LODESTAR ENERGY

January 15, 2021

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

RE: Petition 1398 – LSE Pictor LLC, Platt Hill Road, Winchester

Dear Attorney Bachman:

Please find enclosed petitioner LSE Pictor LLC's motion to re-open based on changed conditions. Per updated filing requirements, one (1) hard copy is enclosed for your records.

Please let me know if you have any questions.

Sincerely,

Carrie Larson Ortolano

Carrie Larson Ortolano

STATE OF CONNECTICUT SITING COUNCIL

PETITION OF LSE PICTOR LLC FOR A DECLARATORY RULING THAT NO CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED IS REQUIRED FOR THE CONSTRUCTION, OPERATION, AND MAINTENANCE OF A 1.99 MW AC SOLAR PHOTOVOLTAIC FACILITY IN WINCHESTER, CONNECTICUT	PETITION NO. 1398 January 15, 2021

MOTION OF LSE PICTOR LLC TO REOPEN AND MODIFY THE DECISION FOR PETITION NO. 1398 DUE TO CHANGED CONDITIONS

I. Introduction

Pursuant to Conn. Gen. Stat. §4-18la(b), LSE Pictor LLC ("Lodestar" or the "Petitioner") respectfully moves the Connecticut Siting Council (the "Council") to reopen Petition No. 1398 and modify, based on changed conditions and new facts, its *Decision on Petition for Reconsideration* dated September 24, 2020 (the "Decision") on Petition No. 1398. The Decision denied, without prejudice, Lodestar's petition for a Declaratory Ruling to construct, operate, and maintain a ground-mounted solar photovoltaic ("PV") electric generating facility (the "Project") at Platt Hill Road, Winchester, CT (the "Site"). Based on changed conditions and new facts discussed in this motion, Lodestar respectfully requests that the Council reopen the Petition No. 1398 proceeding, modify the Decision, and issue a Declaratory Ruling that will allow for the construction, maintenance, and operation of the Project.

II. Procedural Background

On March 27, 2020, Lodestar submitted a petition to the Council for a Declaratory Ruling pursuant to Connecticut General Statutes §4-176 and §16-50k, for the proposed construction, maintenance, and operation of an approximately 1.99 megawatt alternating current

(MW AC) ground-mounted solar photovoltaic electric generating facility located at Platt Hill Road in Winchester, CT (the "Project").

By Council Decision on Petition #1398, the Council notified Lodestar that it had denied, without prejudice, the Petition for eight (8) reasons. For the reasons discussed in detail below, Lodestar respectfully submits that it has satisfied each of the Council's eight concerns by conducting additional studies and modifying the overall design of the Site, as shown in the documentation attached hereto. In addition, the Town of Winchester has expressed its support for the Project as revised herein.

III. **The Council has the Statutory Authority to Reopen and Modify its Decision**

Pursuant to Conn. Gen. Stat. §4-181a(b), the Council has the authority to reopen and modify its Decision regarding Petition 1398 due to new facts and changed conditions that have occurred since the Council's denial thereof. Conn. Gen. Stat. §4-18l a(b) provides, in relevant part, that, "[o]n a showing of changed conditions, the agency may reverse or modify the final decision, at any time, at the request of any person or on the agency's own motion." Changed conditions exist when there is "new information or facts, identification of any unknown or unforeseen events or evidence . . . that were not available at the time of the final decision." *See Town of Fairfield, et al v. Connecticut Siting Council*, 238 Conn. 361,372; 679 A.2d 354,359 (1996).

Consistent with its authority under §4-181a(b), the Council has reopened a number of solar photovoltaic electric generating facilities proceedings and decisions. *See* Petition 1310/1310A; Petition 1345/1345A; Petition 1347/1347A, all of which were similarly situated projects whereby the original petition for declaratory ruling was denied and then subsequently reopened based on changed conditions.

As the discussion of changed conditions below demonstrates, Lodestar has satisfied the applicable standards with respect to reopening the Petition 1398 proceeding and modifying the Decision.

Concern Raised	Previous Design	New Design
Overall impact	7,930 panels, 171,308 sq. ft of coverage	7,288 panels, 157,439 sq. ft of coverage (8.1% reduction)
Development distance to wetlands	50 feet	100 feet; 200 feet from panels
Storm water basin(s)	One (1), ~6400 sq. feet	Four (4), totaling ~14,000 sq ft plus two stone level spreaders 150' and 100' long
Impact on wetlands	Two (2) limited wetland crossings with 800 sq. feet disturbance	1,200 sq. feet of wetland restoration; mitigation plan including removal of invasive species and native re-plantings (3720 sq. feet)
Army Corp		Submitted on 01/14/2021
Dam Safety		Submitted on 01/13/2021
Town of Winchester		Letter of support dated January 12, 2021 attached hereto as **Exhibit 1**

IV. Changed Conditions for the Project -The Project Size has been Reduced

As can be seen from the below and the exhibits attached hereto, Petitioner undertook a significant re-design of the Site to address the concerns raised in the Council's Decision and, in addition, undertook additional efforts to even further reduce any potential environmental impacts associated with the Project. **Exhibit 2** attached hereto depicts the originally proposed site layout overlayed with the revised layout. Some of the highlights of those changes include: (1) due to availability, Petitioner is able to secure a higher wattage panel (410 watts), thereby reducing the total number of panels required for the Project from 7,930 to 7,288 and reducing the overall Project footprint by 13,869 square feet or over 8%; (2) the Project footprint was shifted to the south and east in order to ensure that no element of the Project was located within fifty (50) feet of the wetlands located on the Site or proximate thereto; (3) there have been significant changes implemented to the proposed stormwater controls to improve stormwater quality, reduce stormwater runoff and reduce or eliminate hydrological effects to the wetlands from stormwater impacts; and (4) implementation of a planting plan to reduce the impact of invasive species and improve the wetland quality at the two (2) proposed wetland crossings.

Lodestar retained Vanasse Hangen Brustlin, Inc. ("VHB") to conduct a wetland and vernal pool boundary verification review and wetland impact analysis. In addition, Lodestar retained VHB to serve as a third-party reviewer of the revised Site engineering and stormwater design to ensure that the revisions thereto are consistent with the Department of Energy and Environmental Protection ("DEEP")'s 2002 Connecticut Guidelines for Soil Erosion and Sediment Control and 2004 Storm Water Quality Manual.

A. Site Plan Redesign

As noted above, Lodestar undertook significant Site redesign in response to the Council's decision. Lodestar's revised site plans are attached hereto as **Exhibit 3** and associated revised drainage plan is attached hereto as **Exhibit 4**. In addition, VHB's third-party engineering review report is attached hereto as **Exhibit 5**. As can be seen from these three exhibits, Lodestar undertook significant re-design of the Site in response to the Council's Decision. The highlights of the changes implemented include:

1. Two (2) vehicle passing areas have been added to the access driveway for safety purposes.

2. Two (2) eighteen-inch (18”) drainage pipes are provided on both sides of the two (2) wetland crossings for the purposes of unimpeded movement of wildlife at both wetland crossings.

3. The limit of clearing on the west side of Project has been moved to be a minimum of one hundred feet (100’) from the delineated inland-wetland boundary.

4. The western limit of the actual solar panels has been shifted to the east to be a minimum of two hundred feet (200’) from the delineated inland wetland boundary.

5. The proposed constructed wetland (basin #1) stormwater basin located to the southwest of the Project has been shifted uphill so that all grading associated with the basin is located more than fifty feet (50’) from the delineated inland wetland boundaries.

6. The outlet pipe and emergency spillway from the western stormwater basin have been relocated to expand the distance from wetlands.

7. The alignment of the western grass swale has been modified to direct all potential runoff to stormwater basin #1. The southern end of the swale just above basin #1 will be lined with modified riprap.

8. A gravel path has been added to provide access to basin #1 for maintenance that will follow the existing ground surface.

9. The number of solar panels and subsequent coverage has been reduced from 7,930 panels to 7,288 panels (8% reduction in square footage of array).

10. Two (2) settling basin areas have been created along the alignment of the eastern grass swale to promote infiltration of groundwater runoff to the eastern wetlands.

11. A new detention basin has been provided at the southeast corner of the Project to maintain existing hydrologic watershed boundaries for post-development conditions.

12. A one hundred fifty foot (150') long stone level spreader has been added to accept discharge from the outlet pipe of the basin #2 to ensure overland flow will occur prior to discharge to the undisturbed forested area on the moderate to steep slopes below.

13. Two (2) areas on the north and south of the first wetland crossing will have all invasive vegetation removed and replaced by native wetland plants as detailed more specifically in **Exhibit 7** attached hereto, the invasive species plant management plan.

14. Test pits were dug in the proposed locations of both basin #1 and basin #2, which confirms the depth of mottling (depth to seasonal high groundwater table) to ensure that there is adequate groundwater entering the basin to maintain the hydrologic conditions to support the wetland plants within both constructed wetland basins.

15. A one hundred foot (100') long stone level spreader has been added to accept discharge from the outlet pipe of the basin #1 to ensure overland flow will occur prior to discharge to the undisturbed forested area.

These significant changes address all of the concerns raised by the Council in its Decision and serve to even further reduce any potential environmental impact of the Project. The Town of Winchester has voiced its strong support for approval of the Project as redesigned and improved. Attached hereto as **Exhibit 1** is the letter of support from the Town of Winchester.

B. Wetlands and Vernal Pool Analysis

In the Council's decision, Items #1, #2 and #3 all related to the Petitioner's wetlands and vernal pool investigations at the Site. Attached hereto as **Exhibit 6** is the Wetlands Impact Assessment, which includes a Wetlands Verification letter as an exhibit thereto that was conducted on October 23, 2020. In addition, attached hereto as **Exhibit 7** is the Invasive Species Planting Management Plan, detailing the steps that Lodestar will undertake to prevent the spread of invasive species at the Site and planting plan to restore wetlands functions at the two (2) proposed wetland crossings. As noted in VHB's Wetlands Impact Assessment, Lodestar is now proposing a mitigation to impact ratio of 3 to 1 at the Project.

C. DEEP Dam Safety

As requested in the Council's Decision Item #4, Lodestar has submitted the revised plans to the DEEP Dam Safety division, as evidenced by the e-mail correspondence to the Dam Safety division attached hereto as **Exhibit 8**.

D. Stormwater Detention Basins and Wetlands Setbacks

In the Council's Decision, Item #5 noted concerns with the location of the stormwater detention basin and related wetlands setbacks. As can be seen from **Exhibits 2, 3 and 4**, Lodestar has undertaken significant Site redesign in order to provide a minimum one hundred foot (100') setback of the array from all wetlands at the Site, as specifically requested by the Council. In addition, the single stormwater detention basin has been re-designed to now provide four (4) separate stormwater quality/detention basins. With these revisions, the Project now maintains an undisturbed vegetative buffer to the wetlands as specifically requested by the Council.

E. Hydrological Effects on the Eastern Wetlands and Vernal Pools

In the Council's Decision, Item #6 referenced that Lodestar had provided insufficient information pertaining to the potential hydrological effects on the eastern wetlands and associated vernal pools due to the diversion of overland stormwater flows from the eastern drainage to the western drainage area of the Site. As noted above and in **Exhibit 4** hereto, Lodestar has revised the Site plans so that there is no diversion of overland stormwater flows from different watersheds, thereby alleviating this concern raised by the Council. In addition, VHB has provided a Wetland Resource and Vernal Pool figure as part of the Wetland Assessment report that demonstrates a lack of adverse impacts to the vernal pools primarily due to the minimal proposed disturbance to the critical terrestrial habitats and no impact to the vernal pool envelopes.

F. Placement of Wetland Detention Basin Outlet Structures

The Council noted the placement of the wetland detention basin outlet structures in an area where they may be subject to periodic flooding that could undermine riprap aprons and outlet piping as concern #7 of the Council's Decision. As discussed herein and has shown in **Exhibit 3** and **Exhibit 4**, Lodestar has redesigned all stormwater controls and elements of the Site to now include four (3) stormwater quality basins rather than the single, larger basin originally proposed. In addition, the outlet structures have been relocated and re-designed so that they are not located in areas that may be prone to periodic flooding.

G. U.S. Army Corps of Engineer Self-Verification

Finally, the Council noted that, due to the square footage of wetland impact proposed by the Project, the Project was required to submit a self-verification submission to the U.S. Army Corps of Engineers. Attached hereto as **Exhibit 9** is the self-verification form submitted by Lodestar to the U.S. Army Corps of Engineers.

V. **Conclusion**

For the foregoing reasons, Lodestar respectfully requests that the Council reopen the Petition No. 1398 proceeding, modify the Decision, and issue a Declaratory Ruling for the proposed Project.

Respectfully submitted,

Petitioner
LSE PICTOR LLC

By: Carrie Larson Ortolano
Jeffrey J. Macel, Manager
Carrie Larson Ortolano, Associate General Counsel
℅ Lodestar Energy LLC
40 Tower Lane, Suite 201
Avon, CT 06001

EXHIBIT 1

TOWN OF WINCHESTER – CITY OF WINSTED

Town Hall – 338 Main Street

WINSTED, CONNECTICUT 06098

OFFICE OF THE TOWN MANAGER

January 12, 2021

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

RE: LSE Pictor LLC ("Lodestar Energy") Petition for Declaratory Ruling pursuant to Connecticut General States § 4-7176 and § 16-50k for the proposed construction, operation and maintenance of a 1.99 MW AC ground-mounted solar photovoltaic electric generating facility to be located at Platt Hill Road, Winchester, CT

Dear Attorney Bachman:

I am writing this letter to express the Town of Winchester's support for Lodestar Energy's 1.99 MW AC solar photovoltaic facility to be located at 100 Platt Hill Road in Winchester, Connecticut (the "Site"). As you are aware, the Siting Council has the formal approval associated with the siting of any utility facility and the petitioner is appearing before the Siting Council to address any issues and questions the Council and its staff deems appropriate. As you are further aware, petitioner previously submitted petition #1398, which was denied without prejudice by the Siting Council on September 24, 2020. This project is a part of the State's on-going efforts to address the fragile power supply serving our area. The Town of Winchester shares the state and regional concerns about the significant electric generation capacity shortage projected for northern Connecticut.

Representatives of Lodestar Energy have met on a number of occasions with Town of Winchester staff and other local organizations since the fall of 2019 through the present. Lodestar Energy has kept town officials apprised of the status of the proposed project. It is our understanding that, as a result of the September 24th denial, Lodestar Energy has made significant changes to the design of the project to address the concerns previously raised by the Siting Council, the Town and neighbors.

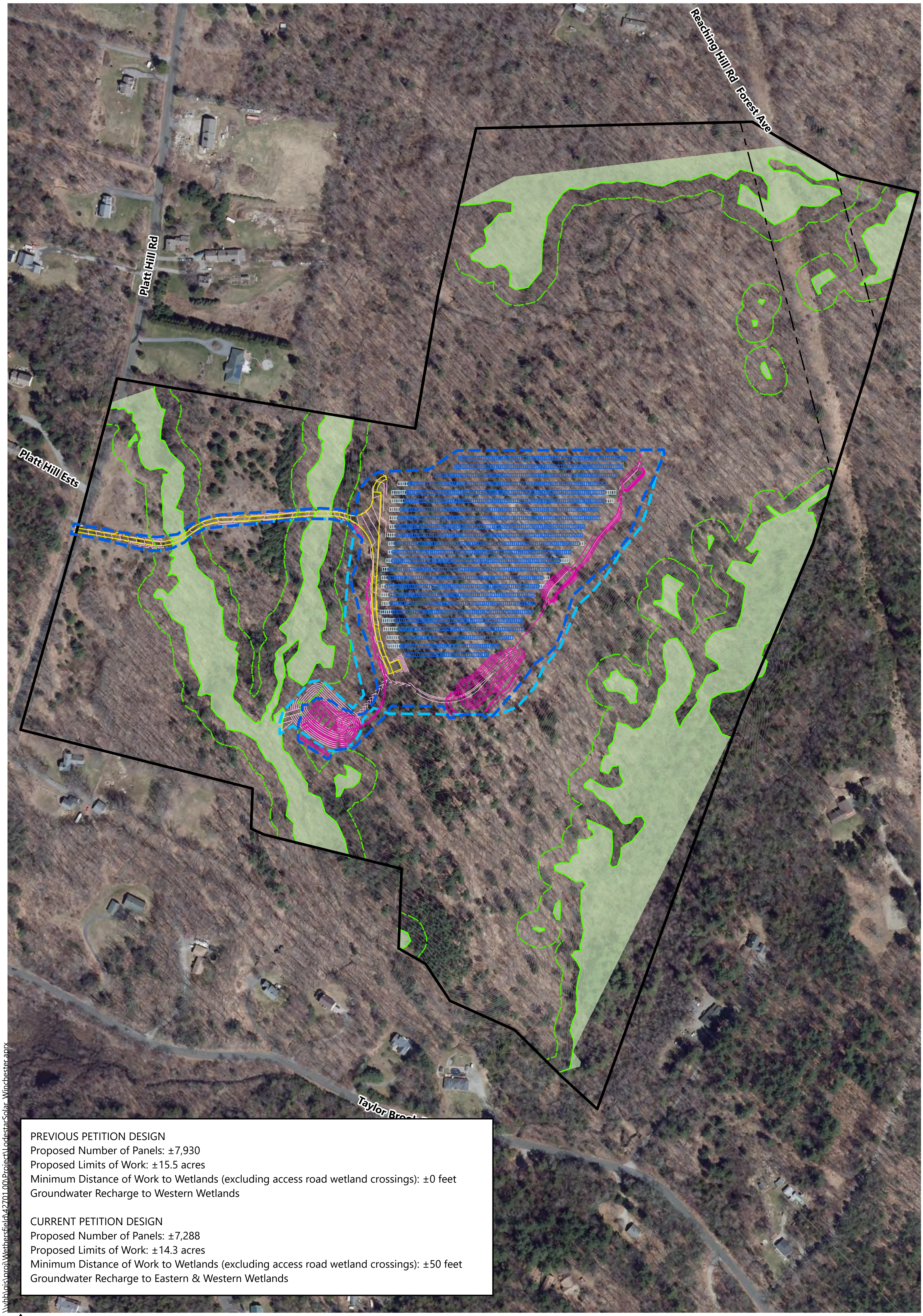
The Town of Winchester supports the proposed facility at the Site. Due to the location and topography of the Site, we agree with Lodestar Energy that there will be little to no impact to abutting property owners and surrounding area. We are confident that Lodestar Energy will continue to cooperate with the Town throughout the construction and implementation phases of this Project and it will be of great benefit to the Town of Winchester. Therefore, the Town of Winchester writes to confirm its support of the re-submission of this petition and urge the Siting Council to approve the re-filed petition as submitted. Please let me know if you have any questions at 860-738-6962.

Sincerely,

Robert Geiger

Robert Geiger
Town Manager

EXHIBIT 2



PREVIOUS PETITION DESIGN
Proposed Number of Panels: ±7,930
Proposed Limits of Work: ±15.5 acres
Minimum Distance of Work to Wetlands (excluding access road wetland crossings): ±0 feet
Groundwater Recharge to Western Wetlands

CURRENT PETITION DESIGN
Proposed Number of Panels: ±7,288
Proposed Limits of Work: ±14.3 acres
Minimum Distance of Work to Wetlands (excluding access road wetland crossings): ±50 feet
Groundwater Recharge to Eastern & Western Wetlands

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0 150 300 600 Feet

LSE Pictor LLC - Platt Hill Road | Winchester, CT

Project Design Comparison

- Property Boundary
- Eversource Easement
- 50' Wetland Setback
- Delineated Wetland Edge
- Wetland Resource Area
- Original Grading
- Original Limit of Work
- Original Panel Layout
- Original Road
- Proposed Grading
- Proposed Limit of Work
- Proposed Panel Layout
- Proposed Road

EXHIBIT 3

SITE DEVELOPMENT PLANS
PROPOSED 1.99 MW SOLAR ARRAY
PLATT HILL ROAD
WINCHESTER, CONNECTICUT
PREPARED FOR LSE PICTOR, LLC

LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

TRINKAUS ENGINEERING, LLC
CIVIL ENGINEERS
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SOUTHBURY, CONNECTICUT 06488
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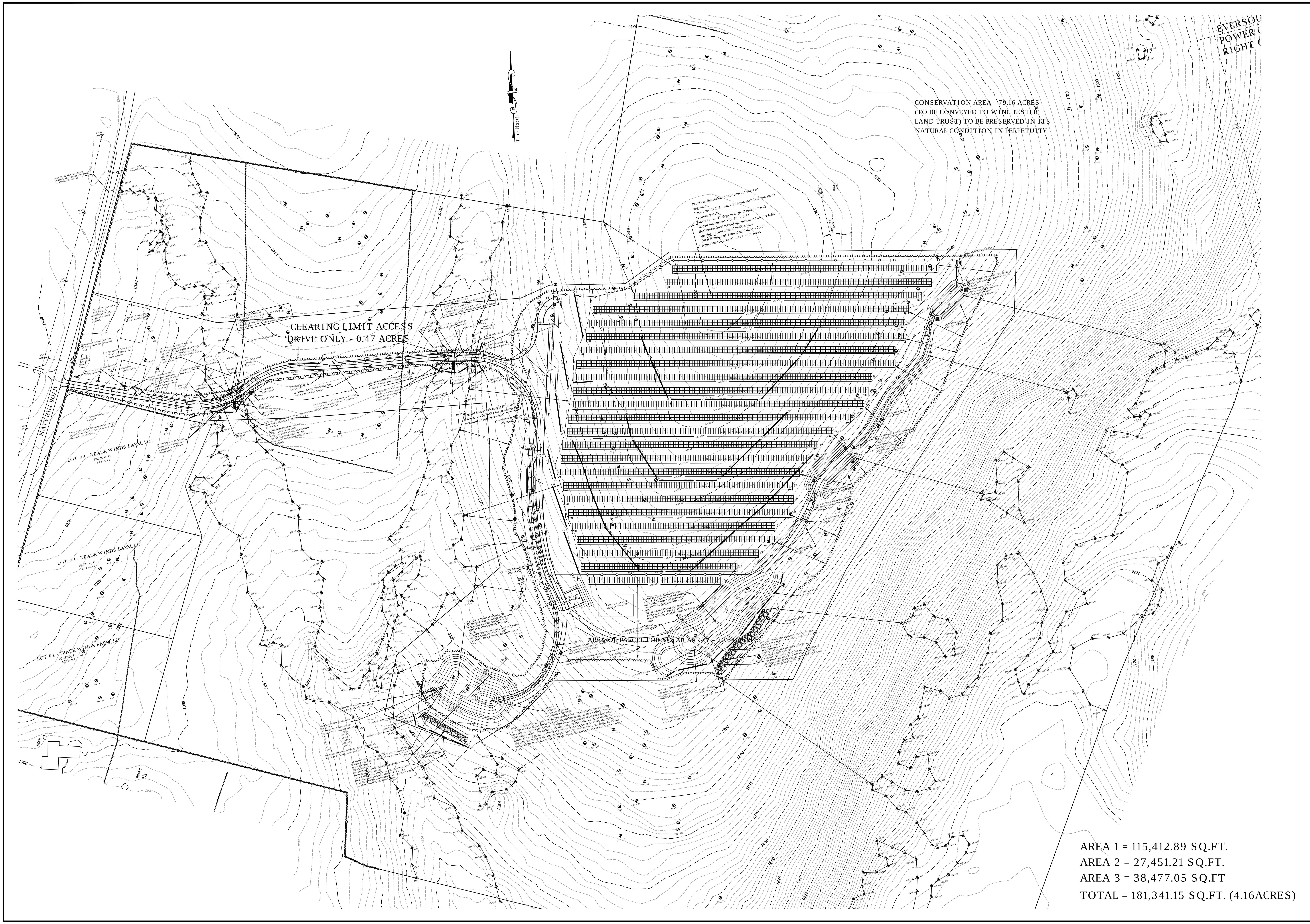
Website: http://www.trinkausengineering.com



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LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

OVERALL PLAN
SHEET 1 OF 16
PROJECT #032-2019
SCALE: 1"= 80'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

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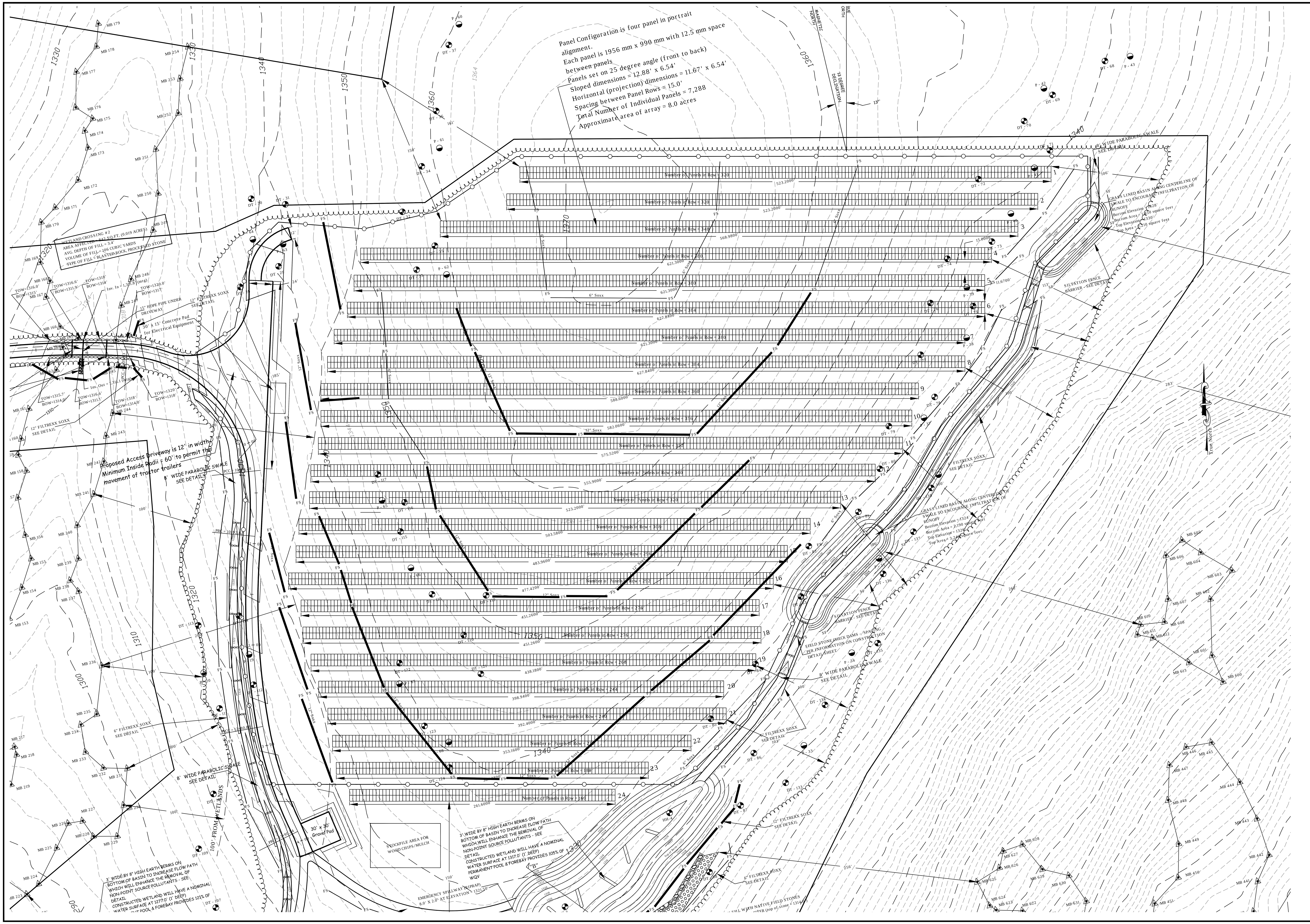
LOW IMPACT SUSTAINABLE DEVELOPMENT ENGINEERING

SITE DEVELOPMENT PLAN
SHEET 2 OF 16
PROJECT #032-2019
SCALE: 1"= 40'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT



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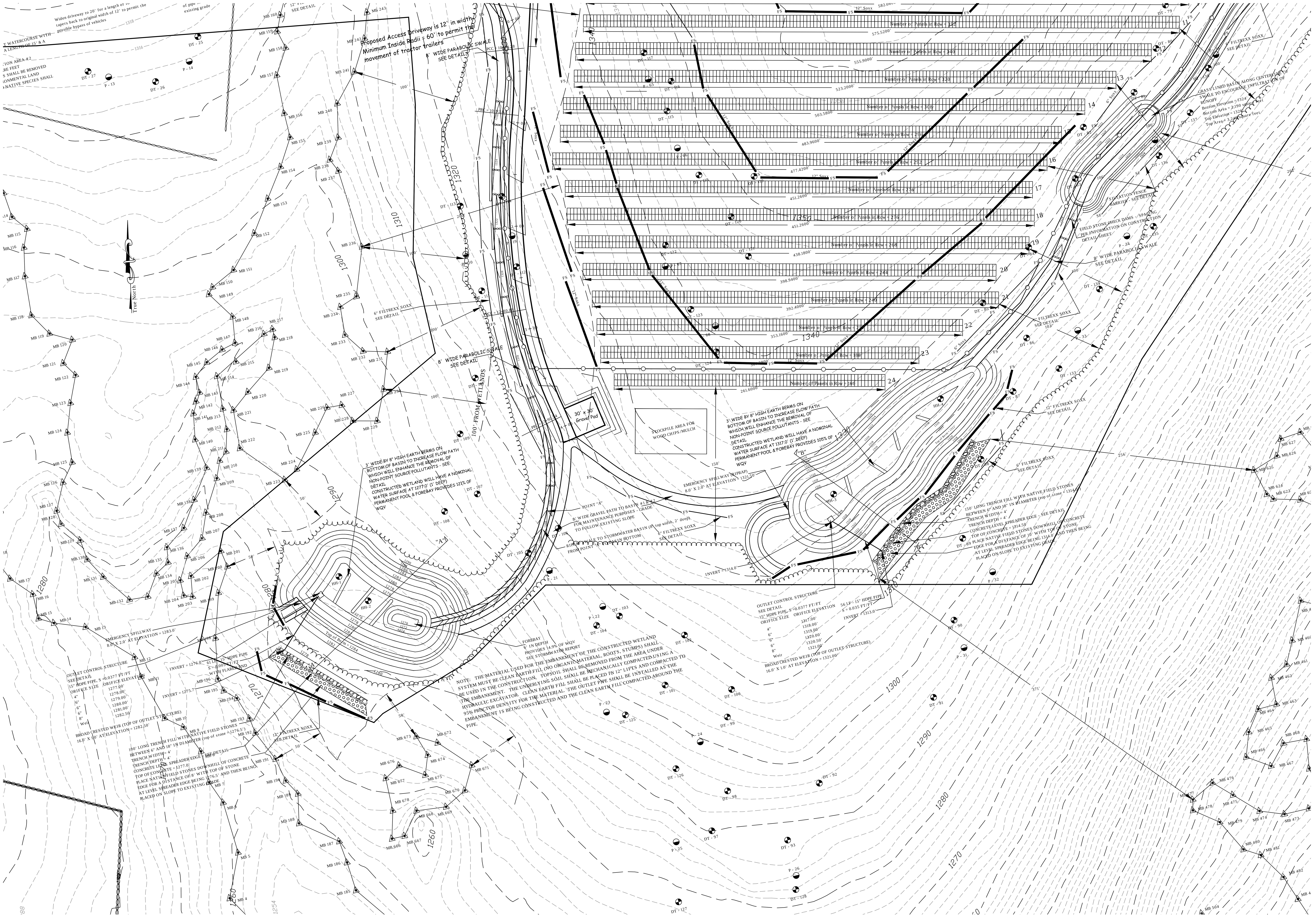
LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

SITE DEVELOPMENT PLAN
SHEET 3 OF 16
PROJECT #032-2019
SCALE: 1"= 40'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT



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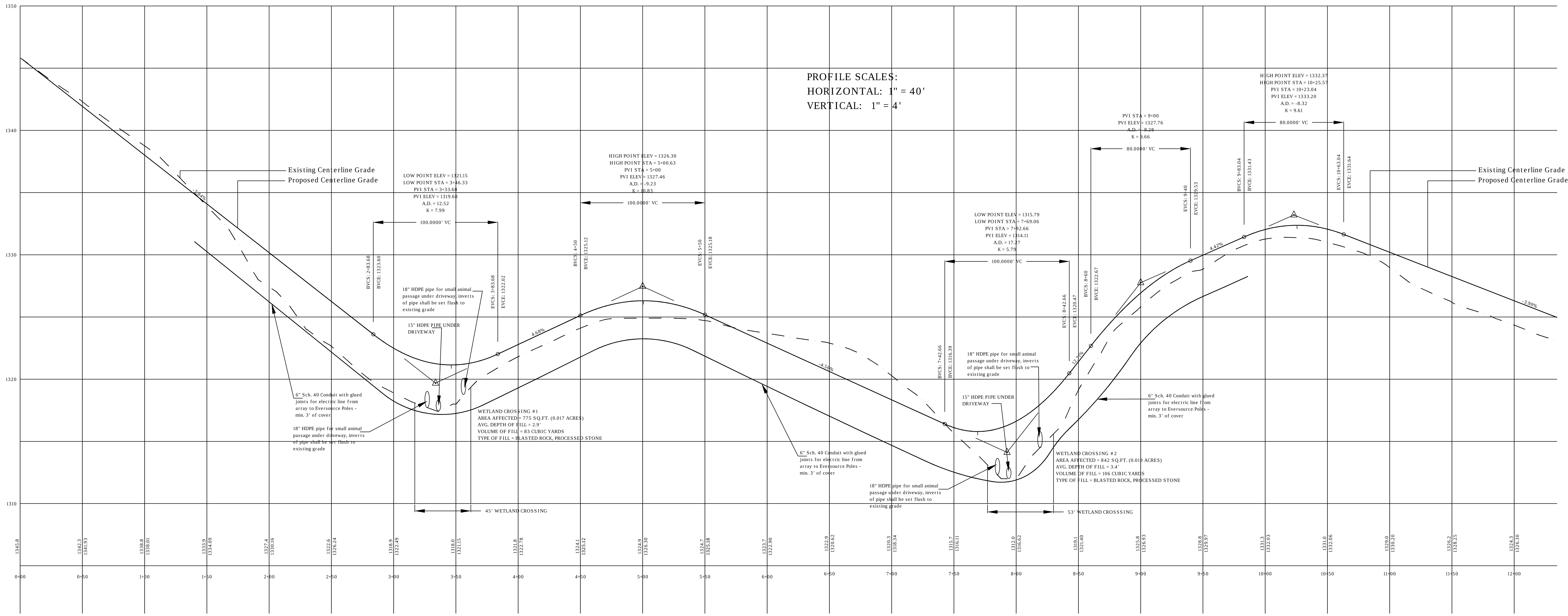
SITE DEVELOPMENT PLAN
SHEET 4 OF 16
PROJECT #032-2019
SCALE: 1"= 40'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT



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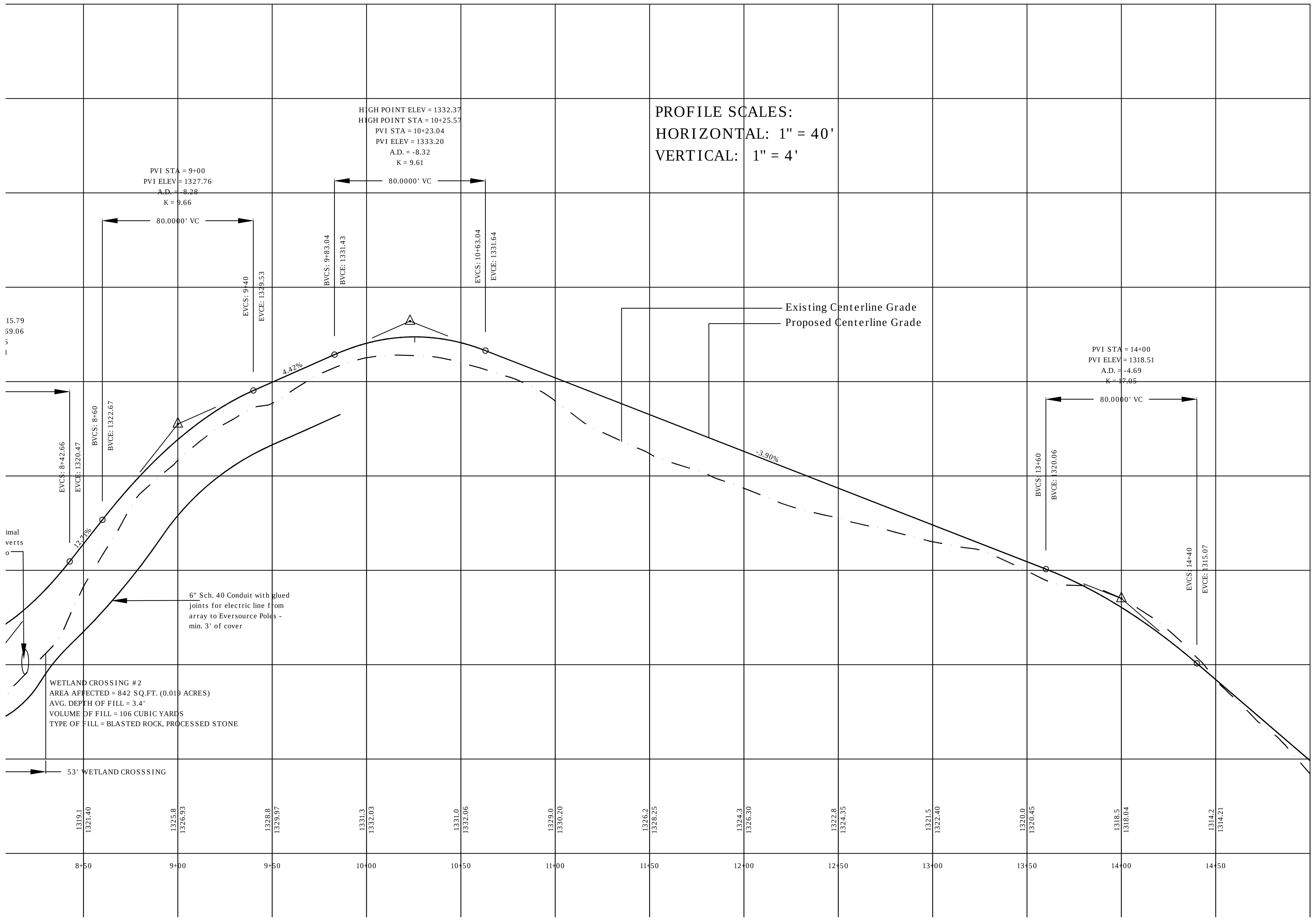
LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

PROFILE OF ACCESS DRIVEWAY
SHEET 5 OF 16
PROJECT #032-2019
SCALES AS NOTED
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT



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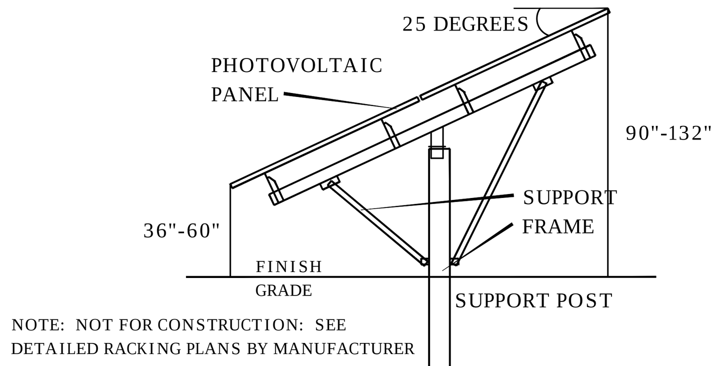
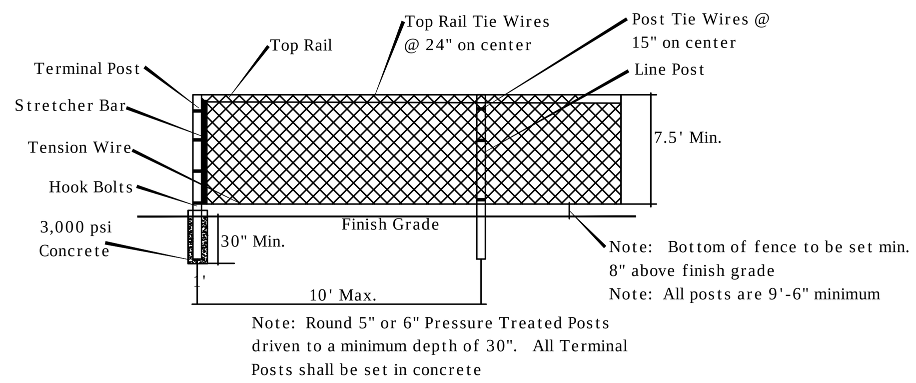
LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

PROFILE OF ACCESS DRIVEWAY
SHEET 6 OF 16
PROJECT #032-2019
SCALES AS NOTED
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT



CROSS SECTION OF TYPICAL RAKING SYSTEM
NOT TO SCALE

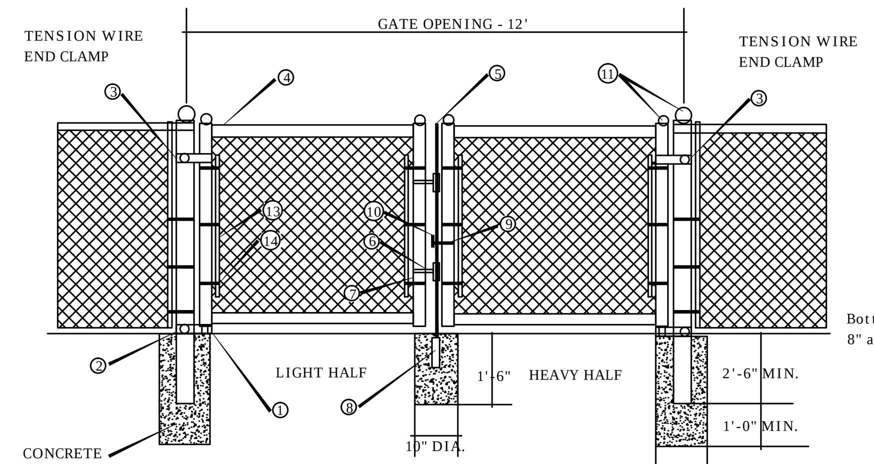


CONSTRUCTION NOTES:
1. MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE MANUFACTURER'S SPECIFICATIONS.
2. ALL POSTS SHALL BE INSTALLED VERTICALLY.
3. GRADUATED MESH OPENING UP TO 6" WIDE SPACES (SMALL SPACES AT BOTTOM TO KEEP SMALL ANIMALS OUT) SIZES 6" WIDE SPACING - CLASS 3, 6 LINES OF 3", 2 LINES OF 4", 2 LINES OF 5" (HOT DIP GALVANIZED - WOVEN WIRE)

SHAPE, SIZE AND WEIGHT REQUIREMENTS FOR FENCE POSTS AND RAILS

ITEM	SHAPE	OUTSIDE DIMENSIONS (INCHES)	WEIGHT LBS/LF
TERMINAL POST	ROUND	5-6"	9.37
	**ROUND	5-6"	9.37
LINE POST	ROUND	1.90	2.72
	*ROUND	1.90	2.28
TOP & BRACE RAILS	ROUND	1.66	2.27
	* ROUND	1.66	1.84

* GRADE B HIGH STRENGTH STEEL
** INCLUDES END, CORNER, ANGLE, INTERSECTION AND INTERMEDIATE BRACED POSTS



GATE DETAIL
NOT TO SCALE

GATE FRAME MEMBERS (SIZE & WEIGHT)

GATE FRAME	OUTSIDE DIMENSIONS (")	WEIGHT (LBS/LF)
ROUND	1.66	2.27
*ROUND	1.66	1.84

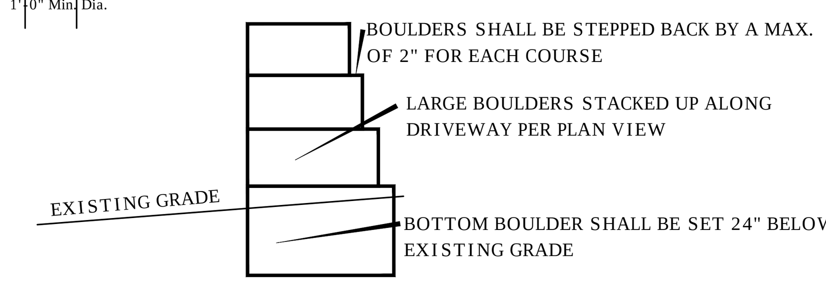
* GRADE B HIGH STRENGTH STEEL

GATE POST (SIZE & WEIGHT)

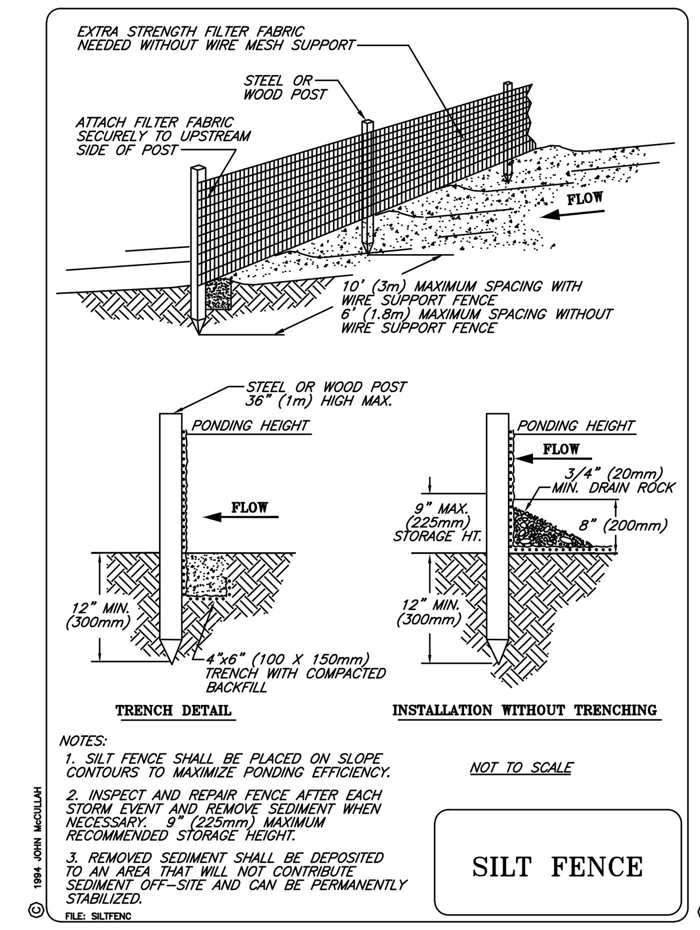
GATE WIDTH	OUTSIDE DIMENSIONS (")	WEIGHT (LBS/LF)
ROUND	2.875	5.79
*ROUND	2.875	4.64

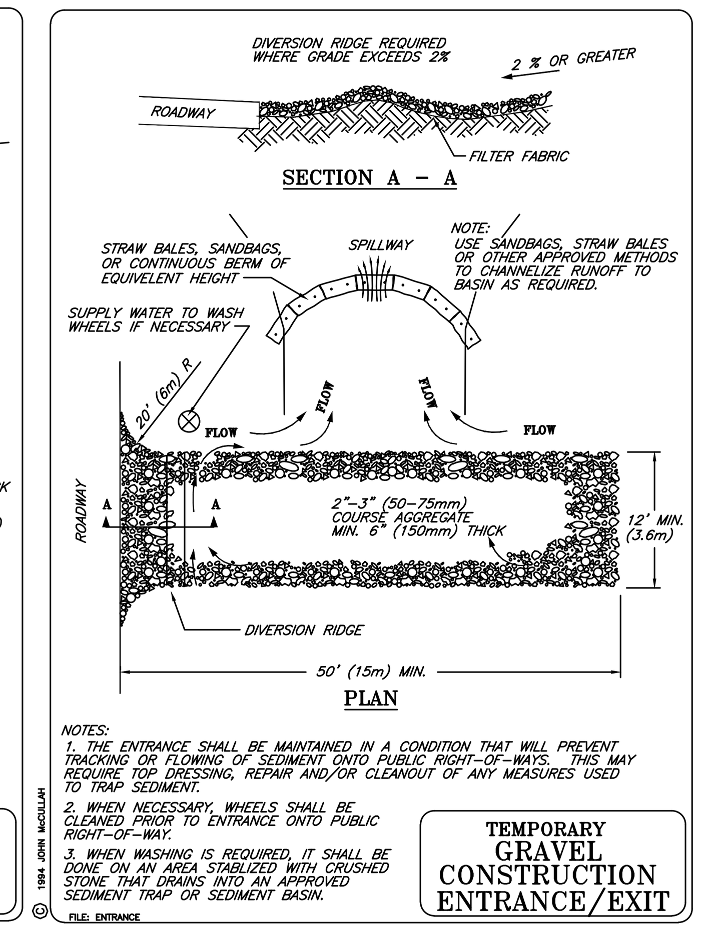
* GRADE B HIGH STRENGTH STEEL

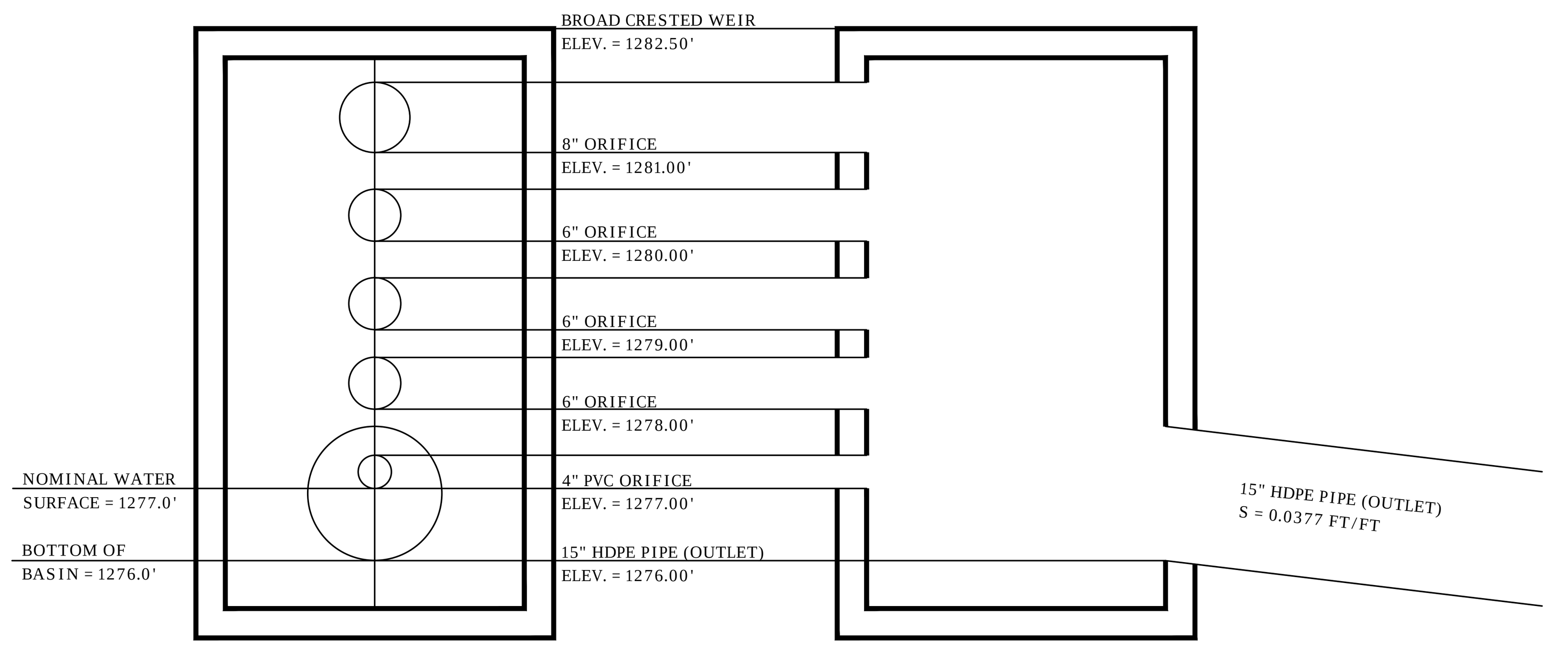
Part #	Description	Quantity
1	Straight Plug	2
2	Bottom Hinge	2
3	Top Hinge	2
4	Corner Elbow	8
5	Plunger Rod	1
6	Latch Fork	2
7	Fork Catch	2
8	Plunger Rod Catch	1
9	Lock Keeper Guide	1
10	Lock Keepter	1
11	Ornamental Tops	6
12	Truss Rods	4
13	Stretcher Bar	4
14	Hook Bolts	12



TYPICAL CROSS SECTION OF BOULDER RETAINING WALL - NOT TO SCALE

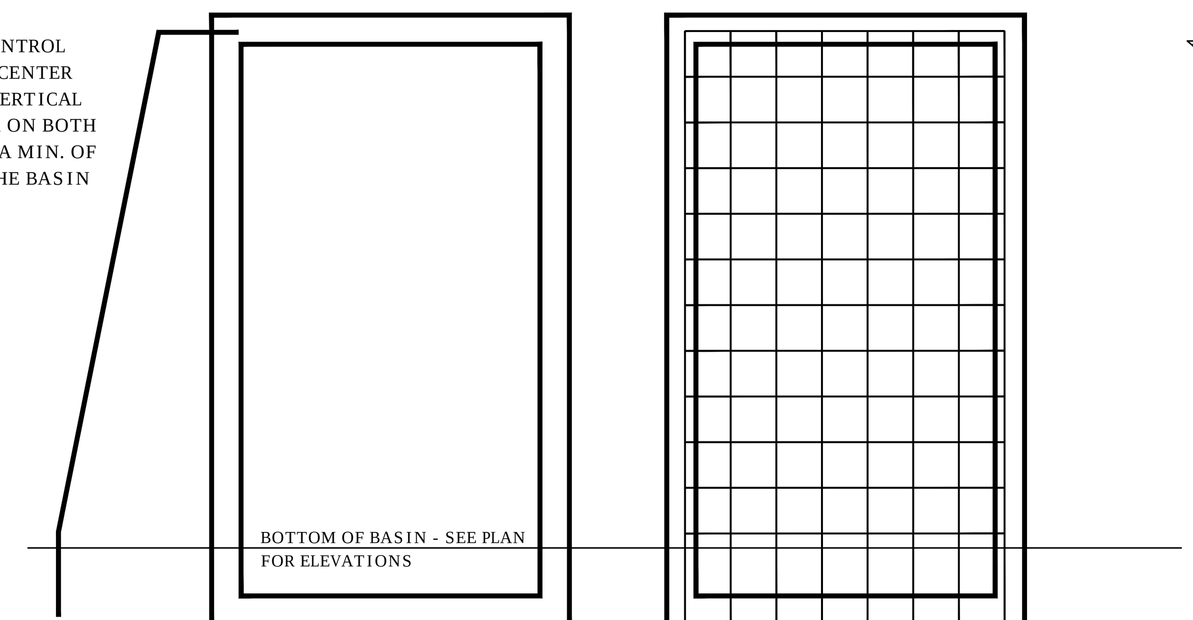




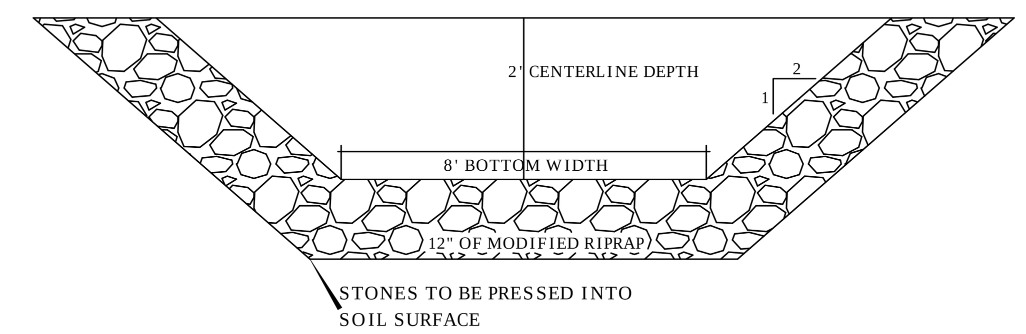


DETAIL OF OUTLET CONTROL STRUCTURE (BASIN #1)
NOT TO SCALE

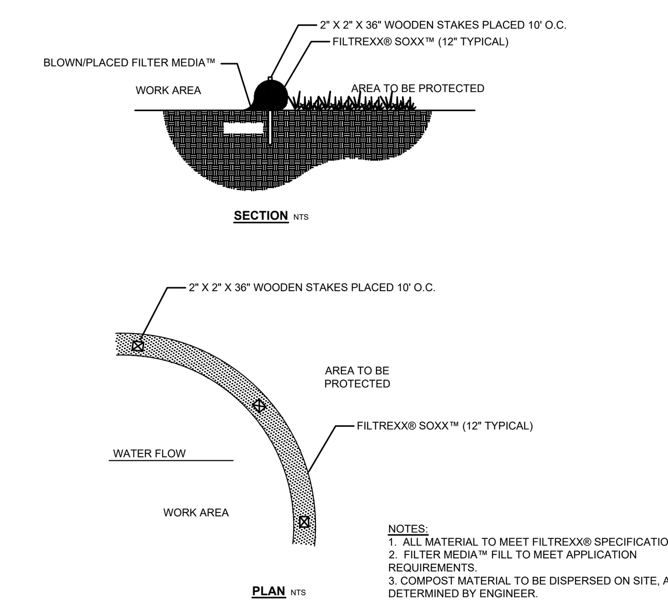
TRASH RACK FOR OUTLET CONTROL STRUCTURE: #3 RBAR AT 4" CENTER TO CENTER SPACING BOTH VERTICAL & HORIZONTAL - WRAP RBAR ON BOTH SIDES - RBAR SHALL BE SET A MIN. OF 12" INTO THE BOTTOM OF THE BASIN



DETAIL OF TRASH RACK FOR OUTLET CONTROL STRUCTURE (BASIN #1 & BASIN #2 - NOT TO SCALE)

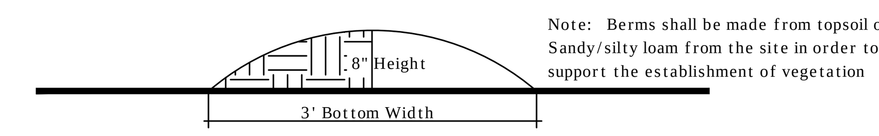


SECTION OF EMERGENCY SPILLWAY
NOT TO SCALE

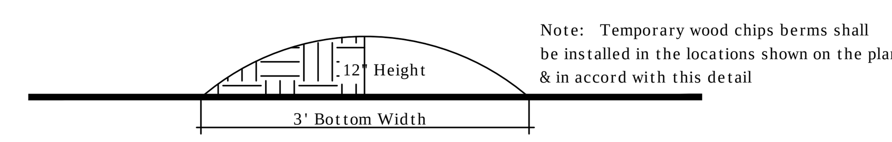


FILTREXX® SEDIMENT CONTROL
NTS

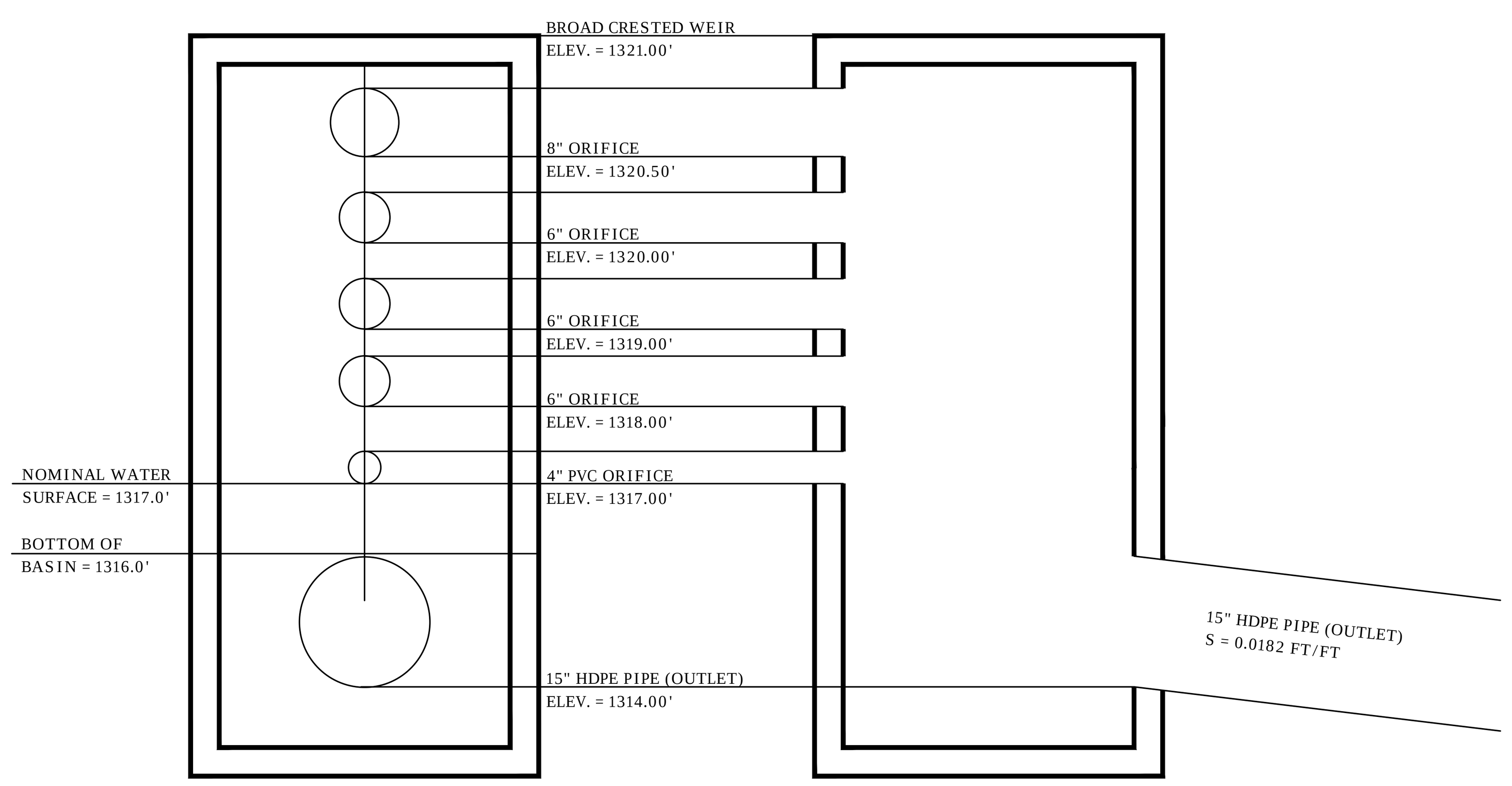
ALTERNATIVE COMPOST SOCKS WHICH ARE AN APPROVED EQUIVALENT TO THE FILTREXX SOXX MAY BE USED



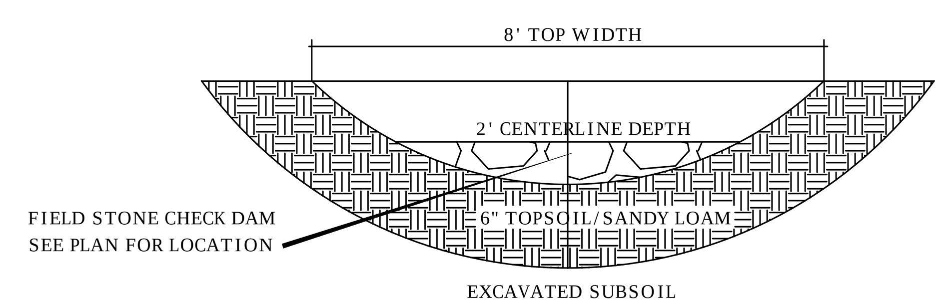
DETAIL OF EARTH BERMS IN CONSTRUCTED WETLAND SYSTEM - NOT TO SCALE



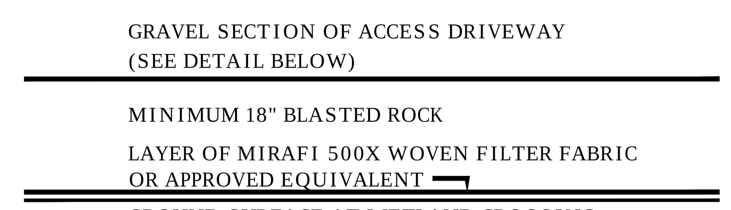
DETAIL OF TEMPORARY WOOD CHIP BERMS
NOT TO SCALE



DETAIL OF OUTLET CONTROL STRUCTURE (BASIN #2)
NOT TO SCALE

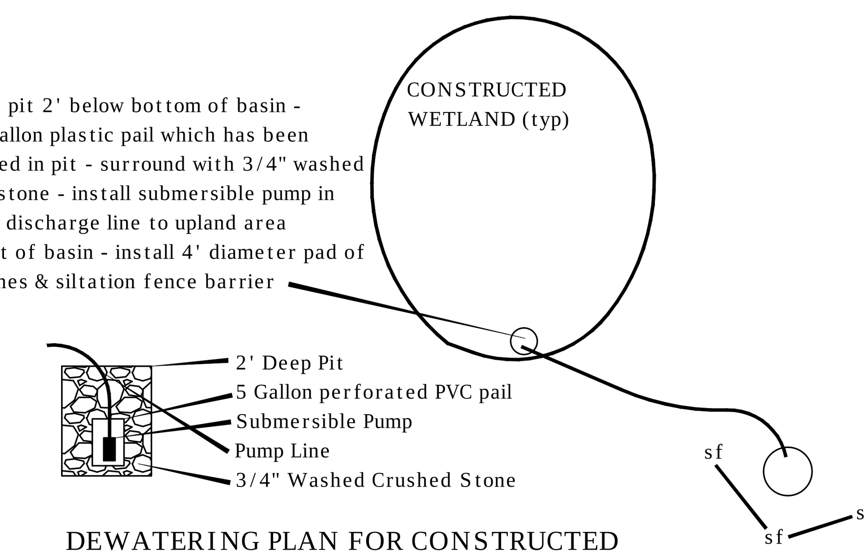


CROSS SECTION OF PARABOLIC GRASS SWALE ALONG EAST & WEST SIDES OF SOLAR ARRAY
NOT TO SCALE

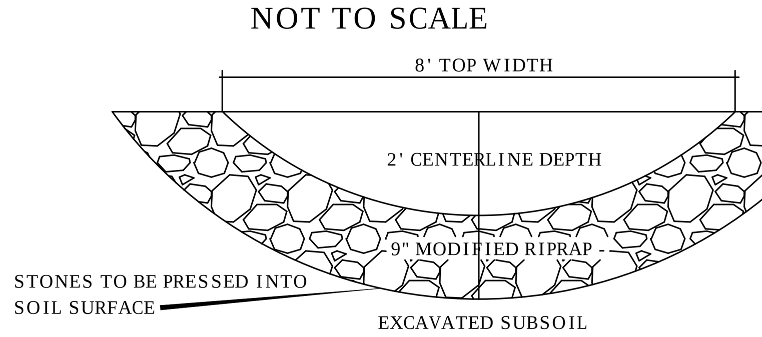


SECTION OF STONE ENVELOPE FOR WETLAND CROSSING
NOT TO SCALE

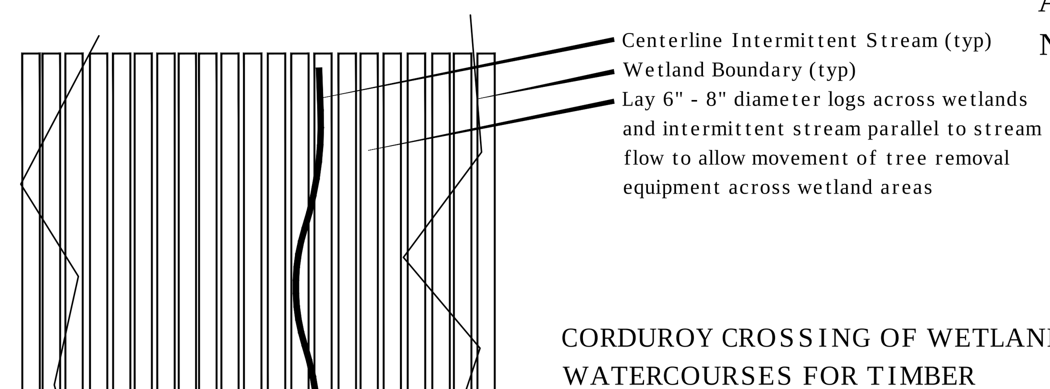
Excavate pit 2' below bottom of basin - place 5 gallon plastic pail which has been perforated in pit - surround with 3/4" washed crushed stone - install submersible pump in pail - run discharge line to upland area southeast of basin - install 4' diameter pad of field stones & siltation fence barrier



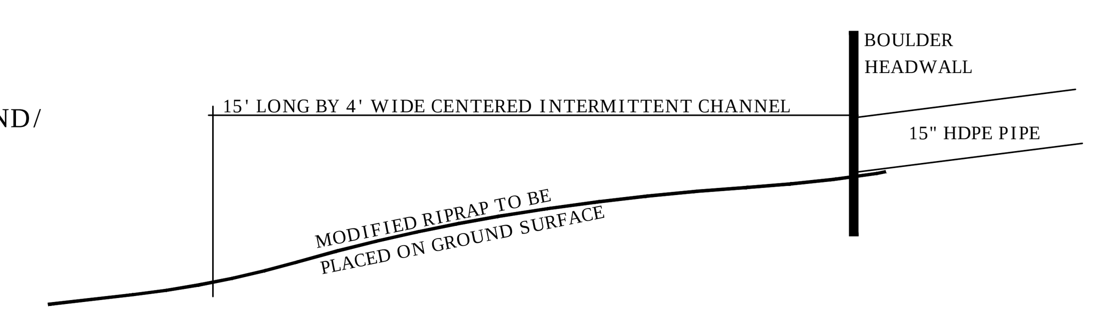
DEWATERING PLAN FOR CONSTRUCTED WETLANDS IF REQUIRED
NOT TO SCALE



CROSS SECTION OF PARABOLIC RIPRAP SWALE FROM SOLAR ARRAY TO CONSTRUCTED WETLANDS
NOT TO SCALE



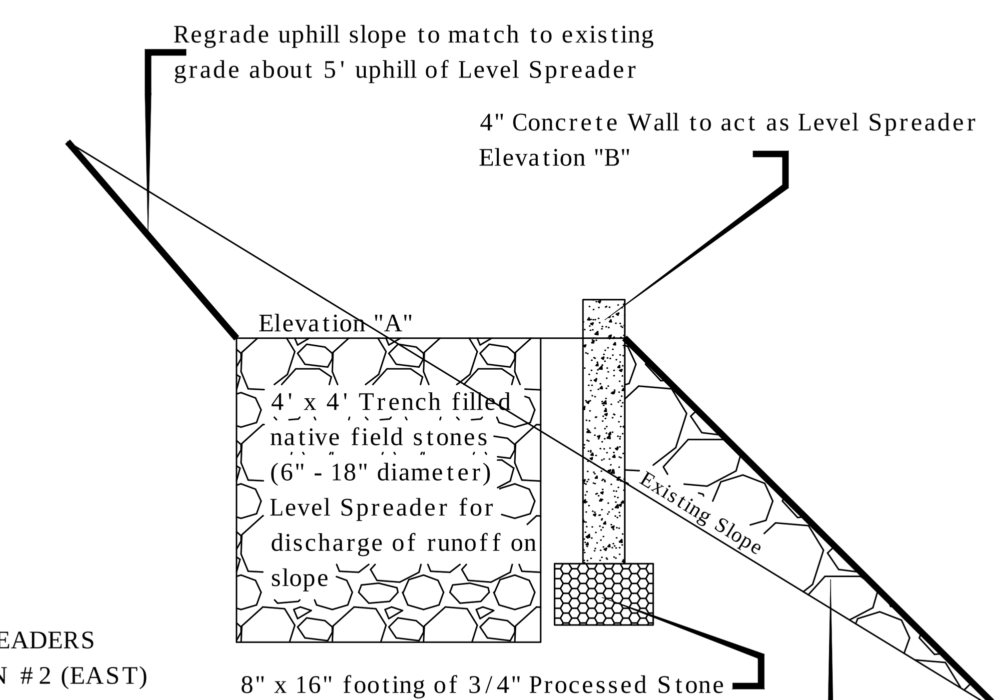
CORDUROY CROSSING OF WETLAND/ WATERCOURSES FOR TIMBER CLEARING
NOT TO SCALE



TYPICAL SECTION OF MODIFIED RIPRAP OUTLET PROTECTION AT WETLAND CROSSINGS
NOT TO SCALE

Regrade uphill slope to match to existing grade about 5' uphill of Level Spreader

4" Concrete Wall to act as Level Spreader Elevation "B"

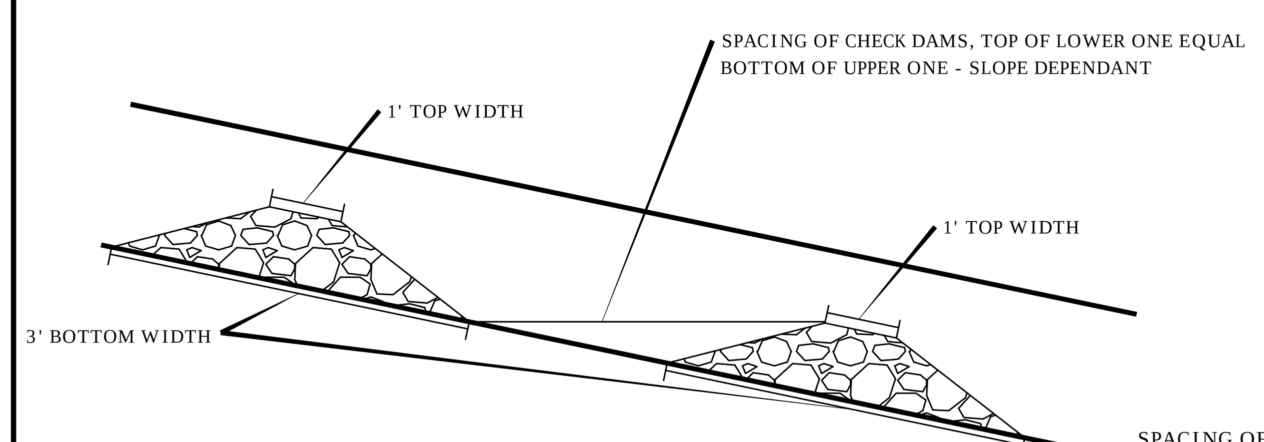


8" x 16" footing of 3/4" Processed Stone compacted to 95% Proctor Density)
Place native field stones downhill of Concrete Wall for a distance of 10'
Top of Stone at Concrete Wall = Elevation "C"

TABLE OF ELEVATIONS FOR LEVEL SPREADERS

	BASIN #1 (WEST)	BASIN #2 (EAST)
Elevation "A"	1276.50'	1314.0'
Elevation "B"	1277.00'	1314.50'
Elevation "C"	1276.50'	1314.0'

Detail of Level Spreader - Not to Scale

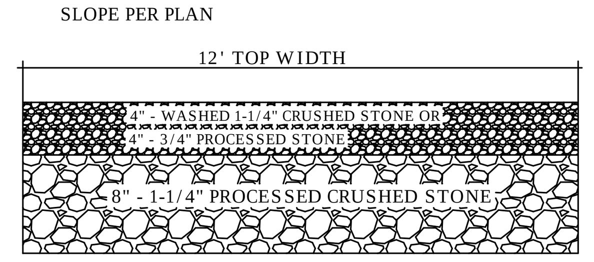


SPACING OF CHECK DAMS

SLOPE	SPACING
1%	100'
2%	50'
3%	33'
4%	25'
5%	20'
6%	16'
7%	14'

CROSS SECTION OF PARABOLIC GRASS SWALE WITH FIELD STONE CHECK DAM
NOT TO SCALE

NOTE: TOP SURFACE SHALL HAVE 2.5% CROSS SLOPE PER PLAN



CROSS SECTION OF ACCESS DRIVEWAY
NOT TO SCALE

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LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

CONSTRUCTION DETAILS
SHEET 7 OF 16
PROJECT #032-2019
SCALES AS NOTED
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

ZONE OF SITE AND SURROUNDING AREA: RR - RURAL RESIDENTIAL
SOURCE: TOWN OF WINCHESTER ZONING MAP

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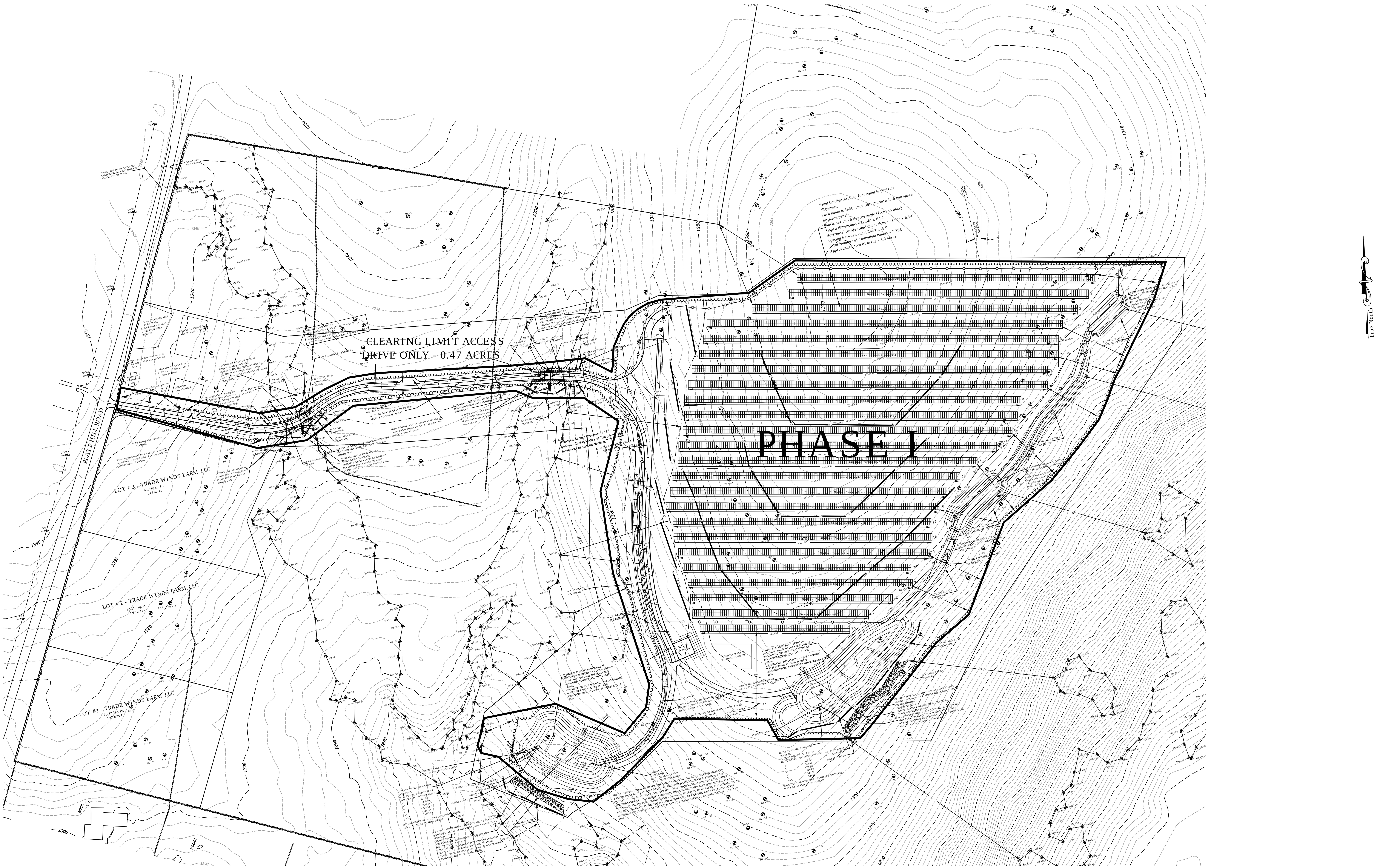
LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

VICINITY MAP
SHEET 8 OF 16
PROJECT #032-2019
SCALE: 1" = 250'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

PHASE I:

1. FIELD STAKING OF CLEARING LIMIT FOR ACCESS DRIVEWAY AND SOLAR ARRAY.
2. CUTTING OF TREES AND BRUSH WITHIN CLEARING LIMITS. BRUSH SHALL BE CHIPPED TO BE USED AS TEMPORARY MULCH DURING THE CONSTRUCTION PERIOD AS NEEDED.
3. INSTALLATION OF EROSION CONTROL BARRIERS ALONG ACCESS PATH AND PERIMETER OF SOLAR ARRAY/SWALES/CONSTRUCTED WETLAND BASIN.



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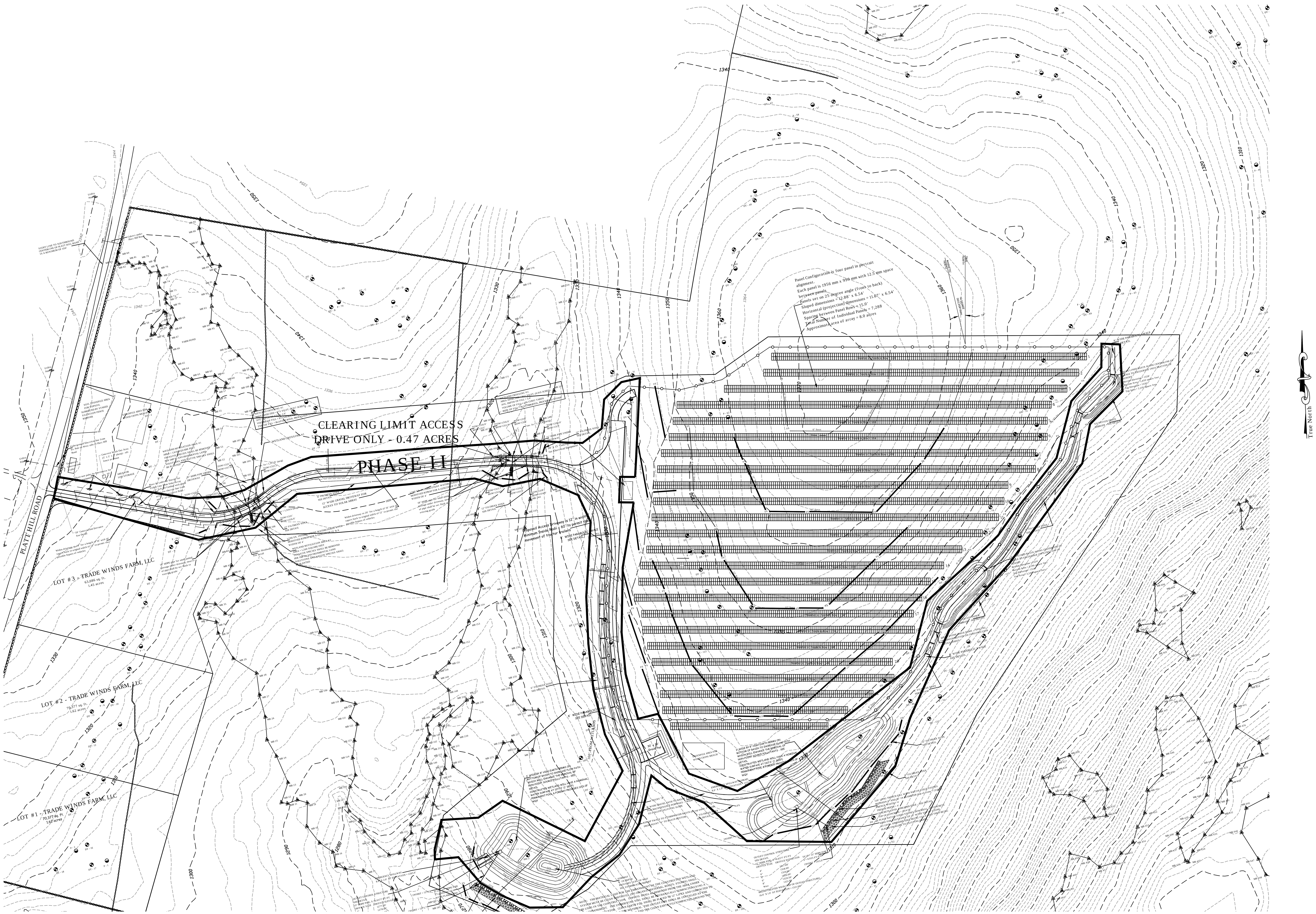
LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

PHASING PLAN -PHASE I
SHEET 9 OF 16
PROJECT #032-2019
SCALE: 1" = 80'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

PHASE II:

1. REMOVAL OF STUMPS WITHIN AREA OF ACCESS DRIVEWAY, EAST AND WEST SWALES AND CONSTRUCTED WETLAND SYSTEM.
2. DISPOSAL OF STUMPS OFF-SITE OR GRINDING OF THEM INTO MULCH ON-SITE.
3. CONSTRUCTION OF ACCESS DRIVEWAY FROM PLATT HILL ROAD TO SOUTHERN END INCLUDING TWO INTERMITTENT STREAM CROSSINGS.
4. AFTER ACCESS DRIVEWAY HAS BEEN CONSTRUCTED AND SIDE SLOPES GRADED, INSTALL PARABOLIC SWALES ON EAST & WEST SIDES OF PROPOSED SOLAR ARRAY.
5. CONSTRUCT COMBINED SWALE AND CONSTRUCTED WETLAND SYSTEM PER PLAN AND DETAILS. SEED ALL DISTURBED AREAS WITH SPECIFIED SEED MIXTURE ON APPROVED PLANS.



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LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

PHASING PLAN -PHASE II
SHEET 10 OF 16
PROJECT #032-2019
SCALE: 1" = 80'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

PHASE III A:

1. INSTALLATION OF EROSION CONTROL MEASURES FOR CONSTRUCTION OF SOLAR ARRAY IN PHASE III A. ALL EROSION MEASURES TO BE INSTALLED IN ACCORDANCE WITH APPROVED PLANS AND DETAILS (FILTREXX SOXX AND WOOD CHIP BERMS PER PLAN).
2. USE YORK RAKE OR SIMILAR EQUIPMENT TO REMOVE LOOSE BRUSH AND SCARIFY GROUND SURFACE. INSTALL STEEL RACKING SYSTEM FOR SOLAR PANELS PER MANUFACTURER'S SPECIFICATIONS.
3. INSTALL SOLAR PANELS ON RACKING SYSTEM.
4. SEED AREAS UNDER AND BETWEEN ROWS OF SOLAR PANELS WITH SPECIFIED SEED MIXTURE.
5. EROSION CONTROL MEASURES TO REMAIN IN PLACE UNTIL PERMANENT VEGETATIVE COVER HAS BEEN ESTABLISHED OVER THE DISTURBED AREA.
6. 6" FILTREXX SOXX & WOOD CHIP BERMS REMAIN IN PLACE TO SLOW RUNOFF DOWN UNTIL VEGETATION GROWS UP.

PHASE III B:

1. INSTALLATION OF EROSION CONTROL MEASURES FOR CONSTRUCTION OF SOLAR ARRAY IN PHASE III B. ALL EROSION MEASURES TO BE INSTALLED IN ACCORDANCE WITH APPROVED PLANS AND DETAILS (FILTREXX SOXX AND WOOD CHIP BERMS PER PLAN).
2. USE YORK RAKE OR SIMILAR EQUIPMENT TO REMOVE LOOSE BRUSH AND SCARIFY GROUND SURFACE. INSTALL STEEL RACKING SYSTEM FOR SOLAR PANELS PER MANUFACTURER'S SPECIFICATIONS.
3. INSTALL SOLAR PANELS ON RACKING SYSTEM.
4. SEED AREAS UNDER AND BETWEEN ROWS OF SOLAR PANELS WITH SPECIFIED SEED MIXTURE.
5. EROSION CONTROL MEASURES TO REMAIN IN PLACE UNTIL PERMANENT VEGETATIVE COVER HAS BEEN ESTABLISHED OVER THE DISTURBED AREA.
6. 6" FILTREXX SOXX & WOOD CHIP BERM REMAIN IN PLACE TO SLOW RUNOFF DOWN UNTIL VEGETATION GROWS UP.

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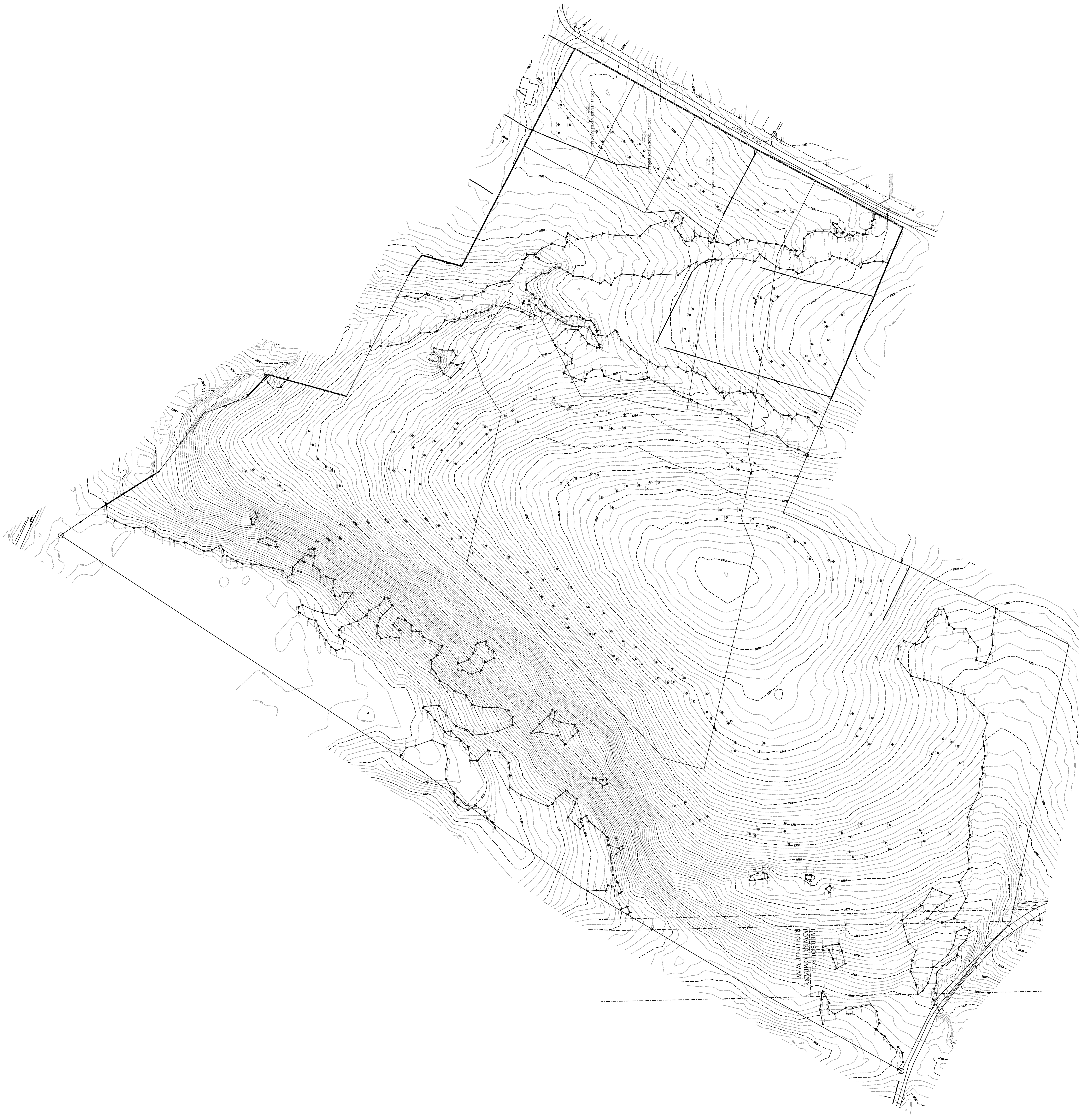
LOW IMPACT SUSTAINABLE DEVELOPMENT TRINKAUS ENGINEERING

PHASING PLAN -PHASE III A & B
SHEET 11 OF 16
PROJECT #032-2019
SCALE: 1" = 80'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT



PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

EXISTING CONDITIONS MAP
SHEET 12 OF 16
PROJECT #032-2019
SCALE: 1" = 150'
DATE: 12/22/20

TRINKAUS ENGINEERING, LLC
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PROPERTY LOCATION: PLATT HILL ROAD -WINCHESTER, CONNECTICUT

1.1 PROJECT DESCRIPTION:

The project proposes the creation of a solar array on a portion of the approved Trade Winds Farm subdivision on Platt Hill Road. The solar array and associated access, equipment, stormwater management facilities, and clearing for solar access will be located on 24.8 acres as shown. The solar array will be 8.0 in size. The remaining land containing 75 acres will be conveyed to the Winchester Land Trust to remain in its natural state for perpetuity. A 12' wide driveway from the east side of Platt Hill Road will provide access to the solar array. Two riprap swales, located to the east and west of the solar array will collect and convey runoff to a constructed wetland system proposed to the southeast of the solar array.

1.2 ESTIMATED DISTURBANCE AREA:

Approximately 8.7 acres will be disturbed for access, solar array and stormwater management. 5.36 acres of trees will be cut down outside the solar array, the stumps left in place and the area seeded with a wildflower see mixture for pollinator habitat.

1.3 EROSION CONTROL MEASURES:

12" high Filtrexx Soxx, siltation fence barriers, anti-tracking pad will be used on this site.
A Construction entrance will be installed at the driveway entrance off Platt Hill Road.

1.4 CONSTRUCTION PHASES:

This project will be done in four phase following the sequence specified below.

1.5 CONSTRUCTION START DATES:

Construction on the site will likely commence within 180 days after all requried local land use approvals have been obtained from the Connecticut Siting Council assuming weather conditions permit. It is anticipated that all work will be completed within 6 months from commencement date.

1.6 DESIGN INFORMATION:

Hydrologic computations and analyses are found in the Stormwater Management Report prepared by this office.

1.7 OTHER PERMITS:

The CT DEEP General Permit for Construction Activities must be obtained by the applicant.

1.8 CONSERVATION PRACTICES:

Use of riprap swales, constructed wetland w/forebay, use of native seed mixtures for stabilization and habitat improvement.

1.9 DOCUMENT LIST:

1. Project Plan Set comprised of Sheet 1 thru 13 of 13

2.1 HYDROLOGIC CALCULATIONS:

Stormwater Management Report

2.2 SOIL TEST RESULTS:

Included in Stormwater Management Report

CONSTRUCTION SEQUENCE:

PHASE I

1. Field delineation of clearing limit for access driveway, stormwater conveyance and treatment systems, solar array and sun exposure area by a licensed land surveyor.
2. Temporary crossings of the two intermittent brooks shall be made using 4-6" diameter trees laid down parallel to the flow path of the intermittent streams to allow for the movement of tree skidders for the cutting and removal of trees.
3. Trees shall be cut down within the staked clearing limits. Whole trees shall be moved using timber skidders to a staging area just off Platt Hill Road. Timber quality logs shall be staked in a pile. All other woody material shall be chipped into a pile for used as a temporary stabilization material on disturbed area if vegetation cannot be established due to weather conditions.
4. No soil disturbance will take place during this phase.

PHASE II

1. Install 12" Filtrexx Soxx along the proposed access driveway, and below portions of the riprap swales and constructed wetland system as shown on the approved plans and in accord with the attached construction detail.
2. Remove stumps from area of access driveway, riprap swales and constructed wetland system. The removed stumps shall be placed temporarily at the edge of the anticipated driveway construction limits.
3. The entrance of the access driveway shall be rough graded and the 50' long construction entrance installated at the inter-section with Platt Hill Road.
4. Topsoil shall be removed from the portion of the driveway from Platt Hill Road to the first intermittent stream. Topsoil shall be placed in stockpile location as shown.
5. Subsoil shall be mechanically compacted by roller or other similar equipment. The base layer of 1-1/4" processed stone shall be placed and mechanically compacted.
6. The culvert and boulder headwalls shall be installed at the first intermittent stream crossing. After the stream crossing, topsoil shall be removed from the area of the driveway up to the second intermittent stream crossing and placed in the stockpile location. The two 18" diameter HDPE pipes for wildlife passage under the driveway shall be installed on both sides of the the 15" HDPE pipe at the centerline of the intermittent stream. The wetland mitigation areas on either side of this crossing shall have all invasive plants removed in accordance with the plan prepared by Environmental Land Solutions. After the invasive plants have been removed, native plants shall be planted in these areas per the Environmental Land Solutions plan to improve the wetland habitat.
7. The same process for the initial section of the driveway shall be repeated for the second intermittent stream crossing.
8. Topsoil shall be removed from the area of the driveway from the second intermittent stream crossing up to the "T" intersection, located just west of the solar array. Topsoil shall be placed in the stockpile location as the driveway constructed in the same manner as discussed above.
9. As the driveway construction reaches the area of the solar array, the previously removed stumps shall be moved to the staging area near Platt Hill Road for chipping into mulch or removal from the site.
10. The vegetated swale along the eastern edge of the solar array shall be installed at this time and in accordance with the details and specifications shown on the plan. Soil removed to ishall be placed on the downhill side of the swale in those areas shown on the plan. The two grassed depressed areas shall be constructed at the same time as the vegetated swale.
11. Topsoil in the area of the southern portion of the driveway shall be removed and placed in a temporary stockpile location as shown.
12. The subsoil shall be mechanically complacted as noted above and then the base layer of 1-1/4" processed stone shall be placed & mechnically compacted.
13. The vegetated swale located to the west of the driveway shall be installed in the same manner as the eastern swale was done. The regraded side slopes along the entire driveway shall be seeded, and covered with hay mulch. If it is not an ideal time to grow grass, then the disturbed areas shall be covered with a minimum of 4" of wood chips/mulch to reduce the impact of raindrops on the un-vegetated surface and prevent erosion of the earth slopes.
14. The two Constructed Wetland systems, outlet structure and emergency spillway shall be installed in compliance with the approved plans and the earth berms in the bottom of the basin shall be installed. The bottom of the basin and side slopes shall be seeded with the specified seed mixture, and covered with hay mulch.
15. The stone trench and concrete level spreader below Basin #2 shall be installed at this time and in accord with the approved plans. Native field stones shall be used in the stone trench as well as downhill of the level spreader per the detail shown on the plan.
16. The area of trees cleared outside the limit of the array shall be seeded with the wildflower seed mixture specified for this area in order to establish pollinator habitat.

PHASE III - A:

1. Remove stumps from upper portion of solar array (Rows #1 to #10). Using Yoke Rake or similar equipment remove brush and other loose organic debris from ground surface.
2. Project land surveyor shall stake centerline of Row #5. 12" Filtrexx Soxx shall be installed just above Row #6 and Row #11 as shown on the plan and in accord with the attached detail.
3. Posts shall be installed for racking system for solar array in accordance with manufacturer's detail and specifications for Row #5.
4. After Row #5 has been installed, the rows uphill and downhill of Row #5 shall be installed providing the edge to edge offset of 15'.
5. After Rows #1 to #10 have been installed along with any electrical equipment, the ground surface shall be lightly scarified by York Rake or mini-excavator, if ground surface has been compacted. All disturbed areas within Phase IIIA of the solar array shall be seeded with New England Semi-Shade Grass and Forbs Mix by New England Wetland Plants.
6. The two rows of Filtrexx Soxx shall remain in place to prevent concentrated flow as the seed mixture becomes established.

PHASE III - B:

1. Remove stumps from lower portion of solar array (Rows #11 to #23). Using Yoke Rake or similar equipment remove brush and other loose organic debris from ground surface.
2. Project land surveyor shall stake centerline of Row #17. 12" Filtrexx Soxx shall be installed just above Row #17 and below Row #23 as shown on the plan and in accord with the attached detail.
3. Posts shall be installed for racking system for solar array in accordance with manufacturer's detail and specifications for Row #17.
4. After Row #17 has been installed, the rows uphill and downhill of Row #17 shall be installed providing the edge to edge offset of 15'.
5. After Rows #11 to #23 have been installed along with any electrical equipment, the ground surface shall be lightly scarified by York Rake or mini-excavator, if ground surface has been compacted. All disturbed areas within Phase IIIA of the solar array shall be seeded with New England Semi-Shade Grass and Forbs Mix by New England Wetland Plants.
6. The two rows of Filtrexx Soxx shall remain in place to prevent concentrated flow as the seed mixture becomes established.
7. The perimeter fence and gate shall be installed at this time and in accord with the submitted details.

PLAN OBJECTIVES AND PRINCIPALS:

The objectives of the Soil Erosion and Sediment Control Plan are to manage both the runoff and the earthwork operations by using Best Management Practices. The objectives are as follows:

a. Control erosion at its source with temporary control measures, minimize the runoff from areas of disturbance, distribute stormwater through natural vegetation before being discharged into wetland systems.
b. Keep land disturbance to a minimum. The site layout has been designed to minimize any potential impacts to wetlands.
c. Construct the project in phases to minimize the area of the site under active construction at one time.
d. Retain existing vegetation wherever feasible. Siltation fence or other barriers will be used to limit the extent of earthwork.
e. Stabilize disturbed areas as soon as practical. Earth disturbance shall not occur on a given area until active construction is to take place in this area.
f. Minimize the length and steepness of slopes.
g. Maintain low runoff velocities.
h. Trap sediment on site. Siltation fence barriers and driveway construction entrance will trap sediment during the construction period.
i. Establish a maintenance and repair program during the construction period. Erosion control measures will be inspected monthly during the active construction period and/or following rainfall events of greater than 0.5 inches and repaired as needed to ensure that they function properly.
j. Assign responsibility for the maintenance program. The responsibility for the maintenance program will be assigned to the contractor who shall designate one of its supervisory personnel to be the liason to the owner's representative. the owner shall retain the services of a licensed professional who shall inspect and monitor the contractor's methods and have the authority to require modifications to the Erosion and Sediment Control Plan. The town will be copied on all inspection reports prepared on behalf of the project.

TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES - MAINTENANCE REQUIREMENTS:

1. Siltation fence barriers: Accumulated sediment shall be removed when it has reached a height of 25% of the exposed sediment barrier and disposed off is an appropriate manner.
2. Filtrexx Soxx shall be inspected on a monthly basis. Accumulated sediment shall be removed from the uphill side of the Soxx when it is 50% of the height of the Soxx above grade.

CONTROL PLAN IMPLEMENTATION:

1. The contractor shall inspect the effectiveness and condition of erosion control devices during storm events, and after each rainfall event of 0.5" or more, prior to weekends and prior to forecasted large storm events.
2. The contractor shall repair or replace damaged erosion control measures immediately, and in case, more than four hours after observing such deficiencies.
3. The contractor shall be prepared to implement interm drainage controls and erosion control measures as may be necessary during the course of construction.
4. The constactor shall make available on-site all equipment, materials and labor necessary to effect emergency erosion control measures within four hours of any impending emergency situation.
5. The contractor shall make a final inspection, and clean up any tracked sediment on the existing road.
6. The contractor shall have on call at all times, a responsible representative who, when authorized, will mobilize the necessary personnel, materials and equipment and otherwise provide the required action when notified of any impending emergency situation.
7. The contractor shall supply a telephone number to the town engineer, planning agent so that the contractor may be contacted during the evenings and on weekends, if necessary.
8. The contractor shall maintain a minimum of 165 lf of Filtrexx 12" Soxx and 200 lf of silt fence on the site for emergencies.

GENERAL EROSION AND SEDIMENTATION CONTROL PLAN NOTES:

1. Regrading on this site shall done in such a manner as to prevent stagnant water from collecting in depresssions.
2. All erosion and sedimentation control measures will be installed prior to the start of any construction activity.
3. All erosion and sedimentation control measures shall be constructed in accordance with the submitted construction details and in compliance with the specifications and standards found in the "Guidelines for Soil Erosion and Sediment Control" as prepared by the State of Connecticut, revised to 2002.
4. Siltation fence barriers will be installed at the limit of all disturbed areas. Staked straw bales, will be utilized as necessary during the construction period. All work done shall be in accordance with the details shown on the plans.
5. Land disturbance will be kept to a minimum. Restabilization of all disturbed areas will occur as soon as final grading in complete.
6. All erosion and sedimentation control measures will be maintained in an effective conditions throughout the construction period.
7. Accumulated sediment will be removed from the control structures and disposed of in a lawful and safe manner.
8. Additional control measures will be installed during the construction period if the Zoning or Wetland Enforcement Officer requires them. The design engineer shall inspect the site periodically to ensure the proper installation of erosion control measures.
9. Regular inspections of the construction site shall be made by a representative of the Town of Winchester and a professional retained by the owner to assure compliance with the approved plans.
10. The responsibility for implementing the erosion and sedimentation control plan, informing all parties engaged on the construction site of the requirements and objectives of the plan, notifying the appropriate town agencies of any transfer of this responsibility and for conveying a copy of the erosion and sedimentation control plan if title to the land is transferred is placed upon the owner of record.

SEED MIXTURES

NEW ENGLAND SEMI-SHADE GRASS AND FORBS MIX:

Virginia Wildrye, Canada Wild Rye, Partridge Pea, Red Fescue, Spiked Grayfeather/Marsh Blazing Star, Sensitive Fern, Zigzag Aster, Hollow-Stem Joe Pye Weed, White Avens, Eastern Columbine, and Pat Rush.
Application Rate: 30 pounds per acre or 1 pound per 1,450 square feet

NEW ENGLAND WILDFLOWER MIX:

Little Bluestem, Red Fescue, Indian Grass, Partridge Pea, Canada Wild Rye, Blue Vervain, Butterfly Milkweed, Narrowleafed Blue Eyed Grass, Black Eyed Susan, New England Aster, Spiked Greyfeather/Marsh Blazing Star, Starved/Calico Aster, Early Goldenrod, and Hollow-Stem Joe Pye Weed.
Application Rate: 23 pounds per acre or 1 pound per 1,900 square feet.

NEW ENGLAND WETMIX:

Fox Sedge, Lurid Sedge, Blunt Broom Sedge, Blue Vervain, Fowl Bluegrass, Hop Sedge, Green Bulrush, Creeping Spike Rush, Fringed Sedge, Soft Rush, Spotted Joe Pye Weed, Rattlesnake Grass, Swamp Aster, Blueflag, Swamp Milkweed, and Square Stemmed Monkey Flower.
Application Rate: 18 pounds per acre or 1 pound per 2,500 square feet

NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DETENTION BASINS AND MOIST SITES:

Riverbank Wild Rye, Creeping Red Fescue, Little Bluestem, Big Bluestem, Switch Grass, Upland Bentgrass, Nodding Bur Marigold, Hollow-Stemed Joe Pye Weed, New England Aster, Boneset, Blue Vervain, Soft Rush, and Wool Grass.
Application Rate: 35 pounds per acre or 1 pound per 1,250 square feet

SEEDING MIXTURES FOR AREAS TO BE MAINTAINED AS GRASS:

MIXTURE #1	
KENTUCKY BLUEGRASS	20 LBS/ACRE
CREEPING RED FESCUT	20 LBS/ACRE
PERENNIAL RYEGRASS	5 LBS/ACRE
MIXTURE #2	
CREEPING RED FESCUE	20 LBS/ACRE
REDTOP	2 LBS/ACRE
TALL FESCUE	20 LBS/ACRE

MAINTENANCE REQUIREMENTS FOR GRASS SWALES/CONSTRUCTED WETLAND BASIN:
GRASS SWALES AND CONSTRUCTED WETLAND BASIN SHALL BE INSPECTED ANNUALLY.

GRASS SWALES:

1. Perform visual inspection by walking the length of the grass swales,
2. Remove any woody debris which may have fallen or been blown in the swales by hand,
3. Visually inspect field stone check dams for their integrity, if stones have become loose, reset by hand
4. No mowing of the swales are necessary.

CONSTRUCTED WETLAND BASIN:

FOREBAY:

1. Perform visual inspection of forebay, use a large stick or piece of wood to measure the depth of any sediment in the forebay. If the depth of sediment is greater than 1/3 the depth, then the sediment shall be removed by mini-excavator,
2. Remove any woody debris which may have fallen or been blown in the forebay by hand,

CONSTRUCTED WETLAND BASIN:

1. Perform visual inspection of the bottom of the constructed wetland,
2. Remove any woody debris which may have fallen or been blown into the bottom of the basin,
3. Inspect the berm for the presence of any woody vegetation. If any woody vegetation is growing on the berm, it shall be cut at ground level and removed. If the woody vegetation is small enough, it shall be pulled out by hand and thrown into the upland area adjacent to the constructed wetland.
4. The outlet structure shall be inspected and any woody debris trapped on the trash rack shall be removed and disposed of in an upland area adjacent to the constructed wetland.

INSPECTION AND MAINTENANCE OF CONSTRUCTED WETLAND VEGETATION:

1. The vegetative community in the Constructed Wetland shall be inspected annually for the presence of any invasive wetland or upland plants for the first three years after planting.
2. Any invasive plants found shall be removed by hand pulling and disposed of in an appropriate manner away from the Construction Wetland Basin.

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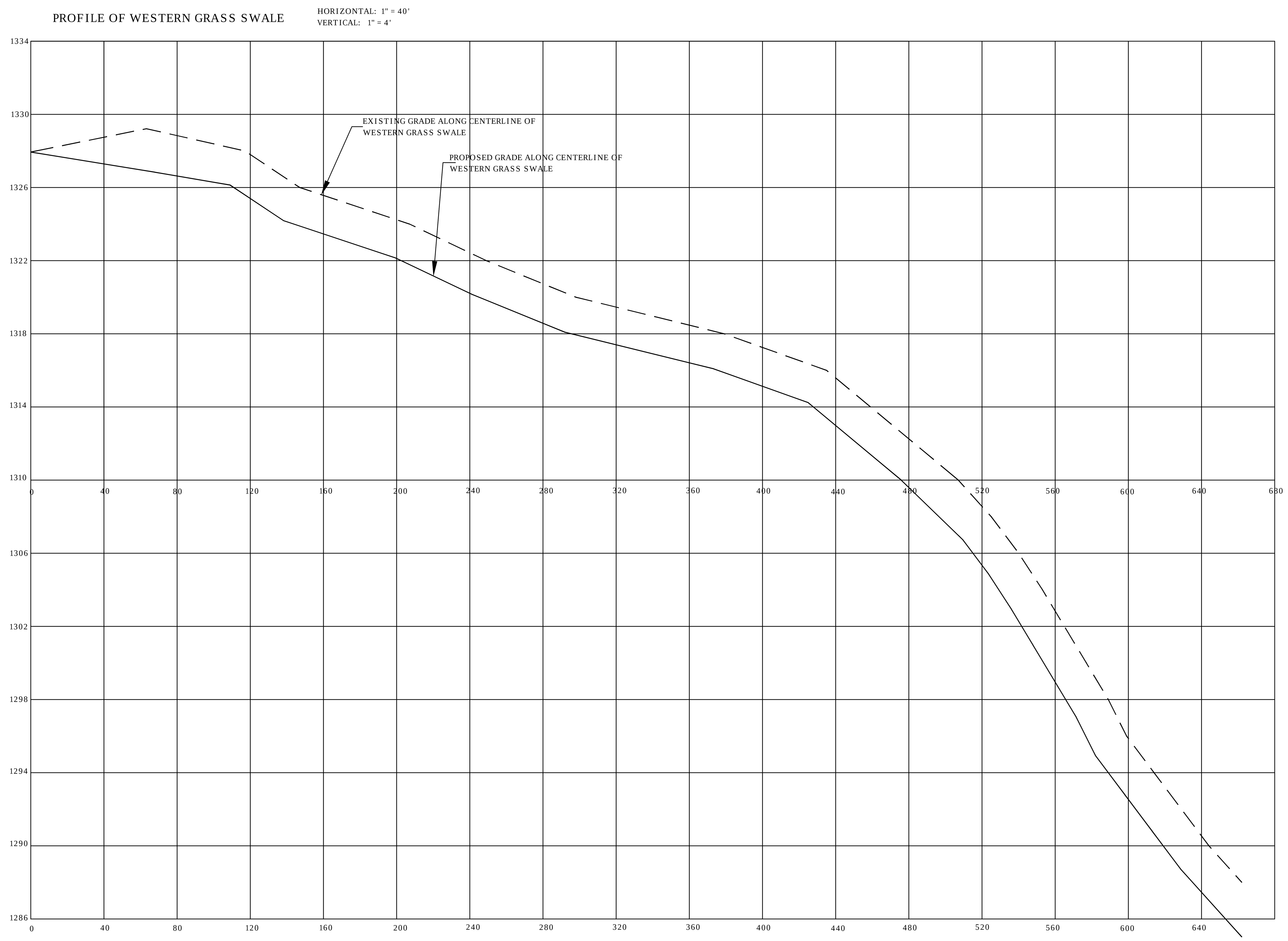
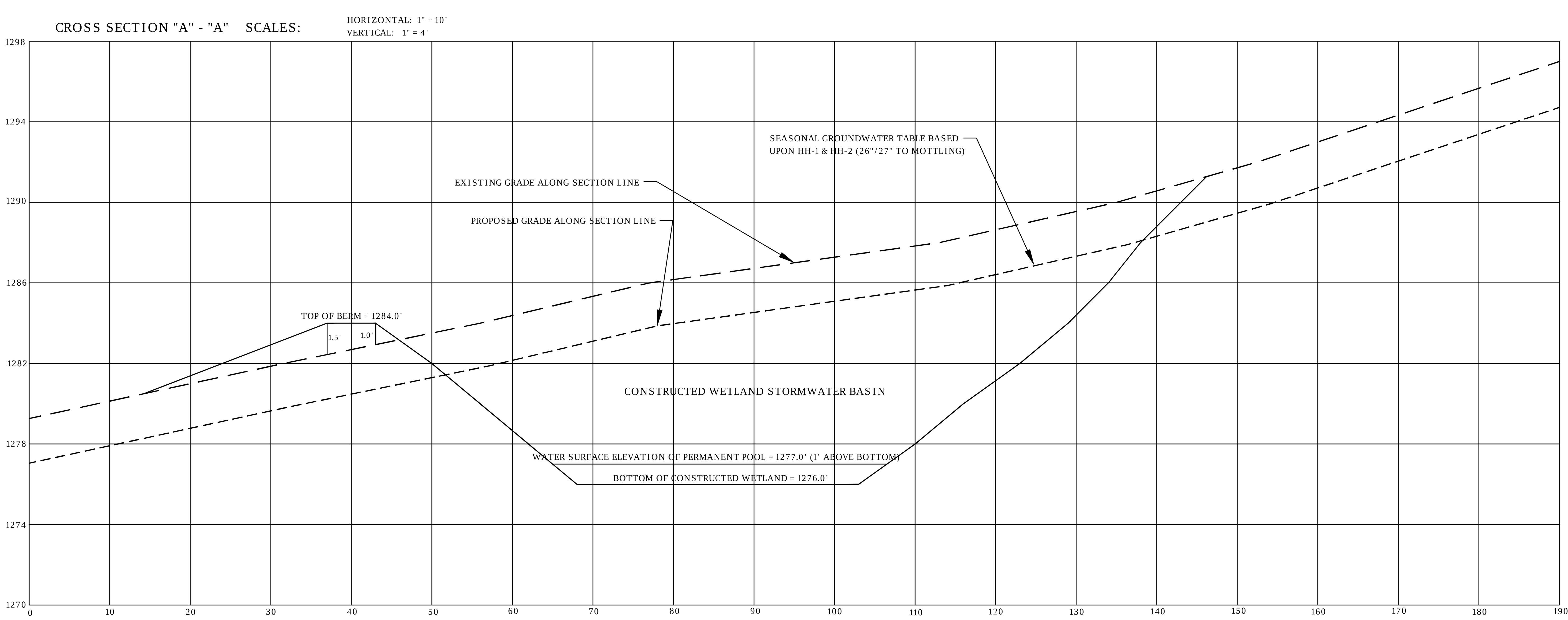
LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

CONSTRUCTION NARRATIVE
SHEET 13 OF 16
PROJECT #032-2019
SCALE: 1" = 150'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT





RESULTS OF HAND HOLES, HH-1 AND HH-2 PERFORMED IN BASIN #1
DATE: DECEMBER 16, 2020
HH-1:
0 - 4" TOPSOIL
4 - 26" YELLOW BROWN FINE SANDY LOAM
26 - 32" GREY BROWN MEDIUM COMPACT MEDIUM SAND, SOME GRAVEL
(COMPACT AT 32"), MOTTLING AT 26"
HH-2
0 - 4" TOPSOIL
4 - 27" YELLOW BROWN FINE SANDY LOAM
27 - 33" GREY BROWN MEDIUM COMPACT MEDIUM SAND, SOME GRAVEL
(COMPACT AT 33"), MOTTLING AT 27"

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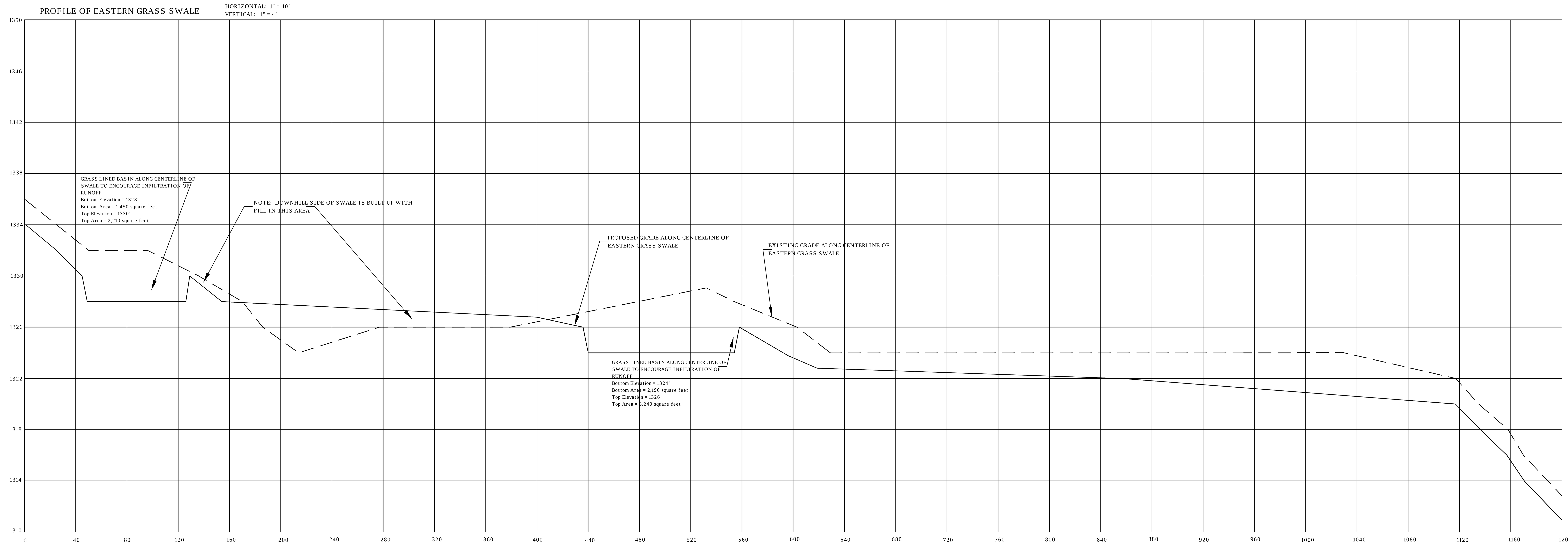
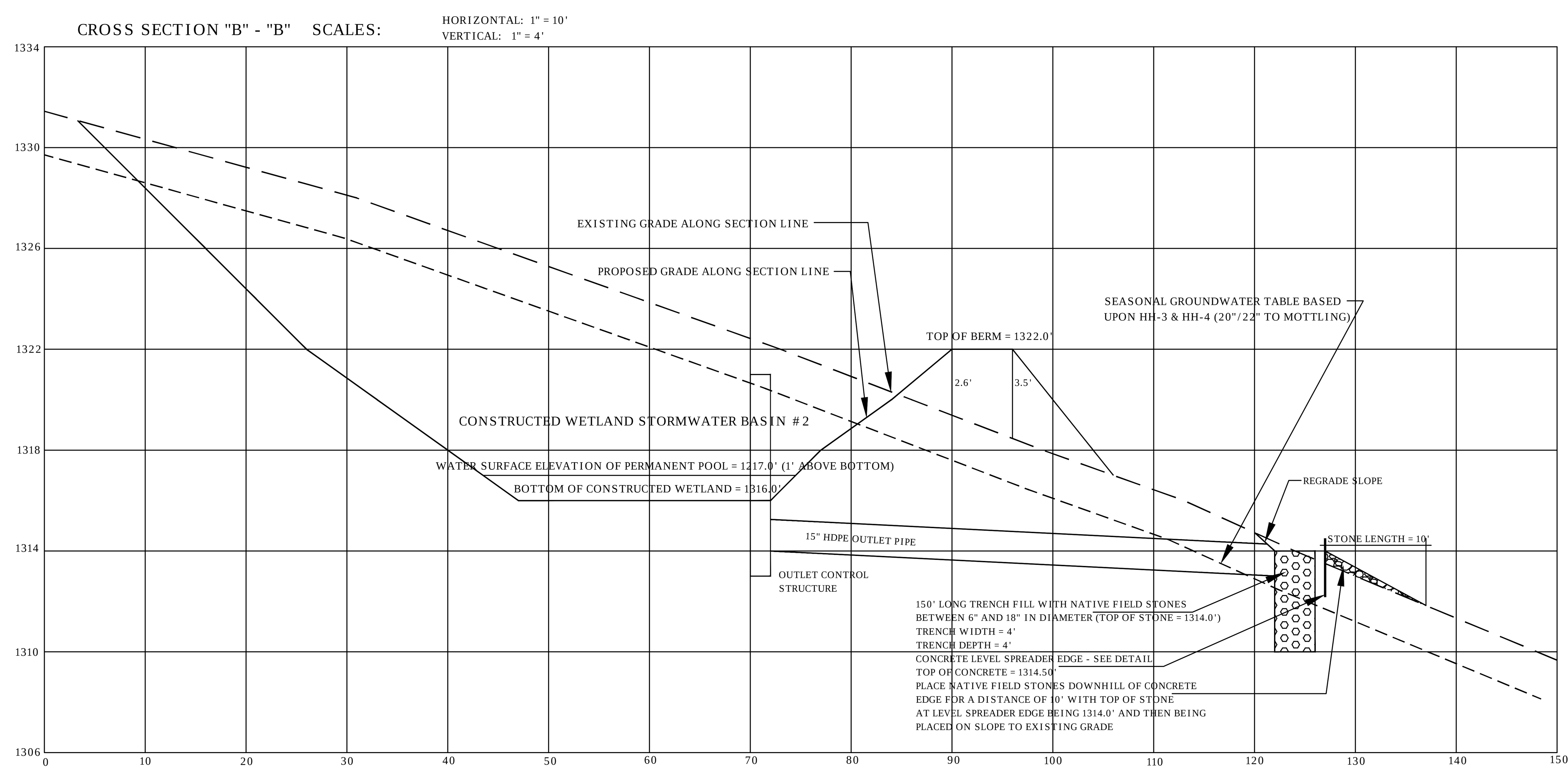
CROSS SECTIONS
SHEET 14 OF 16
PROJECT #032-2019
SCALES AS NOTED
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT





RESULTS OF HAND HOLES, HH-3 AND HH-4 PERFORMED IN BASIN #2
DATE: DECEMBER 16, 2020

HH-3:
0 - 3" TOPSOIL
3 - 20" YELLOW BROWN VERY FINE SAND AND SILT LOAM
20 - 33" GREY BROWN LIGHT TO MEDIUM COMPACT SILTY SAND (COMPACT AT 33"), MOTTLING AND WATER BLEEDING IN AT 20"

HH-4
0 - 4" TOPSOIL
4 - 22" YELLOW BROWN VERY FINE SAND AND SILT LOAM
22 - 35" GREY BROWN LIGHT TO MEDIUM COMPACT SILTY SAND (COMPACT AT 35"), MOTTLING AND WATER BLEEDING IN AT 22"

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LOW IMPACT SUSTAINABLE DEVELOPMENT
TRINKAUS ENGINEERING

CROSS SECTIONS
SHEET 15 OF 16
PROJECT #032-2019
SCALES AS NOTED
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

1

STANDING ON EAST SIDE OF ROAD AT NORTHERN PROPERTY LINE LOOKING EAST

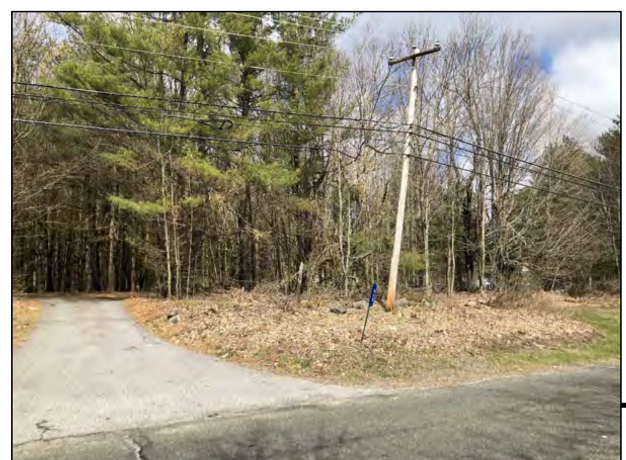
2

STANDING ON EAST SIDE OF ROAD LOOKING EAST AT PROPERTY AND ADJACENT RESIDENCE

3

STANDING ON EAST SIDE OF ROAD LOOKING EAST AT PATH OF DRIVEWAY ACCESS TO SOLAR ARRAY

4



STANDING ON EAST SIDE OF ROAD LOOKING WEST AT UTILITY POLE FOR POWER CONNECTION

5

STANDING ON WEST SIDE OF WETLAND CROSSING #1 LOOKING EAST (ORIGINAL CORDUROY CROSSING STILL IN PLACE)

6

STANDING ON WEST SIDE OF WETLAND CROSSING #2 LOOKING EAST (ORIGINAL CORDUROY CROSSING STILL IN PLACE)

7

STANDING AT APPROXIMATE SOUTHERN LIMIT FARMLAND SOILS LOOKING NORTH

8

STANDING SOUTH OF SOUTHERN VERNAL POOL LOOKING NORTH AT VERNAL POOL - NO EGG MASSES WERE VISIBLE IN POOL
THERE WAS NO WATER IN NORTHERN VERNAL POOL

9

STANDING SOUTH OF WETLAND AREA WITH PONDING LOOKING NORTH - NO EGG MASSES WERE VISIBLE IN THIS WETLAND

10

STANDING AT THE NORTH SIDE OF SOLAR ARRAY LOOKING TO THE SOUTHEAST

11

STANDING AT THE NORTH SIDE OF SOLAR ARRAY LOOKING TO THE SOUTH

12

STANDING AT NORTH SIDE OF SOLAR ARRAY LOOKING TO THE SOUTHWEST

13

STANDING AT THE SOUTH SIDE OF SOLAR ARRAY LOOKING TO THE SOUTHEAST

14

STANDING AT THE SOUTH SIDE OF SOLAR ARRAY LOOKING TO THE SOUTH

15

STANDING AT SOUTH SIDE OF SOLAR ARRAY LOOKING TO THE SOUTHWEST

16

STANDING ON SOUTHERN PORTION OF BASIN LOOKING TO THE NORTHEAST

17

STANDING JUST NORTH OF PROPERTY CORNER LOOKING TO SOUTH ALONG STONE WALL

18

STANDING ON DOWNWARD SIDE OF BERM OF BASIN LOOKING TO THE SOUTHWEST TO THE STREAM WHERE THE OUTLET PIPE WILL DISCHARGE ONTO RIPRAP PAD AND THEN THE STREAM

19

STANDING ON SLOPE ABOVE STREAM JUST BELOW CONFLUENCE OF TWO INTERMITTENT WATERCOURSES LOOKING TO THE NORTHWEST

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PHOTO PLAN OF SITE
SHEET 16 OF 16
PROJECT #032-2019
SCALE: 1" = 200'
DATE: 12/22/20

PREPARED FOR
LSE PICTOR, LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

EXHIBIT 4

STORMWATER MANAGEMENT REPORT
1.99 MW SOLAR ARRAY
PLATT HILL ROAD
WINCHESTER – CONNECTICUT
PREPARED FOR LSE PICTOR, LLC
DECEMBER 22, 2020

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Stormwater Management Report – LSE PICTOR, LLC – Platt Hill Road – Winchester, Connecticut

Date: December 22, 2020

Existing Conditions

The site of the proposed solar array is located on the former Trade Winds Farm Subdivision, which contained 24 lots developed under the Open Space regulations of the Town of Winchester. Trade Winds Farm, LLC is maintaining ownership of the three approved lots which front on Platt Hill Road. The remaining portion of the site is being sold to Maitland Energy, LLC which will then lease a portion of the site to Lodestar Energy for the solar array.

The site consists of overgrown meadow, brush area mostly located in the western portion of the site. The balance of the site is wooded with a mixture of northern hardwood species and a small concentration of white pines in the southeastern portion of the site.

Proposed Conditions

A parcel containing 20.8 acres for the solar array is being created with the required minimum lot width onto Platt Hill Road. An open space parcel of 75.0 acres will surround the solar array and will be given to the Winchester Land Trust for preservation in perpetuity.

The solar array will be in the south-central portion of the site. A gravel driveway, 12' in width will provide access to the array from Platt Hill Road. The driveway will cross two small intermittent streams, found in the western portion of the site in the same locations as the road for the subdivision was approved. The initial 900'+ of the driveway will have a 2.5% cross slope to allow runoff from the gravel driveway to sheet off as overland flow into the adjacent upland areas where it will infiltrate into the undisturbed soils.

A "T" intersection is proposed just to the west of the solar array to allow for the turning movements of trailer trucks which will deliver the photovoltaic panels and support systems for installation. The driveway will then go south to a smaller parking area of approximately 900 square feet (gravel surface).

The proposed solar array, consisting of 24 rows of panels, containing 7,288 panels is located on the west and east sides of the central ridgeline/slope on slopes less than 15.0%. There is a 15' spacing between the panel rows. The area of the solar array is 8.0 acres. The cleared areas to the west, east and south of the actual array is 5.6 acres.

Stumps will be removed from the area of the actual array. The areas under and between the solar panels will be seeded with "New England Semi-Shade Grass and Forbs Mix" from New England Wetland Plants (www.newp.com/catalog/seed-mixes/#erosionDry) . This seed mix is a low mow and maintenance species. The stumps will remain in the cleared areas. The ground within the cleared areas outside the area of the array will be seeded with "New England Wildflower Mix" by New England Wetland Plants ((www.newp.com/catalog/seed-mixes/#erosionDry) to provide a food source for pollinator species. Both seed mixtures are provided on the project plan set.

The soil types as determined by Mr. Beroz in the area of the solar array are Paxton, which are Hydrologic Soil Class C in TR-55. As part of the subdivision, 150 deep test holes were done to determine the suitability for on-site sewage disposal systems. Many of these test holes are in the area of the solar array and are approximately 7' in depth. The results of the test holes in and near the proposed solar array are shown in Appendix "A" of this report

Impacts to Wetland/Watercourses

The driveway to the solar array must cross two intermittent stream/wetland corridors. Both crossings are unavoidable, but the impact to the wetland has been minimized. Crossing #1 will impact 775 square feet of wetlands with 83 cubic yards of fill material. Crossing #2 will impact 842 square feet of wetlands with 106 cubic yards of fill material. The outlet from the Constructed Wetland System and the emergency spillway will both discharge to the edge of the wetland boundary. There is no direct wetland impact associated with the Constructed Wetland System. Figure 1 below shows an overview of the access driveway, solar array and stormwater management systems.

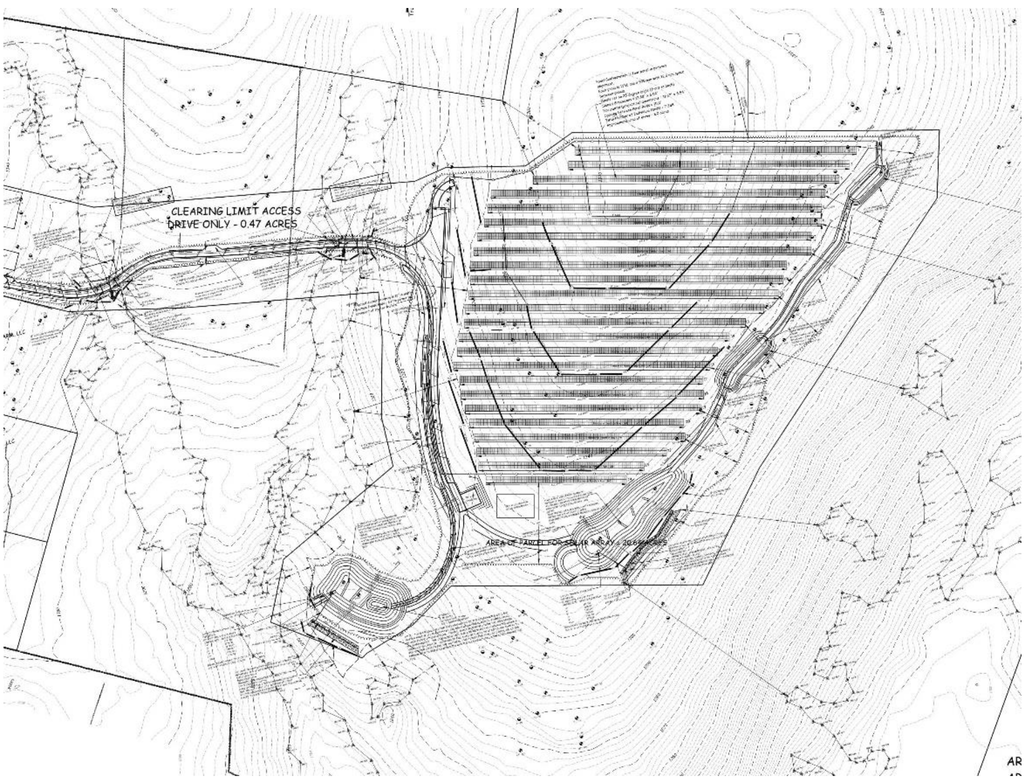

Figure 1 - Existing topographic map with solar array

Summary of Stormwater Management

Stormwater from the proposed impervious surfaces on the site will be handled in two ways. The proposed driveway from Platt Hill Road will have a 2.5% cross slope as shown on the plans to allow runoff from the gravel surface to travel as overland flow into the densely vegetated areas on either side of the driveway. Runoff will naturally infiltrate into the undisturbed soils in these areas.

Runoff from the area of the solar array will occur as overland flow across the slightly disturbed ground surface and will enter swales on the east and west sides of the array. The swales will convey the runoff with non-erosive velocities (< 3 fps) to one or two Constructed Wetland System, located at the southwest (Basin #1) and southeast (Basin #2) corners of the array. All stormwater management systems and outlets are located more than fifty (50) feet from a delineated inland wetland boundary. Two depressional areas are provided along the centerline of the eastern swale to encourage some infiltration into the soil profile above the eastern wetland area. An outlet control structure will restrict outflows to less than the pre-development peak rates for all storm events. Stone filled trenches with concrete level spreaders will accept runoff from both stormwater basins and disperse it as overland flow into the native wooded areas. More detailed information and computations are provided in the Stormwater Management Report which follows. Figure 2 shows an overview of the stormwater management system.

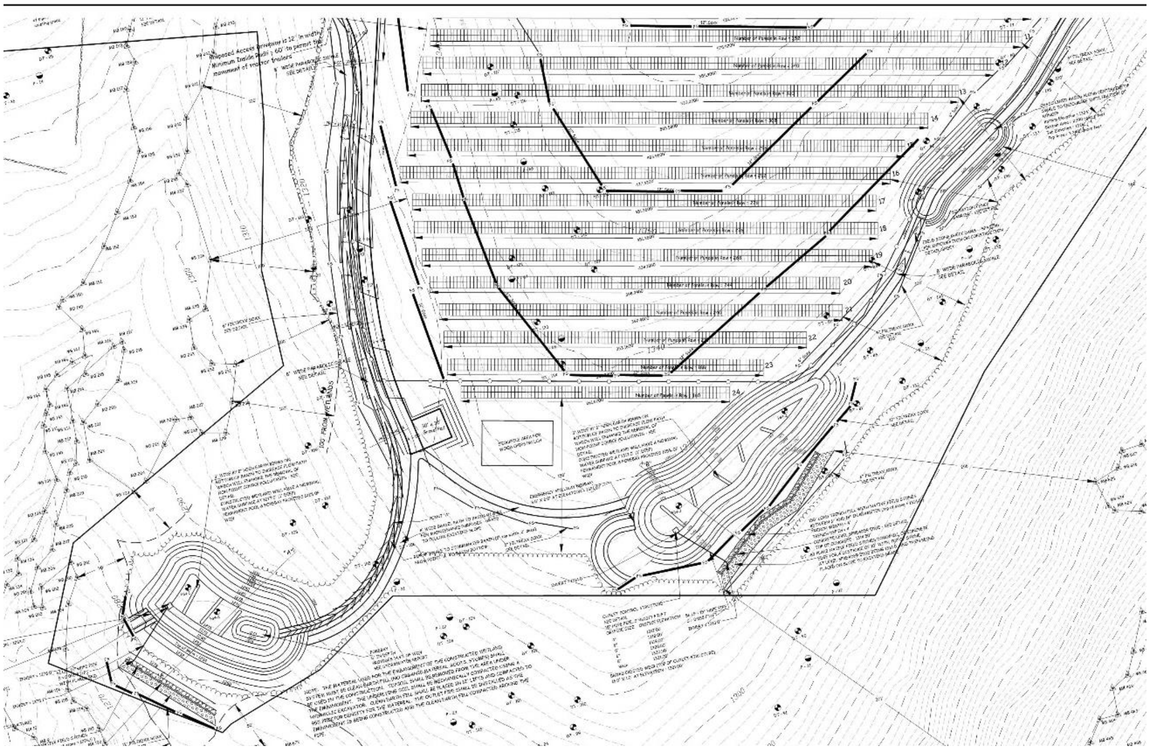

Figure 2 – Overview of Stormwater Management system

Stormwater Management

The design of the stormwater management collection, treatment and detention system fully complies with the requirements found in Appendix "I" of the Connecticut General Permit by the CT DEEP. First, the solar panels are considered impervious (RCN of 98), the gravel driveway is also considered impervious with a slightly lower RCN as the top 4" layer of gravel will be washed (RCN of 96) and thus porous, while the 8" base of the driveway will be compacted processed stone.

The ground cover under and between the rows of panels were considered as Lawn, Fair Condition on Class D soils (required by Appendix "I" by CT DEEP) as there will be some disturbance of the soil surface (removal of stumps, debris) even though no other grading of these soils being proposed for this solar array. The Fair condition was used to be conservative as it takes a minimum of two full years for the vegetation to become fully established and thus initially after the installation of the array, the rate and volume of runoff will be higher.

Runoff from the area of the solar array will drain as overland flow in two directions. Runoff from the center of the array will follow the ridgeline to the south and then will taper to the southwest toward the western grass swale or to the southeast toward the eastern grass swale. Both swale systems will direct runoff to one or two constructed wetland stormwater management practices as shown on the site plan.

The parabolic grass swales will have stone check dams at variable intervals (dependent upon the slope) which will reduce flow velocities while safely conveying the peak rate of runoff generated by the 10-year rainfall event as required by the CT DEP 2004 Storm Water Quality Manual "2004 Manual". Manning's Equation was used to compute the depth of flow and velocity in the swales. Computations are provided later in this report.

Intermittent Stream Crossings

The drainage area tributary to the first intermittent stream/wetland crossing is 5.04 acres. Brush/Meadow condition is the dominant land cover within this area. This drainage area has a peak rate of 7.18 cfs (10-year rainfall event). The proposed 15" HDPE pipe can easily handle this flow. The depth of flow is 0.47', the outlet velocity is 16.8 fps, and the pipe will only flow at 38% of the full flow capacity, so it is more than adequate for this crossing.

The drainage area tributary to the second intermittent stream/wetland crossing is 5.11 acres. Brush/Meadow condition and Woodland, Fair Condition are the dominant land cover in this area. This drainage area has a peak rate of 9.51 cfs (10-year rainfall event). The proposed 15" HDPE pipe can easily handle this flow. The depth of flow is 0.64', the outlet velocity is 14.8 fps, and the pipe will only flow at 51% of the full flow capacity, so it is more than adequate for this crossing.

Stormwater Treatment/Detention

To maintain the natural hydrologic conditions on the site, two stormwater basins are being provided. Basin #1 is located downhill and south of the southwest corner of the solar array and will accept runoff from the western grass swale. The discharge from Basin #1, the spillway, and outlet level spreader are located more than 50' from the delineated inland wetland boundary. The level spreader consists of a 4' x 4' trench filled with native field stones. A concrete lip (level spreader) is proposed on the downhill side of the trench and will ensure that any runoff which does not infiltrate into the underlying soils will occur as uniform flow over the entire length of the concrete spreader (100').

Basin #2 is located downhill of the southeast corner of the solar array and will accept runoff from the eastern grass swale. The discharge from this basin will be directed to a stone filled trench with a level, uniform concrete lip to ensure that the concentrated flow to the stone filled trench will be discharged as overland flow onto the undisturbed forested slope below the stone filled trench. Basin #2 will maintain hydrologic drainage area which is tributary to the wetland system located at the bottom of the slope along the eastern perimeter boundary of the site. Both Basins will be Constructed Wetland systems which have been designed in compliance with CT DEP 2004 Storm Water Quality Manual.

Basin #1 has a 6' deep forebay providing 2,057 cubic feet of storage which is 39% of the calculated Water Quality Volume (WQV) per the 2004 Manual. The forebay, located in the northeast corner of the system will trap any sediment which is not trapped within the west grassed swale. Basin #1 will have a permanent pool which is 12" in depth and will provide 4,352 cubic feet of storage below the lowest outlet orifice. When combined with the forebay volume, 121% of the calculated WQV will be provided, thus exceeding the requirements of the 2004 Manual. The outlet structure is in the southwest corner of the system. In order to provide a higher level of treatment of the runoff, a series of 3' wide by 8" high earth berms will be installed in the bottom of the system to increase the flow path from inlet to outlet, thus increasing the contact time between the runoff and vegetation within the bottom of the basin.

Basin #2 will not have a forebay as there are two grassed depressed areas along the eastern swale which will function as traps for any fine sediments. Similar to Basin #1, low earth berms will be constructed across the bottom of Basin #2 to enhance the pollutant removal. Also, like Basin #1, there will be a permanent pool which is 12" in depth and will provide a volume of 4,922 cubic feet which exceeds the WQV of 4,693 cubic feet.

Appendix "I" requires that a zero increase in the peak rate of runoff is achieved for all design storms. The criteria has been achieved and the results are provided in Tables 3 and 4 below.

Literature and other solar arrays in Connecticut have shown that runoff volumes are significantly increased over pre-development conditions. These increased runoff volumes when discharged to receiving streams have caused erosion of the native channel and downstream sedimentation of the eroded material. To address the increased runoff volumes, the outlet structure of both Basin #1 and Basin #2 been designed to provide the Channel Protection Volume (CPV) found in the 2004 Manual. The CPV requires the reduction of the post-development peak rate for the 2-year storm to be reduced to 50% of the pre-development peak rate for the 2-year storm.

The bottom of the basin and berms will be seeded with New England Wetmix by New England Wetland Plants (www.newp.com/catalog/seed-mixes/#erosionDry). The side slopes of the basin shall be seeded with New England Erosion Control/Restoration Mix for Detention Basins and Moist sites by New England Wetland Plants(www.newp.com/catalog/seed-mixes/#erosionDry) .

The design of the constructed wetland will provide the following aspects:

a. Reduction of non-point source pollutants loads by having a permanent pool, vegetated bottom and long flow paths,

b. The peak rate for the 2-year event will be reduced from 9.13 cfs to 2.16 cfs in Basin #1 and from 8.10 cfs to 1.36 cfs in Basin #2, thus exceeding the requirements of the Channel Protection Volume found in the 2004 Manual.
c. Zero increase in the peak rate of runoff is provided for the WQ Storm, 1-year, 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year rainfall events. It is important to understand that 90% of the annual rainfall events are less than 1" of rainfall in 24 hours and that 98% of the annual rainfall events are less than 3.48" of rainfall in 24 hours (2-year storm) when long term rainfall events are evaluated. It is most important from a peak rate and runoff volume perspective to focus on those storms equal to or less than the 2-year event to prevent adverse environmental impacts to receiving streams.

Table 1 shows the increase in peak rates of runoff from the solar array

Storm Event	Pre-development	Post-development	Net Change
WQ storm	0.03 cfs	0.73 cfs	+0.70 cfs
1-year	5.30 cfs	12.89 cfs	+7.59 cfs
2-year	9.38 cfs	19.59 cfs	+10.21 cfs
5-year	17.00 cfs	31.16 cfs	+14.16 cfs
10-year	23.92 cfs	41.10 cfs	+17.18 cfs
25-year	33.90 cfs	54.91 cfs	+21.01 cfs
50-year	41.28 cfs	64.87 cfs	+23.59 cfs
100-year	49.72 cfs	76.11 cfs	+26.39 cfs

Table 2 shows the increase in runoff volumes from the solar array

Storm Event	Pre-development	Post-development	Net Change
WQ storm	0.019 acre-feet	0.129 acre-feet	+0.11 acre-feet
1-year	0.790 acre-feet	1.333 acre-feet	+0.543 acre-feet
2-year	1.313 acre-feet	1.959 acre-feet	+0.646 acre-feet
5-year	2.300 acre-feet	3.175 acre-feet	+0.875 acre-feet
10-year	3.205 acre-feet	4.205 acre-feet	+1.000 acre-feet
25-year	4.528 acre-feet	5.665 acre-feet	+1.137 acre-feet
50-year	5.519 acre-feet	6.736 acre-feet	+1.217 acre-feet
100-year	6.666 acre-feet	7.959 acre-feet	+1.293 acre-feet

Table 3 shows the reductions of peak rates of runoff from Constructed Wetlands – Basin #1

Storm Event	Post to CW	CW Discharge	Net Change
WQ storm	0.79 cfs	0.00 cfs	0.79 cfs
1-year	6.40 cfs	1.16 cfs	-5.24 cfs
2-year	**9.13 cfs**	**2.16 cfs**	**-6.97 cfs**
5-year	13.68 cfs	3.85 cfs	-9.83 cfs
10-year	17.49 cfs	5.29 cfs	-12.2 cfs
25-year	22.72 cfs	7.37 cfs	-15.35 cfs
50-year	26.46 cfs	11.68 cfs	-14.78 cfs
100-year	30.67 cfs	16.94 cfs	-13.73 cfs

Table 4 shows the reductions of peak rates of runoff from Constructed Wetlands – Basin #2

Storm Event	Post to CW	CW Discharge	Net Change
WQ storm	0.61 cfs	0.00 cfs	-0.61 cfs
1-year	5.61 cfs	0.71 cfs	-4.90 cfs
2-year	**8.10 cfs**	**1.36 cfs**	**-6.74 cfs**
5-year	12.28 cfs	2.68 cfs	-9.60 cfs
10-year	15.79 cfs	3.89 cfs	-11.90 cfs
25-year	20.62 cfs	9.06 cfs	-11.56 cfs
50-year	24.08 cfs	14.62 cfs	-9.46 cfs
100-year	27.97 cfs	17.35 cfs	-10.62 cfs

Table 5 Post-development Peak Rates of runoff at Taylor Brook

Storm Event	Pre-development	Post-development	Net Change
WQ storm	0.03 cfs	0.00 cfs	-0.03 cfs
1-year	5.30 cfs	1.85 cfs	-3.45 cfs
2-year	**9.38 cfs**	**3.50 cfs**	**-5.88 cfs**
5-year	17.00 cfs	6.52 cfs	-10.48 cfs
10-year	23.92 cfs	9.17 cfs	-14.75 cfs
25-year	33.90 cfs	16.39 cfs	-17.51 cfs
50-year	41.28 cfs	25.05 cfs	-16.23 cfs
100-year	49.72 cfs	34.27 cfs	-15.45 cfs

WATER QUALITY VOLUME CALCULATION:
BASIN #1:

WQV = (1")(Rv)(A)/12, WHERE Rv = 0.05 + 0.009 (I)
A = 4.68 acres
I = 1.37 acres (29.2%)
Rv = 0.05 + 0.009 (29.2) = 0.31
WQV = (1)(0.31)(4.68)/12 = 0.1209 acre-feet = 5,266 cubic feet

WATER QUALITY VOLUME CALCULATION:
BASIN #2:

WQV = (1")(Rv)(A)/12, WHERE Rv = 0.05 + 0.009 (I)
A = 4.31 acres
I = 1.22 acres (28.3%)
Rv = 0.05 + 0.009 (28.3) = 0.30
WQV = (1)(0.30)(4.31)/12 = 0.1077 acre-feet = 4,693 cubic feet

GROUNDWATER RECHARGE VOLUME CALCULATION (WEST SWALE):

GRV = (D)(A)(I)/12
A = 4.68 acres
I = 1.37 acres (0.292)
D = 0.10 (Class C soils)
GRV = (0.10)(4.68)(0.292)/12 = 0.0113 acre-feet = 496 cubic feet

GROUNDWATER RECHARGE VOLUME CALCULATION (EAST SWALE):

GRV = (D)(A)(I)/12
A = 4.31 acres
I = 1.22 acres (0.283)
D = 0.10 (Class C soils)
GRV = (0.10)(4.31)(0.283)/12 = 0.0101 acre-feet = 443 cubic feet

CAPACITY CALCULATION OF PARABOLIC GRASS AND RIPRAP SWALES:

BOTH SWALES HAVE A TOP WIDTH = 8.0' AND A CENTERLINE DEPTH OF 2.0'

AVERAGE SLOPE - WEST SWALE = 3.06%, Q = 17.49 CFS (10-year storm)
Depth of flow = 0.92', Flow velocity = 3.63 fps, Full flow capacity = 115.35 cfs
Flow rate for Water Quality Storm = 0.79 cfs
Depth of flow = 0.28', Flow velocity = 0.53 fps

AVERAGE SLOPE – EAST SWALE = 2.50%, Q = 15.79 CFS (10-year storm)
Depth of flow = 0.91', Flow velocity = 3.22 fps, Full flow capacity = 104.27 cfs
Flow rate for Water Quality Storm = 0.61 cfs
Depth of flow = 0.27', Flow velocity = 0.45 fps

Discussion of Water Quality Systems:

There are many types of stormwater treatment systems found in the CT DEP 2004 Storm Water Manual to reduce non-point source pollutant loads. The practices can be divided into two general categories; those systems which are dry and will fully infiltrate the required Water Quality Volume (WQV) and those which have a wetland or open water component.

Infiltration practices include infiltration basins, underground gallery systems, infiltration trenches, Sand Filters, Bioretention systems, Bioswales, and dry detention ponds. With the exception of a dry detention pond, the key commonality for all other dry systems is that they must be located in deep, very well drained soils where a minimum of 30" can be provided between the bottom of the practice and seasonal high ground water to allow for the WQV to fully infiltrate. Infiltration practices are only suitable for the treatment and infiltration of the WQV and are not designed to handle runoff from rainfall events which are larger than the water quality storm (1"/24 hours). Other practices must be used after an infiltration practice to provide peak rate and runoff attenuations per the 2004 Manual.

Dry detention ponds are not effective at reducing non-point source pollutant loads but can be used for the reduction in the peak rate and volume of runoff. All other infiltration practices are used primarily to reduce non-point source pollutant loads by treating the WQV only and meeting the Groundwater Recharge Volume (GRV) for the water quality storm event.

Wet practices consist of various types of ponds, such as micro-pool extended detention ponds, wet pond, wet extended detention pond, pocket pond, and multiple pond systems and wetland systems, such as shallow wetlands, extended detention wetlands, pond/wetland system. The key commonality of these wet practices is that the bottom of these practices must be located below the seasonal high groundwater table in order to maintain the saturated conditions in the practice.

All types of wet practices are very effective at reducing non-point source pollutant loads as well as meeting peak rate and volume reduction requirements. The most commonly used wet practices are the wetland systems as require very little maintenance and do not have large, deep open water components. Wet ponds and other pond systems have a permanent pool of open water with variable depths as their primary treatment component. However, the water found in the permanent pool will become heated by the sun and when discharged has a higher temperature than the receiving wetland or watercourse and this will increase the temperature of the water in the wetland or watercourse which will adversely affect aquatic species which live in these systems.

On this site there are not deep well drained soils found in the area of the proposed array so infiltration practices are not appropriate to treat the runoff from the proposed solar array. If they were to be proposed on this site, they would not function properly as there would not be an unsaturated zone under the practice into which runoff could infiltrate.

The soils in the area of the array have a hardpan layer approximately 24" below the ground surface. The presence of the hardpan layer creates a perched seasonal high groundwater table on top of the hardpan layer. The material in the hardpan layer consist of silts, clay and sometimes, fine gravel which is highly compacted and is simply impermeable to the vertical or horizontal movement of water within this soil layer which causes the perched groundwater table.

Because of the high seasonal groundwater table, only wet practices are suitable on this site to reduce non-point source pollutant loads.

The two constructed wetland systems proposed here have a forebay to trap sediments, a shallow permanent pool (< 12” in depth), low earth berms to lengthen the flow path within the bottom of the basin and increase the contact time between the runoff and the vegetation and soils on the bottom of the basin and is densely planted with native wetland plants which provides an environmental which not only greatly reducing non-point source pollutant loads but does not allow the water in the constructed wetland to heat up and the water surface is covered with the native plants.

This project proposes to use both wet swales (on both sides of the array) and a constructed wetland system at the end of both swales to treat the runoff from the area of the array. There will be minimal sediment loads under post-development conditions as no sand will be applied to any impervious surface. The primary pollutants are nutrients (nitrogen and phosphorous) from both atmospheric deposition on the solar panels and the decomposition of vegetation under and around the array as well as small amounts of metals which may leach from the metal components of the racking system if any rainfall is slightly acidic. The CT DEP goal of reducing the TSS concentration in post-development runoff by 80% will easily be achieved as the TSS removal efficiency for a wet swale is 73% and 75% for the constructed wetland as standalone treatment system.

SOLAR ARRAY – PRE-DEVELOPMENT

WQ STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 0.03 cfs @ 15.55 hrs, Volume= 0.019 af, Depth> 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.00"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

1-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 5.30 cfs @ 12.55 hrs, Volume= 0.790 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.74"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

2-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 9.38 cfs @ 12.52 hrs, Volume= 1.313 af, Depth> 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.48"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

5-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 17.00 cfs @ 12.50 hrs, Volume= 2.300 af, Depth> 2.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.69"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

10-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 23.92 cfs @ 12.49 hrs, Volume= 3.205 af, Depth> 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.70"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

25-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 33.90 cfs @ 12.48 hrs, Volume= 4.528 af, Depth> 3.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=7.09"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

50-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 41.28 cfs @ 12.48 hrs, Volume= 5.519 af, Depth> 4.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=8.09"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

100-YEAR STORM

Summary for Subcatchment 3S: Solar Array Area - PRE

Runoff = 49.72 cfs @ 12.48 hrs, Volume= 6.666 af, Depth> 5.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=9.22"

Area (sf)	CN	Description
593,934	73	Woods, Fair, HSG C
593,934		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.6	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.48"
6.5	483	0.0620	1.24		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
7.5	631	0.0790	1.41		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
34.6	1,214	Total			

SOLAR ARRAY – POST-DEVELOPMENT
WQ STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 0.73 cfs @ 12.43 hrs, Volume= 0.129 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.00"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

1-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 12.89 cfs @ 12.26 hrs, Volume= 1.333 af, Depth> 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.74"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

2-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 19.59 cfs @ 12.26 hrs, Volume= 1.999 af, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.48"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

5-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 31.16 cfs @ 12.25 hrs, Volume= 3.175 af, Depth> 2.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.69"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

10-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 41.10 cfs @ 12.25 hrs, Volume= 4.205 af, Depth> 3.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.70"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

25-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 54.91 cfs @ 12.25 hrs, Volume= 5.665 af, Depth> 4.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=7.09"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

50-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 64.87 cfs @ 12.25 hrs, Volume= 6.736 af, Depth> 5.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=8.09"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

100-YEAR STORM

Summary for Subcatchment 4S: Solar Array Area - POST

Runoff = 76.11 cfs @ 12.25 hrs, Volume= 7.959 af, Depth> 7.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=9.22"

Area (sf)	CN	Adj	Description
10,000	96		Gravel surface, HSG D
142,952	98		Unconnected pavement, HSG D
270,008	84		50-75% Grass cover, Fair, HSG D
170,974	71		Meadow, non-grazed, HSG C
593,934	84	82	Weighted Average, UI Adjusted
450,982			75.93% Pervious Area
142,952			24.07% Impervious Area
142,952			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.7	100	0.0200	0.12		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
18.4	1,214	Total			

SOLAR ARRAY WEST SWALE

WQ STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 0.79 cfs @ 12.23 hrs, Volume= 0.087 af, Depth> 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.00"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

1-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 6.40 cfs @ 12.20 hrs, Volume= 0.589 af, Depth> 1.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.74"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

2-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 9.13 cfs @ 12.20 hrs, Volume= 0.843 af, Depth> 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.48"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

5-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 13.68 cfs @ 12.19 hrs, Volume= 1.276 af, Depth> 3.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.69"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

10-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 17.49 cfs @ 12.19 hrs, Volume= 1.647 af, Depth> 4.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.70"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

25-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 22.72 cfs @ 12.19 hrs, Volume= 2.168 af, Depth> 5.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=7.09"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

50-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 26.46 cfs @ 12.19 hrs, Volume= 2.546 af, Depth> 6.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=8.09"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

100-YEAR STORM

Summary for Subcatchment 7S: Solar Array - West Swale

Runoff = 30.67 cfs @ 12.19 hrs, Volume= 2.976 af, Depth> 7.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=9.22"

	Area (sf)	CN	Adj	Description
	9,000	96		Gravel surface, HSG D
	59,557	98		Unconnected pavement, HSG D
*	135,419	84		Meadow in array area, Fair, HSG D
	203,976	89	87	Weighted Average, UI Adjusted
	144,419			70.80% Pervious Area
	59,557			29.20% Impervious Area
	59,557			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

SOLAR ARRAY EAST SWALE

WQ STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 0.61 cfs @ 12.24 hrs, Volume= 0.071 af, Depth> 0.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr WQ Storm Rainfall=1.00"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

1-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 5.61 cfs @ 12.20 hrs, Volume= 0.517 af, Depth> 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 1-year Rainfall=2.74"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

2-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 8.10 cfs @ 12.20 hrs, Volume= 0.746 af, Depth> 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.48"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

5-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 12.28 cfs @ 12.19 hrs, Volume= 1.141 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 5-year Rainfall=4.69"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

10-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 15.79 cfs @ 12.19 hrs, Volume= 1.480 af, Depth> 4.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-year Rainfall=5.70"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,**
					Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,**
					Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

25-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 20.62 cfs @ 12.19 hrs, Volume= 1.957 af, Depth> 5.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-year Rainfall=7.09"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,**
					Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,**
					Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,**
					Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

50-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 24.08 cfs @ 12.19 hrs, Volume= 2.304 af, Depth> 6.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 50-year Rainfall=8.09"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

100-YEAR STORM

Summary for Subcatchment 8S: Solar Array - East Swale

Runoff = 27.97 cfs @ 12.19 hrs, Volume= 2.698 af, Depth> 7.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-year Rainfall=9.22"

Area (sf)	CN	Adj	Description
53,395	98		Unconnected pavement, HSG D
134,589	84		50-75% Grass cover, Fair, HSG D
187,984	88	86	Weighted Average, UI Adjusted
134,589			71.60% Pervious Area
53,395			28.40% Impervious Area
53,395			100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.4	100	0.0200	0.18		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.48"
2.2	483	0.0620	3.73		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
2.5	631	0.0790	4.22		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
14.1	1,214	Total			

BASIN #1 - CONSTRUCTED WETLAND ROUTING RESULTS: WQ STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 0.22" for WQ Storm event
Inflow = 0.79 cfs @ 12.23 hrs, Volume= 0.087 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,276.97' @ 24.00 hrs Surf.Area= 4,327 sf Storage= 3,789 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,276.00' (Free Discharge)
- **1=Culvert** (Controls 0.00 cfs)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
  - **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **6=Orifice/Grate** (Controls 0.00 cfs)

1-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 1.51" for 1-year event
Inflow = 6.40 cfs @ 12.20 hrs, Volume= 0.589 af
Outflow = 1.16 cfs @ 12.84 hrs, Volume= 0.465 af, Atten= 82%, Lag= 38.7 min
Primary = 1.16 cfs @ 12.84 hrs, Volume= 0.465 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,278.71' @ 12.84 hrs Surf.Area= 5,921 sf Storage= 12,660 cf

Plug-Flow detention time= 222.7 min calculated for 0.465 af (79% of inflow)
Center-of-Mass det. time= 143.8 min (975.4 - 831.5)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=1.16 cfs @ 12.84 hrs HW=1,278.71' (Free Discharge)
└─**1=Culvert** (Passes 1.16 cfs of 8.53 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.52 cfs @ 5.98 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.64 cfs @ 3.27 fps)
  ├─**4=Orifice/Grate** (Controls 0.00 cfs)
  ├─**5=Orifice/Grate** (Controls 0.00 cfs)
  └─**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
└─**6=Orifice/Grate** (Controls 0.00 cfs)

2-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 2.16" for 2-year event
Inflow = 9.13 cfs @ 12.20 hrs, Volume= 0.843 af
Outflow = 2.16 cfs @ 12.71 hrs, Volume= 0.703 af, Atten= 76%, Lag= 30.7 min
Primary = 2.16 cfs @ 12.71 hrs, Volume= 0.703 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,279.49' @ 12.71 hrs Surf.Area= 6,693 sf Storage= 17,588 cf

Plug-Flow detention time= 190.9 min calculated for 0.703 af (83% of inflow)
Center-of-Mass det. time= 123.6 min (945.0 - 821.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=2.16 cfs @ 12.71 hrs HW=1,279.49' (Free Discharge)
↑—**1=Culvert** (Passes 2.16 cfs of 10.00 cfs potential flow)
  ↑—**2=Orifice/Grate** (Orifice Controls 0.64 cfs @ 7.34 fps)
  —**3=Orifice/Grate** (Orifice Controls 1.05 cfs @ 5.36 fps)
  —**4=Orifice/Grate** (Orifice Controls 0.47 cfs @ 2.39 fps)
  —**5=Orifice/Grate** (Controls 0.00 cfs)
  —**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
—**6=Orifice/Grate** (Controls 0.00 cfs)

5-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 3.27" for 5-year event
Inflow = 13.68 cfs @ 12.19 hrs, Volume= 1.276 af
Outflow = 3.85 cfs @ 12.64 hrs, Volume= 1.113 af, Atten= 72%, Lag= 27.0 min
Primary = 3.85 cfs @ 12.64 hrs, Volume= 1.113 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,280.58' @ 12.64 hrs Surf.Area= 7,835 sf Storage= 25,486 cf

Plug-Flow detention time= 161.8 min calculated for 1.113 af (87% of inflow)
Center-of-Mass det. time= 105.3 min (915.0 - 809.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=3.85 cfs @ 12.64 hrs HW=1,280.58' (Free Discharge)
1=Culvert (Passes 3.85 cfs of 11.75 cfs potential flow)
- **2=Orifice/Grate** (Orifice Controls 0.78 cfs @ 8.90 fps)
- **3=Orifice/Grate** (Orifice Controls 1.44 cfs @ 7.35 fps)
- **4=Orifice/Grate** (Orifice Controls 1.09 cfs @ 5.55 fps)
- **5=Orifice/Grate** (Orifice Controls 0.54 cfs @ 2.77 fps)
- **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

6=Orifice/Grate (Controls 0.00 cfs)

10-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 4.22" for 10-year event
Inflow = 17.49 cfs @ 12.19 hrs, Volume= 1.647 af
Outflow = 5.29 cfs @ 12.62 hrs, Volume= 1.468 af, Atten= 70%, Lag= 25.6 min
Primary = 5.29 cfs @ 12.62 hrs, Volume= 1.468 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,281.36' @ 12.62 hrs Surf.Area= 8,694 sf Storage= 31,925 cf

Plug-Flow detention time= 147.9 min calculated for 1.468 af (89% of inflow)
Center-of-Mass det. time= 97.3 min (899.9 - 802.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=5.28 cfs @ 12.62 hrs HW=1,281.36' (Free Discharge)
1=Culvert (Passes 4.89 cfs of 12.85 cfs potential flow)
2=Orifice/Grate (Orifice Controls 0.86 cfs @ 9.86 fps)
3=Orifice/Grate (Orifice Controls 1.67 cfs @ 8.49 fps)
4=Orifice/Grate (Orifice Controls 1.37 cfs @ 6.99 fps)
5=Orifice/Grate (Orifice Controls 0.99 cfs @ 5.07 fps)
7=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
6=Orifice/Grate (Orifice Controls 0.39 cfs @ 2.04 fps)

25-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 5.55" for 25-year event
Inflow = 22.72 cfs @ 12.19 hrs, Volume= 2.168 af
Outflow = 7.39 cfs @ 12.59 hrs, Volume= 1.971 af, Atten= 67%, Lag= 24.2 min
Primary = 7.39 cfs @ 12.59 hrs, Volume= 1.971 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,282.23' @ 12.59 hrs Surf.Area= 9,685 sf Storage= 39,947 cf

Plug-Flow detention time= 134.2 min calculated for 1.971 af (91% of inflow)
Center-of-Mass det. time= 89.8 min (884.9 - 795.1)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=7.39 cfs @ 12.59 hrs HW=1,282.23' (Free Discharge)
- **1=Culvert** (Passes 5.80 cfs of 13.99 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.95 cfs @ 10.84 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.89 cfs @ 9.61 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.63 cfs @ 8.32 fps)
  - **5=Orifice/Grate** (Orifice Controls 1.33 cfs @ 6.78 fps)
  - **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **6=Orifice/Grate** (Orifice Controls 1.59 cfs @ 4.57 fps)

50-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 6.52" for 50-year event
Inflow = 26.46 cfs @ 12.19 hrs, Volume= 2.546 af
Outflow = 11.68 cfs @ 12.51 hrs, Volume= 2.340 af, Atten= 56%, Lag= 19.1 min
Primary = 11.68 cfs @ 12.51 hrs, Volume= 2.340 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,282.69' @ 12.51 hrs Surf.Area= 10,235 sf Storage= 44,450 cf

Plug-Flow detention time= 126.2 min calculated for 2.340 af (92% of inflow)
Center-of-Mass det. time= 85.5 min (876.3 - 790.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=11.55 cfs @ 12.51 hrs HW=1,282.68' (Free Discharge)
- **1=Culvert** (Passes 9.60 cfs of 14.54 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.99 cfs @ 11.31 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.99 cfs @ 10.14 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.75 cfs @ 8.92 fps)
  - **5=Orifice/Grate** (Orifice Controls 1.47 cfs @ 7.51 fps)
  - **7=Broad-Crested Rectangular Weir** (Weir Controls 3.39 cfs @ 1.15 fps)
- **6=Orifice/Grate** (Orifice Controls 1.95 cfs @ 5.60 fps)

100-YEAR STORM

Summary for Pond 9P: Constructed Wetland (Basin #1)

Inflow Area = 4.683 ac, 29.20% Impervious, Inflow Depth > 7.63" for 100-year event
Inflow = 30.67 cfs @ 12.19 hrs, Volume= 2.976 af
Outflow = 16.94 cfs @ 12.40 hrs, Volume= 2.763 af, Atten= 45%, Lag= 12.6 min
Primary = 16.94 cfs @ 12.40 hrs, Volume= 2.763 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,282.92' @ 12.42 hrs Surf.Area= 10,521 sf Storage= 46,888 cf

Plug-Flow detention time= 116.7 min calculated for 2.763 af (93% of inflow)
Center-of-Mass det. time= 79.6 min (866.3 - 786.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,276.00'	58,950 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,276.00	3,485	0	0
1,278.00	5,220	8,705	8,705
1,280.00	7,195	12,415	21,120
1,282.00	9,400	16,595	37,715
1,284.00	11,835	21,235	58,950

Device	Routing	Invert	Outlet Devices
#1	Primary	1,276.00'	**15.0" Round Culvert** L= 106.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,276.00' / 1,272.00' S= 0.0377 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,277.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,278.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,279.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,280.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,281.00'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,282.50'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=16.94 cfs @ 12.40 hrs HW=1,282.92' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 14.82 cfs @ 12.08 fps)
  ↑—**2=Orifice/Grate** (Passes < 1.01 cfs potential flow)
  —**3=Orifice/Grate** (Passes < 2.04 cfs potential flow)
  —**4=Orifice/Grate** (Passes < 1.81 cfs potential flow)
  —**5=Orifice/Grate** (Passes < 1.54 cfs potential flow)
  └—**7=Broad-Crested Rectangular Weir** (Passes < 11.70 cfs potential flow)
└—**6=Orifice/Grate** (Orifice Controls 2.11 cfs @ 6.06 fps)

BASIN #2 – CONSTRUCTED WETLANDS ROUTING RESULTS: WQ STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area = 4.316 ac, 28.40% Impervious, Inflow Depth > 0.20" for WQ Storm event
Inflow = 0.61 cfs @ 12.24 hrs, Volume= 0.071 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,316.75' @ 24.00 hrs Surf.Area= 4,593 sf Storage= 3,079 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=1,316.00' (Free Discharge)
- **1=Culvert** (Passes 0.00 cfs of 6.93 cfs potential flow)
  - **2=Orifice/Grate** (Controls 0.00 cfs)
  - **3=Orifice/Grate** (Controls 0.00 cfs)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
  - **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **6=Orifice/Grate** (Controls 0.00 cfs)
- **8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

1-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

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Inflow Area =      4.316 ac, 28.40% Impervious, Inflow Depth >  1.44"   for 1-year event
Inflow      =      5.61 cfs @  12.20 hrs, Volume=          0.517 af
Outflow     =      0.71 cfs @  13.19 hrs, Volume=          0.379 af, Atten= 87%, Lag= 59.4 min
Primary     =      0.71 cfs @  13.19 hrs, Volume=          0.379 af
```

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,318.32' @ 13.19 hrs Surf.Area= 6,720 sf Storage= 11,916 cf

Plug-Flow detention time= 268.7 min calculated for 0.379 af (73% of inflow)
Center-of-Mass det. time= 178.3 min (1,013.7 - 835.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.71 cfs @ 13.19 hrs HW=1,318.32' (Free Discharge)
- **1=Culvert** (Passes 0.71 cfs of 11.36 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.45 cfs @ 5.17 fps)
  - **3=Orifice/Grate** (Orifice Controls 0.25 cfs @ 1.92 fps)
  - **4=Orifice/Grate** (Controls 0.00 cfs)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
  - **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **6=Orifice/Grate** (Controls 0.00 cfs)
- **8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

2-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area = 4.316 ac, 28.40% Impervious, Inflow Depth > 2.08" for 2-year event
Inflow = 8.10 cfs @ 12.20 hrs, Volume= 0.746 af
Outflow = 1.36 cfs @ 12.88 hrs, Volume= 0.590 af, Atten= 83%, Lag= 41.0 min
Primary = 1.36 cfs @ 12.88 hrs, Volume= 0.590 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,318.96' @ 12.88 hrs Surf.Area= 7,656 sf Storage= 16,506 cf

Plug-Flow detention time= 224.2 min calculated for 0.589 af (79% of inflow)
Center-of-Mass det. time= 147.1 min (972.0 - 824.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=1.36 cfs @ 12.88 hrs HW=1,318.96' (Free Discharge)
└1=**Culvert** (Passes 1.36 cfs of 12.30 cfs potential flow)
  ├2=**Orifice/Grate** (Orifice Controls 0.56 cfs @ 6.44 fps)
  ├3=**Orifice/Grate** (Orifice Controls 0.80 cfs @ 4.05 fps)
  ├4=**Orifice/Grate** (Controls 0.00 cfs)
  ├5=**Orifice/Grate** (Controls 0.00 cfs)
  └7=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
├6=**Orifice/Grate** (Controls 0.00 cfs)
└8=**Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

5-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area = 4.316 ac, 28.40% Impervious, Inflow Depth > 3.17" for 5-year event
Inflow = 12.28 cfs @ 12.19 hrs, Volume= 1.141 af
Outflow = 2.68 cfs @ 12.72 hrs, Volume= 0.958 af, Atten= 78%, Lag= 31.8 min
Primary = 2.68 cfs @ 12.72 hrs, Volume= 0.958 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,319.91' @ 12.72 hrs Surf.Area= 9,045 sf Storage= 24,416 cf

Plug-Flow detention time= 190.5 min calculated for 0.956 af (84% of inflow)
Center-of-Mass det. time= 125.4 min (938.4 - 812.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=2.68 cfs @ 12.72 hrs HW=1,319.90' (Free Discharge)
- **1=Culvert** (Passes 2.68 cfs of 13.58 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.70 cfs @ 7.97 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.22 cfs @ 6.19 fps)
  - **4=Orifice/Grate** (Orifice Controls 0.76 cfs @ 3.89 fps)
  - **5=Orifice/Grate** (Controls 0.00 cfs)
  - **7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- **6=Orifice/Grate** (Controls 0.00 cfs)
- **8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

10-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area = 4.316 ac, 28.40% Impervious, Inflow Depth > 4.12" for 10-year event
Inflow = 15.79 cfs @ 12.19 hrs, Volume= 1.480 af
Outflow = 3.89 cfs @ 12.68 hrs, Volume= 1.279 af, Atten= 75%, Lag= 29.1 min
Primary = 3.89 cfs @ 12.68 hrs, Volume= 1.279 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,320.59' @ 12.68 hrs Surf.Area= 10,114 sf Storage= 30,936 cf

Plug-Flow detention time= 175.3 min calculated for 1.279 af (86% of inflow)
Center-of-Mass det. time= 116.3 min (922.0 - 805.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=3.89 cfs @ 12.68 hrs HW=1,320.58' (Free Discharge)
↑—**1=Culvert** (Passes 3.86 cfs of 14.43 cfs potential flow)
  ↑—**2=Orifice/Grate** (Orifice Controls 0.78 cfs @ 8.90 fps)
  —**3=Orifice/Grate** (Orifice Controls 1.44 cfs @ 7.36 fps)
  —**4=Orifice/Grate** (Orifice Controls 1.09 cfs @ 5.56 fps)
  —**5=Orifice/Grate** (Orifice Controls 0.55 cfs @ 2.79 fps)
  └—**7=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
—**6=Orifice/Grate** (Orifice Controls 0.03 cfs @ 0.99 fps)
└—**8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

25-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area = 4.316 ac, 28.40% Impervious, Inflow Depth > 5.44" for 25-year event
Inflow = 20.62 cfs @ 12.19 hrs, Volume= 1.957 af
Outflow = 9.06 cfs @ 12.51 hrs, Volume= 1.736 af, Atten= 56%, Lag= 19.3 min
Primary = 9.06 cfs @ 12.51 hrs, Volume= 1.736 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,321.18' @ 12.51 hrs Surf.Area= 11,060 sf Storage= 37,246 cf

Plug-Flow detention time= 154.7 min calculated for 1.732 af (89% of inflow)
Center-of-Mass det. time= 103.3 min (901.3 - 798.0)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=8.96 cfs @ 12.51 hrs HW=1,321.18' (Free Discharge)
- **1=Culvert** (Passes 7.97 cfs of 15.13 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.84 cfs @ 9.65 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.62 cfs @ 8.24 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.31 cfs @ 6.69 fps)
  - **5=Orifice/Grate** (Orifice Controls 0.91 cfs @ 4.64 fps)
  - **7=Broad-Crested Rectangular Weir** (Weir Controls 3.28 cfs @ 1.14 fps)
- **6=Orifice/Grate** (Orifice Controls 0.99 cfs @ 2.83 fps)
- **8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

50-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area = 4.316 ac, 28.40% Impervious, Inflow Depth > 6.41" for 50-year event
Inflow = 24.08 cfs @ 12.19 hrs, Volume= 2.304 af
Outflow = 14.62 cfs @ 12.40 hrs, Volume= 2.073 af, Atten= 39%, Lag= 12.6 min
Primary = 14.62 cfs @ 12.40 hrs, Volume= 2.073 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,321.34' @ 12.40 hrs Surf.Area= 11,308 sf Storage= 38,995 cf

Plug-Flow detention time= 141.8 min calculated for 2.073 af (90% of inflow)
Center-of-Mass det. time= 94.1 min (887.6 - 793.6)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=14.61 cfs @ 12.40 hrs HW=1,321.34' (Free Discharge)
- **1=Culvert** (Passes 13.42 cfs of 15.31 cfs potential flow)
  - **2=Orifice/Grate** (Orifice Controls 0.86 cfs @ 9.83 fps)
  - **3=Orifice/Grate** (Orifice Controls 1.66 cfs @ 8.46 fps)
  - **4=Orifice/Grate** (Orifice Controls 1.37 cfs @ 6.96 fps)
  - **5=Orifice/Grate** (Orifice Controls 0.99 cfs @ 5.02 fps)
  - **7=Broad-Crested Rectangular Weir** (Weir Controls 8.55 cfs @ 1.58 fps)
- **6=Orifice/Grate** (Orifice Controls 1.19 cfs @ 3.42 fps)
- **8=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

100-YEAR STORM

Summary for Pond 11P: Constructed Wetland (Basin #2)

Inflow Area =	4.316 ac, 28.40% Impervious, Inflow Depth > 7.50"	for 100-year event		
Inflow =	27.97 cfs @	12.19 hrs, Volume=	2.698 af	
Outflow =	17.35 cfs @	12.38 hrs, Volume=	2.459 af, Atten= 38%, Lag= 11.7 min	
Primary =	17.35 cfs @	12.38 hrs, Volume=	2.459 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,321.57' @ 12.38 hrs Surf.Area= 11,670 sf Storage= 41,615 cf

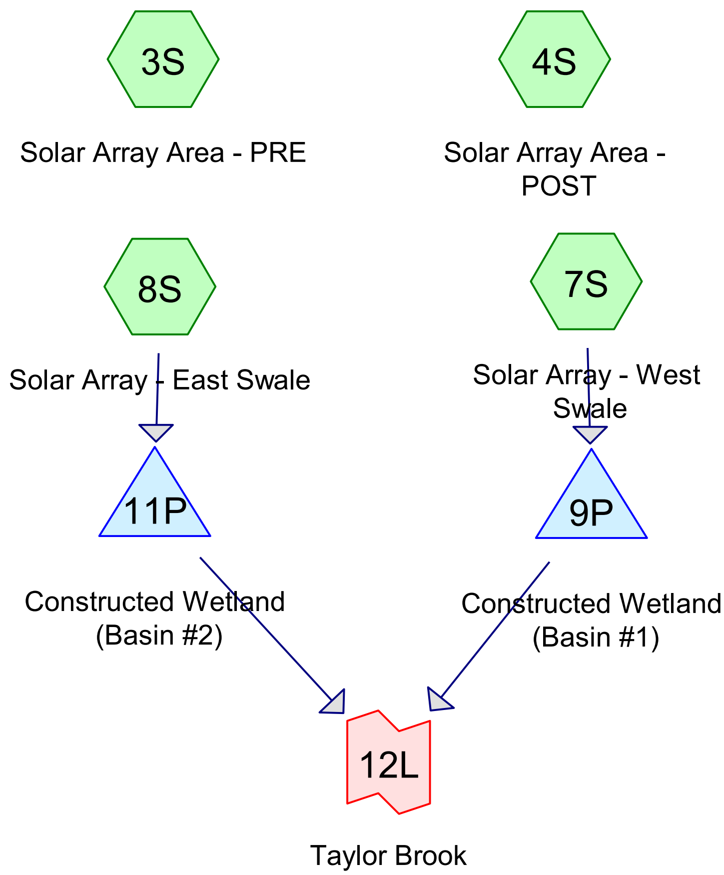
Plug-Flow detention time= 130.7 min calculated for 2.459 af (91% of inflow)
Center-of-Mass det. time= 86.9 min (876.3 - 789.4)

Volume	Invert	Avail.Storage	Storage Description
#1	1,316.00'	46,822 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,316.00	3,592	0	0
1,318.00	6,252	9,844	9,844
1,320.00	9,184	15,436	25,280
1,322.00	12,358	21,542	46,822

Device	Routing	Invert	Outlet Devices
#1	Primary	1,314.00'	**15.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 1,314.00' / 1,313.00' S= 0.0182 '/' Cc= 0.900 n= 0.009 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	1,317.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	1,318.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	1,319.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 1	1,320.00'	**6.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#6	Primary	1,320.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#7	Device 1	1,321.00'	**16.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32
#8	Primary	1,321.50'	**8.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=17.30 cfs @ 12.38 hrs HW=1,321.56' (Free Discharge)
- **1=Culvert** (Inlet Controls 15.56 cfs @ 12.68 fps)
  - **2=Orifice/Grate** (Passes < 0.88 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 1.72 cfs potential flow)
  - **4=Orifice/Grate** (Passes < 1.44 cfs potential flow)
  - **5=Orifice/Grate** (Passes < 1.08 cfs potential flow)
  - **7=Broad-Crested Rectangular Weir** (Passes < 18.54 cfs potential flow)
- **6=Orifice/Grate** (Orifice Controls 1.44 cfs @ 4.11 fps)
- **8=Broad-Crested Rectangular Weir** (Weir Controls 0.30 cfs @ 0.60 fps)



HydroCAD Diagram

CONCLUSION

The analysis and design of the stormwater conveyance system exceeds the requirements found in Appendix “I” from the CT DEP. The design of the Constructed Wetland conforms to the standards found in the CT DEEP 2004 Storm Water Quality Manual in order to reduce non-point source pollutants from the site. The design provides the Channel Protection Volume per the 2004 Manual which will prevent adverse impacts to the receiving streams on this site. Peak rate attenuation is provided for the 1-year, 2-year, 5-year and 10-year rainfall events.

Flows directed to the existing wetland system from the Constructed Wetlands will have velocities less than 3 fps, which are non-erosive for this type of soil, so there will be no erosion of the receiving inland wetlands.

While there will be some filling of wetlands for the access driveway, it is unavoidable and has been minimized to the maximum extent possible through using a narrow driveway and boulder retaining wall to limit the extent of fill within the wetland area.

There will be no impact on any of the other wetlands on this site as a result of the construction of the access driveway, stormwater management system and solar array.

Steven Trinkaus, PE
Trinkaus Engineering, LLC

APPENDIX "A"
SOIL TEST RESULTS WITHIN AREA OF PROPOSED SOLAR ARRAY

DT – 28
0 – 9”   TOPSOIL
9 – 22”   YELLOW BROWN FINE SANDY LOAM
22 – 84”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 84”, ROOTS TO 22”, MOTTLING AT 22”
DT – 29
0 – 6”   TOPSOIL
6 – 26”   YELLOW BROWN FINE SANDY LOAM, SOME SILT
26 – 77”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 77”, ROOTS TO 26”, MOTTLING AT 26”
DT – 32
0 – 6”   TOPSOIL
6 – 20”   YELLOW BROWN FINE SANDY LOAM, SOME SILT
20 – 75”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 75”, ROOTS TO 22”, MOTTLING AT 22”
DT – 33
0 – 6”   TOPSOIL
6 – 15”   YELLOW BROWN FINE SANDY LOAM
15 – 22”   LIGHT YELLOW BROWN SANDY LOAM
22 – 77”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 77”, ROOTS TO 22”, MOTTLING AT 22”
DT – 35
0 – 6”   TOPSOIL
6 – 20”   ORANGE BROWN FINE SANDY LOAM
20 – 30”   YELLOW BROWN FINE SANDY LOAM
30 – 84”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 84”, ROOTS TO 30”, MOTTLING AT 30”
DT – 71
0 – 6”   TOPSOIL
6 – 23”   ORANGE BROWN FINE SAND & SILT LOAM
23 – 81”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 81”, ROOTS TO 23”, MOTTLING AT 23”, WATER
              BLEEDING AT 27”
DT – 72
0 – 6”   TOPSOIL
6 – 26”   O0RANGE BROWN FINE SANDY LOAM, SOME SILT
26 – 84”   GREY BROWN MEDIUM COMPACT SAND AND SILT
              LEDGE > 84”, ROOTS TO 26”, MOTTLING AT 26”, WATER BLEEDING AT 24”
DT – 73
0 – 6”   TOPSOIL
6 – 24”   ORANGE BROWN FINE SANDY LOAM, SOME SILT
24 – 81”   GREY BROWN MEDIUM COMPACT SILTY SAND
              LEDGE > 81”, ROOTS TO 24”, MOTTLING AT 24”, WATER
              BLEEDING AT 28”

DT – 74

0 – 6”	TOPSOIL
6 – 24”	ORANGE BROWN FINE SAND & SILT LOAM
24 – 75”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 75”, ROOTS TO 24”, MOTTLING AT 24”, WATER BLEEDING AT 28”
DT – 75	
0 – 6”	TOPSOIL
6 – 23”	PALE YELLOW BROWN FINE SAND & SILT LOAM
23 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 23”, MOTTLING AT 23”, WATER BLEEDING AT 28”
DT – 76	
0 – 6”	TOPSOIL
6 – 24”	ORANGE BROWN FINE SAND & SILT LOAM
24 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 24”, MOTTLING AT 24”, WATER BLEEDING AT 27”
DT – 77	
0 – 5”	TOPSOIL
5 – 23”	ORANGE BROWN FINE SAND AND SILT LOAM
23 – 77”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 77”, ROOTS TO 23”, MOTTLING AT 23”, WATER BLEEDING AT 28”
DT – 78	
0 – 3”	TOPSOIL
3 – 19”	ORANGE BROWN FINE SAND & SILT LOAM
19 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 19”, MOTTLING AT 19”, WATER BLEEDING AT 23”
DT – 79	
0 – 5”	TOPSOIL
5 – 20”	YELLOW BROWN SILT LOAM
20 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 20”, MOTTLING AT 20”, WATER BLEEDING AT 24”
DT – 80	
0 – 6”	TOPSOIL
6 – 20”	YELLOW BROWN FINE SAND & SILT LOAM
20 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 20”, MOTTLING AT 20”, WATER BLEEDING AT 23”

DT – 81	
0 – 5”	TOPSOIL
5 – 20”	PALE YELLOW BROWN FINE SAND & SILT LOAM
20 – 81”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 81”, ROOTS TO 20”, MOTTLING AT 20”, WATER BLEEDING AT 23”
DT – 82	
0 – 5”	TOPSOIL
5 – 22”	PALE YELLOW BROWN FINE SAND & SILT LOAM
22 – 77”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 77”, ROOTS TO 19”, MOTTLING AT 19”, WATER BLEEDING AT 22”
DT – 83	
0 – 6”	TOPSOIL
6 – 23”	PALE YELLOW BROWN FINE SAND & SILT LOAM
23 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 23”, MOTTLING AT 23”, WATER BLEEDING AT 28”
DT – 84	
0 – 6”	TOPSOIL
6 – 21”	PALE YELLOW BROWN FINE SAND & SILT LOAM
21 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 21”, MOTTLING AT 21”, WATER BLEEDING AT 22”
DT – 85	
0 – 6”	TOPSOIL
6 – 24”	PALE YELLOW BROWN FINE SAND & SILT LOAM
24 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 24”, MOTTLING AT 24”, WATER BLEEDING AT 27”
DT – 86	
0 – 5”	TOPSOIL
5 – 23”	YELLOW BROWN FINE SAND & SILT LOAM
23 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 23”, MOTTLING AT 23”, WATER BLEEDING AT 27”
DT – 87	
0 – 3”	TOPSOIL
3 – 21”	YELLOW BROWN FINE SAND & SILT LOAM
21 – 80”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 80”, ROOTS TO 21”, MOTTLING AT 21”, WATER BLEEDING AT 24”

DT – 88	
0 – 4”	TOPSOIL
4 – 21”	YELLOW BROWN FINE SAND & SILT LOAM
21 – 83”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 83”, ROOTS TO 21”, MOTTLING AT 21”, WATER BLEEDING AT 24”
DT – 89	
0 – 6”	TOPSOIL
6 – 21”	YELLOW BROWN FINE SAND & SILT LOAM
21 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 21”, MOTTLING AT 21”, WATER BLEEDING AT 24”
DT – 102	
0 – 3”	TOPSOIL
3 – 24”	YELLOW BROWN FINE SANDY LOAM
24 – 36”	GREY BROWN MEDIUM COARSE SAND
36 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 36”, LIGHT MOTTLING AT 36”,
DT – 103	
0 – 3”	TOPSOIL
3 – 22”	YELLOW BROWN FINE SANDY LOAM
22 – 361”	GREY BROWN MEDIUM COARSE SAND
31 – 81”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 81”, ROOTS TO 31”, LIGHT MOTTLING AT 31”,
DT – 104	
0 – 3”	TOPSOIL
3 – 24”	YELLOW BROWN FINE SANDY LOAM
24 – 36”	GREY BROWN MEDIUM COARSE SAND
36 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 36”, LIGHT MOTTLING AT 36”,
DT – 105	
0 – 3”	TOPSOIL
3 – 19”	YELLOW BROWN FINE SANDY LOAM
19 – 31”	GREY BROWN MEDIUM COARSE SAND
31 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 31”, LIGHT MOTTLING AT 31”,
DT – 106	
0 – 3”	TOPSOIL
3 – 19”	YELLOW BROWN FINE SANDY LOAM
19 – 30”	GREY BROWN MEDIUM COARSE SAND
30 – 83”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 30”, LIGHT MOTTLING AT 30”,
DT – 107	
0 – 3”	TOPSOIL

3 – 21”	YELLOW BROWN FINE SANDY LOAM
21 – 33”	GREY BROWN MEDIUM COARSE SAND
33 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 33”, LIGHT MOTTLING AT 33”,
DT – 108	
0 – 4”	TOPSOIL
3 – 24”	YELLOW BROWN FINE SANDY LOAM
26 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 26”, LIGHT MOTTLING AT 26”,
DT – 109	
0 – 8”	TOPSOIL
8 – 26”	YELLOW BROWN FINE SANDY LOAM
26 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL
	LEDGE > 84”, ROOTS TO 26”, LIGHT MOTTLING AT 26”,
DT – 111	
0 – 6”	TOPSOIL
6 – 28”	ORANGE BROWN FINE SAND & SILT LOAM
28 – 77”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 77”, ROOTS TO 28”, LIGHT MOTTLING AT 28”
DT – 112	
0 – 3”	TOPSOIL
3 – 22”	ORANGE BROWN FINE SANDY LOAM
22 – 32”	YELLOW BROWN FINE SANDY LOAM
32 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 32”, LIGHT MOTTLING AT 32”,
	NO WATER
DT – 113	
0 – 4”	TOPSOIL
4 – 18”	ORANGE BROWN FINE SANDY LOAM
18 – 27”	YELLOW BROWN FINE SANDY LOAM
27 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 27”, LIGHT MOTTLING AT 27”,
	NO WATER
DT – 114	
0 – 3”	TOPSOIL
3 – 18”	ORANGE BROWN FINE SANDY LOAM
18 – 25”	YELLOW BROWN FINE SANDY LOAM
25 – 81”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 81”, ROOTS TO 25”, LIGHT MOTTLING AT 25”,
	NO WATER

DT – 115	
0 – 6”	TOPSOIL
6 – 21”	YELLOW BROWN FINE SANDY LOAM, SOME SILT
21 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 21”, MOTTLING AT 21”, NO WATER
DT – 116	
0 – 6”	TOPSOIL
6 – 25”	YELLOW BROWN FINE SANDY LOAM, SOME SILT
25 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 25”, MOTTLING AT 25”, NO WATER
DT – 117	
0 – 4”	TOPSOIL
4 – 14”	ORANGE BROWN FINE SANDY LOAM
14 – 23”	YELLOW BROWN FINE SANDY LOAM
23 – 81”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 81”, ROOTS TO 23”, MOTTLING AT 23’, NO WATER
DT – 118	
0 – 5”	TOPSOIL
5 – 21”	YELLOW BROWN FINE SANDY LOAM
21 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 21”, MOTTLING AT 21”, NO WATER
DT – 119	
0 – 7”	TOPSOIL
7 – 21”	YELLOW BROWN FINE SANDY LOAM
21 – 84”	GREY BROWN MEDIUM COMPACT SAND AND SILT
	LEDGE > 84”, ROOTS TO 21”, MOTTINGH AT 21”
DT – 120	
0 – 5”	TOPSOIL
5 – 20”	YELLOW BROWN FINE SANDY LOAM
20 – 81”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 81”, ROOTS TO 20”, MOTTLING AT 20”, NO WATER
DT – 121	
0 – 6”	TOPSOIL
6 – 21”	YELLOW BROWN FINE SANDY LOAM
21 – 84”	GREY BROWN MEDIUM COMPACT SILTY SAND
	LEDGE > 84”, ROOTS TO 21”, MOTTLING AT 21”

DT – 122	
0 – 7”	TOPSOIL
7 – 27”	YELLOW BROWN FINE SANDY LOAM
27 – 33”	GREY BROWN LIGHTLY COMPACT SAND AND GRAVEL
33 – 84”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL, SOME SILT
	LEDGE > 84”, ROOTS TO 33”, MOTTLING AT 33”
DT – 123	
0 – 6”	TOPSOIL
6 – 26”	YELLOW BROWN FINE SANDY LOAM
26 – 31”	GREY BROWN LIGHTLY COMPACT SAND & GRAVEL
31 – 72”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL, SOME SILT
	LEDGE > 72”, ROOTS TO 31”, MOTTLING AT 31”
DT – 124	
0 – 7”	TOPSOIL
7 – 23”	ORANGE BROWN FINE SANDY LOAM
23 – 31”	GREY BROWN LIGHTLY COMPACT SAND & GRAVEL
31 – 80”	GREY BROWN MEDIUM COMPACT SAND & GRAVEL, SOME SILT
	LEDGE > 80”, ROOTS TO 31”, MOTTLING AT 31”
DT – 133	
0 – 6”	TOPSOIL
6 – 24”	YELLOW BROWN FINE SANDY LOAM, SOME SILT
24 – 78”	GREY BROWN COMPACT SILTY SAND, SOME GRAVEL
	LEDGE > 78”, ROOTS TO 24”, MOTTLING AT 24”
DT – 134	
0 – 6”	TOPSOIL
6 – 23”	YELLOW BROWN FINE SANDY LOAM, SOME SILT
23 – 73”	GREY BROWN COMPACT SILTY SAND, SOME GRAVEL
	LEDGE > 73”, ROOTS TO 23”, MOTTLING AT 23”
DT – 135	
0 – 9”	TOPSOIL
9 – 23”	YELLOW BROWN FINE SAND & SILT LOAM
23 – 78”	GREY BROWN COMPACT SILTY SAND, SOME GRAVEL
	LEDGE > 78”, ROOTS TO 23”, MOTTLING AT 23”
DT – 136	
0 – 8”	TOPSOIL
8 – 25”	YELLOW BROWN FINE SAND & SILT LOAM
25 – 81”	GREY BROWN COMPACT SILTY SAND, SOME GRAVEL
	LEDGE > 81”, ROOTS TO 25”, MOTTLING AT 25”

DT – 137	
0 – 5”	TOPSOIL
5 – 24”	YELLOW BROWN FINE SANDY LOAM, SOME SILT
24 – 77”	GREY BROWN COMPACT SILTY SAND, SOME GRAVEL
	LEDGE > 77”, ROOTS TO 24”, MOTTLING AT 24”
DT – 138	
0 – 6”	TOPSOIL
6 – 23”	YELLOW BROWN FINE SANDY LOAM, SOME SILT
23 – 73”	GREY BROWN COMPACT SILTY SAND, SOME GRAVEL
	LEDGE > 73”, ROOTS TO 23”, MOTTLING AT 23”

EXHIBIT 5

January 15, 2021

Ref: 42701.01

Carrie Larson Ortolano
Associate General Counsel
LSE Pictor, LLC
40 Tower Lane, Suite 201
Avon, CT 06001

Re: Third Party Engineering Review by VHB
±1.99 MW-AC Solar Project, Platt Hill Road, Winchester, CT

Dear Ms. Ortolano,

VHB has performed a review of revised site plans and stormwater management report for the above-referenced Project. The intent of this letter is to summarize VHB's opinion of the Project's compliance with State guidance and regulatory documents. VHB has also reviewed available documentation from Connecticut Siting Council's (CSC) Petition #1398, for which a rejection letter was issued on September 28, 2020. A site visit by VHB representatives was performed on November 17, 2020.

The following items have been reviewed in support of this response letter:

- CSC Decision and Staff Report dated September 28, 2020
- Petition Cover Letter dated March 27, 2020
- Petition Exhibit 0 – Narrative dated March 27, 2020
- Petition Exhibit 1 – Site Plans dated March 6, 2020
- Petition Exhibit 2 – Equipment Specifications
- Petition Exhibit 3 – Operations & Maintenance Plan
- Petition Exhibit 4 – Decommissioning Plan
- Petition Exhibit 5 – Carbon Debt Analysis
- Petition Exhibit 6 – Abutters Notice
- Petition Exhibit 7 – List of Municipal Agencies
- Petition Exhibit 8 – Environmental Evaluations dated March 20, 2020
- Petition Exhibit 9 – Stormwater Report dated March 20, 2020
- Petition Exhibit 10 – Wetland Soil Evaluation dated March 20, 2020
- Petition Exhibit 11 – Noise Evaluation
- Petition Exhibit 12 – FAA Determination dated October 24, 2019
- Petition Exhibit 13 – SHPO Correspondence dated March 11, 2020
- List of State agencies dated March 28, 2020
- Letter from CSC to Town of Winchester dated March 30, 2020

100 Great Meadow Road
Wethersfield, Connecticut 06109
P 860.807.4300
F 860.372.4570

- Comments from Council on Environmental Quality (CEQ) to CSC dated May 27, 2020
- Comments from Town of Winchester to CSC dated June 2, 2020
- Interrogatories Set 1 from CSC to LSE Pictor, LLC dated April 21, 2020
- Interrogatories Set 2 from CSC to LSE Pictor, LLC dated June 22, 2020
- Interrogatories Set 3 from CSC to LSE Pictor, LLC dated August 14, 2020
- Responses to Interrogatories Set 1 from LSE Pictor, LLC to CSC dated May 12, 2020
- Responses to Interrogatories Set 2 from LSE Pictor, LLC to CSC dated July 9, 2020
- Responses to Interrogatories Set 3 from LSE Pictor, LLC to CSC dated August 19, 2020
- Project Update from LSE Pictor, LLC to CSC dated September 14, 2020
- Project Update from LSE Pictor, LLC to CSC dated September 22, 2020
- SHPO Correspondence letter dated July 31, 2020
- Exhibit D – Revised Site Plans revised through June 27, 2020
- Exhibit E – NDDB Correspondence dated April 3, 2020
- Exhibit F – Cultural Resources Report by Raber Associates dated July 2020
- Site Development Plans prepared by Trinkaus Engineering LLC, dated December 22, 2020
- Stormwater Management Report prepared by Trinkaus Engineering LLC, dated December 22, 2020
- "Request for Determination" email from LSE Pictor, LLC to CTDEEP Dam Safety Division, dated January 13, 2021

It is the opinion of VHB that the Site Development Plans and Stormwater Management Report prepared by Trinkaus Engineering LLC, dated December 22, 2020, meet the guidance and regulation of *2002 Connecticut Guidelines for Soil Erosion and Sediment Control*, *2004 Connecticut Stormwater Quality Manual*, and *General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities* effective December 31, 2020. Furthermore, based upon a review of the above-listed documentation, it is also the opinion of VHB that the engineering-related deficiencies listed in CSC's Decision and Staff Report dated September 28, 2020, have been addressed. A plan outlining the modifications made to the Project layout has been prepared and is enclosed herewith for reference.

Sincerely,

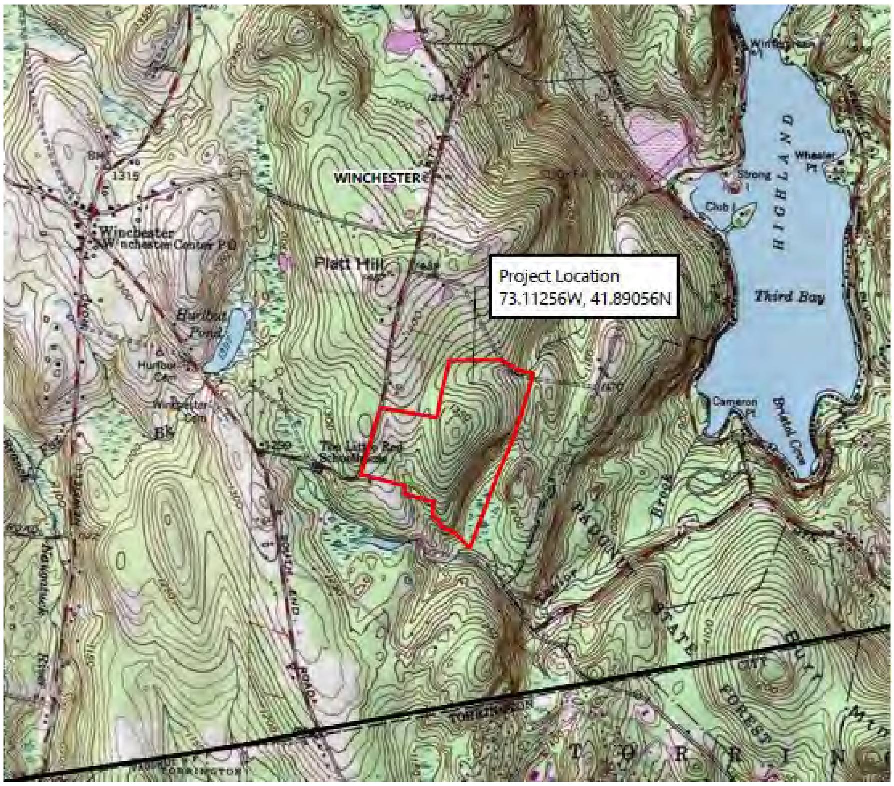
Steven J. Kochis, PE

Senior Project Engineer
skochis@vhb.com

EXHIBIT 6

WETLAND IMPACT ASSESSMENT

Platt Hill Road, Winchester, Connecticut



PREPARED FOR

LSE PICTOR LLC
40 Tower Lane, Suite 201
Avon CT, 06001

PREPARED BY

100 Great Meadow Rd, Suite 200
Wethersfield, CT 06109
860.807.4300

January 14, 2021

VHB Project #42701.01

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1

Introduction

The following Ecological and Wetland Assessment report was prepared by Vanasse Hagen Brustlin, Inc. (VHB) on behalf of LSE Pictor LLC (Lodestar) related to the proposed solar development project described herein located east of Platt Hill Road in Winsted, Connecticut. The property is approximately 104-acres and is currently owned by Trade Wind Farms, LLC. The proposed project includes the development of approximately 20.6-acres into a 1.99-Megawatt AC solar photovoltaic energy facility and convey an approximately 75-acre portion of the parcel to the Winchester Land Trust.

The purpose of this report is to provide a description of onsite wetland communities, assess wetland functions and values, evaluate and mitigate temporary unavoidable wetland impacts that may occur with the project as part of the Connecticut Siting Council Petition application for permit. This report is based on the proposed site development plans prepared by Trinkaus Engineering, dated December 22, 2020. This report was prepared by Jeffrey Shamas who maintains certifications as a Senior Professional Wetland Scientist, Ecologist and Soil Scientist.

The property is located on the east side of Platt Hill Road and south of Dayton Road in a residential and rural setting. The majority of the Project Site contains a wooded hill with steep eastern and western slopes, old field habitat along Platt Hill Road, two intermittent stream and wetland corridors located between the hill and old field area, and wetland and vernal pool areas located along the eastern and northern portions of the parcel.

There are thirteen (13) wetland areas that have been delineated on the project site as well as two (2) vernal pools and 2 (two) intermittent watercourses. These wetlands and watercourses are further described in this report as well as in Appendix 1 – Wetland Verification Letter.

The proposed regulated area impacts due to the project involve wetland and upland regulated area impacts. There are two impacts areas are within the western most wetland for the site access road. These impacts are presented in the following Table 1:

Table 1 Regulated Area Impacts

Impact Types	Approximate Impact Areas (SF)		TOTAL (SF)
	Area 1	Area 2	
Permanent Impacts	775	842	1,617
Temporary Impacts	1,109	1,210	2,319

2

Site Information

Geology

Geologists divide Connecticut into four major regions using the terrane concept, which groups together rocks with similar or related histories (Bell 1995). The four terranes of Connecticut are: 1) Proto-North American; 2) Iapetos; 3) Newark; and 4) Avalonian.

The project site is located within the Proto-North America Terrane consisting of the Iapetos formation (Rogers, 1985). The Iapetos Terrane formed as the ancient ocean, known as Iapetos, was folded into Proto-North America Terrane. Volcanic islands formed in the Iapetos Ocean, at the subduction zone of the plates carrying North America and Baltica. As the plates merged, the dense oceanic crust of the Iapetus Ocean was pulled down into the mantle where it melted. Some magma from the melting, subducting oceanic crust, rose back up through the plate to form the volcanic islands. Weathering and erosion of the volcanic islands produced sediments that were then deposited in the Iapetus Ocean. The volcanic islands drew closer and closer to proto-North America and the volcanic islands.

An on-site soils investigation to determine the presence of inland wetlands and watercourses was completed by Marc Beroz of MB Soil Mapping-and Environmental Consulting Services in 2003 and JMM Wetland Consulting Services, LLC dated January 6 and March 18, 2020. VHB conducted a review of this wetland delineation in October 2020 and found the previously delineated wetland boundaries to be substantially correct across the property (See Appendix 1 – Wetland Verification Letter). The soils observed during the wetland verification investigation consisted mainly of sand and loams. Presented below are the soil map units that occur on the project site, as well as those soil types determined to exist on the site during the wetland verification (See Appendix 2 – NRCS Soil Map). The following is presented as the upland and wetland soils observed on the project site. As noted in VHB's Wetland Verification Letter, dated October 23, 2020 (Appendix 1), there are two potential vernal pools.

Upland Soils

Woodbridge fine sandy loam (45B & 47C)

The Woodbridge series consists of moderately well drained loamy soils formed in lodgment till. They are very deep to bedrock and moderately deep to a densic contact. They are nearly level to moderately steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 25 percent. Saturated hydraulic conductivity ranges from moderately high to high in the surface layer and subsoil and low or moderately low in the dense substratum. Diagnostic horizons and features recognized in this pedon include an ochric epipedon (Ap horizon), cambic horizon (Bw horizons), aquic feature (Bw2 horizon), and densic materials (Cd1 and Cd2) horizons)

Sutton fine sandy loam (52C)

The Sutton series consists of very deep, moderately well drained loamy soils formed in melt-out till. They are nearly level to strongly sloping soils on hills, low ridges, and ground moraines, typically on footslopes, lower backslopes and in slight depressions. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is moderately high or high throughout. Diagnostic horizons and features recognized in this pedon include an ochric epipedon (Oe and A horizons), cambic horizon (Bw horizons) and redox depletions with a chroma 2 or less (Bw2, Bw3, and C1 horizons).

Gloucester gravelly sandy loam (59C)

The Gloucester series consists of very deep, somewhat excessively drained soils formed in sandy till. They are nearly level through very steep soils on ground moraine uplands and moraines. Slope ranges from 0 through 50 percent. Saturated hydraulic conductivity is high or very high. Diagnostic horizons and features recognized in this pedon include an ochric epipedon (A horizon) and cambic horizon (Bw1 horizon).

Rock outcrop-Hollis complex (76E)

This map unit consists of areas of exposed bedrock and nearly level to steep shallow, somewhat excessively drained Hollis soils. The Hollis series consists of well drained and somewhat excessively drained soils formed in a thin mantle of till. They are shallow to bedrock. They are upland soils on bedrock-controlled hills and ridges. Slope ranges from 0 through 60 percent. Saturated hydraulic conductivity is moderately high or high. Depth to hard bedrock ranges from 25 to 50 cm. Diagnostic horizons and features recognized in this pedon include an ochric epipedon (O and A horizons), cambic horizon (Bw1 and Bw2 horizons), and lithic contact (2R horizon).

Paxton and Montauk fine sandy loams (84B, 84C, 85B, & 86C)

Paxton soils

The Paxton series consists of well drained loamy soils formed in lodgment till. The soils are very deep to bedrock and moderately deep to a densic contact. They are nearly level to steep soils on hills, drumlins, till plains, and ground moraines. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the surface layer and subsoil and low or moderately low in the substratum. Diagnostic horizons and features recognized in the pedon include an ochric epipedon (Ap horizon), cambic horizon (Bw horizon), and densic material (Cd horizon).

Montauk soils

The Montauk series consists of well drained soils formed in lodgment or flow till derived primarily from granitic materials with lesser amounts of gneiss and schist. The soils are very deep to bedrock and moderately deep to a densic contact. These soils are on upland hills and moraines. Slope ranges from 0 to 35 percent. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low to moderately high in the substratum. Diagnostic horizons and features recognized in the pedon include Diagnostic horizons and features recognized in the pedon include an ochric epipedon (Ap horizon), cambic horizon (Bw1 and Bw2 horizons), and densic material (2Cd1 and 2Cd2 layers).

Canton and Charlton fine sandy loams (61B, 62C, & 62D)

Canton soils

The Canton series consists of very deep, well drained soils formed in a loamy mantle underlain by sandy till. They are on nearly level to very steep moraines, hills, and ridges. Slope ranges from 0 to 45 percent. Saturated hydraulic conductivity is moderately high or high in the solum and high or very high in the substratum. Diagnostic horizons and features recognized in the pedon include Diagnostic horizons and features recognized in the pedon include an ochric epipedon (Oi and A horizons), cambic horizon (Bw1, Bw2 and Bw3 horizons), and lithologic discontinuity (2C horizon).

Wetland Soils

Ridgebury, Leicester, and Whitman soils (3)

Ridgebury soils

The Ridgebury series consists of very deep, somewhat poorly and poorly drained soils formed in lodgment till derived mainly from granite, gneiss and/or schist. They are commonly shallow to a densic contact. They are nearly level to gently sloping soils in depressions in uplands. They also occur in drainageways in uplands, in toe slope positions of hills, drumlins, and ground moraines, and in till plains. Slope ranges from 0 to 15 percent. Saturated hydraulic conductivity is moderately high or high in the solum and very low to moderately low in the substratum. Diagnostic horizons and features in this pedon include an ochric epipedon (A horizon), aeric feature (Bw1 horizon), cambic horizon (Bw and Bg horizons) and densic contact root limiting material (Cd horizon).

Leicester soils

The Leicester series consists of very deep, poorly drained soils formed in coarse-loamy till. They are nearly level or gently sloping soils in drainageways and low-lying positions on hills. Slope ranges from 0 to 8 percent. Permeability is moderate or moderately rapid in the surface layer and subsoil and moderate to rapid in the substratum. Diagnostic horizons and features in this pedon include an ochric epipedon (Oe and A horizon), cambic horizon (Bg horizon), and an aquic moisture regime (Bg horizon).

Whitman soils

The Whitman series consists of very deep, very poorly drained soils formed in lodgment till derived mainly from granite, gneiss, and schist. They are shallow to a densic contact. These soils are nearly level or gently sloping soils in depressions and drainageways on uplands. Saturated hydraulic conductivity is moderately high or high in the solum and very low to moderately low in the substratum. Diagnostic horizons and features in this pedon include an ochric epipedon (Ap horizon), cambic horizon (Bg horizon), and aquic conditions (Bg horizon).

Catden and Freetown soils (18)

Catden soils

The Catden series consists of very deep, very poorly drained soils formed in highly decomposed woody and herbaceous organic materials in depressions on till plains, lake plains, outwash plains, and flood plains. Saturated hydraulic conductivity is moderately high or high. Slope ranges from 0 to 2 percent. Diagnostic horizons and features in this pedon include sapric material from the surface to 225 cm (Oa1, Oa2, Oa3, Oa4 and Oa5 horizons).

Freetown soils

The Freetown series consists of very deep, very poorly drained organic soils formed in more than 130 centimeters of highly decomposed organic material. They are commonly in depressions or on level uplands and alluvial plains. Slope ranges from 0 to 2 percent. Saturated hydraulic conductivity is moderately high or high. Diagnostic horizons and features recognized in this pedon include sapric material from the surface to 165 cm (Oa1, Oa2, Oa3, Oa4 and Oa5 horizons).

Rippowam fine sandy loam

The Rippowam series consists of very deep, poorly drained loamy soils formed in alluvial sediments. They are nearly level soils on flood plains subject to frequent flooding. Slope ranges from 0 to 3 percent. Saturated hydraulic conductivity ranges from moderately high or high in the loamy upper part and high or very high in the underlying sandy materials. Diagnostic horizons and features recognized in this pedon include an ochric epipedon (A horizon) and cambic horizon (Bg1, Bg2, BCg1, and BCg2 horizons).

Existing Drainage

The site drains in several directions around and off site but ultimately flows northeasterly towards Highland Lake. In the western portion of the site surface water flows towards and along the wetland corridor in a southerly direction towards Taylor Brook Road. The eastern portion of the site flow towards the east to the eastern most wetlands, and to the northern portion of the site towards the northern wetland and continues northeasterly towards Highland Lake.

The Site topography is variable. From Platt Hill Road, it slopes down in an easterly direction to the two wetland corridors. There is an upland area in between the two wetland corridors. From the eastern wetland corridor, the site slopes upward to the east where there is a north/south ridgeline eventually leading to the highest point. The highest point in of the Site is at elevation 1,372-feet (NAVD 1998). From the high point of the Site, it slopes down moderately to the north towards Dayton Road and slopes down moderate then steeply towards the wetland to the east and eventually drains to Highland Lake.

The project is designed to maintain the natural drainage patterns to wetlands to the greatest extent possible.

3

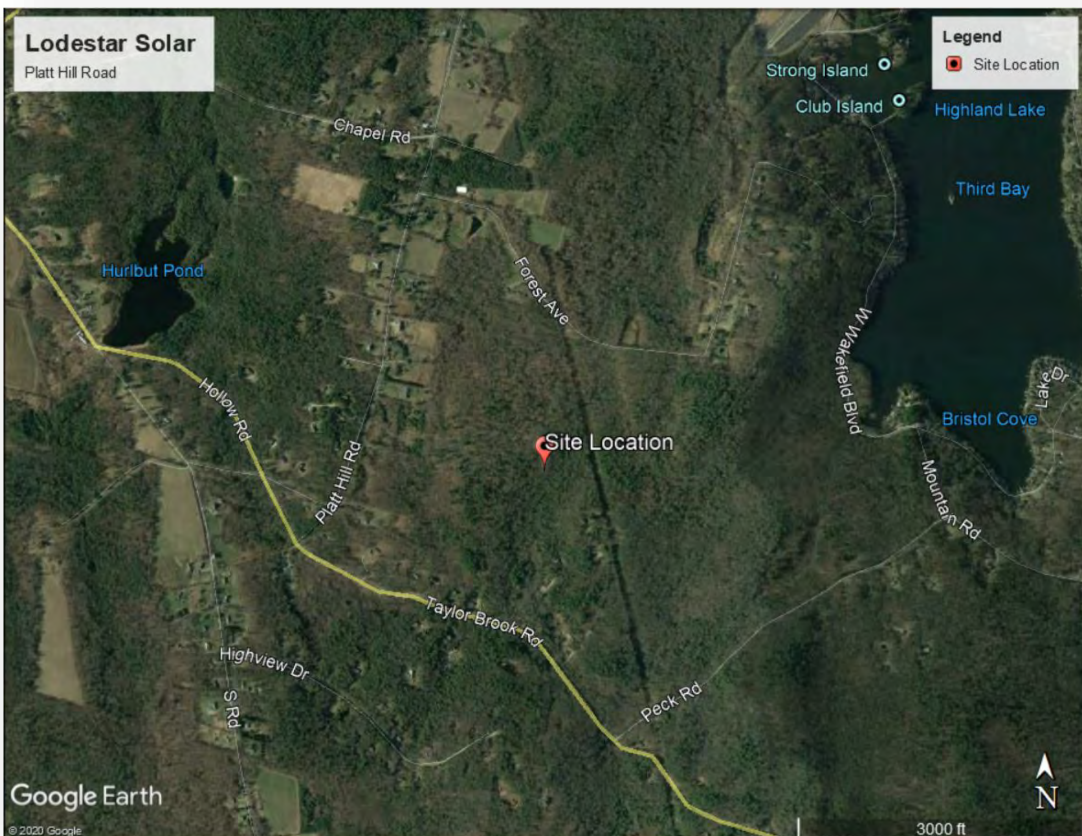
Landscape

Landscape ecology provides an understanding of the landscape mosaic, existing interrelationships between the matrix of habitat patches, and other landscape features within a macro and micro-scale scope. The macro-scale discussion provides information beyond the limits of the project site while the micro-scale discusses the immediate project site.

The site is within the Lower Berkshire Hills ecoregion of the Northern Upland-Transitional Hardwoods Zone of the state. An ecoregion is characterized by distinctive patterns of landscapes and regional climate as expressed by vegetation composition.

Macro-scale

Inset Figure 1- Macro Scale (*Source-Google Earth 2020: NTS*)

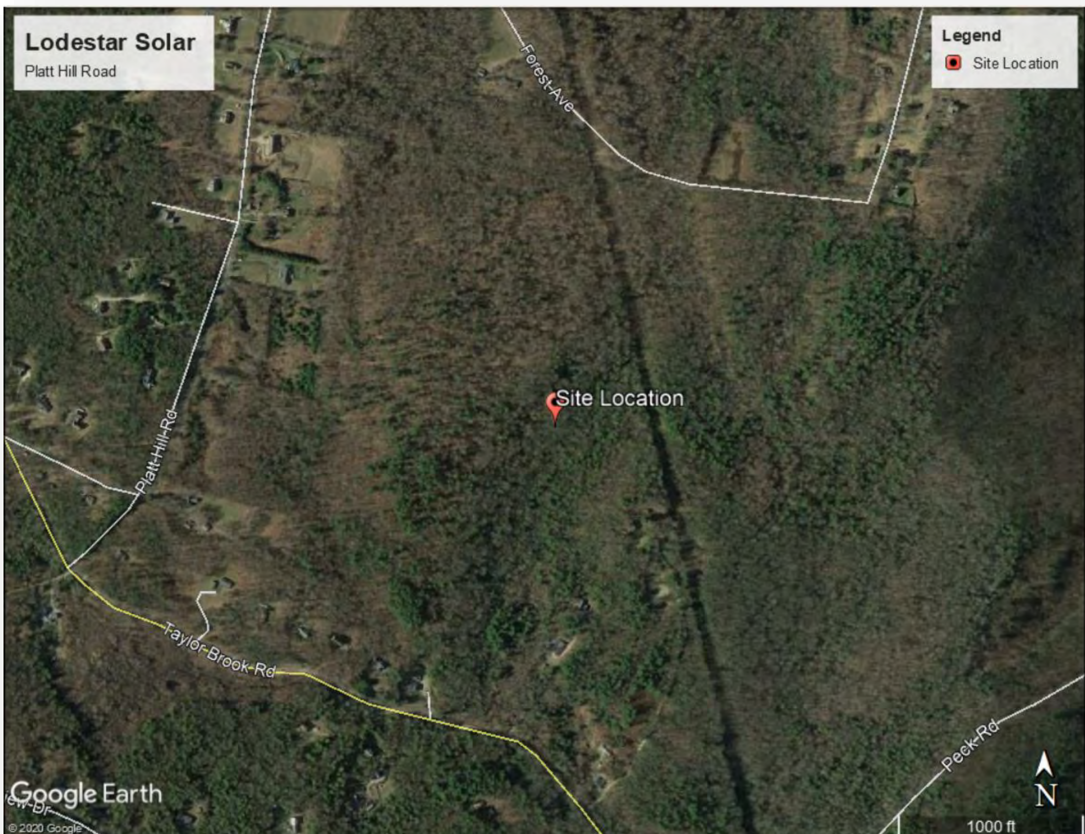


The project site is located within a relatively heterogenous landscape mosaic composed of residential development, agricultural fields, lakes and ponds, as well as a network of local and state roads.

There are large woodland tracts of over 100-acres that likely have the suitability of supporting those species associated with large rural areas. Based on the high connectivity of the project site and surround landscape it is likely that high or moderately high area sensitive species utilize the project site and surrounding forests. Some highly and moderately area sensitive forest bird species would include broad-winged hawk, pileated woodpecker, flycatcher, ovenbird, tanagers, vireo, nuthatch, wren, and some warbler varieties (Herkert, 1993). Low area sensitive bird species (i.e., generalists) that have either been observed or have the potential to occur within habitats of the site include some of the typical generalists, cowbird, red-bellied woodpecker, downy woodpecker, blue-jay, cardinal, grosbeak, oriole, catbird, grackle, warblers, swallows, chickadee, and robin. Some of these species were observed and noted in the Environmental Land Solutions August 1, 2003 (rev. July 21, 2005) Environmental Assessment Report for Trade Winds Farm.

Micro-Landscape Scale

Inset Figure 2- Micro Landscape Scale (*Source-Google Earth 2020: NTS*



The project site is located on a topographically variable land east of Platt Hill Road. The site consists of a mixture of old growth meadow and forested uplands and wetlands. The property was previously developed for farming practices and apparently maintained for this purpose until the early- to mid-part of the last century. Historic stone walls are also present throughout the site and there is a cleared maintained powerline right-of-way in the northeastern corner. The site sits on a glacial drumlin, with the ridge line running down the approximate middle of the property. The site is bordered to the north, south, and west by residential development and to the east by woodlands.

4

Wetland and Ecological Communities Functions and Values

The total area of wetlands and watercourses on the project site is approximately 943,510-square feet (approximately 21.66-acres) and composed of freshwater forested depression and slope wetland communities. Please refer to the attached Wetland and Vernal Pool Resources (Figure 2). These wetlands are classified using the U.S. Fish and Wildlife Services (Cowardin et. al., 1979) method of classification as well as the Hydrogeomorphic (HGM) classification system (Brinson, 1993) as a qualifier of landscape position. The focus of the report will be on the wetland area (Wetland 1) where there is a proposed direct impact as a result of the project.

VHB had previously issued a letter, dated October 23, 2020 (refer to Appendix 1) that was a review of the wetland locations on the subject property as well as detailing the vernal pools and assessment of those pools along with their 100-foot Vernal Pool Envelope (VPE) and 750-foot Critical Terrestrial Habitat (CTH) with accompanying figures. Due to some changes in the recent Trinkaus Engineering Plan dated, 12/22/2020, we have updated the VPE and CTH numbers for the proposed conditions in the following sections. The focus of this report is on the wetland area (Wetland 1) along the western portion of the project, nearest Platt Hill Road, where there are proposed direct impacts, mitigation, and a proposed stormwater basin upland of the wetland boundary

Wetland 1

Wetland 1 is comprised of a large freshwater forested depression and seep wetland and is characterized as palustrine forested broad-leaved deciduous wetland with a seasonally flooded/saturated water regime (USFWS classification: PFO1E). This wetland community is located in the western portion of the site and occupies two separate wetland corridors in the northwestern corner that eventually converge in the southwestern portion of the site. These wetland corridors contain intermittent watercourses, although during the time of the wetland verification only the eastern most corridor was observed to have flow further south of the proposed crossing locations. In the western most of these corridors contains an old farm pond. At the time of the investigation the water level in the farm pond was approximately 2 to 4-inches. The wetland is likely fed by groundwater from hillside seeps as well as surface runoff. Dominate vegetation found within the wetland includes ash (*Fraxinus* sp.), red maple (*Acer rubrum*), northern hemlock (*Tsuga canadensis*), yellow birch (*Betula alleghaniensis*), Japanese barberry (*Berberis thunbergii*), multiflora rose (*Rosa multiflora*), spicebush (*Lindera benzoin*), winterberry (*Ilex verticillata*), cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*) and skunk cabbage (*Symplocarpus foetidus*).

Function-Value Assessment

Biophysical elements such as a wetland's landscape position, geology, hydrology, substrate, and vegetation determine the wetland functions and to what capacity they are performed. Due to the differing biophysical characteristics between on-site wetlands, the functions the wetlands provide and the capacity to perform those functions vary. To better understand these differences, a description of the assessed wetland functional values was completed based on the United States Army Corps of Engineers (ACOE) Highway Methodology Workbook (1993) and its supplement workbook. This method requires a description of each of the wetland communities as well as indicating the functions they provide. The ACOE workbook includes the following thirteen (13) functions and values that have been recognized as functions wetlands can provide: Groundwater Recharge/Discharge, Floodflow Alteration, Fish and Shellfish Habitat, Sediment/Toxicant Retention, Nutrient Removal/Retention/Transformation, Production Export, Sediment/Shoreline Stabilization, Wildlife Habitat, Recreation, Education/Scientific Value, Uniqueness/Heritage, Visual Quality/Aesthetics, and Endangered Species. Presented below is the table used in this process to graphically depict the functional values.

Table 2 Wetland Functions and Value

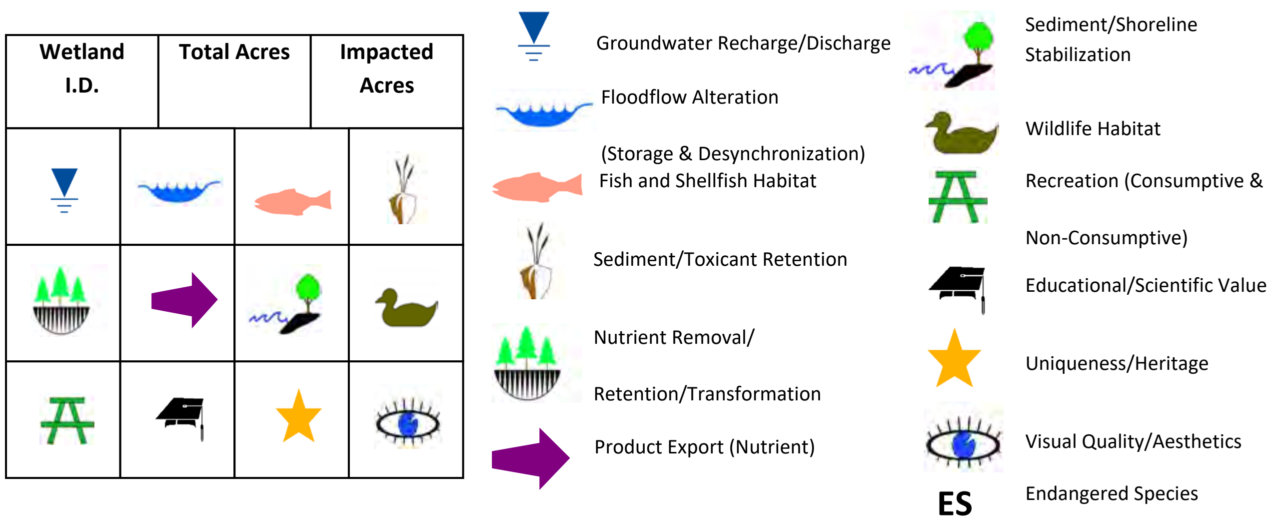


Table 3 Site Wetland Functions and Values based on Army Corps Highway Methodology

Function/Value	Wetland 1
Groundwater Discharge/ Recharge	**P** – Wetland 1 primarily provides groundwater discharge as this wetland is associated with intermittent streams. Hillside seeps also provide groundwater discharge.
Floodflow Alteration	**SC** – The wetland receives and retains overland sheet flow from surrounding areas. However, there are reductions in the wetland's capabilities due to the intermittent watercourse functions.
Fish and Shellfish Habitat	Due to the lack of suitable habitat, the wetland
Sediment/ Toxicant Retention	**SC** – The farm pond in the northwestern corner provides the capacity to provide this function from receiving and retaining drainage. Otherwise, there is limited capabilities to contribute to this function since the watercourses do not allow for slowing and much retention of sediment down gradient of the farm pond.

Function/Value	Wetland 1 (continued)
Nutrient Removal	**SC** – The farm pond in the northwestern corner provides an opportunity for nutrient trapping, however, the watercourses down-stream carry nutrients off site.
Production Export	**P** – Vegetation abundance and diversity within the wetland provides food sources for wildlife to support the food web. Because of the associated watercourses present there is direct connection to transport food sources.
Sediment/ Shoreline Stabilization	The wetland does not provide the capacity to contribute to this function, as shorelines do not exist for example.
Wildlife Habitat	**P -** The wetland is largely not degraded by human activity. Areas dense vegetation in areas of the wetland can provide habitat for small and medium sized animals. The wetland is bordered by large tracts of undeveloped woodland on and off site.
Recreation	Limited, private property, no off-road parking and accessibility to public
Educational/ Scientific Value	Limited, private property, no off-road parking and accessibility to public
Uniqueness/ Heritage	There are no cultural and archaeological resources of concern, based on the Raber Associates July 2020 report.
Visual Quality/ Aesthetics	While the forested environment does provide some visual quality, there is a limited capacity to contribute to this function due to the lack of multiple wetland classification types able to be viewed from primary viewing locations due to the density of the forested community for example.
Endangered Species Habitat	There were no rare species previously observed or an NDDB polygon is within the project site development.

P=Primary Function

SC= Secondary Function

Table 4 Inventory of Representative Vegetation (within & adjancent to wetlands (Common (*Scientific*)

TREES & SAPLINGS				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
Acer rubrum	Red maple	FAC	X	X
Alnus incana	Speckled alder	FACW		X
Betula alleghaniensis	Yellow birch	FAC		X
Fraxinus sp.	Ash	-		X
Pinus strobus	White pine	FACU	X	
Tsuga canadensis	Eastern hemlock	FACU	X	
SHRUBS				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
Berberis thunbergii	Japanese barberry		X	X
Ilex verticillata	Winterberry	FACW		X

SHRUBS *(continued)*				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
Kalmia latifolia	Mountain laurel	FACU	X	X
Lindera benzoin	Spicebush	FACW		X
Rubus hispidus	Bristly dewberry	FACW		X
Sambucus nigra	Black elderberry	FACW		X
Spiraea alba	White meadowsweet	FACW		X
Spiraea tomentosa	Steeplebush	FACW		X
Vaccinium corymbosum	Highbush blueberry	FACW		X
Vitis sp.	Grape	-	X	X
Rosa multiflora	Multiflora Rose	UPL	X	X

HERBS & VINES				
Scientific	**Common**	**Indicator**	**Upland**	**Wetland**
Amphicarpaea bracteata	Hog-peanut	FAC		X
Aralia nudicaulis	Wild sarsaparilla	FACU	X	
Arisaema triphyllum	Jack-in-the-pulpit	FAC		X
Calamagrostis canadensis	Blue joint grass	FACW		X
Carex stricta	Tussock sedge	OBL		X
Cinna latifolia	Slender wood-reed	FACW		X
Coptis trifolia	Three-leaved goldthread	FACW		X
Dryopteris cristata	Crested wood fern	OBL		X
Dryopteris intermedia	Evergreen wood fern	FAC	X	X
Equisetum arvense	Field horsetail	FAC	X	X
Eutrochium maculatum	Spotted joe-pye weed	OBL		X
Eupatorium perfoliatum	Common boneset	FACW		X
Ageratina altissima	White snakeroot	FACU	X	
Eurybia divaricata	White wood-aster	NI	X	
Galium palustre	Common marsh-bedstraw	OBL		X
Galium aparine	Scratch bedstraw	FACU	X	
Galium asprellum	Rough bedstraw	OBL		X
Glyceria striata	Fowl manna grass	OBL		X
Impatiens capensis	Jewelweed	FACW		
Juncus effusus	Soft rush	OBL		X
Maianthemum canadense	Canada mayflower	FACU	X	
Onoclea sensibilis	Sensitive Fern	FACW		X
Osmunda cinnamomea	Cinnamon fern	FACW		X
Osmunda claytoniana	Interrupted fern	FAC	X	X
Osmunda regalis	Royal fern	OBL		X
Polygonum arifolium	Halberd-leaved tearthumb	OBL		X
Polystichum acrostichoides	Christmas fern	FACU	X	
Saxifraga pensylvanica	Eastern swamp saxifrage	OBL		X
Symplocarpus foetidus	Skunk Cabbage	OBL		X
Toxicodendron radicans	Poison ivy	FAC	X	X

NI=Not indicated

5

Potential Vernal Pools

During the wetland verification VHB, two Potential Vernal Pools (PVPs) were observed, which are briefly discussed in the wetland verification letter (Appendix 1) as well as on Figure 3. These PVPs are isolated and are situated in the northeastern portion of the site. Presented below are updated calculations based on the recent updated site development plans from Trinkaus Engineering (12/22/2020). We have classified these as "Potential" vernal pools because we are outside of the amphibian breeding season for confirmation purposes.

Updated Potential Vernal Pool Assessment

Presented below in Table 6 is the area of existing and proposed development impacts within each of the vernal pool habitat areas, the Vernal Pool Envelop (VPE) and the Critical Terrestrial Habitat (CTH). These calculations are from Figure 2- Wetland and Vernal Pool Resource figure. As detailed in the Appendix 1 document, desired management measures in the Calhoun and Klemens (2002) technical document, are to maintain an undisturbed VPE to the extent possible and up to 25% development within the CTH (maintain 75% undeveloped within the CTH).

Table 6 Vernal Pool Approximate Disturbance Areas

<table>
<tr><th>Habitat Zone</th><th>Development Category</th><th>VP 1 (SF)</th><th>VP 2 (SF)</th></tr>
<tr><td rowspan="2">Vernal Pool Envelope (0-100 ft)</td><td>Existing Developed Area</td><td>0</td><td>0</td></tr>
<tr><td>Proposed Developed Area Plus Existing</td><td>0</td><td>0</td></tr>
<tr><td rowspan="2">Critical Terrestrial Habitat (100-750 ft)</td><td>Existing Developed Area</td><td>101,470+/- (5.7%)</td><td>93,311+/- (5.3%)</td></tr>
<tr><td>Proposed Developed Area Plus Existing</td><td>132,593 +/- (7.5%)</td><td>145,814+/- (8.7%)</td></tr>
</table>

The VPE for PVP 1 and 2 are currently undeveloped. Thus, the proposed development will not impact the VPE. The CTH for the PVPs 1 and 2 will be increased from an existing developed area consisting of a 5.7% and 5.3%, respectively, to a proposed developed area of 7.5% and 8.7%, respectively. The 1.8% and 3.4% increases for the CTH's of PVP 1 and 2, respectively, are considered insignificant and continue to be well under the guidance of no more than 25% developed CTH.

It is important to reiterate that we have not confirmed these two pools as vernal pools that support amphibian breeding; however, we are providing this evaluation as if the species were breeding in these pools and a sense of potential impacts. There is extensive suitable habitat both on and off the project site in all directions.

6

Proposed Impacts & Mitigation

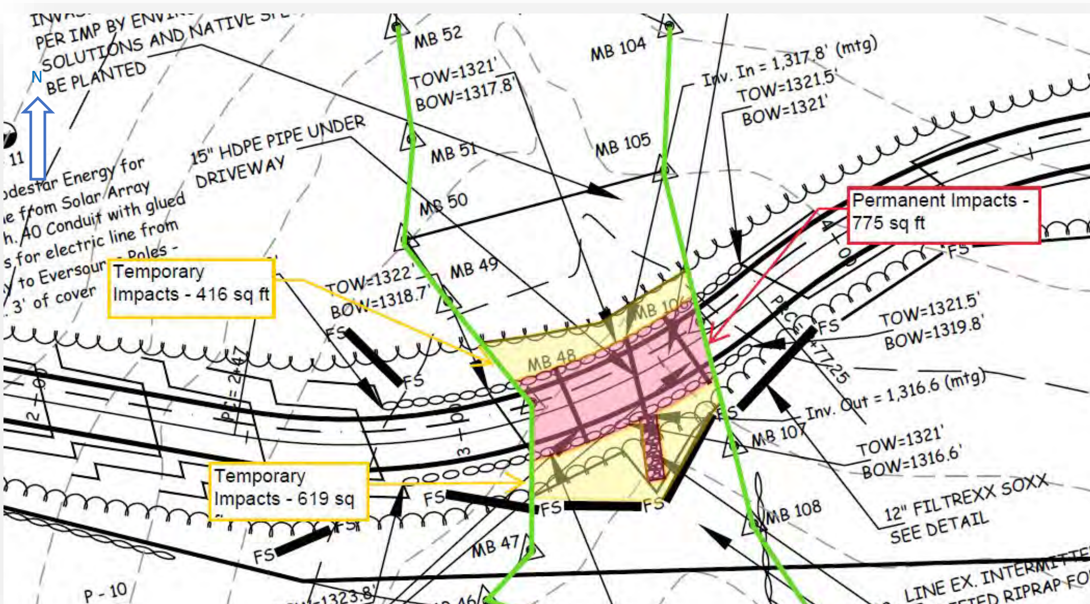
The proposed regulated activities include the construction of the 1.99 MW solar array and a 12-foot gravel access road. The activities will include direct and temporary impacts to inland wetlands as well as mitigation proposed to offset these impacts. Per the Town of Winchester Inland Wetlands and Watercourses Regulations (revised June 20, 2007), the jurisdictional Regulated Area include the delineated wetlands and watercourses as well as activities occurring within 75-feet from the upland edge of wetlands and within 100-feet of watercourses.

Specifically, the following table (also in Section 1, Table 1 of this report) provides the area of proposed impacts:

Wetland Impacts	Approximate Impact Areas (SF)		TOTAL (sf)
	Area 1	Area 2	
Permanent Impacts	775	842	1,617
Temporary Impacts	1,109	1,210	2,319

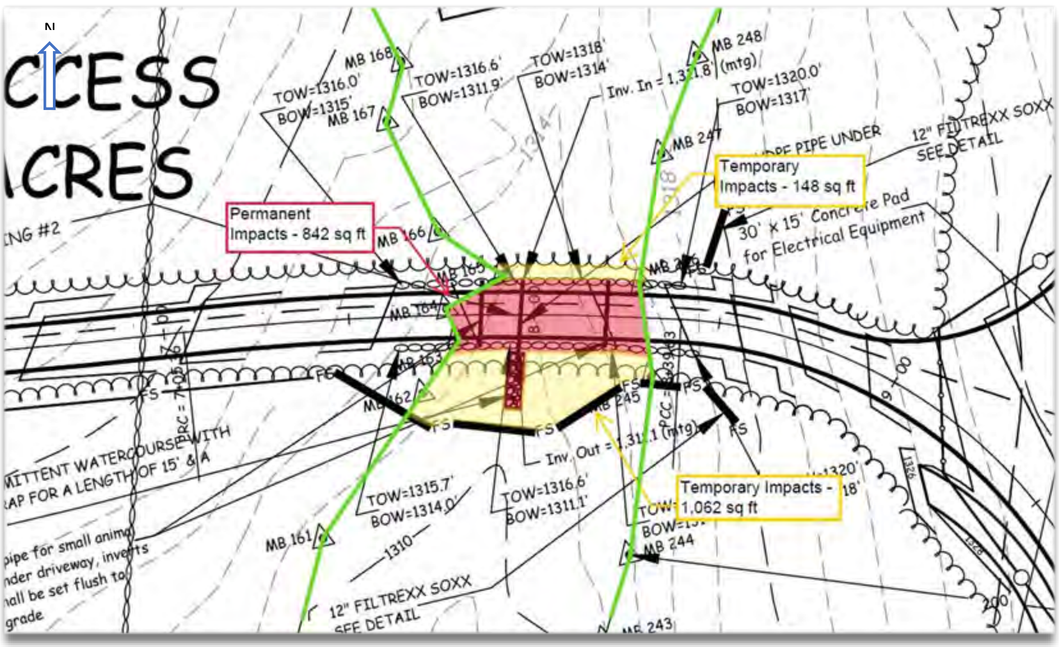
The following impact area snapshot figures are from the Trinkaus Engineering site development plans for the solar development as previously noted in this report. These impacts discussed below have been minimized to the extent possible but are unavoidable in order to provide access to the solar array facility off Platt Hill Road. Mitigation has been provided to offset these impacts and provided in Appendix 3.

Impact Area 1 - Western Access Road Crossing 1



Approximately 775 SF of fill is proposed at this location within the wetland. This wetland area is being affected due to the need for the construction of an access road to the proposed solar array. This impact area will include crushed process stone and boulders for the construction of the access road, installation of 15-inch HDPE pipes to continue the connectivity and conveyance of surface water flow, a rip-rap slope at the downgradient side of the pipe, and installation of two 18-inch HDPE pipes set about 3-inches below existing grade within the wetland corridor for small wildlife passage having a naturalized bottom. The 1,109-SF of temporary impact will include the installation and removal of silt fencing and clearing for the access road. These temporary impact areas will be mitigated through the planting of native trees and shrubs and part of an invasive species management plan (see Appendix 3).

Impact Area 2 - Eastern Access Road Crossing 2



Approximately 842-SF of fill is proposed at this location within the wetland for the access road. Impacts will be the same as the previously mentioned crossing and include: crushed process stone and boulders for the construction of the gravel access road, installation of 15-inch HDPE pipes to convey surface water flow, a rip-rap slope at the downgradient side of the pipe, and installation of two 18-inch HDPE pipes set about 3-inches below existing grade within the wetland corridor for small wildlife passage having a naturalized bottom. for small animal passage. The 1,210-SF of temporary impact will include the installation and removal of silt fencing and clearing for the access road.

Stormwater Measures

Four (4) stormwater quality basins have been designed to manage and treat the stormwater runoff from the project development area prior to discharging to upland areas and have been placed in areas that are proposed to allow for overland flows to continue to contribute to the wetlands along the east and south of the basins.

The Southernmost stormwater basin is closest to wetlands and designed with a series of internal berms after a plunge pool to slow and dissipate flows and allow settling of coarse suspended solids. The outlet of the basin is set at an invert of 1276’, which is at the bottom of the basin, intending to empty the basin. The outlet pipe from basin will discharge to a 100-foot long stoned trench with a concrete level spreader edge. Additionally, there will be native stones placed abutting the level spreader for further protection of stormwater flows prior to reaching the wetlands to address the potential for long term erosion. The basin, level spreader and native stone field will be no closer than 50-feet from the wetland boundary.

Mitigation

Wetland mitigation has been provided by Lodestar to compensate for the approximate 1,617-SF of direct wetland impacts on site. Mitigation efforts is a combination of land preservation of approximately 75-acres in addition to the approximate 3,720-SF in-kind replacement for the forested wetland areas adjacent to each of the wetland crossing areas (please refer to the Wetland Crossing Planting Plan and Invasive Species Control Plan by ELS (Appendix 3)).

The proposed mitigation also involves invasive species removal and a native planting plan using a diversity of native tree and shrub species at Wetland Crossing 1 and primarily shrubs at Wetland Crossing 2 due to the size of the areas.

During the planning for the mitigation Lodestar utilized the states recommended mitigation policy in the following order of priority: restoration, enhancement and lastly wetland creation. The project was able to meet the state’s highest priority for mitigation but also meet the U.S. Army Corps of Engineers recommended first step in mitigation, which is to provide in-kind mitigation in the US Army Corps of Engineers Compensatory Mitigation Guidance document (2016). For example, impacting a forested freshwater wetland would require restoring, enhancing or creating a forested wetland.

The plant species have been intentionally chosen to be similar to the onsite forest community species that occur in the wetlands on site as well as adding diversity. These include black gum (*Nyssa sylvatica*), serviceberry (*Amelanchier canadensis)*, southern gentleman holly (*Ilex verticillata* 'Southern Gentleman'), winter red winterberry (*Ilex verticillata* 'Winter Red’), spicebush (*Lindera benzoin*) and northern bayberry (*Myrica pensylvanica*). In addition, the entire mitigation area will be seeded with New England Wetmix from New England Wetland Plants.

The approximate ratio of wetland mitigation to impacts is 3:1.

7

Conclusions

The proposed project includes the development approximately 20.6-acres into a 1.99-Megawatt AC solar photovoltaic energy facility and convey an approximate 75-acre portion of the parcel to the Winchester Land Trust.

The proposal includes construction of an access road off Platt Hill Road in order to reach the solar array facility. The project proposes approximately 1,617-SF of direct impact to wetlands with approximately 2,319-SF of temporary impact due to two wetland crossings along the access road.

Stormwater management has been provided through the design of four stormwater quality basins with internal berms and level spreaders at the outlet of the two largest basins in order to address quality and quantity of the stormwater and avoid long term erosion from basin outlets. The southernmost basin will be the closest to a wetland, however, will be no closer than 50-feet to the wetland boundary from the closest limit of the stormwater management features (level spreaders) of that basin.

As noted above, there are impacts to wetlands due to the need to access the solar array facility. Lodestar, LLC have incorporated the states policy of avoidance, minimization and compensation of wetland impacts. The unavoidable impacts have been minimized through the design of a 12-foot wide access road and the use of natural stone walls to reduce any addition fill. Mitigation to offset the minimized wetland impacts have been provided in the approximate quantity of 3:1.

The vernal pools and their habitat that has been evaluated and discussed in this and other reports (Appendix 1) have included the evaluation of the VPE and CTH. The development in the CTH with proposed conditions are limited to 7.5% and 8.7% of the CTH for PVP 1 and PVP 2, respectively. These are only a 1.8% and 3.4% increase from existing conditions for PVP 1 and PVP 2, respectively. These increases are considered minimal and are not proposed to adversely affect potential breeding amphibians that may utilize each of the PVP’s.

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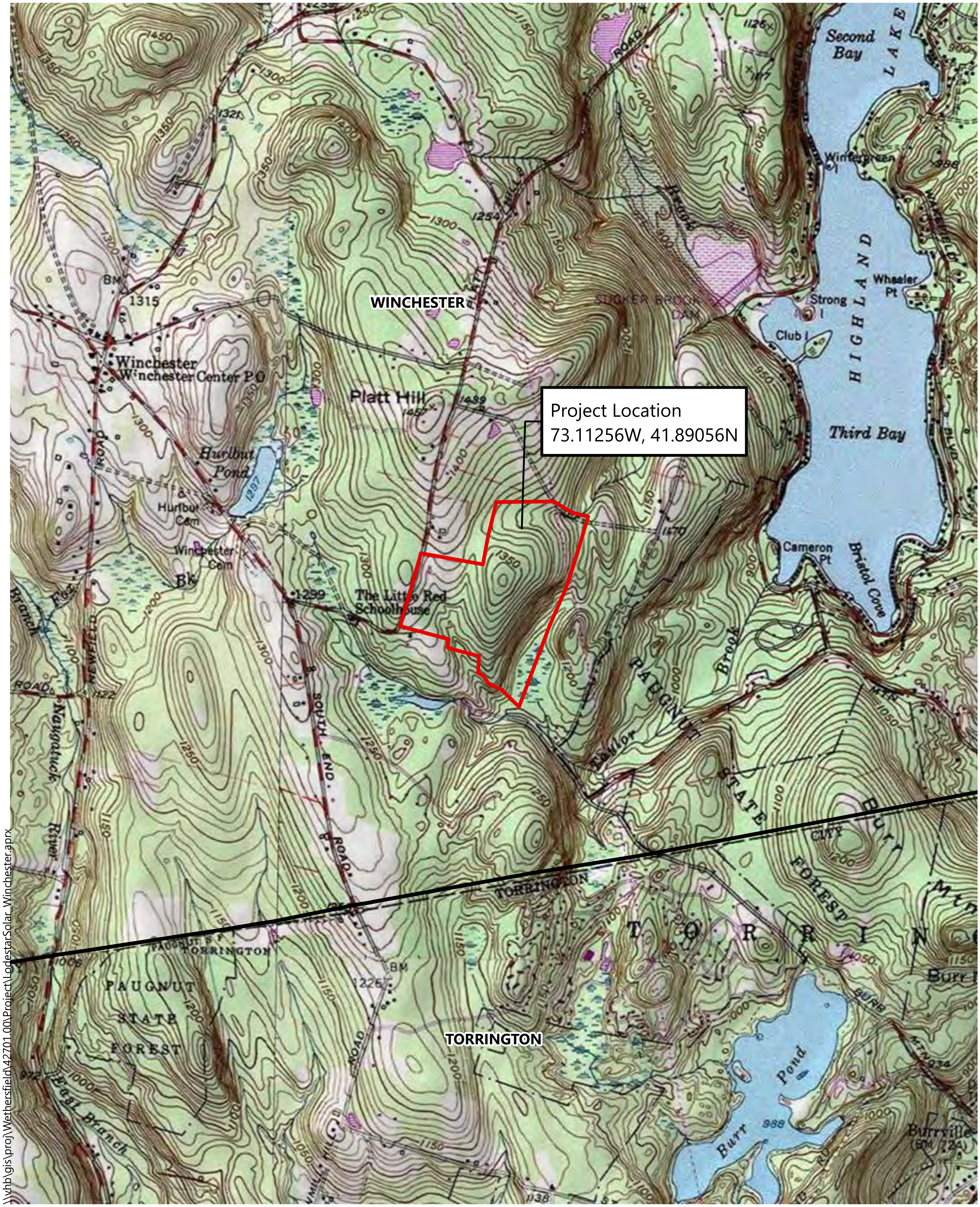
6. Rodgers, J., 1985, Bedrock Geological Map of Connecticut. Connecticut Department of Environmental Protection.

Figures



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Project Location
Town Boundary

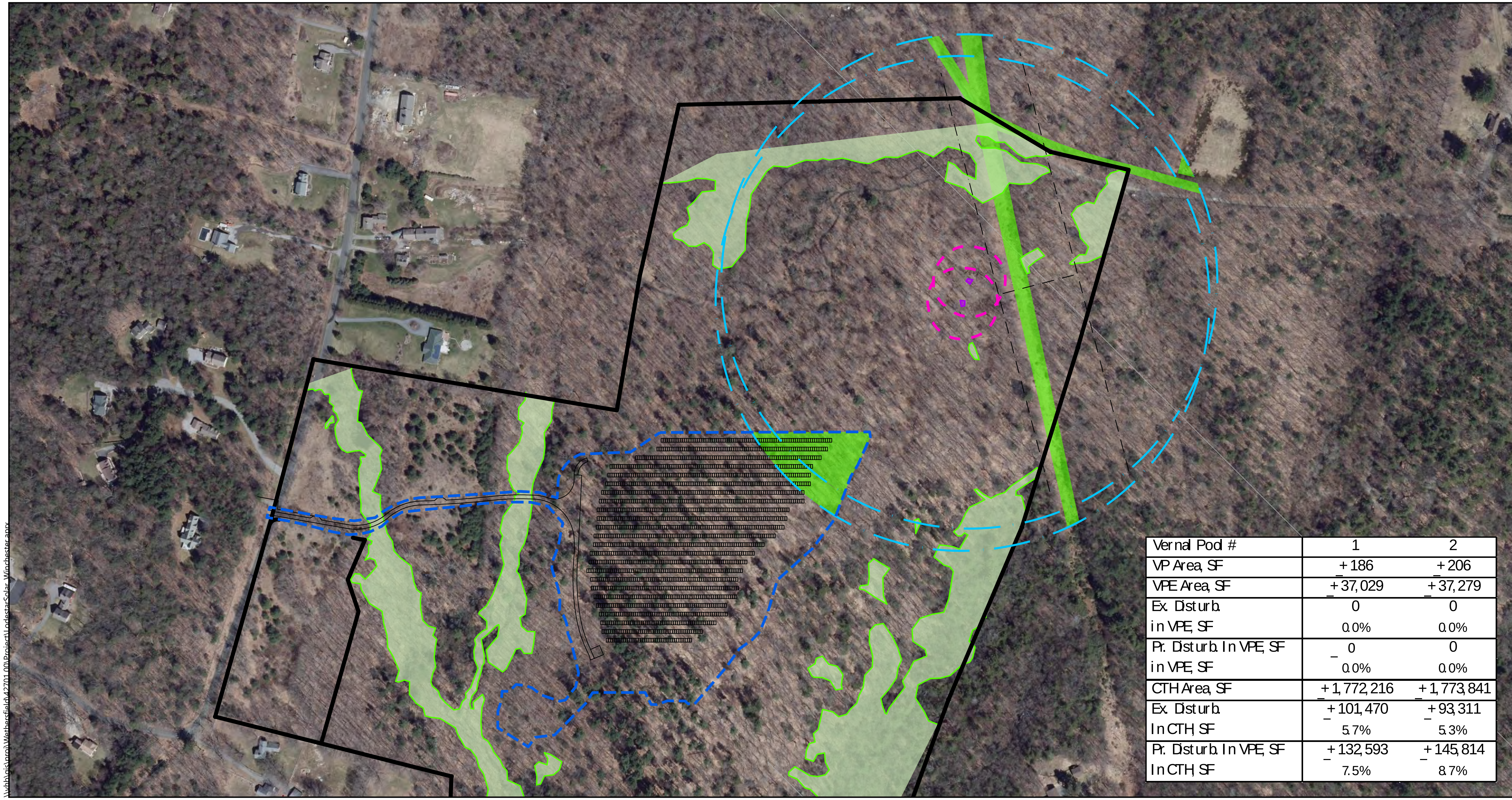
LSE Winchester Solar
Platt Hill Road

Winchester, CT

USGS Site Location Map

Source: VHB, ArcGIS Online, CTDEEP

January 14, 2021 | **FIGURE 2**



Vernal Pool #	1	2
VP Area, SF	±186	±206
VPE Area, SF	±37,029	±37,279
Ex. Disturb. in VPE, SF	0 0.0%	0 0.0%
Pr. Disturb. In VPE, SF in VPE, SF	±0 0.0%	0 0.0%
CTH Area, SF	±1,772,216	±1,773,841
Ex. Disturb. In CTH, SF	±101,470 5.7%	±93,311 5.3%
Pr. Disturb. In VPE, SF In CTH, SF	±132,593 7.5%	±145,814 8.7%

0 150 300 600 Feet

Legend

- Delineated Wetland Edge
- Delineated Vernal Pool Edge
- Critical Terrestrial Habitat (CTH) (100-750 Feet)
- Vernal Pool Envelope (VPE) (0-100')
- Wetland Resource Area
- Vernal Pool Area
- Proposed Disturbance
- Limit of Work
- Eversource ROW Corridor

LSE Winchester Solar
Platt Hill Road

Winchester, CT

Wetland and Vernal Pool Resources

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Appendix 1 – Wetland Verification Letter

October 23, 2020

Ref: 42701.00

Carrie Larson Ortolano, Esq.
Associate General Counsel
LSE Pictor LLC
40 Tower Lane, Suite 201
Avon, CT 06001

Re: Wetland Verification Letter
Platt Hill Road- 1.99+/-MW Project

Dear Attorney Ortolano,

Vanasse Hangen Brustlin, Inc (VHB) is pleased to provide this Wetland Verification Letter as requested and authorized regarding the LSE PictorLLC ("Lodestar") Platt Hill Road project site in Winchester, Connecticut (the "Site"). Our project study area included approximately 75-acres of land that contained the majority of the eastern and western wetland corridors and vernal pools.

I. Background

VHB has received and reviewed the following documents:

1. The original soil scientist report dated June 7, 2003 from Marc Beroz of MB Soil Mapping-Soil and Environmental Consulting Services.
2. A wetland investigation from JMM Wetland Consulting Services, LLC, dated January 6, 2020
3. Site Investigation letter from JMM Wetland Consulting Services, LLC, dated March 18, 2020.
4. The Environmental Assessment Report from Environmental Land Solutions ("ELS"), dated August 1, 2003 rev. July 21, 2005.
5. Site Development Plans from Trinkaus Engineering, LLC, dated March 6, 2020.
6. The Connecticut Siting Council ("CSC") decision letter on Petition No. 1398, dated September 28, 2020.

II. Regulatory Information

Wetlands and watercourses are regulated by both state and federal law each with different definitions and regulatory requirements. Accordingly, the State may regulate waters that fall outside of federal jurisdiction; however, where federal jurisdiction exists concurrent State jurisdiction is almost always present.

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Wethersfield, Connecticut 06109
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<u>State Regulation</u>

Wetland determinations are based on the presence of poorly drained, very poorly drained, alluvial, or floodplain soils and submerged land. *Watercourses* are defined as "rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon the state or any portion thereof." *Intermittent watercourse* determinations are made based on the presence of a defined permanent channel and bank, and two of the following characteristics: (1) evidence of scour or deposits of recent alluvium or detritus, (2) the presence of standing or flowing water for a duration longer than a particular storm incident, and (3) the presence of hydrophytic vegetation. (CT Inland Wetlands and Watercourses Act §22a-38 CGS.)

III. Methodology

VHB received electronic data files provided by the client that contained the previously surveyed delineated wetland boundaries. The data was uploaded onto a Trimble 99133 R1 unit (R1 unit) having submeter accuracy. VHB used the RI unit, connected to a Trimble Hurricane L1 antennae, to locate and walk all previously surveyed upland-wetland boundaries across the property study area. The wetland and upland soil boundaries were evaluated and verified by conducting intermittent straight-line transects using a dutch soil auger and spade. Soil types were identified by observing soil morphology (soil texture, color, structure, etc.). Soil morphology was evaluated through numerous soil test pits and/or hand auger borings (generally to a depth of at least two feet). Soil borings were taken at various intervals and locations along each wetland boundary line. While evaluating the wetland-upland boundaries, VHB also reviewed and considered the vegetation, hydrology, geomorphology and landscape position (slope, depression, riverine) of each wetland to verify the accuracy and of the previously surveyed data and wetland habitat types.

VHB also investigated the two previously determined vernal pools located in the northeast portion of the survey area. The boundary of each vernal pool and identified the characteristics and composition of the habitat and identified potential migratory routes and habitat connectivity.

IV. Results & Discussion

a. <u>Wetlands</u>

VHB qualified wetland staff conducted a site investigation on the Platt Hill Road Site on Thursday October 15, 2020. The weather was sunny, 79°F and no rain. Overall, VHB found the previously delineated upland-wetland boundaries to be substantially correct across our study are of the property. The boundaries included a combination of forested and scrub-shrub wetlands as well as intermittent watercourses. At the time of the site visit, the smaller isolated wetlands were dry, including the previously identified potential vernal pools.

In addition to the geomorphological setting coupled with the time of year and ongoing declared Stage 2 – Incipient Drought conditions in Litchfield County, VHB determined that the isolated wetlands were likely associated with hillside seeps, having water present at or near the surface during the wet season in most years.

Wetland resource areas at the proposed crossing locations consisted of forest swamp. Vegetation along the access route has been previously cleared up to both sides of the wetland and there is evidence of a two-wheeled vehicle crossing at both locations. It is unclear how much (if any clearing) was previously conducted within the wetlands at the proposed crossings. The geomorphology of the area indicates that the wetlands at the crossings are two separate narrow depressions that run along the property from north to south. These wetland depressions appear to be connected to wetlands located offsite to the north. A defined stream channel forms in each depression, located south of the proposed crossings and they eventually combine into one intermittent stream channel. There was no evidence of a defined stream channel located at either wetland crossing.

The proposed stormwater basin is located within a forested upland area, immediately adjacent to an intermittent watercourse to the west, a portion of forested swamp, likely fed by a hillside seep, to the north and an isolated portion of forested swamp, likely fed by a hillside seep, to the south.

b. <u>Vernal Pools</u>

In reviewing the project documentation, we did not find a vernal pool report that demonstrates confirmation of the pools or understand if a study was completed during amphibian breeding season.

VHB investigated the site during the fall season, which is not within the breeding season of amphibians that would typically be utilizing these types of habitats during the spring of the year. Therefore, we could not confirm the presence of vernal pool obligate or facultative species, however we documented the habitat and morphological features observed.

The following is a vernal pool ecological definition of common ecological functions (Calhoun and Klemens, 2002)[1]:

Vernal pools are seasonal bodies of water that attain maximum depths in spring or fall and lack permanent surface water connections with other wetlands or water bodies. Pools fill with snowmelt or runoff in the spring, although some may be fed primarily by groundwater sources. The duration of surface flooding, known as hydroperiod, varies depending upon the pool and the year; vernal pool hydroperiods range along a continuum from less than 30 days to more than one year (Semlitsch 2000)[2]. Pools are generally small in size (< 2 acres), with the extent of vegetation varying widely. They lack established fish populations, usually as a result of periodic drying, and support communities dominated by animals adapted to living in temporary, fishless pools. In the Region, they provide essential breeding habitat for one or more wildlife species

---

[1] Calhoun, A. J. K. and M. W. Klemens. 2002. Best development practices: Conserving pool-breeding amphibians in residential and commercial developments in the northeastern United States. MCA Technical Paper No. 5, Metropolitan Conservation Alliance, Wildlife Conservation Society, Bronx, New York.

[2] Semlitsch, R. D. 2000. Principles for management of aquatic-breeding amphibians. Journal of Wildlife Management 64: 615-631.

including Ambystomatid salamanders (Ambystoma *spp., called "mole salamanders" because they live in burrows), wood frogs* (*Rana sylvatica*), *and fairy shrimp* (*Eubranchipus spp.*).

Two small previously identified Vernal Pools (VPs) located in the northeastern portion of the property were observed and habitat documented (Please refer to the attached Wetland Vernal Pool Resources figure). The northern-most VP (VP-1) is roughly 12-feet long by 10-feet wide depression with not well-defined edges. According to the Trinkaus site plans, this VP is delineated with flags MB 352 through MB 355. The depression was roughly 1-foot deep and contained numerous rocks, fallen woody debris, live tree saplings and ferns (see Photos 3, 4, 5 and 6, below).

The southern-most VP (VP-2) is a well-defined shallow depression, approximately 1-2 feet deep, 10-feet long and approximately 6-feet wide. According to the Trinkaus site plans, this VP is delineated with flags MB 356 through MB 359. VP-2 contained fallen leaf debris from surrounding trees but no visible plant species growing within the depression (see Photos 1 and 2, below). This pool appeared to have a longer hydroperiod than VP-1 due to the deeper pool and lack vegetation at the bottom of the depression area. Generally, VP's that lack vegetation on the bottom of the depression exhibits ponding water for a duration long enough to create anerobic conditions inhibiting vascular plant stem survival.

The geomorphology and landscape position of the VPs occur on a gently sloping hillside downward from west to east. While the immediate area of the VP is relatively flat, there is a slope to the east. At the time of the site visit, surface water was not observed within either of the VPs. Given their landscape position the VPs appear to likely be fed by a hillside seep and localized snow melt and stormwater runoff.

Generally, it is recognized through studies and publications from Calhoun and Klemens (2002) Best Development Practices guidelines and the U.S. Army Corps of Engineers (ACOE) Vernal Pool Best Management Practices (January 2015) that vernal pool breeding species depend on both the aquatic and terrestrial habitat for survival. Two different concentric buffer areas around vernal pools that have been designed as conservation practice measures to allow species movement to other wetland and terrestrial habitats involve a 100-foot Vernal Pool Envelope (VPE) and a 750-foot Critical Terrestrial Habitat (CTH).

For the project site, the majority of the land within the existing 100-foot VPE for each VP consists of undeveloped temperate deciduous forest habitat. A small portion of the VPE's to the east consists of a maintained electrical transmission right-of-way for a distribution line, which consists of emergent and scrub-shrub habitat. Based on the condition of the VPs and their immediate surroundings, VP species have unfettered and direct access to the surrounding 100-foot VPE. 100-percent of the VPEs for both VPs 1 and 2 will not be disturbed and will be maintained. (please refer to the attached Wetland and Vernal Pool Resources figure).

The 750-foot CTH's also consist primarily of undeveloped temperate deciduous forest habitat, while also containing portions of maintained electrical right-of-way and developed residential property. The geomorphology of the entire 750-foot CTH for both VPs consist primarily of a hillside sloping eastward with portions of steeper slopes to the south. A portion of the 750-foot CTH's area located off the subject Property to the north and east.

A desktop map review (refer to the attached Wetland and Vernal Pool Resources figure) of the surrounding online indicates that the majority of the land offsite is also undeveloped temperate deciduous forest with some areas of developed residential property on Forest Street. Under existing conditions for VP-1 and VP-2 approximately 5.7% and 5.3%, respectively, of the CTH is currently disturbed. Under proposed conditions for VP-1 and VP-2 an estimated 7.9% and 8.7%, respectively, of the CTH will be development and would predominately include solar panels and meadow habitat.

Calhoun and Klemens (2002) suggest best management practices where no more than 25% of the CTH should be developed. Thus, the project is not anticipated to have adverse impacts to the vernal pools under the current proposed development layout.

The existing 750-foot CTH is undeveloped temperate deciduous forest, with the majority of the developed portions consisting of the maintained electrical right-of-way. Wetland habitat is located in multiple locations within the 750-foot CTHs. Portions of the 750-foot CTH located on adjacent properties do appear to contain wetlands, based on the boundaries of onsite wetlands in relation to the adjacent properties, visual confirmation from within the property during the site visit and by a review of soil maps of the area. Wetland resource areas within the 750-foot CTHs include the following:

- An intermittent waterbody and forested swamp located across the north and northwestern portions of the 750-foot CTHs, approximately 200-feet north of the VPs;
- Forested swamp located approximately 250-feet east of the VPs;
- Three small isolated forested swamps (most likely fed by hillside seeps) located 150-feet to the east, 100-feet to the south and 700-feet to the southwest; and
- Forested swamp located approximately 600 feet to the south.

A portion of the proposed solar field is located within the southwestern portion of the 750-foot CTHs, which account for the approximate 8% developed area of the total area of the CTH.

V. Closing

Based on the results and findings of our investigations the wetlands were found to be substantially accurate with respect to the Trinkaus site plan data and flagging. The previously determined vernal pools were observed and found to be small depressions likely supported by stormwater runoff, snow melt water and groundwater discharges on the hillside.

Please feel free to contact me at (860) 807-4388 or jshamas@vhb.com with any questions or comments.

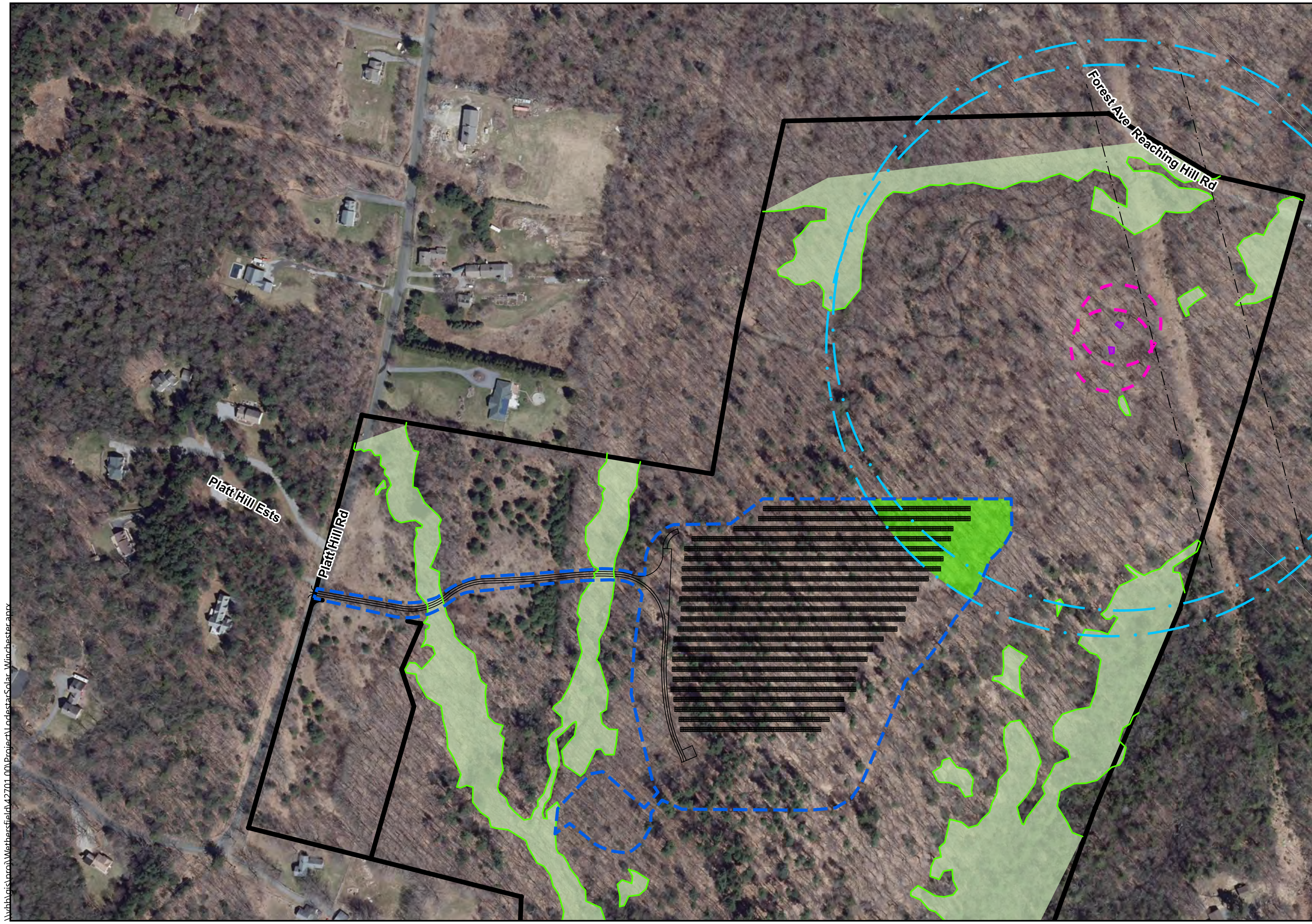
Sincerely,

Jeffrey Shamas, CE, CSS, PWS
Director of Environmental Services

Attachments

FIGURES

October 23, 2020 | **FIGURE 1**



Vernal Pool #	1	2
VP Area, SF	± 186	± 206
VPE Area, SF	± 37,029	± 37,279
Ex. Disturb. in VPE, SF	0 0.0%	0 0.0%
Pr. Disturb. In VPE, SF in VPE, SF	0 0.0%	0 0.0%
CTH Area, SF	± 1,772,216	± 1,773,841
Ex. Disturb. In CTH, SF	± 101,470 5.7%	± 93,311 5.3%
Pr. Disturb. In VPE, SF In CTH, SF	± 139,582 7.9%	± 155,023 8.7%

0 150 300 600 Feet

Legend

- Delineated Wetland Edge
- Delienated Vernal Pool Edge
- Critical Terrestrial Habitat (CTH) (100-750 Feet)
- Vernal Pool Envelope (VPE) (0-100')
- Wetland Resource Area
- Vernal Pool Area
- Proposed Disturbance
- Limit of Work
- Eversource ROW Corridor

LSE Winchester Solar
Platt Hill Road

Winchester, CT

Wetland and Vernal Pool Resources

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PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 1	Date: 10/16/20

Description:

View facing northwest of the southern-most potential vernal pool located in the northeastern portion of the proposed study area.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 2	Date: 10/16/20

Description:

View facing southeast of the southern-most potential vernal pool located in the northeastern portion of the proposed study area.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 3 | Date: 10/16/20

Description:

View facing northwest of the northern-most potential vernal pool located in the northeastern portion of the proposed study area.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy | Site Location: Winchester, CT | Project No: 42701.00

Photo No.: 4 | Date: 10/16/20

Description:

View facing northwest of the northern-most potential vernal pool located in the northeastern portion of the proposed study area.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 5	Date: 10/16/20

Description:

View facing northeast of the northern-most potential vernal pool located in the northeastern portion of the proposed study area.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 6	Date: 10/16/20

Description:

View facing southwest of the northern-most potential vernal pool located in the northeastern portion of the proposed study area.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 7 | Date: 10/16/20

Description:

View facing west of the eastern wetland crossing located in the central-western portion of the property, ajacent to the area of the proposed solar field.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 8 | Date: 10/16/20

Description:

View facing southwest of the eastern wetland crossing located in the central-western portion of the property, ajacent to the area of the proposed solar field.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 9	Date: 10/16/20

Description:

View facing east of the eastern wetland crossing located in the central-western portion of the property, ajacent to the area of the proposed solar field.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 10	Date: 10/16/20

Description:

View facing west of the eastern wetland crossing located in the central-western portion of the property, ajacent to the area of the proposed solar field.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 11 | Date: 10/16/20

Description:

View facing southwest of the western wetland crossing located in the western portion of the property, near Platt Hill Road.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy | Site Location: Winchester, CT | Project No: 42701.00

Photo No.: 12 | Date: 10/16/20

Description:

View facing southwest of the western wetland crossing located in the western portion of the property, near Platt Hill Road.

Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 13 | Date: 10/16/20

Description:

View facing southwest of the western wetland crossing located in the western portion of the property, near Platt Hill Road.

Engineers | Scientists | Planners | Designers

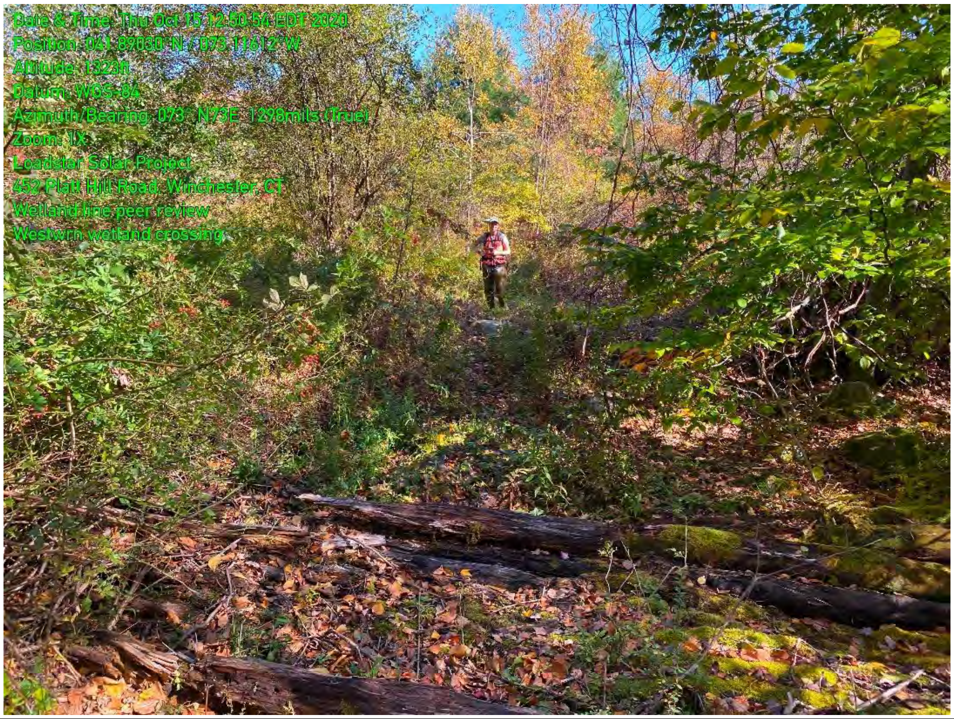
PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 14 | Date: 10/16/20

Description:

View facing northeast of the western wetland crossing located in the western portion of the property, near Platt Hill Road.



Engineers | Scientists | Planners | Designers

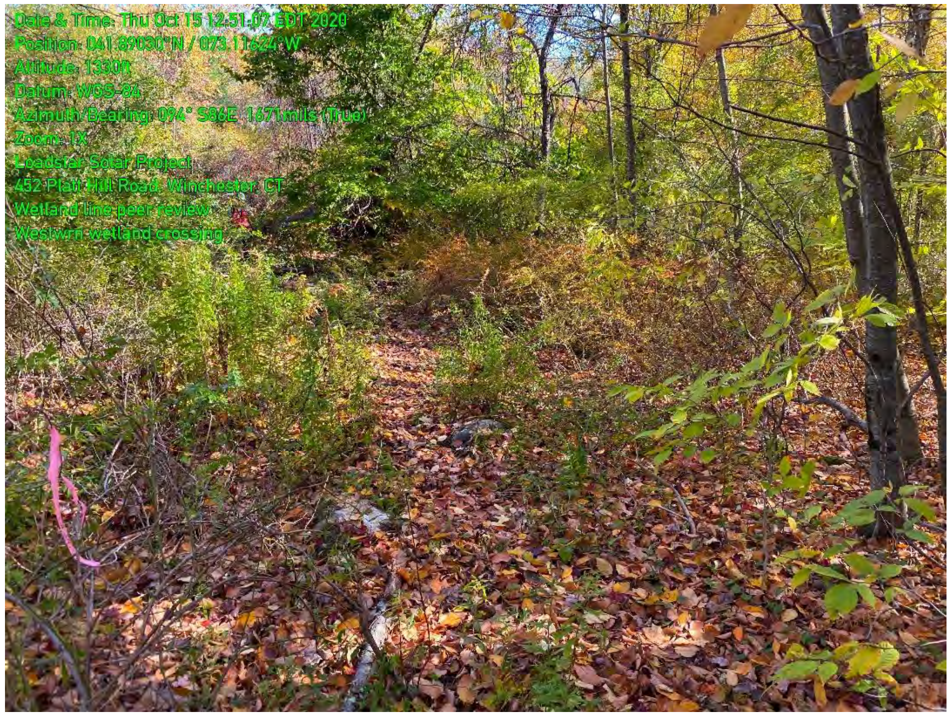
PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 15	Date: 10/16/20

Description:

View facing southeast of the western wetland crossing located in the western portion of the property, near Platt Hill Road.



Engineers | Scientists | Planners | Designers

PHOTOGRAPHIC LOG

Client Name: Lodestar Energy | Site Location: Winchester, CT | Project No: 42701.00

Photo No.: 16	Date: 10/16/20

Description:

View facing northwest of the currently upland wooded location of the detention basin in the southwest portion of the property.

vhb Engineers | Scientists | Planners | Designers

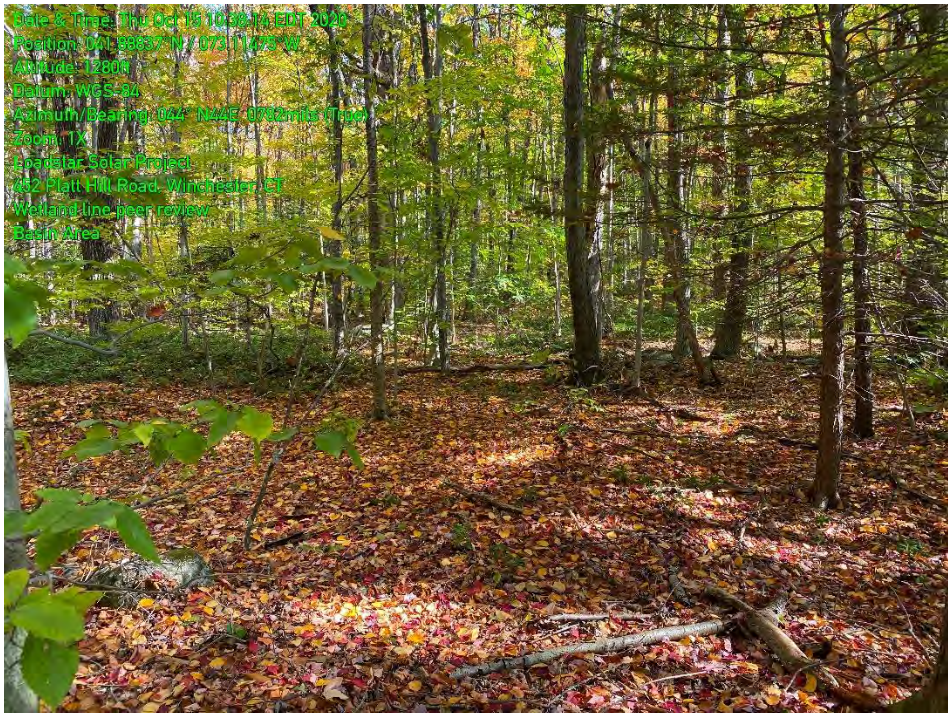
PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 17 | Date: 10/16/20

Description:

View facing northeast of the currently upland wooded location of the detention basin in the southwest portion of the property.



vhb Engineers | Scientists | Planners | Designers

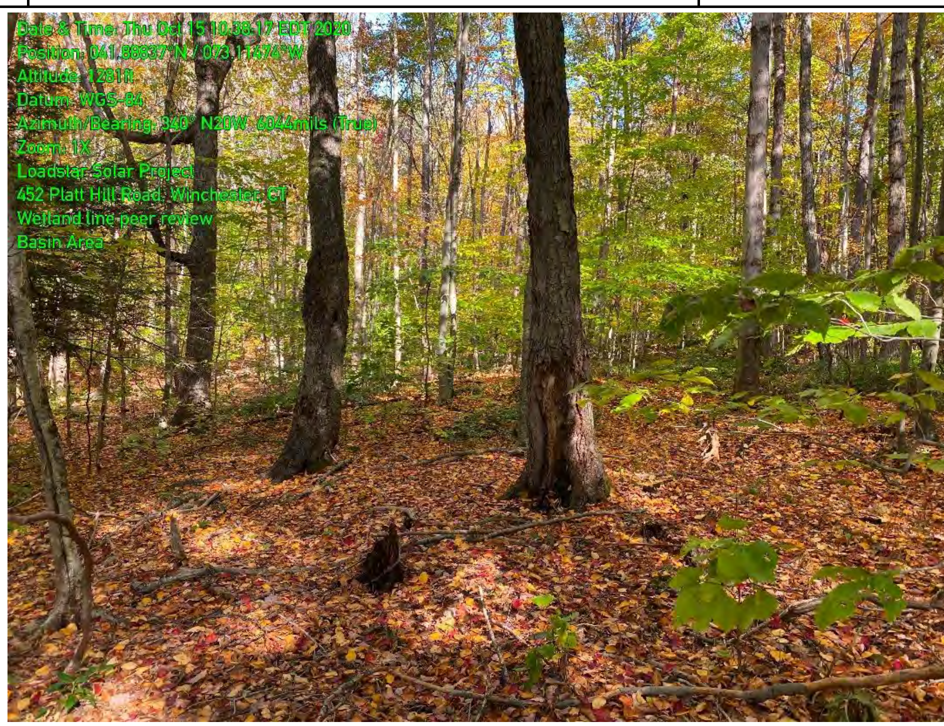
PHOTOGRAPHIC LOG

Client Name: Lodestar Energy	Site Location: Winchester, CT	Project No: 42701.00

Photo No.: 18 | Date: 10/16/20

Description:

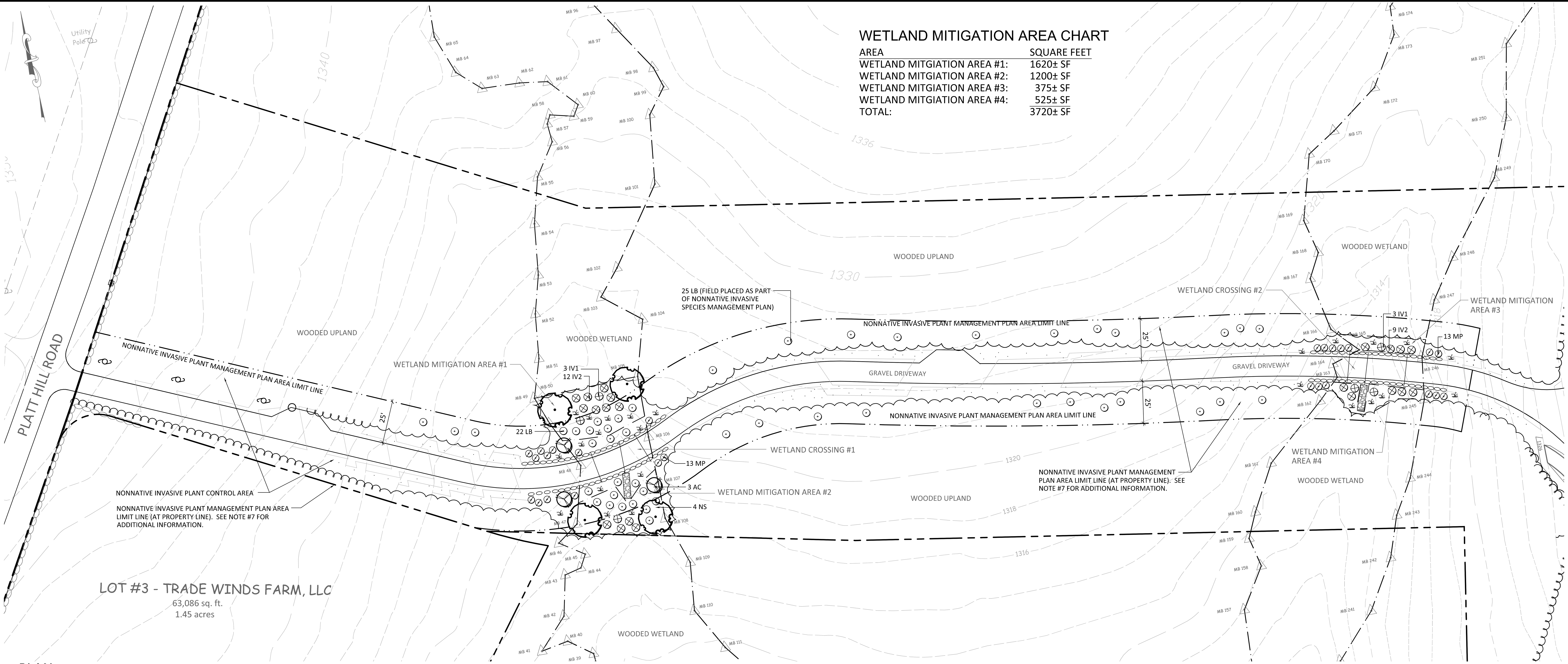
View facing northwest of the currently upland wooded location of the detention basin in the southwest portion of the property.



Appendix 3 – Wetland Crossing Planting Plan & Invasive Species Control Plan

WETLAND MITIGATION AREA CHART

AREA	SQUARE FEET
WETLAND MITGIATION AREA #1:	1620± SF
WETLAND MITGIATION AREA #2:	1200± SF
WETLAND MITGIATION AREA #3:	375± SF
WETLAND MITGIATION AREA #4:	525± SF
TOTAL:	3720± SF



PLAN

SCALE: 1"=30'

LEGEND

PROPERTY LINE

MB 51 — WETLAND LINE

NONNATIVE INVASIVE SPECIES MANAGEMENT AREA

62 — EXISTING CONTOUR

62 — PROPOSED CONTOUR

TREE LINE TO REMAIN (APPROX.)

NEW DECIDUOUS SHADE TREE

NEW DECIDUOUS SMALL TREE

NEW SHRUB

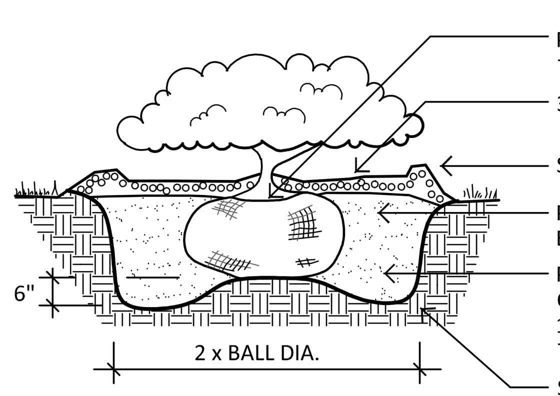
NEW SEEDED AREA (AS PER PLAN NOTES)

PLANT LIST

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
3	AC	AMELANCHIER CANADENSIS	SHAD	4-5' HT.	B&B	MULTI-STEM
4	NS	NYSSA SYLVATICA	BLACK GUM	7-8' HT.	B&B	
6	IV1	ILEX VERTICILLATA 'SOUTHERN GENTLEMAN'	SOUTHERN GENTLEMAN HOLLY	2-3' HT.	CONT.	
21	IV2	ILEX VERTICILLATA 'WINTER RED'	WINTER RED WINTERBERRY	3-4' HT.	CONT.	
47	LB	LINDERA BENZOIN	SPICEBUSH	2-3' HT.	CONT.	
26	MP	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	2-3' HT.	CONT.	

NOTES:

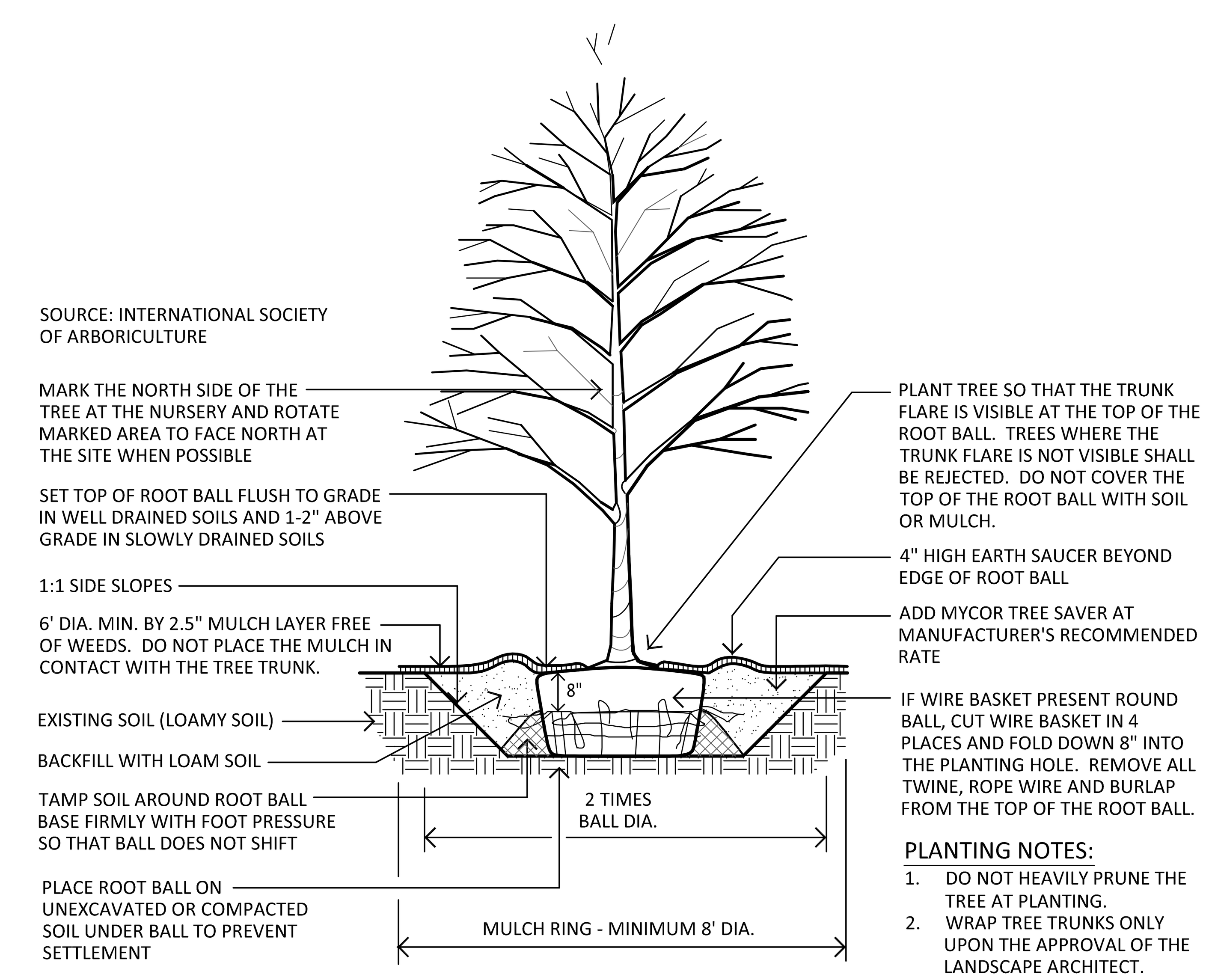
1. EXACT LOCATION OF PROPOSED PLANTINGS AND SPECIES TYPES MAY VARY FROM THIS PLAN BASED ON SITE PLAN REVISIONS AND/OR ACTUAL FIELD CONDITIONS.
2. SEED DISTURBED WETLAND AND WETLAND BUFFERS AT THE METHODS AND 125% THE APPLICATION RATE RECOMMENDED BY THE SEED MANUFACTURER. MAINTAIN MEADOW AT A 6" HEIGHT THE FIRST GROWING SEASON FOLLOWED BY AN ANNUAL LATE FALL MOWING TO A 6" HEIGHT (OR LEAVE UNMOWN TO SUCCEED NATURALLY INTO WOODLAND). SEED MIXTURES SHALL BE AS FOLLOWS:
   A. DISTURBED WETLAND BUFFERS: SEED THESE AREAS WITH "WETMIX" SEED MIXTURE BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000) OR AN EQUIVALENT NATIVE MEADOW SEED MIXTURE APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE.
   B. DISTURBED WETLANDS: SEED DISTURBED WETLAND AREAS WITH "NEW ENGLAND CONSERVATION / WILDLIFE SEED MIX" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000) OR AN EQUIVALENT NATIVE MEADOW SEED MIXTURE APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE.
3. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING. SUBSTITUTED PLANTS SHALL BE AT AN EQUAL OR GREATER SIZE AS NOTED USING A SIMILAR TYPE PLANT.
4. PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
5. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.
6. SPRAY NEW PLANTINGS IMMEDIATELY AFTER INSTALLATION WITH A WHITE-TAILED DEER REPELLENT AND CONTINUE AS NEEDED TO MAINTAIN PLANTS FREE OF SIGNIFICANT DEER BROWSING.
7. REFER TO "GENERAL NONNATIVE INVASIVE PLANT MANAGEMENT PLAN" PREPARED BY ENVIRONMENTAL LAND SOLUTIONS, LLC , DATED JANUARY 2021 FOR MANAGEMENT FOR ADDITIONAL INFORMATION.



SHRUB PLANTING DETAIL

SCALE: NOT TO SCALE

SOURCE: INTERNATIONAL SOCIETY OF ARBORICULTURE



PLANTING NOTES:

1. DO NOT HEAVILY PRUNE THE TREE AT PLANTING.
2. WRAP TREE TRUNKS ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT.

TREE PLANTING DETAIL

SCALE: NOT TO SCALE

ENVIRONMENTAL LAND SOLUTIONS, LLC
Landscape Architects and Environmental Planners
8 KNIGHT STREET, SUITE 203
NORWALK, CONNECTICUT 06851
203-855-7879 (phone) 203-855-7835 (fax)
Email: matt@elsllc.net
Website: http://www.elsllc.net
ELS — LANDSCAPE ARCHITECTURE — ENVIRONMENTAL PLANNING

WETLAND PLANTING PLAN

SHEET 1 OF 1
SCALE: AS SHOWN
DATE: 1/12/21

PREPARED FOR:
LSE PICTOR LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

General Nonnative Invasive Plant Management Plan

for

LSE Pictor LLC

Platt Hill Road, Winchester, CT

Date: January 2021

Prepared By: Environmental Land Solutions, LLC
Landscape Architecture & Environmental Planning
8 Knight Street, Suite 203, Norwalk, CT 06851
Tel: (203) 855-7879 Fax: (203) 855-7836

Nonnative Invasive Plant Management Plan

for

LSE Pictor LLC

Platt Hill Road, Winchester, CT

Nonnative invasive plants are an increasing threat to natural plant communities throughout Connecticut mainly because these aggressive plants outcompete our native species, reducing diversity of both our native plants and wildlife. Since nonnative invasive plants readily become established on disturbed lands that are associated with development, early detection of the establishment of nonnative and invasive plants, followed by immediate action, is critical in any land management plan that is aimed at minimizing potential development-related adverse impacts. This plan is intended as a general guide to control the establishment and spread of nonnative invasive plants post development of this property. Both non-chemical and chemical means of control have been incorporated for this plan. The choice of control measures to be implemented will depend on the size of the nonnative invasive plant stand. If acted on early, nonnative invasive plant can often be controlled by non-chemical methods. However, a herbicide-based approach may be required to control invasive plants that have become well established and/or widespread.

OBJECTIVES FOR CONTROL

Management objectives for the targeted species listed below will involve detection and removal of nonnative invasive plants within the property's uplands, wetlands, and riparian corridors as delineated on the "Wetland Planting Plan," prepared by Environmental Land Solutions, LLC, dated 1/12/21. The control of nonnative invasive plants should be an integral part of a long-term routine landscape maintenance of the site. However, since nonnative invasive plants are a significant concern when the site soils are disturbed, this plan is intended to be active for two (2) consecutive growing seasons immediately after the site has been stabilized with vegetation.

Nonnative invasive plants spread rapidly by seeds that are generally dispersed by birds, other wildlife, and wind. Their seeds can remain viable within soil for many years. This control plan is not intended to remove all nonnative invasive plants from the control area but rather to limit their establishment within this area.

TARGET AREAS

Target areas for the control of nonnative invasive species includes the landscaped areas delineated on the "Wetland Planting Plan," prepared by Environmental Land Solutions, LLC, dated 1/12/21. The control area include the site areas within 25' from the edge of the new access road from Platt Hill Road to 25' to the east of the eastern access road wetland crossing. Base source information within this plan has come from the Plant Conservation Alliance's Alien Plant Working Group and Connecticut Invasive Plant Working Group.

TARGET SPECIES

Listed below are the predominate nonnative invasive species that may become established on the site. The list below does not preclude additional nonnative invasive plants from growing on the site. If additional species are found on the property, they should be controlled as per the Connecticut Invasive Plant Working Group guidelines.

Trees:
Ailanthus *(Ailanthus altissima)*
Norway Maple *(Acer platanoides)*

Shrubs and Vines:
Porcelainberry *(Ampelopsis brevipedunculata)*
Multiflora Rose *(Rosa multiflora)*
Japanese Barberry *(Berberis thunbergii)*
Burningbush *(Euonymous alatus)*
Tartarian Honeysuckle *(Lonicera tatarica)*
Japanese Privet *(Ligustrum japonica)*
Japanese Knotweed *(Polygonum cuspidatum)*
Asiatic Bittersweet *(Celastrus orbiculatus)*

Herbaceous Plants:
Japanese Stiltgrass *(Microstegium vimineum)*
Garlic Mustard **(***Alliaria petiolata)*
Purple Loosestrife *(Lythrum salicaria)*
Mugwort *(Artemisia vulgaris)*
Common Reed *(Phragmites australis)*

PRE-CONSTRUCTION PROTOCOL

If needed, the site contractor shall meet on the site with the project environmental consultant to identify nonnative invasive plant to be targeted for control. Depending upon the degree of the existing nonnative invasive plant populations present on the site, the control of some nonnative invasive plants (such as Japanese Stiltgrass, Mugwort, and Garlic Mustard) may not be realistic without significant impact to the environment. The environmental consultant shall have final determination over the control of these plants.

MANAGEMENT OPTIONS

The following options are available for the control of nonnative invasive plants:

1. Hand Pulling: This method is generally useful for the removal of individual or small colonies of undesirable herbaceous plants.

2. Grubbing-out Root Collar: Mechanical removal is a useful method for managing nonnative invasive shrubs. Using a pulaski or similar digging tool, remove the entire plant including all roots and runners. Juvenile plants can be hand pulled depending on soil conditions and root development.

3. Cutting at Grade: Repeated cutting or mowing at the rate of three to four times per growing season is effective for controlling vines and shrubs. In high quality natural communities, cutting of individual plants is preferred to site mowing to minimize habitat disturbance.

4. Herbicide Treatment: Chemical control of nonnative invasive plants is warranted on large stands of nonnative invasive plants and on hard to control species (such as Japanese Knotweed and Phragmites). Application of systemic herbicides (e.g., Glyphosate) to freshly cut stumps or to regrowth may be the most effective methods, especially if conducted late in the growing season. Chemical control of nonnative invasive plants should not be implemented unless controls noted above have been insufficient to diminish the population by 50%.

   Care shall be taken to avoid herbicide contact with native or other desirable vegetation. In areas where native plants are growing near plants to be controlled, the herbicide shall not be sprayed onto the target plants. In these areas the herbicide shall be applied with a brush or cloth.

   The landscape contractor shall follow the methods and recommendations recommended by the herbicide manufacturer and comply with all federal, state and local laws. A permit from CT DEEP is required for any pesticide application to a body of water.

GENERAL CONTROL NOTES

With regards to the control of nonnative and invasive plants, the following general notes shall apply to the project.

1. Removal of nonnative invasive plants is proposed to be performed over the two (2) year control period. Depending upon the start of the construction, if feasible, existing nonnative invasive species should be documented on the site prior to any site disturbance.

2. The landscape contractor shall contact the project environmental consultant with any questions regarding the control or identification of invasive nonnative species.

3. If feasible, start control of nonnative invasive plant species prior to the start of earth moving activities.

GENERAL CONTROL SEQUENCE

Control nonnative invasive species as follows:

A. Control of Nonnative Invasive Trees and Shrubs

Step #1 (prior to herbicide treatment): Cut plant down to grade level during the growing season (late summer or early fall is preferable). Grub-out root collar and remove roots if feasible. Dispose of cut plant material and roots as outlined below.

Step #2: Immediately after cutting and if roots remain in the ground, treat cut stems with an appropriate herbicide (such as Round-up) at the rate and methods recommended by the manufacturer. Care shall be taken to avoid herbicide contact with native or other desirable vegetation.

Step #3: Check control area monthly during the growing season for new growth. Spot treat new growth with an appropriate herbicide as needed for control.

B. Control of Nonnative Invasive Vines

Step #1: Pull targeted vines (including roots if feasible) from the ground during the spring and early summer months. However, manual removal of roots may be difficult because of their extensive root system. If plants are cut at grade, treat cut stems systemic herbicide.

Step #2: Follow up with both manual removal and herbicide treatment monthly until controlled.

C. Control of Nonnative Invasive Herbaceous Plants

Step #1: For control of individual plants to small stands, remove plants by hand pulling.

Step #2: For control of large colonies of herbaceous nonnative invasive plants, cut plant down to grade monthly during the growing season.

Step #3: If plants persist, apply appropriate herbicide per manufacturer's recommendation.

D. Control of Phragmites and Japanese Knotweed

Step #1: Cut plant down to grade in mid summer. Apply herbicide (Glyphosate) when regrowth reaches 2-3' tall.

Step #2: Repeat herbicide treatment as needed two weeks after initial herbicide treatment. Glyphosate is most active in late summer when Phragmites is in bloom.

Steps #3: After 3-4 weeks following herbicide applications, cut or mow down the stalks to stimulate the emergence and growth of other plants previously suppressed.

DISPOSAL OF INVASIVE PLANTS

All cut or pulled invasive nonnative plant materials shall be disposed of appropriately and comply with the 2004 DEEP / UCONN "Guidelines for Disposal of Terrestrial Invasive Plants." All cuttings shall be collected and placed onsite on a plastic tarp (or on an asphalt pavement area) and sun dried until dead. Avoid cuttings from being in contact with any soil. Dead plants shall be bagged and deposited at an incinerator waste facility (not a composting facility).

End.

Platt Hill Road-winchester-invasive control plan2 2021.wpd

EXHIBIT 7

General Nonnative Invasive Plant Management Plan

for

LSE Pictor LLC

Platt Hill Road, Winchester, CT

Date: January 2021

Prepared By: Environmental Land Solutions, LLC
Landscape Architecture & Environmental Planning
8 Knight Street, Suite 203, Norwalk, CT 06851
Tel: (203) 855-7879   Fax: (203) 855-7836

Nonnative Invasive Plant Management Plan

for

LSE Pictor LLC

Platt Hill Road, Winchester, CT

Nonnative invasive plants are an increasing threat to natural plant communities throughout Connecticut mainly because these aggressive plants outcompete our native species, reducing diversity of both our native plants and wildlife. Since nonnative invasive plants readily become established on disturbed lands that are associated with development, early detection of the establishment of nonnative and invasive plants, followed by immediate action, is critical in any land management plan that is aimed at minimizing potential development-related adverse impacts. This plan is intended as a general guide to control the establishment and spread of nonnative invasive plants post development of this property. Both non-chemical and chemical means of control have been incorporated for this plan. The choice of control measures to be implemented will depend on the size of the nonnative invasive plant stand. If acted on early, nonnative invasive plant can often be controlled by non-chemical methods. However, a herbicide-based approach may be required to control invasive plants that have become well established and/or widespread.

OBJECTIVES FOR CONTROL

Management objectives for the targeted species listed below will involve detection and removal of nonnative invasive plants within the property's uplands, wetlands, and riparian corridors as delineated on the "Wetland Planting Plan," prepared by Environmental Land Solutions, LLC, dated 1/12/21. The control of nonnative invasive plants should be an integral part of a long-term routine landscape maintenance of the site. However, since nonnative invasive plants are a significant concern when the site soils are disturbed, this plan is intended to be active for two (2) consecutive growing seasons immediately after the site has been stabilized with vegetation.

Nonnative invasive plants spread rapidly by seeds that are generally dispersed by birds, other wildlife, and wind. Their seeds can remain viable within soil for many years. This control plan is not intended to remove all nonnative invasive plants from the control area but rather to limit their establishment within this area.

TARGET AREAS

Target areas for the control of nonnative invasive species includes the landscaped areas delineated on the "Wetland Planting Plan," prepared by Environmental Land Solutions, LLC, dated 1/12/21. The control area include the site areas within 25' from the edge of the new access road from Platt Hill Road to 25' to the east of the eastern access road wetland crossing. Base source information within this plan has come from the Plant Conservation Alliance's Alien Plant Working Group and Connecticut Invasive Plant Working Group.

TARGET SPECIES

Listed below are the predominate nonnative invasive species that may become established on the site. The list below does not preclude additional nonnative invasive plants from growing on the site. If additional species are found on the property, they should be controlled as per the Connecticut Invasive Plant Working Group guidelines.

Trees:
Ailanthus *(Ailanthus altissima)*
Norway Maple *(Acer platanoides)*

Shrubs and Vines:
Porcelainberry *(Ampelopsis brevipedunculata)*
Multiflora Rose *(Rosa multiflora)*
Japanese Barberry *(Berberis thunbergii)*
Burningbush *(Euonymous alatus)*
Tartarian Honeysuckle *(Lonicera tatarica)*
Japanese Privet *(Ligustrum japonica)*
Japanese Knotweed *(Polygonum cuspidatum)*
Asiatic Bittersweet *(Celastrus orbiculatus)*

Herbaceous Plants:
Japanese Stiltgrass *(Microstegium vimineum)*
Garlic Mustard **(***Alliaria petiolata)*
Purple Loosestrife *(Lythrum salicaria)*
Mugwort *(Artemisia vulgaris)*
Common Reed *(Phragmites australis)*

PRE-CONSTRUCTION PROTOCOL

If needed, the site contractor shall meet on the site with the project environmental consultant to identify nonnative invasive plant to be targeted for control. Depending upon the degree of the existing nonnative invasive plant populations present on the site, the control of some nonnative invasive plants (such as Japanese Stiltgrass, Mugwort, and Garlic Mustard) may not be realistic without significant impact to the environment. The environmental consultant shall have final determination over the control of these plants.

MANAGEMENT OPTIONS

The following options are available for the control of nonnative invasive plants:

1. Hand Pulling: This method is generally useful for the removal of individual or small colonies of undesirable herbaceous plants.

2. Grubbing-out Root Collar: Mechanical removal is a useful method for managing nonnative invasive shrubs. Using a pulaski or similar digging tool, remove the entire plant including all roots and runners. Juvenile plants can be hand pulled depending on soil conditions and root development.

3. Cutting at Grade: Repeated cutting or mowing at the rate of three to four times per growing season is effective for controlling vines and shrubs. In high quality natural communities, cutting of individual plants is preferred to site mowing to minimize habitat disturbance.

4. Herbicide Treatment: Chemical control of nonnative invasive plants is warranted on large stands of nonnative invasive plants and on hard to control species (such as Japanese Knotweed and Phragmites). Application of systemic herbicides (e.g., Glyphosate) to freshly cut stumps or to regrowth may be the most effective methods, especially if conducted late in the growing season. Chemical control of nonnative invasive plants should not be implemented unless controls noted above have been insufficient to diminish the population by 50%.

   Care shall be taken to avoid herbicide contact with native or other desirable vegetation. In areas where native plants are growing near plants to be controlled, the herbicide shall not be sprayed onto the target plants. In these areas the herbicide shall be applied with a brush or cloth.

   The landscape contractor shall follow the methods and recommendations recommended by the herbicide manufacturer and comply with all federal, state and local laws. A permit from CT DEEP is required for any pesticide application to a body of water.

GENERAL CONTROL NOTES

With regards to the control of nonnative and invasive plants, the following general notes shall apply to the project.

1. Removal of nonnative invasive plants is proposed to be performed over the two (2) year control period. Depending upon the start of the construction, if feasible, existing nonnative invasive species should be documented on the site prior to any site disturbance.

2. The landscape contractor shall contact the project environmental consultant with any questions regarding the control or identification of invasive nonnative species.

3. If feasible, start control of nonnative invasive plant species prior to the start of earth moving activities.

GENERAL CONTROL SEQUENCE

Control nonnative invasive species as follows:

A. Control of Nonnative Invasive Trees and Shrubs

Step #1 (prior to herbicide treatment): Cut plant down to grade level during the growing season (late summer or early fall is preferable). Grub-out root collar and remove roots if feasible. Dispose of cut plant material and roots as outlined below.

Step #2: Immediately after cutting and if roots remain in the ground, treat cut stems with an appropriate herbicide (such as Round-up) at the rate and methods recommended by the manufacturer. Care shall be taken to avoid herbicide contact with native or other desirable vegetation.

Step #3: Check control area monthly during the growing season for new growth. Spot treat new growth with an appropriate herbicide as needed for control.

B. Control of Nonnative Invasive Vines

Step #1: Pull targeted vines (including roots if feasible) from the ground during the spring and early summer months. However, manual removal of roots may be difficult because of their extensive root system. If plants are cut at grade, treat cut stems systemic herbicide.

Step #2: Follow up with both manual removal and herbicide treatment monthly until controlled.

C. Control of Nonnative Invasive Herbaceous Plants

Step #1: For control of individual plants to small stands, remove plants by hand pulling.

Step #2: For control of large colonies of herbaceous nonnative invasive plants, cut plant down to grade monthly during the growing season.

Step #3: If plants persist, apply appropriate herbicide per manufacturer's recommendation.

D. Control of Phragmites and Japanese Knotweed

Step #1: Cut plant down to grade in mid summer. Apply herbicide (Glyphosate) when regrowth reaches 2-3' tall.

Step #2: Repeat herbicide treatment as needed two weeks after initial herbicide treatment. Glyphosate is most active in late summer when Phragmites is in bloom.

Steps #3: After 3-4 weeks following herbicide applications, cut or mow down the stalks to stimulate the emergence and growth of other plants previously suppressed.

DISPOSAL OF INVASIVE PLANTS

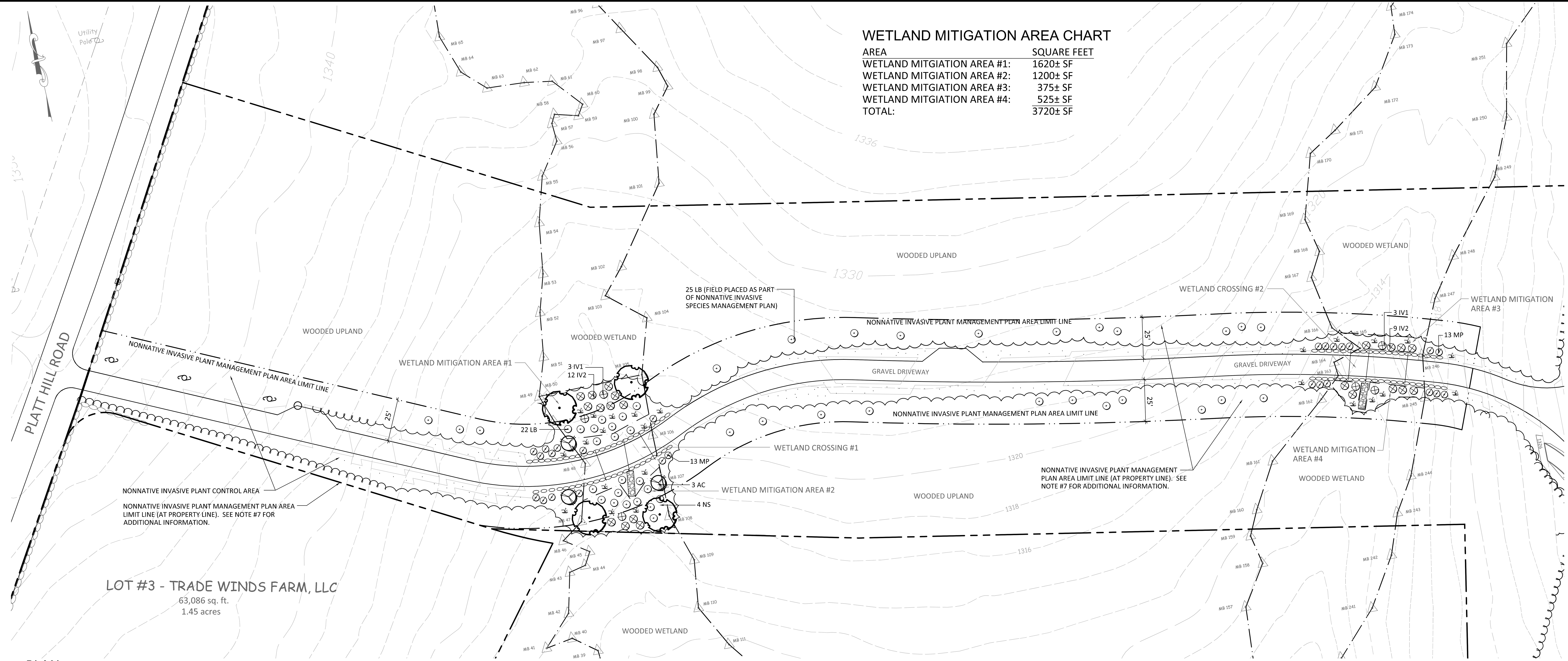
All cut or pulled invasive nonnative plant materials shall be disposed of appropriately and comply with the 2004 DEEP / UCONN "Guidelines for Disposal of Terrestrial Invasive Plants." All cuttings shall be collected and placed onsite on a plastic tarp (or on an asphalt pavement area) and sun dried until dead. Avoid cuttings from being in contact with any soil. Dead plants shall be bagged and deposited at an incinerator waste facility (not a composting facility).

End.

Platt Hill Road-winchester-invasive control plan2 2021.wpd

WETLAND MITIGATION AREA CHART

AREA	SQUARE FEET
WETLAND MITGIATION AREA #1:	1620± SF
WETLAND MITGIATION AREA #2:	1200± SF
WETLAND MITGIATION AREA #3:	375± SF
WETLAND MITGIATION AREA #4:	525± SF
TOTAL:	3720± SF



PLAN

SCALE: 1"=30'

LEGEND

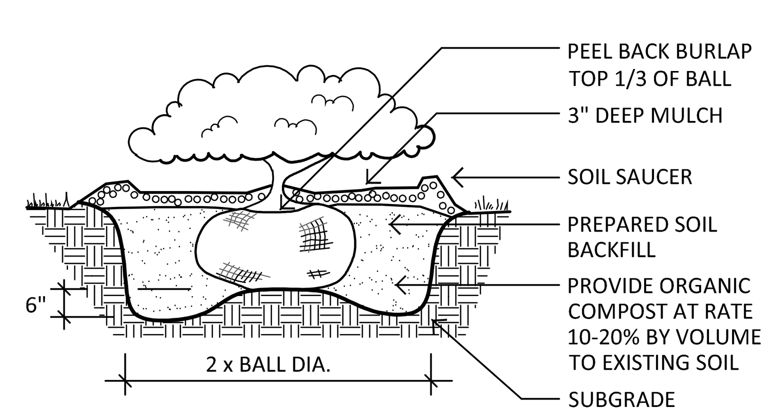
- PROPERTY LINE
- WETLAND LINE
- NONNATIVE INVASIVE SPECIES MANAGEMENT AREA
- EXISTING CONTOUR
- PROPOSED CONTOUR
- TREE LINE TO REMAIN (APPROX.)
- NEW DECIDUOUS SHADE TREE
- NEW DECIDUOUS SMALL TREE
- NEW SHRUB
- NEW SEEDED AREA (AS PER PLAN NOTES)

PLANT LIST

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	ROOT	REMARKS
3	AC	AMELANCHIER CANADENSIS	SHAD	4-5' HT.	B&B	MULTI-STEM
4	NS	NYSSA SYLVATICA	BLACK GUM	7-8' HT.	B&B	
6	IV1	ILEX VERTICILLATA 'SOUTHERN GENTLEMAN'	SOUTHERN GENTLEMAN HOLLY	2-3' HT.	CONT.	
21	IV2	ILEX VERTICILLATA 'WINTER RED'	WINTER RED WINTERBERRY	3-4' HT.	CONT.	
47	LB	LINDERA BENZOIN	SPICEBUSH	2-3' HT.	CONT.	
26	MP	MYRICA PENSYLVANICA	NORTHERN BAYBERRY	2-3' HT.	CONT.	

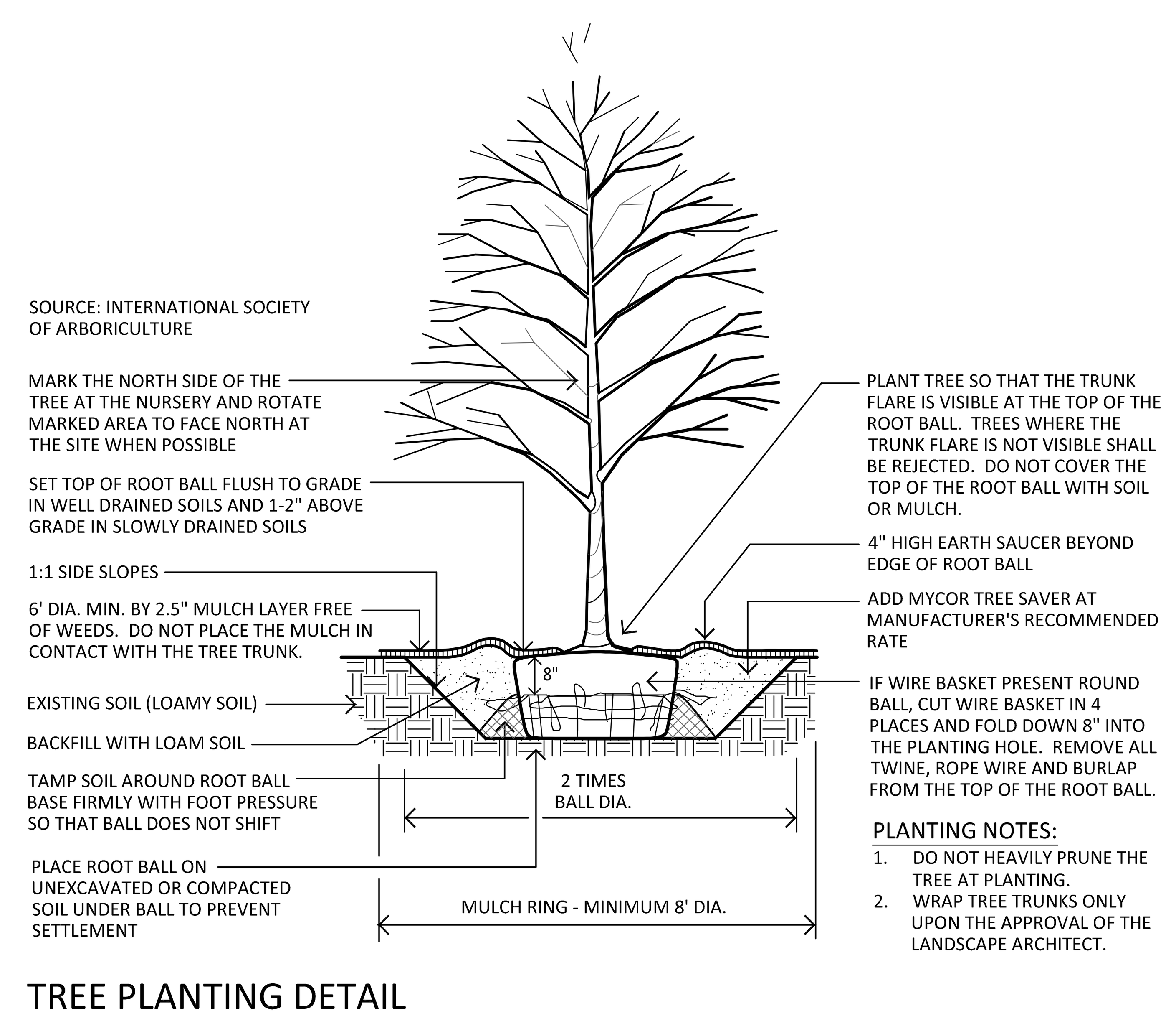
NOTES:

1. EXACT LOCATION OF PROPOSED PLANTINGS AND SPECIES TYPES MAY VARY FROM THIS PLAN BASED ON SITE PLAN REVISIONS AND/OR ACTUAL FIELD CONDITIONS.
2. SEED DISTURBED WETLAND AND WETLAND BUFFERS AT THE METHODS AND 125% THE APPLICATION RATE RECOMMENDED BY THE SEED MANUFACTURER. MAINTAIN MEADOW AT A 6" HEIGHT THE FIRST GROWING SEASON FOLLOWED BY AN ANNUAL LATE FALL MOWING TO A 6" HEIGHT (OR LEAVE UNMOWN TO SUCCEED NATURALLY INTO WOODLAND). SEED MIXTURES SHALL BE AS FOLLOWS:
   A. DISTURBED WETLAND BUFFERS: SEED THESE AREAS WITH "WETMIX" SEED MIXTURE BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000) OR AN EQUIVALENT NATIVE MEADOW SEED MIXTURE APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE.
   B. DISTURBED WETLANDS: SEED DISTURBED WETLAND AREAS WITH "NEW ENGLAND CONSERVATION / WILDLIFE SEED MIX" BY NEW ENGLAND WETLAND PLANTS, INC. (413-548-8000) OR AN EQUIVALENT NATIVE MEADOW SEED MIXTURE APPROVED BY THE PROJECT LANDSCAPE ARCHITECT PRIOR TO USE.
3. PLANT SPECIES SUBSTITUTIONS MAY BE MADE WITH THE APPROVAL OF THE PROJECT LANDSCAPE ARCHITECT PRIOR TO PLANTING. SUBSTITUTED PLANTS SHALL BE AT AN EQUAL OR GREATER SIZE AS NOTED USING A SIMILAR TYPE PLANT.
4. PLANTING METHODS SHALL BE IN ACCORDANCE WITH THE "AMERICAN STANDARDS FOR NURSERY STOCK", LATEST EDITION, AS PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION.
5. THIS PLAN FOR PLANTING PURPOSES ONLY. SEE PLANS BY OTHERS FOR ADDITIONAL INFORMATION.
6. SPRAY NEW PLANTINGS IMMEDIATELY AFTER INSTALLATION WITH A WHITE-TAILED DEER REPELLENT AND CONTINUE AS NEEDED TO MAINTAIN PLANTS FREE OF SIGNIFICANT DEER BROWSING.
7. REFER TO "GENERAL NONNATIVE INVASIVE PLANT MANAGEMENT PLAN" PREPARED BY ENVIRONMENTAL LAND SOLUTIONS, LLC , DATED JANUARY 2021 FOR MANAGEMENT FOR ADDITIONAL INFORMATION.



SHRUB PLANTING DETAIL

SCALE: NOT TO SCALE



PLANTING NOTES:

1. DO NOT HEAVILY PRUNE THE TREE AT PLANTING.
2. WRAP TREE TRUNKS ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT.

TREE PLANTING DETAIL

SCALE: NOT TO SCALE

ENVIRONMENTAL LAND SOLUTIONS, LLC
Landscape Architects and Environmental Planners
8 KNIGHT STREET, SUITE 203
NORWALK, CONNECTICUT 06851
203-855-7879 (phone) 203-855-7835 (fax)
Email: matt@elsllc.net
Website: http://www.elsllc.net

WETLAND PLANTING PLAN

SHEET 1 OF 1
SCALE: AS SHOWN
DATE: 1/12/21

PREPARED FOR:
LSE PICTOR LLC
PLATT HILL ROAD
WINCHESTER - CONNECTICUT

EXHIBIT 8

Carrie Ortolano <cortolano@lodestarenergy.com>

dam safety request for classification -- Platt Hill Road, Winchester

1 message

Carrie Ortolano <cortolano@lodestarenergy.com> Wed, Jan 13, 2021 at 11:49 AM
To: anna.laskin@ct.gov, Ivonne.hall@ct.gov
Cc: Anna Lifland <alifland@lodestarenergy.com>, Steve Trinkaus <strinkaus@earthlink.net>, "Kochis, Steve" <skochis@vhb.com>

Good morning-

LSE Pictor LLC ("Lodestar") is the developer of a proposed solar photovoltaic generating facility located at Platt Hill Road in Winchester, On behalf of Lodestar, I am submitting the attached for a determination from dam safety. I enclose the proposed site plans and stormwater report, prepared in connection with a Siting Council petition for declaratory ruling, which will be filed in January, 2021. Steve Trinkaus, the project engineer at Trinkaus Engineering and Steve Kochis, Lodestar's consulting engineer from VHB, are copied on this correspondence. As you will see, the project includes two proposed detention basins, the berms of which are shown as 2.5 feet above ground level.

Lodestar respectfully requests a classification of the proposed berms/detention basins.

Please let us know if you need any more information or if you have any questions.

Respectfully submitted on behalf of Lodestar.

Carrie Larson Ortolano
Associate General Counsel
860.539.5137
cortolano@lodestarenergy.com
www.lodestarenergy.com

2 attachments

LSE Pictor stormwater report 2020-12-22.pdf
1124K

LSE Pictor site plans 2020-12-22.pdf
17113K

EXHIBIT 9

Carrie Ortolano <cortolano@lodestarenergy.com>

USACOE SV- LSE Pictor, LLC Platt Solar Facility Project

3 messages

Shamas, Jeffrey <jshamas@vhb.com> Thu, Jan 14, 2021 at 6:54 PM
To: cenae-r-ct <cenae-r-ct@usace.army.mil>
Cc: Carrie Ortolano <cortolano@lodestarenergy.com>

NE Army Corps of Engineering Regulatory Division,

This is email 1 of 3 and includes the attached Self Verification form & USGS only (due to overall size of submittal) for a 1.99MW AC Solar development facility proposed with access off of Platt Hill Road in Winchester, CT.

A link to our **SharePoint** folder with the complete document package:
https://vhb.sharepoint.com/:b:/s/LSEPictor-PlattHillSiteWinchesterCT/EUE_7sIapeJFuullJkXSL98BXbnjUXqGUxC7APJ27DuAkw?e=mgtjfd

Applicant/requestor/client contact information:
LSE Pictor, LLC
40 Tower Lane, Suite 201
Avon CT, 06001
Carrie Ortolano
(860) 539-5137

Detailed narrative describing the project purpose:

Work will include the installation of a new twelve (12) foot wide gravel access road off of Platt Hill Road. Direct wetland impacts will include crushed process stone and boulders for the construction of the gravel access road, installation of 15" HDPE pipes to convey surface water flow, rip-rap slope, and 18" HDPE pipe for small animal passage. Temporary impacts will include the installation/removal of silt fencing and clearing for access road. Mitigation is provided through invasive species management with removal and planting with native species increasing mitigation that is in addition to the approx. 79-acres to land trust.

Location description of the project area:

Platt Hill Road, Winchester, CT

Type of Request:

Self-Verification.

Please let me let me know if you cannot access this SharePoint link or we need a specific government link.

Thank you,
Jeff

Jeffrey Shamas
Director of Environmental Services

100 Great Meadow Road
Suite 200
Wethersfield, CT 06109-2377
P 860.807.4388 **| M** 203.400.1558 **| F** 860.372.4570
jshamas@vhb.com

Engineers | Scientists | Planners | Designers
www.vhb.com

VHB Viewpoints
Explore trends and critical issues with our thought leaders.

SV form only-Lodestar_Winchester_AppendixESelfVerificationFormRevised 1-12-2020_signed.pdf
286K

Shamas, Jeffrey <jshamas@vhb.com> Thu, Jan 14, 2021 at 6:56 PM
To: cenae-r-ct <cenae-r-ct@usace.army.mil>
Cc: Carrie Ortolano <cortolano@lodestarenergy.com>

Email 2 of 3 with the Site Plans for the ACOE SV form detailed in email below.

Jeffrey Shamas
Director of Environmental Services
P 860.807.4388

M 203.400.1558
www.vhb.com

[Quoted text hidden]
[Quoted text hidden]

Plans for SV-Lodestar_Winchester_AppendixESelfVerificationFormRevised 1-12-2020_signed.pdf
8574K

Shamas, Jeffrey <jshamas@vhb.com> Thu, Jan 14, 2021 at 6:59 PM
To: cenae-r-ct <cenae-r-ct@usace.army.mil>
Cc: Carrie Ortolano <cortolano@lodestarenergy.com>

Email 3 of 3 including the mitigation plan and invasive species plan associated with the project detailed in the ACOE SV project below.

[Quoted text hidden]
[Quoted text hidden]

Mitigation for SV-Lodestar_Winchester_AppendixESelfVerificationFormRevised 1-12-2020_signed-2.pdf
1747K

US Army Corps of Engineers ®
New England District

Appendix E: Self-Verification Notification Form

This form is required for all **non-tidal projects in Connecticut**, but **not** required if work is done within boundaries of Mashantucket Pequot or Mohegan Tribal Lands. **Before** work commences, complete **all** fields (write "none" if applicable); attach project plans (not required for projects involving the installation of construction mats only); and any state or local approval(s); and send to:

Permits & Enforcement Branch B U.S. Army Corps of Engineers 696 Virginia Road Concord, MA 01742-2751 *or* cenae-r@usace.army.mil	*and*	CT DEEP Inland Water Resources Division 79 Elm Street Hartford, CT 06106-5127

****

State or local Permit Number: ______________________

Date of State or local Permit: ______________________

State/local Project Manager: ______________________

Permittee: LSE Pictor, LLC; Attn: Carrie Larson Ortolano, Esq.

Address, City, State & Zip: 40 Tower Lane, Suite 201, Avon, CT 06001

Phone(s) and Email: (860) 539-5137, cortolano@lodestarenergy.com

Contractor: TBD

Address, City, State & Zip: ______________________

Phone(s) and Email: ______________________

Consultant/Engineer/Designer: Trinkaus Engineering, LLC; Attn: Steven D. Trinkaus, PE

Address, City, State & Zip: 114 Hunters Ridge Road, Southbury, CT 06488

Phone(s) and Email: (203) 264-4558; strinkaus@earthlink.net

Wetland/Soil Scientist Consultant: Vanasse Hangen Brustlin, Inc (VHB), Attn: Jeffery Shamas

Address, City, State & Zip: 100 Great Meadow Road, Wethersfield, CT 06019

Phone(s) and Email: (860) 807-4388; jshamas@vhb.com

Project Location (provide detailed description & locus map): Undeveloped parcel east of Platt Hill Road in Winchester, CT

Address, City, State & Zip: Access from Platt Hill Road in Winchester, CT

Latitude/Longitude Coordinates: 73.11256 W, 41.89056 N

Waterway Name: Wetland Area 1 (PFO)

Project Purpose (include all aspects of the project including those not within Corps jurisdiction): The purpose of the project is the construction a 1.99 MW AC solar photovoltaic facility and gravel access road on approximately 20.6 Acres, while conveying another approximately 79.1 acres to the Winchester Land Trust.

Work Description: Work will include the installation of a new twelve (12) foot wide gravel access road off of Platt Hill Road. Direct wetland impacts will include crushed process stone and boulders for the construction of the gravel access road, installation of 15" HDPE pipes to convey surface water flow, rip-rap slope, and 18" HDPE pipe for small animal passage. Temporary impacts will include the installation/removal of silt fencing and clearing for access road. Mitigation is provided through invasive species management with removal and planting with native species increasing mitigation that is in addition to the approx. 79-acres to land trust.

Work will be done under the following GP(s) (check all that have associated impacts):

______**GP. 2 - Repair or maintenance of authorized or grandfathered structures/fills**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 5 - Boat ramps/marine railways**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 6 - Utility line activities (include calculations for each single & complete crossing – attach additional sheet if necessary)**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 9 - Shoreline and bank stabilization projects**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 10 - Aquatic habitat restoration, establishment and enhancement activities**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 11 - Fish & wildlife harvesting, enhancement and attraction devices and activities**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 12 - Oil Spill and Hazardous material cleanup**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 13 - Cleanup of hazardous and toxic waste**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 14 - Scientific measurements devices**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 15 - Survey activities**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

______**GP. 17 - New/expanded developments & recreational facilities**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent__________SF

X______**GP. 18 - Linear transportation projects- wetland crossings only (include calculations for each single & complete crossing - attach additional sheet if necessary)**
Area of total wetland impacts: temporary ____2,319____SF permanent ____1,617____SF
Area of total waterway impacts: temporary ____0____SF permanent ____0____SF

______**GP. 19 - Stream, river & brook crossings – not including wetland crossings (include calculations for each single & complete crossing – attach additional sheet if necessary)**
Area of total wetland impacts: temporary ____________SF permanent __________SF
Area of total waterway impacts: temporary ___________SF permanent __________SF

______**GP. 21 - Temporary fill not associated with any other GP activities**
Area of total wetland impacts: temporary ____________SF
Area of total waterway impacts: temporary ___________SF

Does your project include any secondary effects? Yes _______________ No X____________
(Secondary effects include, but are not limited to non-tidal waters or wetlands drained, flooded, fragmented, or mechanically cleared resulting from a single and complete project. See Appendix F - Definitions.) If YES, describe here: ____

Proposed Work Dates: Start: April 1, 2021 Finish: June 30, 2021

Your name/signature below, as permittee, confirms that your project meets the self-verification criteria and that you accept and agree to comply with the applicable terms and conditions in the Connecticut General Permits.

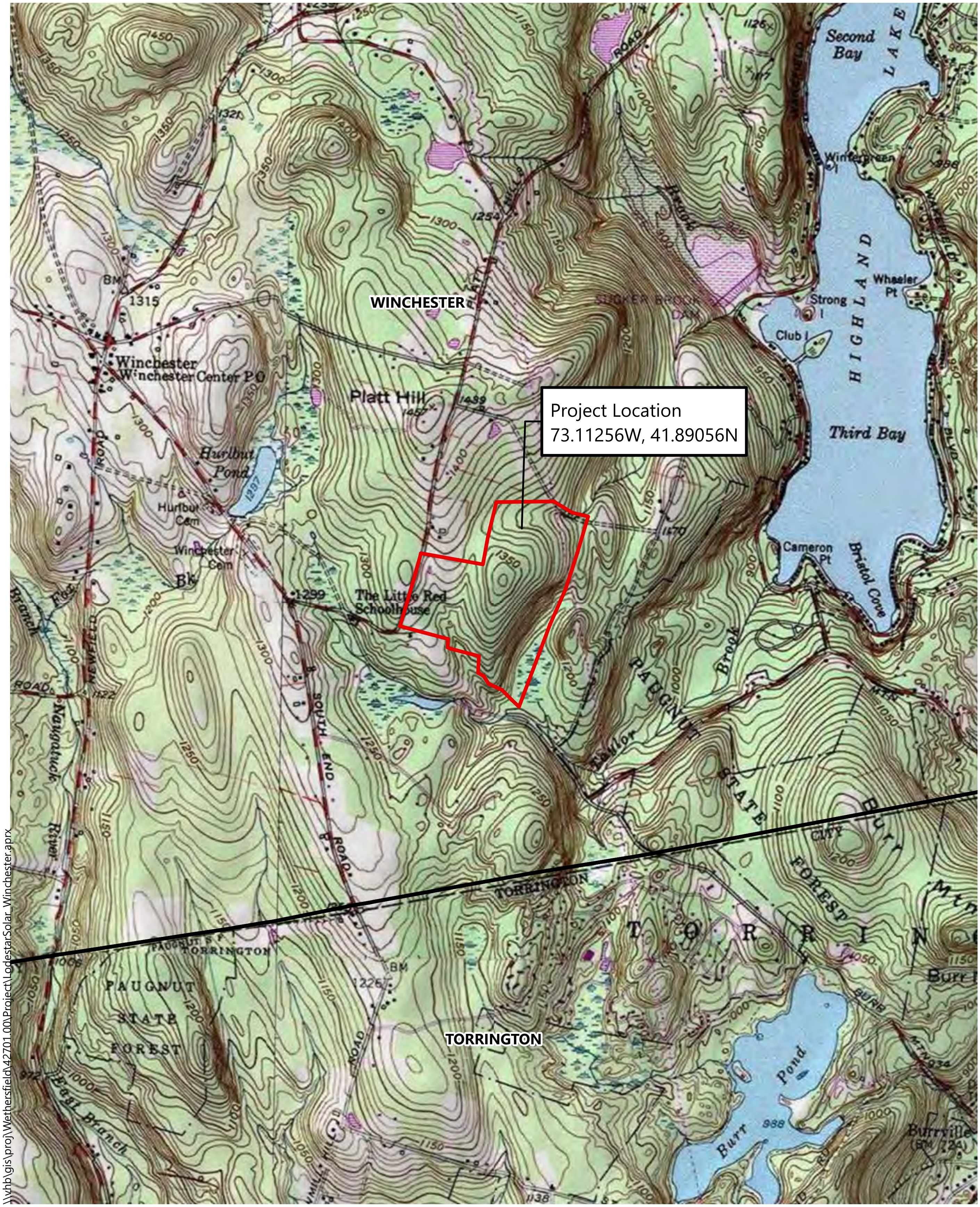
Digitally signed by Jeffrey J. Macel
DN: cn=Jeffrey J. Macel, o=Lodestar Energy LLC, ou, email=jmacel@lodestarenergy.com, c=US
Date: 2021.01.12 17:23:27 -05'00'

Signature of Permittee

January 12, 2021

Date

January 12, 2021 | **FIGURE 1**



\\vhb\gis\proj\Wethersfield\42701.00\Project\LodestarSolar_Winchester.aprx

0 1000 2000 4000 Feet

Project Location

Town Boundary

LSE Winchester Solar
Platt Hill Road

Winchester, CT

USGS Site Location Map

Source: VHB, ArcGIS Online, CTDEEP