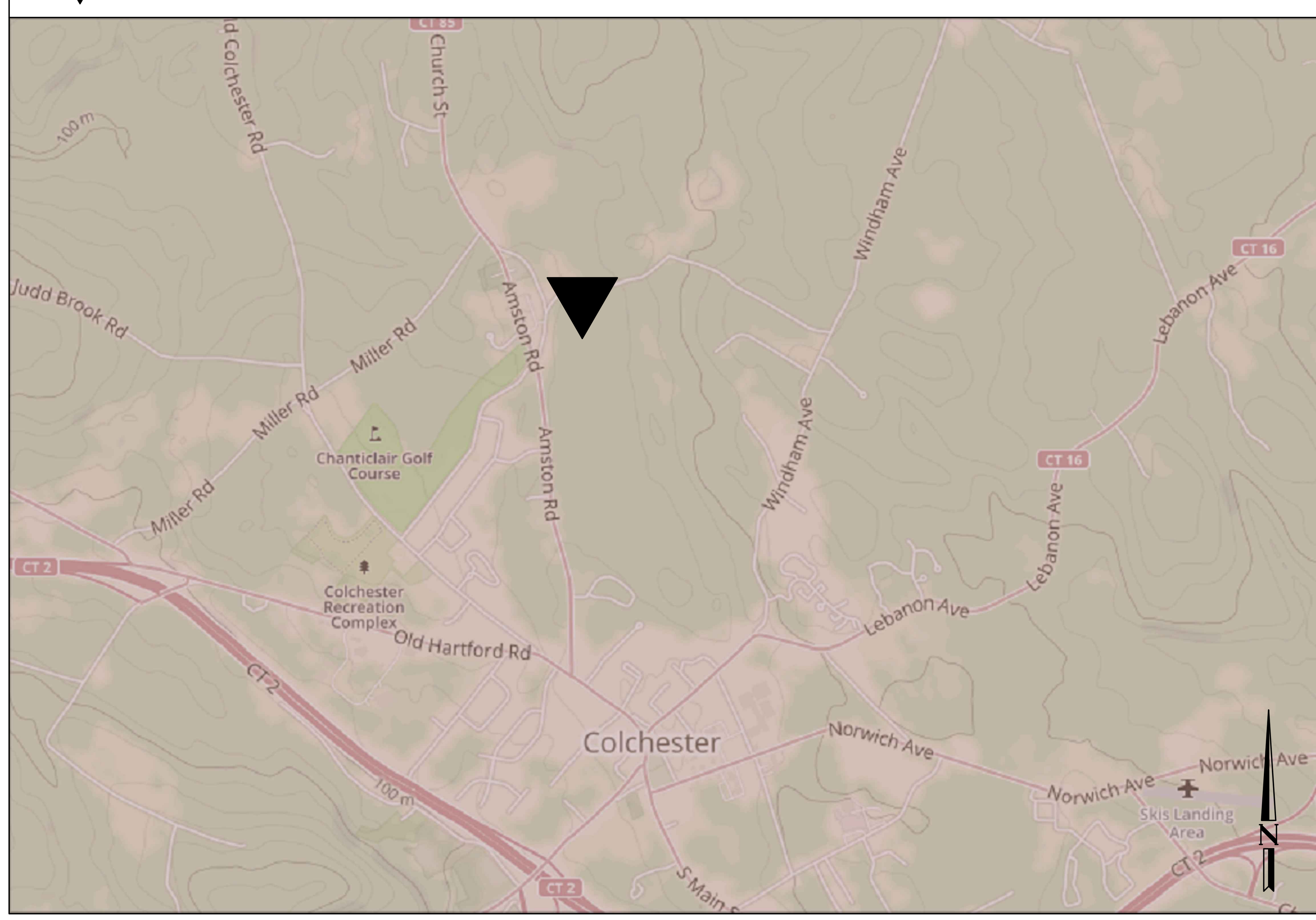
AGENCY	DEPARTMENT
PLANNING	TOWN OF COLCHESTER
BUILDING	TOWN OF COLCHESTER
FIRE	COLCHESTER FIRE DEPARTMENT

UTILITY

TYPE	COMPANY
NATURAL GAS	EVERSOURCE (CT)
ELECTRICAL	EVERSOURCE (CT)
WATER	TOWN OF COLCHESTER SEWER & WATER DEPARTMENT

VICINITY MAP (NTS)

▼ PROJECT SITE



CODES

BUILDING	2012 INTERNATIONAL BUILDING CODE
BUILDING	2012 INTERNATIONAL EXISTING BUILDING CODE
ENERGY	2012 INTERNATIONAL ENERGY CONSERVATION CODE
PLUMBING	2012 INTERNATIONAL PLUMBING CODE
FUEL GAS	2012 INTERNATIONAL FUEL GAS CODE
ELECTRICAL	2014 NATIONAL ELECTRICAL CODE (NFPA 70)
FIRE	2016 CONNECTICUT STATE FIRE SAFETY CODE
FIRE	2015 CONNECTICUT STATE FIRE PREVENTION CODE
MECHANICAL	2012 INTERNATIONAL MECHANICAL CODE

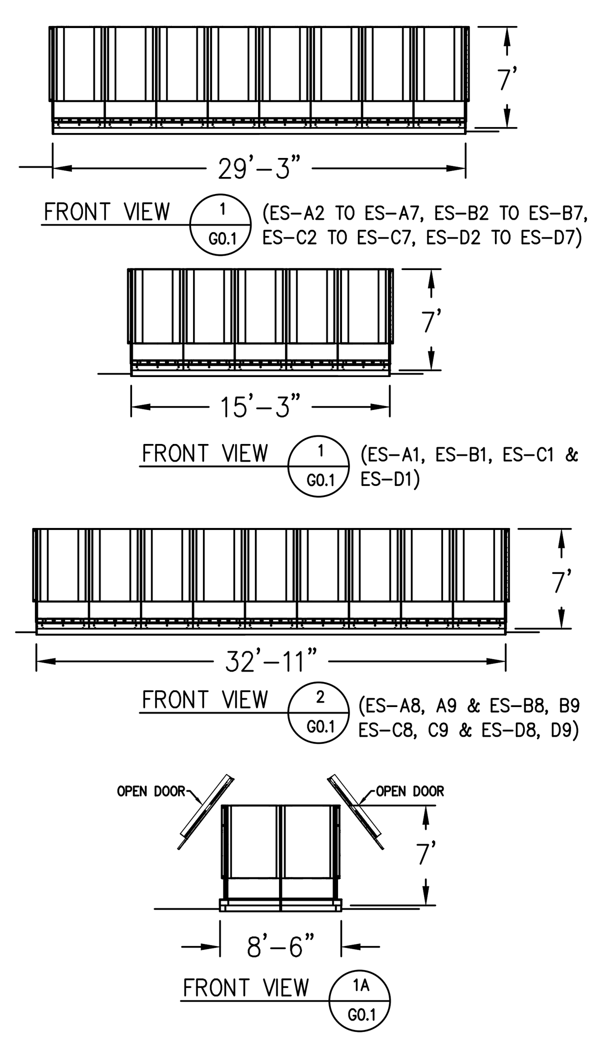
PROJECT TEAM CONTACTS

FIRM	ADDRESS	CONTACT INFO
MANUFACTURER BLOOM ENERGY	1299 ORLEANS DR. SUNNYVALE, CA 94089	(408) 543–1500
CUSTOMER EVERSOURCE	160 OLD AMSTON ROAD, COLCHESTER, CT 06415 UNITED STATES	(800) 286–2000
GREENBERGFARROW (MEP) AMY HADLOW, P.E.079288	1430 W. PEACHTREE ST. SUITE 200 ATLANTA, CA 30309	(404) 601–4000
GREENBERGFARROW (CIVIL) STEPHEN POWERS, PEN.0030199	153 CORDAVILLE ROAD SUITE 120 SOUTHBOROUGH, MA 01772	(857) 305–0596
GREENBERGFARROW (STRUCTURAL) BILL BORNHORST, P.E.	301 PERIMTER CENTER NORTH, SUITE 100 ATLANTA, GA 30346	(707) 457–2376
GREENBERGFARROW (ELECTRICAL) GUIDO ALVAREZ, P.E.	1430 PEACHTREE STREET, SUITE 200 ATLANTA, GA 30309	(404) 601–4000
WHITESTONE ASSOC..INC. (GEOTECHNICAL CONSULTANT) KEVIN A.FEATH, P.E,	35 TECHNOLOGY DRIVE WARREN, NJ 07059	(908) 668–7777

DRAWING INDEX

PROJECT DESCRIPTION

THIS PROJECT CONSISTS OF THE INSTALLATION OF THIRTY SIX (36) BLOOM ENERGY ES5 OUTDOOR NATURAL GAS CLEAN ENERGY SERVERS. THE CLEAN ENERGY SERVERS ARE SUPPORTED ON CONCRETE PADS. THE WORK INCLUDES ALL ITEMS LISTED IN THE SCOPE OF WORK.



SCOPE OF WORK

THE SCOPE OF THIS PROJECT WILL CONSIST OF THE FOLLOWING:

1. CIVIL WORK
   - CONTRACTOR TO REMOVE TREES AND CLEAR AREA FOR INSTALLATION OF ENERGY SERVERS AND ASSOCIATED EQUIPMENT.
   - EXISTING SUBGRADE AT LANDSCAPE REMOVAL WILL BE PREPARED FOR THE NEW EQUIPMENT WEIGHT.
   - NEW TRENCH FROM BLOOM ENERGY SERVER TO EXISTING SUBSTATION FOR GAS, WATER AND ELECTRICAL CONNECTIONS BETWEEN BLOOM ENERGY SERVER AND EXISTING SUBSTATION. TRENCH TO BE BACKFILLED AND NEW LANDSCAPE COVER TO BE PROVIDED.
   - NEW ENERGY SERVER PRECAST CONCRETE PADS AND ANCILLARY CAST–IN–PLACE CONCRETE PADS TO BE PLACED AT PREPARED SURFACE AT LANDSCAPE REMOVAL.
2. ELECTRICAL WORK
   - NEW ELECTRICAL FEEDERS BETWEEN BLOOM ENERGY SERVER AND EXISTING MAIN SERVICE SWITCHBOARD.
3. PLUMBING WORK
   - NEW WATER CONNECTION FROM NEW 8" WATER MAIN TO BLOOM ENERGY SERVER.
   - NEW NATURAL GAS CONNECTION. NEW METER AND REGULATOR REQUIRED.

BLOOM ENERGY FAQ's

Q: WHAT IS A BLOOM ENERGY SERVER?
A: THE BLOOM ENERGY SERVER IS A STATIONARY FUEL CELL POWER SYSTEM.
Q: IS THE BLOOM PRODUCT LISTED OR CERTIFIED?
A: YES. ES–5XXX SERIES:
- THE FUEL CELL IS UL LISTED AS A "STATIONARY FUEL CELL POWER SYSTEM" TO ANSI/CSA AMERICA FC 1–2004.
- IT IS UL LISTED UNDER UL CATEGORY IRGZ AND UL FILE NUMBER MH45102.

ES5 SERIES:
- THE FUEL CELL IS UL LISTED AS A "STATIONARY FUEL CELL POWER SYSTEM" TO ANSI/CSA FC 1–2014.
- IT IS UL LISTED UNDER UL CATEGORY IRGZ AND UL FILE NUMBER MH45102.

Q: WHERE ARE FUEL CELLS COVERED IN THE NATIONAL ELECTRICAL CODE (NEC)?
A: FUEL CELLS ARE COVERED IN ARTICLE 692 OF THE NEC (NFPA 70). FUEL CELLS HAVE BEEN INCORPORATED INTO THE NEC SINCE 2002.
Q: WHAT IS THE MODEL NUMBER OF THIS PRODUCT?
A: PLEASE SEE THE DATA SHEET PROVIDED WITH THIS FAQ.
Q: WHAT IS THE NOISE LEVEL OF THE FUEL CELL SYSTEM?
A: FOR SPECIFIC DB RANGES, PLEASE REFER TO THE DATA SHEET PROVIDED WITH THIS FAQ.
Q: DO BLOOM FUEL CELL SYSTEMS PROVIDE LIFE SAFETY POWER?
A: NO. WE ARE NOT LIFE SAFETY AND DO NOT PROVIDE LIFE SAFETY POWER, EVEN WHEN A UPM IS INSTALLED. WE ARE NOT ALTERING WHATEVER LIFE SAFETY IS CURRENTLY PRESENT AT THE FACILITY.
Q: IS THE BLOOM FUEL CELL SYSTEM TAMPER–PROOF?
A: YES. THE FUEL CELLS ARE SECURED IN PLACE AND DOORS ARE SECURED AND LOCKED. ONLY BLOOM SERVICE PERSONNEL HAVE THE KEYS AND CAN BE ON–SITE WITHIN 24 HOURS.
Q: WHAT HAPPENS TO THE CUSTOMER FACILITY POWER IF THE FUEL CELLS SHUT DOWN?
A: THE FUEL CELL SYSTEM IS OPERATED IN GRID–PARALLEL MODE. IF THE UTILITY GRID IS OPERATIONAL, THE CUSTOMER FACILITY WILL RECEIVE POWER FROM THE GRID AND NOTICE NO DIFFERENCE.
Q: WHAT HAPPENS TO THE FUEL CELL SYSTEM WHEN THE UTILITY POWER SHUTS DOWN?
A: IF UTILITY PROVIDED POWER IS LOST FOR ANY REASON, THE FUEL CELL SYSTEM WILL ALSO STOP PRODUCING POWER. THE FUEL CELL SYSTEM WILL REMAIN IN STAND–BY MODE UNTIL IT AUTOMATICALLY SENSES THE UTILITY GRID HAS BEEN RESTORED.
Q: WHAT HAPPENS TO THE FUEL CELL SYSTEM WHEN THE UTILITY GAS SHUTS DOWN?
A: IF THE UTILITY GAS IS INTERRUPTED, THE FUEL CELL SYSTEM WILL AUTOMATICALLY SHUT DOWN AS WELL.
Q: CAN THE FUEL CELL SYSTEM BE SHUT DOWN LOCALLY IN CASE OF AN EMERGENCY?
A: YES. IF THE FUEL CELL MUST BE SHUT DOWN RIGHT AWAY––FOR EXAMPLE, IN CASE OF A BUILDING FIRE OR ELECTRICAL HAZARD––TWO SHUTOFF CONTROLS ARE INSTALLED AT THE FACILITY EXTERNAL TO THE SYSTEM. THE LOCATIONS OF THESE TWO CONTROLS SHOULD BE KNOWN TO THE FACILITIES MANAGER BEFORE OPERATION AND SHOULD BE NOTED ON THE SITE DIAGRAM THAT IS CREATED FOR EACH SITE DURING INSTALLATION. THE TWO SHUTOFFS ARE:
(1) THE ELECTRICAL DISCONNECT SWITCH AND
(2) THE MANUAL NATURAL GAS SHUTOFF VALVE. A THIRD SHUTOFF, AN EMERGENCY POWER OFF (EPO) BUTTON, MAY BE PROVIDED ON–SITE.
Q: DOES THE BLOOM FUEL CELL SYSTEM OPERATE 24/7?
A: YES.
Q: ARE THE BLOOM FUEL CELL SYSTEMS MONITORED?
A: YES. BLOOM FUEL CELL SYSTEMS ARE CONTROLLED REMOTELY AND HAVE INTERNAL SENSORS THAT CONTINUOUSLY MONITOR SYSTEM OPERATION. IF SAFETY CIRCUITS DETECT A CONDITION OUTSIDE NORMAL OPERATING PARAMETERS, THE FUEL SUPPLY IS STOPPED AND INDIVIDUAL SYSTEM COMPONENTS ARE AUTOMATICALLY SHUT DOWN. A BLOOM ENERGY REMOTE OPERATOR CAN ALSO REMOTELY INITIATE ANY EMERGENCY SEQUENCE. AN EMERGENCY STOP ALARM INITIATES AN AUTOMATIC SHUTDOWN SEQUENCE THAT PUTS THE SYSTEM INTO "SAFE MODE" AND CAUSES IT TO STOP EXPORTING POWER. IF YOU HAVE QUESTIONS ABOUT ANY OF THESE SAFETY FEATURES, PLEASE CONTACT BLOOM ENERGY AT CUSTOMERCARE@BLOOMENERGY.COM.
Q: WHAT ARE THE EMISSIONS GENERATED BY BLOOM FUEL CELL SYSTEMS?
A: THE SPECIFIC PERCENTAGE OF CARBON EMISSION REDUCTIONS ARE DEPENDENT ON YOUR STATE'S GENERATION MIX, BUT BLOOM FUEL CELL SYSTEMS VIRTUALLY ELIMINATE NOX, SOX, AND OTHER CRITICAL AIR POLLUTANTS THAT ARE FOUND IN TRADITIONAL ELECTRICITY GENERATION METHODS. FOR SPECIFIC EMISSIONS RANGES, PLEASE REFER TO THE DATA SHEET PROVIDED WITH THIS FAQ.
Q: WHAT IS THE SUSTAINABILITY IMPACT OF BLOOM FUEL CELL SYSTEMS?
A: BLOOM FUEL CELL SYSTEMS GENERATE ELECTRICITY ON–SITE THROUGH AN EFFICIENT ELECTROCHEMICAL REACTION WITHOUT COMBUSTION. DUE TO THE HIGH EFFICIENCY (65%–53% COMPARED TO A COMBINED CYCLE NATURAL GAS PLANT WITH EFFICIENCY OF 40–45% OR COAL PLANTS AT 35%) BLOOM ENERGY SERVERS REDUCE CARBON EMISSIONS BY 20–50% COMPARED TO THE US GRID EMISSION RATES. THE VARIATION IN EMISSIONS REDUCTION IS DUE TO THE VARIATION IN HOW DIFFERENT STATES GENERATE ELECTRICITY. IN ADDITION, BLOOM FUEL CELL SYSTEMS USE NO WATER DURING NORMAL OPERATION

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EVERSOURCE

REVISION HISTORY

REV	REVISION ISSUE	DATE
1	INITIAL RELEASE	10/16/2019

DESIGNED BY KATE TAYLOR	REVIEWED BY CHAD PEARSON
DRAWN BY SURESH KUMAR	APPROVED BY GREENBERG FARROW

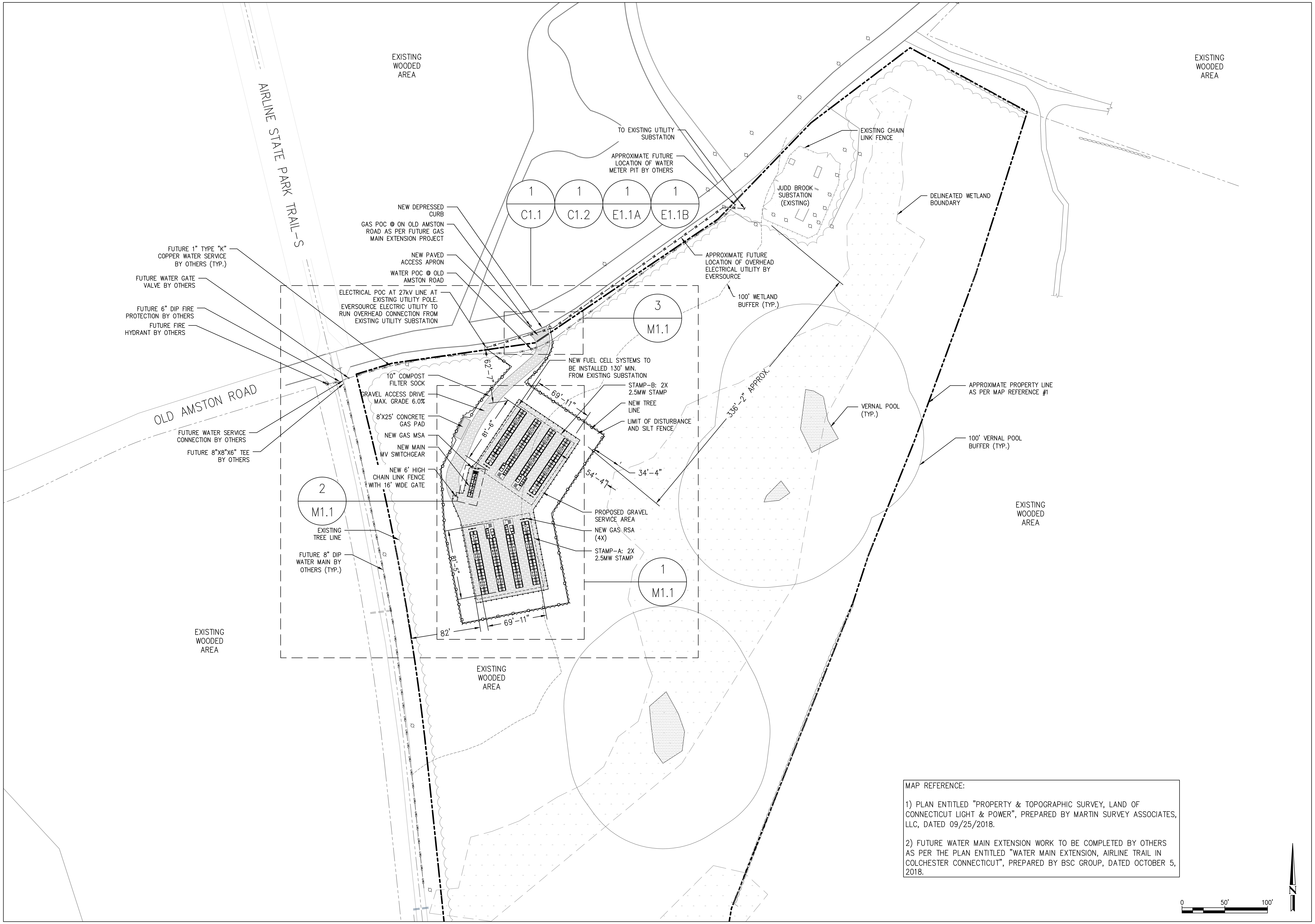
SHEET TITLE
COVER SHEET

DRAWING NUMBER
G0.1

BLOOM DOCUMENT
DOC–1010853

THIS DRAWING IS 24" X 36" AT FULL SIZE

SITE ID: EVS000.0 | SHEET 01 OF 19



MAP REFERENCE:

1) PLAN ENTITLED "PROPERTY & TOPOGRAPHIC SURVEY, LAND OF CONNECTICUT LIGHT & POWER", PREPARED BY MARTIN SURVEY ASSOCIATES, LLC, DATED 09/25/2018.

2) FUTURE WATER MAIN EXTENSION WORK TO BE COMPLETED BY OTHERS AS PER THE PLAN ENTITLED "WATER MAIN EXTENSION, AIRLINE TRAIL IN COLCHESTER CONNECTICUT", PREPARED BY BSC GROUP, DATED OCTOBER 5, 2018.

OVERALL SITE PLAN

SCALE: 1" = 50'

1
G1.1

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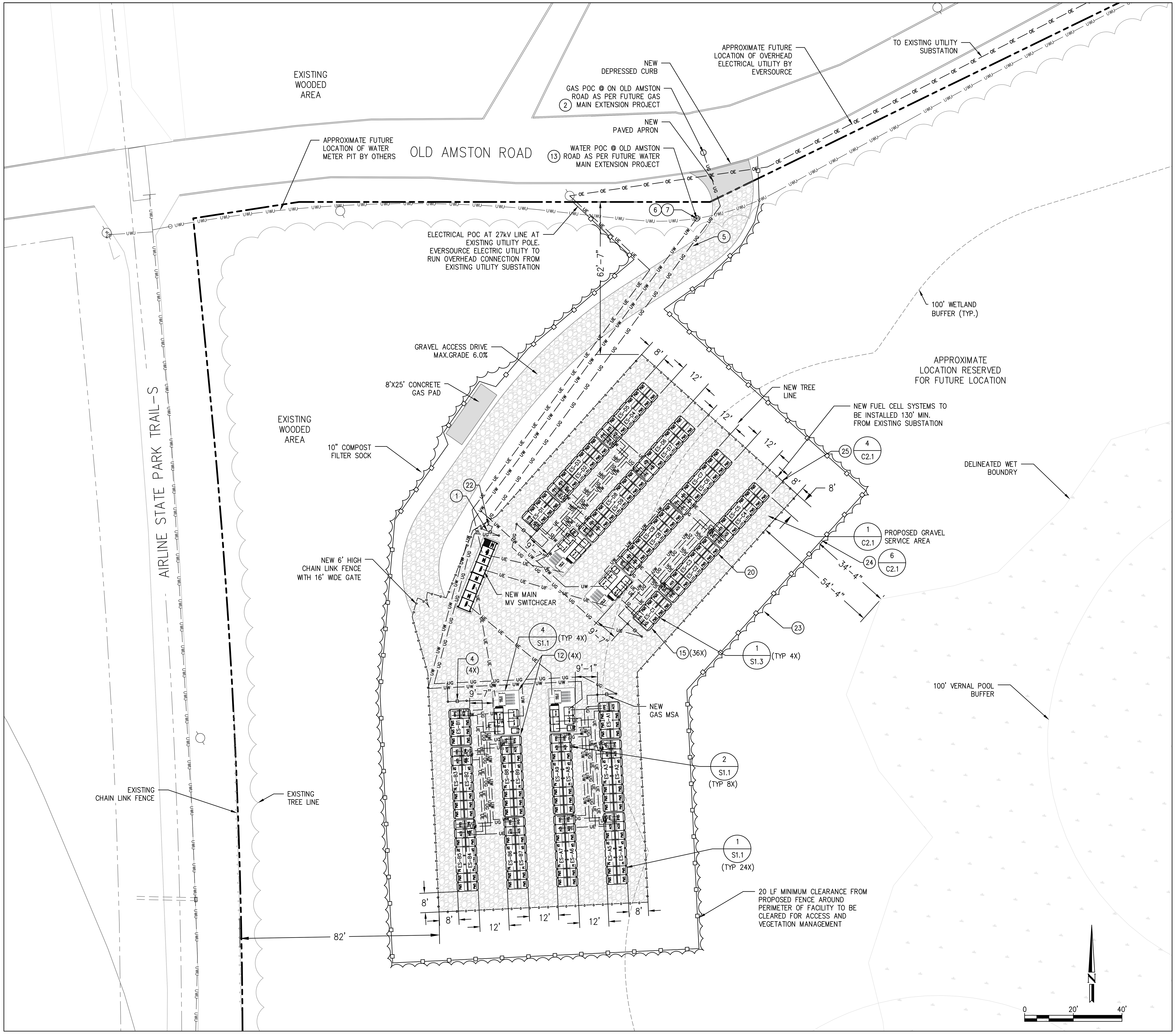

DETAILED SITE PLAN 1 C1.1

SCALE: 1" = 20'

GENERAL NOTES

1. CLEAN AND PRIME ALL NEW WIRE MOUNTED PIPING AND CONDUIT. PIPING AND CONDUIT SHALL BE PAINTED WITH EXTERIOR GRADE PAINT TO MATCH EXISTING.
2. CONDUITS AND PIPES MOUNTED TO BUILDING WALL SHALL BE SUPPORTED AS PER LOCAL CODE, RUN AT HEIGHT ABOVE DOORWAYS, AND STAND OFF WALL TO AVOID EXISTING CONDUITS AND PIPES.
3. SLOPE LINES SHOWN ARE APPROXIMATE AND INTENDED TO SHOW THE GENERAL DIRECTION OF WATER RUN OFF; SLOPE LINES ARE DRAWN PER VISUAL SURVEY OF SURROUNDING AREA.
4. SEE BLOOM ENERGY PRODUCT INSTALLATION DRAWINGS FOR UTILITY CONNECTIONS TO ANCILLARY EQUIPMENT AND ENERGY SERVER.
5. ALL ABOVE FROST LINE SECTIONS OF WATER PIPES SHALL HAVE POWERED HEAT TRACE AND INSULATION, ENSURE UNDERGROUND WATER PIPE DEPTHS ARE BELOW FROST LINE.

REFERENCE SHEET NOTES

1. NEW UTILITY PROVIDED AND INSTALLED GAS METER & REGULATOR ASSEMBLY WITH SHUT-OFF VALVE. CONTRACTOR SHALL PROVIDE PAD PER DETAILS IF REQUIRED BY UTILITY COMPANY. COORDINATE ALL CONNECTIONS WITH GAS UTILITY.
2. NEW UNDERGROUND GAS SERVICE TAP BY UTILITY COMPANY. COORDINATE WITH GAS UTILITY. CONTRACTOR SHALL PERFORM COMPACTION AND MATCH EXISTING SURFACE AND GRADE. CONTRACTOR SHALL COORDINATE GAS PIPE SIZING AND INSTALLATION REQUIREMENTS WITH UTILITY.
4. NEW PRIVATE GAS REGULATOR SET ASSEMBLY FOR ENERGY SERVER WITH SHUT-OFF VALVE. REFER TO GAS RISER DETAIL FOR ADDITIONAL REQUIREMENTS.
5. NEW GAS PIPE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. REFER TO GAS RISER DETAIL FOR ADDITIONAL REQUIREMENTS.
6. TAP EXISTING WATER LINE AT WATER METER PIT WITH A LOCAL SHUT-OFF VALVE. REFER TO DOMESTIC WATER CONNECTION DETAIL FOR ADDITIONAL REQUIREMENTS.
7. NEW WATER PIPE SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. REFER TO WATER RISER DETAIL FOR ADDITIONAL REQUIREMENTS.
12. CONTRACTOR SHALL PROVIDE TWO GROUNDING RODS TO BE PLACED 6' APART MINIMUM. REFER TO ELECTRICAL SINGLE LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS.
13. NEW ELECTRICAL FEEDER SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. REFER TO ELECTRICAL SINGLE LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS.
15. NEW BLOOM ENERGY SERVER. REFER TO BLOOM STANDARD INSTALLATION DRAWING SET FOR ADDITIONAL ENERGY SERVER DETAILS.
16. FACTORY WIRED ENERGY SERVER EMERGENCY POWER-OFF SWITCH (EPO).
20. CONTRACTOR SHALL EXCAVATE UNDER ENERGY SERVER AND ANCILLARY PAD LOCATIONS. REFER TO PAD DETAIL FOR ADDITIONAL EXCAVATION AND BACKFILL REQUIREMENTS.
22. CONTRACTOR SHALL PROVIDE NEW CONDUIT AND CABLE FROM NEW UTILITY GAS MSA TO CUSTOMER MPOE FOR UTILITY BILLING. REFER TO BLOOM ENERGY PRODUCT INSTALLATION DRAWINGS FOR CONNECTION REQUIREMENTS.
23. CONTRACTOR TO REMOVE TREES AND CLEAR AREA FOR INSTALLATION OF ENERGY SERVERS AND ASSOCIATED EQUIPMENT. PROVIDE 10' MINIMUM CLEARANCE FROM PROPOSED ENERGY SERVER TO DRIP LINE OF ANY EXISTING TREES.
24. PROPOSED LIMIT OF DISTURBANCE AND SILT FENCE.
25. NEW 6' HIGH CHAIN LINK FENCE WITH PRIVACY SCREENING.
26. PROPOSED PAVED SITE ACCESS ENTRANCE WITH PARKING AREA FOR SERVICE VEHICLES.

EXISTING UTILITY NOTE:
THE LOCATION OF EXISTING UTILITIES IS SHOWN FOR THE CONTRACTOR'S REFERENCE. EXACT LOCATION, DEPTH AND SIZE OF ALL EXISTING UTILITIES IS NOT KNOWN. CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR ALL EXISTING UTILITIES NOT SHOWN ON THESE DRAWINGS. CONTRACTOR TO FIELD VERIFY LOCATION OF EXISTING UNDERGROUND UTILITIES AND PROTECT THE EXISTING UNDERGROUND UTILITY LINES FROM DAMAGE WHEN CROSSING WITH NEW UNDERGROUND UTILITIES. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIR OR REPLACEMENT OF ANY DAMAGED LINES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY IF ANY FIELD CONDITIONS ENCOUNTERED DIFFER FROM THOSE REPRESENTED HEREON. SUCH CONDITIONS COULD RENDER THE DESIGNS HEREON IN APPROPRIATE AND MAY REQUIRE ADJUSTMENTS TO AVOID CONFLICTS.

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SITE ID: EVS000.0 SHEET 04 OF 19

EROSION CONTROL NOTES

EROSION AND SEDIMENT CONTROL PLAN NOTES

1. THE CONTRACTOR SHALL CONSTRUCT ALL SEDIMENT AND EROSION CONTROLS IN ACCORDANCE WITH THE 2002 CONNECTICUT GUIDELINES FOR SOIL EROSION AND SEDIMENT CONTROL, LATEST EDITION, IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, AND AS DIRECTED BY THE TOWN OF 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. ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHOWN ON THE EROSION & SEDIMENT CONTROL PLAN ARE SHOWN IN A GENERAL SIZE AND LOCATION ONLY. 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. SEE SEDIMENT AND EROSION CONTROL DETAILS AND SUGGESTED CONSTRUCTION SEQUENCE FOR MORE INFORMATION. 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 EXISTING.

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 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. TURF ESTABLISHMENT SHALL BE PERFORMED OVER 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. SEEDING MIXTURES SHALL BE NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DRY SITES, OR APPROVED EQUAL BY OWNER.

SEDIMENT & EROSION CONTROL NARRATIVE

1. THE PROJECT INVOLVES THE CONSTRUCTION OF A FUEL CELL POWER GENERATION FACILITY WITH ASSOCIATED EQUIPMENT, INCLUDING THE CLEARING, GRUBBING AND GRADING OF APPROXIMATELY 0.69± ACRES OF EXISTING LOT.

THE PROPOSED PROJECT INVOLVES THE FOLLOWING CONSTRUCTION:

A. CLEARING, GRUBBING, AND GRADING OF EXISTING LOT.
B. CONSTRUCTION OF FUEL CELL POWER GENERATION FACILITY WITH ASSOCIATED EQUIPMENT.
B. THE STABILIZATION OF DISTURBED AREAS WITH PERMANENT TREATMENTS.

2. FOR THIS PROJECT, THERE ARE APPROXIMATELY 0.69± ACRE 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 EQUIPMENT.

3. THE PROJECT SITE, AS MAPPED IN THE SOIL SURVEY OF STATE OF CONNECTICUT (NRCS, VERSION 18, DEC 6, 2018), CONTAINS TYPE 38E (HYDROLOGIC SOIL GROUP A), 61C (HYDROLOGIC SOIL GROUP B) AND 701B (HYDROLOGIC SOIL GROUP C). A GEOTECHNICAL ENGINEERING REPORT HAS NOT BEEN COMPLETED.

4. IT IS ANTICIPATED THAT CONSTRUCTION WILL BE COMPLETED IN APPROXIMATELY 6-8 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 2004 CONNECTICUT STORMWATER QUALITY MANUAL AND THE TOWN OF COLCHESTER STANDARDS, 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 CONNECTICUT EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, LATEST EDITION.

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 AREA:
   A. STAGED CONSTRUCTION;
   B. MINIMIZE THE DISTURBED AREAS TO THE EXTENT PRACTICABLE DURING CONSTRUCTION;
   C. STABILIZE DISTURBED AREAS AS SOON AS POSSIBLE WITH TEMPORARY OR PERMANENT MEASURES;
   D. MINIMIZE IMPERVIOUS AREAS;
   E. UTILIZE APPROPRIATE CONSTRUCTION EROSION AND SEDIMENTATION MEASURES.

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.

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 REPRESENTATIVE(S), THE MUNICIPALITY, 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 TOWN OF COLCHESTER AGENT AT LEAST FORTY-EIGHT (48) HOURS PRIOR TO COMMENCEMENT OF ANY DEMOLITION, CONSTRUCTION OR REGULATED ACTIVITY ON THIS PROJECT.

4. NOTIFY DIG SAFE AT 811, AS REQUIRED, PRIOR TO THE START OF CONSTRUCTION.

5. REMOVE EXISTING IMPEDIMENTS AS NECESSARY AND PROVIDE MINIMAL CLEARING AND GRUBBING TO INSTALL THE REQUIRED CONSTRUCTION ENTRANCES.

6. 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.

7. INSTALL REMAINING PERIMETER EROSION AND SEDIMENTATION CONTROL MEASURES.

8. PERFORM THE REMAINING CLEARING AND GRUBBING AS NECESSARY. 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.

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

10. INSTALL ELECTRICAL CONDUIT, GAS PIPES AND CONCRETE PADS.

11. INSTALL FUEL CELLS AND COMPLETE GAS AND ELECTRICAL INSTALLATION.

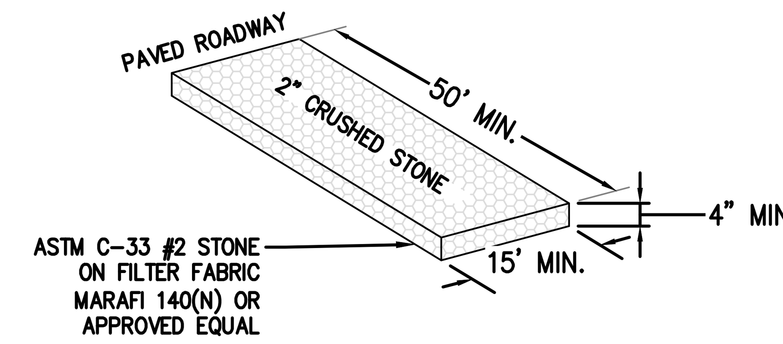
12. AFTER SUBSTANTIAL COMPLETION OF THE INSTALLATION OF THE FUEL CELLS, COMPLETE REMAINING SITE WORK, STABILIZE ALL DISTURBED AREAS.

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

14. AFTER THE SITE IS STABILIZED AND WITH THE APPROVAL OF THE PERMITTEE AND TOWN OF COLCHESTER AGENT, REMOVE PERIMETER EROSION AND SEDIMENTATION CONTROLS.

CONSTRUCTION OPERATION AND MAINTENANCE PLAN – BY CONTRACTOR

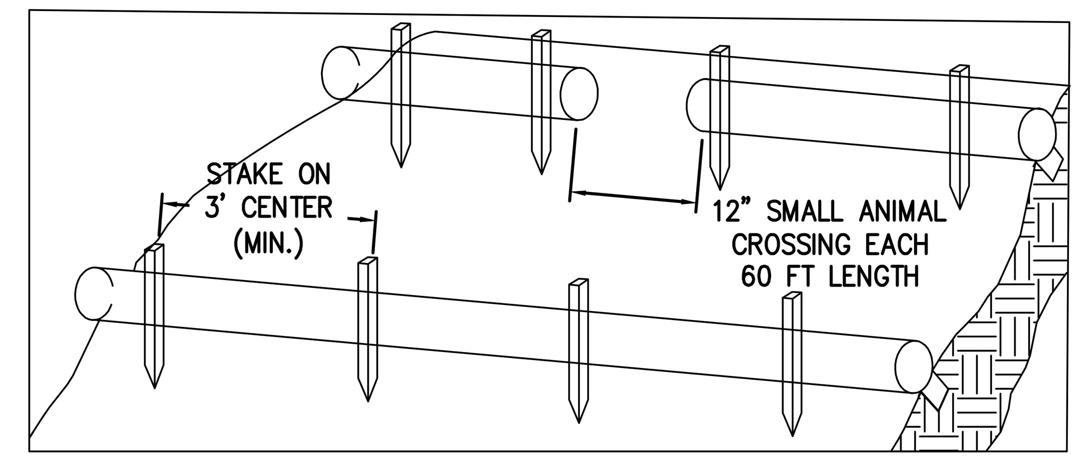
E&S MEASURE	INSPECTION SCHEDULE	MAINTENANCE REQUIRED
CONSTRUCTION ENTRANCE	DAILY	PLACE ADDITIONAL STONE, EXTEND THE LENGTH OR REMOVE AND REPLACE THE STONE. CLEAN PAVED SURFACES OF TRACKED SEDIMENT.
COMPOST FILTER SOCK	WEEKLY & WITHIN 24 HOURS OF RAINFALL > 0.25"	REPAIR/REPLACE WHEN FAILURE OR DETERIORATION IS OBSERVED.
TOPSOIL/BORROW STOCKPILES	DAILY	REPAIR/REPLACE SEDIMENT BARRIERS AS NECESSARY.



CONSTRUCTION ENTRANCE DETAIL

SCALE: NTS

1 / C2.5

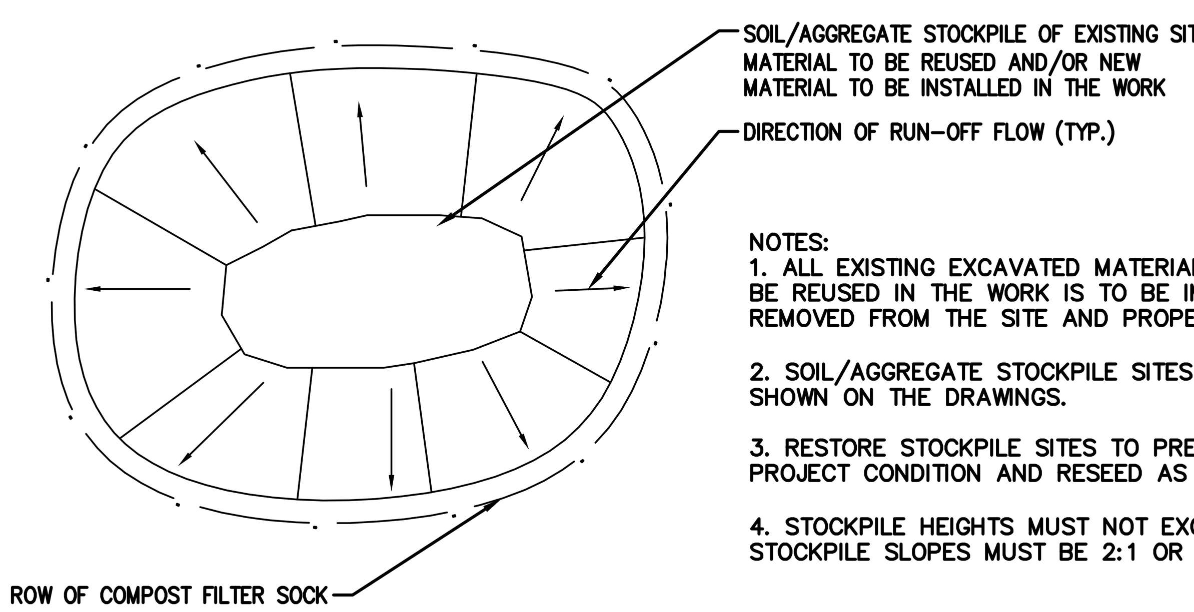


1. BEGIN AT THE LOCATION WHERE THE SOCK IS TO BE INSTALLED BY EXCAVATING A 2-3" (5-7.5 CM) DEEP X 9" (22.9 CM) WIDE TRENCH ALONG THE CONTOUR OF THE SLOPE. EXCAVATED SOIL SHOULD BE PLACED UPSLOPE FROM THE ANCHOR TRENCH.
2. PLACE THE SOCK IN THE TRENCH SO THAT IT CONTOURS TO THE SOIL SURFACE. COMPACT SOIL 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.

COMPOST FILTER SOCK SEDIMENTATION CONTROL BARRIER

SCALE: NTS

2 / C2.5



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.

MATERIALS STOCKPILE DETAIL

SCALE: NTS

3 / C2.5

Bloomenergy
4353 N 1ST STREET
SAN JOSE, CA 95134

CUSTOMER SITE
EVERSOURCE
160 OLD AMSTON ROAD
COLCHESTOR, CT 06415

EVERSOURCE

REVISION HISTORY

REV	REVISION ISSUE	DATE
1	INITIAL RELEASE	10/16/2019

DESIGNED BY KATE TAYLOR	REVIEWED BY CHAD PEARSON
DRAWN BY SURESH KUMAR	APPROVED BY GREENBERG FARROW

SHEET TITLE
SOIL EROSION AND SEDIMENT CONTROL DETAILS

DRAWING NUMBER
C2.5

BLOOM DOCUMENT
DOC-1010853

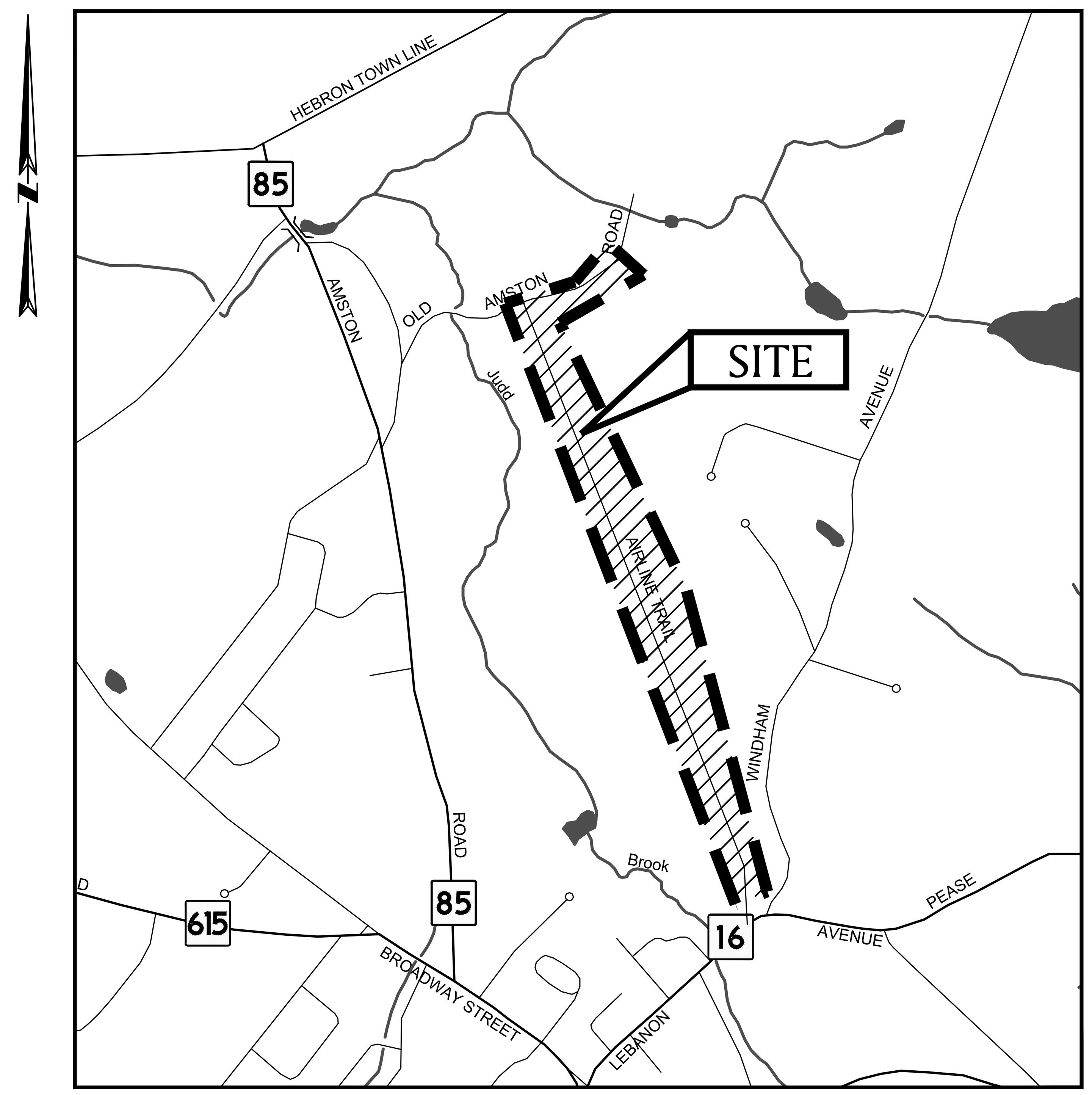
THIS DRAWING IS 24" X 36" AT FULL SIZE

SITE ID: EVS000.0

WATER MAIN EXTENSION

AIRLINE TRAIL
COLCHESTER, CONNECTICUT

SEPTEMBER 4, 2019



KEY MAP

500 0 1000 2000 3000 feet

SCALE: 1"=1000'

INDEX OF DRAWINGS

T-01	TITLE SHEET
KEY-01	KEY PLAN
PLN-01	UTILITY PLAN & PROFILE
PLN-02	UTILITY PLAN & PROFILE
PLN-03	UTILITY PLAN & PROFILE
PLN-04	UTILITY PLAN & PROFILE
PLN-05	UTILITY PLAN & PROFILE
PLN-06	UTILITY PLAN & PROFILE
DET-01	MISCELLANEOUS DETAILS
DET-02	WATER MAIN DETAILS
DET-03	WATER MAIN DETAILS

PREPARED FOR:

BLOOM ENERGY - CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

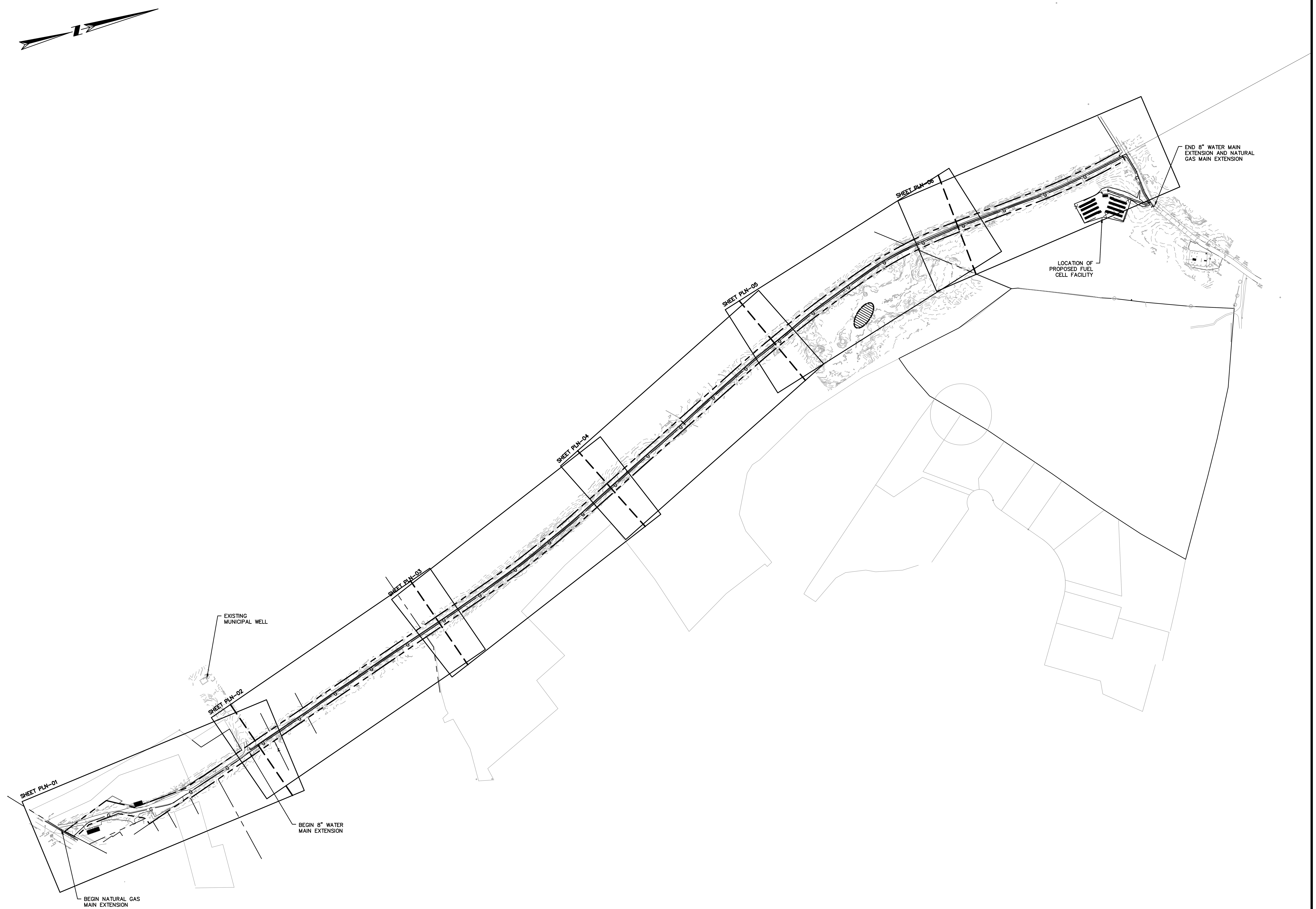
PREPARED BY:

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

PRELIMINARY DESIGN - DRAFT

JOB NO: 83723.00 DWG NO:

SHEET T-01



PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER CONNECTICUT

KEY PLAN

SEPTEMBER 4, 2019

REVISIONS:

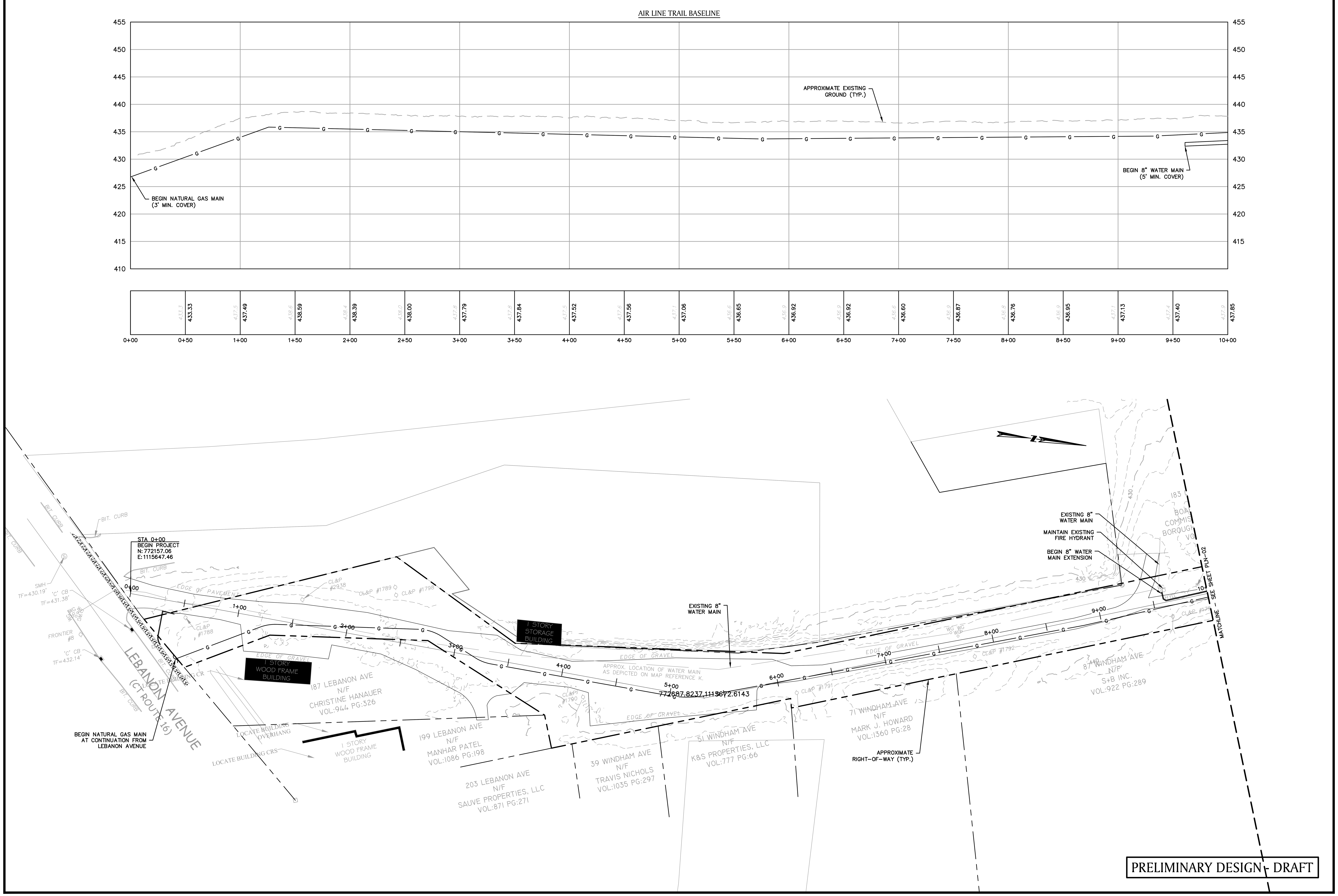
PREPARED FOR:
BLOOM ENERGY – CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: 1"=200'_XREF

0 100 200 400 FEET

FILE: 8372300-BASE.DWG
DWG. NO:
JOB. NO: 83723.00 KEY-01



WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER
CONNECTICUT

UTILITY PLAN & PROFILE

SEPTEMBER 4, 2019

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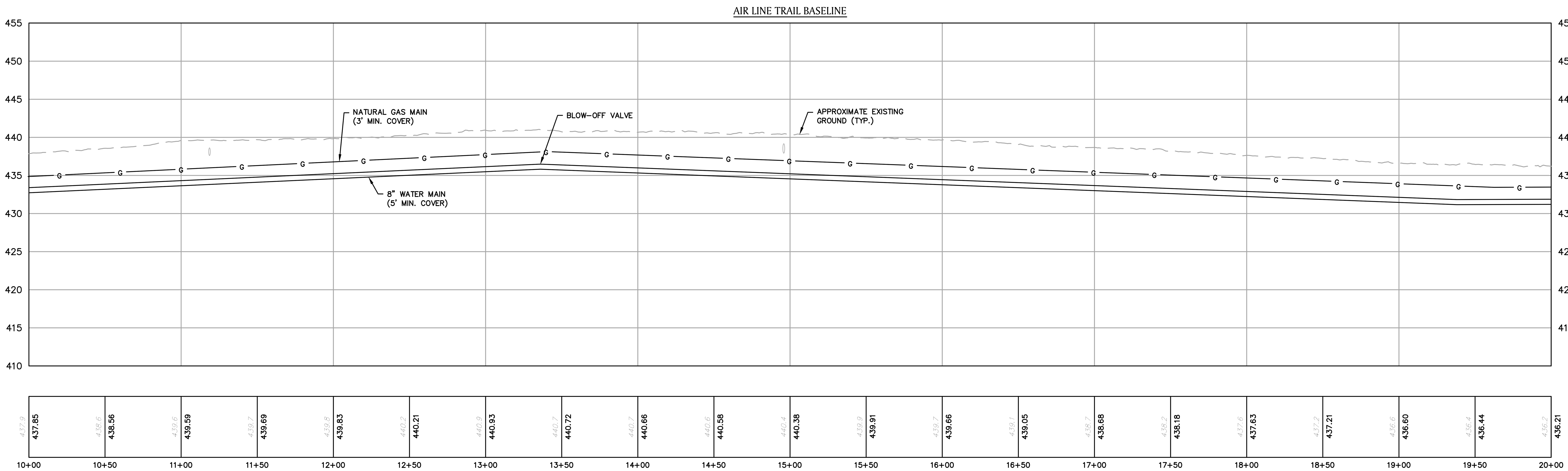
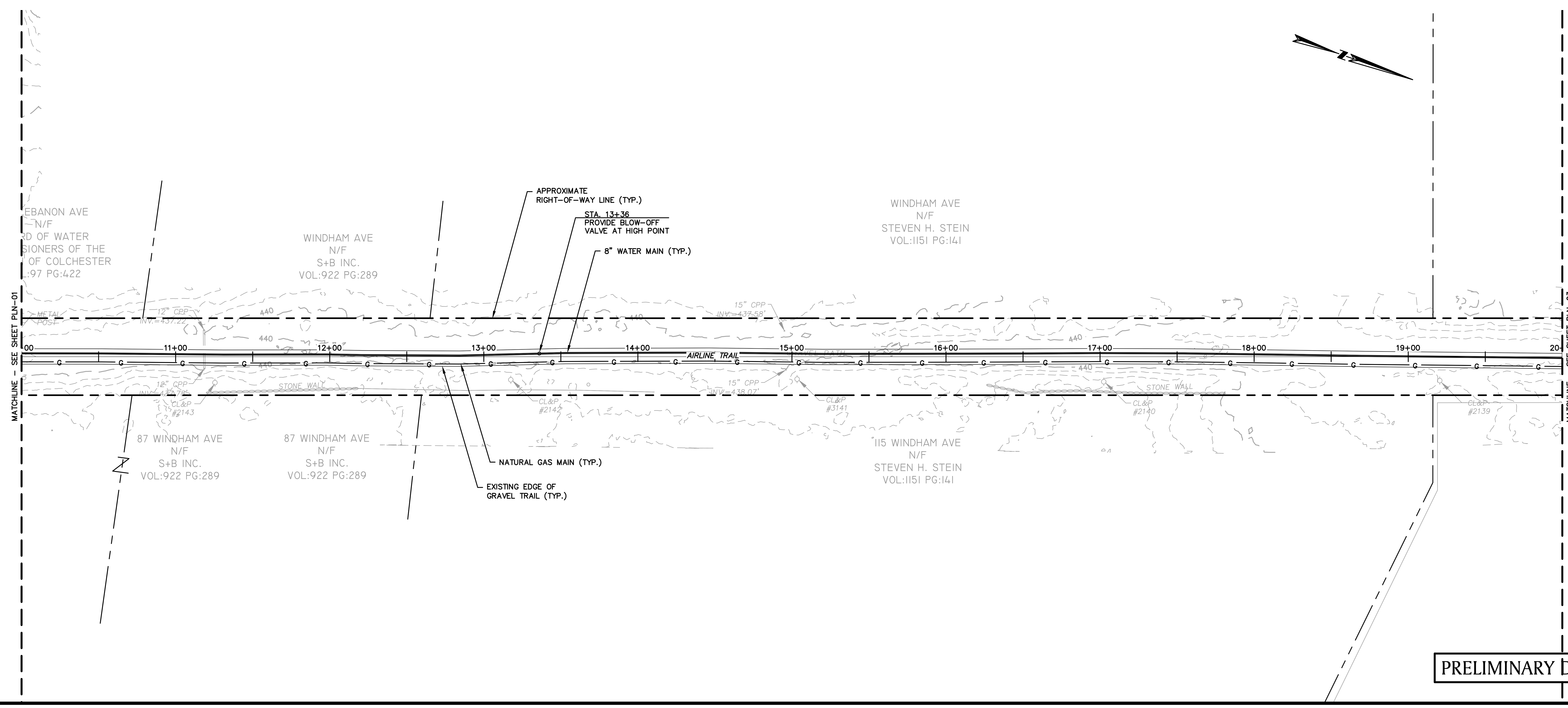
BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: 1" = 40'

0 20 40 80 FEET

FILE: 8372300-BASE.DWG
DWG. NO:
JOB. NO: 83723.00
PLN-01





PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER CONNECTICUT

UTILITY PLAN & PROFILE

SEPTEMBER 4, 2019

REVISIONS:

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BLOOM ENERGY - CONNECTICUT
1299 ORLEANS DRIVE
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BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

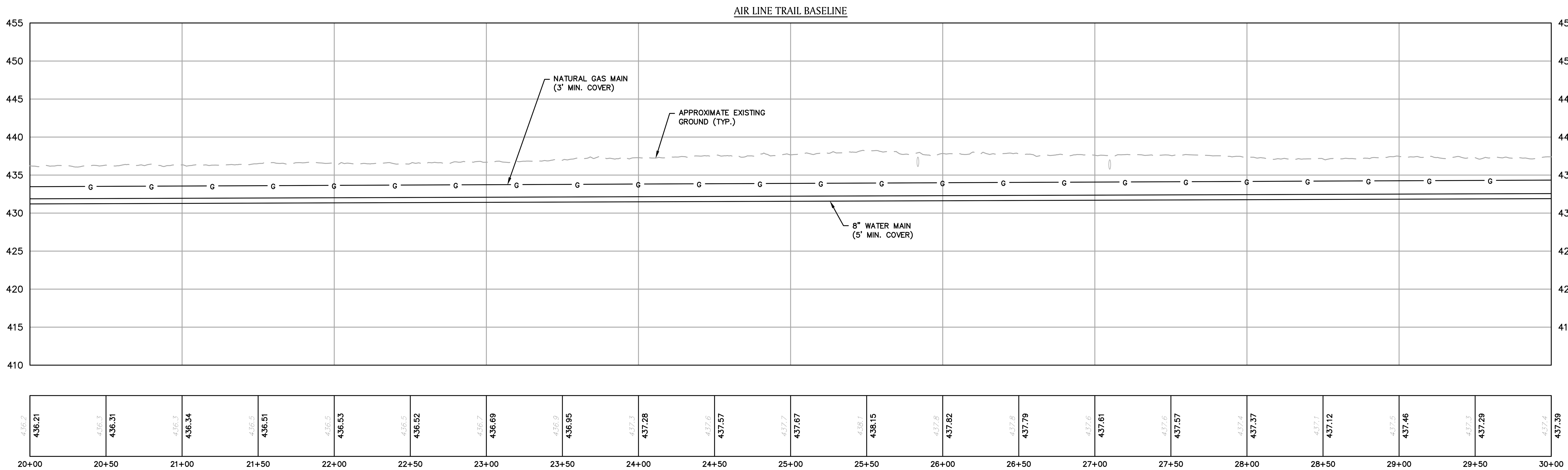
SCALE: 1" = 40'

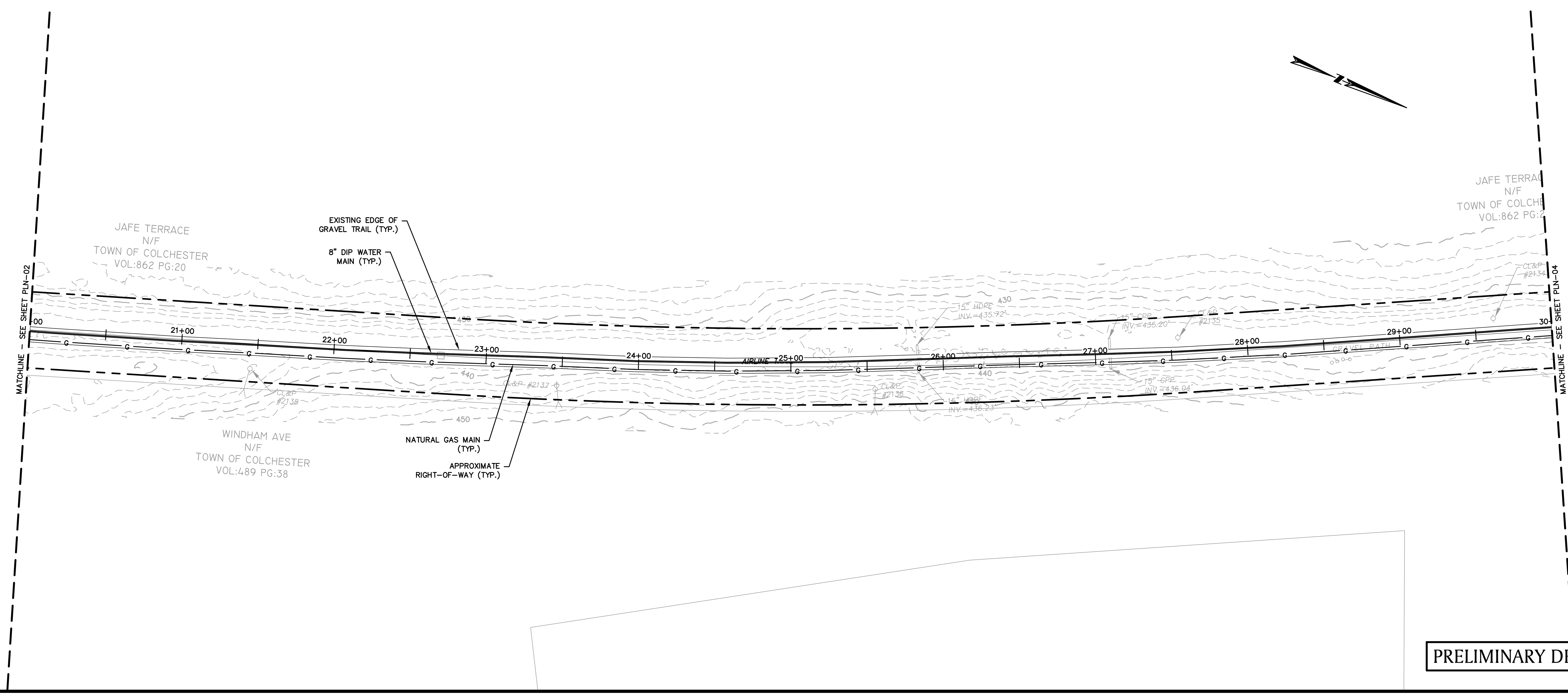
0 20 40 80 FEET

FILE: 8372300-BASE.DWG

DWG. NO: PLN-02

JOB. NO: 83723.00





PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER
CONNECTICUT

UTILITY PLAN & PROFILE

SEPTEMBER 4, 2019

REVISIONS:

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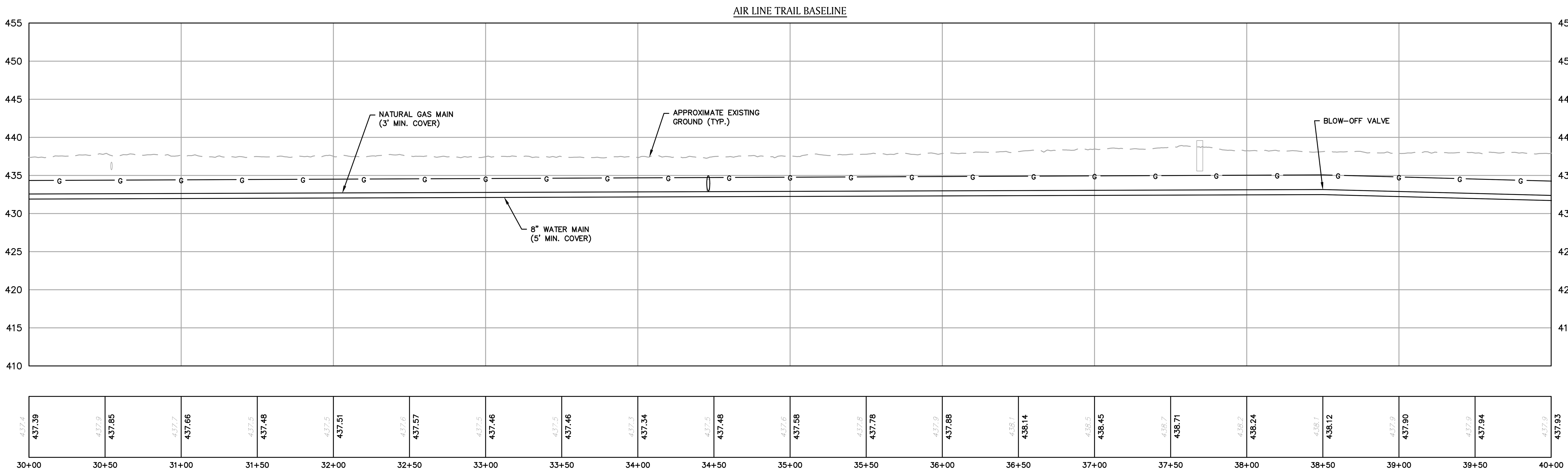
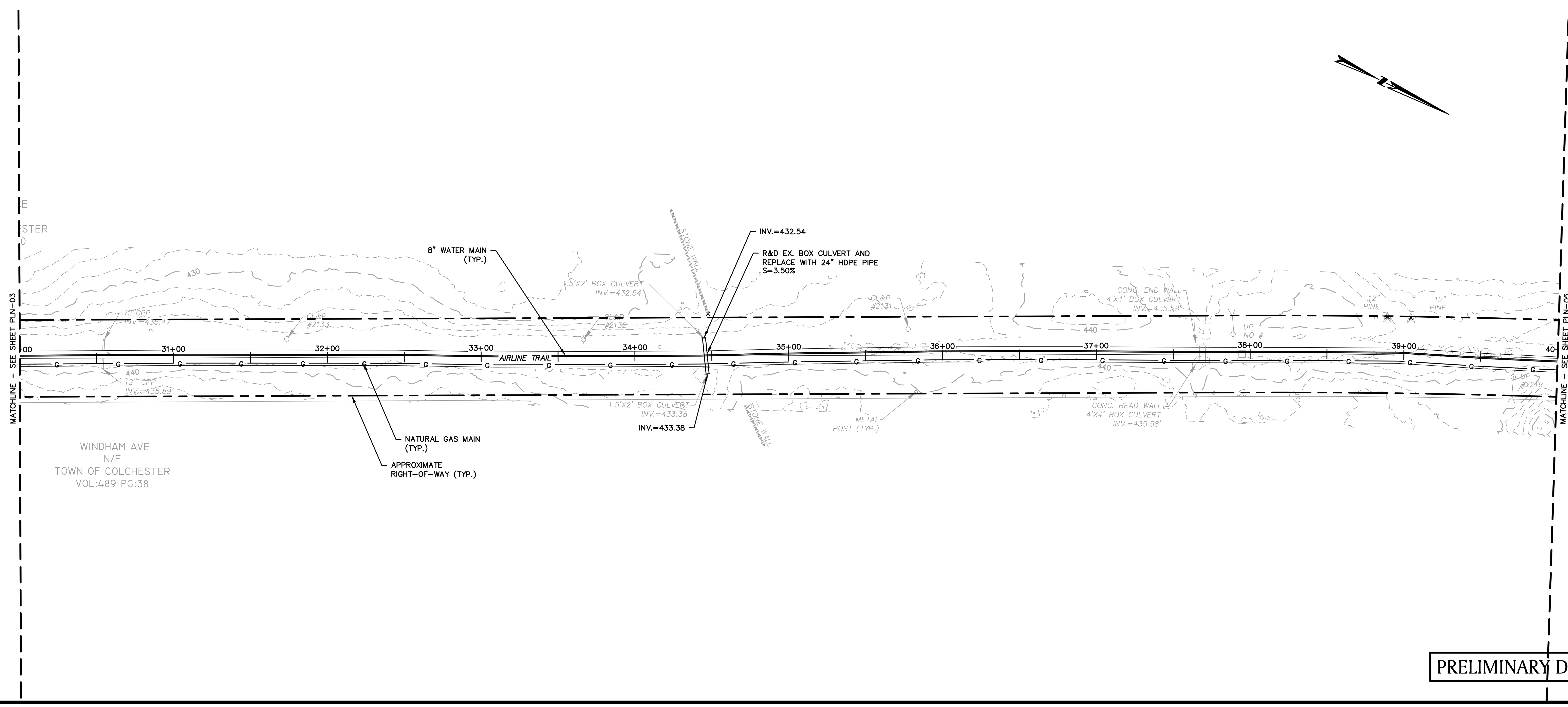
BLOOM ENERGY – CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: 1" = 40'
0 20 40 80 FEET

FILE: 8372300-BASE.DWG
DWG. NO:
JOB. NO: 83723.00 PLN-03





PRELIMINARY DESIGN - DRAFT

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER
CONNECTICUT

UTILITY PLAN & PROFILE

SEPTEMBER 4, 2019

REVISIONS:

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BLOOM ENERGY – CONNECTICUT
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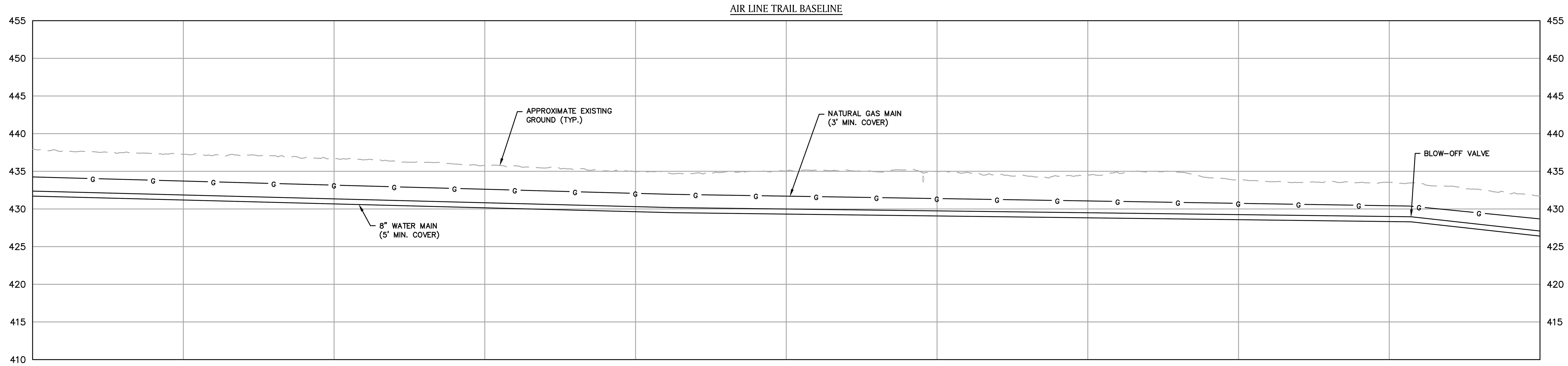
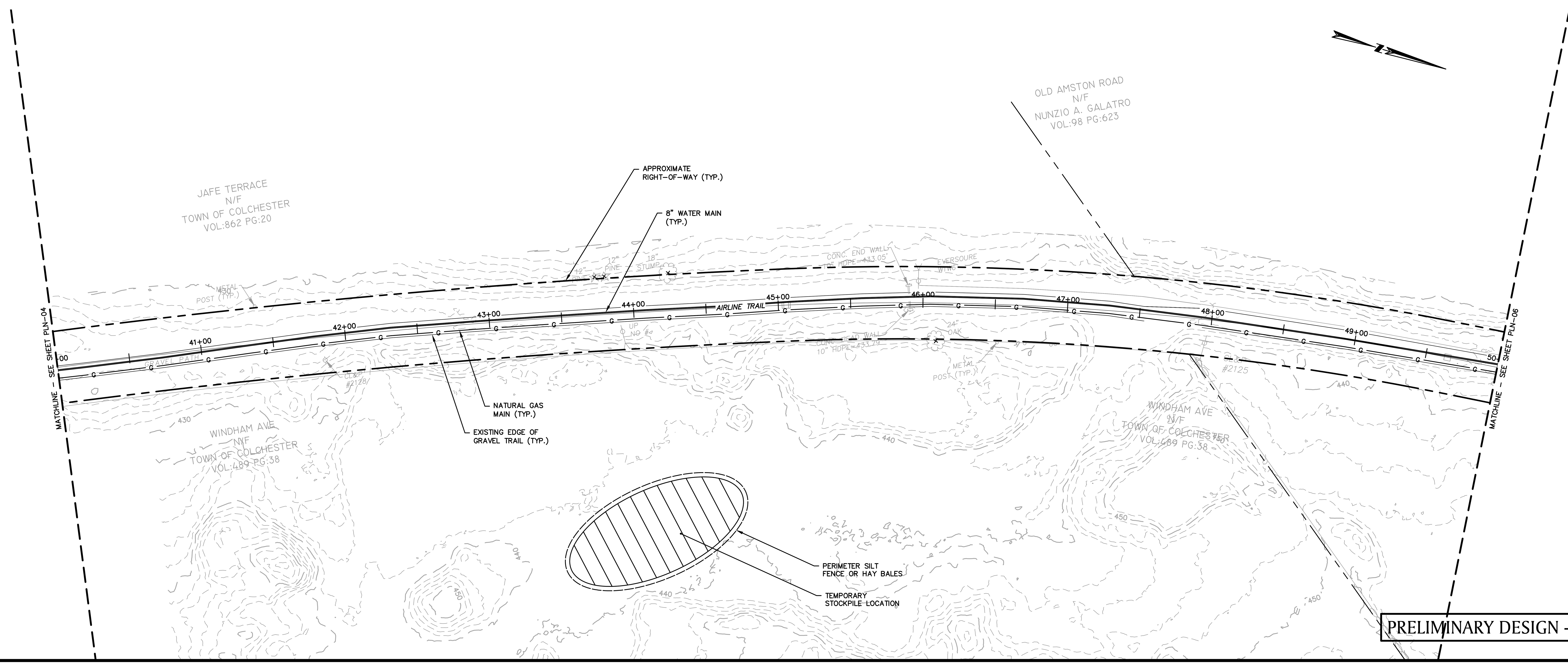
BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: 1" = 40'
0 20 40 80 FEET

FILE: 8372300-BASE.DWG
DWG. NO:
JOB. NO: 83723.00
PLN-04



40+00	40+50	41+00	41+50	42+00	42+50	43+00	43+50	44+00	44+50	45+00	45+50	46+00	46+50	47+00	47+50	48+00	48+50	49+00	49+50	50+00
437.9	437.5	437.3	437.1	436.6	436.2	435.8	435.4	434.9	434.8	435.0	435.0	435.0	434.4	434.5	434.9	433.8	433.6	433.5	432.7	431.7
437.93	437.52	437.25	437.07	436.64	436.21	435.77	435.37	434.93	434.83	435.05	434.98	434.97	434.37	434.45	434.95	433.84	433.59	433.54	432.73	431.73



PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER
CONNECTICUT

UTILITY PLAN & PROFILE

SEPTEMBER 4, 2019

REVISIONS:

PREPARED FOR:
BLOOM ENERGY - CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

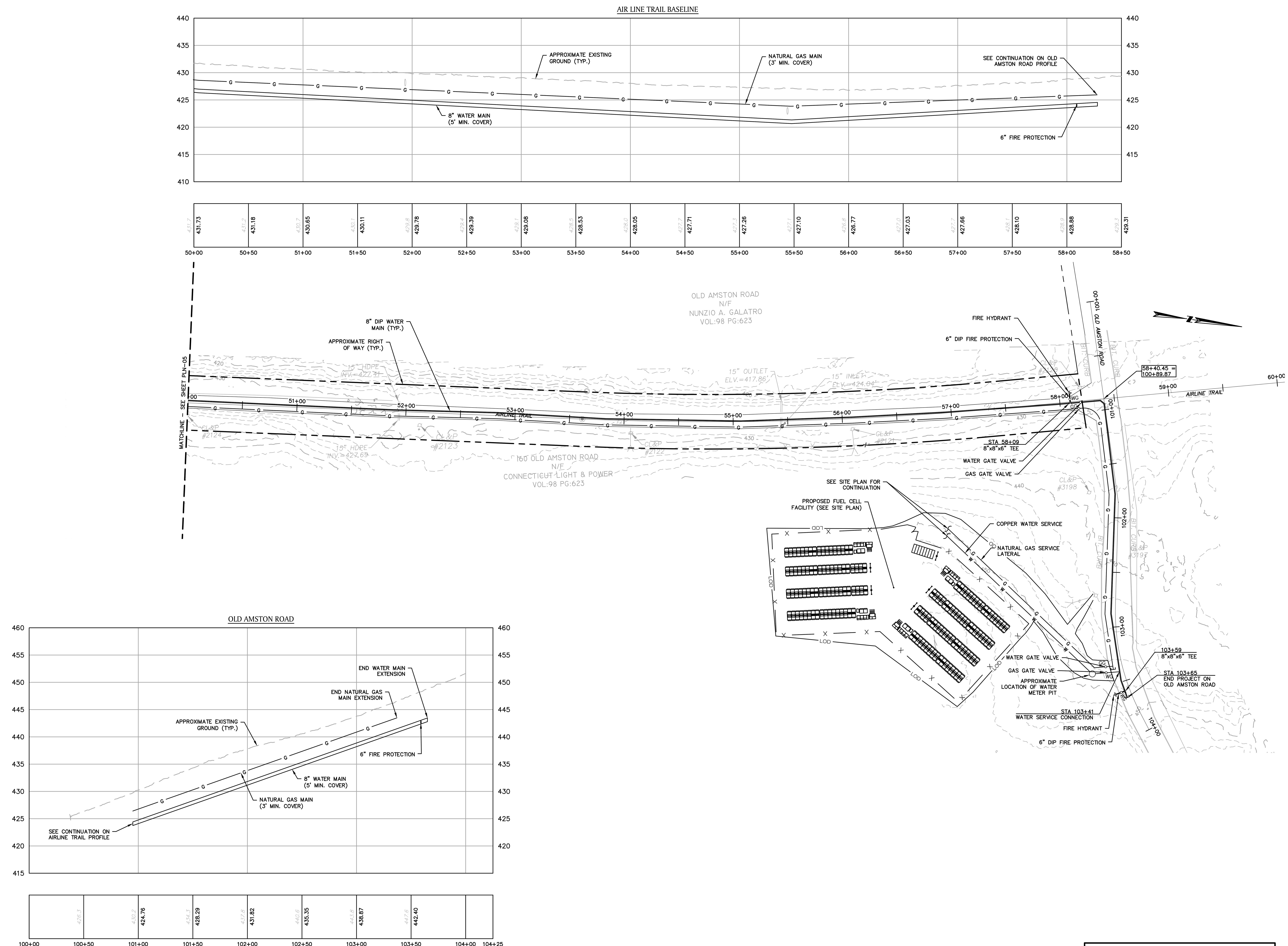
BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: 1" = 40'

0 20 40 80 FEET

FILE: 8372300-BASE.DWG
DWG. NO:
JOB. NO: 83723.00

PLN-05



PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER CONNECTICUT

UTILITY PLAN & PROFILE

SEPTEMBER 4, 2019

REVISIONS:

PREPARED FOR:

BLOOM ENERGY - CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: 1" = 40'

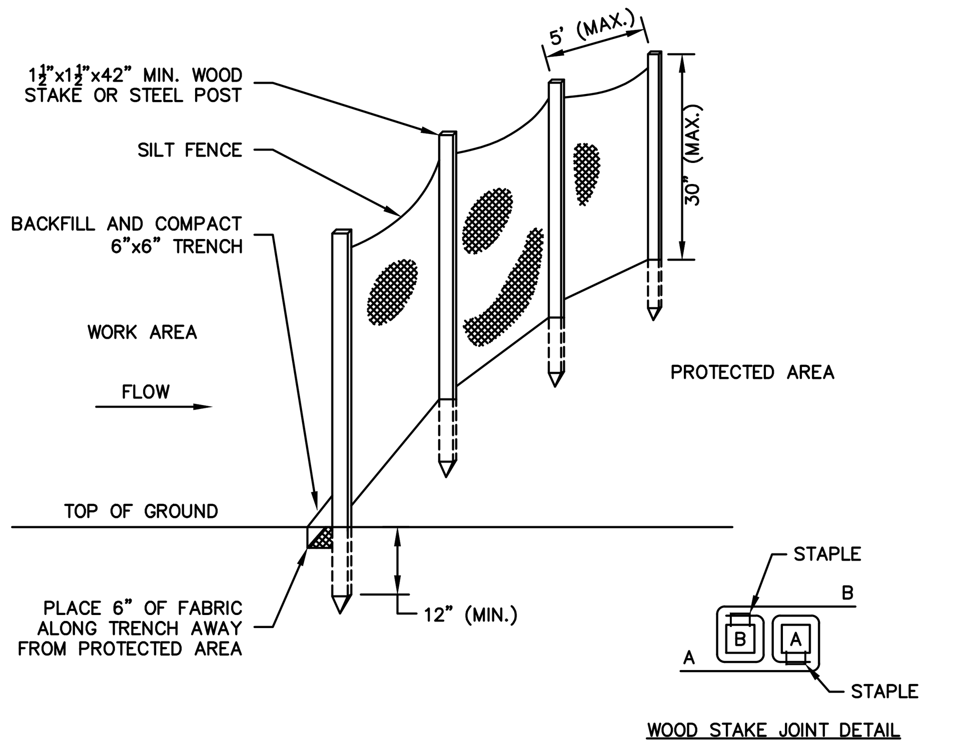
0 20 40 80 FEET

FILE: 8372300-BASE.DWG

DWG. NO.:

JOB. NO: 83723.00

PLN-06

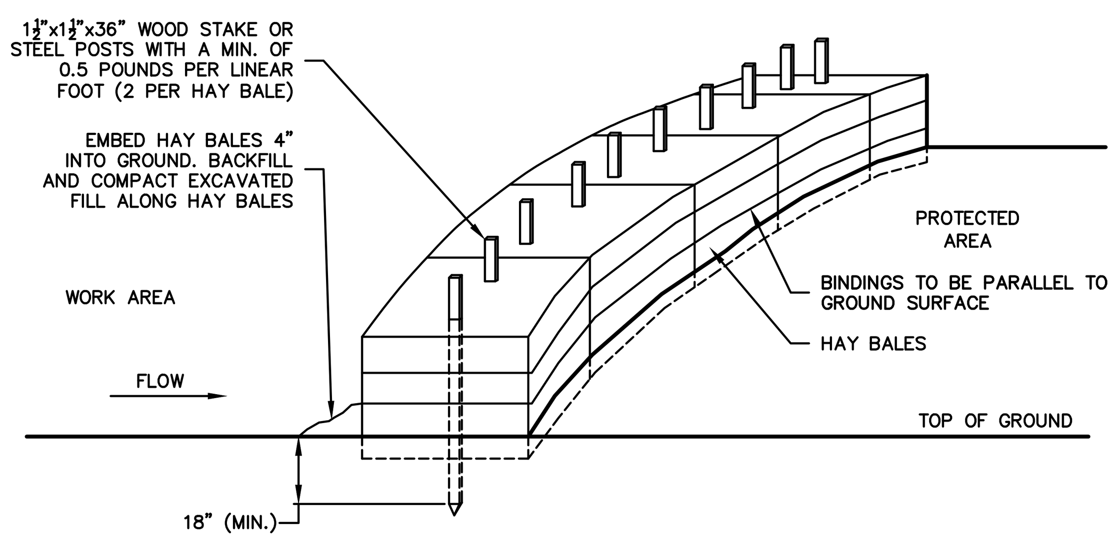


GENERAL NOTES

1. FOR SLOPE & SWALE INSTALLATIONS, EXTEND FENCE OP SLOPE SUCH THAT BOTTOM ENDS OF FENCE WILL BE HIGHER THAN THE TOP OF THE LOWEST PORTION OF FENCE.
2. FOR FENCE INSTALLED ON LEVEL TERRAIN INSTALL WING SECTIONS PERPENDICULAR TO MAIN BARRIER AT 50'–100' INTERVALS.

SILT FENCE BARRIER

SCALE: NONE
EC–107

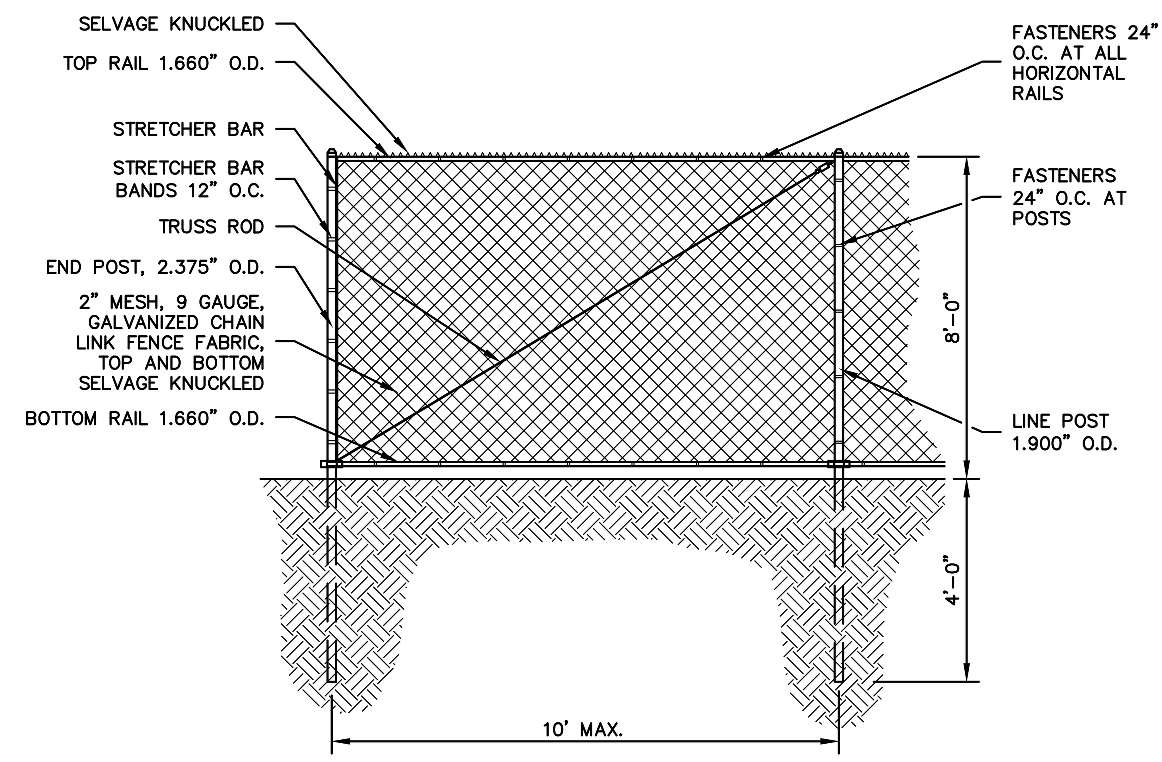


GENERAL NOTES

1. HAY BALES SHALL BE MADE OF HAY OR STRAW WITH 40 POUND MIN. WEIGHT AND 120 POUND MAX. WEIGHT HELD TOGETHER BY TWINE OR WIRE.
2. PLACE HAY BALES ON CONTOUR AND WING THE LAST HAY BALES UP SLOPE SO THAT THE TOP OF THE LAST SEVERAL HAY BALES ARE HIGHER THAN THE LINE OF HAY BALES.
3. DRIVE FIRST STAKE IN EACH BALE TOWARD THE PREVIOUSLY LAID BALE TO FORCE THEM TOGETHER.
4. PUT ONE HAY BALE PERPENDICULAR ALONG HAY BALE BARRIER EACH 100 FEET.

HAY BALE BARRIER

SCALE: NONE
EC–106–CT



CONSTRUCTION FENCE

SCALE: NONE
FSN–104–CT

PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER
CONNECTICUT

MISCELLANEOUS DETAILS

SEPTEMBER 4, 2019

REVISIONS:

PREPARED FOR:
BLOOM ENERGY – CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: AS SHOWN

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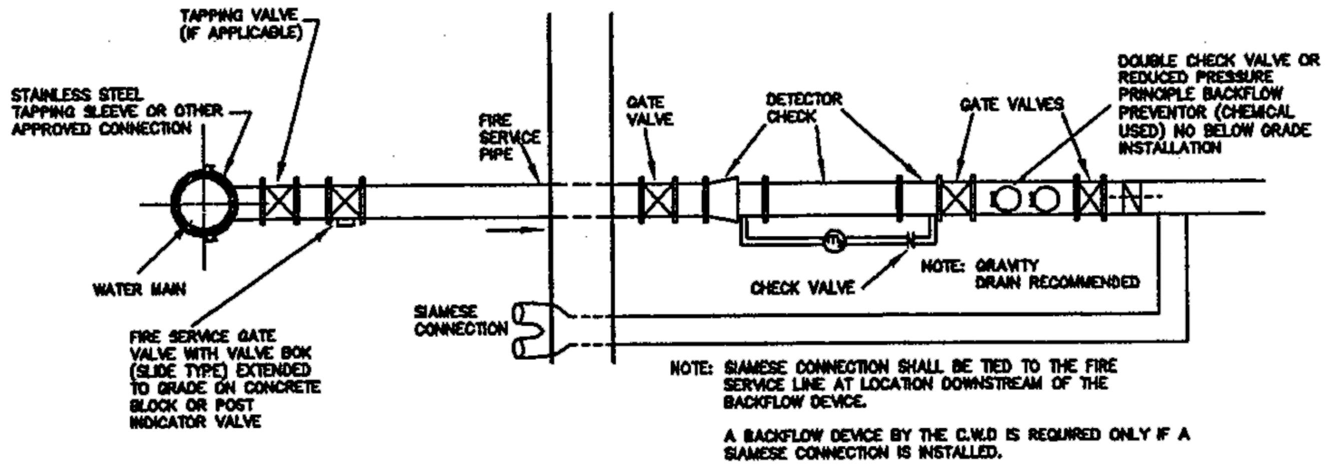
FILE: 8372300–DET.DWG
DWG. NO:
JOB. NO: 83723.00

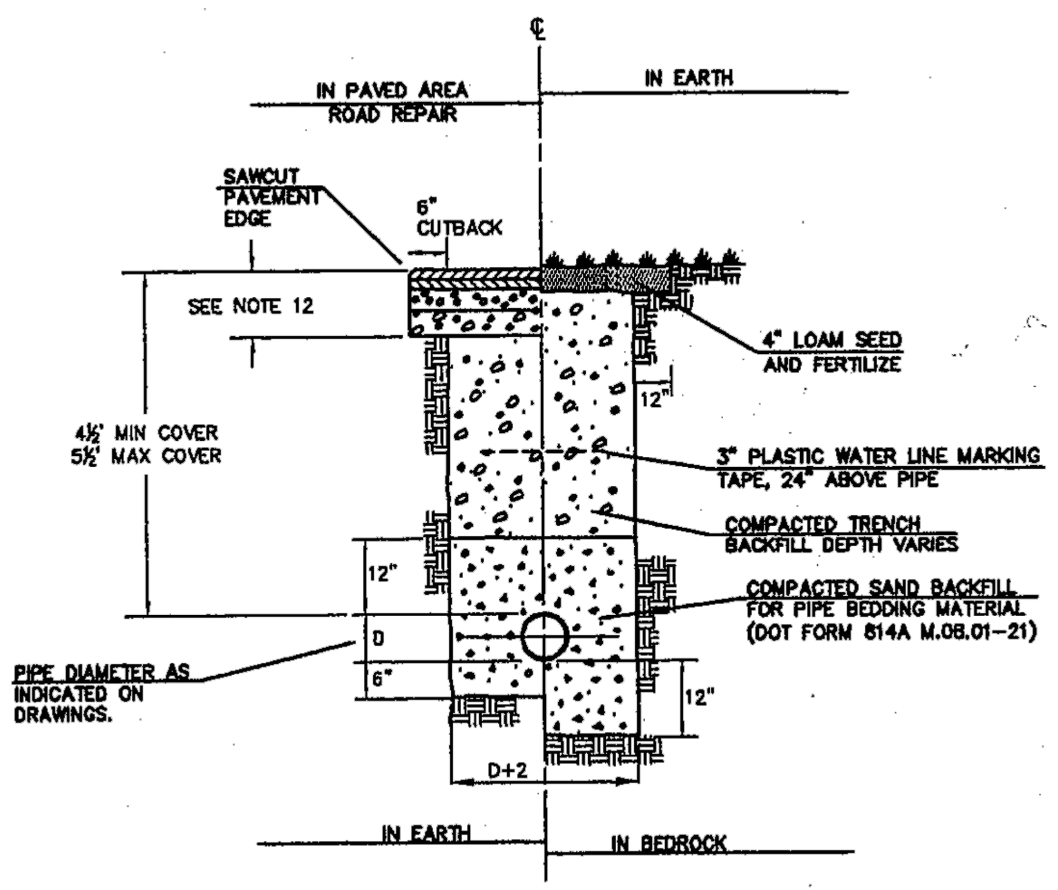
DET-01



PLAN VIEW

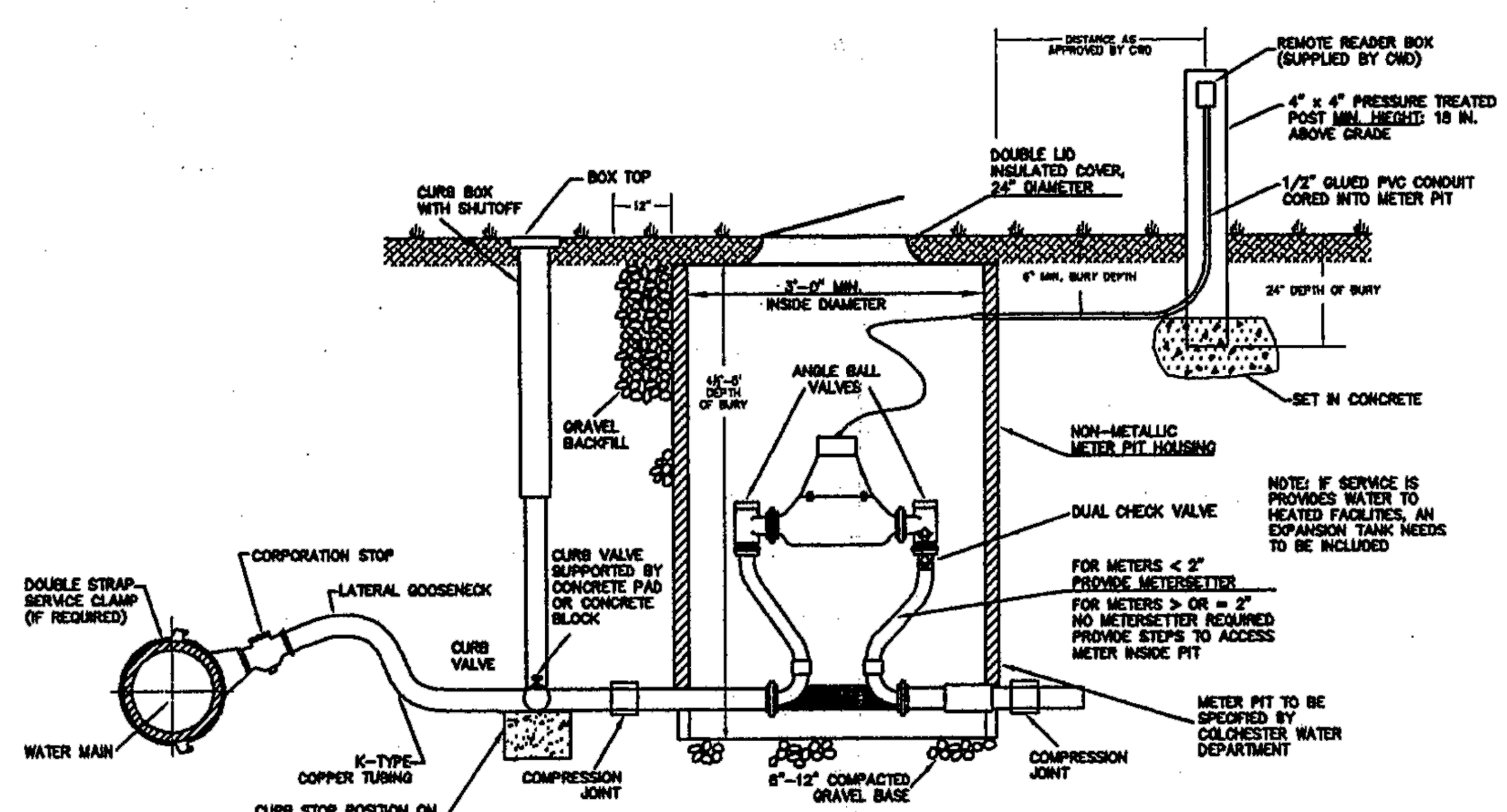
TYPICAL FIRE SERVICE INSTALLATION

NOT TO SCALE



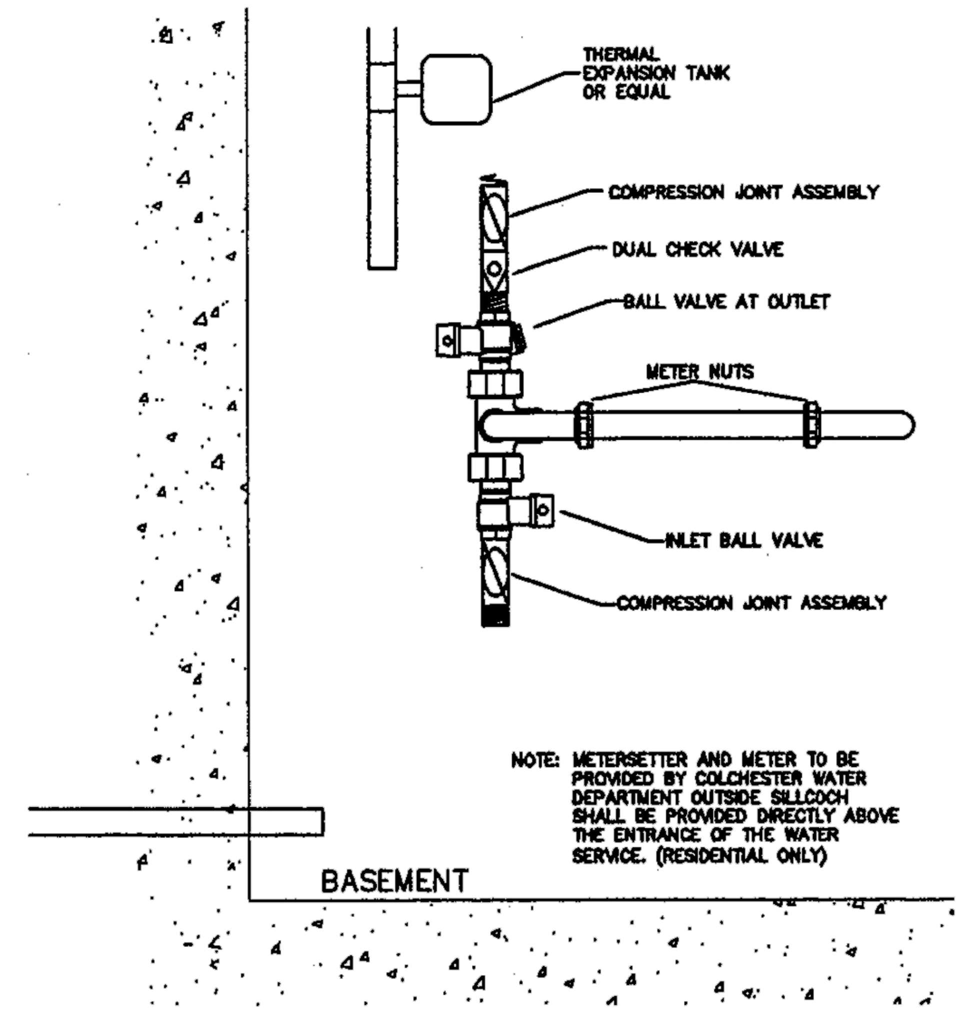
TYPICAL WATER TRENCH

NOT TO SCALE



TYPICAL METER PIT DETAIL

NOT TO SCALE

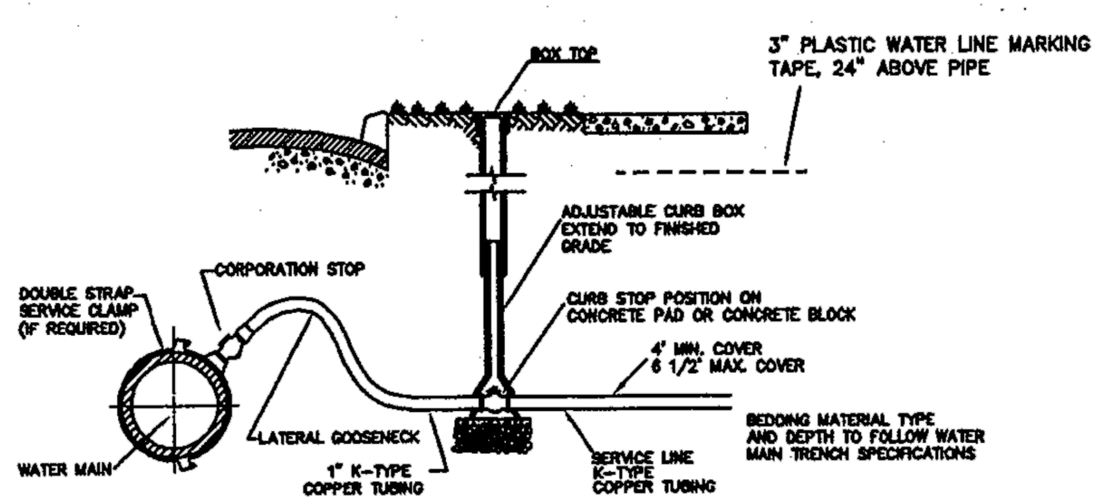


TYPICAL WATER METER INSTALLATION

NOT TO SCALE

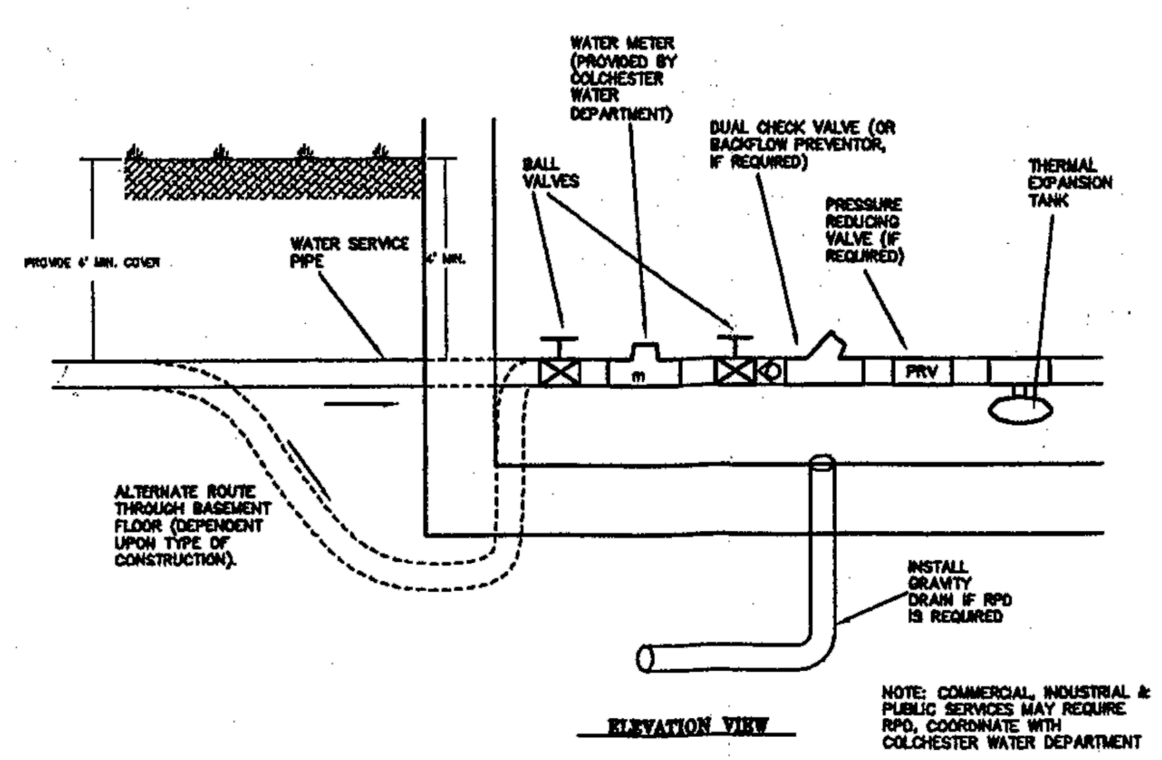
NOTES

1. ALL MATERIALS SHALL CONFORM WITH THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
2. WATER MAINS SHALL BE MINIMUM CLASS 52 CEMENT-LINED DUCTILE IRON PIPE WITH PUSH-ON JOINTS, IN ACCORDANCE WITH AWWA C104, C111 AND C150. MAINS SHALL BE INSTALLED IN ACCORDANCE WITH AWWA C600 AND THE COLCHESTER WATER DEPARTMENT STANDARD DETAILS.
3. HYDRANTS SHALL BE OPEN LEFT, 3-WAY HYDRANTS, WITH A 5-1/4" VALVE AND MECHANICAL JOINT CONNECTIONS IN ACCORDANCE WITH AWWA C502. ACCEPTABLE MANUFACTURERS ARE MUELLER CENTURION
4. GATE VALVES SHALL BE OPEN RIGHT, RESILIENT SEAT GATE VALVES WITH MECHANICAL JOINT CONNECTIONS, IN ACCORDANCE WITH AWWA C500. ACCEPTABLE MANUFACTURERS OF GATE VALVES ARE LISTED IN THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
5. ALL FITTINGS SHALL BE MECHANICAL JOINT, CEMENT-LINED DUCTILE IRON CLASS 52 OR GREATER, IN ACCORDANCE WITH AWWA C153. ACCEPTABLE MANUFACTURERS OF FITTINGS ARE LISTED IN THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
6. CORPORATIONS AND CURB STOPS SHALL BE COMPRESSION TYPE AND BE MANUFACTURED BY EITHER MUELLER OR FORD.
7. CURB BOXES SHALL BE MINIMUM 2-1/2" DIAMETER CAST IRON, BUFFALO TYPE. GATE BOXES SHALL BE MINIMUM 5-1/4" DIAMETER CAST IRON, SLIDE TYPE. EACH OF THESE SHALL BE NORTH AMERICAN MADE. ACCEPTABLE MANUFACTURERS ARE LISTED IN THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
8. SERVICE CONNECTIONS: ALL SERVICE CONNECTIONS SHALL BE A MINIMUM OF 1-INCH DIAMETER TYPE K COPPER TUBING AND SHALL BE CONSTRUCTED OF CONTINUOUS TUBING (NO JOINTS, CONNECTIONS, COUPLINGS, ETC.) WHEREVER POSSIBLE. SERVICE LINES IN EXCESS OF 150 FEET IN LENGTH FOR ALL TYPES OF USES, OR SERVICES FOR ANY NON-RESIDENTIAL/NON-POTABLE USE, INCLUDING BUT NOT LIMITED TO FIRE PROTECTION, PROCESS/INDUSTRIAL USE, COMMERCIAL USE, IRRIGATION, OR OTHER SUCH APPLICATIONS ARE SUBJECT TO PRE-APPROVAL BY COLCHESTER WATER DEPARTMENT AND/OR ADDITIONAL REQUIREMENTS INCLUDING BUT NOT LIMITED TO LARGER SIZE PIPING, ALTERNATE PIPING MATERIALS/INSTALLATION, HYDROSTATIC TESTING AND/OR DISINFECTION, METER PIT INSTALLATION, OR OTHER SPECIAL CONDITIONS AS MAY BE REQUIRED. INSTALLATION OF A 3/4-INCH SERVICE CONNECTION IS ONLY PERMITTED FOR RENEWAL OF CERTAIN EXISTING 3/4-INCH CONNECTIONS.
9. DISINFECTION AND PRESSURE TESTING - UPON COMPLETION, ALL MAINS, SERVICES AND OTHER PIPING AND APPURTENANCES SHALL BE PRESSURE AND LEAKAGE TESTED IN ACCORDANCE WITH AWWA C600, AND DISINFECTED BY THE CONTINUOUS FEED METHOD AND IN ACCORDANCE WITH AWWA C651 BY AN INDEPENDENT PARTY APPROVED BY COLCHESTER WATER DEPARTMENT.
10. SHOP DRAWINGS FOR ALL MATERIALS TO BE USED ON THE JOB SHALL BE SUBMITTED TO THE COLCHESTER WATER DEPARTMENT FOR APPROVAL.
11. AS-BUILT DRAWINGS WILL BE SUPPLIED TO THE COLCHESTER WATER DEPARTMENT WITHIN 90 DAYS AFTER ACCEPTANCE OF THE MAIN BY COLCHESTER WATER DEPARTMENT.
12. THE MINIMUM DEPTH OF ROAD BASE MATERIAL AND PAVEMENT INSTALLED OVER ANY WATER MAIN TRENCH, INCLUSIVE OF ANY CUTBACKS, SHALL BE THE LARGEST OF THE FOLLOWING:
    A. FOR EXISTING ROADS - THE DEPTH OF EXISTING ROAD BASE AND PAVEMENT,
    OR
    SIX (6) INCHES OF COMPACTED ROAD BASE AND THREE (3) INCHES OF NEW PAVEMENT,
    B. FOR NEWLY CONSTRUCTED ROADS - DEPTHS SHOWN ON PLANS APPROVED BY THE LOCAL P&Z COMMISSION, STATE D.O.T., OR OTHER GOVERNING AUTHORITY,
    OR
    SIX (6) INCHES OF COMPACTED ROAD BASE AND THREE (3) INCHES OF NEW PAVEMENT.
13. CONCRETE THRUST BLOCKS, EITHER POURED OR PLACED (PRECAST SOLID BRICK), MAY BE REQUIRED BY COLCHESTER WATER DEPARTMENT IN ADDITION TO, OR POSSIBLY IN THE PLACE OF, PUSH ON JOINT PIPE RESTRAINT OR MEGALUG RETAINER GLANDS, BASED ON SPECIFIC CONDITIONS. ANY SUCH REQUIREMENTS WOULD BE NOTED DURING THE PLAN REVIEW PHASE.
14. REMOTE READER LOCATION SHALL BE ON THE FRONT OF THE BUILDING NOT LESS THAN 3 FEET FROM GRADE NO MORE THAN 5 FEET FROM GRADE. ADVANCE NOTICE OF SHEET ROCKING SHALL BE PROVIDED TO C.W.D FOR READER WIRE INSTALLATION.



TYPICAL 1", 1½" AND 2" WATER SERVICE CONNECTION

NOT TO SCALE



ELEVATION VIEW

TYPICAL SERVICE INSTALLATION > 1"

NOT TO SCALE

Designed By: JJU
Drawn By: JJU
Checked By: JEE
CAD File: 01-485.1/STD DETAILS

Drawing Scale: AS SHOWN

Drawing date: JAN. 29, 2003

Rev.	Date	Revision	By

SERVICE CONNECTION DETAILS

PREPARED FOR

TOWN OF COLCHESTER

COLCHESTER, CONNECTICUT

Lenard Engineering, Inc.
Civil, Environmental and Hydrogeological Consultants
1066 Storrs Road STORRS, CT (860) 429-9400
140 Willow Street WINSTED, CT (860) 379-8859
15 Midstate Drive Auburn, MA (508) 721-7850

Drawing #: 1 OF 2

Job #:

PRELIMINARY DESIGN - DRAFT

WATER MAIN EXTENSION - SEPTEMBER 4, 2019

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL

IN

COLCHESTER CONNECTICUT

WATER MAIN DETAILS

SEPTEMBER 4, 2019

REVISIONS:

PREPARED FOR:
BLOOM ENERGY – CONNECTICUT
1299 ORLEANS DRIVE
SUNNYVALE, CA 94089

BSC GROUP
300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

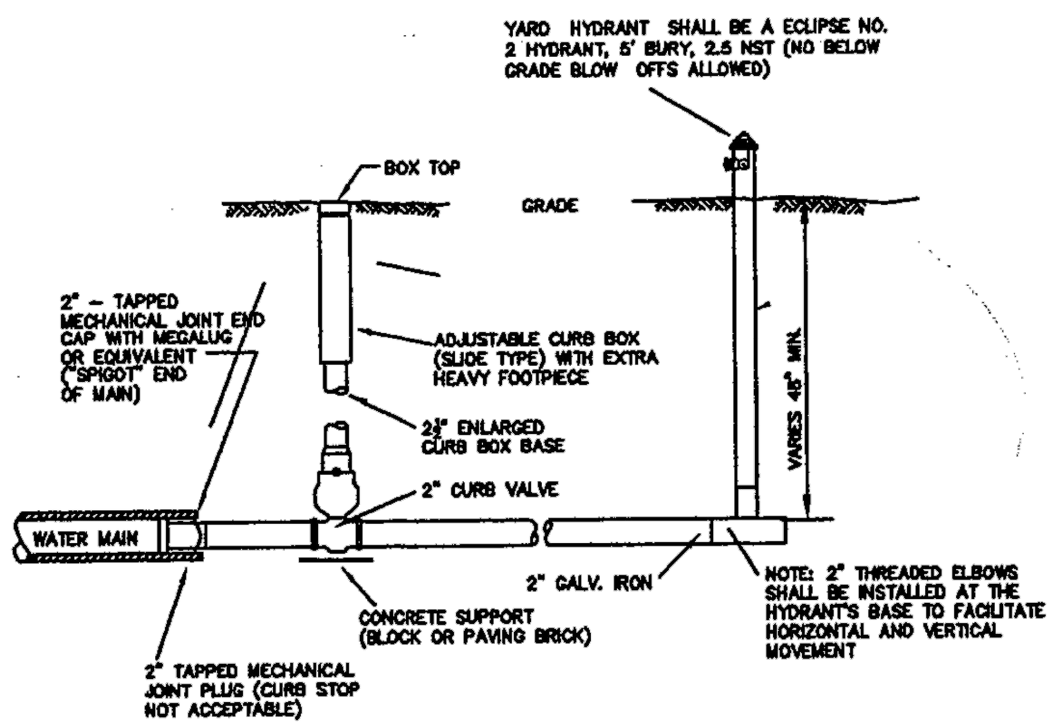
SCALE: AS SHOWN

FILE: 83723OO-DET.DWG

DWG. NO:

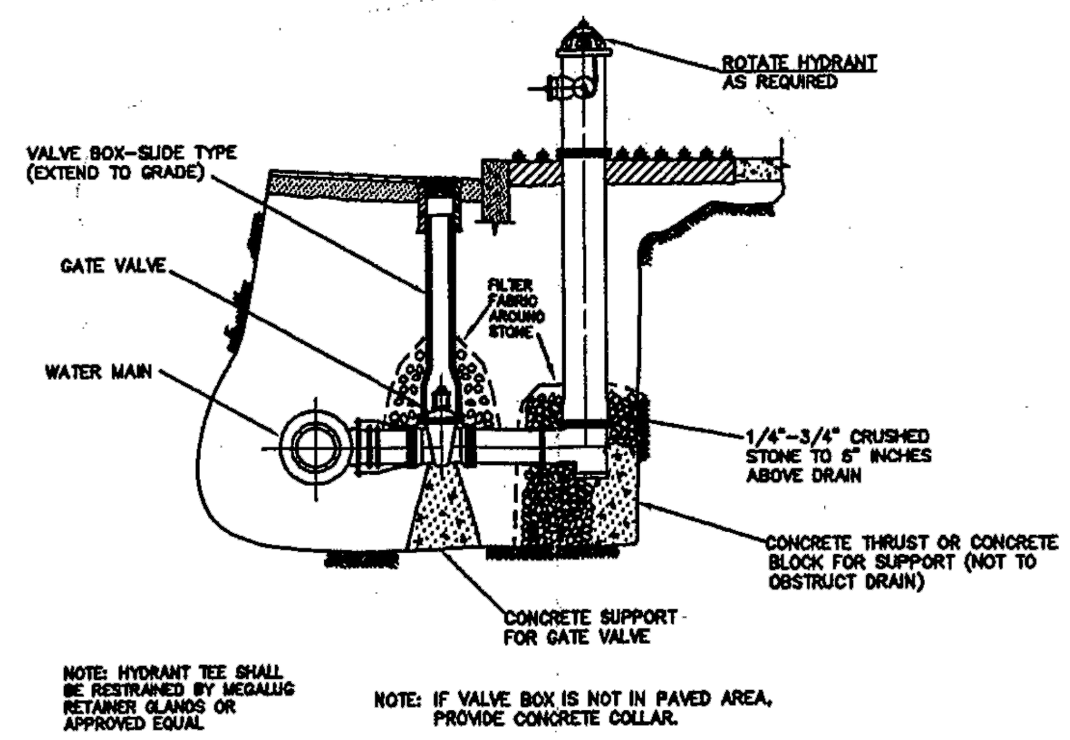
JOB. NO: 83723.00

DET-02



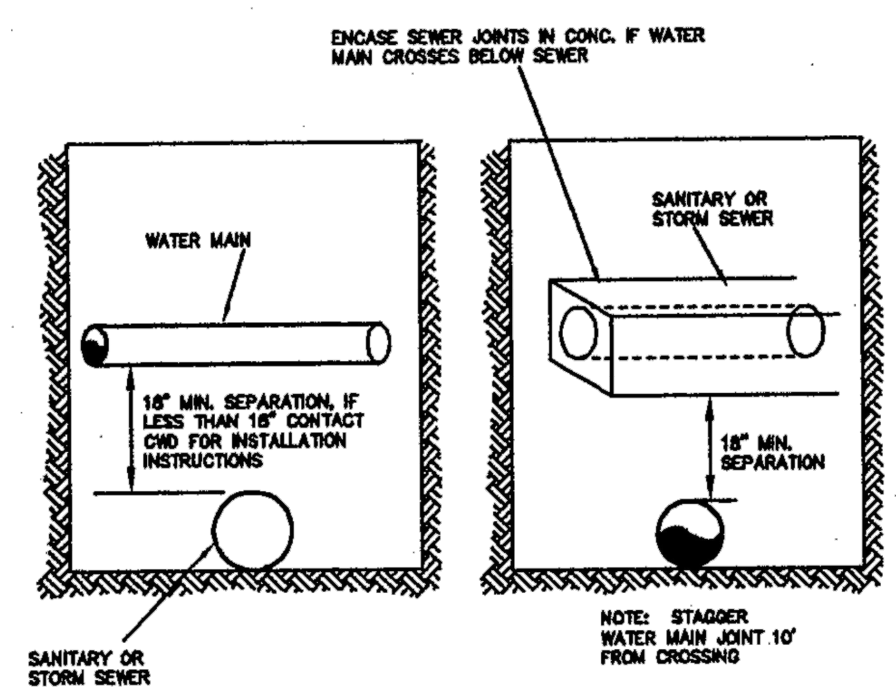
TYPICAL FLUSHING VALVE INSTALLATION

NOT TO SCALE



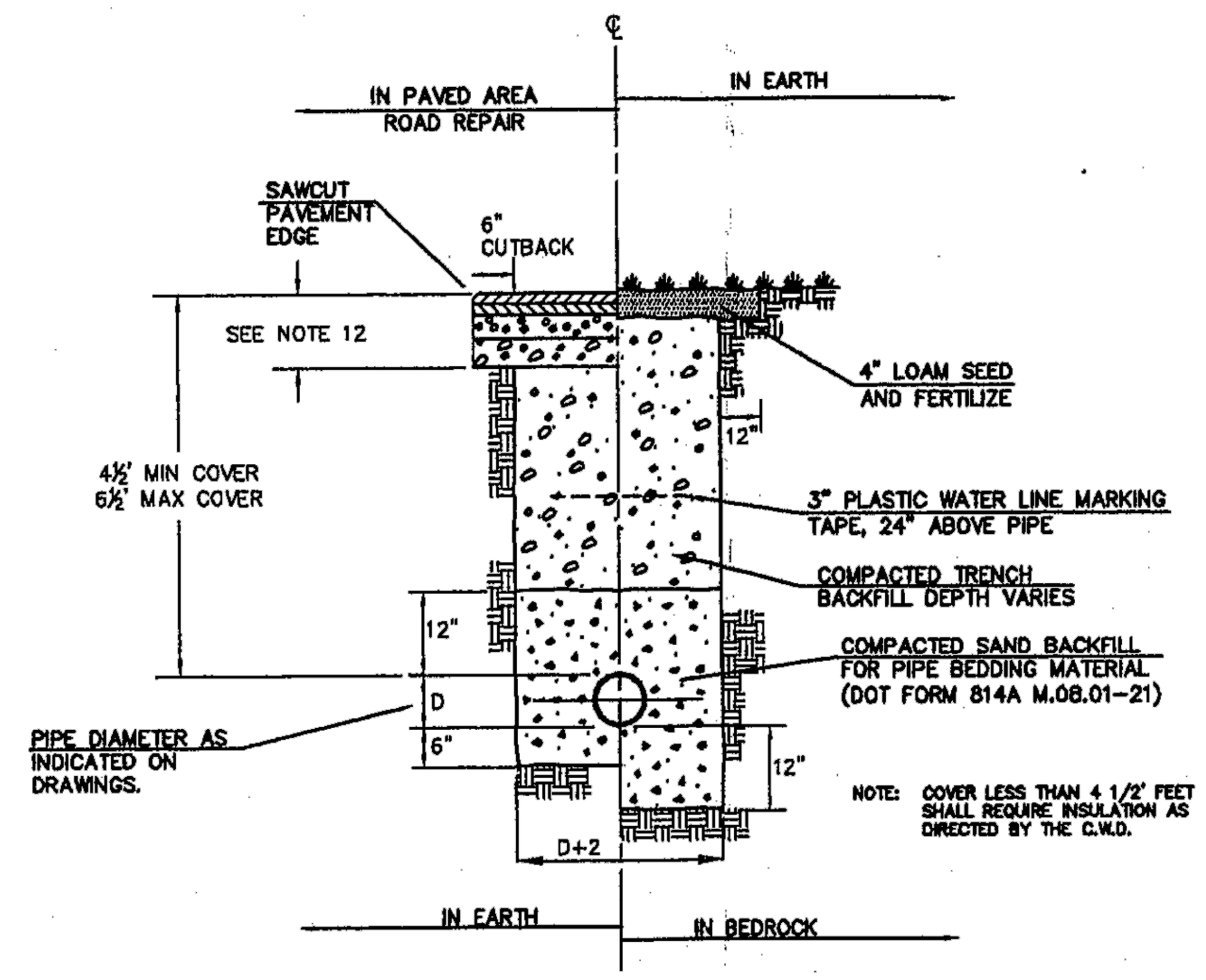
TYPICAL HYDRANT AND VALVE INSTALLATION

NOT TO SCALE



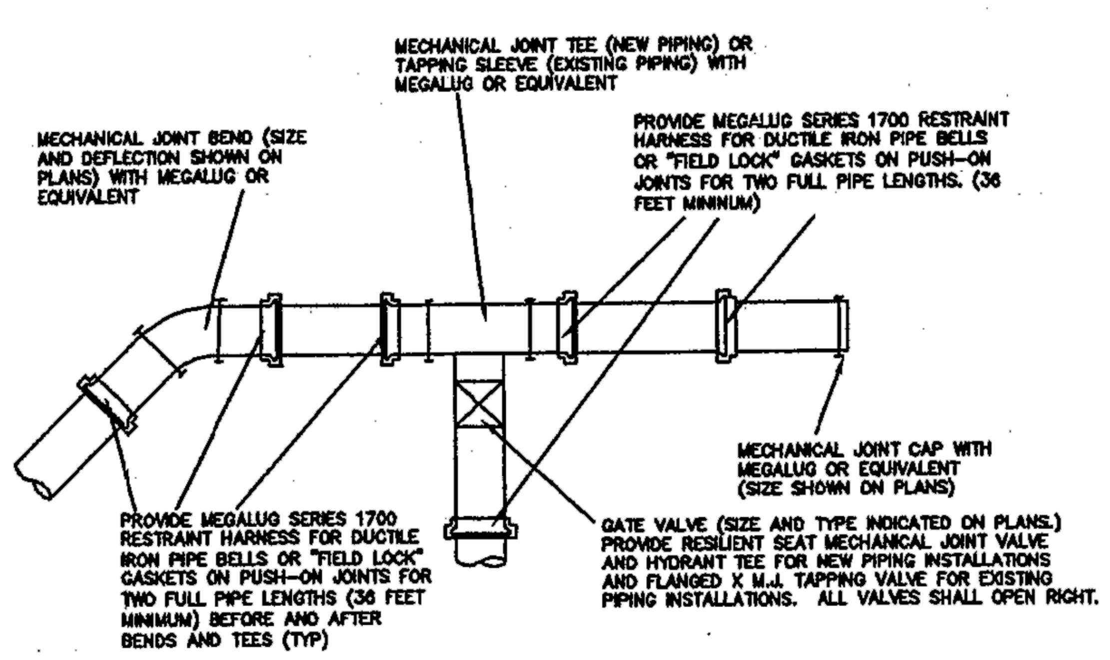
WATER AND SEWER CROSSINGS

NOT TO SCALE



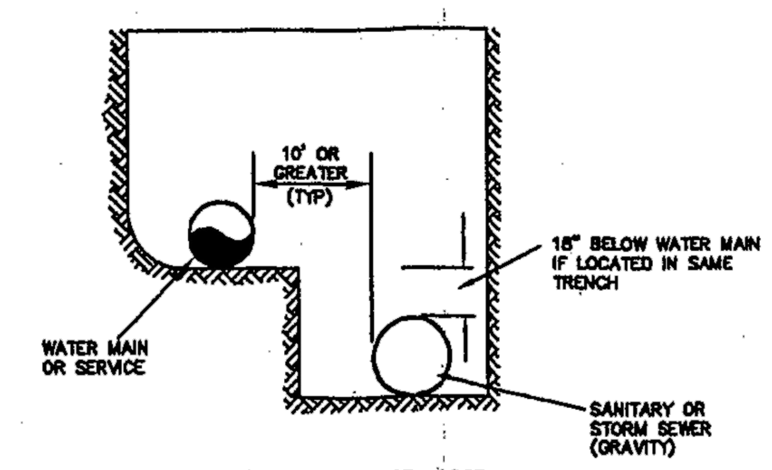
TYPICAL WATER OR SANITARY TRENCH

NOT TO SCALE



TYPICAL CONNECTIONS TO BENDS, TEES, VALVES AND CAPS

NOT TO SCALE



WATER MAIN AND SEWER TRENCH DETAIL PARALLEL INSTALLATION

NOT TO SCALE

NOTES

1. ALL MATERIALS SHALL CONFORM WITH THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
2. WATER MAINS SHALL BE MINIMUM CLASS 52 CEMENT-LINED DUCTILE IRON PIPE WITH PUSH-ON JOINTS, IN ACCORDANCE WITH AWWA C104, C111 AND C150. MAINS SHALL BE INSTALLED IN ACCORDANCE WITH AWWA C600 AND THE COLCHESTER WATER DEPARTMENT STANDARD DETAILS.
3. HYDRANTS SHALL BE OPEN LEFT, 3-WAY HYDRANTS, WITH A 5-1/4" VALVE AND MECHANICAL JOINT CONNECTIONS IN ACCORDANCE WITH AWWA C502. ACCEPTABLE MANUFACTURERS ARE MUELLER CENTURION
4. GATE VALVES SHALL BE OPEN RIGHT, RESILIENT SEAT GATE VALVES WITH MECHANICAL JOINT CONNECTIONS, IN ACCORDANCE WITH AWWA C500. ACCEPTABLE MANUFACTURERS OF GATE VALVES ARE LISTED IN THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
5. ALL FITTINGS SHALL BE MECHANICAL JOINT, CEMENT-LINED DUCTILE IRON CLASS 52 OR GREATER, IN ACCORDANCE WITH AWWA C153. ACCEPTABLE MANUFACTURERS OF FITTINGS ARE LISTED IN THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
6. CORPORATIONS AND CURB STOPS SHALL BE COMPRESSION TYPE AND BE MANUFACTURED BY EITHER MUELLER OR FORD.
7. CURB BOXES SHALL BE MINIMUM 2-1/2" DIAMETER CAST IRON, BUFFALO TYPE. GATE BOXES SHALL BE MINIMUM 5-1/4" DIAMETER CAST IRON, SLIDE TYPE. EACH OF THESE SHALL BE NORTH AMERICAN MADE. ACCEPTABLE MANUFACTURERS ARE LISTED IN THE COLCHESTER WATER DEPARTMENT MATERIAL SPECIFICATIONS.
8. SERVICE CONNECTIONS: ALL SERVICE CONNECTIONS SHALL BE A MINIMUM OF 1-INCH DIAMETER TYPE K COPPER TUBING AND SHALL BE CONSTRUCTED OF CONTINUOUS TUBING (NO JOINTS, CONNECTIONS, COUPLINGS, ETC.) WHEREVER POSSIBLE. SERVICE LINES IN EXCESS OF 150 FEET IN LENGTH FOR ALL TYPES OF USES, OR SERVICES FOR ANY NON-RESIDENTIAL/NON-POTABLE USE, INCLUDING BUT NOT LIMITED TO FIRE PROTECTION, PROCESS/INDUSTRIAL USE, COMMERCIAL USE, IRRIGATION, OR OTHER SUCH APPLICATIONS ARE SUBJECT TO PRE-APPROVAL BY COLCHESTER WATER DEPARTMENT AND/OR ADDITIONAL REQUIREMENTS INCLUDING BUT NOT LIMITED TO LARGER SIZE PIPING, ALTERNATE PIPING MATERIALS/INSTALLATION, HYDROSTATIC TESTING AND/OR DISINFECTION, METER PIT INSTALLATION, OR OTHER SPECIAL CONDITIONS AS MAY BE REQUIRED. INSTALLATION OF A 3/4-INCH SERVICE CONNECTION IS ONLY PERMITTED FOR RENEWAL OF CERTAIN EXISTING 3/4-INCH CONNECTIONS.
9. DISINFECTION AND PRESSURE TESTING – UPON COMPLETION, ALL MAINS, SERVICES AND OTHER PIPING AND APPURTENANCES SHALL BE PRESSURE AND LEAKAGE TESTED IN ACCORDANCE WITH AWWA C600, AND DISINFECTED BY THE CONTINUOUS FEED METHOD AND IN ACCORDANCE WITH AWWA C651 BY AN INDEPENDENT PARTY APPROVED BY COLCHESTER WATER DEPARTMENT.
10. SHOP DRAWINGS FOR ALL MATERIALS TO BE USED ON THE JOB SHALL BE SUBMITTED TO THE COLCHESTER WATER DEPARTMENT FOR APPROVAL.
11. AS-BUILT DRAWINGS WILL BE SUPPLIED TO THE COLCHESTER WATER DEPARTMENT WITHIN 90 DAYS AFTER ACCEPTANCE OF THE MAIN BY COLCHESTER WATER DEPARTMENT.
12. THE MINIMUM DEPTH OF ROAD BASE MATERIAL AND PAVEMENT INSTALLED OVER ANY WATER MAIN TRENCH, INCLUSIVE OF ANY CUTBACKS, SHALL BE THE LARGEST OF THE FOLLOWING:
    A. FOR EXISTING ROADS – THE DEPTH OF EXISTING ROAD BASE AND PAVEMENT,
       OR
       SIX (6) INCHES OF COMPACTED ROAD BASE AND THREE (3) INCHES OF NEW PAVEMENT,
    B. FOR NEWLY CONSTRUCTED ROADS – DEPTHS SHOWN ON PLANS APPROVED BY THE LOCAL P&Z COMMISSION, STATE D.O.T., OR OTHER GOVERNING AUTHORITY,
       OR
       SIX (6) INCHES OF COMPACTED ROAD BASE AND THREE (3) INCHES OF NEW PAVEMENT.
13. CONCRETE THRUST BLOCKS, EITHER POURED OR PLACED (PRECAST SOLID BRICK), MAY BE REQUIRED BY COLCHESTER WATER DEPARTMENT IN ADDITION TO, OR POSSIBLY IN THE PLACE OF, PUSH ON JOINT PIPE RESTRAINT OR MEGALUG RETAINER GLANDS, BASED ON SPECIFIC CONDITIONS. ANY SUCH REQUIREMENTS WOULD BE NOTED DURING THE PLAN REVIEW PHASE.
14. REMOTE READER LOCATION SHALL BE ON THE FRONT OF THE BUILDING NOT LESS THAN 3 FEET FROM GRADE NO MORE THAN 5 FEET FROM GRADE. ADVANCE NOTICE OF SHEET ROCKING SHALL BE PROVIDED TO C.W.D FOR READER WIRE INSTALLATION.

Designed By: JJU
Drawn By: JJU
Checked By: JEE
CAD File: 01-486.1/STD DETAILS
Drawing Scale: AS SHOWN
Drawing date: JAN. 29, 2003

Rev.	Date	Revision	By

WATER MAIN DETAILS
PREPARED FOR
TOWN OF COLCHESTER
COLCHESTER, CONNECTICUT

Lenard Engineering, Inc.
Civil, Environmental and Hydrogeological Consultants
1995 Storrs Road, STORRS, CT (860) 429-5400
140 Willow Street, WINSTED, CT (860) 379-6669
15 Midstate Drive, Auburn, MA (508) 721-7050

Drawing #: 2 OF 2
Job #:

PRELIMINARY DESIGN - DRAFT

ROBERT NEWTON, PE No. 20662

WATER MAIN EXTENSION

AIRLINE TRAIL
IN
COLCHESTER CONNECTICUT

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SEPTEMBER 4, 2019

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BLOOM ENERGY – CONNECTICUT
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300 Winding Brook Drive
Glastonbury, Connecticut 06033
860 652 8227

SCALE: AS SHOWN
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FILE: 8372300-DET.DWG
DWG. NO:
JOB. NO: 83723.00
DET-03

Bloomenergy

Exhibit 3

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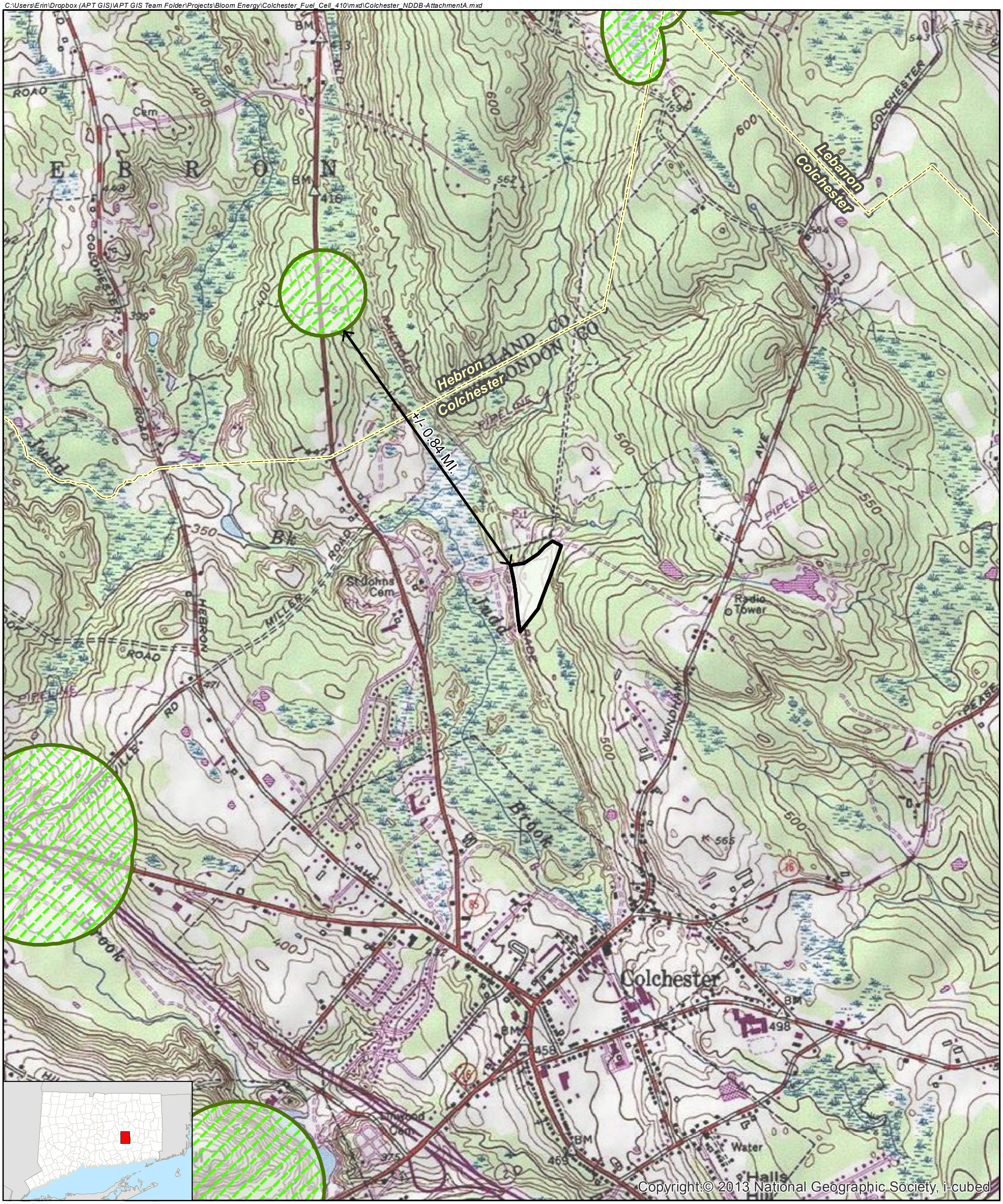

Legend

- Site
- Municipal Boundary
- Natural Diversity Database Area (June 2019)

Map Notes:
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Maps: Colchester (1984), CT
Map Scale: 1:24,000
Map Date: October 2019

2,000 1,000 0 2,000 Feet

NDDB Attachment A
Overview Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

Bloomenergy

ALL-POINTS TECHNOLOGY CORPORATION

Exhibit 4

WETLAND INSPECTION

September 29, 2018 **APT Project No.: CT507410**

Prepared For: Bloom Energy
1299 Orleans Drive
Sunnyvale, CA 94089
Attn: Justin Adams, Lead Permitting Specialist

Site Name: Eversource Judd Brook Substation – CT10MW

Site Address: Eversource Energy Services Co. Judd Brook Substation
160 Old Amston Road, Colchester, Connecticut

Date(s) of Investigation: 7/19/2018

Field Conditions: **Weather:** sunny**,** low 80's
Soil Moisture: dry to moist

Wetland/Watercourse Delineation Methodology*:

☒Connecticut Inland Wetlands and Watercourses
☐Connecticut Tidal Wetlands
☐Massachusetts Wetlands
☐U.S. Army Corps of Engineers

Municipal Upland Review Area/Buffer Zone:

Wetlands: 75 feet
Watercourses: 100 feet

The wetlands inspection was performed by†:

Matthew Gustafson, Registered Soil Scientist

Enclosures: Wetland Delineation Field Form & Wetland Inspection Map

This report is provided as a brief summary of findings from APT's wetland investigation of the referenced Study Area that consists of proposed development activities and areas generally within 200 feet.‡ If applicable, APT is available to provide a more comprehensive wetland impact analysis upon receipt of site plans depicting the proposed development activities and surveyed location of identified wetland and watercourse resources.

* *Wetlands and watercourses were delineated in accordance with applicable local, state and federal statutes, regulations and guidance.*

† *All established wetlands boundary lines are subject to change until officially adopted by local, state, or federal regulatory agencies.*

‡ *APT has relied upon the accuracy of information provided by Bloom Energy and its contractors regarding proposed lease area and access road/utility easement locations for identifying wetlands and watercourses within the study area.*

Attachments

- Wetland Delineation Field Form
- Wetland Inspection Map

Wetland Delineation Field Form

Wetland I.D.:	Wetland 1	
Flag #'s:	WF 1-01 to 1-50	
Flag Location Method:	Site Sketch ☒	GPS (sub-meter) located ☒

WETLAND HYDROLOGY:

NONTIDAL ☒

Intermittently Flooded ☐	Artificially Flooded ☐	Permanently Flooded ☐
Semipermanently Flooded ☐	Seasonally Flooded ☒	Temporarily Flooded ☐
Permanently Saturated ☐	Seasonally Saturated – seepage ☒	Seasonally Saturated - perched ☐
Comments: Wetland consists of a hillside seep complex with seasonal saturation and localized inundation and an interior intermittent watercourse that seasonally floods.		

TIDAL ☐

Subtidal ☐	Regularly Flooded ☐	Irregularly Flooded ☐
Irregularly Flooded ☐		
Comments: None		

WETLAND TYPE:

SYSTEM:

Estuarine ☐	Riverine ☐	Palustrine ☒
Lacustrine ☐	Marine ☐	
Comments: None		

CLASS:

Emergent ☒	Scrub-shrub ☒	Forested ☒
Open Water ☐	Disturbed ☒	Wet Meadow ☐
Comments: Vegetation classes are diverse with historically cleared areas in the northern end of the wetland consisting of emergent vegetation with transitional scrub/shrub habitat; the majority of Wetland 1 is dominated by mature forest.		

WATERCOURSE TYPE:

Perennial ☐	Intermittent ☒	Tidal ☐
Watercourse Name: Unnamed		
Comments: An interior braided northeast-southwest flowing intermittent watercourse is located within Wetland 1 with banks ranging from 1 to 3 feet wide with a sandy bottom.		

Wetland Delineation Field Form (Cont.)

SPECIAL AQUATIC HABITAT:

Vernal Pool Yes ☒ No ☐ Potential ☒	Other ☐
Vernal Pool Habitat Type: 'Classic'	
Comments: Three depressional pockets were noted within Wetland 1 that have characteristics of seasonal flooding ranging from 4 to 10 inches in depth, identified as Vernal Pools 1, 2, and 3. Two of these areas contained inundation at the time of inspection with Vernal Pool 1 containing 2 to 4 inches of inundation and Vernal Pool 2 containing 4 to 6 inches of inundation. Several juvenile wood frogs were observed in proximity to Wetland 1 providing evidence that one or more of these potential vernal pools is supporting breeding by obligate vernal pool species.	

SOILS:

Are field identified soils consistent with NRCS mapped soils?	Yes ☒	No ☐
If no, describe field identified soils		

DOMINANT PLANTS:

Red Maple (Acer rubrum)	American Elm (Ulmus americana)
Skunk Cabbage (Symplocarpus foetidus)	Spicebush (Lindera benzoin)
Sensitive Fern (Onoclea sensibilis)	Sweet Pepperbush (Clethera alnifolia)
Fox Grape (Vitis labrusca)	Winterberry (Ilex verticillata)
Purple Loosestrife* (Lythrum salicaria)	Skunk Cabbage (Symplocarpus foetidus)
Mugwort* (Artemisia vulgaris)	Tussock Sedge (Carex stricta)

* denotes Connecticut Invasive Species Council invasive plant species

GENERAL COMMENTS:

Wetland 1 consists of a complex of hillside seep wetlands that border on an interior intermittent watercourse and contain pockets of seasonally flooded areas that have the potential of supporting vernal pool breeding habitat. The northern extents of Wetland 1 have historically been cleared in proximity to the existing electrical substation. The western delineated wetland boundary within this northern portion of the wetland is characterized by stone fill material. Wetland 1 generally flows to the south/southwest focusing its flows within the northeast-southwest flowing interior intermittent watercourse. The watercourses is characterized by braided flows with small depressional pockets that are seasonally flooded and have the potential for supporting vernal pool breeding habitat. The majority of Wetland 1 is dominated by mature, closed canopy forest with the exception of the northern end near the substation which contains comparatively smaller emergent and scrub-shrub habitats. As this wetland drains to the southwest near the southwestern property corner, it crosses under an existing gravel trail (Colchester Spur Airline Trail) via a 15-inch corrugated plastic pipe and eventually converges offsite with Judd Brook further to the west.

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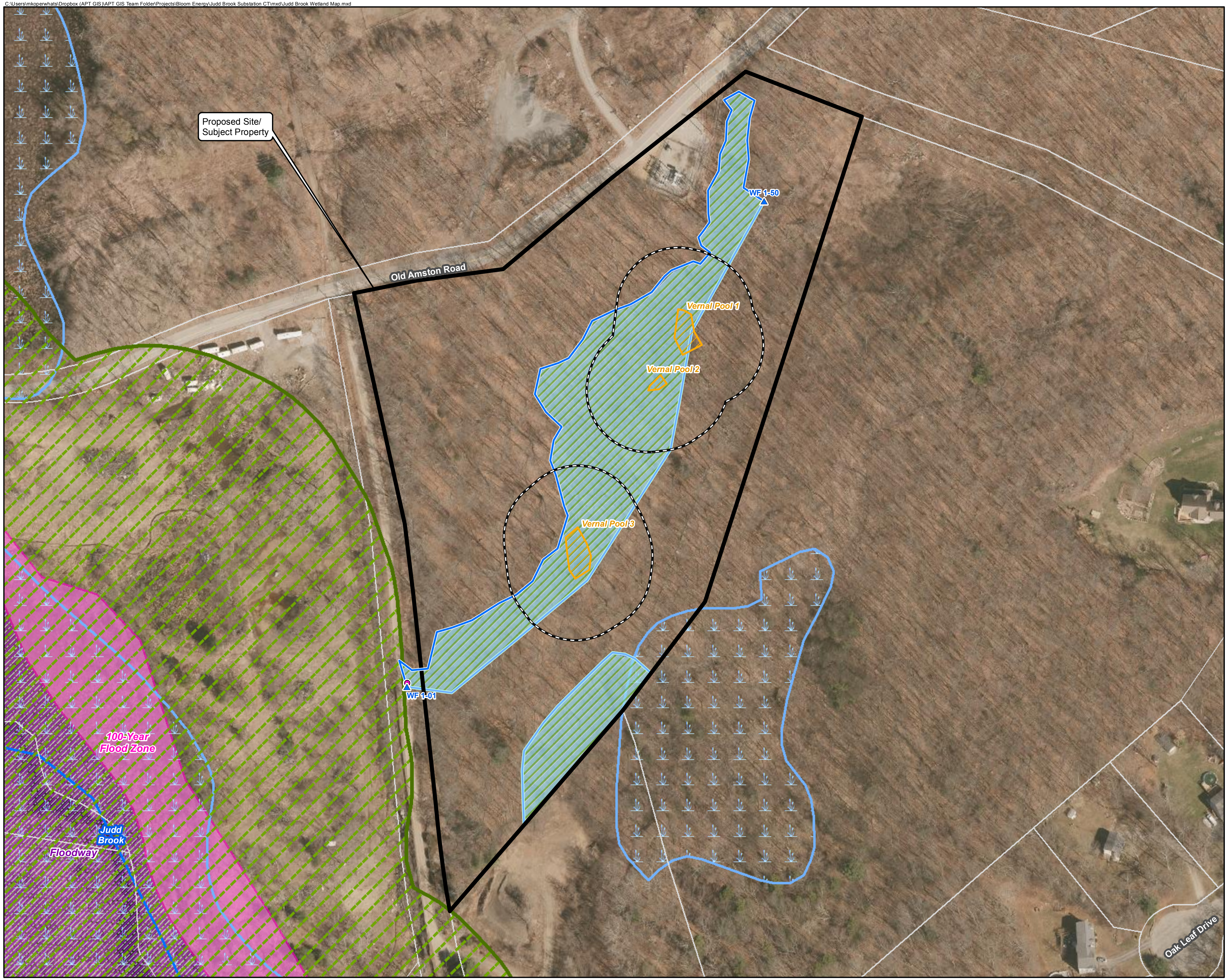


Wetland Map
Proposed Judd Brook Substation - CT 10MW Fuel Cell Energy Facility
160 Old Amston Road
Colchester, Connecticut

Legend

- Proposed Site/Subject Property
- Wetland Flag
- Delineated Wetland Boundary
- Estimated Wetland Boundary
- Wetland Area
- Vernal Pool
- 100' Vernal Pool Envelope
- Culvert
- Natural Diversity Database Area (December 2017)
- Critical Habitat (CTDEEP; July 2009)*
- Wetlands (CTDEEP)
- Open Water (CTDEEP)
- Watercourse (CTDEEP)
- Approximate Parcel Boundary (CTDEEP)
- Municipal Boundary

FEMA Flood Zones

- 100-Year Flood Zone
- 500-Year Flood Zone
- Floodway

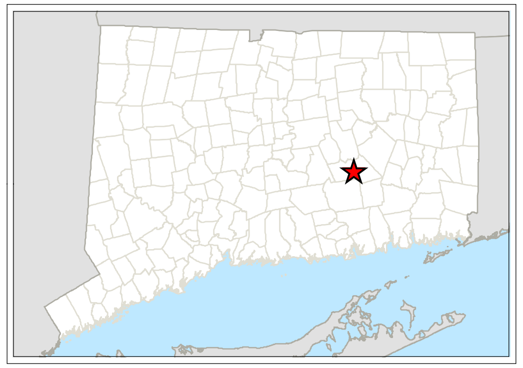
Aquifer Protection Area (CTDEEP, Oct. 2016)*

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

N W E S

150 75 0 150 Feet

1 in = 150 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

*Legend item not in mapped area

Ortho Base Map: State of Connecticut 2016 aerial imagery with 0.5-foot ground resolution provided by CTECO Map Service

Elevation contours derived from 2000 LiDAR data provided by CTECO

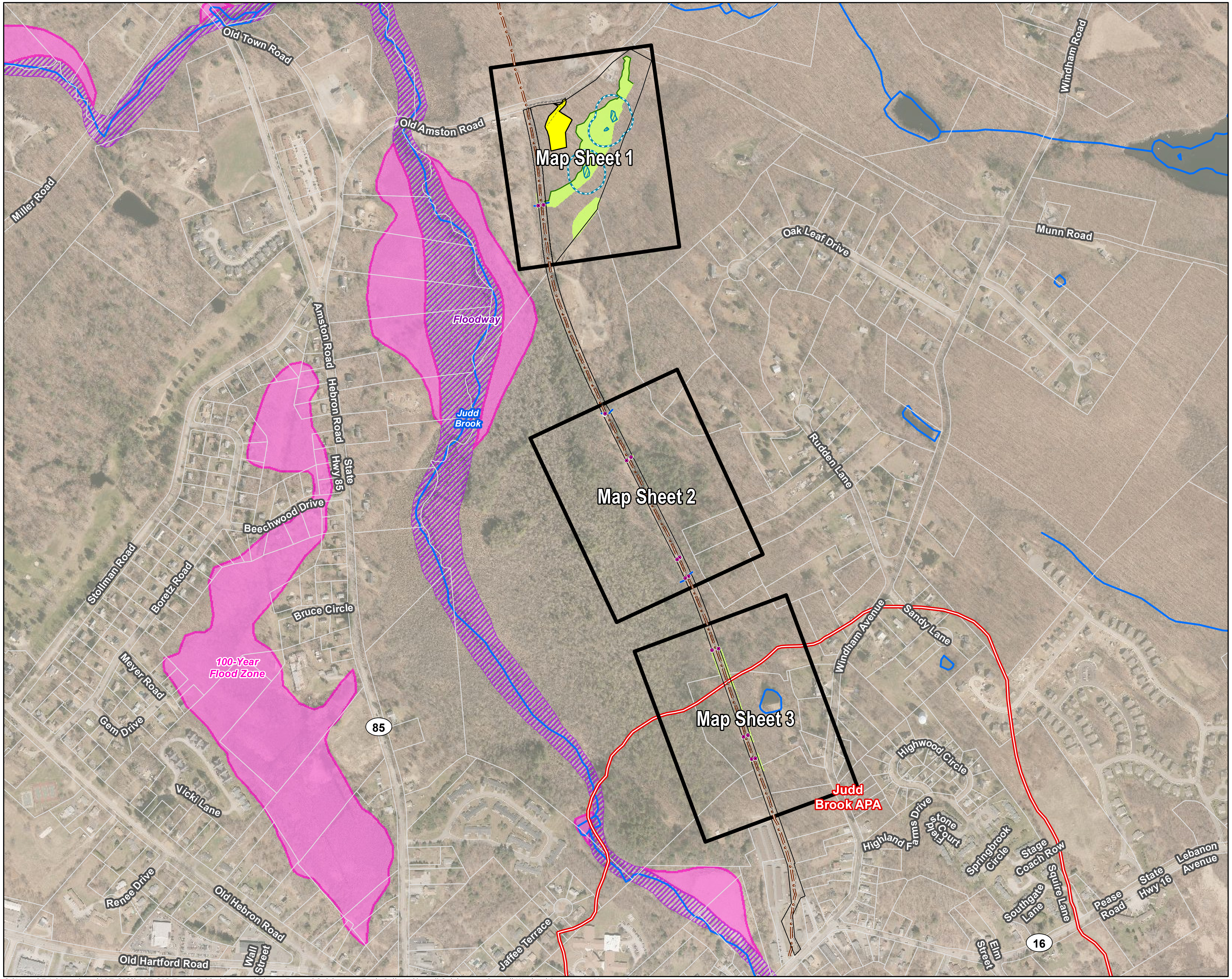
Flood Zones obtained from FEMA National Flood Hazard Layer(NFHL) dataset.

CTDEEP's data library (http://www.ct.gov/deep)
Data layers are maintained and updated by CTDEEP and represent the most recent publications.

Map Date: July 2018

Bloomenergy

Exhibit 5



Overall Wetland Inspection Map
Proposed Judd Brook Substation - CT 10MV
160 Old Amston Road
Colchester, CT

Bloomenergy

Legend

- Site
- Trail Right-Of-Way
- Approximate Parcel Boundary
- Air Line Trail (Colchester Railroad)
- Project Area
- Underground Utility Lines Route
- Delineated Wetland Boundary Line
- Approximate Wetland Area
- Vernal Pool
- 100' Vernal Pool Envelope
- Watercourse
- Culvert
- Watercourse (CTDEEP)

FEMA Flood Zones

- 100-Year Flood Zone
- 500-Year Flood Zone
- Floodway

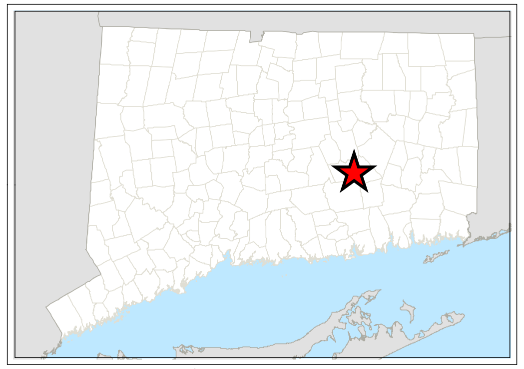
Aquifer Protection Area (CTDEEP, July 2019)

- Final Adopted Aquifer Protection Area

N S W E

600 300 0 600 Feet

1 in = 600 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

Ortho Base Map: CT ECO 2016 Aerial Imagery

Wetlands field delineated by: Matthew Gustafson, Registered Soil Scientist, APT.
Date: 07/18 & 09/19.

Flood Zones obtained from FEMA National Flood Hazard Layer (NFHL) dataset.

CTDEEP's data library (http: //www.ct.gov/deep)
Data layers are maintained and updatd by CTDEEP and represent the most recent publications.

Map Date: October 2019

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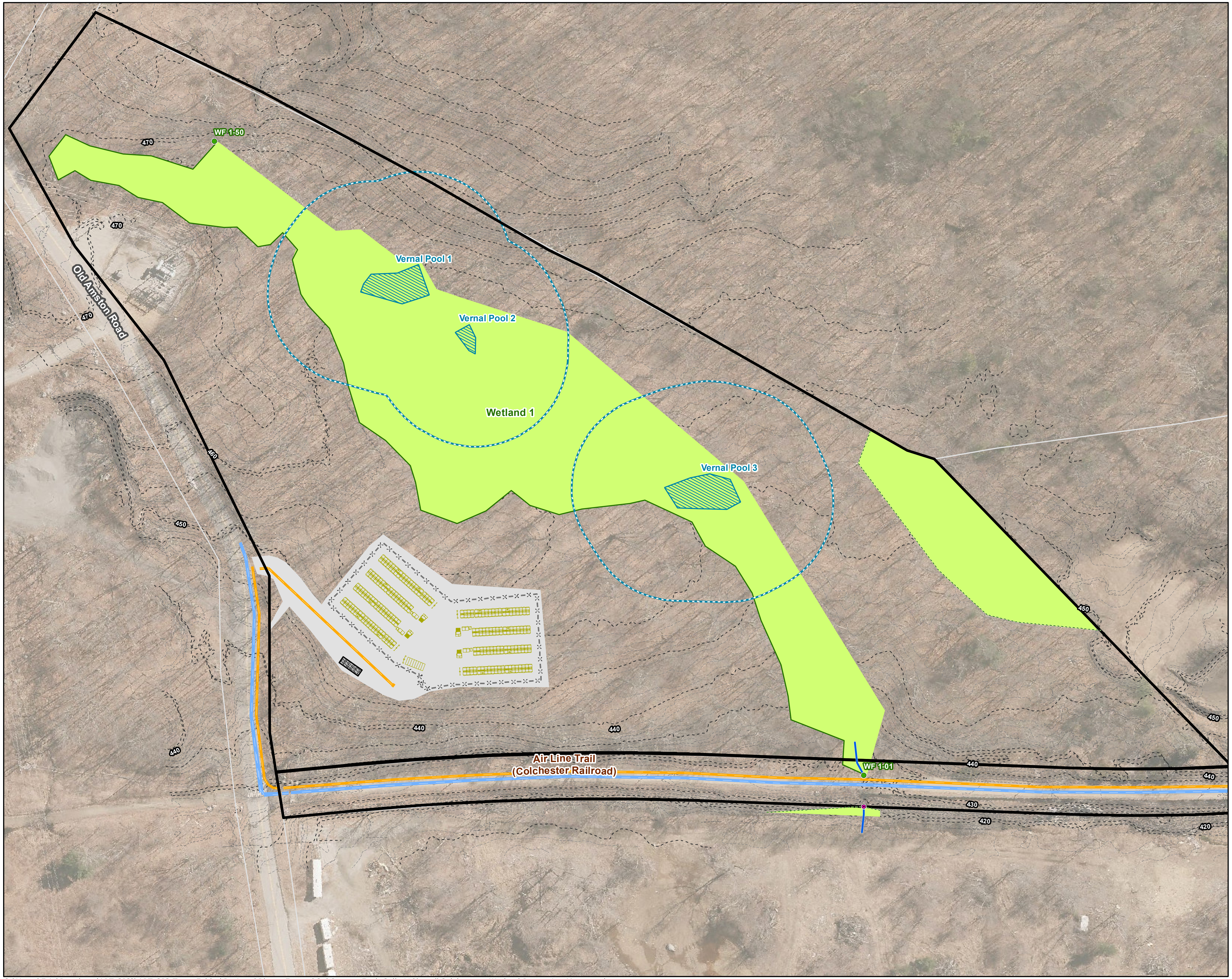


Wetland Inspection Map
Proposed Judd Brook Substation - CT 10MV
160 Old Amston Road
Colchester, CT

Bloomenergy

Map Sheet 1 of 3

Legend

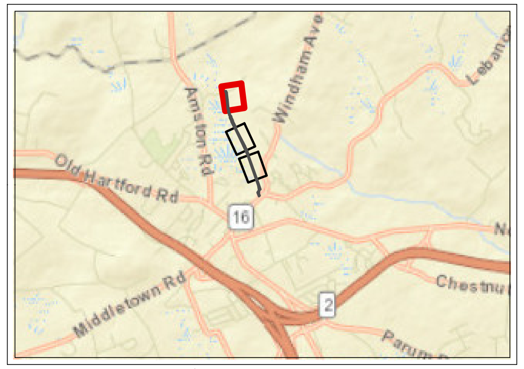
- Site
- Trail Right-Of-Way
- Approximate Parcel Boundary
- Delineated Wetland Boundary Line
- Approximate Wetland Boundary Line
- Approx. Wetland Area
- Wetland Flag
- Vernal Pool
- 100' Vernal Pool Envelope
- Watercourse
- Culvert
- 10' Contours
- 2' Contours
- Project Area
- EnergyServers
- PerimeterFence
- Underground Gas Line Route
- Underground Water Line Route

Aquifer Protection Area (CTDEEP, July 2019)

- Final Adopted Aquifer Protection Area

100 50 0 100 Feet

1 in = 100 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

Ortho Base Map: CT ECO 2016 Aerial Imagery

Wetlands field delineated by: Matthew Gustafson, Registered Soil Scientist, APT.
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Data layers are maintained and updatd by CTDEEP and represent the most recent publications.

Map Date: October 2019

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Wetland Inspection Map
Proposed Judd Brook Substation - CT 10MV
160 Old Amston Road
Colchester, CT

Bloomenergy

Map Sheet 2 of 3

Legend

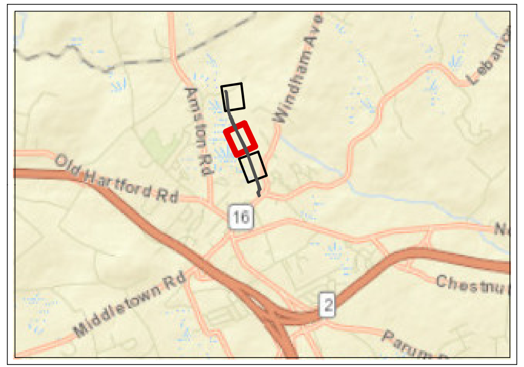
- Site
- Trail Right-Of-Way
- Approximate Parcel Boundary
- Delineated Wetland Boundary Line
- Approximate Wetland Boundary Line
- Approx. Wetland Area
- Wetland Flag
- Vernal Pool
- 100' Vernal Pool Envelope
- Watercourse
- Culvert
- 10' Contours
- 2' Contours
- Project Area
- EnergyServers
- PerimeterFence
- Underground Gas Line Route
- Underground Water Line Route

Aquifer Protection Area (CTDEEP, July 2019)

- Final Adopted Aquifer Protection Area

100 50 0 100 Feet

1 in = 100 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

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Wetlands field delineated by: Matthew Gustafson, Registered Soil Scientist, APT.
Date: 07/18 & 09/19.

Flood Zones obtained from FEMA National Flood Hazard Layer (NFHL) dataset.

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Data layers are maintained and updatd by CTDEEP and represent the most recent publications.

Map Date: October 2019

Wetland Inspection Map
Proposed Judd Brook Substation - CT 10MV
160 Old Amston Road
Colchester, CT

Bloomenergy

Map Sheet 3 of 3

Legend

- Site
- Trail Right-Of-Way
- Approximate Parcel Boundary
- Delineated Wetland Boundary Line
- Approximate Wetland Boundary Line
- Approx. Wetland Area
- Wetland Flag
- Vernal Pool
- 100' Vernal Pool Envelope
- Watercourse
- Culvert
- 10' Contours
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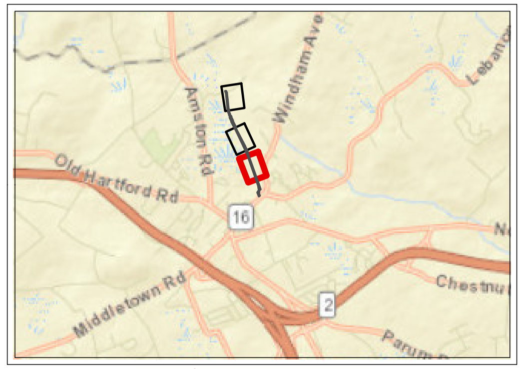
- Project Area
- EnergyServers
- PerimeterFence
- Underground Gas Line Route
- Underground Water Line Route

Aquifer Protection Area (CTDEEP, July 2019)

- Final Adopted Aquifer Protection Area

100 50 0 100 Feet

1 in = 100 ft



ALL-POINTS TECHNOLOGY CORPORATION

Map Sources:

Ortho Base Map: CT ECO 2016 Aerial Imagery

Wetlands field delineated by: Matthew Gustafson, Registered Soil Scientist, APT. Date: 07/18 & 09/19.

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Map Date: October 2019

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Exhibit 6

AUGUST 2019

PHASE IA CULTURAL RESOURCES ASSESSMENT SURVEY OF A PROPOSED PARCEL IN COLCHESTER, CONNECTICUT

PREPARED FOR:

ALL-POINTS TECHNOLOGY CORPORATION

3 SADDLEBROOK DRIVE
KILLINGWORTH, CONNECTICUT 06419

PREPARED BY:

HERITAGE CONSULTANTS

P.O. BOX 310249
NEWINGTON, CONNECTICUT 06131

ABSTRACT

This report presents the results of a Phase IA cultural resources assessment survey for a 12.7 ac project parcel Colchester, Connecticut. An as yet-to-be-determined portion of the project parcel will be used for the construction of a Bloom Energy fuel cell facility. All-Points Technology Corporation, P.C., Bloom Energy's contractor, has requested that Heritage Consultants, LLC complete the current assessment survey as part of the planning process for the proposed fuel cell facility. The research methodology for this project included a review of historic map and aerial imagery review, site file research at the Connecticut State Historic Preservation Office, pedestrian survey, mapping, photo-documentation, and stratification of the project area into no/low, moderate, and high archaeologically sensitive areas. The background research revealed that the proposed project area is located near two previously identified State Register of Historic Places properties; however, based on either distance from these resources or intervening vegetation, modern obstacles, and/or topography, no direct or indirect impacts to these historic resources are anticipated by the construction of the proposed fuel cell facility. Pedestrian survey, mapping, and photo-documentation of the project parcel revealed that 6.9 ac of it possess a no/low archaeological sensitivity, while 3.1 and 2.7 ac retain moderate and high archaeological sensitivity, respectively. No archaeological examination of no/low sensitivity areas is recommended. In contrast, if the proposed fuel cell facility is to be built within any of the moderate or high archaeologically sensitive areas, Phase IB cultural resources reconnaissance survey is recommended.

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CHAPTER I
INTRODUCTION

This report presents the results of a Phase IA cultural resources assessment survey of a 12.7 ac parcel of land in Colchester, Connecticut (Figure 1). According to project specifications, the project proponent, Bloom Energy, plans to locate a proposed fuel cell facility on the project parcel. Since the exact location of the fuel cell has yet to be determined, All-Points Technology Corporation, P.C. (All-Points), Bloom Energy's consultant, has requested that Heritage Consultants, LLC (Heritage) complete Phase IA assessment survey of the entirety of the project parcel as part of the planning process for the fuel cell facility. Heritage completed this investigation in July of 2019 and all work associated with this investigation was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources* promulgated by the Connecticut Historic Commission, State Historic Preservation Office (Poirier 1987).

Project Description and Methods Overview

As discussed above, the parcel of land on which the proposed fuel cell facility is planned encompasses approximately 12.7 acres of land. The proposed project parcel is bounded by Old Amston Road on the North, the Air Line Trail wetlands associated with Judd Brook on the west, and forest areas to the south and east (Figure 1). This Phase IA cultural resources assessment survey consisted of the completion of the following tasks: 1) preparation of a contextual overview of the area's prehistory, history, and natural setting (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously recorded archaeological sites and historic standing structures, as well as National and State Register of Historic Places properties/districts, in the vicinity of the project parcel; 3) a review of readily available historic maps and aerial imagery depicting the project parcel to identify potential historic resources and/or areas of past disturbance; 4) pedestrian survey and photo-documentation of the project parcel to determine its archaeological sensitivity, as well as to record any historic built resources within its limits; and 5) preparation of the current Phase IA assessment survey report.

Project Results and Management Recommendations Overview

During the current Phase IA cultural resources assessment survey, Heritage reviewed historic maps and aerial images of the project parcel, examined files maintained by the Connecticut State Historic Preservation Office, and completed a pedestrian survey, photo-documentation, and mapping of the project parcel. The cultural resources review revealed that the proposed project parcel is located in the vicinity of two State Register of Historic Places properties known as the Zagray Sawmill and the Old Railroad Station, respectively. However, based on distance from these resources and the presence of intervening vegetation, modern obstacles, and/or topography, no direct or indirect impacts to these historic resources are anticipated by the construction of the proposed fuel cell facility.

In terms of archaeological potential, pedestrian survey of the project parcel revealed that large parts of the southwestern, central, and northern portions of the project parcel contain slopes, wetlands, and small previously disturbed areas. These "no/low" sensitivity areas total 6.9 ac in size. No additional archaeological examination of these no/low sensitivity areas is recommended. The remainder of the parcel contained 3.1 ac of land considered to retain a moderate sensitivity to possess intact archaeological deposits and 2.7 ac of land deemed to retain a high potential to contain undisturbed archaeological deposits. Should any of the moderate or high sensitive areas be selected for construction of the proposed fuel cell facility, it is recommended that Phase IB cultural resources reconnaissance survey of them be completed before any ground disturbing activities are initiated.

Project Personnel

Key personnel for this project included Mr. David R. George, M.A., R.P.A, who acted as Principal Investigator. He was assisted by Mr. Cory Atkinson, M.A., who assisted in the field review portion of the project. Mr. George also was assisted by Mr. Stephen Anderson, B.A., and Mr. William Keegan, B.A., who provided GIS support services and project mapping. Finally, Ms. Kristen Keegan completed this historic background research of the project and contributed to the final report.

Organization of the Report

The natural setting of the region encompassing the project parcel is presented in Chapter II; it includes a review of the geology, hydrology, and soils, of the project region. The prehistory of the project region is outlined in Chapter III. The history of the region encompassing the project area is discussed in Chapter IV, while previously identified cultural resources near the project area are reviewed in Chapter V. The methods used to complete this investigation are discussed in Chapter VI. Finally, the results of this investigation are presented in Chapter VII, and management recommendations are contained in Chapter VIII.

CHAPTER II
NATURAL SETTING

Introduction

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

Ecoregions of Connecticut

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

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

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

<u>Southeast Hills Ecoregion</u>

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

Hydrology of the Study Region

The project area is located within close proximity to several streams, ponds and wetlands. These major fresh water sources in this area include Judd Brook, Sherman Brook, Raymond Brook, and Amston Lake, as well as numerous unnamed wetlands and streams. Previously completed archaeological investigations in Connecticut have demonstrated that streams, rivers, and wetlands were focal points for prehistoric 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 Area

Soil formation is the direct result of the interaction of several variables, including climate, vegetation, parent material, time, and organisms present (Gerrard 1981). Once archaeological deposits are buried within the soil, they are subject to 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 in within the current project area. In contrast, acidic soils enhance the preservation of charred plant remains.

A review of the soils within the project is presented below. It is characterized by three soil types, including Ninigret/Tisbury, Hinckley, and Canton/Charlton soils (Figure 2). All three of these soil types are well drained and are correlated with the location of prehistoric and historic period archaeological sites,. The profiles of these soil types are described briefly below. Data regarding them was collected from the National Resources Conservation Service (https://soilseries.sc.egov.usda.gov)

<u>Ninigret/Tisbury Soils (Code 21):</u>

A typical profile for Ninigret/Tisbury soils 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; abrupt smooth boundary; **Bw1** --8 to 16 inches; yellowish brown (10YR 5/6) fine sandy loam; weak coarse granular structure; very friable; few fine roots; strongly acid; clear wavy boundary; **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; clear wavy boundary; **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.

<u>Hinckley Soils (Code 38):</u>

A typical profile for Hinckley soils is as follows: **Oe** -- 0 to 3 cm; moderately decomposed plant material derived from red pine needles and twigs; **Ap** -- 3 to 20 cm; very dark grayish brown (10YR 3/2) loamy sand; weak fine and medium granular structure; very friable; many fine and medium roots; 5 percent fine gravel; very strongly acid; abrupt smooth boundary; **Bw1** -- 20 to 28 cm; strong brown (7.5YR 5/6) gravelly loamy sand; weak fine and medium granular structure; very friable; common fine and medium roots; 20 percent gravel; very strongly acid; clear smooth boundary; **Bw2** -- 28 to 41 cm; yellowish brown (10YR 5/4) gravelly loamy sand; weak fine and medium granular structure; very friable; common fine and medium roots; 25 percent gravel; very strongly acid; clear irregular boundary; **BC** -- 41 to 48 cm; yellowish brown (10YR 5/4) very gravelly sand; single grain; loose; common fine and medium roots; 40

percent gravel; strongly acid; clear smooth boundary; **C** -- 48 to 165 cm; light olive brown (2.5Y 5/4) extremely gravelly sand consisting of stratified sand, gravel and cobbles; single grain; loose; common fine and medium roots in the upper 20 cm and very few below; 60 percent gravel and cobbles; moderately acid.

Canton and Charlton Soils (Codes 61 and 62):
A typical soil profile for Canton and Charlton soils contains the following profile: **Oi** -- 0 to 5 cm; slightly decomposed plant material; **A** -- 5 to 13 cm; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; common fine roots; 5 percent gravel; very strongly acid; **Bw1** -- 13 to 30 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; very strongly acid (pH 4.6); clear smooth boundary; **Bw2** -- 30 to 41 cm; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; strongly acid (pH 5.1); clear smooth boundary; **Bw3** -- 41 to 56 cm; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak medium subangular blocky; friable; common fine and medium roots; 15 percent gravel; strongly acid (pH 5.1); abrupt smooth boundary; **2C** -- 56 to 170 cm; grayish brown (2.5Y 5/2) gravelly loamy sand; massive; friable; 25 percent gravel; moderately acid (pH 5.6).

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 favorable for both prehistoric and historic period occupations. This includes areas of low to moderate slopes with well drained soils located near freshwater sources. The types of Native American 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
PREHISTORIC SETTING

Introduction
Prior to the late 1970s and early 1980s, very few systematic archaeological surveys of large portions of the state of Connecticut had been undertaken. Rather, the prehistory of the region was studied at the site level. As a result, a skewed interpretation of the prehistory of Connecticut was developed. It was suggested that the upland portions of the state, i.e., the northeastern and northwestern hills ecoregions, were little used and rarely occupied by prehistoric Native Americans, while the coastal zone, i.e., the eastern and western coastal and the southeastern and southwestern hills ecoregions, were the focus of settlements and exploitation in the prehistoric era. This interpretation remained unchallenged until the 1970s and 1980s when several town-wide and regional archaeological studies were completed. These investigations led to the creation of several archaeological phases that subsequently were applied to understand the prehistory of Connecticut. The remainder of this chapter provides an overview of the prehistoric setting of the region encompassing the current project area.

Paleo-Indian Period (12,000 to 10,000 B.P.)
The earliest inhabitants of the area encompassing the State of Connecticut, who have been referred to as Paleo-Indians, arrived in the area by ca. 12,000 B.P. (Gramly and Funk 1990; Snow 1980). Due to the presence of large Pleistocene mammals at that time and the ubiquity of large fluted projectile points in archaeological deposits of this age, Paleo-Indians often have been described as big-game hunters (Ritchie and Funk 1973; Snow 1980); however, as discussed below, it is more likely that they hunted a broad spectrum of animals.

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

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

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

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

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

The Archaic Period, which succeeded the Paleo-Indian Period, began by ca., 10,000 B.P. (Ritchie and Funk 1973; Snow 1980), and it has been divided into three subperiods: Early Archaic (10,000 to 8,000 B.P.), Middle Archaic (8,000 to 6,000 B.P.), and Late Archaic (6,000 to 3,400 B.P.). These periods were devised to describe all non-farming, non-ceramic producing populations in the area. Regional archaeologists 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).

<u>Early Archaic Period (10,000 to 8,000 B.P.)</u>

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 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 recognized on the basis of a series of ill-defined bifurcate-based projectile points. These projectile points are identified by the presence of their characteristic bifurcated base, and they generally are made from high quality raw materials. Moreover, finds of these projectile points have rarely been in stratified contexts. Rather, they occur commonly either as surface expressions or intermixed with artifacts representative of later periods. Early Archaic occupations, such as the Dill Farm Site and Sites 6LF64 and 6LF70 in Litchfield County, and 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.

<u>Middle Archaic Period (8,000 to 6,000 B.P.)</u>

By the onset of the Middle Archaic Period, essentially modern deciduous forests had developed in the region (Davis 1969). It is at this time that increased numbers and types of sites are noted in Connecticut (McBride 1984). The most well-known Middle Archaic site in New England is the Neville Site, which is in Manchester, New Hampshire and studied by Dincauze (1976). Careful analysis of the Neville Site indicated that the Middle Archaic occupation dated from between ca. 7,700 and 6,000 years ago. In fact, Dincauze (1976) obtained several radiocarbon dates from the Middle Archaic component of the Neville Site. The dates, associated with the then-newly named Neville type projectile point, ranged from 7,740±280 and 7,015±160 B.P. (Dincauze 1976).

In addition to Neville points, Dincauze (1976) described two other projectile point 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; Wiegand 1978, 1980).

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 prehistory. Originally termed the "Transitional Archaic" by Witthoft (1953) and recognized by the introduction of technological innovations, e.g., broadspear projectile points and soapstone bowls, the Terminal Archaic 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 the use 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 subterranean storage, suggests that Terminal Archaic groups were characterized by reduced mobility and longer-term use of established occupation sites (Snow 1980:250).

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

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

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

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

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

Careful archaeological investigations of Early Woodland sites in southern New England have resulted in the recovery of narrow stemmed projectile points in association with ceramic sherds and subsistence remains, including specimens of White-tailed deer, soft and hard-shell clams, and oyster shells (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 indicates that Early Woodland Period settlement patterns were characterized by multiple re-use of the same sites on a seasonal basis by small co-residential groups.

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

The Middle Woodland Period is marked by an increase in the number of ceramic types and forms utilized (Lizee 1994a), as well as an increase in the amount of exotic lithic raw material used in stone tool manufacture (McBride 1984). The latter suggests that regional exchange networks were established, and that they were used to supply local populations with necessary raw materials (McBride 1984; Snow 1980). The Middle Woodland Period is represented archaeologically by narrow stemmed and Jack's Reef projectile points; increased amounts of exotic raw materials in recovered lithic assemblages, including chert, argillite, jasper, and hornfels; and conoidal ceramic vessels decorated with dentate stamping. Ceramic types indicative of the Middle Woodland Period includes 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; Wiegand 1983).

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

Summary of Connecticut Prehistory

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

CHAPTER IV
HISTORIC OVERVIEW

As discussed in Chapter I of this report, the project parcel is located in the northeastern part of the town of Colchester, which is in New London County, Connecticut. Historically, this area has been rural, although the main village of Colchester was not very far to the south. The remainder of this chapter provides an overview history of Colchester, as well as data specific to the project parcel.

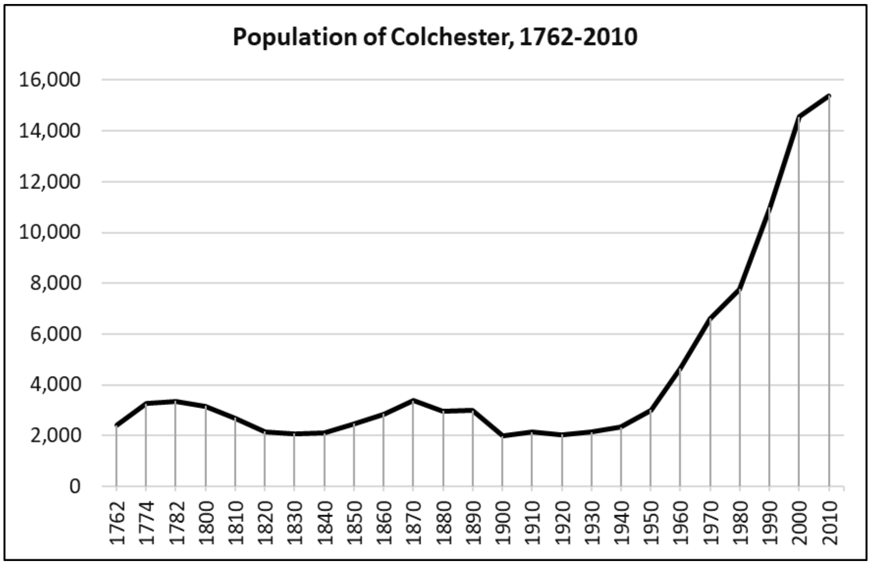
Native American History of the Town of Colchester

Colchester was part of a large territory that the Mohegan leader Uncas claimed to be his hereditary property using the colonists' legal system rather than Native American concepts. Because Uncas had been the colonists' ally during the Pequot War (1636-1637), the Connecticut government chose to recognize this claim. When Uncas died, his will divided this territory between his sons Owaneco and Joshua, who received the easterly and westerly sections, respectively. When Joshua died in 1676, he left his portion to his son Abimelech and various colonists. In the 1680s, the ownership claims of Joshua's legatees, Abimelech, John Fitch (who had acquired Owaneco' s lands), as well as individuals who claimed to own land based on other purchases from Native Americans, led to both litigation and occasional episodes of violence (Bushman 1967). Although there were not enough Mohegans to occupy the area claimed by Uncas, and Connecticut's Native Americans did not have monarchs as the British understood them, the success of Fitch's tactics means that very little is known about the actual Native American communities in this region. Most historic documentation of such communities comes from their land sales or land claims, which this sequence of events made unnecessary in the eyes of the colonial authorities. It can be assumed that small Native American communities were present in and around Colchester at the time of its colonization, and most likely for a period of some years after that. Ultimately, however, all or most of the original inhabitants would have relocated to places that offered better opportunities to make a living.

Colonial Era History of the Town of Colchester (to 1790)

Because of the title disputed mentioned above, the colony government did not authorize a settlement at Colchester until 1698. Prior to that time, and undoubtedly forming part of the title questions, the colony had granted an individual named Jeremiah Adams a tract of 340 acres (137.6 ha) of land in the area. This grant was made by ca., 1662, and Adams named the area "Jeremiah's Farm." The town was named Colchester by the legislature in 1699. A revival of Mohegan claims to the area had to be adjudicated in 1700, after which the town's proprietors apparently were undisturbed in their expansion across their territory (Crofut 1937; Hurd 1882). Colchester's growth was rapid; according to the colonial census taken in 1762, the town was home to 2,403 residents in that year. Its population continued to grow through 1782, when it had 3,365 residents. The 1790 census data for New London County were not properly collected for the towns (see the population chart below; Keegan 2012). Throughout this period, Colchester included territory that would later be part of the towns of Salem and Marlborough (Barry 1985). During the Revolutionary War, part of the forces of the French Duke de Lauzun camped at a place called Pine Swamp in Colchester (Crofut 1937).

Colchester's Congregational church was organized in 1703, as was required by the colony government, and the first meeting house in town was erected in 1705-1706. It was replaced within a few years, and



again in 1771. The town's population growth and spread required the establishment of a second Congregational church society in 1728; it was called Westchester (Hurd 1882). It appears that the new religious movements of the late eighteenth century did not spark the creation of any other new churches in Colchester before the end of the period.

Early National and Industrializing Period History of the Town of Colchester (1790 to 1930)
Colchester's nineteenth-century population information is complicated. As of 1800, the town had lost some population, reporting 3,163 residents in that year. Colchester then lost territory to the new towns of Marlborough (in 1803) and Salem (in 1819), which brought the population down to 2,152 residents as of 1820. For two decades the population stagnated, before rising to 3,383 residents between 1840 and 1870. Another overall decline followed, reducing the population to only 1,991 residents as of 1900. Another period of stagnation followed, leading to a population of 2,134 residents in the year 1930 (see the population chart above; Keegan 2012). In 1803, a bequest from Pierpont Bacon established a secondary school called the Bacon Academy, which was free to Colchester students (Crofut 1937). By the end of the second decade of the nineteenth century, the town developed the necessary complement of agricultural and timber processing facilities (grist mills, sawmills, and fulling mills) to support the local population; it also had a small iron forge at that time (Warren and Gillet 1813).

A gazetteer published in 1819 reported that Colchester's soil was good for grazing, and its farmers concentrated on meat and dairy products, although they also produced several grain crops. For industry, there was a single woolen factory and an iron production facility; otherwise, tanneries, grain mills, and sawmills processed the town's primary sector products. There were three Congregational societies in time by the early nineteenth century, including a Congregationalist, a Baptist, and a Methodist congregation, each of which had its own church. The main village had approximately 40 houses and the Bacon Academy, a semi-public secondary school that had been established in 1800 (Pease and Niles 1819).

In the 1830s, Colchester's land was described as uneven and hilly, with adequate soil, and it was reported that a high-quality mine of iron ore had recently been opened. Culturally, the town had two Congregational societies and one Baptist church, Bacon Academy (which had some 200 students in 1836), and a separate school for African-American children. The main village, where the academy and the older Congregational church were located, now contained between 40 and 50 houses (Barber 1837; Crofut 1937). In 1850, the federal industrial census return for Colchester was unusually detailed, and it included listings for sawmill/grist mill combinations owned by one person as two entries. Thus, there were 37 firms reported in Colchester, including the two butchers whose firms probably should not have been listed at all. Only one of the firms, however, had more than 10 employees on average. This was the rubber factory that employed 150 each of men and women for a total of 300 workers. The next largest employer listed in the 1850 industrial census was a carpenter and joiner, who employed 10 men. The rest – blacksmiths, grist and sawmills, a tailor, two butchers, two hat makers, and tanners – employed six men or fewer. Thus, aside from the rubber factory, the town's industrial producers had a total of 77 employees on average (United States Census 1850). As the post-1850 population numbers suggest, the presence of one extremely large firm and many very small ones was not sufficient to increase Colchester's population by any appreciable degree.

The 1854 map of New London County shown in Figure 3 indicates that Colchester had two named villages at that time. The smaller village, Westchester, was located in the southwestern corner of the town, while the larger village, Colchester, was thickly settled and located in the western part of the town, approximately 1.5 miles (2.3 km) to the south of the project parcel (Figure 3; Walling 1854). An inset map of the village indicated that the only large manufacturing firm there was the Hayward Rubber Company on Spring Brook, although alongside the numerous residences were a hat factory, a cabinet shop, a blacksmith, multiple stores, a hotel, and three different churches. Approximately a half-mile (0.7 km) to the north and west of the project parcel, there was a smaller cluster of buildings focused on a group of mills (a sawmill, a grist mill, and a shingle mill) drawing power from Judd Brook. At the project area and within 152 m (500 ft) of it, however, the only cultural feature depicted on the map was a road at its northern boundary (Figure 3; Walling 1854). In the subsequent 1868 map of the town, Colchester had five named villages, including Westchester and Colchester. In addition, two of the newly-portrayed villages were located to the northwest of Colchester (identified as Union Mill Village and Iron Works). The third was Packwoodville, which was situated to the north of Colchester and to the northwest of the project parcel, where in the 1854 map there had only been a cluster of buildings. The 1868 map showed a textile mill, a grist mill, and a sawmill at that location. Again, however, there were no marked cultural features near the project area, aside from the above-referenced road. A separate map of Colchester Village reported the continued presence of the rubber company as the only large manufacturer there, and fewer small manufacturers in the thriving village (Figure 4; Beers 1868).

By the 1880s, Colchester had added a Methodist, a Baptist, an Episcopal, and even a small Roman Catholic church. The crown of its industrial activities was the previously-mentioned Hayward Rubber Company, established in 1847, which survived until 1894 when it was bought out and closed; it later burned to the ground (Crofut 1937; Hurd 1882). Earlier in the nineteenth century, State of Connecticut efforts to encourage commerce and industry led to the creation of turnpike companies, which received the right to charge tolls in exchange for building or improving roads. No fewer than five turnpikes converged on Colchester's main village by 1813. Once the alternative transport method of the railroad began to compete, however, these companies disbanded and their roads became toll-free (Wood 1919; Warren and Gillet 1813). One of Colchester's problems with industrial development is that only one nineteenth-century railroad reached it, and at a relatively late point in time: the Air Line route between New Haven and Willimantic, planning for which started in the 1840s, was not built until the early 1870s. The main line passed through the northwestern corner of Colchester at a place then called Westchester. A short branch line to Colchester Village (and the rubber factory) had to be built southward in 1876, connecting it to the main line at Amston in the town of Hebron (Turner and Jacobus 1987). It is the branch line that passed along the western boundary of the project parcel. Whatever hopes for economic growth and development might have been pinned on this railroad, the town's population numbers – and the closure of the rubber factory in the 1890s – indicate that they were poorly founded.

Modern History of the Town of Colchester (1930 to Present)

After 1930, Colchester began to see consistent population growth. At first it was modest, with the town reporting 3,007 residents in 1950, up from the 2,134 residents of 1930. Strong growth in the next two decades brought the population to 6,603 residents as of 1970, and then even faster growth raised it to 14,551 residents as of 2000. The growth rate was lower after that, leaving the town with 15,383 residents in 2010 (see the population chart above; Keegan 2012). A summary of the state's towns' status as of 1932 reported that Colchester's industrial activities, aside from agriculture, included production of ready-made clothing, curlers, and leather goods; it also had rail service and bus service by this time(Connecticut 1932). In the early twentieth century, Colchester was one of the towns chosen for resettlement of European Jewish immigrants by the Hirsch Foundation. Some of them added housing for summer visitors to their economic repertoire, leading to the development of a substantial tourist industry through the 1930s (Connecticut Historical 2019). During the same period, the state began a program of improving and organizing its roads, which included a concrete roadway that joined Hartford and New London via Colchester; it was funded in 1920 and eventually designated as Route 2. In the 1950s, this road was both a major route to Connecticut's eastern shoreline and a significant traffic problem. As a result, a freeway version of the road was planned and was being completed in Colchester by 1958 (Oglesby 2013). The connection between these road improvements and Colchester's population growth is clear, although its bypassing of downtown Colchester and its retail businesses did not help them (Colchester Historical 2019).

The 1934 aerial photograph depicted in Figure 5 shows that the project area was not, at that time, in an area that was being used for farming. Although one or two cleared or formerly cleared fields were located nearby, most of the area was forested. By this time, the road threading through the forest on the northern edge of the project parcel was, or had become, a mere route from one place to another. The railroad line also was clearly visible on the western edge of the project parcel; further to the west, the straightening and of what is now Route 85 had clearly cut off a loop of historic road on the far side of Judd Brook. To the south, a short road contained a group of buildings that might have been a camp or resort (Figure 5; Fairchild 1934). The lack of active farming in this are in the 1930s is consistent with the historic maps, with their absence of farmhouses along the road. This suggests that if there was farming in this area during the historic period, the land was of marginal quality and was abandoned early.

A topographic map dating from 1945 indicates that the road on the north side of the project parcel was unimproved at that time. This map also identified the railroad line as part of the New Haven and Hartford company. Aside from two trails to the north, no other cultural features were shown as within the vicinity of the project parcel. To the south, however, a section of unimproved road contained a line of four buildings along its west side, suggesting an early stage of development outside the village of Colchester (Figure 6; USGS 1945). In the subsequent 1951 aerial photograph, however, these buildings look more like farm buildings than homes, and the cluster of possible summer cabins was no longer visible. The project parcel and its immediate vicinity were still wooded at this time, and farm areas were still present further off to the east and west. While it is difficult to say whether the road was still present, the railroad bed was still in place as of 1951 (Figure 7; USDA 1951). A 1953 topographic map of the area shows several changes in the project region. First, the railroad was mapped as abandoned rather than active. Second, a gravel pit was noted to the north of the project area, partly within 152 m (500 ft) of it, with a second one further to the northeast. Third, the short road to the south of the project parcel contained multiple new houses; in addition, to the west, on the far side or Route 85, a substantial small-lot residential development had been built (Figure 8; USGS 1953).

The 1965 aerial photograph, however, suggests that the topographic map's portrayal of the area to the south of the project area was incorrect, as there appear to be no houses on the east side of the short road in this image. Closer to the project area, on the west side of the railroad bed and near the project parcel, was what appears to be either a mobile home park or a campground for trailers. The project parcel itself remained wooded at this time. It appears, also, that a section of the road on the north side of the project parcel had been abandoned; and there was a new road or access road cut through the woods to the north and extending westward across the rail line (Figure 9; CT DEP 1965). No notable change, other than an increased area of ground disturbance to the north, can be seen in the 1970 aerial photograph (USGS 1970).

As shown in the 1986 aerial image of the project region, the electrical substation in the northeastern corner of the project parcel had been constructed. Otherwise the woods within the project parcel appeared as relatively undisturbed. Further afield, the above-referenced trailer park/campground on the west side of the railroad had expanded and there were a few more new buildings to the south. To the north, part of the old road had been reopened to provide access to the town dump (now the town transfer station) further to the northeast (Figure 10; CT DEP 1986). In the subsequent 1991 aerial photograph, the ground disturbance to the south had expanded, but there were no other notable changes within or near the project parcel (USGS 1991). By 2016, a single new house had been built just to the southeast of the project area and at the end of the surviving portion of old road. It seems from this image that there was no longer a connection between that segment of road and the segment leading to the transfer station further to the north. To the west, the trailer park or campground had been abandoned except or a few derelict trailers. Further to the west, the area along Route 85 had become noticeably more developed. In the general area, there were only a few cleared fields left, most of which looked more like lawns or hay fields than working agricultural areas. Where housing had not been built, forest had taken over by 2016 (Figure 11; Capitol Region 2016).

As noted above, Colchester's population increased greatly during the latter half of the twentieth century, especially after construction of Route 2. Today, many of the town's residents work in the cities of Middletown and New London, among others. Beginning in 1996, the above-referenced abandoned rail line was made part of the Air Line Rail Trail for recreational walking and bicycling, which explains its visibility in modern aerial images (Colchester 2014). An economic profile of Colchester compiled in 2018 reported that town's population growth had essentially halted after 2010. As of 2016, Colchester had 406 firms that supported 3,912 employees; the largest employment was government, with 784 employees (20 percent of the total), followed by health care and social assistance and retail trade. The town also had 11 manufacturing firms employing 235 people (6 percent of the total). Two of the town's five largest employers in 2017 were manufacturing firms, while another two were retail and one was in health care (CERC 2018). Agricultural employment data were not included in this profile. Nonetheless, the town's early twenty-first century planning document contemplated protection of its surviving farmland, as well as of its open space and natural and historic resources. Its development plans focused on constraining business and denser residential development to areas in close proximity to the existing centers of Westchester and downtown Colchester, and maintaining the town's rural appearance in other areas as much as possible. According to these plans, the project parcel's location was near the northern edge of a "Suburban District" outside the downtown "Village District." Areas for which future growth was expected or continued, however, were to the west and south of these village and suburban districts (Colchester 2014). These plans are similar to those of other suburban towns and can be expected to constrain development outside the designated areas.

Conclusions

The documentary record indicates that it is unlikely that the proposed work will impact any significant historic resources. No evidence of historic buildings on the parcel has been identified. Remnants of past agricultural use such as stonewalls may be present, but these may not be significant historical resources.

CHAPTER V
PREVIOUS INVESTIGATIONS

Introduction
This chapter presents the results of a cultural resources literature review for the proposed project region (Figures 12 and 13). Personnel from Heritage visited the Connecticut State Historic Preservation Office in Hartford, Connecticut, as well as searched Heritage's corporate files, in an attempt to identify all previously identified cultural resources situated within 1.6 km (1 mi) of the project area, including known archaeological sites, historic standing structures, and National/State Register of Historic Places that may be affected by the proposed undertaking. This review resulted in the identification of two previously recorded State Register of Historic Properties located within 1.6 km (1 mi) of the project area (Zagray Sawmill and Old Railroad Station; these two resources are discussed below. No previously identified archaeological sites, National Register of Historic Properties, and/or potential eligible historic standing structures were noted within the 1.6 km (1 mi) search radius.

<u>Zagray Sawmill</u>
The Zagray Antique Circular Sawmill was listed on the State Register of Historic Places in June 2004 by Paul Towne of the Quinebaug Valley Engineers Association Inc. The historic sawmill is located at 544 Amston Road, or Route 85, in Colchester, Connecticut (Figure 13). It was construct in 1873 using a post and beam structural system. A flat roof was added to the sawmill building in the early 1960s; it is constructed of tin. The Zagray Sawmill is one story tall and measures 9.1 x 15.2 m (30 x 50 ft) in size. This late nineteenth century sawmill is now part of the Zagray Farm Museum and was listed as in fair condition when it was added to the in 2004 State Register of Historic Places. This historic resource will not be impacted by the proposed project.

<u>Old Railroad Station</u>
The Old Railroad Station is located at the junction of Windham Avenue and Lebanon Avenue (Route 16). There are two historic buildings located on the property, both of which area decorative railroad stations with unique cornice work (Figure 13). The station building located at 199 Lebanon Avenue has been converted to a package store while the building situated at 187 Lebanon Avenue houses a bicycle shop. The associated railroad tracks have been removed and converted to a walking trail as part of the "rails to trails" program sponsored by the Connecticut Department of Transportation. The Old Railroad Station was originally built as the Colchester Station, a stop on the Colchester Railroad. By 1877, it was connected to the Air Line Railroad, which connected Boston and New York City. The Colchester Railroad segment consisted of a 5.8 km (3.6 mi) long spur of the Air Line Railroad. The Old Railroad Station was recorded by Nancy Belcher and William Hurley of the Connecticut Development Commission on December 6, 1966. This two building comprising this historic resource will not be impacted by the proposed project.

Summary
The review of previously identified cultural resources on file with the Connecticut State Historic Preservation office suggests that there are only two known historic period built resources in the project region. Neither of these items will be impacted by the proposed project. The low number recorded cultural resources in the region to date is mostly likely related to a lack of professional cultural resources

surveys having been completed in the area rather than actual absence of cultural resources there. Based on the general knowledge and history of the project region, it may be expected that other archaeological and historical resources may be located near or within undisturbed portions of the project parcel.

CHAPTER VI
METHODS

Introduction

This chapter describes the research design and field methodology used to complete the Phase IA cultural resources assessment survey of the project area in Colchester, Connecticut. The following tasks were completed during this investigation: 1) study of the region's prehistory, history, and natural setting as presented in Chapters II through IV; 2) a literature search to identify and discuss previously completed cultural resources surveys and all previously recorded cultural resources in the area encompassing the project parcel; 3) a review of historic maps, topographic quadrangles, and aerial imagery depicting the project parcel in order to identify potential historic resources and/or areas of past disturbance; and 4) pedestrian survey and photo-documentation of the project parcel in order to determine its archaeological sensitivity. These methods are in keeping with those required by the Connecticut State Historic Preservation Office in the document entitled: *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987).

Research Framework

The current Phase IA cultural resources assessment survey was designed to assess the historical and archaeological sensitivity of the proposed project parcel, as well as to visually examine it and record any prehistoric or historic resources noted during pedestrian survey. The undertaking was comprehensive in nature, and project planning considered the distribution of previously recorded cultural resources located within and near the project parcel, as well as a visual assessment of the area. The methods used to complete this investigation were designed to provide coverage of all portions of the project parcel. The fieldwork portion of this undertaking entailed pedestrian survey, photo-documentation, and project parcel mapping (see below).

Archival Research & Literature Review

Background research for this project included a review of a variety of historic maps depicting the proposed project parcel; an examination of USGS 7.5' series topographic quadrangles; an examination of aerial images dating from 1934 through 2016; and a review of all National and State Register of Historic Places properties, previously identified archaeological sites, and potentially eligible historic standing structures on file with the Connecticut State Historic Preservation Office, as well as electronic cultural resources data maintained by Heritage. The intent of this review was to identify all previously recorded cultural resources situated in and adjacent to the project parcel, and to provide a natural and cultural context for the proposed project parcel. This information then was used to develop the archaeological context of the project parcel, and to assess its sensitivity with respect to producing intact cultural resources.

Background research materials, including historic maps, aerial imagery, and information related to previous archaeological investigations, were gathered from the Colchester Public Library, Colchester Town Hall, the Connecticut State Library, the Connecticut Historical Society, the Homer Babbidge Library on the Storrs Campus of the University of Connecticut, and the Connecticut State Historic Preservation Office. Finally, electronic databases and Geographic Information System files maintained by Heritage were employed during this project, and they provided valuable data related to the project parcel, as well as data concerning previously identified archaeological sites within the general vicinity of the project parcel.

Field Methodology and Data Synthesis

Heritage also performed fieldwork for the Phase IA cultural resources assessment survey of the project parcel in Colchester, Connecticut. This included pedestrian survey, photo-documentation, and mapping of the project parcel. During the completion of the pedestrian survey, representatives from Heritage visually reconnoitered and photo-documented the project parcel using digital media. Heritage also obtained GIS files depicting the project parcel from All-Points. The digital files were imported into ESRI's ArcGIS 10.5, the geographic information system (GIS) employed by Heritage. The inclusion of the digital files in the project GIS streamlined the research process and it ensured that all portions of the project parcel that may be impacted by the proposed fuel cell facility were examined during the investigation and mapped accurately. Finally, the GIS files were employed to output the maps and drawings included in this report.

Curation

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

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CHAPTER VII
RESULTS OF THE INVESTIGATION

Introduction
As mentioned in Chapter I of this report, the current Phase IA cultural resources assessment survey of the project parcel in Colchester, Connecticut consisted of the completion of the following tasks: 1) preparation of a contextual overview of the area's prehistory, history, and natural setting (e.g., soils, ecology, hydrology, etc.); 2) a literature search to identify and discuss previously recorded archaeological sites, National and State Register of Historic Places properties/districts, and potential eligible historic standing structures more than 50 years in age within the region encompassing the project parcel; 3) a review of readily available historic maps and aerial imagery depicting the project parcel to identify potential cultural resources and/or areas of past disturbance; and 4) pedestrian survey, mapping, and photo-documentation of the project parcel to determine its archaeological sensitivity, as well as to record any prehistoric sites or historic period built resources. The results of Tasks 1 through 3 area presented in Chapters II through V, while the results of Task 4, as well an overall sensitivity assessment of the project parcel, are presented below.

Results of Pedestrian Survey and Photo-Documentation of the Project Parcel
Heritage completed the pedestrian survey, mapping, and photo documentation of the proposed project parcel in July of 2019. The pedestrian survey involved a walkover of the entire project parcel and included photo-documentation of existing conditions of the area. Currently, the proposed project parcel consists of a mixture of landscape types, most of which are covered in secondary forest. However, there are a few areas of prior disturbance on the parcel, the largest of which is associated with the previous construction of an Eversource Energy substation in the northeastern part of the project parcel (Figure 14). Construction of the substation resulted in grade changes, vegetation removal, and an overall loss of depositional integrity in this portion of the project parcel. Other areas of disturbance were noted as well and included small isolated areas of previous excavations, the origin of which are unknown but may represent former percolation test locations (see for example Figure 15). Some portions of the project parcel also contained moderate slopes and rocky soils with boulders and large rocks on the surface (see for example Figure 16). All of the above-referenced areas were assigned as having a no/low sensitivity for containing intact cultural deposits from either the prehistoric or historic eras; they encompassed 6.9 ac of land and no additional archaeological examination of these areas is recommended.

Other portions of the project parcel examined during the pedestrian survey contained moderate slopes and well drained soils with no obvious signs of previous disturbances (Figures 17 and 18). They were deemed to retain a moderate potential to yield intact cultural deposits due to their natural characteristics. These areas encompass roughly 3.1 ac of land. Finally, 2.7 ac of the project parcel were determined to present high archaeologically sensitive areas. These areas contained essentially no slopes, sandy and well drained soils, and, generally speaking, close proximity to Judd Brook, the major source of fresh water in the area (see Figures 19 and 20).

Overall Sensitivity of the Proposed Project area and Project Recommendations

In addition to the above-referenced research and as discussed above, the field data collected during the pedestrian survey, mapping, and photo-documentation effort was used in conjunction with the analysis of topographic and soils mapping to stratify the project area into zones of no/low, moderate, and high archaeological sensitivity (Figure 21). Historic period sites are generally easy to find on the landscape because the features associated with them tend to be relatively permanent above-ground constructions (e.g., stone walls, building foundations, wells, pens, etc.) or clusters of artifacts representing refuse dumps on the surface of a given parcel of land. Prehistoric sites, on the other hand, are less often identified during pedestrian survey, and predicting their locations relies more on environmental factors that would have informed Native American site choices. With respect to the potential for identifying prehistoric archaeological sites, the project area was divided into areas of no/low or moderate/high archaeological potential by analyzing landform types, slope, aspect, soils, and distance to water.

In general, areas located less than 300 m (1,000 ft) and no more than 600 m (2,000 ft) from a freshwater source and that contain slopes of less than 8 percent and well-drained soils possess a moderate/high potential for producing prehistoric archaeological deposits. This is in keeping with broadly based interpretations of prehistoric 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 prehistoric 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, on upland terraces, and near stream/river confluences. 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 deemed to retain a no/low archaeological sensitivity.

Based on the discussion above, Heritage personnel stratified the proposed project areas as follows. Those portions of the project parcel that contain strong slopes, previous disturbances, wet soils, or large numbers of boulders and significant stones on the surface were assessed as no/low archaeologically sensitive areas. No archaeological testing of these areas is recommended as they are unlikely to yield undisturbed archaeological deposits. In contrast, other portions of the project parcel were considered to possess either modern or high archaeological sensitivity because they contain well drained soils and either moderate to no slope and proximity to Judd Brook. The moderate sensitivity areas encompass 3.1 ac of land, while the high sensitivity areas include 2.7 ac of land (Figure 21). If the proposed fuel cell facility is sited in any of the moderate or high archaeologically sensitive areas, then Phase IB cultural resources reconnaissance survey is recommended.

CHAPTER VIII
SUMMARY & MANAGEMENT RECOMMENDATIONS

The review of historic maps and aerial images of the project parcel, files maintained by the Connecticut State Historic Preservation Office, and pedestrian survey of the proposed project area revealed that it is located near two State Register of Historic Properties; they are the Zagray Sawmill and the Old Railroad Station. However, based on either distance from these resources or intervening vegetation, modern obstacle, and/or topography, no direct or indirect impacts to these historic resources are anticipated by the construction of the proposed distribution facility. In terms of archaeological potential, pedestrian survey of the project parcel revealed that 6.9 ac possess a no/low archaeological sensitivity, while 3.1 and 2.7 ac retain moderate and high archaeological sensitivity, respectively. No archaeological examination of no/low sensitivity areas is recommended. In contrast, if the proposed fuel cell facility is to be built within any of the moderate or high archaeologically sensitive areas, Phase IB cultural resources reconnaissance survey is recommended.

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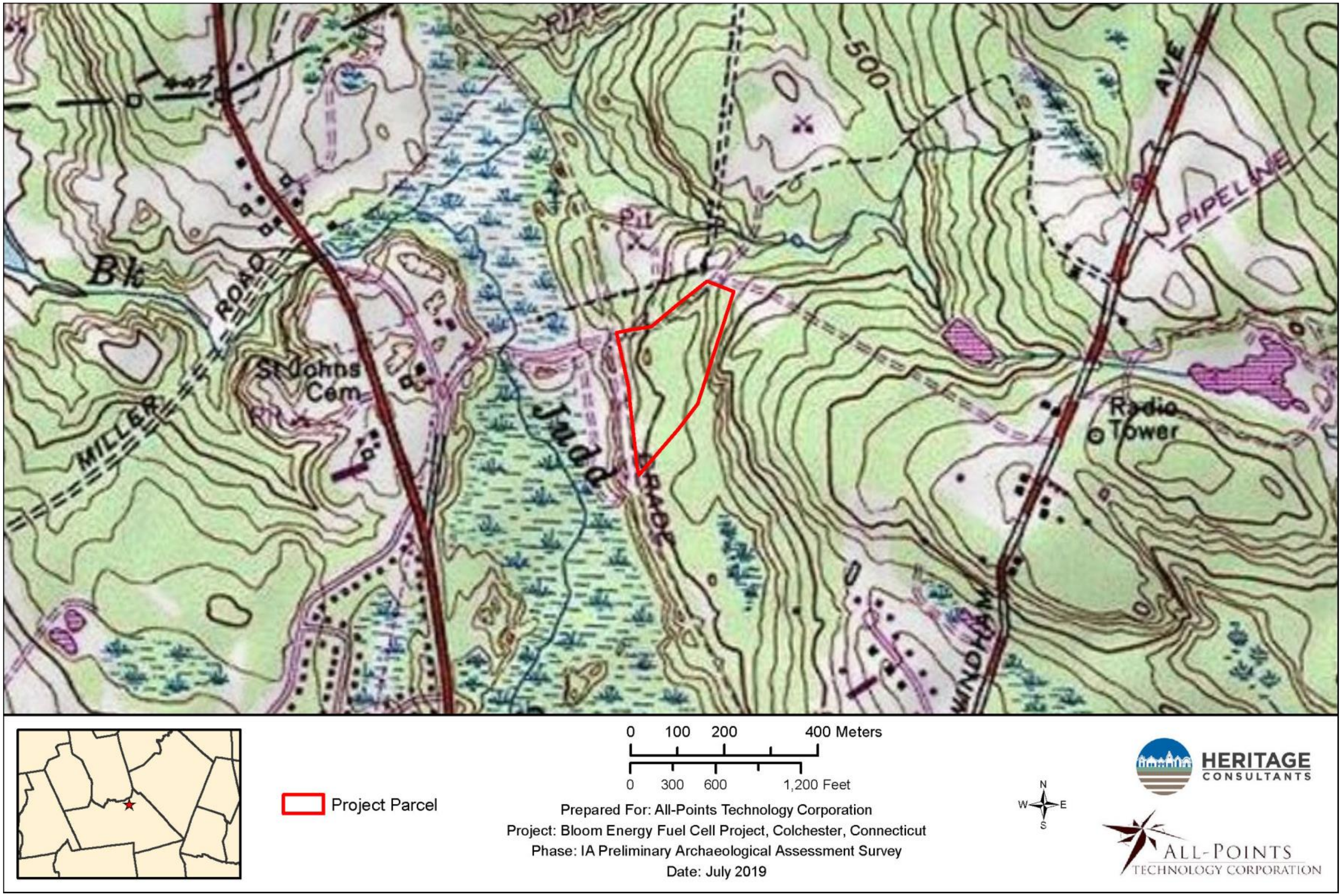

Figure 1. Excerpt from a USGS 7.5’ series topographic quadrangle image showing the location of the proposed development parcel in Colchester, Connecticut.

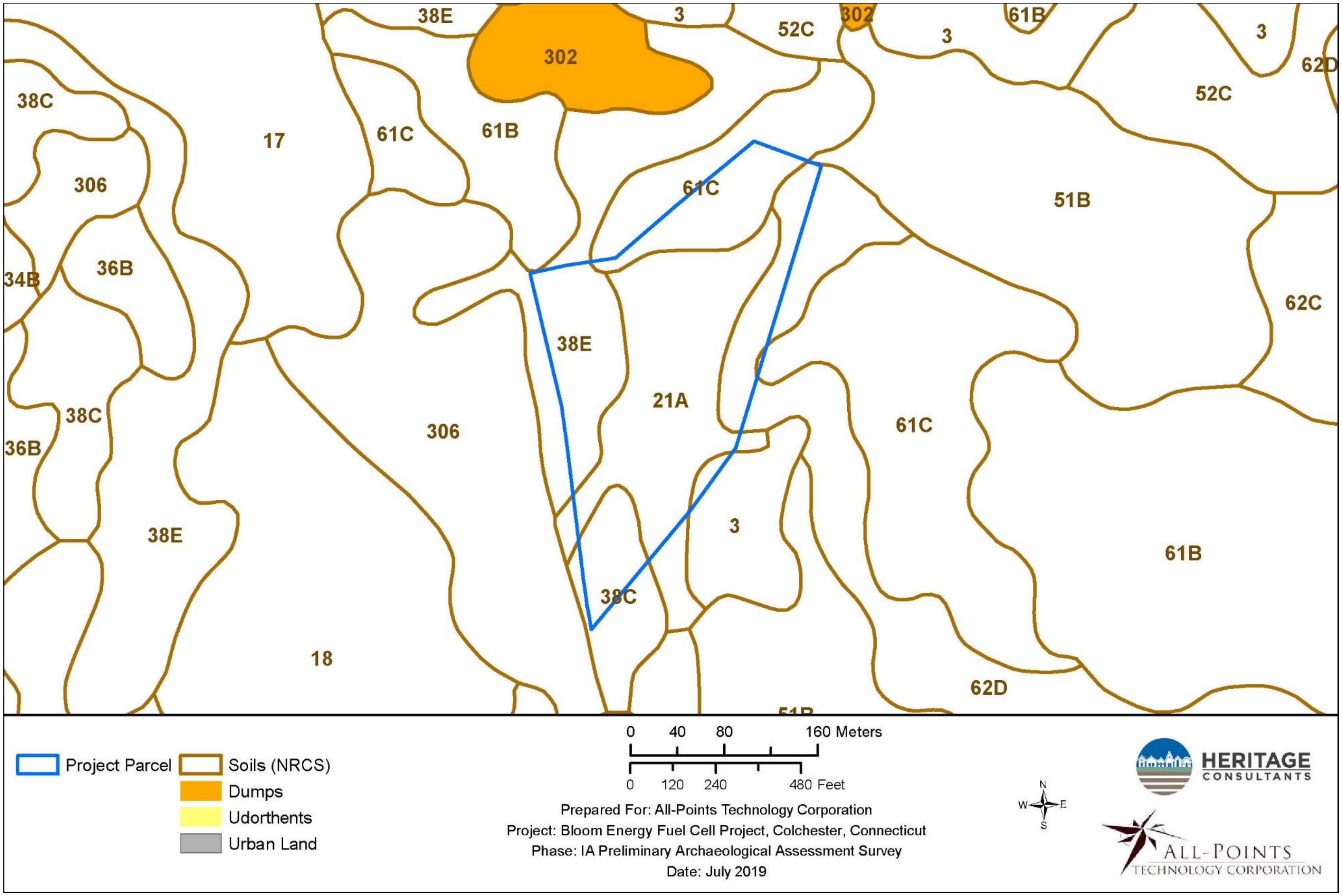

Figure 2. Digital map depicting the soil types present in the vicinity of proposed development parcel in Colchester, Connecticut.

Figure 3. Excerpt from an 1854 map showing proposed development parcel in Colchester, Connecticut.

Project Parcel

0 220 440 880 Meters
0 625 1,250 2,500 Feet

Prepared For: All-Points Technology Corporation
Project: Bloom Energy Fuel Cell Project, Colchester, Connecticut
Phase: IA Preliminary Archaeological Assessment Survey
Date: July 2019

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Figure 4. Excerpt from an 1868 map showing proposed development parcel in Colchester, Connecticut.

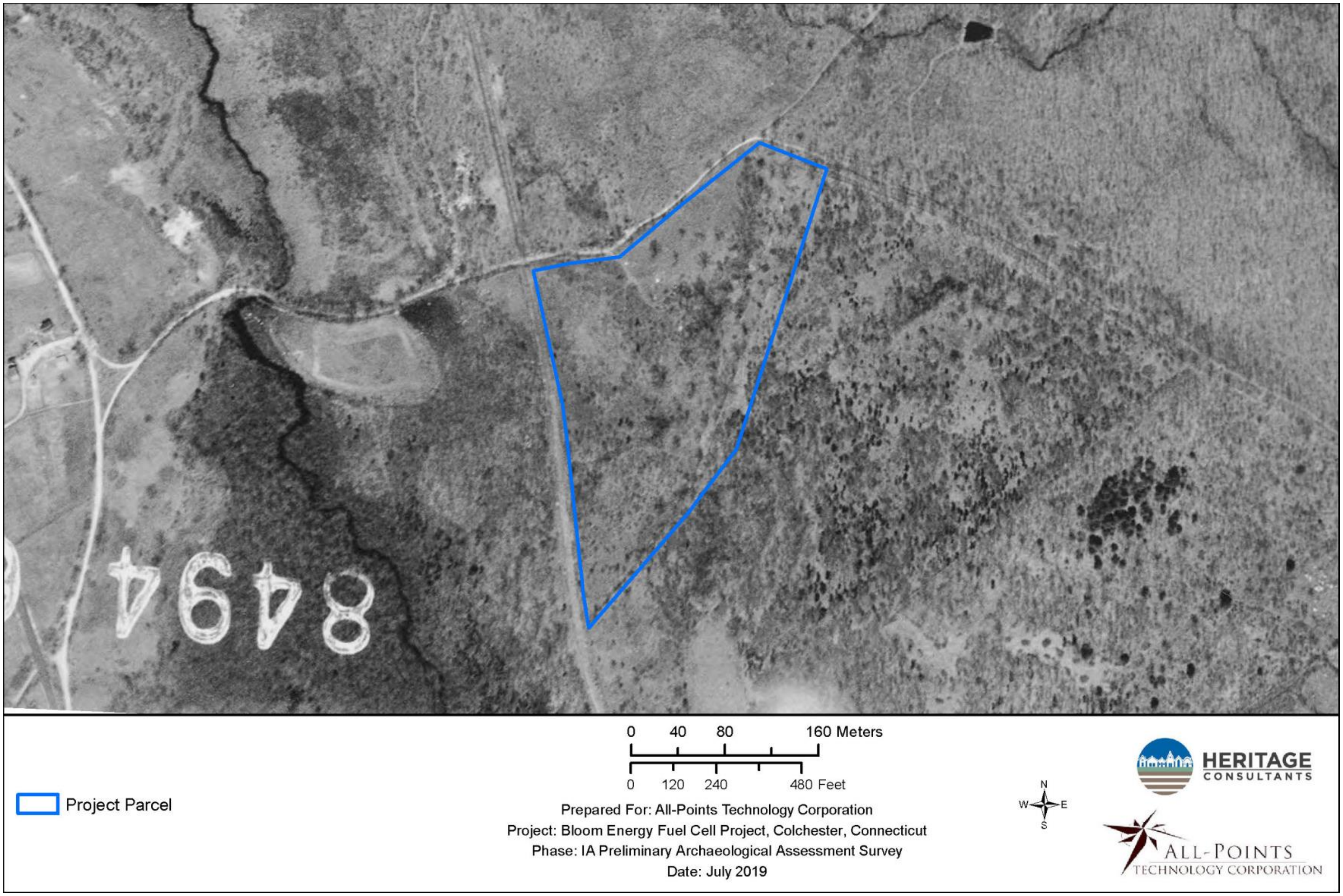

Figure 5. Excerpt from a 1934 aerial photograph showing proposed development parcel in Colchester, Connecticut.

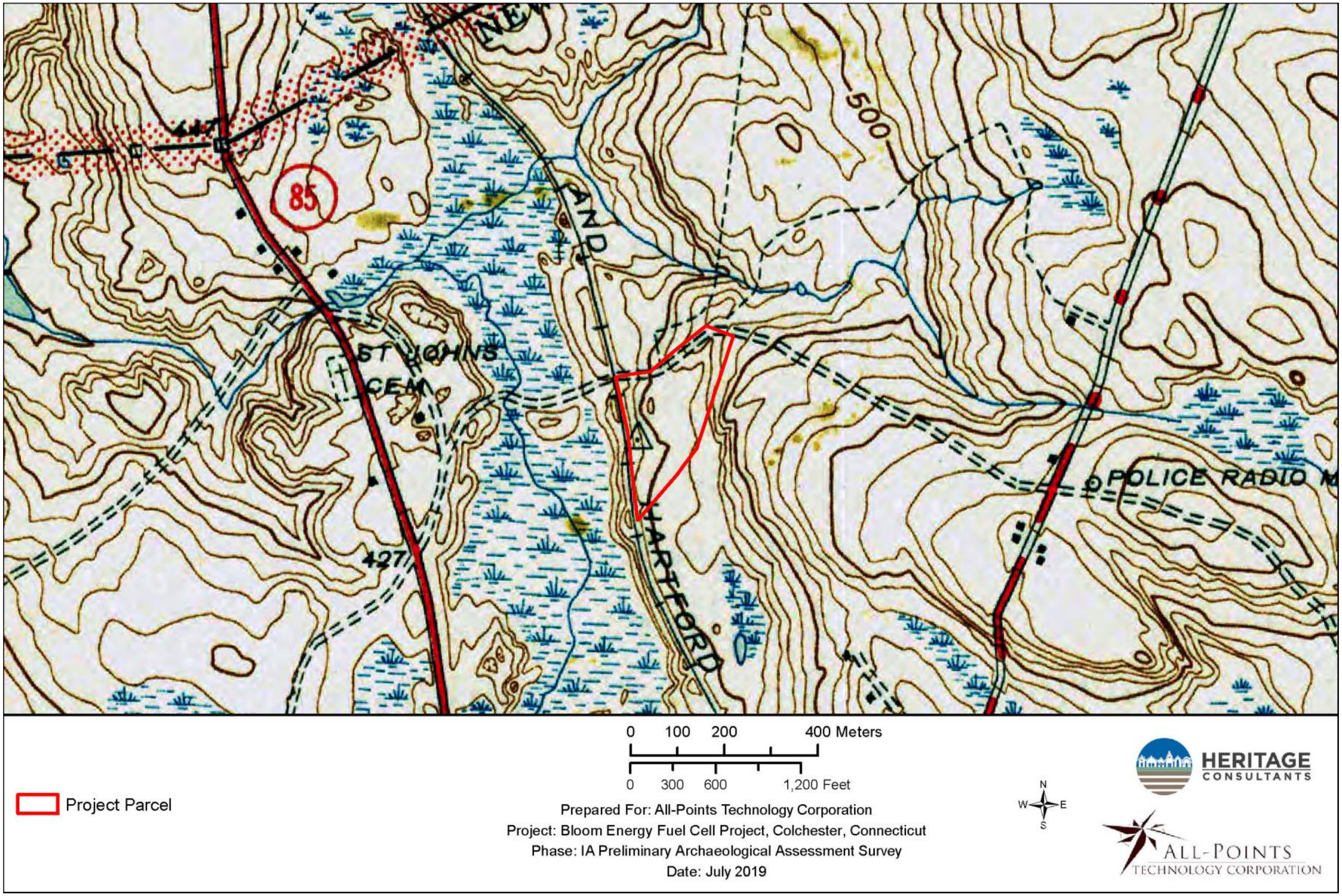

Figure 6. Excerpt from a 1945 USGS 7.5' series topographic map showing proposed development parcel in Colchester, Connecticut.

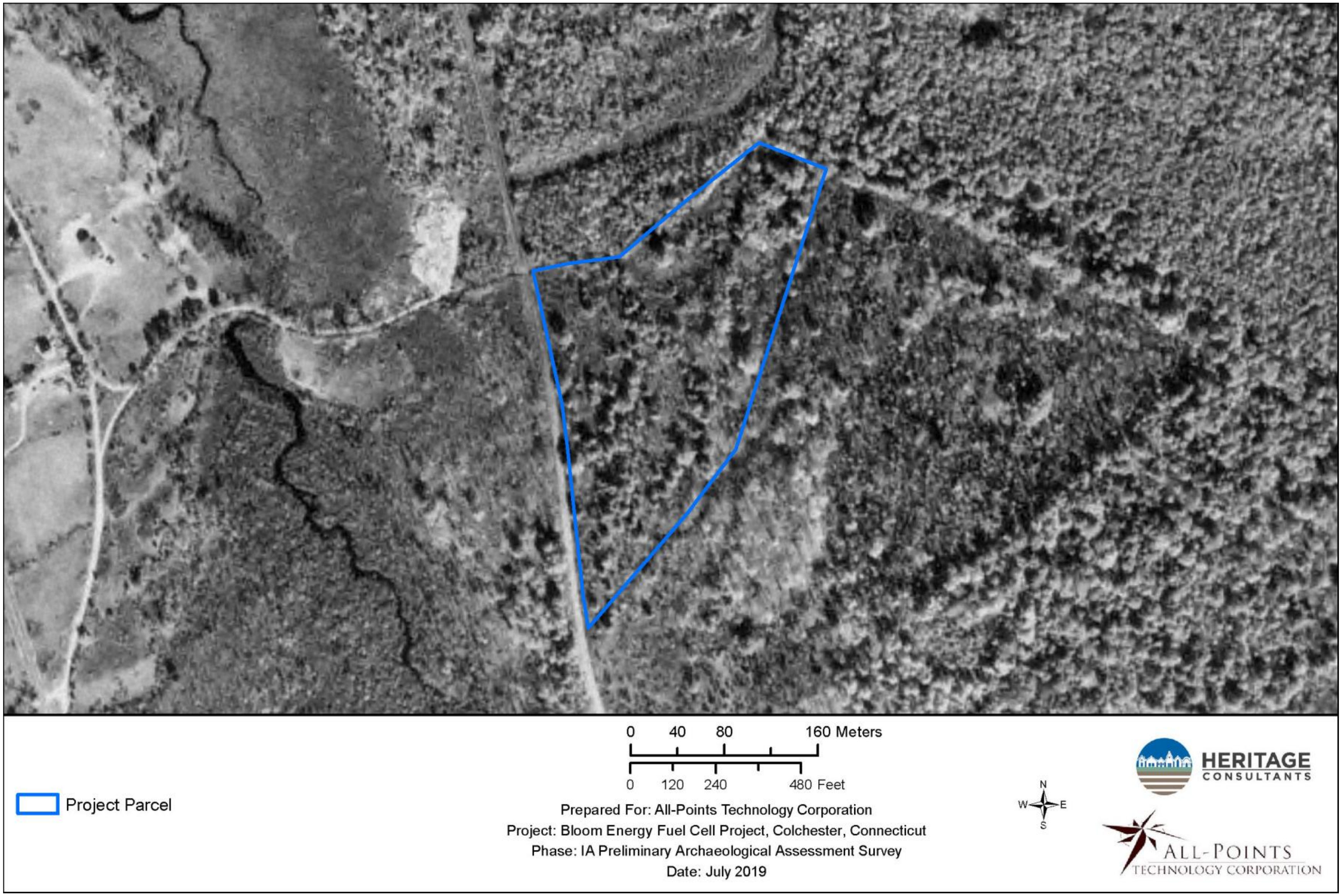

Figure 7. Excerpt from a 1951 aerial photograph showing proposed development parcel in Colchester, Connecticut.

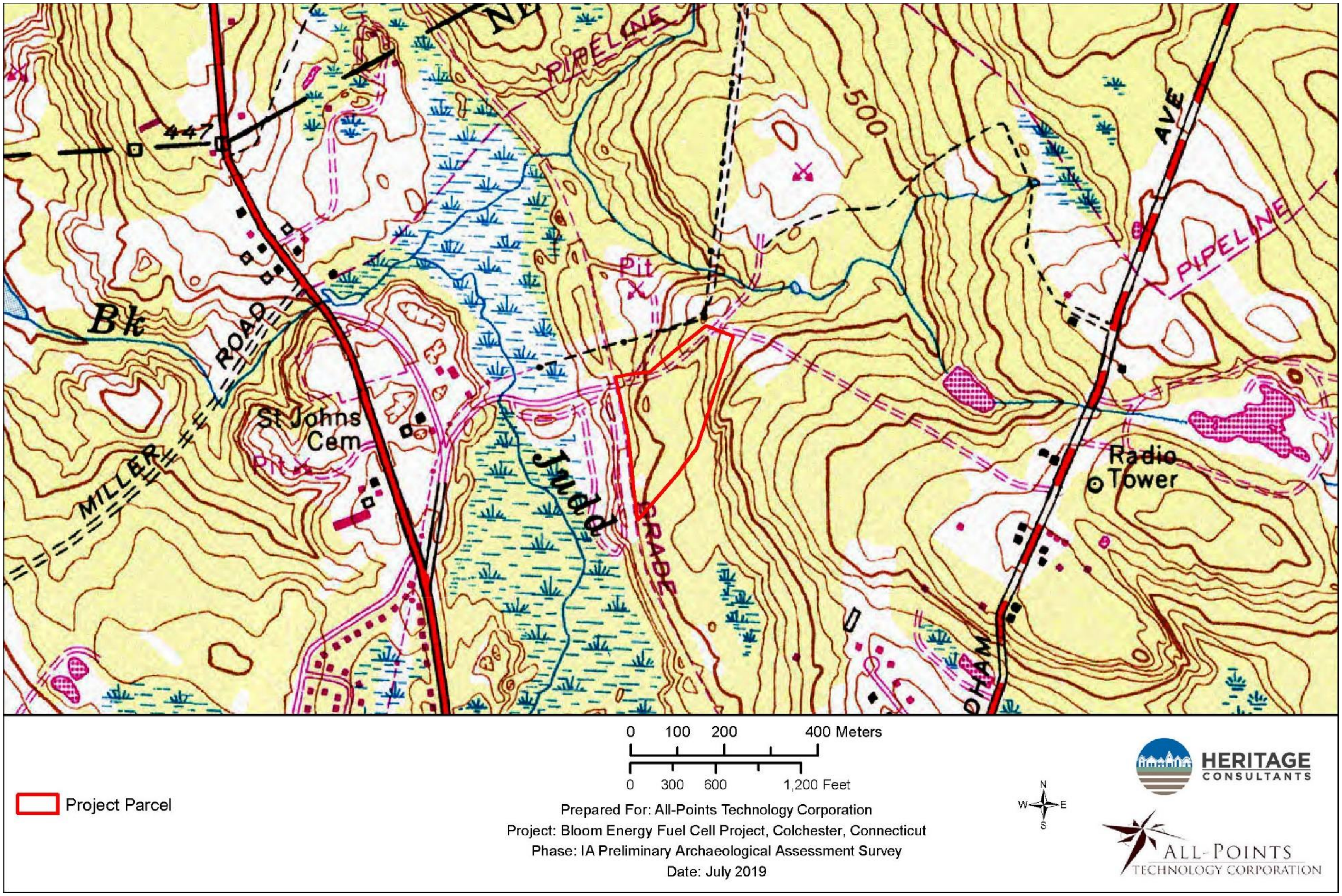

Figure 8. Excerpt from a 1945 USGS 7.5' series topographic map showing proposed development parcel in Colchester, Connecticut.

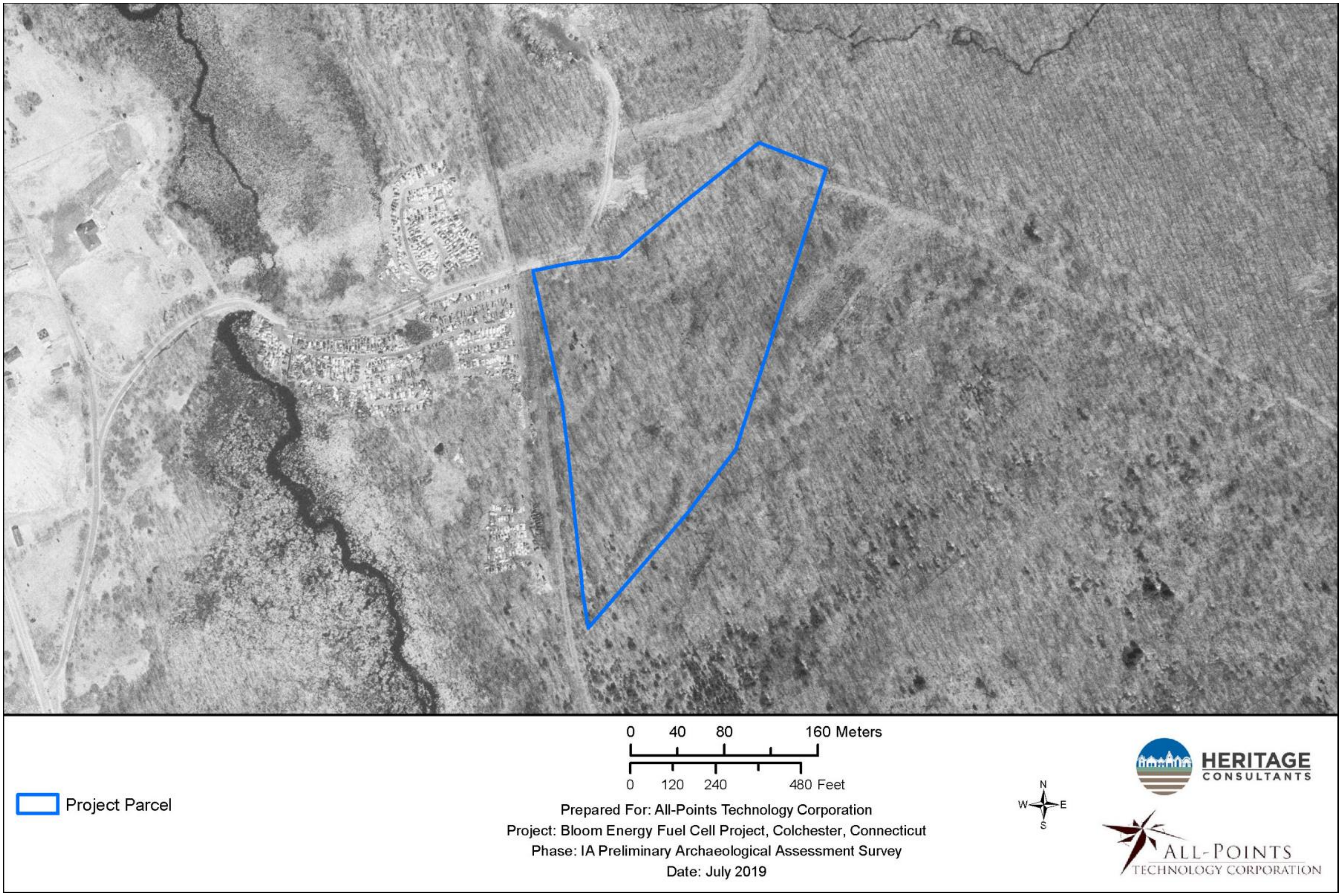

Figure 9. Excerpt from a 1965 aerial photograph showing proposed development parcel in Colchester, Connecticut.

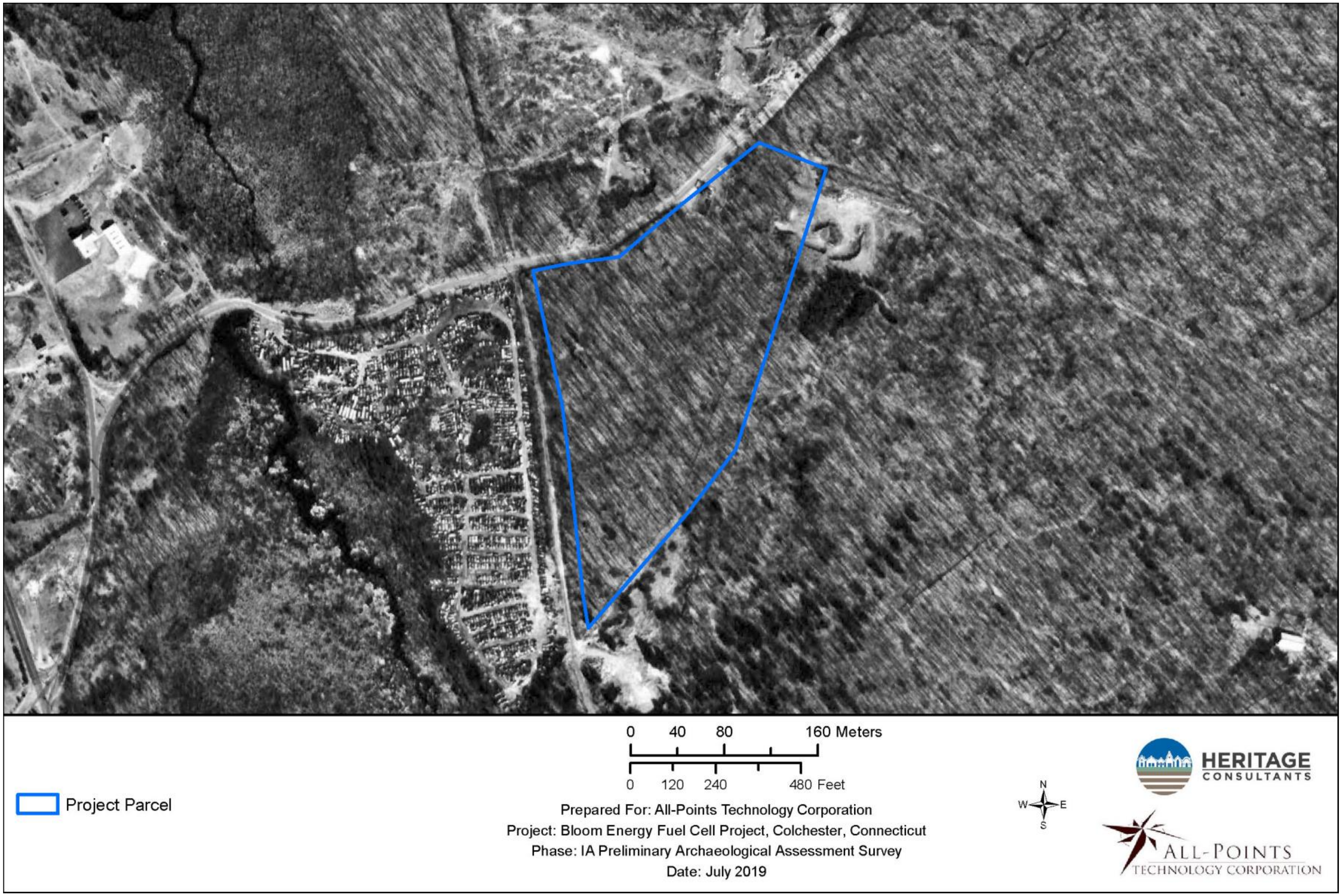

Figure 10. Excerpt from a 1986 aerial photograph showing proposed development parcel in Colchester, Connecticut.

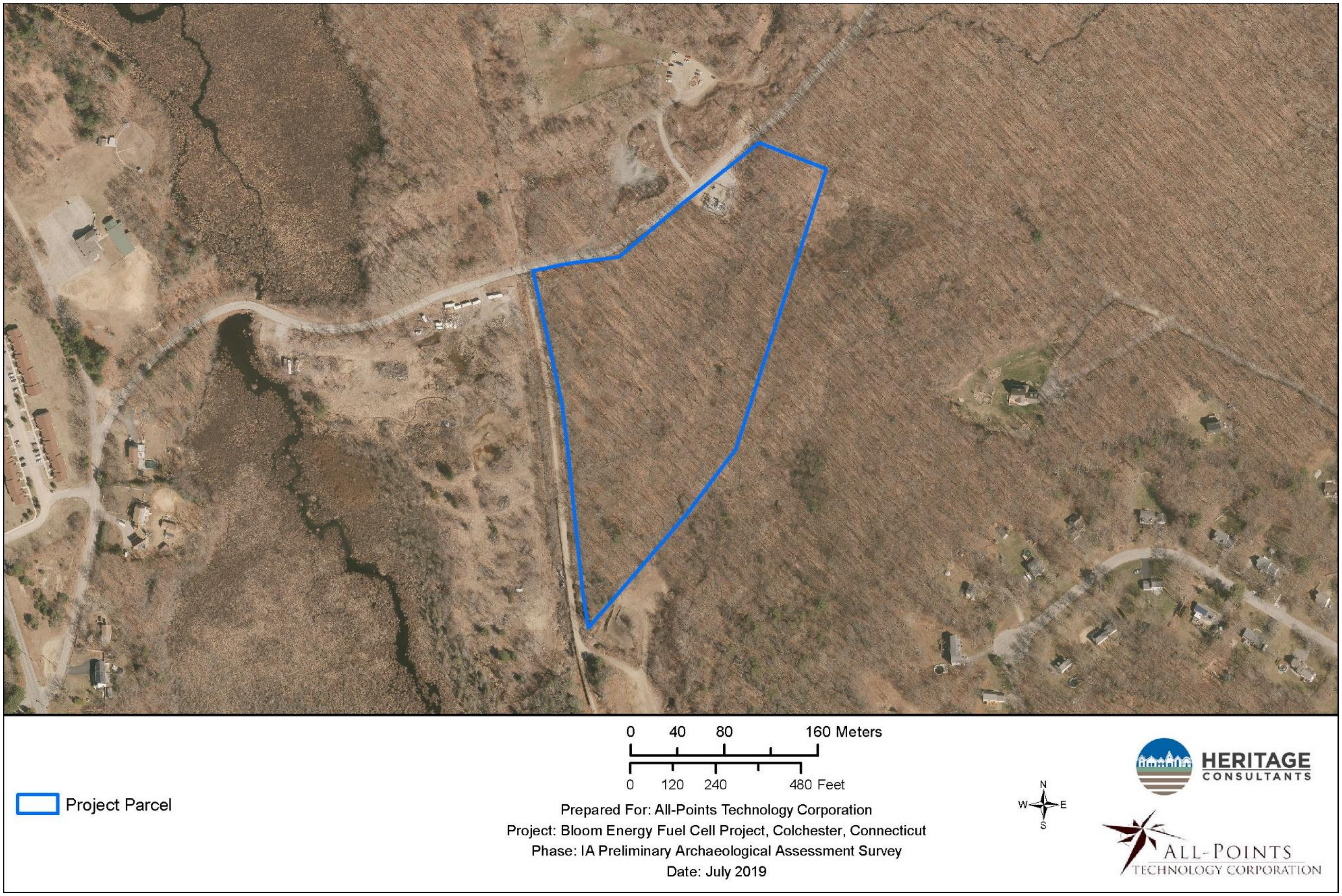

Figure 11. Excerpt from a 2016 aerial photograph showing proposed development parcel in Colchester, Connecticut.

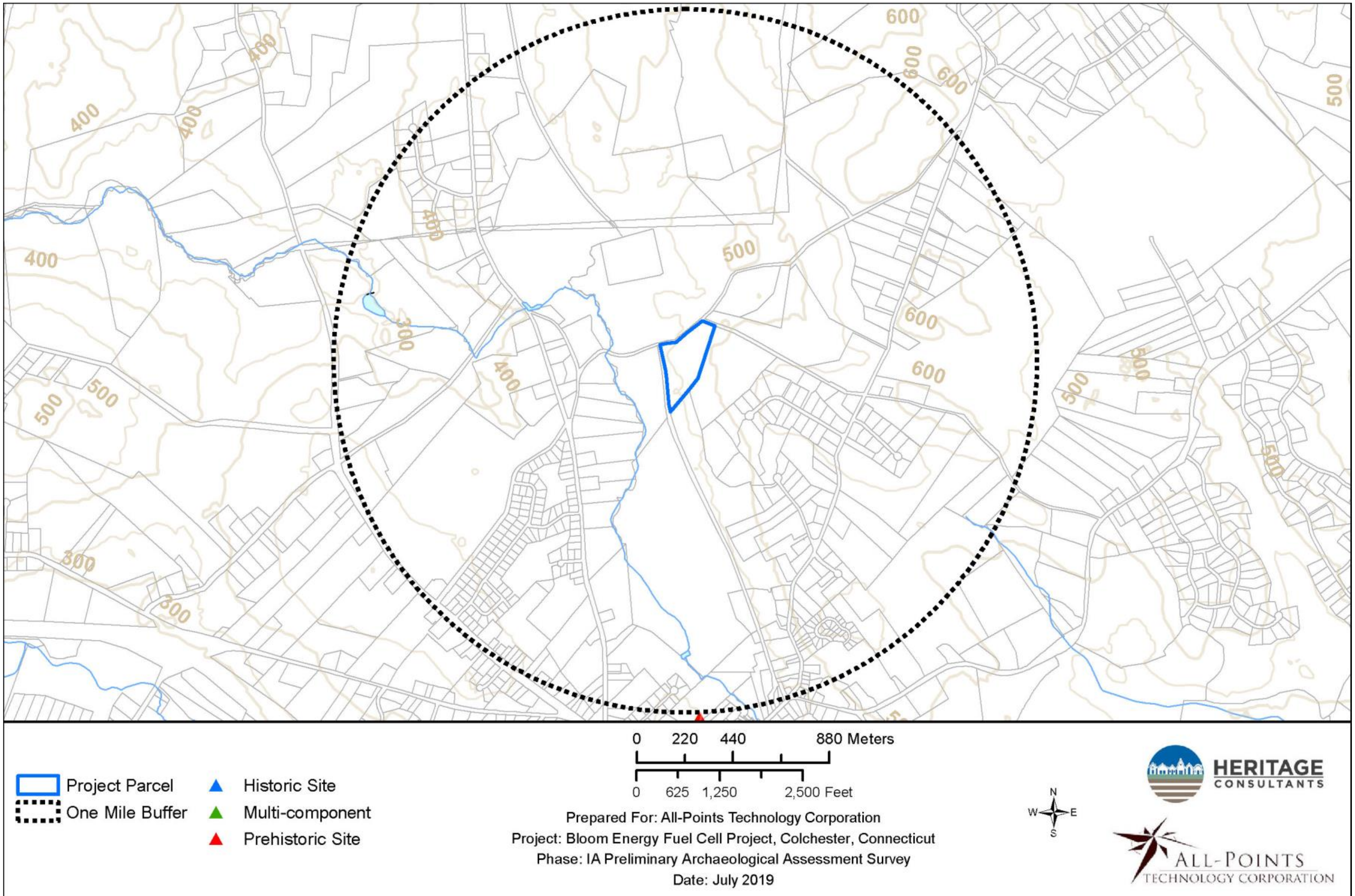

Figure 12. Digital map depicting the locations of previously identified archaeological sites in the vicinity of the proposed development parcel in Colchester, Connecticut.

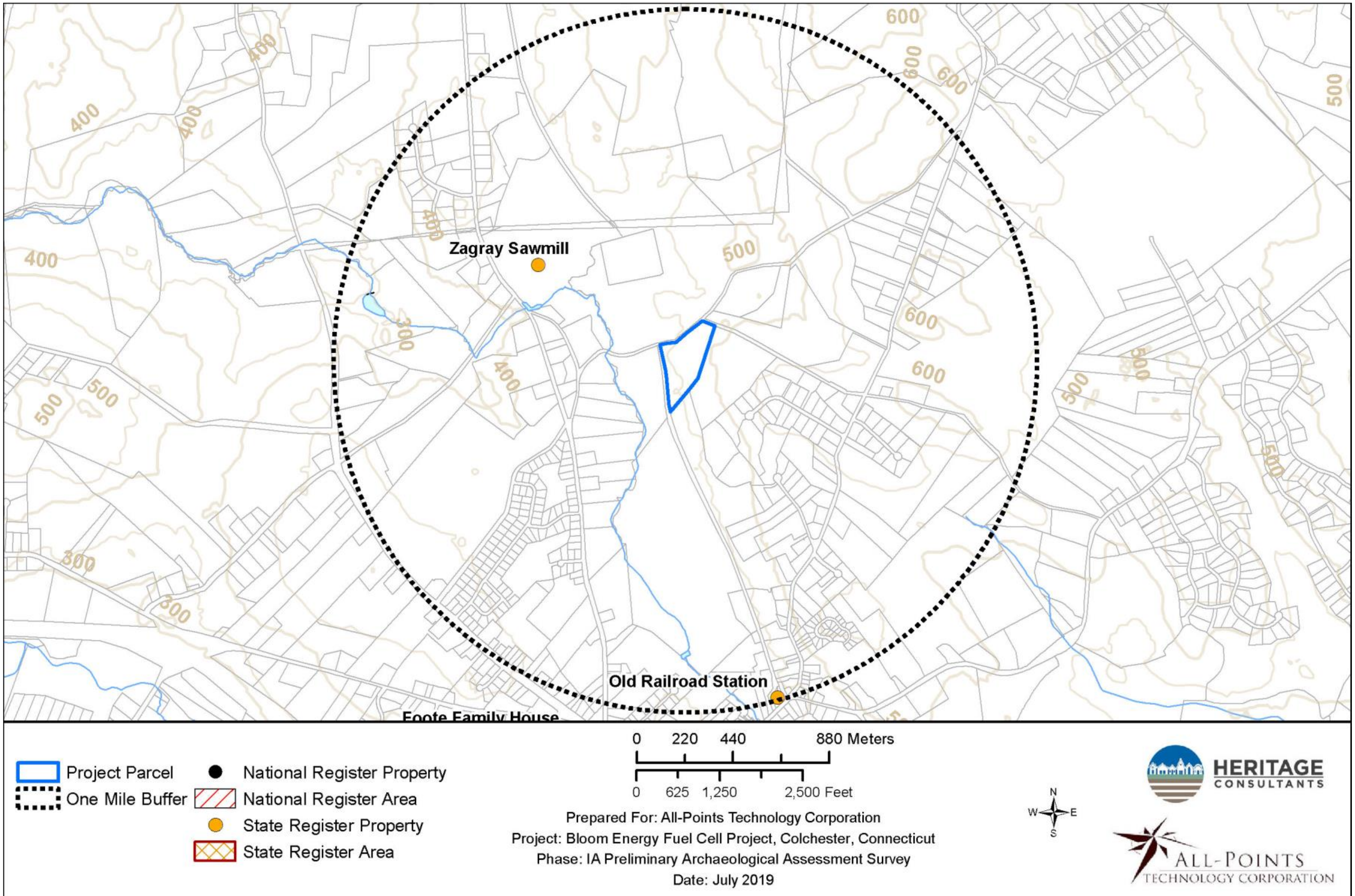

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Figure 18. Overview of a typical moderate sensitivity area within the project parcel.

Figure 19. Overview of a typical high sensitivity area within the project parcel.

Figure 20. Overview of a typical high sensitivity area within the project parcel.

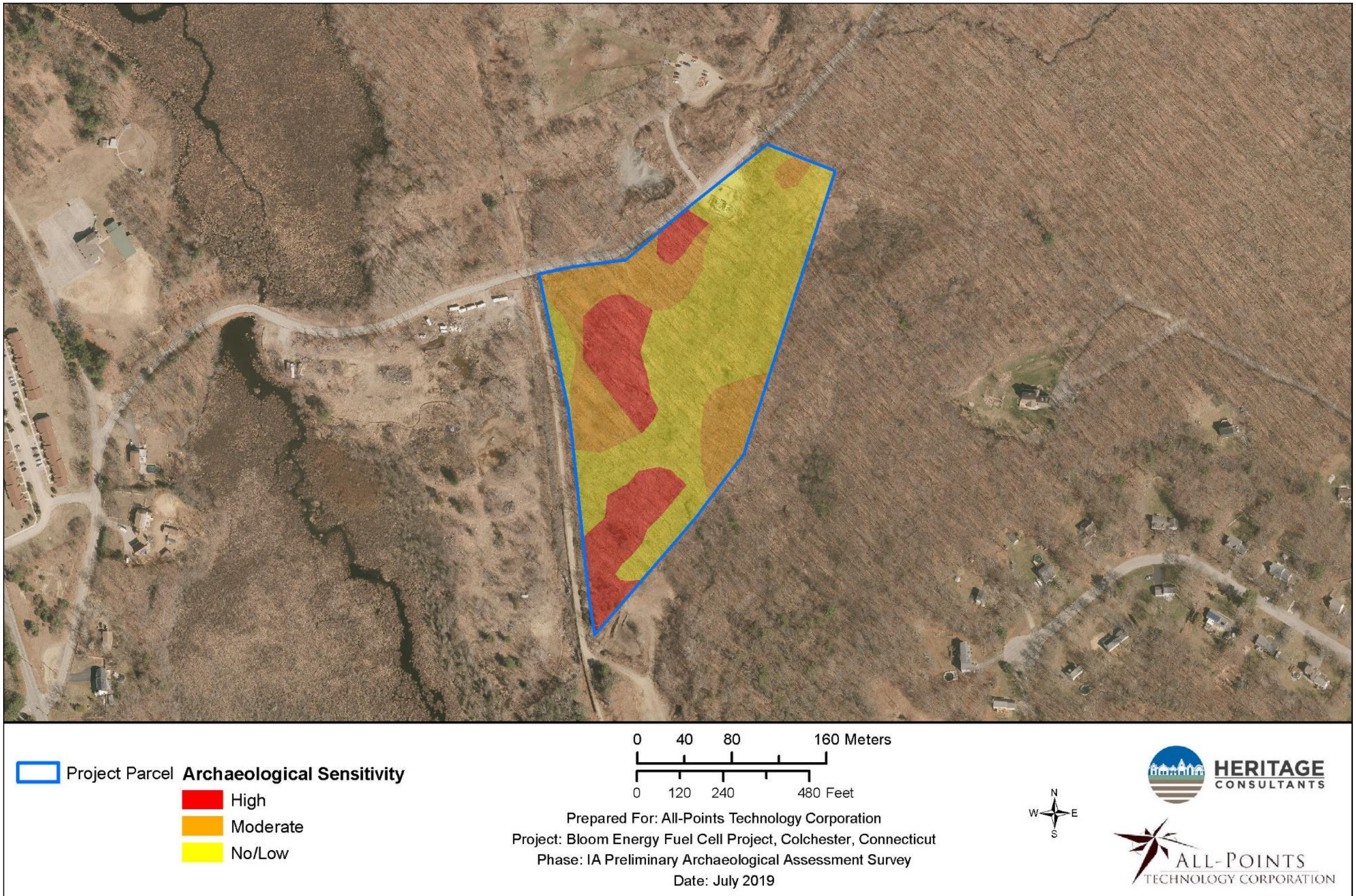

Figure 21. Excerpt from a 2016 aerial image showing the proposed project parcel, development area, and areas of no/low and moderate/high archaeological sensitivity.

SEPTEMBER 2019

PHASE IB CULTURAL RESOURCES RECONNAISSANCE SURVEY OF THE PROPOSED BLOOM ENERGY FUEL CELL FACILITY IN COLCHESTER, CONNECTICUT

PREPARED FOR:

ALL-POINTS TECHNOLOGY CORPORATION
3 SADDLEBROOK DRIVE
KILLINGWORTH, CONNECTICUT 06419

PREPARED BY:

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ABSTRACT

This report presents the results of a Phase IB cultural resources reconnaissance survey for a proposed Bloom Energy fuel cell facility in Colchester, Connecticut. The facility will be built within a 0.73 ac portion of a 12.7 acre parcel of land located to the south of Old Amston Road in Colchester, Connecticut and it will be connected to a nearby Eversource Energy electrical line via the Airline Trail corridor. All-Points Technology Corporation, P.C. requested that Heritage Consultants, LLC complete the current survey on behalf of Bloom Energy as part of the planning process for the proposed fuel cell facility. Phase IB cultural resources reconnaissance survey of the project area was completed using both pedestrian survey and subsurface testing. A total of 72 of 73 planned (99 percent) planned shovel tests were excavated throughout the project area, which was assessed as retaining moderate/high archaeological sensitivity during a previously completed Phase IA cultural assessment survey. The single planned but unexcavated shovel tests fell within an area containing ground wasp nests. The Airline Trail corridor was not subjected to Phase IB survey since it has been heavily disturbed in the past.

Phase IB cultural resources reconnaissance survey of the project area resulted in the identification of prehistoric cultural material from eight shovel tests, which was designated Locus 1. The recovered material consisted of chert secondary thinning flakes, quartzite secondary thinning flakes, and quartz secondary thinning flakes recovered from the A-Horizon and B-Horizon. None of the recovered cultural material was temporally diagnostic or could be assigned to a particular prehistoric cultural affiliation, and no cultural features were identified during survey. It was determined that Locus 1 lacked substantial cultural deposit and research potential; thus, it was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]) No additional examination of Locus 1 is recommended at this time. However, additional intact archaeological resources may be situated in other portions of the project parcel and could be impacted by future development. If construction of the proposed fuel cell or any other facility will extend beyond the area examined for cultural resources during this investigation, additional Phase IB survey would be recommended.

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CHAPTER I
INTRODUCTION

This report presents the results of a Phase IB cultural resources reconnaissance survey of a proposed fuel cell facility in Colchester, Connecticut (Figure 1). All-Points Technology Corporation, P.C. (All-Points), on behalf of Bloom Energy, requested that Heritage Consultants, LLC (Heritage) complete the current Phase IB reconnaissance survey as part of the planning process for the proposed facility. It will be built on a 12.7 ac parcel of land bounded by Old Amston Road on the North, the Air Line Trail wetlands associated with Judd Brook on the west, and forest areas to the south and east. Heritage previously completed a Phase IA assessment survey of the proposed project area and determined that 6.9 ac possess a no/low archaeological sensitivity, while 3.1 and 2.7 ac retain moderate and high archaeological sensitivity, respectively. The central portion of the parcel, which will not be impacted by development, contains moderate to steep slopes, wetlands, previously disturbed areas, and standing water (Heritage Consultants, LLC 2019). No testing of this area was recommended during the Phase IA effort. In contrast, the northwest and southwest portions of the project area, as well as two small areas in the southern and eastern portions of the project parcel were determined to possess a moderate/high archaeological sensitivity based on the presence of well drained soils, low slopes, and proximity to fresh water sources (Heritage Consultants, LLC 2019). Heritage completed Phase IB survey of these areas as part of the proposed fuel cell project in September of 2019. All work associated with this investigation was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological* Resources, which promulgated by the Connecticut State Historic Preservation Office (Poirier 1987). The remainder of this document presents a description of the proposed project, information used as project context, the methods by which the current Phase IB cultural resources reconnaissance survey

Project Description and Methods Overview

As discussed above, the parcel of land on which the proposed facility is planned encompasses approximately 12.7 acres of land; of this, an area approximately 0.73 ac in size will be impacted by a proposed fuel cell facility. It will include the facility, associated equipment, and an access road (Figure 1). The facility will be connected to a nearby Eversource Energy electrical line via the Airline Trail, a previously disturbed corridor once used for a railroad; it currently serves as a walking trail. The proposed fuel cell area is situated within areas previously identified as moderate/high archaeological sensitivity areas Phase IA survey. The fuel cell area is bounded by Old Amston Road to the north, and by wooded areas to the south, east, and west. The project area is positioned at approximate elevations ranging from 133 to 137 m (436.4 to 449.5 ft) NGVD, and soils situated throughout the project area can be characterized primarily as loamy sands. The nearest freshwater sources are Judd Brook, as well as several unnamed ponds and wetlands.

The current Phase IB cultural resources reconnaissance survey was completed utilizing pedestrian survey, systematic shovel testing along evenly spaced survey transects, detailed mapping, and photo-documentation of the fuel cell area. During survey, shovel tests were excavated at 7.5 m (28.6 ft) intervals along survey transects spaced 7.5 m (28.6 ft) apart. Each shovel test measured 50 x 50 cm (19.7 x 19.7 in) in size and each was excavated to the glacially derived C-Horizon or until immovable objects (e.g., tree roots, boulders, etc.) were encountered. Each shovel test was excavated in 10 cm (3.9 in) arbitrary levels within natural strata, and the fill from each level was screened separately. All shovel test fill was screened through 0.635 cm (0.25 in) hardware cloth and examined visually for cultural material.

Soil characteristics were recorded using Munsell Soil Color Charts and standard soils nomenclature. Each shovel test was backfilled immediately upon completion of the archeological recordation process.

Project Results and Management Recommendations Overview

During survey, a total of 72 of 73 (99 percent) planned shovel tests were excavated throughout the project area. The single planned but unexcavated shovel test fell within an area that contained ground wasp nests and could not be completed safely. Phase IB cultural resources reconnaissance survey of the fuel cell area resulted in the identification of prehistoric cultural material from eight shovel tests; this area was designated Locus 1. The recovered material consisted of chert secondary thinning flakes, quartzite secondary thinning flakes, and quartz secondary thinning flakes, which were recovered from the A-Horizon and B-Horizon. All of the recovered cultural material was temporally non-diagnostic in character and could not be assigned to a prehistoric cultural affiliation. Further, no cultural features were identified during survey. Based on the lack of substantial numbers of artifacts, cultural feature, and research potential, Locus 1 was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional examination of the archaeological deposits contained within the proposed fuel cell area is recommended prior to construction. However, additional intact archaeological resources may be situated beyond the fuel cell area and could be impacted by future development. Thus, if the footprint of the fuel cell areas is increased or is other development is planned beyond the proposed project area, additional Phase B survey would be required.

Project Personnel

Key personnel for this project included Mr. David R. George, M.A., R.P.A, served as Principal Investigator and who supervised the project. He was assisted by Mr. Cory Atkinson, M.A, who managed the fieldwork portion of the project and compiled this report. Mr. Stephen Anderson, B.A. provided Geographic Information System services. Ms. Kristen Keegan completed this historic background research of the project and contributed to the final report. Ms. Elizabeth Correia completed the analysis of the recovered cultural material under the supervision of Mr. George. The key personnel were assisted by Heritage support staff, both in the field and while compiling the report.

Organization of the Report

The natural setting of the region encompassing the project parcel is presented in Chapter II; it includes a brief overview of the geology, hydrology, and soils of the region. The prehistory of the project region is outlined briefly in Chapter III. The history of the region encompassing the project region and parcel is discussed in Chapter IV, while an overview of previous archaeological investigations and previously identified archaeological sites in the region is presented in Chapter V. The methods used to complete this investigation are discussed in Chapter VI. Finally, the results of this investigation are presented in Chapter VII, while management recommendations are contained in Chapter VIII.

CHAPTER II
NATURAL SETTING

Introduction

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

Ecoregions of Connecticut

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

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

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

<u>Southeast Hills Ecoregion</u>

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

Hydrology of the Study Region

The project area is located within close proximity of several streams, ponds and wetlands. The major fresh water sources in this area include Judd Brook, Sherman Brook, Raymond Brook, and Amston Lake, as well as numerous unnamed wetlands and streams. Previously completed archaeological investigations in Connecticut have demonstrated that streams, rivers, and wetlands were focal points for prehistoric 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 Area

Soil formation is the direct result of the interaction of several variables, including climate, vegetation, parent material, time, and organisms present (Gerrard 1981). Once archaeological deposits are buried within the soil, they are subject to 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 in within the current project area. In contrast, acidic soils enhance the preservation of charred plant remains.

A review of the soils within the project is presented below. It is characterized by three soil types, including Ninigret/Tisbury, Hinckley, and Canton/Charlton soils (Figure 2). All three of these soil types are well drained and are correlated with the location of prehistoric and historic period archaeological sites,. The profiles of these soil types are described briefly below. Data regarding them was collected from the National Resources Conservation Service (https://soilseries.sc.egov.usda.gov)

<u>Ninigret and Tisbury Soils (Code 21A):</u>

A typical profile for Ninigret/Tisbury soils 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; abrupt smooth boundary; **Bw1** --8 to 16 inches; yellowish brown (10YR 5/6) fine sandy loam; weak coarse granular structure; very friable; few fine roots; strongly acid; clear wavy boundary; **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; clear wavy boundary; **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.

<u>Hinckley Soils (Code 38E):</u>

A typical profile for Hinckley soils is as follows: **Oe** -- 0 to 3 cm; moderately decomposed plant material derived from red pine needles and twigs; **Ap** -- 3 to 20 cm; very dark grayish brown (10YR 3/2) loamy sand; weak fine and medium granular structure; very friable; many fine and medium roots; 5 percent fine gravel; very strongly acid; abrupt smooth boundary; **Bw1** -- 20 to 28 cm; strong brown (7.5YR 5/6) gravelly loamy sand; weak fine and medium granular structure; very friable; common fine and medium roots; 20 percent gravel; very strongly acid; clear smooth boundary; **Bw2** -- 28 to 41 cm; yellowish brown (10YR 5/4) gravelly loamy sand; weak fine and medium granular structure; very friable; common fine and medium roots; 25 percent gravel; very strongly acid; clear irregular boundary; **BC** -- 41 to 48 cm; yellowish brown (10YR 5/4) very gravelly sand; single grain; loose; common fine and medium roots; 40 percent gravel; strongly acid; clear smooth boundary; **C** -- 48 to 165 cm; light olive brown (2.5Y 5/4) extremely gravelly sand consisting of stratified sand, gravel and cobbles; single grain; loose; common fine and medium roots in the upper 20 cm and very few below; 60 percent gravel and cobbles; moderately acid.

Canton and Charlton Soils (Codes 61C):
A typical soil profile for Canton and Charlton soils contains the following profile: **Oi** -- 0 to 5 cm; slightly decomposed plant material; **A** -- 5 to 13 cm; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; friable; common fine roots; 5 percent gravel; very strongly acid; **Bw1** -- 13 to 30 cm; yellowish brown (10YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; very strongly acid (pH 4.6); clear smooth boundary; **Bw2** -- 30 to 41 cm; yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 5 percent gravel; strongly acid (pH 5.1); clear smooth boundary; **Bw3** -- 41 to 56 cm; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak medium subangular blocky; friable; common fine and medium roots; 15 percent gravel; strongly acid (pH 5.1); abrupt smooth boundary; **2C** -- 56 to 170 cm; grayish brown (2.5Y 5/2) gravelly loamy sand; massive; friable; 25 percent gravel; moderately acid (pH 5.6).

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 favorable for both prehistoric and historic period occupations. This includes areas of low to moderate slopes with well drained soils located near freshwater sources. The types of Native American 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
PREHISTORIC SETTING

Introduction
Prior to the late 1970s and early 1980s, very few systematic archaeological surveys of large portions of the state of Connecticut had been undertaken. Rather, the prehistory of the region was studied at the site level. As a result, a skewed interpretation of the prehistory of Connecticut was developed. It was suggested that the upland portions of the state, i.e., the northeastern and northwestern hills ecoregions, were little used and rarely occupied by prehistoric Native Americans, while the coastal zone, i.e., the eastern and western coastal and the southeastern and southwestern hills ecoregions, were the focus of settlements and exploitation in the prehistoric era. This interpretation remained unchallenged until the 1970s and 1980s when several town-wide and regional archaeological studies were completed. These investigations led to the creation of several archaeological phases that subsequently were applied to understand the prehistory of Connecticut. The remainder of this chapter provides an overview of the prehistoric setting of the region encompassing the current project area.

Paleo-Indian Period (12,000 to 10,000 B.P.)
The earliest inhabitants of the area encompassing the State of Connecticut, who have been referred to as Paleo-Indians, arrived in the area by ca. 12,000 B.P. (Gramly and Funk 1990; Snow 1980). Due to the presence of large Pleistocene mammals at that time and the ubiquity of large fluted projectile points in archaeological deposits of this age, Paleo-Indians often have been described as big-game hunters (Ritchie and Funk 1973; Snow 1980); however, as discussed below, it is more likely that they hunted a broad spectrum of animals.

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

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

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

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

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

The Archaic Period, which succeeded the Paleo-Indian Period, began by ca., 10,000 B.P. (Ritchie and Funk 1973; Snow 1980), and it has been divided into three subperiods: Early Archaic (10,000 to 8,000 B.P.), Middle Archaic (8,000 to 6,000 B.P.), and Late Archaic (6,000 to 3,400 B.P.). These periods were devised to describe all non-farming, non-ceramic producing populations in the area. Regional archaeologists 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 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 recognized on the basis of a series of ill-defined bifurcate-based projectile points. These projectile points are identified by the presence of their characteristic bifurcated base, and they generally are made from high quality raw materials. Moreover, finds of these projectile points have rarely been in stratified contexts. Rather, they occur commonly either as surface expressions or intermixed with artifacts representative of later periods. Early Archaic occupations, such as the Dill Farm Site and Sites 6LF64 and 6LF70 in Litchfield County, and are represented by camps that were relocated periodically to take advantage of seasonally available resources (McBride 1984; Pfeiffer 1986). In this sense, a foraging type of settlement pattern was employed during the Early Archaic Period.

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

By the onset of the Middle Archaic Period, essentially modern deciduous forests had developed in the region (Davis 1969). It is at this time that increased numbers and types of sites are noted in Connecticut (McBride 1984). The most well-known Middle Archaic site in New England is the Neville Site, which is in Manchester, New Hampshire and studied by Dincauze (1976). Careful analysis of the Neville Site indicated that the Middle Archaic occupation dated from between ca. 7,700 and 6,000 years ago. In fact, Dincauze (1976) obtained several radiocarbon dates from the Middle Archaic component of the Neville Site. The dates, associated with the then-newly named Neville type projectile point, ranged from 7,740±280 and 7,015±160 B.P. (Dincauze 1976).

In addition to Neville points, Dincauze (1976) described two other projectile point 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; Wiegand 1978, 1980).

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 prehistory. Originally termed the "Transitional Archaic" by Witthoft (1953) and recognized by the introduction of technological innovations, e.g., broadspear projectile points and soapstone bowls, the Terminal Archaic 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 the use 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 subterranean storage, suggests that Terminal Archaic groups were characterized by reduced mobility and longer-term use of established occupation sites (Snow 1980:250).

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

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

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

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

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

Careful archaeological investigations of Early Woodland sites in southern New England have resulted in the recovery of narrow stemmed projectile points in association with ceramic sherds and subsistence remains, including specimens of White-tailed deer, soft and hard-shell clams, and oyster shells (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 indicates that Early Woodland Period settlement patterns were characterized by multiple re-use of the same sites on a seasonal basis by small co-residential groups.

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

The Middle Woodland Period is marked by an increase in the number of ceramic types and forms utilized (Lizee 1994a), as well as an increase in the amount of exotic lithic raw material used in stone tool manufacture (McBride 1984). The latter suggests that regional exchange networks were established, and that they were used to supply local populations with necessary raw materials (McBride 1984; Snow 1980). The Middle Woodland Period is represented archaeologically by narrow stemmed and Jack's Reef projectile points; increased amounts of exotic raw materials in recovered lithic assemblages, including chert, argillite, jasper, and hornfels; and conoidal ceramic vessels decorated with dentate stamping. Ceramic types indicative of the Middle Woodland Period includes 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; Wiegand 1983).

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

Summary of Connecticut Prehistory

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

CHAPTER IV
HISTORIC OVERVIEW

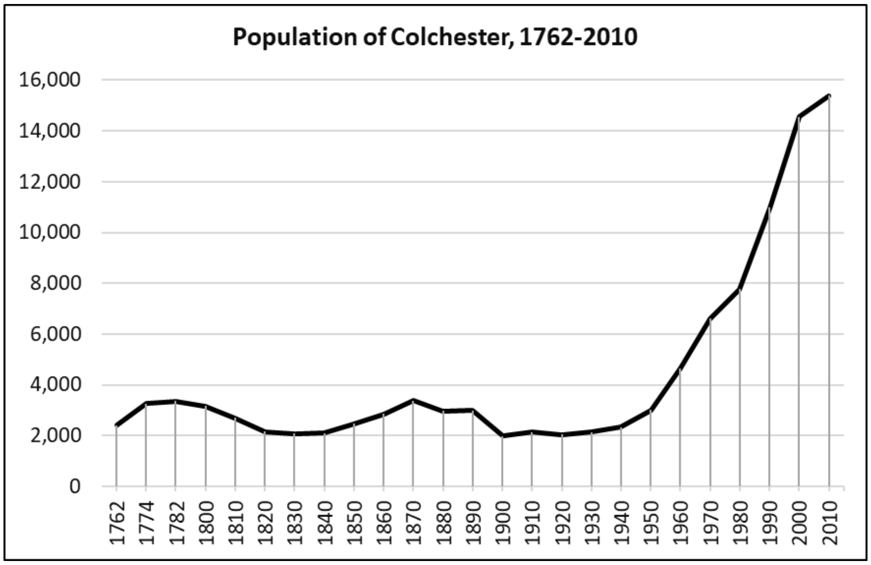
As discussed in Chapter I of this report, the project parcel is located in the northeastern part of the town of Colchester, which is situated in New London County, Connecticut. Historically, this area has been rural, although the main village of Colchester was not very far to the south. The remainder of this chapter provides an overview history of Colchester, as well as historical data specific to the project parcel.

Native American History of the Town of Colchester

Colchester was part of a large territory that the Mohegan leader Uncas claimed to be his hereditary property using the colonists' legal system rather than Native American concepts. Because Uncas had been the colonists' ally during the Pequot War (1636-1637), the Connecticut government chose to recognize this claim. When Uncas died, his will divided this territory between his sons Owaneco and Joshua, who received the easterly and westerly sections, respectively. When Joshua died in 1676, he left his portion to his son Abimelech and various colonists. In the 1680s, the ownership claims of Joshua's legatees, Abimelech, John Fitch (who had acquired Owaneco' s lands), as well as individuals who claimed to own land based on other purchases from Native Americans, led to both litigation and occasional episodes of violence (Bushman 1967). Although there were not enough Mohegans to occupy the area claimed by Uncas, and Connecticut's Native Americans did not have monarchs as the British understood them, the success of Fitch's tactics means that very little is known about the actual Native American communities in this region. Most historic documentation of such communities comes from their land sales or land claims, which this sequence of events made unnecessary in the eyes of the colonial authorities. It can be assumed that small Native American communities were present in and around Colchester at the time of its colonization, and most likely for a period of some years after that. Ultimately, however, all or most of the original inhabitants would have relocated to places that offered better opportunities to make a living.

Colonial Era History of the Town of Colchester (to 1790)

Because of the title disputed mentioned above, the colony government did not authorize a settlement at Colchester until 1698. Prior to that time, and undoubtedly forming part of the title questions, the colony had granted an individual named Jeremiah Adams a tract of 340 acres (137.6 ha) of land in the area. This grant was made by ca., 1662, and Adams named the area "Jeremiah's Farm." The town was named Colchester by the legislature in 1699. A revival of Mohegan claims to the area had to be adjudicated in 1700, after which the town's proprietors apparently were undisturbed in their expansion across their territory (Crofut 1937; Hurd 1882). Colchester's growth was rapid; according to the colonial census taken in 1762, the town was home to 2,403 residents in that year. Its population continued to grow through 1782, when it had 3,365 residents. The 1790 census data for New London County were not properly collected for the towns (see the population chart below; Keegan 2012). Throughout this period, Colchester included territory that would later be part of the towns of Salem and Marlborough (Barry 1985). During the Revolutionary War, part of the forces of the French Duke de Lauzun camped at a place called Pine Swamp in Colchester (Crofut 1937).



Colchester's Congregational church was organized in 1703, as was required by the colony government, and the first meeting house in town was erected in 1705-1706. It was replaced within a few years, and again in 1771. The town's population growth and spread required the establishment of a second Congregational church society in 1728; it was called Westchester (Hurd 1882). It appears that the new religious movements of the late eighteenth century did not spark the creation of any other new churches in Colchester before the end of the period.

Early National and Industrializing Period History of the Town of Colchester (1790 to 1930)

Colchester's nineteenth-century population information is complicated. As of 1800, the town had lost some population, reporting 3,163 residents in that year. Colchester then lost territory to the new towns of Marlborough (in 1803) and Salem (in 1819), which brought the population down to 2,152 residents as of 1820. For two decades the population stagnated, before rising to 3,383 residents between 1840 and 1870. Another overall decline followed, reducing the population to only 1,991 residents as of 1900. Another period of stagnation followed, leading to a population of 2,134 residents in the year 1930 (see the population chart above; Keegan 2012). In 1803, a bequest from Pierpont Bacon established a secondary school called the Bacon Academy, which was free to Colchester students (Crofut 1937). By the end of the second decade of the nineteenth century, the town developed the necessary complement of agricultural and timber processing facilities (grist mills, sawmills, and fulling mills) to support the local population; it also had a small iron forge at that time (Warren and Gillet 1813).

A gazetteer published in 1819 reported that Colchester's soil was good for grazing, and its farmers concentrated on meat and dairy products, although they also produced several grain crops. For industry, there was a single woolen factory and an iron production facility; otherwise, tanneries, grain mills, and sawmills processed the town's primary sector products. There were three Congregational societies in time by the early nineteenth century, including a Congregationalist, a Baptist, and a Methodist congregation, each of which had its own church. The main village had approximately 40 houses and the Bacon Academy, a semi-public secondary school that had been established in 1800 (Pease and Niles 1819).

In the 1830s, Colchester's land was described as uneven and hilly, with adequate soil, and it was reported that a high-quality mine of iron ore had recently been opened. Culturally, the town had two

Congregational societies and one Baptist church, Bacon Academy (which had some 200 students in 1836), and a separate school for African-American children. The main village, where the academy and the older Congregational church were located, now contained between 40 and 50 houses (Barber 1837; Crofut 1937). In 1850, the federal industrial census return for Colchester was unusually detailed, and it included listings for sawmill/grist mill combinations owned by one person as two entries. Thus, there were 37 firms reported in Colchester, including the two butchers whose firms probably should not have been listed at all. Only one of the firms, however, had more than 10 employees on average. This was the rubber factory that employed 150 each of men and women for a total of 300 workers. The next largest employer listed in the 1850 industrial census was a carpenter and joiner, who employed 10 men. The rest – blacksmiths, grist and sawmills, a tailor, two butchers, two hat makers, and tanners – employed six men or fewer. Thus, aside from the rubber factory, the town's industrial producers had a total of 77 employees on average (United States Census 1850). As the post-1850 population numbers suggest, the presence of one extremely large firm and many very small ones was not sufficient to increase Colchester's population by any appreciable degree.

The 1854 map of New London County shown in Figure 3 indicates that Colchester had two named villages at that time. The smaller village, Westchester, was located in the southwestern corner of the town, while the larger village, Colchester, was thickly settled and located in the western part of the town, approximately 1.5 miles (2.3 km) to the south of the project parcel (Figure 3; Walling 1854). An inset map of the village indicated that the only large manufacturing firm there was the Hayward Rubber Company on Spring Brook, although alongside the numerous residences were a hat factory, a cabinet shop, a blacksmith, multiple stores, a hotel, and three different churches. Approximately a half-mile (0.7 km) to the north and west of the project parcel, there was a smaller cluster of buildings focused on a group of mills (a sawmill, a grist mill, and a shingle mill) drawing power from Judd Brook. At the project area and within 152 m (500 ft) of it, however, the only cultural feature depicted on the map was a road at its northern boundary (Figure 3; Walling 1854). In the subsequent 1868 map of the town, Colchester had five named villages, including Westchester and Colchester. In addition, two of the newly-portrayed villages were located to the northwest of Colchester (identified as Union Mill Village and Iron Works). The third was Packwoodville, which was situated to the north of Colchester and to the northwest of the project parcel, where in the 1854 map there had only been a cluster of buildings. The 1868 map showed a textile mill, a grist mill, and a sawmill at that location. Again, however, there were no marked cultural features near the project area, aside from the above-referenced road. A separate map of Colchester Village reported the continued presence of the rubber company as the only large manufacturer there, and fewer small manufacturers in the thriving village (Figure 4; Beers 1868).

By the 1880s, Colchester had added a Methodist, a Baptist, an Episcopal, and even a small Roman Catholic church. The crown of its industrial activities was the previously-mentioned Hayward Rubber Company, established in 1847, which survived until 1894 when it was bought out and closed; it later burned to the ground (Crofut 1937; Hurd 1882). Earlier in the nineteenth century, State of Connecticut efforts to encourage commerce and industry led to the creation of turnpike companies, which received the right to charge tolls in exchange for building or improving roads. No fewer than five turnpikes converged on Colchester's main village by 1813. Once the alternative transport method of the railroad began to compete, however, these companies disbanded and their roads became toll-free (Wood 1919; Warren and Gillet 1813). One of Colchester's problems with industrial development is that only one nineteenth-century railroad reached it, and at a relatively late point in time: the Air Line route between New Haven and Willimantic, planning for which started in the 1840s, was not built until the early 1870s. The main line passed through the northwestern corner of Colchester at a place then called Westchester. A short branch line to Colchester Village (and the rubber factory) had to be built southward in 1876, connecting it to the main line at Amston in the town of Hebron (Turner and Jacobus 1987). It is the branch line that passed along the western boundary of the project parcel. Whatever hopes for economic growth and development might have been pinned on this railroad, the town's population numbers – and the closure of the rubber factory in the 1890s – indicate that they were poorly founded.

Modern History of the Town of Colchester (1930 to Present)

After 1930, Colchester began to see consistent population growth. At first it was modest, with the town reporting 3,007 residents in 1950, up from the 2,134 residents of 1930. Strong growth in the next two decades brought the population to 6,603 residents as of 1970, and then even faster growth raised it to 14,551 residents as of 2000. The growth rate was lower after that, leaving the town with 15,383 residents in 2010 (see the population chart above; Keegan 2012). A summary of the state's towns' status as of 1932 reported that Colchester's industrial activities, aside from agriculture, included production of ready-made clothing, curlers, and leather goods; it also had rail service and bus service by this time(Connecticut 1932). In the early twentieth century, Colchester was one of the towns chosen for resettlement of European Jewish immigrants by the Hirsch Foundation. Some of them added housing for summer visitors to their economic repertoire, leading to the development of a substantial tourist industry through the 1930s (Connecticut Historical 2019). During the same period, the state began a program of improving and organizing its roads, which included a concrete roadway that joined Hartford and New London via Colchester; it was funded in 1920 and eventually designated as Route 2. In the 1950s, this road was both a major route to Connecticut's eastern shoreline and a significant traffic problem. As a result, a freeway version of the road was planned and was being completed in Colchester by 1958 (Oglesby 2013). The connection between these road improvements and Colchester's population growth is clear, although its bypassing of downtown Colchester and its retail businesses did not help them (Colchester Historical 2019).

The 1934 aerial photograph depicted in Figure 5 shows that the project area was not, at that time, in an area that was being used for farming. Although one or two cleared or formerly cleared fields were located nearby, most of the area was forested. By this time, the road threading through the forest on the northern edge of the project parcel was, or had become, a mere route from one place to another. The railroad line also was clearly visible on the western edge of the project parcel; further to the west, the straightening and of what is now Route 85 had clearly cut off a loop of historic road on the far side of Judd Brook. To the south, a short road contained a group of buildings that might have been a camp or resort (Figure 5; Fairchild 1934). The lack of active farming in this are in the 1930s is consistent with the historic maps, with their absence of farmhouses along the road. This suggests that if there was farming in this area during the historic period, the land was of marginal quality and was abandoned early.

A topographic map dating from 1945 indicates that the road on the north side of the project parcel was unimproved at that time. This map also identified the railroad line as part of the New Haven and Hartford company. Aside from two trails to the north, no other cultural features were shown as within the vicinity of the project parcel. To the south, however, a section of unimproved road contained a line of four buildings along its west side, suggesting an early stage of development outside the village of Colchester (Figure 6; USGS 1945). In the subsequent 1951 aerial photograph, however, these buildings look more like farm buildings than homes, and the cluster of possible summer cabins was no longer visible. The project parcel and its immediate vicinity were still wooded at this time, and farm areas were still present further off to the east and west. While it is difficult to say whether the road was still present, the railroad bed was still in place as of 1951 (Figure 7; USDA 1951). A 1953 topographic map of the area shows several changes in the project region. First, the railroad was mapped as abandoned rather than active. Second, a gravel pit was noted to the north of the project area, partly within 152 m

(500 ft) of it, with a second one further to the northeast. Third, the short road to the south of the project parcel contained multiple new houses; in addition, to the west, on the far side or Route 85, a substantial small-lot residential development had been built (Figure 8; USGS 1953).

The 1965 aerial photograph, however, suggests that the topographic map's portrayal of the area to the south of the project area was incorrect, as there appear to be no houses on the east side of the short road in this image. Closer to the project area, on the west side of the railroad bed and near the project parcel, was what appears to be either a mobile home park or a campground for trailers. The project parcel itself remained wooded at this time. It appears, also, that a section of the road on the north side of the project parcel had been abandoned; and there was a new road or access road cut through the woods to the north and extending westward across the rail line (Figure 9; CT DEP 1965). No notable change, other than an increased area of ground disturbance to the north, can be seen in the 1970 aerial photograph (USGS 1970).

As shown in the 1986 aerial image of the project region, the electrical substation in the northeastern corner of the project parcel had been constructed. Otherwise the woods within the project parcel appeared as relatively undisturbed. Further afield, the above-referenced trailer park/campground on the west side of the railroad had expanded and there were a few more new buildings to the south. To the north, part of the old road had been reopened to provide access to the town dump (now the town transfer station) further to the northeast (Figure 10; CT DEP 1986). In the subsequent 1991 aerial photograph, the ground disturbance to the south had expanded, but there were no other notable changes within or near the project parcel (USGS 1991). By 2016, a single new house had been built just to the southeast of the project area and at the end of the surviving portion of old road. It seems from this image that there was no longer a connection between that segment of road and the segment leading to the transfer station further to the north. To the west, the trailer park or campground had been abandoned except or a few derelict trailers. Further to the west, the area along Route 85 had become noticeably more developed. In the general area, there were only a few cleared fields left, most of which looked more like lawns or hay fields than working agricultural areas. Where housing had not been built, forest had taken over by 2016 (Figure 11; Capitol Region 2016).

As noted above, Colchester's population increased greatly during the latter half of the twentieth century, especially after construction of Route 2. Today, many of the town's residents work in the cities of Middletown and New London, among others. Beginning in 1996, the above-referenced abandoned rail line was made part of the Air Line Rail Trail for recreational walking and bicycling, which explains its visibility in modern aerial images (Colchester 2014). An economic profile of Colchester compiled in 2018 reported that town's population growth had essentially halted after 2010. As of 2016, Colchester had 406 firms that supported 3,912 employees; the largest employment was government, with 784 employees (20 percent of the total), followed by health care and social assistance and retail trade. The town also had 11 manufacturing firms employing 235 people (6 percent of the total). Two of the town's five largest employers in 2017 were manufacturing firms, while another two were retail and one was in health care (CERC 2018). Agricultural employment data were not included in this profile. Nonetheless, the town's early twenty-first century planning document contemplated protection of its surviving farmland, as well as of its open space and natural and historic resources. Its development plans focused on constraining business and denser residential development to areas in close proximity to the existing centers of Westchester and downtown Colchester, and maintaining the town's rural appearance in other areas as much as possible. According to these plans, the project parcel's location was near the northern edge of a "Suburban District" outside the downtown "Village District." Areas for which future growth was expected or continued, however, were to the west and south of these village and suburban districts (Colchester 2014). These plans are similar to those of other suburban towns and can be expected to constrain development outside the designated areas.

Conclusions

The documentary record indicates that it is unlikely that the proposed work will impact any significant historic period archaeological resources. No evidence of historic buildings on the parcel has been identified. Remnants of past agricultural use such as stonewalls may be present, but they will likely be the only representations of historic period use of the project parcel.

CHAPTER V
PREVIOUS INVESTIGATIONS

Introduction

This chapter presents the results of a cultural resources literature review for the proposed project region (Figures 12 and 13). Personnel from Heritage visited the Connecticut State Historic Preservation Office in Hartford, Connecticut, as well as searched Heritage's corporate files, in an attempt to identify all previously identified cultural resources situated within 1.6 km (1 mi) of the project area, including known archaeological sites, historic standing structures, and National/State Register of Historic Places that may be affected by the proposed undertaking. This review resulted in the identification of two previously recorded State Register of Historic Properties located within 1.6 km (1 mi) of the project area (Zagray Sawmill and Old Railroad Station; these two resources are discussed below. No previously identified archaeological sites, National Register of Historic Properties, and/or potential eligible historic standing structures were noted within the 1.6 km (1 mi) search radius.

Zagray Sawmill

The Zagray Antique Circular Sawmill was listed on the State Register of Historic Places in June 2004 by Paul Towne of the Quinebaug Valley Engineers Association Inc. The historic sawmill is located at 544 Amston Road, or Route 85, in Colchester, Connecticut (Figure 13). It was construct in 1873 using a post and beam structural system. A flat roof was added to the sawmill building in the early 1960s; it is constructed of tin. The Zagray Sawmill is one story tall and measures 9.1 x 15.2 m (30 x 50 ft) in size. This late nineteenth century sawmill is now part of the Zagray Farm Museum and was listed as in fair condition when it was added to the in 2004 State Register of Historic Places. This historic resource will not be impacted by the proposed project.

Old Railroad Station

The Old Railroad Station is located at the junction of Windham Avenue and Lebanon Avenue (Route 16). There are two historic buildings located on the property, both of which area decorative railroad stations with unique cornice work (Figure 13). The station building located at 199 Lebanon Avenue has been converted to a package store while the building situated at 187 Lebanon Avenue houses a bicycle shop. The associated railroad tracks have been removed and converted to a walking trail as part of the "rails to trails" program sponsored by the Connecticut Department of Transportation. The Old Railroad Station was originally built as the Colchester Station, a stop on the Colchester Railroad. By 1877, it was connected to the Air Line Railroad, which connected Boston and New York City. The Colchester Railroad segment consisted of a 5.8 km (3.6 mi) long spur of the Air Line Railroad. The Old Railroad Station was recorded by Nancy Belcher and William Hurley of the Connecticut Development Commission on December 6, 1966. This two building comprising this historic resource will not be impacted by the proposed project.

Summary

The review of previously identified cultural resources on file with the Connecticut State Historic Preservation office suggests that there are only two known historic period built resources in the project region. Neither of these items will be impacted by the proposed project. The low number recorded cultural resources in the region to date is mostly likely related to a lack of professional cultural resources surveys having been completed in the area rather than actual absence of cultural resources there. Based on the general knowledge and history of the project region, it may be expected that other archaeological and historical resources may be located near or within undisturbed portions of the project parcel.

CHAPTER VI
METHODS

Introduction

This chapter describes the research design and field methodology used to complete the current Phase IB cultural resources reconnaissance survey of the proposed Bloom Energy fuel cell area in Colchester, Connecticut. In addition, the location and point-of-contact for the facility at which all cultural material, drawings, maps, photographs, and field notes generated during survey will be curated is provided below.

Research Design

The current Phase IB cultural resources reconnaissance survey was designed to identify all prehistoric and historic cultural resources located within the proposed fuel cell area. Fieldwork for the project was comprehensive in nature; planning considered the results of previously completed archaeological surveys within the larger project region, the distribution of previously recorded archaeological sites located near the project area and an assessment of the natural qualities of the parcel. The methods used to complete this investigation were designed to provide complete and thorough coverage of all fuel cell area. This undertaking entailed pedestrian survey, systematic subsurface testing, detailed mapping, and photo-documentation.

Field Methodology

Following the completion of all background research, the proposed fuel cell area was subjected to a Phase IB cultural resources reconnaissance survey utilizing pedestrian survey, photo-documentation, mapping, and systematic shovel testing. The pedestrian survey portion of this investigation included visual reconnaissance of the proposed fuel cell facility project, as well as photo-documentation of the project area. The field methodology also included subsurface testing of the fuel cell area, during which shovel tests were excavated at 7.5 m (24.6 ft) intervals along parallel survey transects spaced 7.5 m (24.6 ft) apart.

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

Curation

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

Office of Connecticut State Archaeology
Box U-1023
University of Connecticut
Storrs, Connecticut 06269

CHAPTER VII
RESULTS OF THE INVESTIGATION

Introduction

This chapter presents the results of a Phase IB cultural resources reconnaissance survey of the proposed Bloom Energy fuel cell project area located in Colchester, Connecticut. The Phase IB investigation was completed on behalf of All-Points in September of 2019 by personnel representing Heritage. All fieldwork was performed in accordance with the *Environmental Review Primer for Connecticut's Archaeological Resources* (Poirier 1987) promulgated by the Connecticut State Historic Preservation Office. The Phase IB cultural resources reconnaissance survey results are presented below.

Results of the Phase IB Cultural Resources Reconnaissance Survey

The proposed project area associated with the fuel cell facility encompasses approximately 0.73 and is bounded by Old Amston Road to the north and by wooded areas to the south, east, and west. Elevations throughout this area ranged from approximately 133 to 137 m (436.4 to 449.5 ft) NGVD, with the area sloping gently from east to west (Figure 1). At the time of survey, vegetation consisted of a mixed/deciduous forest with minimal undergrowth (Figures 14 through18). The project area is characterized by Ninigret and Tisbury, Hinckley, and Canton and Charlton soils, all of which are described as loamy sands. During the Phase IB cultural resources reconnaissance survey, 72 of 73 (99 percent) planned shovel tests were excavated successfully throughout the project area. The single planned but unexcavated shovel test fell within an area that contained ground wasp nests (Figure 14). The Airline Trail portion of the proposed project was not surveyed since it has been heavily disturbed in the past.

A typical profile of a shovel test excavated within the fuel cell area exhibited four soil horizons in profile and extended to a maximum depth of 83 cmbs (32.7 inbs). The A-Horizon extended from 0 to 19 cmbs (0 to 7.5 inbs) and was described as a deposit of dark brown (10YR 3/3) silty fine sand. Underlying the A-Horizon was the B1-Horizon, which reached from 19 to 50 cmbs (7.5 to 19.7 inbs) and consisted of a layer of brown (7.5YR 4/4) silty sand. The B2-Horizon extended from 50 to 72 cmbs (19.7 to 28.3 inbs) and was described as a layer of brownish yellow (10YR 6/6) silty sand. Finally, the glacially derived C-Horizon, was classified as a deposit of olive yellow (2.5Y 6/6) medium sand; it ranged in depth from 72 to 83 cmbs (28.3 to 32.7 inbs), where excavation was terminated. Prehistoric cultural material was recovered from eight shovel tests excavated within the project area. The portion of the proposed fuel cell area containing the eight positive shovel tests was designated as Locus 1, which is discussed in detail below.

Locus 1

Locus 1, a prehistoric occupation situated at an approximate elevation of 135 m (443 ft) NGVD and within a wooded area, was initially identified during the excavation three shovel tests within the southern portion of the project area (Figures 14 through 18). Shovel Test 10 along Survey Transect 3 and Shovel Test 10 along Survey Transect 4 each produced a single chert secondary thinning flake; they were recovered from the B1-Horizon and A-Horizon, respectively. Shovel Test 11 along Transect 5 yielded 2 chert secondary thinning flakes and a single quartzite secondary thinning flake, both of which were recovered from the A-Horizon. In addition, 21 delineation shovel tests were placed around the three positive shovel tests to further explore artifact concentrations. Of the 21 delineation shovel tests excavated, five produced prehistoric cultural material. The artifacts recovered during the delineation shovel testing consisted of 5 chert secondary thinning flakes, 1 quartz secondary thinning flake, and 5 quartzite secondary thinning flakes recovered from the A- Horizon. They also yielded 2 chert secondary thinning flakes and 1 quartzite secondary thinning flake recovered from the B1-Horizon, as well as a single chert secondary thinning flake from the B2-Horizon.

All of the artifacts recovered from Locus 1 date from an unknown prehistoric time period, and survey and delineation shovel testing failed to reveal any evidence of cultural features within the fuel cell area. Given the low density of artifacts recovered and the lack of cultural features, it was determined that Locus 1 lacks research potential. Thus, it was assessed as not significant applying the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional archaeological investigation of Locus 1 or the fuel cell area is recommended. However, it is possible that additional intact archaeological resources may be situated beyond the fuel cell area and could be impacted by future development. If the fuel cell footprint is expanded or other portions of the larger project parcel will be impacted in the future, additional Phase IB survey would be recommended.

CHAPTER VIII
SUMMARY AND MANAGEMENT RECOMMENDATIONS

Heritage completed Phase IB cultural resources reconnaissance survey of the proposed Bloom Energy fuel cell facility in Colchester, Connecticut during September of 2019. The project was performed on behalf All-Points. The field effort resulted in the archaeological survey of 0.73 acres of land. The area was examined through the excavation of 72 of 73 (99 percent) planned shovel tests. The single planned but unexcavated shovel test was located in the vicinity of the of ground wasp nests and could not be completed. Phase IB cultural resources reconnaissance survey resulted in the identification of prehistoric cultural material from eight shovel tests, which were collectively designated as Locus 1. Unfortunately, all of the recovered cultural material dates from of an unknown prehistoric time period and no cultural features were identified during the Phase IB survey. Thus, was determined that Locus 1 lacked substantial archaeological deposits, cultural features, research potential, and/or the qualities of significance as defined by the National Register of Historic Places criteria for evaluation (36 CFR 60.4 [a-d]). No additional archaeological examination of Locus 1 or the reminder of the fuel cell area is recommended. However, it is possible that additional intact archaeological resources may be situated beyond the fuel cell area and could be impacted by future development. Thus, If the fuel cell footprint is expanded or other portions of the larger project parcel will be impacted in the future, additional Phase IB survey would be recommended.

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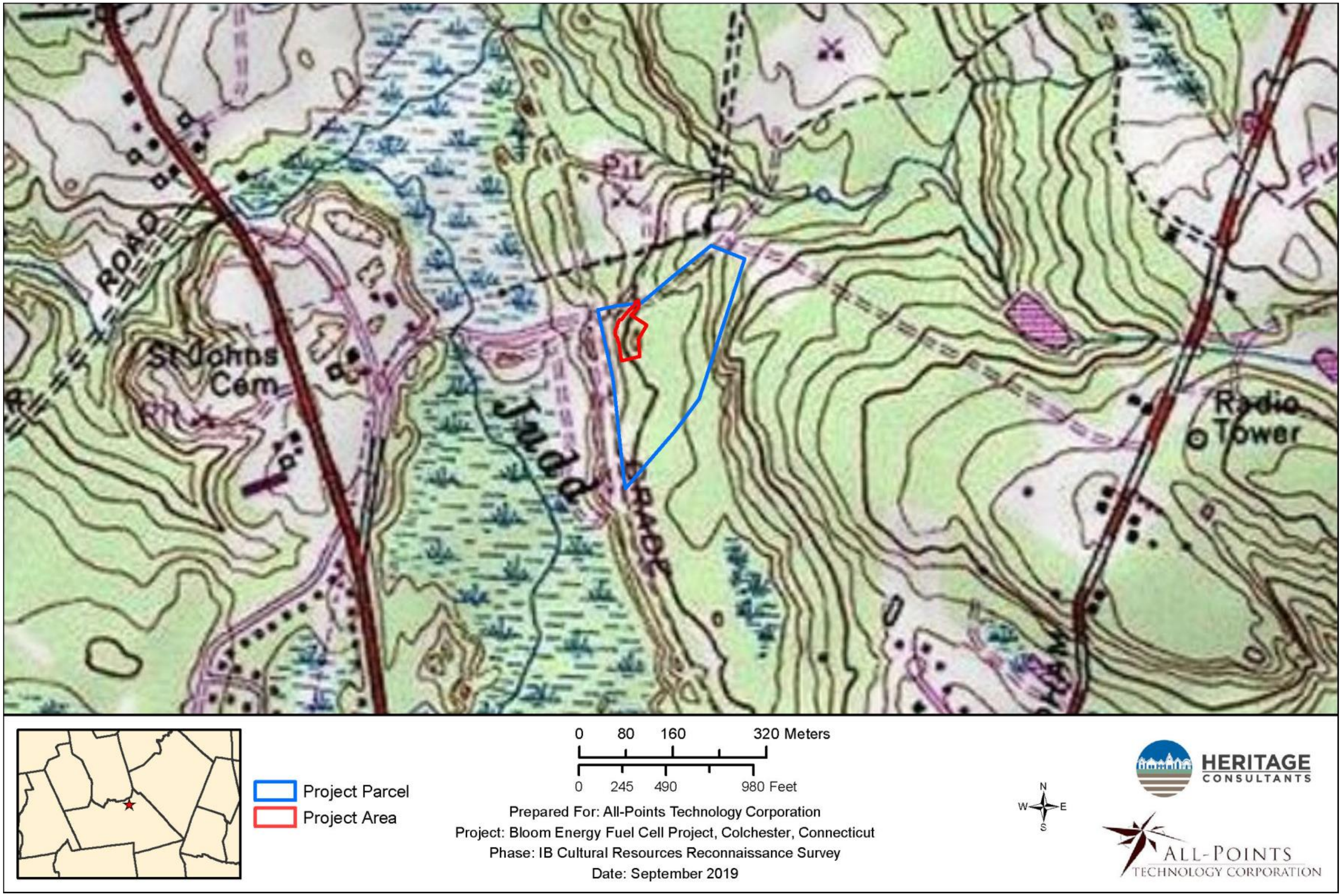


Figure 1. Excerpt from a USGS 7.5' series topographic quadrangle image showing the location of the proposed project parcel and the proposed fuel cell footprint in Colchester, Connecticut.

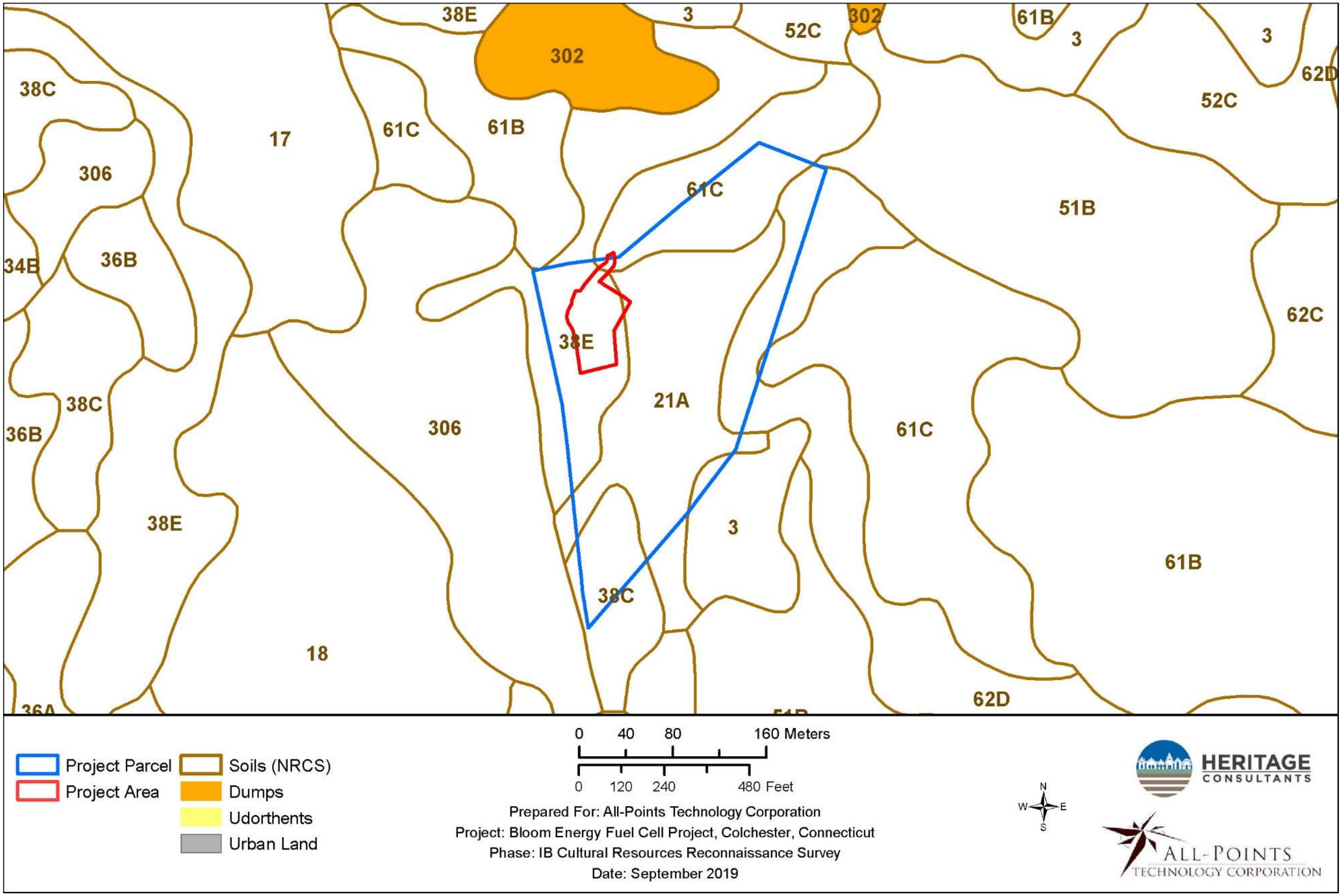


Figure 2. Digital map depicting the soil types present in the vicinity of proposed fuel cell in Colchester, Connecticut.

Figure 3. Excerpt from an 1854 map showing proposed project parcel and fuel cell area in Colchester, Connecticut.

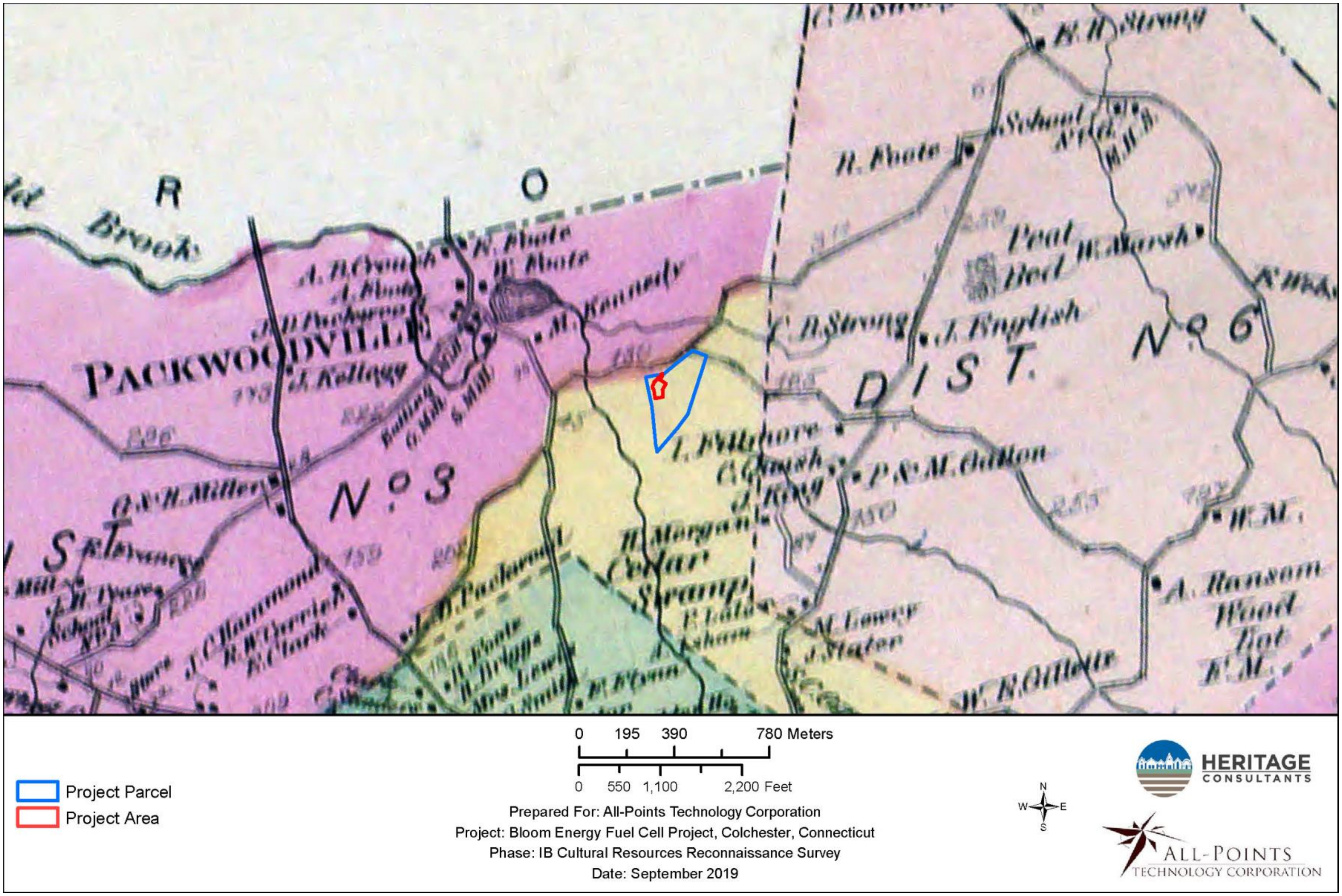


Figure 4. Excerpt from an 1868 map showing proposed project parcel and fuel cell area in Colchester, Connecticut.

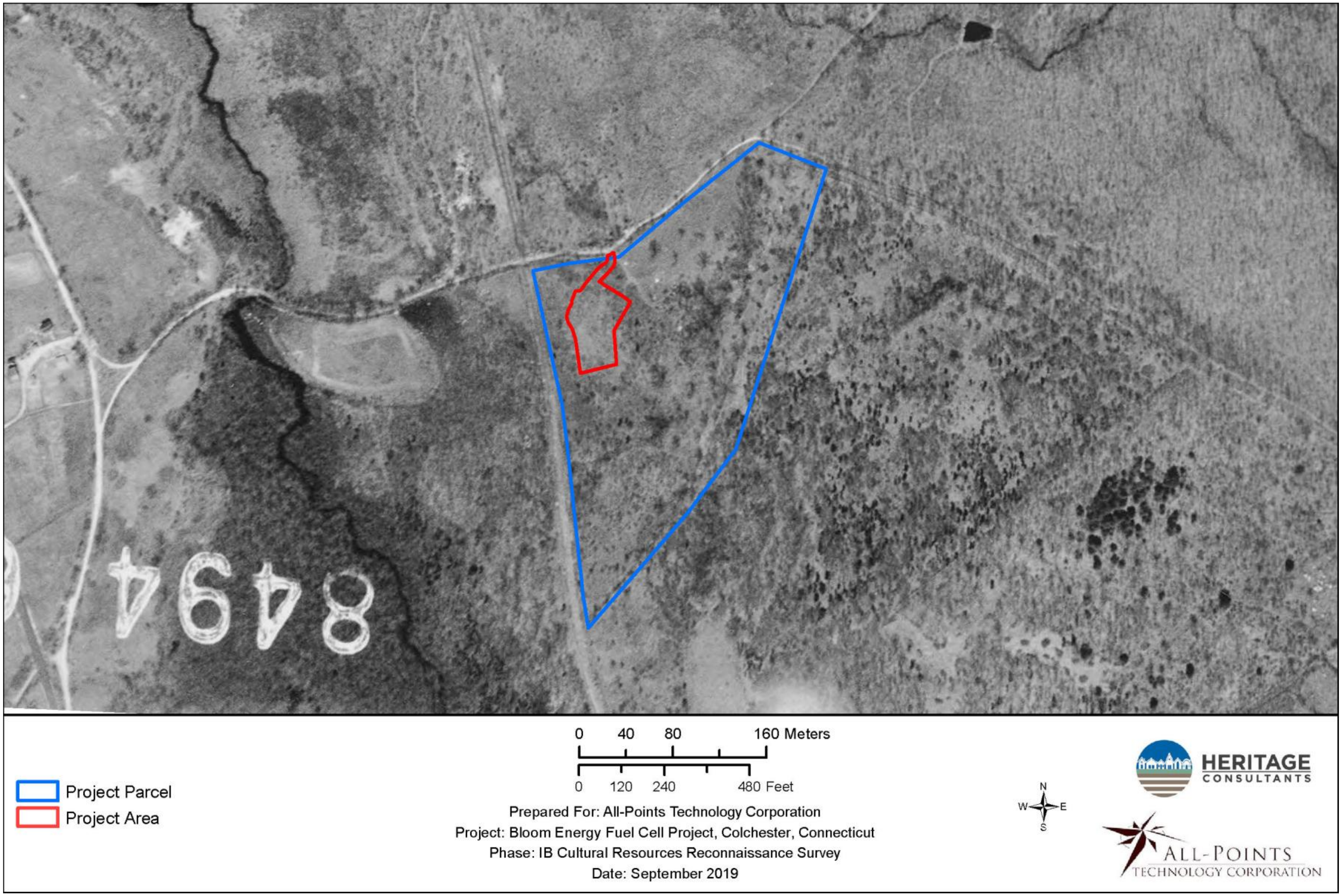


Figure 5. Excerpt from a 1934 aerial photograph showing the proposed project parcel and fuel cell area in Colchester, Connecticut.

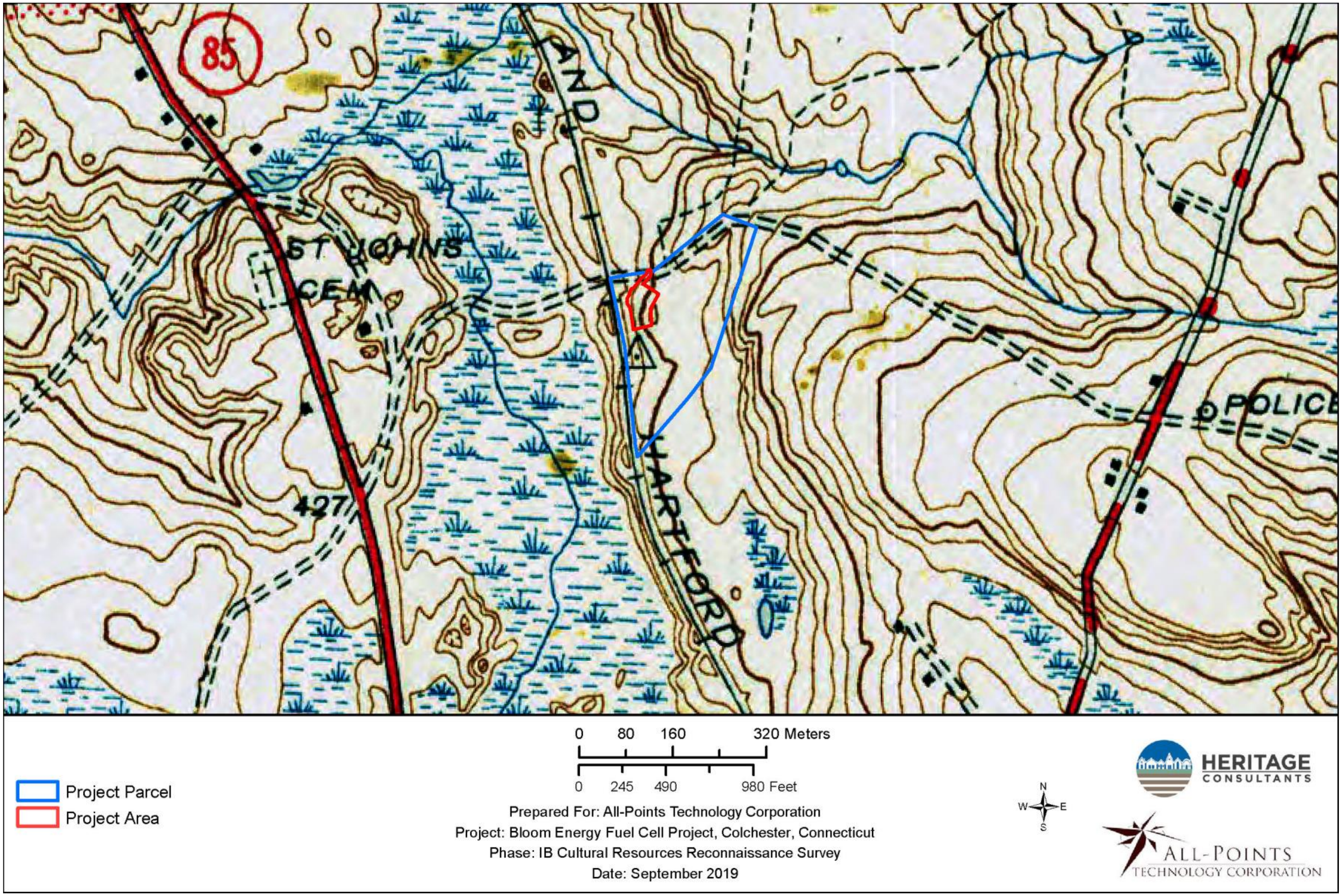


Figure 6. Excerpt from a 1945 USGS topographic quadrangle image proposed project parcel and fuel cell area in Colchester, Connecticut.

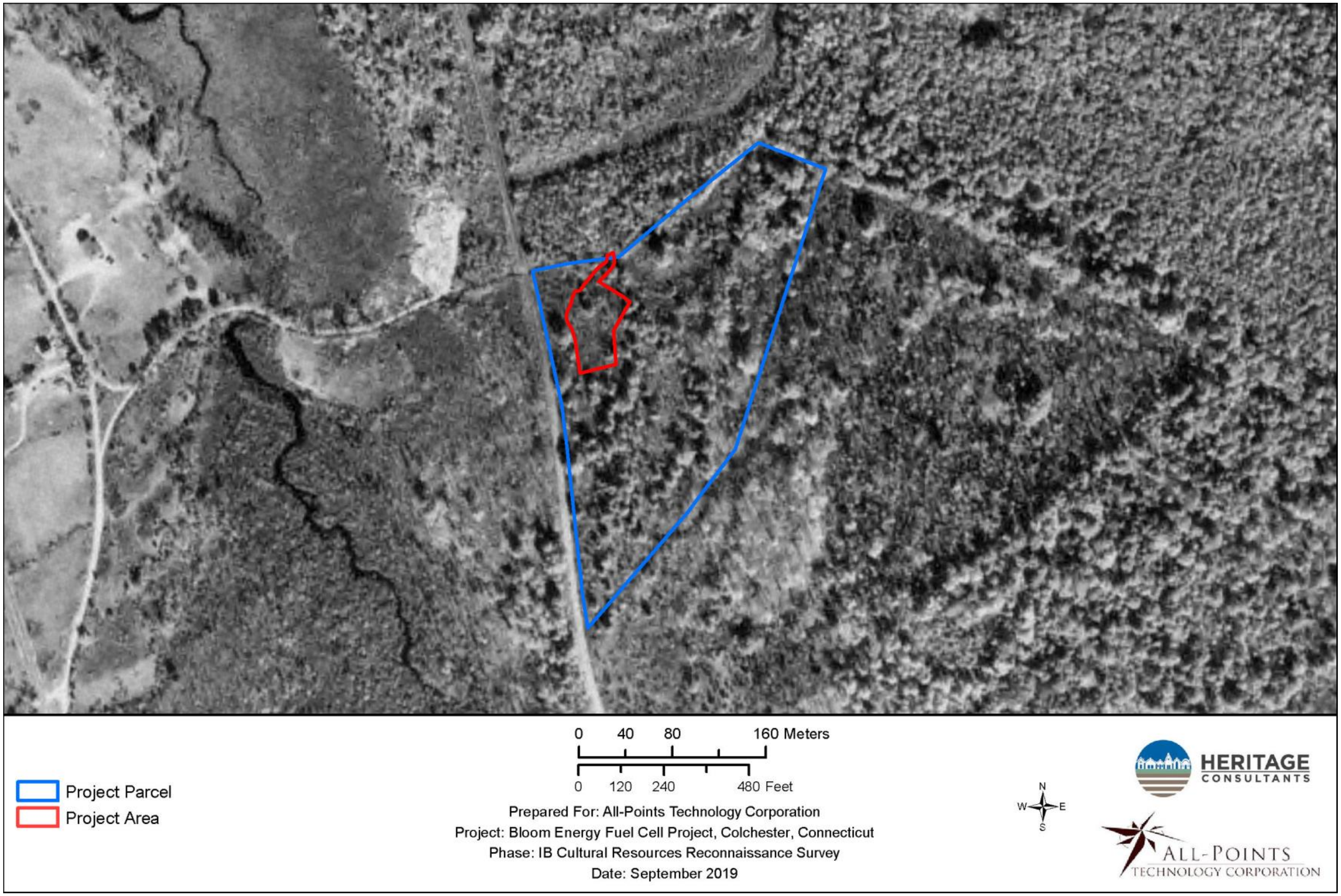


Figure 7. Excerpt from a 1934 aerial photograph showing the proposed project parcel and fuel cell area in Colchester, Connecticut.

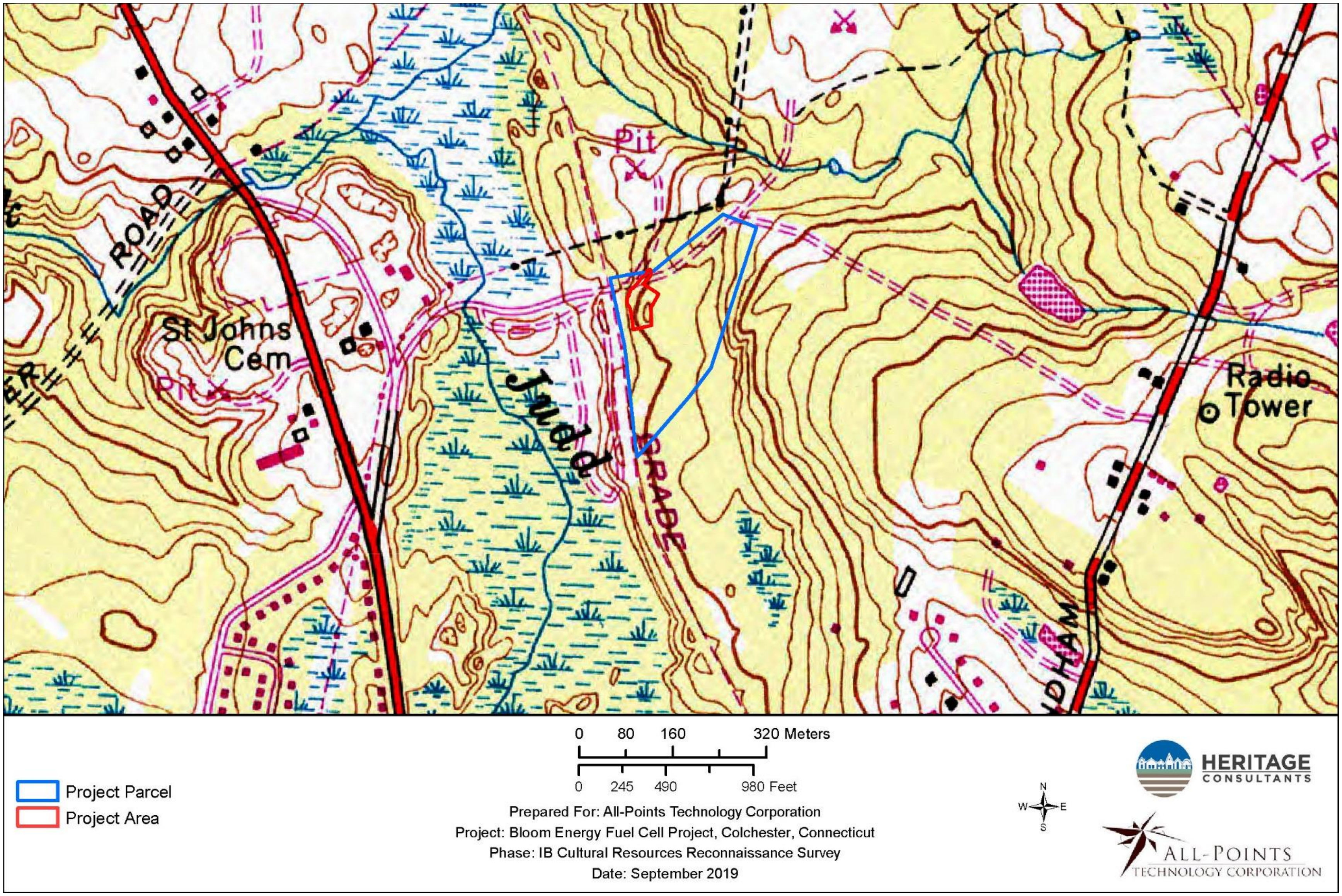


Figure 8. Excerpt from a 1953 USGS topographic quadrangle image proposed project parcel and fuel cell area in Colchester, Connecticut.

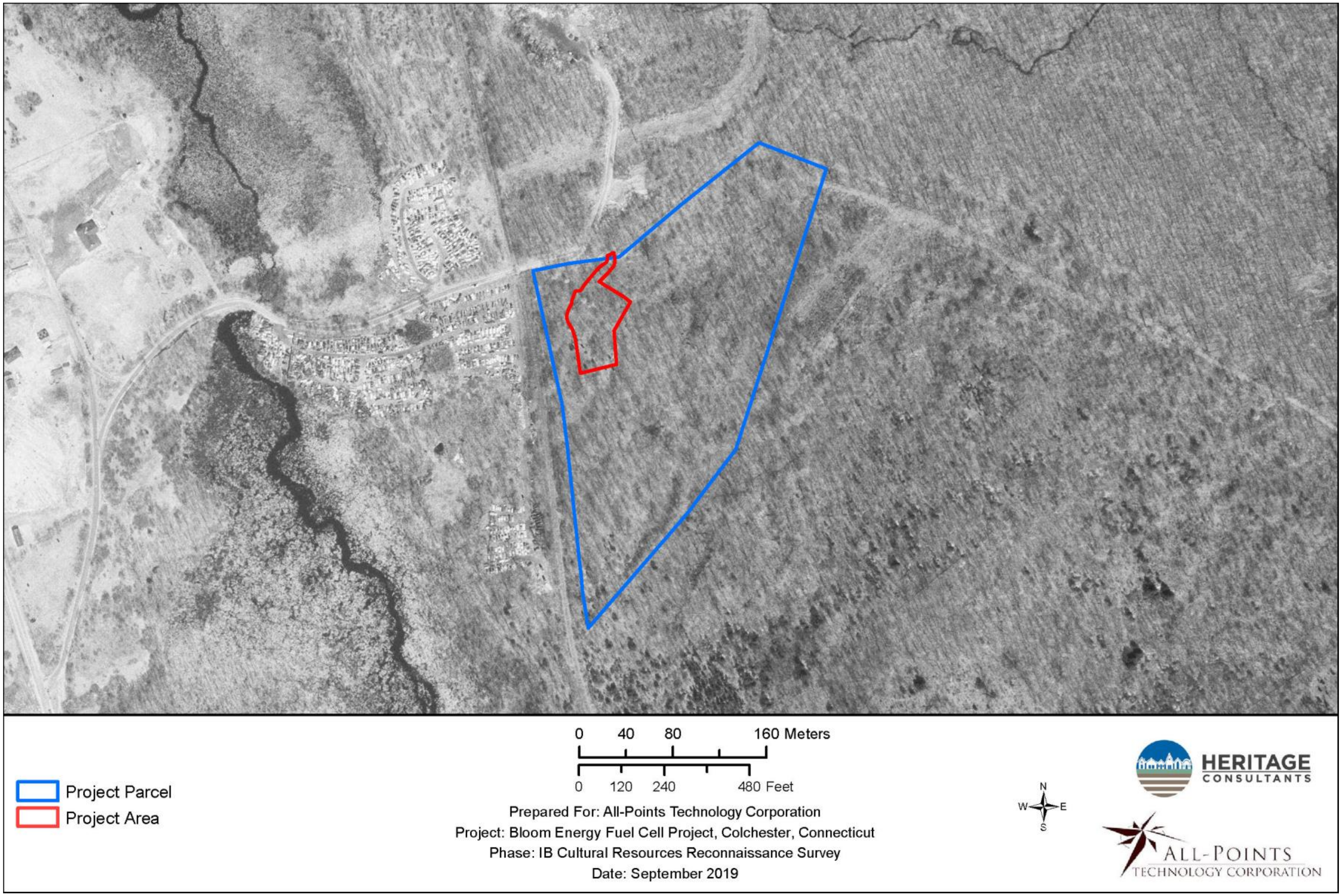


Figure 9. Excerpt from a 1965 aerial photograph proposed project parcel and fuel cell area in Colchester, Connecticut.

Figure 10. Excerpt from a 1986 aerial photograph proposed project parcel and fuel cell area in Colchester, Connecticut.

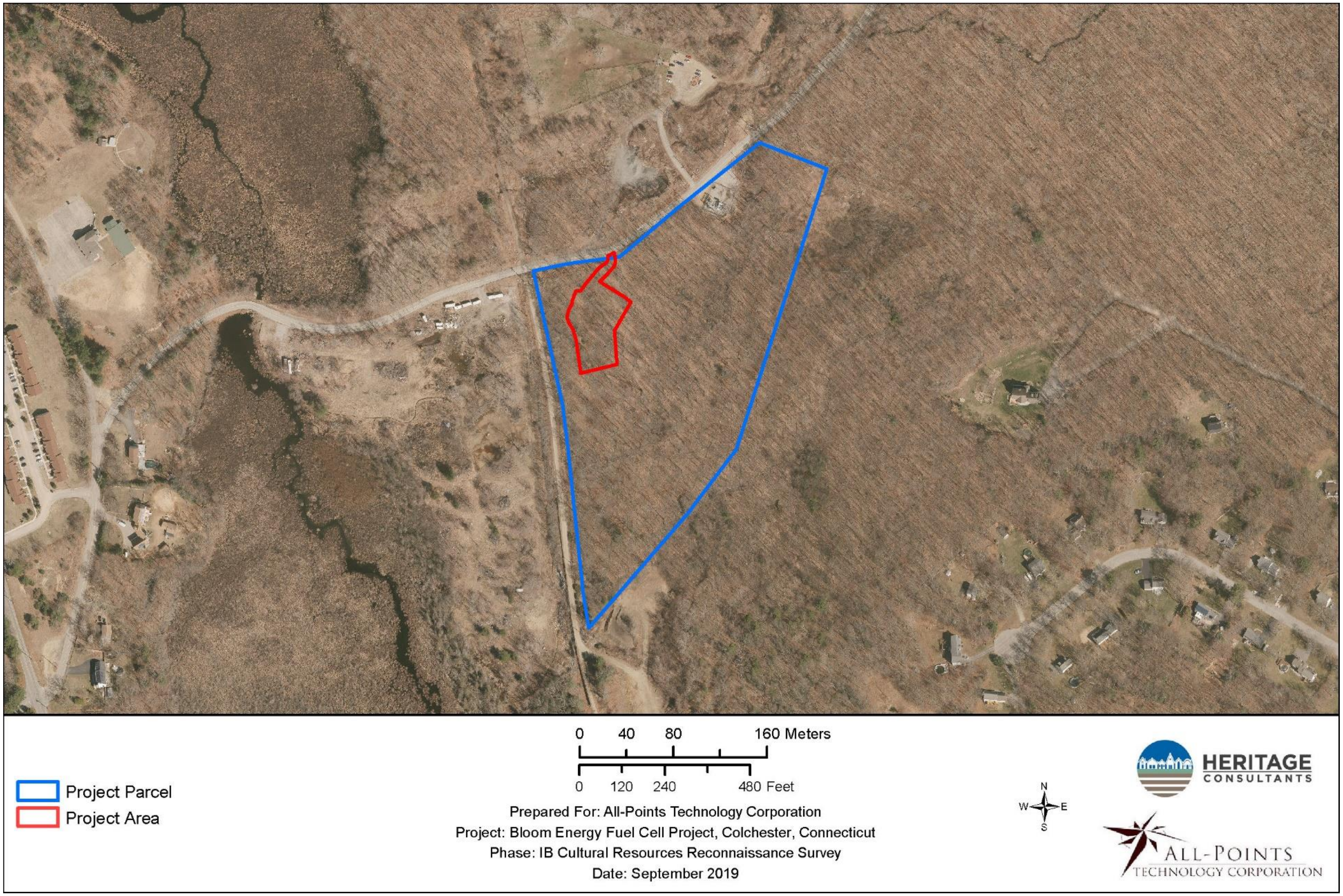


Figure 11. Excerpt from a 2016 aerial photograph proposed project parcel and fuel cell area in Colchester, Connecticut.

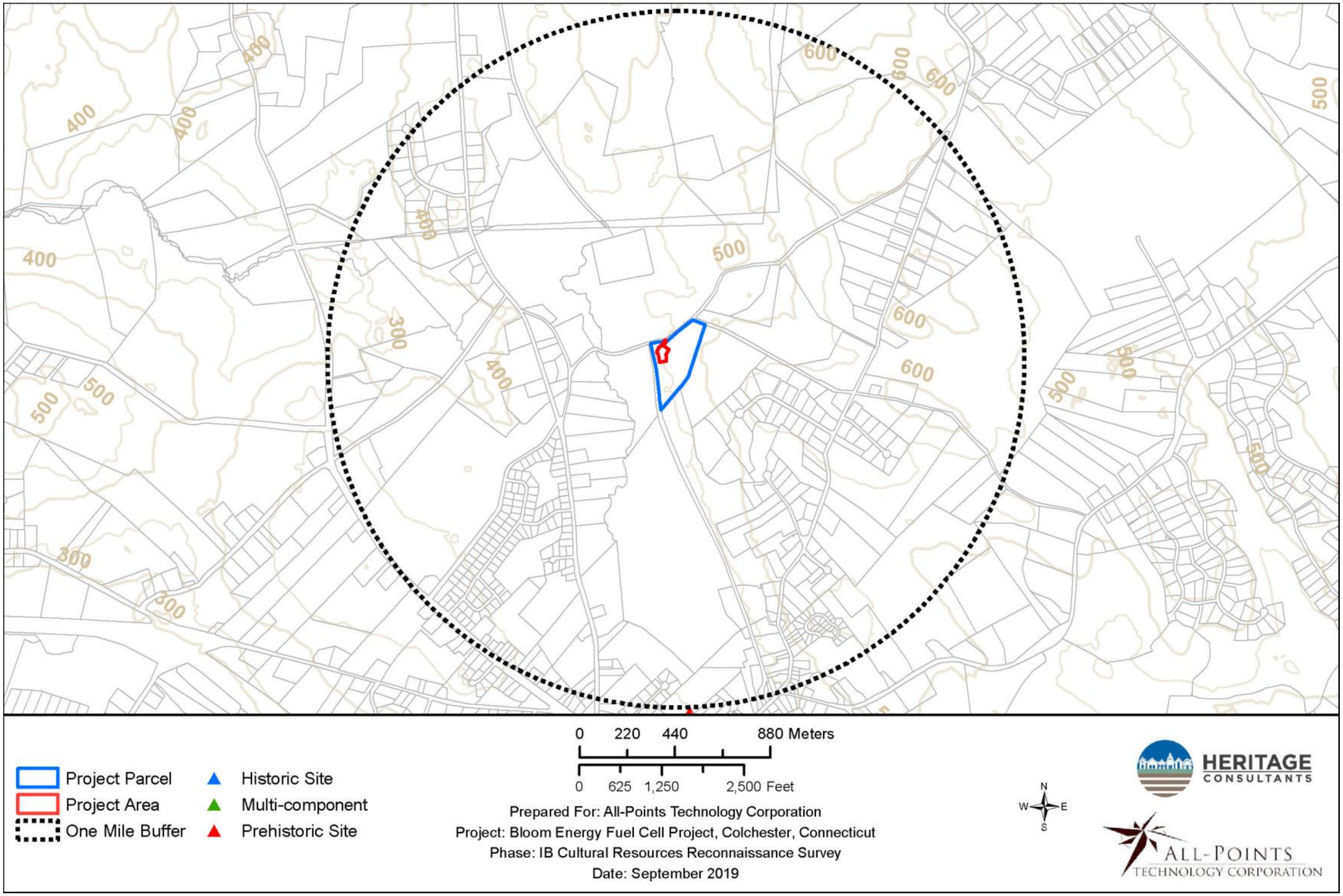


Figure 12. Digital map depicting the locations of previously identified archaeological sites in the vicinity of the proposed project parcel and fuel cell area in Colchester, Connecticut.

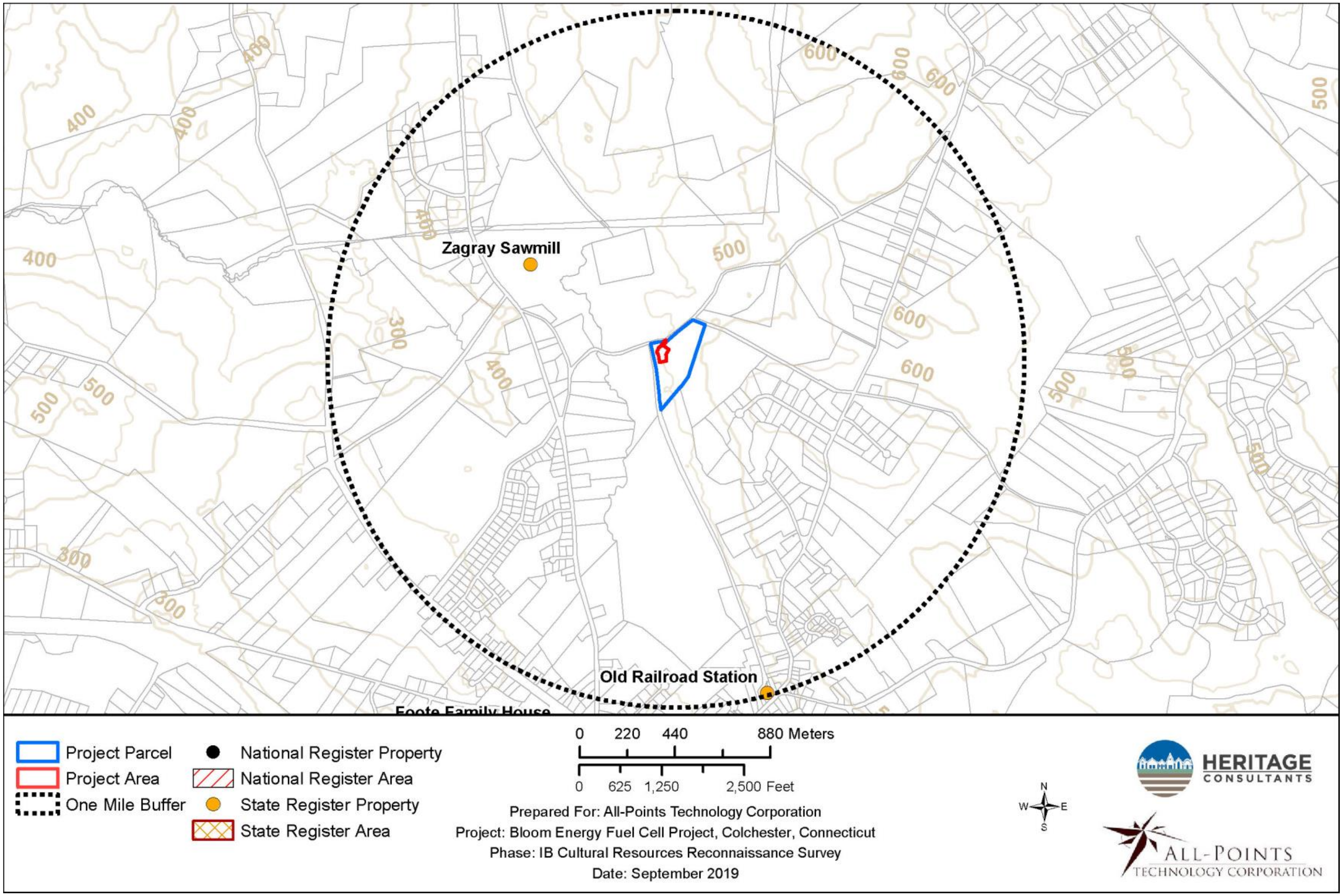


Figure 13. Digital map depicting the locations of previously identified National Register of Historic Places properties in the vicinity of the proposed project parcel and fuel cell area in Colchester, Connecticut.

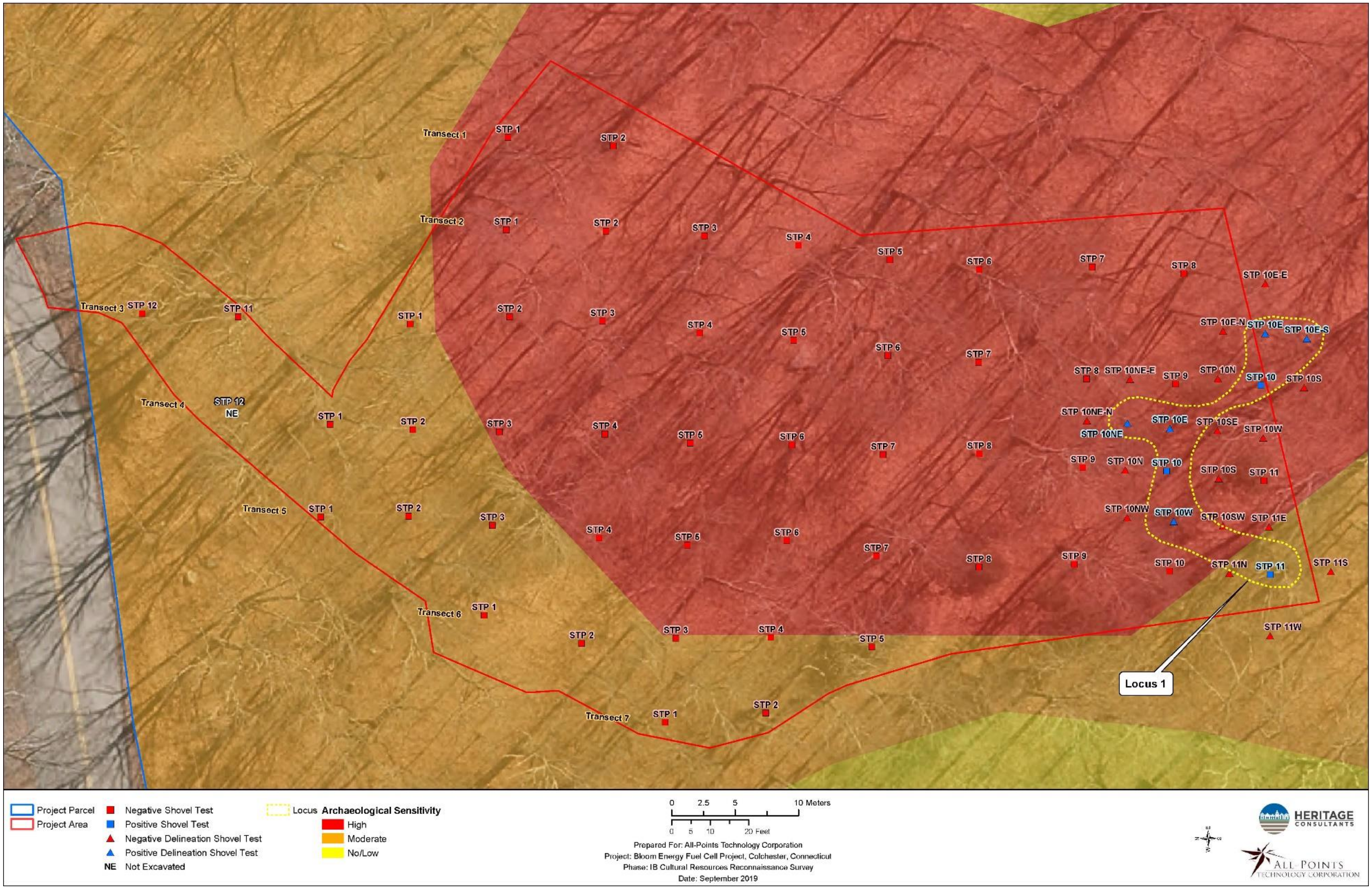


Figure 14. Excerpt from a 2016 aerial image showing the limit of work associated with the proposed fuel cell facility, shovel tests, vegetation, local landscape features, and the boundaries of Locus 1 as determined in the field.

Figure 15. Overview photo of the fuel cell area facing south.

Figure 16. Overview photo of the fuel cell area facing east.

Figure 17. Overview photo of the fuel cell area facing north.

Figure 18. Overview photo of Locus 1 facing northeast.

Bloomenergy

Exhibit 7

October 15, 2019

Mr. Justin Adams
Bloomenergy - Connecticut

Justin.Adams@bloomenergy.com

SUBJECT: 10 MW Fuel Cell Facility – Acoustic Review
160 Old Amston Road, Colchester CT

Dear Mr. Adams,

Cavanaugh Tocci Associates has evaluated environmental sound impact associated with the proposed 10 MW fuel cell facility at 160 Old Amston Road in Colchester, Connecticut. The objectives of this evaluation were:

- To define acoustic design goals based on applicable noise regulations,
- To estimate the acoustic impact of the proposed project in the surrounding community.

Results of the evaluation are summarized herein.

Environmental Sound Regulations

To the best of our knowledge, the Town of Colchester Connecticut does not have a noise regulation that is applicable to the proposed project. However, the Connecticut Regulations for the Control of Noise, which are enforced by the Connecticut Department of Energy and Environmental Protection, define limits for sound produced by the proposed project. The following briefly discusses the applicable aspects of this regulation.

State of Connecticut Noise Regulation

The State of Connecticut Noise Regulation (Section 22a-69-1 to 7.4) defines sound level limits for environmental sound produced by the Project. These limits are based on both emitter and receptor land use classifications, and are listed below in Table 1:

Table 1: Connecticut Regulations for the Control of Noise Sound Level Limits (dBA)

	Receptor Class			
Emitter Class	**C**	**B**	**A/Day**	**A/Night**
C	70	66	61	51
B	62	62	55	45
A	62	55	55	45

Definitions

In the above table, day is defined as the time interval 7:00 a.m. to 10:00 p.m. Night is defined as the time interval 10:00 p.m. to 7:00 a.m. Noise Zone Classifications are based on the actual use of the land. Where multiple land uses exist on the same property, the least restrictive limits apply.

- A Class A noise zone is land generally designated for residential use or areas where serenity and tranquility are essential to the intended use.
- A Class B noise zone includes land uses generally of a commercial nature.
- A Class C noise zone includes uses generally of an industrial nature. The proposed fuel cell facility is considered a Class C noise emitter.

Exceptions and Other Limit Provisions

Section 22a-69-3.3 Prominent Discrete Tones

To offset the undesirable nature of tonal sound in the environment, the regulation penalizes sources of prominent, audible discrete tones. If a facility produces such sounds, the applicable limits in Table 1 are reduced by 5 dBA. In its definitions (Section 22a-69-1.2), the regulation defines a method for identifying prominent discrete tones based on measuring one third octave band sound levels.

Facility Acoustic Requirements

Our interpretation of the above referenced regulations follows:

- The Fuel Cell facility is classified as Class C emitter and will produce sound continuously during daytime and nighttime hours. As such, where the regulations provide more stringent limits for nighttime operation, these will apply.
- Sound produced by the fuel cell facility is not expected to be contain prominent discrete tones as defined by the regulation.
- Land north of the facility is owned by the Town and is currently used as a dog park. This property boundary is classified as a Class B receptor with a limit of 62 dBA (day or night).
- Land uses east and south of the proposed facility are residential properties (Class A receptors). The most stringent nighttime limit of 51 dBA applies at these boundaries.
- Currently the land west of the site is vacant but is zoned for potential residential use. To be conservative this evaluation considers this boundary as a class A receptor with a 51 dBA limit.

Facility Sound Analysis

Facility related sound impacts that are associated with equipment at the proposed Project have been calculated using CadnaA environmental sound modeling software (Version 2018 DataKustic GmbH). The CadnaA sound modeling software uses algorithms and procedures described in International Standard ISO 9613-2:1996 "Acoustics- Attenuation of sound during propagation outdoors – Part 2: General method of calculation". This standard and its associated methodology are the most universally accepted approach for environmental sound modeling of industrial and transit sound sources. The methodology described in this standard provides estimates of A-weighted and octave band sound levels for meteorological conditions that are favorable for the propagation of sound (downwind with a wind speed of 1-5 meters/sec). This methodology is also valid for sound propagation under well-developed moderate ground-based temperature profile inversions, which commonly occur on clear calm nights.

The analysis is based on source sound emission data derived from measurements performed near similar fuel cell equipment located in Cambridge, Massachusetts Figures 1 presents the results of the acoustic modeling. As indicated, facility sound impacts are expected to fall below 50 dBA at all property boundaries. In addition, estimated sound levels at existing residences are 30 dBA or lower.

Conclusion

Based on our review of the modeling results, it is our opinion that sound produced by the proposed project will comply with the most stringent requirements of the state noise regulations. Furthermore, it is our opinion that sound produced by the proposed project will not produce a noticeable impact on the acoustic environment at existing nearby residences and will not have an unreasonable adverse effect at all surrounding properties.

Sincerely,
CAVANAUGH TOCCI

Douglas Bell

Douglas H. Bell
19213/Fuel Cell Facility - Colchester CT - Acoustic Review.docx

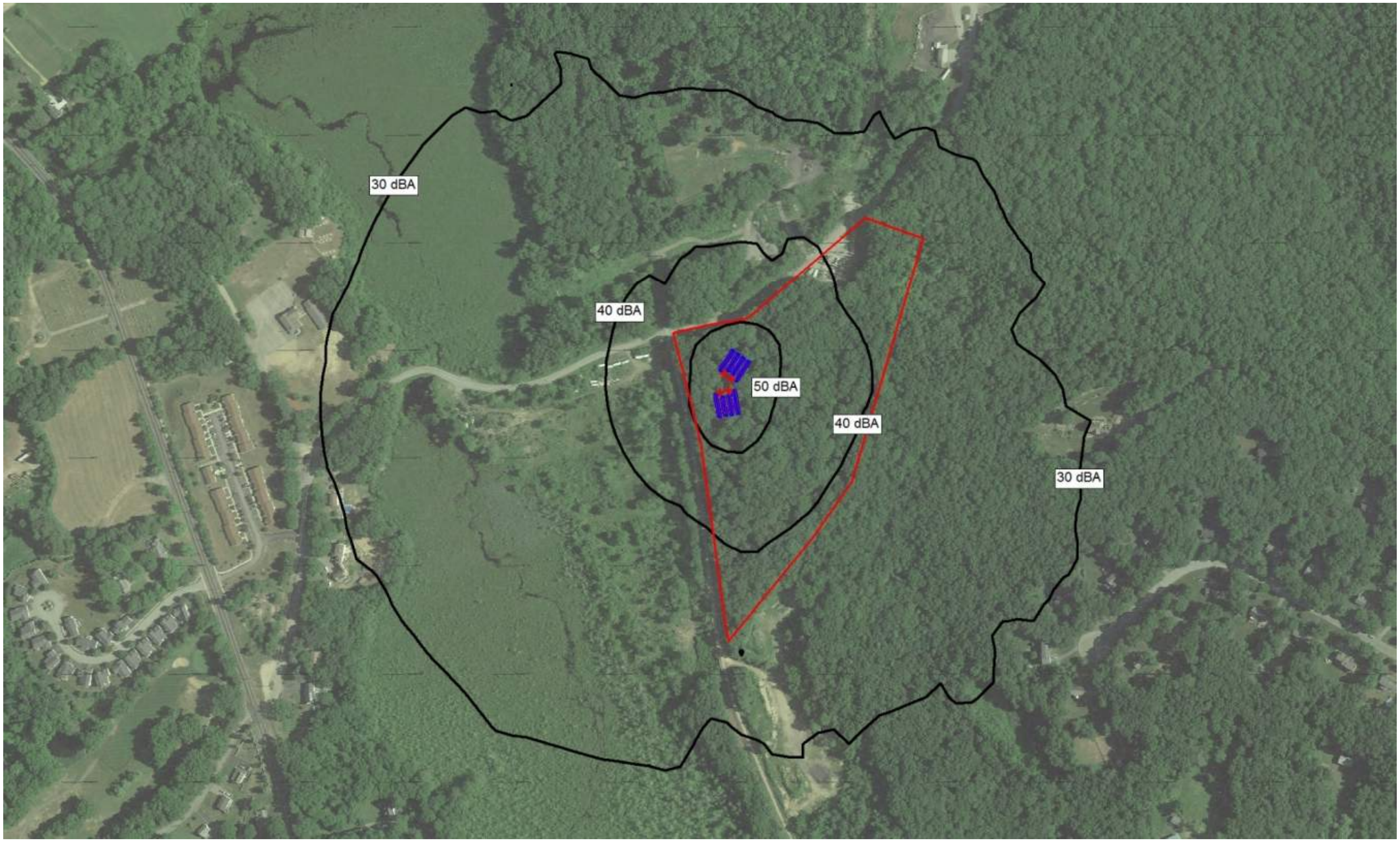


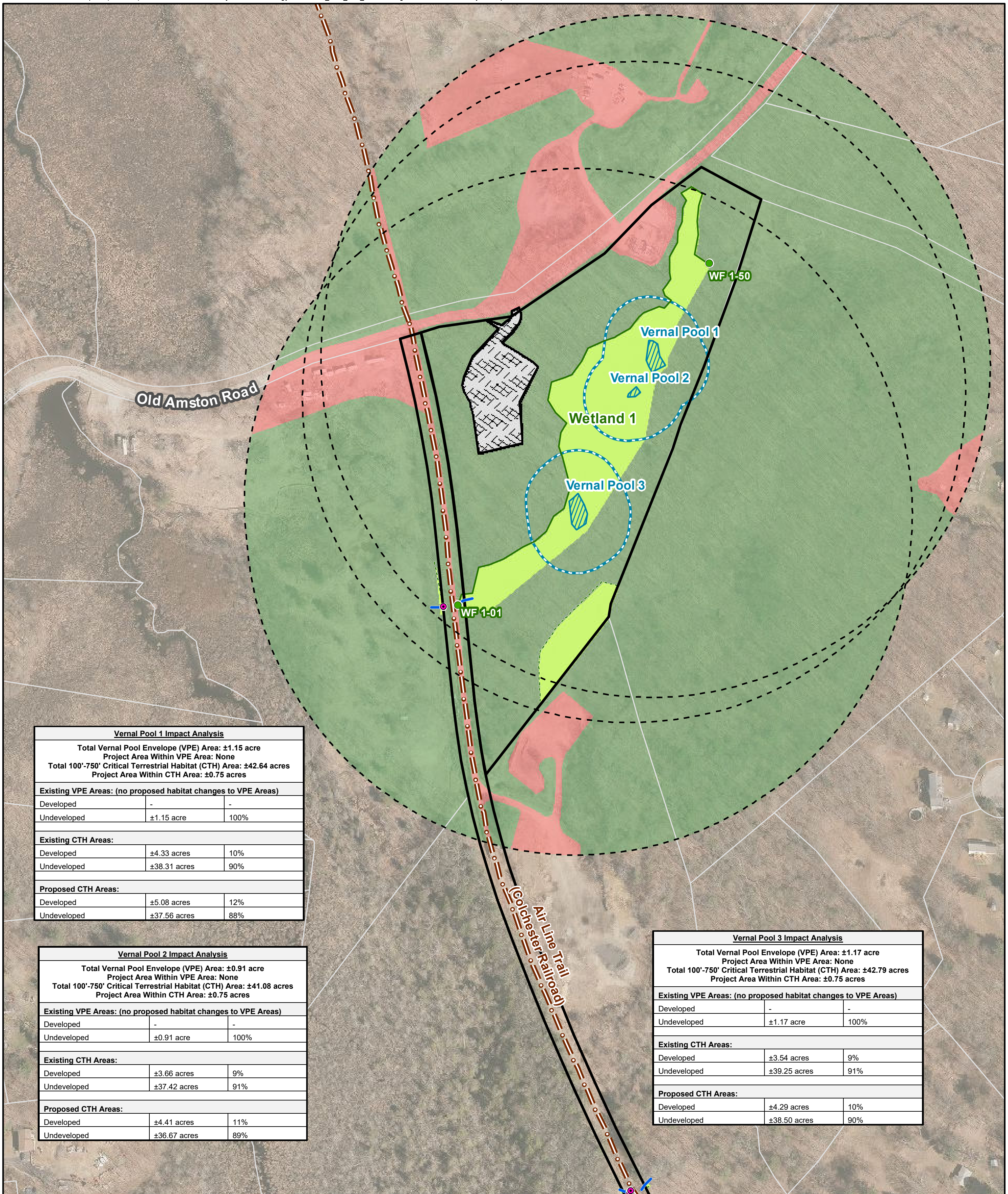
Figure 1

CAVANAUGHTOCCI

Bloomenergy

Exhibit 8

C:\Users\NicoleCastro\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Bloom Energy\Colchester_Fuel_Cell_410\mxd\Figure 6 Vernal Pool Analysis Map.mxd



Vernal Pool 1 Impact Analysis

Total Vernal Pool Envelope (VPE) Area: ±1.15 acre
Project Area Within VPE Area: None
Total 100'-750' Critical Terrestrial Habitat (CTH) Area: ±42.64 acres
Project Area Within CTH Area: ±0.75 acres

Existing VPE Areas: (no proposed habitat changes to VPE Areas)		
Developed	-	-
Undeveloped	±1.15 acre	100%
Existing CTH Areas:		
Developed	±4.33 acres	10%
Undeveloped	±38.31 acres	90%
Proposed CTH Areas:		
Developed	±5.08 acres	12%
Undeveloped	±37.56 acres	88%

Vernal Pool 2 Impact Analysis

Total Vernal Pool Envelope (VPE) Area: ±0.91 acre
Project Area Within VPE Area: None
Total 100'-750' Critical Terrestrial Habitat (CTH) Area: ±41.08 acres
Project Area Within CTH Area: ±0.75 acres

Existing VPE Areas: (no proposed habitat changes to VPE Areas)		
Developed	-	-
Undeveloped	±0.91 acre	100%
Existing CTH Areas:		
Developed	±3.66 acres	9%
Undeveloped	±37.42 acres	91%
Proposed CTH Areas:		
Developed	±4.41 acres	11%
Undeveloped	±36.67 acres	89%

Vernal Pool 3 Impact Analysis

Total Vernal Pool Envelope (VPE) Area: ±1.17 acre
Project Area Within VPE Area: None
Total 100'-750' Critical Terrestrial Habitat (CTH) Area: ±42.79 acres
Project Area Within CTH Area: ±0.75 acres

Existing VPE Areas: (no proposed habitat changes to VPE Areas)		
Developed	-	-
Undeveloped	±1.17 acre	100%
Existing CTH Areas:		
Developed	±3.54 acres	9%
Undeveloped	±39.25 acres	91%
Proposed CTH Areas:		
Developed	±4.29 acres	10%
Undeveloped	±38.50 acres	90%

Legend

- Site
- Wetland Flag
- Delineated Wetland Boundary Line
- Approximate Wetland Boundary Line
- Wetland Area
- Watercourse
- Vernal Pool
- 100' Vernal Pool Envelope (VPE)
- 100' - 750' Critical Terrestrial Habitat (CTH)

Critical Terrestrial Habitat Areas

- Developed Project Area
- Existing Developed
- Existing Undeveloped
- Approximate Parcel Boundary

Map Notes:
Base Map Source: CTECO 2016 Aerial Photograph
Map Scale: 1 inch = 300 feet
Map Date: October 2019

300 150 0 300 Feet

N E S W

Figure 6
Vernal Pool Analysis Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

Bloomenergy
ALL-POINTS TECHNOLOGY CORPORATION

Exhibit 9

EXISTING

ALL-POINTS
TECHNOLOGY CORPORATION

PROPOSED

ALL-POINTS
TECHNOLOGY CORPORATION

Bloomenergy

Exhibit 10

Town of Colchester, Connecticut

127 Norwich Avenue, Colchester, Connecticut 06415

October 2, 2018

Mr. William Akley
President, Gas Business
Eversource Energy
107 Selden Street
Berlin, CT 06037

Mr. Roddy Diotalevi
Senior Director
UIL Holdings
180 Marsh Hill Road
Orange, CT 06477

RE: Access to Natural Gas - 10MW fuel cell project in Colchester, CT

Gentlemen:

The Town of Colchester was excited to learn that the 10MW Bloom Energy fuel cell project that our Town supported during the recent CT DEEP RFP process was selected. We strongly support the project because of its potential to serve as an "anchor" gas customer that would enable a local distribution company to deliver gas to other residents and businesses in our Town.

The Town of Colchester remains one of the few towns in Connecticut without access to natural gas. That fact places our community – and its residents and businesses - at a distinct disadvantage when it comes to competing for economic development opportunities, job creation, and job retention. The lack of natural gas service in Colchester also means that our residents are forced to use other options like propane and distillate heating oil. Those options present serious safety and environmental concerns to which residents in other Connecticut towns are not exposed.

We understand that the project cannot economically proceed if forced to select one LDC but may economically proceed if allowed to select the other. It is also our understanding that the Town of Colchester will remain without gas service absent this project. The Town of Colchester is not interested in taking a position for or against either company serving the project and the Town -

provided that the end result is *anything other than neither* LDC serving the Town. Simply put, we need natural gas service in our community.

Finally, we understand that there are circumstances in which the two companies have in the past worked out mutually beneficial arrangements which have allowed expansion projects to proceed and could in this case permit the Town to access natural gas service. We request that you work together in good faith to find a creative way to allow for natural gas to be brought into Colchester. We think the proposed 10MW project selected by DEEP is the way to do that and that the time is now. Please involve yourself in this issue in whatever way will most effectively bring about a resolution that is mutually agreeable to all parties.

Please feel free to contact me at Selectman@ColchesterCT.gov or 860-537-7220 if you have any questions or need additional information.

Sincerely,

Arthur Shilosky
First Selectman
Town of Colchester

cc: Mr. David Allain, Eversource Gas
Mr. Roy Young, Connecticut Natural Gas
Mr. Justin Adams, Bloomenergy
Mr. James Paggioli, Town of Colchester

Town of Colchester, Connecticut

127 Norwich Avenue, Colchester, Connecticut 06415

Board of Selectmen Minutes
Special Meeting Minutes
Monday, October 21, 2019
Colchester Town Hall @ 3pm

MEMBERS PRESENT: First Selectman Art Shilosky, Selectman Rosemary Coyle, Selectman Denise Turner; via teleconference; Selectman Stan Soby and Selectman Denise Mizla

MEMBERS ABSENT: none

OTHERS PRESENT: Assessor J Chaponis and clerk T Dean

1. **Call to Order**
   A Shilosky called the meeting to order at 3:01 p.m.

2. **Citizen's Comment** - none

3. **Discussion and Possible Action on Bloom Connecticut Clean Energy Company LLC Energy Tax Stabilization**
   A Shilosky stated that included in the packet is a memo from the Assessor, letter from Bloom, and a copy of the C.G.S.32-71a(a).

   R Coyle moved to send the following to a town meeting on Wednesday, October 30, 2019, at 7pm in Town Hall meeting room 1: To discuss and vote upon the town of Colchester, in accordance with C.G.S. 32-71a(a), and/or such other statutes under the laws of the State of Connecticut, authorizing the First Selectman to enter into a twenty year tax stabilization agreement with Bloom Clean Energy Company, LLC whereby Bloom will pay the town a stabilized semi-annual tax payment for their personal property. The total of such stabilized semi-annual payments shall be equal to the total tax liability that Bloom would have paid to the town had they been taxed conventionally, seconded by D Mizla.

   Discussion. S Soby asked if the language in the agreement would apply to any successor to Bloom. J Chaponis stated the contract has been vetted by town counsel and does have language allowing Bloom to sell with the agreement still being held in full force.

   Motion and second on the floor. Unanimously approved. MOTION CARRIED.

4. **Adjourn**
   D Turner moved to adjourn at 3:06 p.m., seconded by S Soby. Unanimously approved. MOTION CARRIED.

Respectfully submitted,

Tricia Dean, Clerk

Attachment:
Interdepartmental Memorandum Assessor
Bloom Energy letter
C.G.S. 32-71a(a)

Town of Colchester
Office of the Assessor

Interdepartmental Memorandum

To: Art Shilosky, First Selectman

From: John Chaponis, Assessor

CC:

Date: October 15, 2019

Re: Bloom Connecticut Clean Energy Company, LLC
Tax Stabilization Agreement

Bloom Connecticut Clean Energy Company, LLC (Bloom) wants to construct a 10 Mega Watt Fuel Cell in the town of Colchester. . Personal Property Costs are estimated at 35 Million. The energy is not intended for any particular property owner and will be sold back to the grid. The location of the property would be 160 Old Amston Ro, a 13 acre parcel enroute to the transfer station and owned by Connecticut Light & Power. Bloom will lease the land for a period of 20 years. The town will revalue the land based on the new use/land lease which would create an approximate additional $30,000 per year in tax dollars (billed to CL&P).

Since Personal Property is assessed based on its cost x deprecation each year, the bill starts out higher in year one and lesser in year twenty (when fully depreciated). I have estimated the taxes to be $766,343 in year one and $221,440 in year twenty. The total tax liability over the entire twenty year period is estimated at $9,110,707.

Bloom claims to be working on an extremely thin margin on this project and the cost to connect to the natural gas line exceeded their originally estimate. They stated that they need to reduce their costs in the early years in order to make the project feasible. They claimed they could not complete the project without this assistance.

While there are no C-TIP incentives for Personal Property, Bloom has requested that the town enter into an "Tax Stabilization Agreement " which is authorized by Connecticut General Statutes Sec. 32-71a(a) specifically for electric generating facilities (copy attached).

Bloom is requesting that the town take the estimated $9,110,707 that they would pay over the twenty years and stabilize that amount into twenty (20) equal annual tax bills of $455,535.36.

C.G.S. Sec. 32-71a(a) requires that such a stabilization agreement be approved by the municipality's legislative body.

Bloomenergy

VIA CERTIFICATE OF MAILING

October 11, 2019

RE: Application of Bloom Energy for the location and construction of a 10-Megawatt fuel cell Grid-Side Distributed Resource at 160 Old Amston Road, Colchester, Connecticut

Dear Ladies and Gentlemen:

Pursuant to Section §16-50j-40 of the Connecticut Siting Council's (the "Council") regulations, we are notifying you that Bloom Energy intends to file, on or about October 18, 2019, a petition for declaratory ruling with the Council. The petition will request the Council's approval of the location and construction of a 10-Megawatt (MW) fuel cell installation and associated equipment ("Facility"). The Facility will be located at 160 Old Amston Road in Colchester, Connecticut (the "Site").

The proposed Facility was selected by the Connecticut Department of Energy and Environmental Protection through its Notice of Request for Proposals from Private Developers for Clean Energy, dated January 31, 2018. Electricity generated by the Facility will be exported to the existing electrical grid via Eversource Energy's Judd Brook Substation located on Site.

Keeping the lines of communication open is an important part of our work in your community. If you have questions about this work, please contact the undersigned or the Council.

Respectfully,

Justin Adams
justin.adams@bloomenergy.com

Be

Sec. 32-71a. Treatment of certain electric generating facilities completed after July 1, 1998. (a) Any electric generating facility, the construction of which is completed after July 1, 1998, may be treated for purposes of section 32-71 as if it were located in an enterprise zone and used for commercial or retail purposes. Notwithstanding the provisions of section 32-71, upon the approval of a municipality's legislative body, either before or after July 1, 2001, the full amount of either assessments or taxes may be fixed for the real and personal property of such electric generating facility both during and after the construction period, provided such assessments or taxes as so fixed represent an approximation of the projected tax liability of such facility based on a reasonable estimation of its fair market value as determined by the municipality upon the exercise of its best efforts.

(b) Any new electric generating facility, the construction of which is completed after July 1, 2003, may be treated for purposes of section 32-71 as if it were located in an enterprise zone and used for commercial or retail purposes, provided: (1) The owner of such facility has negotiated a tax agreement with the municipality in which such facility would be located; and (2) such agreement has been approved by the municipality's legislative body between January 1, 2002, and February 28, 2002. Notwithstanding the provisions of section 32-71, upon approval of such municipality's legislative body, either before or after June 14, 2002, up to the full amount of either assessments or taxes may be fixed for the real and personal property of such electric generating facility both during and after the construction period, provided such assessments or taxes as so fixed represent an approximation of the commensurate portion of the projected tax liability of such facility based on a reasonable estimation of its fair market value as determined by the municipality upon the exercise of its best efforts.

(c) Any new electric generating facility, the construction of which is completed after July 1, 2003, may be treated for purposes of section 32-71 as if it were located in an enterprise zone and used for commercial or retail purposes, provided the municipality in which such facility is located is under state governance. Notwithstanding the provisions of section 32-71, upon approval of such municipality's legislative body, either before or after June 14, 2002, up to the full amount of either assessments or taxes may be fixed for the real and personal property of such electric generating facility both during and after the construction period, provided such assessments or taxes as so fixed represent an approximation of the commensurate portion of the projected tax liability of such facility based on a reasonable estimation of its fair market value as determined by the municipality upon the exercise of its best efforts.

(d) As used in this section, "electric generating facility" means a facility, as defined in subdivision (3) of subsection (a) of section 16-50i.

(June Sp. Sess. P.A. 01-9, S. 86, 131; P.A. 02-143, S. 3.)

History: June Sp. Sess. P.A. 01-9 effective July 1, 2001; P.A. 02-143 added new Subsecs. (b) and (c) re treatment of certain electric generating facilities completed after July 1, 2003, and the fixing of assessments on such facilities and redesignated existing Subsec. (b) as Subsec. (d), effective June 14, 2002.

Bloomenergy

Exhibit 11

VIA CERTIFICATE OF MAILING

October 11, 2019

RE: Application of Bloom Energy for the location and construction of a 10-Megawatt fuel cell Grid-Side Distributed Resource at 160 Old Amston Road, Colchester, Connecticut

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Keeping the lines of communication open is an important part of our work in your community. If you have questions about this work, please contact the undersigned or the Council.

Respectfully,

Justin Adams
justin.adams@bloomenergy.com

Notice and Service List Pursuant to Conn. Agencies Regs. § 16-50j-40(a)

Municipal and Elected Officials

Last Name	First Name	Title	Address	City	State	Postal Code
Shilosky	Art	First Selectman, Town of Colchester	127 Norwich Avenue	Colchester	CT	06415
Bordeaux	Matthew	Town Planner	127 Norwich Avenue	Colchester	CT	06415
Mathieu	Joseph	Chairman, Planning & Zoning Commission	127 Norwich Avenue	Colchester	CT	06415
Von Plachecki	Falk	Chair, Conservation Commission	127 Norwich Avenue	Colchester	CT	06415
Blumenthal	Richard	U.S. Senator	702 Hart Senate Office Building	Washington	DC	20510
Murphy	Chris	U.S. Senator	B40A Dirksen Senate Office Building	Washington	DC	20510
Courtney	Joe	U.S. Congressman	2332 Rayburn HOB	Washington	DC	20515
Needleman	Norm	State Senator, 33rd District	Legislative Office Building, Room 3900,	Hartford	CT	06106
Orange	Linda	State Representative, 48th District	Legislative Office Building, Room 4012,	Hartford	CT	06106
Tong	William	Connecticut Attorney General	55 Elm Street	Hartford	CT	06106
Dykes	Katie	Commissioner, Department of Energy and Environmental Protection	79 Elm Street	Hartford	CT	06106-5127
Paslick Gillett	Marissa	Chairman, Public Utilities Regulatory Authority	10 Franklin Square	New Britain	CT	06051
Coleman-Mitchell	Renée D.	Commissioner, Department of Public Health	410 Capitol Avenue	Hartford	CT	06134
Merrow	Susan D.	Chair, Council on Environmental Quality	79 Elm Street	Hartford	CT	06106

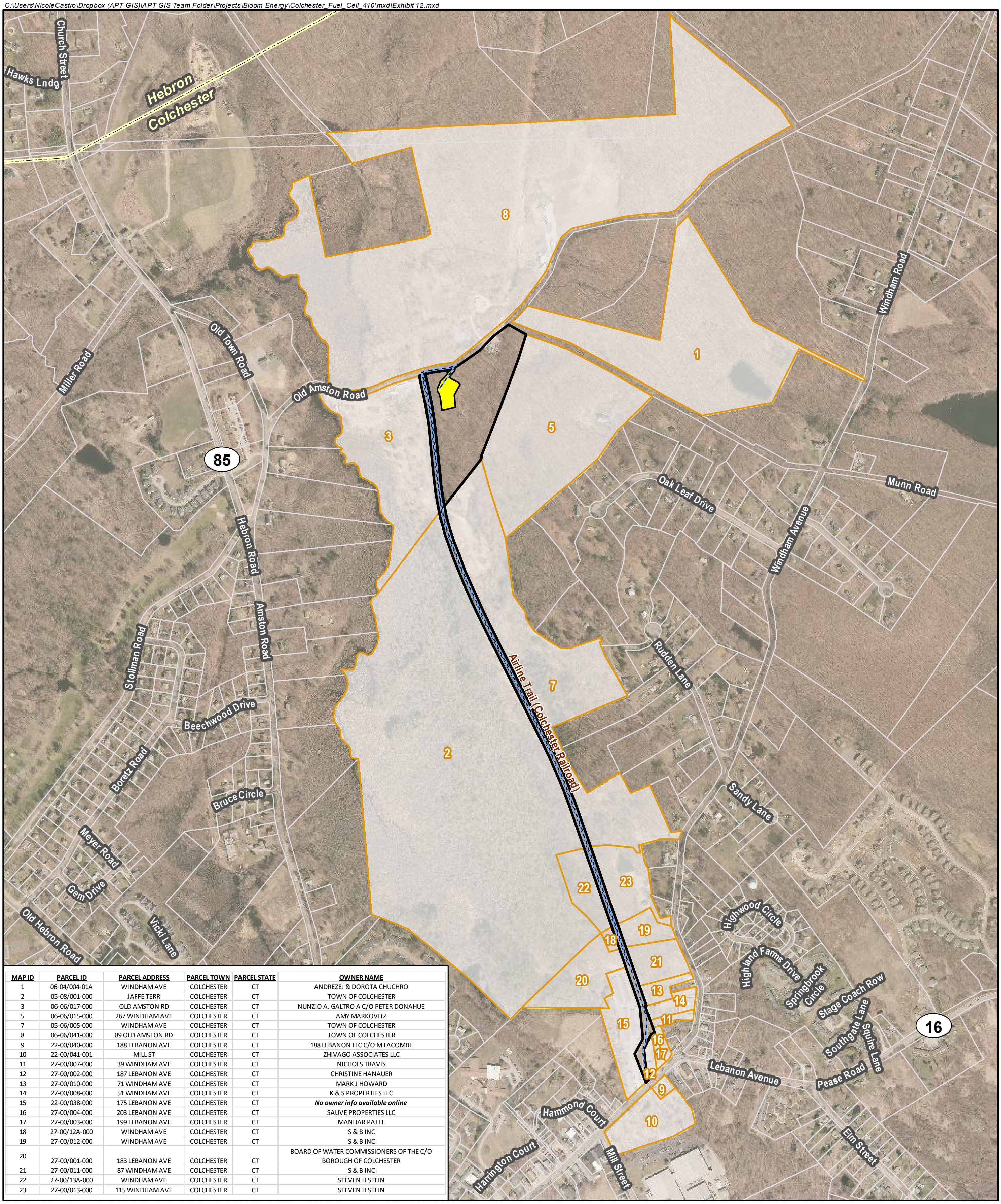
Hurlburt	Bryan P.	Commissioner, Department of Agriculture	450 Columbus Blvd., Suite 701	Hartford	CT	06103
McCaw	Melissa	Secretary, Office of Policy and Management	450 Capitol Avenue	Hartford	CT	06106
Giulietti	Joseph	Commissioner, Department of Transportation	2800 Berlin Turnpike	Newington	CT	06111
Lehman	David	Commissioner, Department of Economic and Community Development	450 Columbus Boulevard	Hartford	CT	06103
Rush-Kittle	Regina	Deputy Commissioner, Division of Emergency Management and Homeland Security (DEMHS)	1111 Country Club Road	Middletown	CT	06457
Seagull	Michelle H.	Commissioner, Department of Consumer Protection	450 Columbus Boulevard, Suite 901	Hartford	CT	06103
Geballe	Josh	Commissioner, Department of Administrative Services	450 Columbus Boulevard	Hartford	CT	06103
Westby	Kurt	Commissioner, Department of Labor	200 Folly Brook Boulevard	Wethersfield	CT	06109
Butler	James	Executive Director, Southeastern Connecticut Council of Governments	5 Connecticut Avenue	Norwich	CT	06360

Abutter Properties

MAP ID	PARCEL ID	PARCEL ADDRESS	OWNER NAME	OWNER MAILING ADDRESS	OWNER MAILING TOWN	OWNER MAILING STATE	OWNER MAILING ZIP
1	06-04/004-01A	WINDHAM AVE	ANDREZEJ & DOROTA CHUCHRO	285 WINDHAM AVE	COLCHESTER	CT	06415
2	05-08/001-000	JAFFE TERR	TOWN OF COLCHESTER	127 NORWICH AVE	COLCHESTER	CT	06415
3	06-06/017-000	OLD AMSTON RD	NUNZIO A. GALTRO A C/O PETER DONAHUE	6 POTTER CROSSING	WETHERSFIELD	CT	06109
5	06-06/015-000	267 WINDHAM AVE	AMY MARKOVITZ	267 WINDHAM AVE	COLCHESTER	CT	06415
7	05-06/005-000	WINDHAM AVE	TOWN OF COLCHESTER	127 NORWICH AVE	COLCHESTER	CT	06415
8	06-06/041-000	89 OLD AMSTON RD	TOWN OF COLCHESTER	127 NORWICH AVE	COLCHESTER	CT	06415
9	22-00/040-000	188 LEBANON AVE	188 LEBANON LLC C/O M LACOMBE	235 MCDONALD RD	COLCHESTER	CT	06415
10	22-00/041-001	MILL ST	ZHIVAGO ASSOCIATES LLC	75 MILL ST	COLCHESTER	CT	06415
11	27-00/007-000	39 WINDHAM AVE	NICHOLS TRAVIS	39 WINDHAM AVE	COLCHESTER	CT	06415
12	27-00/002-000	187 LEBANON AVE	CHRISTINE HANAUER	287 STATION RD	WINDHAM	CT	06280
13	27-00/010-000	71 WINDHAM AVE	MARK J HOWARD	71 WINDHAM AVE	WINDHAM	CT	06415
14	27-00/008-000	51 WINDHAM AVE	K & S PROPERTIES LLC	175 FLOOD RD	MARLBOROUGH	CT	06447
15	22-00/038-000	175 LEBANON AVE	***No owner info available online***	175 LEBANON AVE	COLCHESTER	CT	06415
16	27-00/004-000	203 LEBANON AVE	SAUVE PROPERTIES LLC	PO BOX 46	MARLBOROUGH	CT	06447
17	27-00/003-000	199 LEBANON AVE	MANHAR PATEL	199 LEBANON AVE	COLCHESTER	CT	06415
18	27-00/12A-000	WINDHAM AVE	S & B INC	7 KENNEDY DR	COLCHESTER	CT	06415
19	27-00/012-000	WINDHAM AVE	S & B INC	7 KENNEDY DR	COLCHESTER	CT	06415
20	27-00/001-000	183 LEBANON AVE	BOARD OF WATER COMMISSIONERS OF THE C/O BOROUGH OF COLCHESTER	127 NORWICH AVE	COLCHESTER	CT	06415
21	27-00/011-000	87 WINDHAM AVE	S & B INC	7 KENNEDY DR	COLCHESTER	CT	06415
22	27-00/13A-000	WINDHAM AVE	STEVEN H STEIN	42 SAWMILL BROOK LN	MANSFIELD	CT	06250
23	27-00/013-000	115 WINDHAM AVE	STEVEN H STEIN	42 SAWMILL BROOK LN	MANSFIELD	CT	06250

Exhibit 12

C:\Users\NicoleCastro\Dropbox (APT GIS)\APT GIS Team Folder\Projects\Bloom Energy\Colchester_Fuel_Cell_410\mxd\Exhibit 12.mxd



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7	05-06/005-000	WINDHAM AVE	COLCHESTER	CT	TOWN OF COLCHESTER
8	06-06/041-000	89 OLD AMSTON RD	COLCHESTER	CT	TOWN OF COLCHESTER
9	22-00/040-000	188 LEBANON AVE	COLCHESTER	CT	188 LEBANON LLC C/O M LACOMBE
10	22-00/041-001	MILL ST	COLCHESTER	CT	ZHIVAGO ASSOCIATES LLC
11	27-00/007-000	39 WINDHAM AVE	COLCHESTER	CT	NICHOLS TRAVIS
12	27-00/002-000	187 LEBANON AVE	COLCHESTER	CT	CHRISTINE HANAUER
13	27-00/010-000	71 WINDHAM AVE	COLCHESTER	CT	MARK J HOWARD
14	27-00/008-000	51 WINDHAM AVE	COLCHESTER	CT	K & S PROPERTIES LLC
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22	27-00/13A-000	WINDHAM AVE	COLCHESTER	CT	STEVEN H STEIN
23	27-00/013-000	115 WINDHAM AVE	COLCHESTER	CT	STEVEN H STEIN

Legend

- Site
- Project Area
- Underground Utility Route
- Abutter
- Approximate Parcel Boundary
- Municipal Boundary

Exhibit 12
Abutters Map

Proposed Bloom Energy Facility
Proposed Judd Brook Substation - CT10MV
160 Old Amston Road
Colchester, CT

N
W E
S

1,000 500 0 1,000
Feet

Map Notes:
Base Map Source: CTECO Aerial Photograph (2016)
Map Scale: 1 inch = 1,000 feet
Map Date: October 2019

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