

Guy Corbosiero, Chair
Winchendon Planning Board
 109 Front Street, Dept 10
 Winchendon, Massachusetts 01475

March 27, 2023

RE: Project Impact Statement
 Solar Energy Storage System (ESS)
 ZP Battery DevCo, LLC
 #0 Murdock Avenue (Map 5A2/25; 5A2/26)

Dear Mr. Corbosiero,

On behalf of our client, ZP Battery DevCo, LLC, Hannigan Engineering, Inc. is submitting the following Impact Statement as is required for Site Plan Approval for the application to construct a Solar Energy Storage System (ESS) at #0 Murdock Avenue in Winchendon, Massachusetts (Map/Parcel 5A2/25 and 5A2/26). We offer our review of the project below with additional information associated with this project included in the Appendix.

Existing Conditions

The main components of the site are located on the easterly side of Murdock Avenue on Parcel 5A2/26. Portions of the drainage system are located on the westerly side of Murdock Avenue. Currently the portions of the property to be developed are comprised of woodland area with no standing structures on the property. Areas subject to protection under the Wetlands Protection Act were reviewed by LEC Environmental Consultants and are depicted on the Site Plans. These areas include a bordering vegetated wetland located along the easterly and westerly sides of Murdock Avenue and hydraulically connected via a stone culvert within the roadway with the area generally flowing in a westerly direction. There are no documented areas subject to the Natural Heritage review nor any documented FEMA Flood Areas.

The portion of the site where the systems will be located (Parcel 5A2/26) generally slopes in a westerly direction towards Murdock Avenue. The overland flows reach an existing stone culvert at the southerly portion of the site which directs the flows under Murdock Avenue to a broader wetland system on the parcel of land on the westerly side of the road (Parcel 5A2/25). This is the area where the detention/rain garden will be located.

Per Natural Resource Conservation Service (NRCS), the property is generally underlain with loamy lodgment glacial till, typical of the area, with a Hydrological Soil Group classification of C (HSG-C). Reference is made to *Table 1: Soil Classification* for the list of mapped soils.

Table 1: Soil Classification.

<u>Soil Designation</u>	<u>Soil Name</u>	<u>Hydrological Group Class</u>	<u>Parent Material (Per NRCS)</u>
908C	Becket-Skerry Association	C	Loamy lodgment till derived from granite and gneiss and/or schist over sandy lodgment till derived from granite and gneiss and/or schist
917B	Pillsbury-Peacham Association	C/D	Friable coarse-loamy eolian deposits over dense coarse-loamy lodgment till derived from granite and gneiss

On-site soil excavations were performed to observe the in-situ soil conditions of the site. These were performed by this office in February of this year. Soil observations generally confirmed the mapped soils with an Estimated Seasonal High Groundwater Table (ESHGWT) of approximately 30” within the project area. Soil logs are provided in Appendix A.

Proposed Development

The project entails the construction of a standalone solar Energy Storage System (ESS) with an estimated capacity of approximately 10-Megawatt AC on the property. The proposed storage systems will be located along the easterly side of Murdock Avenue on Parcel 5A2/26, with Parcel 5A2/25 along the westerly side being utilized for a rain garden for stormwater management. Unlike ground-mounted Solar Energy Systems that involve the generation of energy, this facility is utilized purely for the storage of energy generated from area solar systems connected to the grid.

As part of the initial site preparation, appropriate erosion control measures will be installed to prevent the transport of soils and sediments to the lower elevations of the site. The site development will consist of the installation of eight (8) concrete pads on which the sixteen (16) ESS units will be situated. Additional electrical components and transformer pads will also be installed to allow the eventual interconnection to the grid. The electrical equipment has been separated into two fenced in areas, each containing four concrete pads with a central area between the two sites to utilize a single common electrical connection. The total area of alteration associated with the project will be approximately an acre along the easterly side and 15,000 square feet along the westerly side of Murdock Avenue. Specific area tabulations are provided below within *Table #2: Proposed Development Calculations*.

Table 1: Proposed Development Calculations

Total Site Area	<u>Lot 5A2/25</u>		<u>Lot 5A2/25</u>	
	4.33 Acres		3.67 Acres	
	Total Area	% of Lot Area	Total Area	% of Lot Area
Wetland Areas	97,889 sf	51.9%	64,129 sf	40.1%
Drainage Area	14,993 sf	7.9%	0 sf	0%
Proposed Impervious Coverage*	0 sf	0%	20,671 sf	12.9%
Total Area of Disturbance	14,993 sf	7.9%	48,670 sf	30.4%
Open Space	173,622 sf	92.1%	111,195 sf	69.6%

*Impervious coverage is defined as *Low Impact Development (LID) Regulations for the Town of Winchendon Section 2 Definitions*; IMPERVIOUS SURFACE: Any material or structure on or above the ground that prevents water from infiltrating through the underlying soil. Impervious surface is defined to include, without limitation: paved parking lots, sidewalks, roof tops, driveways, patios, paved recreation areas and paved, gravel and compacted dirt surfaced roads.

The anticipated list of permits required for this development area as listed below:

- Site Plan Approval- *Town of Winchendon Planning Board*
- Low Impact Development (LID)- *Town of Winchendon Planning Board*
- Order of Conditions (OOC) -*Town of Winchendon Conservation Commission*
- General Construction Permit (CGP) – *Environmental Protection Agency (EPA)*
- Building Permit - *Town of Winchendon Building Department*

Transportation

Access to the site will be provided via Murdock Avenue by a 24-foot-wide gravel driveway that extends easterly into the development and then runs parallel to Murdock Avenue. This driveway will provide access between the two fenced areas with three access points to Murdock Avenue. Access points are located at the terminal ends of the driveway and at the center of the project near the connection equipment. The gravel driveway is intended to provide access to the site on a periodic basis for general maintenance and inspections of the facility. This loop configuration of the access drive will allow for smaller emergency vehicles or service vehicles to enter the site and drive through the site. If in the event of a larger emergency vehicle entering the area, they would utilize Murdock Avenue to gain access to the project as it is in close proximity to the roadway.

Due to the nature of the development upon the completion of construction, it is expected that the vehicle traffic will be limited to a few trips per month to perform maintenance on the stormwater and electrical infrastructure and to inspect the overall site for deficiencies. As such vehicular traffic for this development is expected to be minimal.

Construction

It is anticipated that the construction of the project will occur in a single phase and take approximately three to six months to complete. Construction activity will occur during typical business hours Monday through Friday as allowed by the Bylaws and as permitted by the Planning Board. The construction will commence with the clearing of the site and installation of erosion control measures. The site work would then continue with the installation of site utilities and infrastructure including the installation of drainage facilities depicted on the plans. Electrical conduit runs and subsurface equipment pads including containment pads as may be required will be installed as part of this work.

During construction, the entire perimeter of the construction area will be bounded by straw wattle and silt-fence to provide sedimentation and erosion control. Additionally at the entry points of the construction area a construction tracking pad will be installed to mitigate tracking of sediment onto Murdock Avenue. Upon the completion of daily earth moving operations, the roadway will be cleared of any sediment present. Street sweeping will be performed if conditions warrant. The site would then be finished with the installation of the gravel drives, concrete pads, and stabilization with loam products.

During construction it is expected that earthen materials will be live loaded or temporarily stockpiled near the center of the development for export. Any stockpiling of earthen materials will be surrounded by an additional line of straw wattles to prevent migration. Should stockpiles be anticipated to be in place for any period of 14 days or more during dry conditions, this may result in excessive dust. In this case, the stockpiles shall be stabilized with appropriate measures which may include temporary mulching or hydroseeding. Upon the completion of earth moving activities the disturbed areas will be immediately stabilized with crushed stone or loam and seed depending on location.

Based upon preliminary volumetric analysis it is expected that approximately 5,300 cy of material will be removed from the site to facilitate the construction to subgrade. It is anticipated that approximately 540-cubic yards of materials would be imported to the site consisting of gravel, crushed stone and concrete. Materials to remain on site for final grading as well as materials brought to the site for construction will be stored appropriately with additional erosion control measures as needed. It is anticipated that new materials will be purchased from local suppliers. Reference is made to Appendix B for the cut-fill analysis.

Upon the completion of construction, the site will be graded as to prevent any ponding, and runoff will be transmitted to a rain garden feature to provide mitigation of stormwater impacts. To prevent erosion from stormwater discharges a rip-rap apron has been provided and sized per the Connecticut DOT Drainage Manual to accommodate the anticipated flows from the 100-year storm event.

At this time, the final construction costs have not been determined. Final anticipated construction costs will be provided to the Town via the Building Department prior to Construction for review to determine if a performance bond is warranted.

Public Utility

Due to the nature of the development, there is no need for water supply or sewage disposal for the project. Additionally, the need for solid waste disposal facility (dumpster) is not anticipated for the project. Upon the completion of construction, the ESS does not require these amenities. Relative to stormwater, the project has been designed with an on-site drainage system to accommodate post development flows. Reference is made to the Stormwater Drainage Analysis and Report for review of the drainage system and its compliance with local and state regulations.

Conservation and Recreation

The main components of the site are located on the easterly side of Murdock Avenue on Parcel 5A2/26. Portions of the drainage system are located on the westerly side of Murdock Avenue. Currently the portions of the property to be developed are comprised of woodland area with no standing structures on the property. Areas subject to protection under the Wetlands Protection Act were reviewed by LEC Environmental Consultants and are depicted on the Site Plans. These areas include a bordering vegetated wetland located along the easterly and westerly sides of Murdock Avenue and hydraulically connected via a stone culvert within the roadway with the area generally flowing in a westerly direction. There are no documented areas subject to the Natural Heritage review nor any documented FEMA Flood Areas.

The portion of the site where the systems will be located (Parcel 5A2/26) generally slopes in a westerly direction towards Murdock Avenue. The overland flows reach an existing stone culvert at the southerly portion of the site which directs the flows under Murdock Avenue to a broader wetland system on the parcel of land on the westerly side of the road (Parcel 5A2/25). This is the area where the detention/rain garden will be located.

Per Natural Resource Conservation Service (NRCS), the property is generally underlain with loamy lodgment glacial till, typical of the area, with a Hydrological Soil Group classification of C (HSG-C). Reference is made to *Table 1: Soil Classification* for the list of mapped soils. On-site soil excavations were performed to observe the in-situ soil conditions of the site. These were performed by this office in February of this year. Soil observations generally confirmed the mapped soils with an Estimated Seasonal High Groundwater Table (ESHGWT) of approximately 30" within the project area. There was no evidence of ledge within the excavations performed. Soil logs are provided in Appendix A.

Surface runoff from the site will be captured and treated with a stormwater management system that complies with state and local regulations. Additionally, there are no direct wastewater discharges into the subsurface soils as part of the development. As such it is expected that the impacts to surface and subsurface water quality will be mitigated. Areas outside of the limits of disturbance are intended to remain in their natural state as a woodland.

Sustainable Energy Element

The project entails the construction of Solar Energy Storage System (ESS) which directly provides an enhancement to the development of sustainable energy. The purpose of the system is to capture excess energy within the grid during peak solar hours, which are typically during the middle of the day when the sun is at its highest point in the sky. This time also correlates to lower residential energy use as most residential users are at their place of employment. This is the predominant disconnect with solar energy systems. The time of day they produce the most energy is not necessarily the time of day when the most energy is utilized. The ESS systems tie directly into the grid and allow the excess energy to be captured and stored during these peak solar hours. These systems then allow for the control release of the energy during the off-peak solar hours which usually occur in the morning and evening times of day. This translates into a more efficient use of solar energy within the grid.

Aesthetics

The proposed ESS System is comprised of metal storage containers utilized to store the battery systems and does not contain any structures intended for occupancy. These units will be located within a fenced area and shielded from view with an evergreen vegetated screen along Murdock Avenue to provide a visual barrier. The other sides of the project will rely on the remaining woodland areas to provide a visual barrier to the site. Additionally, typical surface lighting is not anticipated for the project aside from a motion activated light near the electrical components. As typical maintenance activities occur during daylight hours, the need for additional lighting is not required. Reference is Made to Appendix C for Typical Rendering of an ESS System.

Neighborhood and Community Element

The area around the project is a general mix of uses. To the north there is an existing industrial facility; to the east and west the existing land is generally vacant; and a few residential properties are located to the south. The project is located on a dead-end portion of Murdock Avenue with the terminal end leading to the industrial building to the north. As such traffic within this area is limited to the traffic associated with the industrial building at the end of Murdock Avenue. As the project is relatively secluded, impacts to the neighborhood and surrounding area are not anticipated.

Impacts to the Town of Winchendon School system are not anticipated as there is not a residential component to the project. The project also does not anticipate a significant requirement for police services. Potential vandalism of the site has been considered and mitigated with the project being encompassed by a security fence which would inhibit unauthorized access to the components.

The project does require the specialized training of fire department personnel relative to the appropriate methods of controlling a fire on site if it were to occur. Emergency power shut offs are provided outside of the fenced area for immediate action. A dry-hydrant fire suppression system is provided to each of the containers within the battery storage system. These are also located outside of fenced area and are marked with designations to allow the fire department personnel to immediately apply fire suppressants to the specific container. Knox Boxes are provided at all gate entry points to allow for immediate access if so required.

As part of the project submittals, a draft Emergency Response Plan is provided for the project. Prior to Certificate of Occupancy, this Emergency Response Plan will be finalized and reviewed with appropriate Town Departments to address potential emergency situations as they may arise.

The project works in conjunction with the Master Plan of the Town by providing and improving green development within the Town. Deficiencies in the existing electrical grid system in this area will be enhanced with improvements in the efficiency of the solar energy system. This reduces the need to rely on conventional energy sources.

Social-Economic Element

It is not anticipated that the project will result in an increase in population or housing as there is not an associated residential component. Furthermore, upon the completion of construction the occupational force present on the property will be reduced to periodic maintenance. As such, the project does not add to the housing need within the Town or the region.

Municipal Benefit/Cost Element

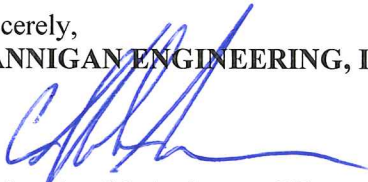
The project is expected to provide a significant benefit without financial impacts on the Town. The project would bring additional tax dollars to the Town in the form of increased property value. As discussed, the project does not have a residential component that could result in school age children. Thus, there would be no financial impact on the school system. Additionally due to the general innocuous use to the project, significant traffic generation or requirement for municipal services is not anticipated. The combination of additional tax dollars without significant expenses on the Town provides for an overall benefit.

Waste Generation and Disposal

Upon the completion of construction, the site will not generate a regular waste stream which will require disposal. During construction a waste dumpster will be provided to dispose of trash and debris generated during construction. This dumpster will be emptied on a periodic basis as needed and will be removed from the site upon completion of construction. Additionally, the project is not expected to generate hazardous waste materials.

Hannigan Engineering, Inc. is submitting this information in association with the Site Plan Approval application with the Planning Board. Should you require additional information prior to the meeting, please do not hesitate to contact this office. We appreciate your continued assistance in this process as we look forward to working with you to obtain the anticipated approval of this project.

Sincerely,
HANNIGAN ENGINEERING, INC



Christopher M. Anderson, PE
Project Engineer

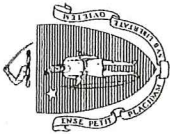


William D. Hannigan, PE
President

pc: Pete Forte, ZP Battery DevCo,LLC
Tom Corbett, ZP Battery DevCo,LLC

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Appendix A
Soil Observation Logs



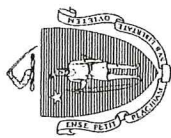
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

A. Facility Information

Owner Name: BOSTWICK REALTY TRUST
 Street Address: 0 MURDOCK AVENUE Map/Lot #: 5A2/25
 City: WINCHENDON State: MA Zip Code: 01475

B. Site Information

- (Check one) New Construction Upgrade
- Soil Survey: NRCS Source: 908C Soil Map Unit: NONE Soil Series: _____
 Landform: MORRAINE Soil Limitations: _____
- Soil Parent material: LODGMNT GLACIAL TILL
 Surficial Geological Report: _____ Year Published/Source: _____ Map Unit: _____
- Description of Geologic Map Unit: _____
- Flood Rate Insurance Map: _____ Within a regulatory floodway? Yes No
- Within a velocity zone? Yes No
- Within a Mapped Wetland Area? Yes No
- Current Water Resource Conditions (USGS): 02/23 Range: Above Normal Normal Below Normal
Month/Day/ Year Wetland Type
- Other references reviewed: _____
(Zone II, IWPA, Zone A, EEA Data Portal, etc.)



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 0223-2 Hole # 2/9/23 Date 10:00 Time SUN Weather 0-5 Longitude _____

1. Land Use WOODLAND DECIDUOUS NEW NONE Surface Stones (e.g., cobbles, stones, boulders, etc.) 0-5 Slope (%)
(e.g., woodland, agricultural field, vacant lot, etc.)
Vegetation GROWTH Surface Stones (e.g., cobbles, stones, boulders, etc.)

Description of Location: IN WOODLAND ABOUT 60-FT OFF ROAD

2. Soil Parent Material: GLACIAL TILL MORRAIN ON SLOPE Position on Landscape (SU, SH, BS, FS, TS, Plain) _____
Landform _____

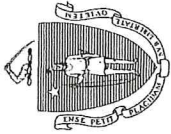
3. Distances from: Open Water Body +100 feet Drainage Way +100 feet Wetlands 80 feet
Property Line 50 feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 52 Depth to Weeping in Hole _____ Depth to Standing Water in Hole _____

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features			Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel	Cobbles & Stones			
0-12	A	LOAM	10YR 2/2	Cnc : Dpl:							
12-26+	B	SA LOAM	7.5YR 5/8	Cnc : Dpl:				MASS	FIRM		
26-52	B/V	LO SAND	7.5 YR6/6	Cnc : Dpl:	28			MASS	FIRM		
52-96	C	LO SAND	10YR 6/6	Cnc : Dpl:				MASS	FIRM		
				Cnc : Dpl:							
				Cnc : Dpl:							



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Additional Notes:
NO REFUSAL, GWO@52"

C. On-Site Review (minimum of two holes required at every proposed primary and reserve disposal area)

Deep Observation Hole Number: 0223-3 Hole # 2/19/23 Date 10:30 Time SUNB Weather 0-5 Longitude
 1. Land Use: WOODLAND (e.g., woodland, agricultural field, vacant lot, etc.) DECIDUOUS NEW GROWTH Vegetation NONE Surface Stones (e.g., cobbles, stones, boulders, etc.) 0-5 Slope (%)
 Description of Location: IN WOODLAND ABOUT 60-FEET OFF ROAD

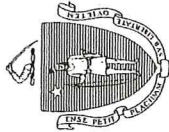
2. Soil Parent Material: GLACIAL TILL MORRAINE Landform ON SOPE Position on Landscape (SU, SH, BS, FS, TS, Plain)
 3. Distances from: Open Water Body +100 feet Drainage Way +100 feet Wetlands 70 feet
 Property Line +50 feet Drinking Water Well _____ feet Other _____ feet

4. Unsuitable Materials Present: Yes No If Yes: Disturbed Soil/Fill Material Weathered/Fractured Rock Bedrock

5. Groundwater Observed: Yes No If yes: 47 Depth to Weeping in Hole _____ Depth Standing Water in Hole _____

Soil Log

Depth (in)	Soil Horizon /Layer	Soil Texture (USDA)	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features		Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
				Depth	Color	Percent	Gravel			
0-12	A	LOAM	10YR 2/2							
12-18	B	SA LOAM	7.5YR 5/8	Cnc : Dpl:				MASS	FIRM	
18-26	B/C	LO SAND	7.5 YR 6/6	Cnc : Dpl:				MASS	FIRM	
26-96	C	LO SABD	10YR 6/6	Cnc : Dpl:	30			MASS	FIRM	
				Cnc : Dpl:						
				Cnc : Dpl:						



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Additional Notes:
NO REFUSAL, GWO@47"

D. Determination of High Groundwater Elevation

1. Method Used (Choose one):
- Depth to soil redoximorphic features Obs. Hole # 0223-2 28 inches Obs. Hole # 0223-3 30 inches
 - Depth to observed standing water in observation hole 52 inches 47 inches
 - Depth to adjusted seasonal high groundwater (S_h) (USGS methodology) _____ inches _____ inches

Index Well Number _____ Reading Date _____

$S_h = S_c - [S_r \times (OW_c - OW_{max}) / OW_r]$

Obs. Hole/Well# _____ S_c _____ S_r _____ OW_c _____ OW_{max} _____ OW_r _____ S_h _____

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
- a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?
 Yes No
 - b. If yes, at what depth was it observed (exclude O, A, and E Horizons)? Upper boundary: _____ inches Lower boundary: _____ inches
 - c. If no, at what depth was impervious material observed? Upper boundary: _____ inches Lower boundary: _____ inches



Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

F. Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator

CHRISTOPHER ANDERSON#14005

Typed or Printed Name of Soil Evaluator / License #

2/10/23

Date

6/30/2025

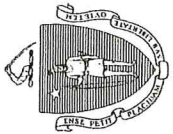
Expiration Date of License

Name of Approving Authority Witness

Approving Authority

Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with [Percolation Test Form 12](#).

Field Diagrams: Use this area for field diagrams:



Commonwealth of Massachusetts
City/Town of WINCHENDON

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Hydrologic Soil Group—Worcester County, Massachusetts, Northwestern Part



Map Scale: 1:5,640 if printed on A portrait (8.5" x 11") sheet.

Meters

0 50 100 200 300

0 250 500 1000 1500

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

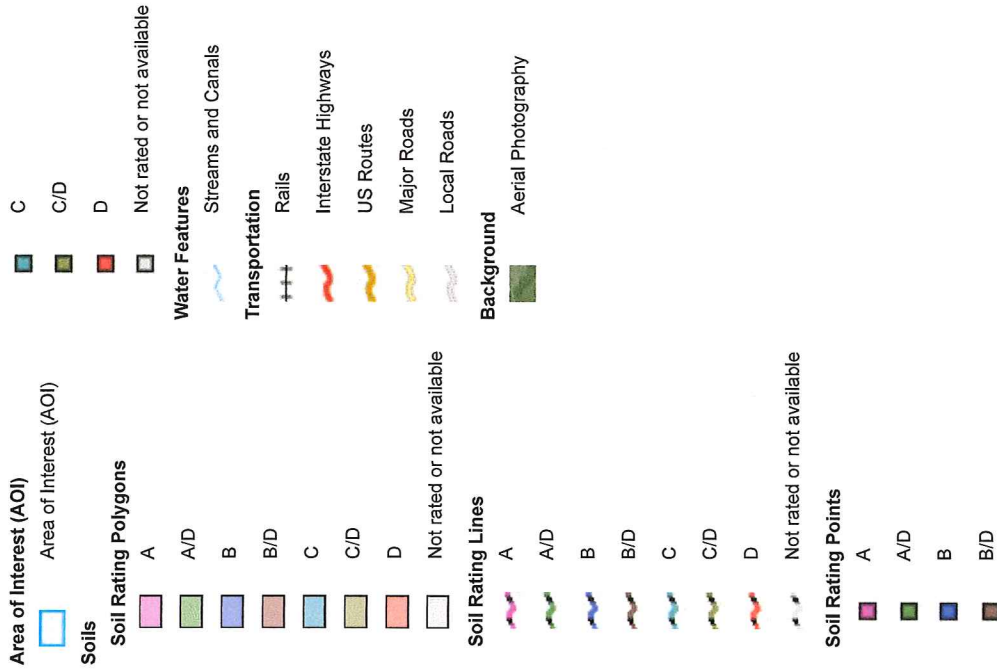


Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

3/17/2023
Page 1 of 4

MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

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

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

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

Soil Survey Area: Worcester County, Massachusetts, Northwestern Part
 Survey Area Data: Version 16, Sep 9, 2022

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

Date(s) aerial images were photographed: Oct 15, 2020—Oct 31, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		1.9	1.2%
59A	Bucksport and Wonsqueak mucks, 0 to 2 percent slopes	B/D	0.6	0.4%
365B	Skerry fine sandy loam, 3 to 8 percent slopes	C/D	6.1	3.8%
908C	Becket-Skerry association, 0 to 15 percent slopes, extremely stony	C	110.5	67.6%
917B	Pillsbury-Peacham association, 0 to 8 percent slopes, extremely stony	C/D	44.3	27.1%
Totals for Area of Interest			163.5	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix B
Cut Fill Analysis

Cut/Fill Report

Generated: 2023-03-20 15:26:07

By user: canderson

Drawing: J:\DWG\WINCHENDON\Murdock Avenue\3101-ZP
Battery\J:\DWG\WINCHENDON\Murdock Avenue\3101-ZP Battery\3101-Survey.dwg

Volume Summary							
Name	Type	Cut Factor	Fill Factor	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
volfg	full	1.2500	1.1500	476778	7342.83*	2723.21*	4619.62*

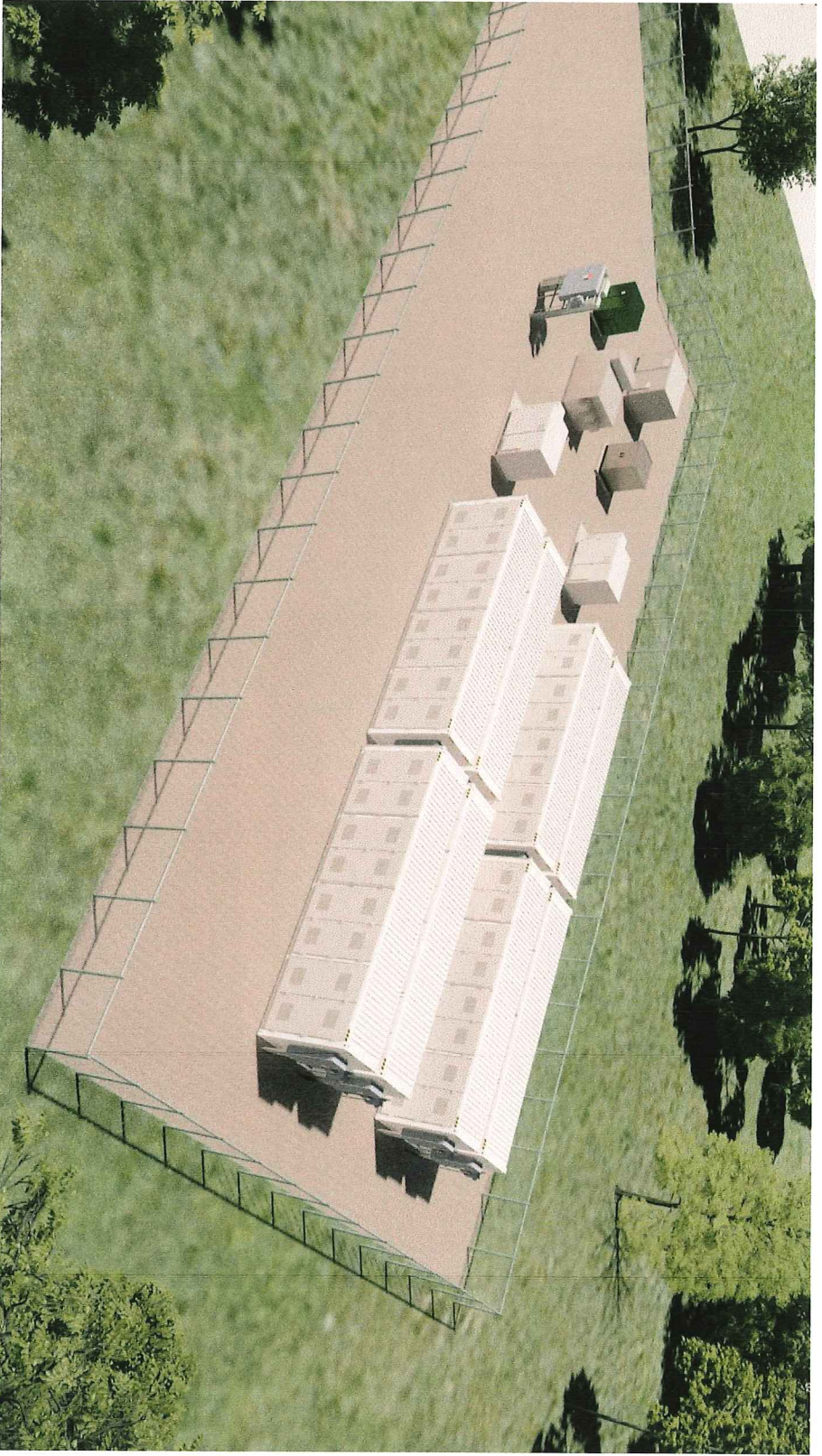
Totals				
	2d Area (Sq. Ft.)	Cut (Cu. Yd.)	Fill (Cu. Yd.)	Net (Cu. Yd.)
Total	476778	7342.83*	2723.21*	4619.62*

* Value adjusted by cut or fill factor other than 1.0

Appendix C
Visual Rendering

**CONCEPTUAL
RENDERINGS**

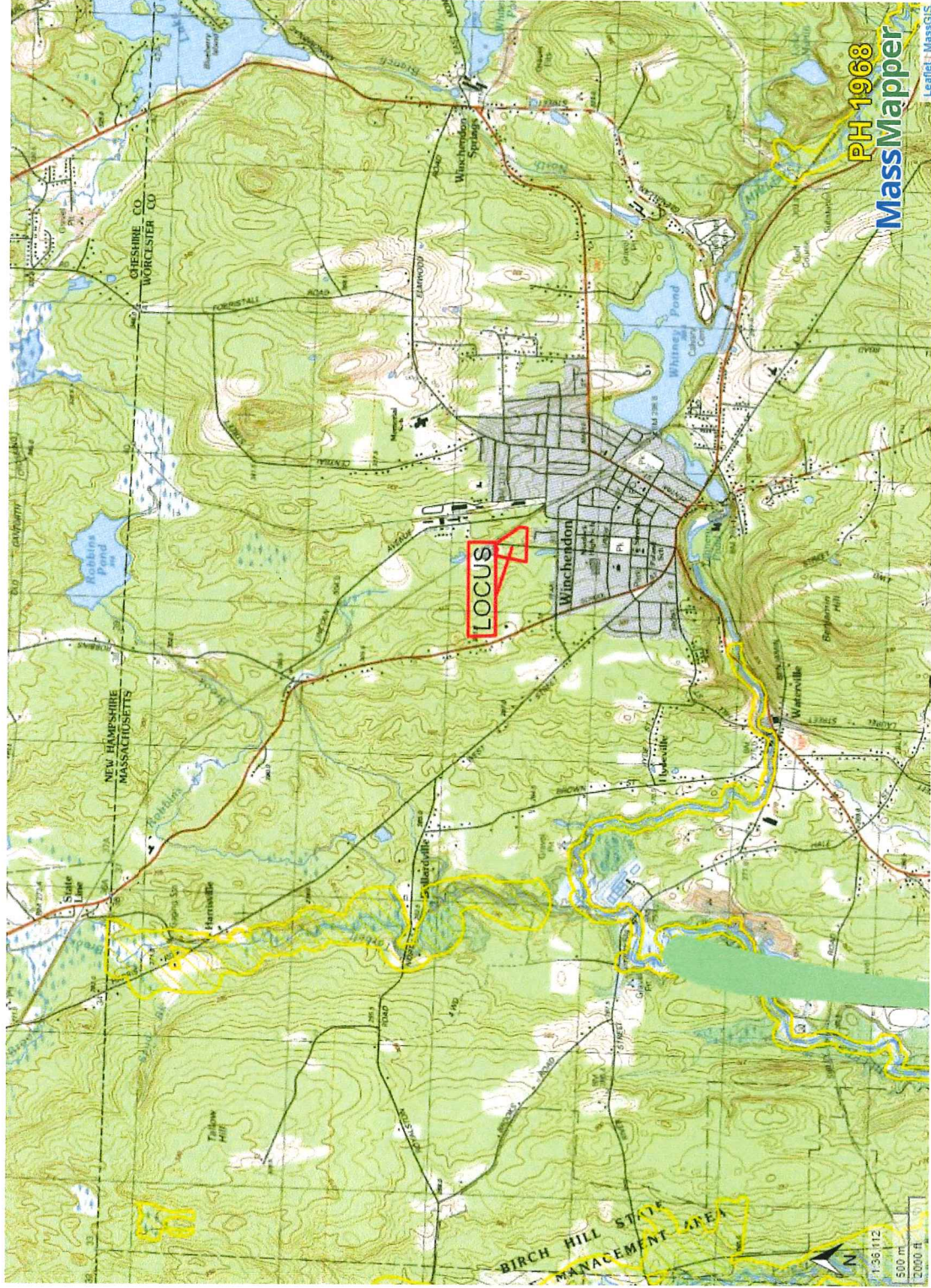
Energy Storage System (ESS)



5-Megawatt Facility

Appendix D
Locus Plan

MURDOCK AVENUE



Cape Cod and Islands Basins



Non Potential Drinking Water Source Areas



Aquifers by Yield



NHESP Priority Habitats of Rare Species



NHESP Estimated Habitats of Rare Wildlife



Property Tax Parcels

USGS Topographic Maps