

June 3, 2026

Town of Southampton Planning Board
210 College Highway
Southampton, MA 01073

Re: Site Plan Review Application
Proposed 5.49 MW DC Solar Electric Generating Facility, Dual-Use and Agriculture Use
43 & 53 Pleasant Street, Southampton, MA 01073

Dear Members of the Planning Board:

On behalf of Bluewave (d/b/a Manhan River, LLC), Weston & Sampson Engineers, Inc. is hereby enclosing this Site Plan Review application in support of the project where Manhan River, LLC is proposing to construct an approximate 5.49 megawatt (MW) direct current (DC) single axis tracking dual use agrivoltaic (Ag-solar) array and associated battery energy storage system (BESS) located at 43 & 53 Pleasant Street.

In addition, we have included a check of \$5,000.00 for the Large-Scale Solar Electric Generating Facilities Application fee. As part of the application, we have attached the following:

Appendix A: Zoning Application and Stormwater Management Permit Application Forms
Appendix B: Project Description
Appendix C: Project Plan Set
Appendix D: Noise Analysis
Appendix E: Solar Operation and Maintenance Plan
Appendix F: Decommissioning Estimate
Appendix G: Utility Interconnection Application
Appendix H: Electrical Plan & Specifications
Appendix I: Stormwater Report
Appendix J: Certified Abutter List, and Notification to Abutters
Appendix K: Emergency Response Plan
Appendix L: Hazard Mitigation Analysis

Should you have any further questions or require any additional information, please feel free to contact me by phone at (978) 532-1900 or by email at costello.melinda@wseinc.com.

Sincerely,
WESTON & SAMPSON ENGINEERS, INC.



Melinda Costello, PE
Senior Team Leader



Nicholas Granata, PE
Project Engineer

cc: Michael Zhe – Manhan River, LLC

Appendix A: Zoning Application and Stormwater Management Permit Application Forms



TOWN OF SOUTHAMPTON
ZONING APPLICATION

Reserved For Town Clerk's USE



You must obtain a signed zoning determination before completing this application

PROPERTY INFORMATION

STREET ADDRESS 43 & 53 Pleasant Street, Southampton, MA 01073

Date Filed: _____

ZONING DISTRICT Residential-Rural OVERLAY DISTRICT WSPD

File #: _____

ASSESSOR'S MAP _____ LOT _____ DEED REFERENCE: BOOK _____ PAGE _____

2 parcels: 25-20 and 24-23D, book/page #s: 10517/155 and 14457-323 respectively See Attached

☒ No outstanding debt obligations to the Town exist - obtain signature from Town Collector's Office _____ date dated 8/28/25

PERMIT INFORMATION (from signed Zoning Permit determination)

Approval(s) Sought:

Permitting Authority:

Subject Zoning Ordinance Section(s)

(Check ONE only)

☐ SPECIAL PERMIT(s)

☐ SELECT BOARD

275-7.6 Solar Electric Generating Facilities

Article IX Site Plan Review

☒ STORMWATER PERMIT

☒ PLANNING BOARD

275-7.2 Water Supply Protection District

Chapter 227: Stormwater Management and Erosion Control

☐ Petition for VARIANCE (ZBA)

☐ ZONING BOARD OF APPEALS

☐ Amendment to a previously issued approval (attached)

☐ Administrative APPEAL (ZBA)

APPLICANT INFORMATION

NAME Manhan River, LLC

MAILING ADDRESS 116 Huntington Ave, Suite 601, Boston, MA 02116

PHONE 617-209-3122 EMAIL mzhe@bluewave.energy

CURRENT OWNER INFORMATION (if different from Applicant)

NAME Stephen E. & Ronald S. Bashista (25-20) and Bashista Family Irrevocable Trust(24-23D)

MAILING ADDRESS 61 Pleasant Street, Southampton, MA 01073 (both parcels)

PHONE _____ EMAIL _____

REQUEST / PROJECT SUMMARY (attach additional pages or materials as needed)

See attached application document

☒ I have reviewed the relevant findings and criteria described in the Zoning Ordinance, upon which my application will be adjudicated.

EXISTING USE / GENERAL DESCRIPTION OF THE PROPERTY

agricultural farming

EXISTING USES / GENERAL DESCRIPTION OF THE SURROUNDING NEIGHBORHOOD

open space / farm fields

☐ I have already discussed this application with my neighbors (*recommended prior to filing*).**ATTACHMENT CHECKLIST**

- ☒ Processed ZONING PERMIT DETERMINATION from the Building Department - *or copy of administrative action APPEALED – or copy of previous approval/permit sought to be AMENDED*
- ☒ FILING FEE (*non-refundable*) - *made payable to the Town of Southamptn* Amount \$ 5,000
- ☒ ABUTTERS LIST (property owners within 300') – *prepared by the Assessor's Office within 30 days prior to filing (include, from the adjacent municipality's Assessor, any non-Southampton owners if the property is within 300' of the Town line)*
- ☒ Site plans, supporting evidence, documents, reports, calculations, maps, architectural elevations, etc., (as required or warranted) submitted as part of this application. Such materials should also be provided in digital (PDF) format.

Additional items required for ZONING BOARD OF APPEALS filings only

- ☐ LEGAL AD FEE of \$__ – *made payable to the Daily Hampshire Gazette*
- ☐ *VARIANCES only:* a completed Variance Justification Statement form
- ☐ *APPEALS only:* a separate letter to the Board of Appeals describing the grounds for appealing an administrative decision, order or zoning interpretation. File application (bearing Town Clerk's date stamp) within 30 days of such decision, copied to the Building Inspector or other administrative party whose decision is being appealed. (*MGL ch. 40A sec. 8, 15*)

CERTIFICATION & ACKNOWLEDGEMENT

I herewith make application, as indicated above and together with any supporting documents, represent all information as true and accurate and acknowledge the following: All materials submitted are records made available for public inspection (including on the Town's web site); I may be billed directly by the newspaper for the required legal notices and am responsible for full payment thereof; Permission is granted to the permit granting authority, or its agent, to view, enter upon or photograph the subject property prior to acting on this application; a license or permit may be denied where an outstanding debt/obligation to the Town exists; Abutters to the subject property will be notified of this application and of the final action of the permitting authority, including their rights of appeal; If a permit or relief is granted, I am responsible for recording such document at the Hampshire County Registry of Deeds, at my expense, after the expiration of the appeal period; such permit will run with the land and may be binding on future parties, including required compliance with any conditions attached to the permit; The burden of evidence is my responsibility; My representative, if any, will be used as the primary contact person; If an email address is provided, email may be used as the primary form of contact for administrative matters; Any testimony during the public hearing may be recorded, broadcast and re-broadcast and will be reflected in the official record of proceedings; It is my responsibility to comply with all applicable codes and ordinances and to obtain any other zoning or non-zoning permits, licenses or approvals as may be required.

APPLICANT'S SIGNATURE Joel Lindsay DATE 03/30/26

OWNER'S SIGNATURE (*if different*) Ronald S. Bashista Marianne Bashista DATE 03/20/26 Mar 26, 2026
Ronald S. Bashista (Mar 20, 2026 19:44:18 EDT) Marianne Bashista (Mar 26, 2026 14:54:23 EDT)
Stephen Bashista DATE 03/24/26
Stephen Bashista (Mar 24, 2026 20:00:09 EDT)

APPLICANT'S REPRESENTATIVE (*if any*)

CONTACT PERSON Melinda Costello, PE FIRM Weston & Sampson Engineers, Inc.

MAILING ADDRESS 55 Walkers Brook Drive, Suite 100, Reading MA, 01867

PHONE 978-532-1900 EMAIL costello.melinda@wseinc.com

FILING INSTRUCTIONS

File ORIGINAL and ONE COPY of this completed application, together with the required attachments from the checklist above, at the Town Clerk's Office. Fees, filing deadlines and procedures may vary by permitting authority. Contact the above subject office for more information.

Southampton Pleasant St Special Permit Application - LOs Signed

Final Audit Report

2026-03-30

Created:	2026-03-27
By:	Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA_Ux1Z8vvH5sGLgz2A1LsTT8I-RQ9QJwC

"Southampton Pleasant St Special Permit Application - LOs Signed" History

-  Document created by Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
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-  Document e-signed by Joel Lindsay (jlindsay@bluewave.energy)
Signature Date: 2026-03-30 - 4:19:39 PM GMT - Time Source: server
-  Agreement completed.
2026-03-30 - 4:19:39 PM GMT



STORMWATER MANAGEMENT PERMIT

APPLICATION

Fee Paid: _____
Date Paid: _____
Permit #: _____
Approved By: _____
Approval Date: _____
(for use by Planning Board only)

1. Project/Site Information

Project/Site Name: 5.49 MW (DC) Agrivoltaic Solar Development & Battery Energy Storage System (BESS)

Project Street/Location 43 & 53 Pleasant Street, Southampton, MA 01073

Assessor's Map: _____ Parcel(s): 2 parcels: 25-20 and 24-23D

Estimated Area to be Disturbed (ft²): 75,300 +/-

Total Area of Impervious Surfaces:

Existing

Proposed

(paved, parking, decks, roofs, etc.) (ft²):

16,200

16,394

2. Applicant Information

Name: Manhan River, LLC

Address: 116 Huntington Ave, Suite 601

Telephone: 617-209-3122

E-Mail: mzhe@bluewave.energy

Fax: _____

3. Owner Information (if different from Applicant)

Name: Stephen E. & Ronald S. Bashista (25-20) and
Bashista Family Irrevocable Trust(24-23D)

Address: _____

Telephone: 61 Pleasant Street, Southampton, MA 01073 (both parcels)

E-Mail: _____

Fax: _____

4. Contractor Information

Name: Mike Zhe

Address: 116 Huntington Ave, Suite 601

Telephone: 617-209-3122

E-Mail: mzhe@bluewave.energy

Fax: _____

5. Engineer Information

Name: Melinda Costello, PE

Address: 55 Walkers Brook Drive, Suite 100, Reading, MA 01867

Telephone: 978-532-1900

E-Mail: costello.melinda@wseinc.com

Fax: _____

6. Certification

I hereby certify that the information contained herein including all attachments is true, accurate and complete to the best of my knowledge. I grant the Southampton Planning Board permission to designate Town Board(s) (i.e., Reviewing Board) as its authorized agent(s) for the purpose of reviewing stormwater submittals and making recommendations on stormwater permit applications within the designated Board's expertise. I also grant the Southampton Planning Board other delegated Reviewing Boards, and their agent's permission to enter the property to review this application and make inspections during and after construction. Further, I agree to pay for the reasonable costs for engineering and consultant services necessary for the Southampton Planning Board or delegated Reviewing Boards to review the application.

Joel Lindsay

03/30/26

Applicant's Signature

Date

Ronald S. Bashista

Ronald S. Bashista (Mar 20, 2026 19:37:39 EDT)

Owner's Signature

Marianne Bashista

Marianne Bashista (Mar 26, 2026 14:55:29 EDT)

Stephen Bashista

Stephen Bashista (Mar 24, 2026 20:03:55 EDT)

03/20/26

Date

Mar 26, 2026

03/24/26

Stormwater Management Permit Application

STORMWATER MANAGEMENT PERMIT APPLICATION

Planning Board

210 College Highway • Post Office Box 155
Southampton, Massachusetts 01073
Telephone: (413)
Fax: (413)

ROUTING SLIP

Per the Town of Southampton Stormwater Management Bylaw, the Planning Board is designated as the Stormwater Authority. The Stormwater Authority shall administer, implement and enforce the Bylaw. The Stormwater Authority may also designate Town Boards, including (but not limited to) the Highway Department, Conservation Commission, Board of Health, and Building Inspections, to review stormwater submittals and make recommendations on stormwater permit applications within the designated Board's (the "Reviewing Board") expertise. For additional information, refer to Section 4 of the Bylaw. The Planning Board will use this Routing Slip to select additional Reviewing Boards when necessary and to collect the appropriate signatures for stormwater permitting. *Please attach a copy of this Routing Slip with your Stormwater Management Permit Application.*

To be filled out by the Applicant:

Project/Site Name: 5.49 MW (DC) Agrivoltaic Solar Development & Battery Energy Storage System (BESS)

Project Street/Location: 43 & 53 Pleasant Street, Southampton, MA 01073

Applicant Name: Manhan River, LLC

Applicant Mailing Address: 116 Huntington Ave, Suite 601, Boston, MA 02116

Applicant Telephone: 617-209-3122

Applicant E-Mail: mzhe@bluewave.energy

Please do not write below this line. To be filled out by the Stormwater Authority and Reviewing Boards only.

Date of Permit Application: _____

Date of Stormwater Management Plan: _____

Department or Board	Technical Review Required (Y or N)	Application Administratively Complete (Y or N), Signature and Date	Technical Review Complete (Y or N), Signature and Date	Final Recommendation or Decision (A, AC, D), Signature and Date
Highway Dept.				
Conservation Commission				
Planning Board				
Board of Health				
Bldg. Inspector				

A = approval; AC = Approval with conditions; D = Disapproval

Attach any applicable conditions to this Routing Slip.

7. Application Requirements

The application to the Southampton Planning Board for a Stormwater Management Permit must include four (4) copies of the following application materials:

- A. For land altering activity involving construction of a single-family dwelling, where "approval is not required" (ANR), as defined in the Subdivision Control Act, and that disturbs less than 1 acre of land:

Section A is
not applicable

- ☐ Completed and signed Stormwater Management Permit Application Form, including permit application Routing Slip
- ☐ A list of abutters, certified by the Assessors Office, within 100 feet of the property line of the site, including property owners in another municipality (fee 10.00)
- ☐ Stormwater Management Plan
- ☐ Payment of the permit application and review fee

Stormwater Management Plan Requirements: (Check items below indicating that you have provided the following minimum information)

- ☐ Contact Information. The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected;
- ☐ A locus map;
- ☐ The existing zoning and land use at the site;
- ☐ The location(s) of existing and proposed easements;
- ☐ The location of existing and proposed utilities;
- ☐ The site's existing & proposed topography. Existing and proposed topographical contours at 2-foot intervals are required unless the applicant demonstrates that the proposed activity will meet the requirements of the Southampton Stormwater Management Bylaw and Section 7 of the Southampton Stormwater Management Regulations (Stormwater Management Criteria) without such information;
- ☐ Proposed limits of disturbance;
- ☐ Estimate of the total area expected to be disturbed by excavation, grading or other construction activities;
- ☐ A description of the existing site hydrology;
- ☐ A description & delineation of existing stormwater conveyances, impoundments, and wetlands on or adjacent to the site or into which stormwater flows;
- ☐ A description of the proposed management systems for runoff from impervious surfaces including roofs and driveways and the locations of any foundation drains, curtain drains, or other site features that serve to collect and convey stormwater and their outfalls;
- ☐ Description of erosion and sediment control measures.

B. For all other land altering activity:

- ☒ Completed and signed Stormwater Management Permit Application Form, including permit application Routing Slip
- ☒ A list of abutters, certified by the Assessors Office, within 100 feet of the property line of the site, including property owners in another municipality (fee 10.00)
- ☒ Stormwater Management Plan
- ☒ Operation and Maintenance Plan, with Inspection and Maintenance agreement
- ☒ Payment of the permit application and review fee

Stormwater Management Plan Requirements: (Check items below indicating that you have provided the following minimum information)

- ☒ Contact Information. The name, address, and telephone number of all persons having a legal interest in the property and the tax reference number and parcel number of the property or properties affected;
- ☒ A locus map;
- ☒ The existing zoning and land use at the site;
- ☒ The proposed land use;
- ☒ The location(s) of existing and proposed easements;
- ☒ The location of existing and proposed utilities;
- ☒ The site's existing & proposed topography with contours at 2 foot intervals;
- ☒ Proposed limits of disturbance;
- ☒ Estimate of the total area expected to be disturbed by excavation, grading or other construction activities;
- ☒ A description of the existing site hydrology;
- ☒ A description & delineation of existing stormwater conveyances, impoundments, and wetlands on or adjacent to the site or into which stormwater flows;
- ☒ A delineation of 100-year flood plains, if applicable;
- ☒ Habitats mapped by the Massachusetts Natural Heritage & Endangered Species Program as Endangered, Threatened or of Special Concern, Estimated Habitats of Rare Wildlife and Certified Vernal Pools, and Priority Habitats of Rare Species within five hundred (500) feet of any construction activity.
- ☒ Estimated seasonal high groundwater elevation in areas to be used for stormwater retention, detention, or infiltration;
- ☒ The existing and proposed vegetation and ground surfaces with runoff coefficients for each;
- ☒ A drainage area map showing pre and post construction watershed boundaries, drainage area and stormwater flow paths, including municipal drainage system flows;
- ☒ A description and drawings of all components of the proposed stormwater management system including;

N/A as not
permanent
BMPs are
proposed

- N/A as not permanent BMPs are proposed
- ☒ Locations, cross sections, and profiles of all brooks, streams, drainage swales and their method of stabilization;
 - ☒ All measures for the detention, retention or infiltration of water;
 - ☒ All measures for the protection of water quality;
 - ☒ The structural details for all components of the proposed drainage systems and stormwater management facilities;
 - ☒ Notes on drawings specifying materials to be used, construction specifications, and expected hydrology with supporting calculations;
 - ☒ Proposed improvements including location of buildings or other structures, impervious surfaces, and drainage facilities, if applicable;
 - ☒ Any other information requested by the Stormwater Authority.
- N/A as Stormwater Authority has not provided comment at time of this submission
- ☒ Hydrologic and hydraulic design calculations for the pre-development and post-development conditions for the design storms specified in this Regulation. Such calculations shall include:
 - ☒ Description of the design storm frequency, intensity and duration;
 - ☒ Time of concentration;
 - ☒ Soil Runoff Curve Number (RCN) based on land use and soil hydrologic group;
 - ☒ Peak runoff rates and total runoff volumes for each watershed area;
 - ☒ Information on construction measures used to maintain the infiltration capacity of the soil where any kind of infiltration is proposed;
 - ☒ Infiltration rates, where applicable;
 - ☒ Culvert capacities;
 - ☒ Flow velocities;
 - ☒ Data on the increase in rate and volume of runoff for the specified design storms, and
 - ☒ Documentation of sources for all computation methods and field test results.
 - ☒ Post-development downstream analysis, if deemed necessary by the Stormwater Authority;
 - ☒ Soils information from test pits performed at the location of proposed stormwater management facilities, including soil descriptions, depth to seasonal high groundwater, depth to bedrock, and infiltration rates. Soils information will be based on site test pits logged by a Massachusetts Registered Soil Evaluator, a Massachusetts Registered Sanitarian, or a Massachusetts Registered Professional Engineer;
 - ☒ Landscaping plan describing the woody and herbaceous vegetative stabilization and management techniques to be used within and adjacent to the stormwater practices;
 - ☒ Drainage patterns and approximate slopes anticipated after major grading activities;
 - ☒ A description of provisions for project phasing;
 - ☒ Erosion and Sediment Control Plan:
 - ☒ Location and details of erosion and sediment control measures with a narrative of the construction sequence/phasing of the project, including both
- N/A as not permanent BMPs are proposed
- N/A as not permanent BMPs are proposed

N/A due to site topography and location of disturbance.



operation and maintenance for structural and non-structural measures, interim grading, and material stockpiling areas;

Path and mechanism to divert uncontaminated water around disturbed areas, to the maximum extent practicable;

Location and description of and implementation schedule for temporary and permanent seeding, vegetative controls, and other stabilization measures;

A description of construction and waste materials expected to be stored on-site. The Plan shall include a description of controls to reduce pollutants from these materials, including storage practices to minimize exposure of the materials to stormwater, and spill prevention and response.

8. Application Submittal, Review, and Approval Procedures

- A. Application Submittal: Four (4) copies of an application to the Southampton Planning Board for a Stormwater Management Permit should be submitted after obtaining a well permit and septic permit (if applicable), and concurrently with any other land use permit applications issued by the Planning Board or Conservation Commission, as necessary. A stormwater management permit must be issued prior to any land altering activity under the jurisdiction of the Southampton Stormwater Management Bylaw. The applicant shall provide written notice to the Town Clerk of the filing of the application and of the date on which it was filed. Submission of an application should be made to the Southampton Planning Board, 210 College Highway, P.O. Box 155, Southampton, Massachusetts, 01073.

For more information and copies of the Southampton Stormwater Bylaw and Regulations, visit the Planning Board website:

<http://www.Southampton.org/departments/conservation/conservationhome.htm> contact John Furman, Chair at: 413-###-#### or planningboard@town.southampton.ma.us

- B. Administrative Review: The Planning Board will review the application for administrative completeness. If the Planning Board determines the application to be incomplete, the Board will inform the applicant that the application will be denied based on the determination that the application is administratively incomplete unless the incomplete items are addressed by a specific date to be determined by the Planning Board.
- C. Designation of Reviewing Board: The Planning Board will designate Town Board(s), including (but not limited to) the Highway Department, Conservation Commission, or Board of Health, as its authorized agent(s) for the purposes of reviewing and making recommendations on stormwater management permit applications for projects within that particular Board's (the "Reviewing Board") expertise.
- D. Technical Review: The Reviewing Board(s) will review the application and supporting documents based on the criteria set forth in the Southampton Stormwater Management Bylaw and Regulations. The Reviewing Board(s) will notify the Planning Board in writing of its recommendation on a stormwater management permit application.
- E. Final Action: The Planning Board will take final action within 45 days of the receipt of an application by the Reviewing Board(s), unless such time is extended by agreement between the applicant and the Planning Board and/or Reviewing Board(s). The Planning Board will render its final action (approval, approval with conditions, or disapproval) in writing to the applicant based on the recommendation of the Reviewing Board(s).

Southampton Pleasant St SP Application - LOs Signed

Final Audit Report

2026-03-30

Created:	2026-03-27
By:	Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAAbxmwQ4V7Jsb-YhQtMlef-M3nu_eVMGn9

"Southampton Pleasant St SP Application - LOs Signed" History

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Signature Date: 2026-03-30 - 4:19:08 PM GMT - Time Source: server
-  Agreement completed.
2026-03-30 - 4:19:08 PM GMT

Appendix B: Project Description

Introduction

Manhan River, LLC is proposing to construct an approximate 5.49 megawatt (MW) direct current (DC) single axis tracking dual use agrivoltaic (Ag-solar) array and associated battery energy storage system (BESS) located at 43 & 53 Pleasant Street. The site is located on two adjoining parcels; parcel#24-23D owned by Bashista Family Irrevocable Trust, and parcel#25-20 owned by Stephen E. & Ronald S. Bashista.

The project parcels are located in the Residential-Rural zone where, in accordance with Table 1 – Use Regulations of the Town of Southampton Zoning Bylaws (Zoning Bylaws), dual-use solar electric generating facilities is an agricultural use permitted by right with site plan approval. Per Section 275-2.3 Definitions, a “solar electric generating facility, dual-use and agriculture use” is *“A solar electric generating facility of any size where agricultural production and electricity production from solar photovoltaic (PV) panels are occurring together on the same piece of land. These facilities may also be referred to as agrivoltaic systems, agrisolar, or co-location of solar and agriculture”*. As existing agricultural activities will be maintained beneath the proposed Ag-solar array, the project meets the definition of the zoning bylaws for a dual-use solar electric generating facility.

In accordance with Section 275-7.6.G.8.h.1, the Stormwater Management Permit Application is also being submitted concurrently with the Site Plan Review application.

In accordance with the Zoning Bylaws, the project is required to comply with Section 275-7.6 Solar Electric Generating Facilities, Article IX Site Plan Review - Section 275-9, Section 275-7.2 Water Supply Protection District, and Chapter 227 Stormwater Management and Erosion and Sediment Control.

Site Description

Currently, the property is being used as hay and corn fields and compost, with existing gravel and dirt access roads spanning throughout the property. A wetland delineation was performed by Fleetwood Environmental Solutions, LLC on July 17, 19, 25 and 26, 2023 with an additional delineation performed on September 18, 2025 where the Mean Annual High-Water Line (MAHWL) for two perennial streams (Tripple Brook and the Manhan River), three intermittent streams, and six bordering vegetated wetlands (BVWs) were delineated. All water resource areas are located along the southwestern, western and northwestern perimeter of the project site and are described further below:

- Tripple Brook is a tributary of the Manhan River and outlets to the Manhan River at a confluence point centrally located along the western perimeter of the site.
- BVW-1 surrounds an intermittent stream that has a westerly flow path, is wooded, and is located centrally amongst the site separating the northern and southern fields. BVW-1 and this associated intermittent stream outlet near the confluence point of Tripple Brook and the Manhan River.
- BVW-2 and BVW-3 are both located centrally within the southern field, have a northwesterly flow pattern, and outlet near the confluence point of Tripple Brook and the Manhan River.
- BVW-4 is associated with the northern intermittent stream which flows northwesterly north of, and adjacent to, the northern field. Both BVW-4 and the associated intermittent stream outlet to the Manhan River north of the site.
- BVW-5 is located in the northwest corner of the site and is directly associated with the Manhan River.
- BVW-6 is associated with the southwestern intermittent stream which flows northwesterly and outlets near the confluence point of Tripple Brook and the Manhan River. BVW-6 is located southwest of the southern field and the site.

The property's highpoint is generally along Pleasant Street with the overall site topography sloping in a westerly/northwesterly direction with stormwater runoff draining towards the on-site BVWs and the Manhan River.

There is a 200-foot riverfront area associated with the Manhan River, a 100-foot wetland buffer associated with the on-site BVWs, and a Southampton Conservation Commission determined 25-foot conservation zone associated with the Manhan River and the on-site BVWs.

PROJECT DESCRIPTION

A Notice of Intent filing was submitted to the Town of Southampton Conservation Commission on November 26, 2025 and review is ongoing.

The Town of Southampton Zoning Application and Stormwater Management Permit Application forms have been included in **Appendix A**, and the project plan set has been included in **Appendix C**.

Project Description

The proposed development covers approximately 40 acres. As currently designed, the proposed development is comprised of an approximately 5.49 MW DC dual use Ag-solar array and BESS that covers approximately 22 acres. The solar modules will be raised approximately 10 feet above grade when horizontally positioned to allow continued agriculture use in the field and to meet the requirements of the SMART program regulation System Design Parameters which includes minimum panel height requirements. For tracking ASTGU (Agricultural Solar Tariff Generation Unit) "the minimum height of the panel at its horizontal position shall be 10 feet above ground." The existing gravel access road entering the site from Pleasant Street and two segments of existing dirt access roads are proposed to be improved to gravel roads allowing access to the site.

No tree clearing is proposed for the project. Site grading is limited to the construction of the equipment pads and the western portion of the proposed gravel access road to provide an adequate longitudinal slope for maintenance vehicles to access the site. The Ag-solar array will be surrounded by a 7-foot-tall farm knot fence with a double gate to allow access to the array area. An offset of at least 18-feet between the fence and the Ag-solar panels has been provided to meet electrical code requirements and to allow for access around the site. Underground conduit is proposed to extend from the equipment pad areas, along the proposed access road, to the proposed utility poles (installed by others) prior to interconnection via the existing utility pole near the site entrance along Pleasant Street.

The project is proposing approximately 75,294 square feet of direct land disturbance relative to the proposed footprint of the installation of the gravel access road, equipment pads, array racking posts, underground conduit trenching, and grading relative to the proposed access road.

Table 1 – Area of Disturbance Breakdown

HydroCAD Node	Area (Square Feet)	Notes
Gravel Access Road	53,500	
Equipment Pads	11,100	
Array Racking Posts	194	Assumed 3-inch diameter posts per array table, with each array table containing 24 modules, and each array table containing 10 posts
Underground Conduit Trenching	5,000	Assumed 3-foot wide trench
Grading	5,500	
Total	75,294	

Zoning Bylaws Conformance

The applicable zoning bylaws from the sections listed above (275-7.6, 275-9, 275-7.2, and 227) have been provided below with applicant's response in kind provided in *italics*.

275-7.6 Solar Electric Generating Facilities

A. Purpose. The purpose of this section is to facilitate the creation of new solar electric generating facilities by providing standards for the placement, design, construction, operation, monitoring, modification and removal of

such installations that address public safety and minimize impacts on environmental, scenic, natural and historic resources and to provide adequate financial assurance for the eventual decommissioning of such installations.

Acknowledged.

B. Applicability. The provisions set forth in this section shall apply to the construction, operation, repair and/or removal of solar electric generating facilities as permitted in Article V, Use Regulations. All such facilities require a building permit and must comply with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, electrical, and communications requirements and other applicable provisions of Southampton's Zoning Bylaw.

Acknowledged.

C. General requirements.

(1) The construction and operation of all solar electric generating facilities shall be consistent with all applicable local, state and federal requirements, including but not limited to all applicable safety, construction, electrical, and communications requirements. All buildings and fixtures forming part of a solar electric installation shall be constructed in accordance with the Massachusetts State Building Code.

Acknowledged. The project complies with all Codes listed.

(2) Solar electric generating facilities shall not be constructed, installed or modified as provided in this section without first obtaining a building permit and paying any required fees.

Acknowledged.

(3) Noise generated by solar electric generating facilities and associated equipment and machinery shall conform to applicable state and local noise regulations, including the Department of Environmental Protection's Division of Air Quality noise regulations, 310 CMR 7.10. A source of sound will be considered in violation of said regulations if the source:

(a) Increases the broadband sound level by more than 10 db(A) above ambient; or

(b) Produces a "pure tone" condition, when an octave band center frequency sound-pressure level exceeds the two adjacent center frequency sound-pressure levels by three decibels or more.

(4) Said criteria are measured both at the property line and at the nearest inhabited residence. "Ambient" is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment hours, unless established by other means with the consent of the Department of Environmental Protection (DEP).

*A noise analysis is included in **Appendix D**.*

(5) All plans for any solar generating electric facility shall depict the location of and describe any battery energy storage system proposed to be installed and operated in association with the solar electric generating facility.

*The project plan set included in **Appendix C** depicts the locations of all proposed equipment pads.*

D. Maintenance. The solar electric generating facility's owner or operator shall maintain the facility in good condition. Maintenance shall include, but not be limited to, painting, structural repairs, and integrity of security measures. Site access shall be maintained to a level acceptable to the local Fire Chief and Emergency Management Director. The owner or operator shall be responsible for the cost of maintaining the solar electric generating facilities and any access road(s).

*Acknowledged. The facility's owner/operator operation and maintenance plan is included in **Appendix E**.*

E. Site plans.

(1) Where site plan review is required for a solar generating facility, the processing of applications, decisions, approvals/denials, lapsing, application fees, application review fees, and appeals shall be in accordance with the provisions of Article IX and the Planning Board Policies and Procedures.

Acknowledged, this submittal package is in support of the site plan review application being submitted to the Planning Board.

F. Solar electric generating facilities allowed by right.

All subsections under Section 275-7.6.F are not applicable to the proposed project. A Site Plan Review is being applied for as the project proposes a dual-use solar agrivoltaic project with a capacity greater than 250 kW DC qualifying as a Large-Scale Solar Electric Generating Facility.

G. General requirements applicable to all solar electric generating facilities requiring either site plan review (Article IX) or a special permit (Article X).

(1) Applicability. The provisions of this § 275-7.6G are applicable to any solar electric generating facility requiring either site plan review or special permit approval whether they are a primary use, accessory electric generating facility, or a dual-use solar electric generating facility.

The project requires conformance of Article IX and has been designed as such. A special permit is not required for this project therefore Article X does not apply.

(2) Dimension and height requirements.

(a) Minimum setbacks for solar electric generating facilities.

[1] Front yard. No facilities are permitted between the front of the principal building and the front lot line. Where no building is located on the lot, the minimum front yard setback shall not be less than 50 feet.

[2] Side yard: 35 feet.

[3] Rear yard: 35 feet.

(b) Height of structures.

[1] The height of any structure associated with a solar electric generating facility shall not exceed 35 feet.

[2] The height of solar panels and associated support structures shall not exceed 15 feet.

The project meets the 50 feet front yard, 35 feet side yard, and 35 feet rear yard setback requirements. The racking system for the single tracking agrivoltaic array is designed to have the panels lay flat at a minimum of 10' height per SMART ASTGU regulations and rotate about the axis east to west of the racking pole aligned north to south. This primary axis is proposed to be at a maximum of 15-feet above grade.

(3) Appurtenant structures. All appurtenant structures to solar electric generating facilities shall be subject to regulations concerning the bulk and height of structures, lot area, and setbacks as specified within the appropriate section of the Southampton Zoning Code and open space, parking and building coverage requirements. All such appurtenant structures, including but not limited to equipment shelters, storage facilities, transformers, and substations, shall be architecturally compatible with each other. Whenever

reasonable, structures should be screened from view by vegetation and/or joined or clustered to avoid adverse visual impacts.

*Acknowledged. Equipment pad areas are shown on the site plans included in **Appendix C**.*

(4) Over parking areas. Where the facility is being constructed in or over an existing parking area, the facility:

- (a) May not diminish the number of parking spaces below the minimum number required by the Zoning Bylaw.
- (b) May not alter the stormwater runoff or drainage flow without an approved stormwater management permit.

Not Applicable. The project does not propose any solar canopies over parking areas.

(5) Waivers. The Planning Board may, upon the prior written request of the applicant, waive any of the requirements of this § 275-7.6G but must state its reasons for doing so in writing as part of its decision on the site plan review or special permit, whichever is applicable.

Acknowledged. The applicant is not seeking any waivers at this time.

(6) Abandonment or decommissioning.

(a) Removal requirements. Any solar electric generating facility which has reached the end of its useful life or has been abandoned shall be removed. The owner or operator shall physically remove the installation within 150 days of abandonment or the proposed date of decommissioning, or the Town retains the right, after the receipt of an appropriate court order, to enter and remove an abandoned, hazardous or decommissioned solar electric generating facility. As a condition of site plan or special permit approval, an applicant shall agree to allow the Town entry to remove an abandoned or decommissioned installation. Reimbursement for removal shall be obtained from the financial surety posted by the applicant as part of the special permit issuance. The owner or operator shall notify the Planning Board by certified mail of the proposed date of discontinued operations and plans for removal. Decommissioning shall consist of:

- [1] Physical removal of all solar electric generating facilities, structures, equipment, building, security barriers and transmission lines from the site, including any materials used to limit vegetation.
- [2] Disposal of all solid and hazardous waste in accordance with local, state, and federal waste disposal regulations.
- [3] Stabilization or revegetation of the site as necessary to minimize erosion. The Planning Board may allow the owner or operator to leave landscaping or designated below-grade foundations in order to minimize erosion and disruption to vegetation.

Acknowledged.

(b) Abandonment. Absent notice of a proposed date of decommissioning or written notice of extenuating circumstances, the solar electric generating facility shall be considered abandoned when it fails to operate for more than one year without the written consent of the Planning Board. If the owner or operator of the solar electric generating facility fails to remove the installation in accordance with the requirements of this subsection within 150 days of abandonment or the proposed date of decommissioning, the Town may enter the property and physically remove the installation.

Acknowledged.

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(c) Financial surety. Proponents of solar electric generating facilities shall provide a form of surety, either through escrow account, bond or other form of surety, approved by the Planning Board to cover the cost of removal in the event the Town must remove the installation and remediate the landscape, in an amount and form determined to be reasonable by the Planning Board, but in no event to exceed more than 125% of the cost of removal and compliance with the additional requirements set forth herein, as determined by the project proponent and the Town. Such surety will not be required for municipal or state-owned facilities. The project proponent shall submit a fully inclusive estimate of the costs associated with removal, prepared by a qualified engineer. The amount shall include a mechanism for calculating increased removal costs due to inflation.

*The decommissioning estimate is included in **Appendix F**.*

(7) Utility notification. No solar electric generating facility shall be constructed until evidence has been given to the Planning Board that the utility company that operates the electrical grid where the installation is to be located has been informed of the solar electric installation owner's or operator's intent to install an interconnected facility and acknowledges receipt of such notification. Off-grid systems shall be exempt from this requirement.

*The utility interconnection application is included in **Appendix G**.*

(8) Design and performance standards.

(a) Lighting. Lighting of solar electric generating facilities shall be consistent with local, state and federal law.

[1] Lighting of other parts of the installation, such as appurtenant structures, shall be limited to that required for safety and operational purposes and shall be reasonably shielded from abutting properties.

[2] Lighting of the solar electric generating facility shall be directed downward and shall incorporate full cutoff fixtures to reduce light pollution.

No lighting is proposed for the project; neither for the post-development conditions, nor during construction.

(b) Signage. Solar electric generating facilities shall not be used for displaying any advertising signage except for reasonable identification of the manufacturer or operator of the solar electric installation.

[1] Signs on solar electric generating facilities shall comply with § 275-8.3, Signs.

[2] A sign consistent with § 275-8.3 shall be required to identify the owner and provide a twenty-four-hour emergency contact phone number.

*The owner/operator sign with contact information will be posted at the site entrance gate as shown on sheet C502 the project plan set included in **Appendix C**.*

(c) Utility connections. Reasonable efforts, as determined by the Planning Board, shall be made to place all utility connections from the solar electric generating facility underground, depending on appropriate soil conditions, shape and topography of the site, and any requirements of the utility provider. Electrical transformers for utility interconnections may be above ground if required by the utility provider.

All conduit will be routed either directly connected to the modules within each table of the array or underground for the array to connect to the equipment pad areas. From the equipment pad areas, conduit will again run underground towards the site entrance where the conduit will connect to utility poles prior to interconnection at the existing utility pole along Pleasant Street.

- (d) Access. Access drives shall be constructed to minimize grading and removal of stone walls or trees and minimize impacts to environmental or historic resources.

The proposed access road will improve the existing farm access road where applicable to reduce grading. No stone wall or tree removal is proposed for the project.

- (e) Vegetation management.

- [1] Herbicides, pesticides, or chemical fertilizers may not be used to manage vegetation at the solar electric generating facility.
- [2] Mowing, grazing and using geotextile materials underneath the solar array are possible alternatives.
- [3] In the Water Supply Protection District, low-growing grasses are optimal. Other grasses must be regularly mowed or grazed so as to minimize the amount and height of "fuel" available in case of fire.

The nature of the dual-use solar photovoltaic array is to allow farming operations to continue beneath the array. No herbicides or pesticides will be used in the proposed array hay or compost fields. Along the project fence line, a string trimmer for vegetative maintenance will be used, and potentially herbicides only along the fence line area, and if so used, will be in accordance with MA G.L. c. 132B and MDAR standards. Fertilizers if used for post construction seeding steps, would also be in accordance with MA G.L. c. 132B and MDAR standards.

- (f) Hazardous materials. If hazardous materials are utilized within the solar electric equipment then impervious containment areas capable of controlling any release to the environment and to prevent potential contamination of groundwater are required. Hazardous materials stored, used, or generated on-site shall not exceed the amount for a "very small quantity generator of hazardous waste" as defined by the DEP pursuant to Mass DEP regulations 310 CMR 30.000 and shall meet all requirements of the DEP, including storage of hazardous materials in a building with an impervious floor that is not adjacent to any floor drains to prevent discharge to the outdoor environment.

*Specifications of electrical equipment are included in the electrical plans included in **Appendix H**. The transformer oil is vegetable based and non-toxic as shown on the specification sheet. Specifications of the BESS are included in the electrical plans included in **Appendix H** and Fire Risk Alliance, LLC performed a Hazard Mitigation Analysis (HMA) included in **Appendix L** that demonstrates that the proposed BESS meets all the HMA performance criteria for approval outlined in NFPA 855.*

- (g) Impact on agricultural and environmentally sensitive land.

- [1] The solar electric generating facility shall be designed to minimize impacts to agricultural and environmentally sensitive land and to be compatible with continued agricultural use of the land whenever possible.
- [2] No more than 50% of the total land area proposed for the solar electric field may be occupied by the solar panels, with the remainder of the land remaining as undeveloped open space left in its natural state.

The nature of the dual-use solar photovoltaic array, in this case, is to allow the hay cultivation operations to continue beneath the array. The only loss in agricultural footprint of land is relative to the posts of the array racking equipment, the footprint of the added gravel coverage for the access road, and the footprint of the equipment pad areas. These cumulative areas will not be greater than 50% of the total land area proposed for the array.

(h) Drainage. The design shall minimize the use of concrete and other impervious materials to the greatest extent possible and minimize erosion and transport of sediment.

[1] If a permit in accordance with Chapter 227, Stormwater Management and Erosion and Sediment Control, is required, consideration of the permit application and plans submitted pursuant to Chapter 227 shall run concurrently with the approval process under this section.

*As the project proposes more than 40,000 square feet of disturbance (as shown in Table 1 above) the Stormwater Management Permit Application is required and is included with this submittal package. The Stormwater Management Permit Application form is included in **Appendix A**. The project compliance with Chapter 227 is included below.*

(i) Screening. Solar electric generating facilities shall be screened from view by a minimum fifteen-foot-wide staggered and grouped planting of shrubs and small trees. Such plantings shall use native plants and a mix of deciduous and evergreen species and may be located within the setback area.

*Screening trees have been proposed along the southern boundary of the project area accordingly. See the project plan set included in **Appendix C** for more information.*

(9) Safety and environmental standards.

(a) Emergency services. The solar electric generating facility's owner or operator shall provide a copy of the project summary, electrical schematic, and site plan to the local Fire Chief. The owner and/or operator shall cooperate with local emergency services in developing an emergency response plan. All means of shutting down the solar electric generating facility shall be clearly marked. The owner or operator shall identify a responsible person for public inquiries throughout the life of the installation.

*The contact on the Zoning Application form (**Appendix A**) and on the owner/operator sign attached to the site entrance gate shall be the point of contact for such inquiries. A copy of the plan set and application were submitted to the local Fire Chief, Building Commissioner/Inspector, Police Department and Highway Superintendent concurrently with the Site Plan Review submission in accordance with this requirement and Section 275-9.7.D.*

(b) Land clearing, soil erosion and habitat impacts. Clearing of natural vegetation shall be limited to what is necessary for the construction, operation and maintenance of the solar electric generating facility or otherwise prescribed by applicable laws, regulations, and bylaws.

[1] Solar electric generating facilities shall be designed and constructed so as no such installations shall occur on any slopes greater than 15% in order to minimize erosion.

[2] No less than 50% of the land parcel utilized for solar electric generating facilities shall remain forested.

[3] No topsoil shall be removed from the land parcel under consideration for solar electric generating facilities.

[4] If earthworks operations are required, topsoil shall be stockpiled within the property bounds and protected against erosion until such time as earthwork operations are completed and topsoil can be respread over the parcel. Earthworks shall be planned to limit export of soil material (non-topsoil) to 1,000 cubic yards per acre affected by installation.

[5] A detailed earthworks estimate, and topsoil management plan, is a required site plan submittal component. These documents demonstrate to the Board's satisfaction that the quantity is to be maintained.

The project meets the requirements listed above. No soil material is proposed to be removed from the site. Grading is proposed for the improved access road and upgraded culvert crossing located centrally within the site. All cut/fill

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materials from this activity will remain on-site. Gravel is proposed to be imported to the site for use in applications such as, but not limited to, the gravel access road, equipment pads, and a gravel riprap apron.

H. Solar electric generating facilities requiring site plan approval in accordance with Article IX.

All subsections under Section 275-7.6.H have been discussed in Section 275-7.6.G above.

I. Solar electric generating facilities requiring special permit approval.

(1) In addition to site plan review, a special permit is required for certain categories of solar electric generating facilities as indicated in Attachment 1, Table 1, Use Regulations.

The project is a dual use Ag-solar array which in accordance with Table 1 – Use Regulations of the Town of Southampton Zoning Bylaws (Zoning Bylaws), is an agricultural use permitted by right with site plan approval. Therefore, special permit approval is not required for the project.

(2) No building permit or certificate of use and occupancy shall be issued by the Building Commissioner/Inspector without the written approval of the special permit and certification by the Town Clerk that no appeal of the special permit decision has been filed.

Not applicable to the project.

(3) Where a special permit and site plan review are required, the Planning Board shall consolidate the review process but issue separate decisions on the two applications for the project.

Not applicable to the project.

J. Accessory solar electric generating facilities.

(1) Where the facility is being added to a facility for which site plan review or approval or a special permit has been granted, the accessory solar electric generating facility must:

- (a) Conform to all conditions of the previous site plan or special permit decision.
- (b) Be approved as an amendment to the previously approved site plan or special permit. The Planning Board may grant such an amendment as a minor modification.

Not Applicable to this project.

(2) Where the facility is being constructed in or over an existing parking area, the facility:

- (a) May not diminish the number of parking spaces below the minimum number required by the Zoning Bylaw.
- (b) May not alter the stormwater runoff or drainage flow without an approved stormwater management permit.

Not Applicable to this project.

K. Dual-use solar electric generating facilities.

(1) Applications for any dual-use solar electric generating facility must demonstrate it will not diminish the use of the property for an agricultural purpose.

As mentioned above, the proposed dual-use Ag-solar array is designed to allow continual use of agricultural operations beneath the array.

Article IX Site Plan Review - Section 275-9

§ 275-9.1. Purpose.

The overall purpose of site plan review is to ensure that subject developments and uses are designed in a manner that protects the health, safety, convenience and general welfare of residents of the Town. In implementing site plan review the Town intends to ensure that the proposed development activity/use:

- A. Complies with all applicable bylaws and regulations;
- B. Fulfills any applicable site design guidance provided by the Southampton Master Plan and applicable design standards adopted by the Planning Board;
- C. Preserves or enhances the unique character and visual qualities of the Town, including, where appropriate, historic character, rural character, natural areas, environmental and natural resources, and scenic vistas;
- D. Does not unreasonably impact adjoining and nearby properties or the neighborhood in which it is located; and
- E. Promotes sustainable design and development that supports long-term economic vitality and ecological integrity.

The applicant acknowledges Sections 275-9.1.A through 275-9.1.E.

§ 275-9.2. Applicability.

Except as may be exempted in § 275-9.4, site plan review by the Planning Board is required for the following activities and uses.

A. Construction, alteration, or expansion of the following:

- (1) Any residential buildings of two dwelling units or more;
- (2) Any principal or accessory building used for exempt use under MGL c. 40A, § 3;
- (3) Any nonresidential building.

B. Any exempt use under MGL c. 40A, § 3.

C. Any use identified in Attachment 1, Table 1, Use Regulations,[1] as "Use permitted by right with site plan approval."

D. Change of use where the new use will require more parking than the previous use.

E. Construction or expansion of a parking lot for a municipal, institutional, commercial, industrial, or multifamily structure or purpose.

The applicant acknowledges Sections 275-9.2A through 275-9.2.E.

§ 275-9.3. Site plan review for exempt uses.

Site plan review for uses exempt from Zoning under MGL c. 40A, § 3, is limited to ensuring compliance with reasonable regulations as related to parking, open spaces, building height, and building setback requirements as provided for in MGL c. 40A and § 275-7.5 (Accessory dwelling units).

Section 275-9.3 is not applicable, the project is not exempt from a site plan review.

§ 275-9.4. Exemptions.

Not Applicable, the project is not exempt from a site plan review.

§ 275-9.5. Relationship to building permits and special permits.

A. Use, structure, or activity available as of right or special permit. An application for a building permit to perform work as set forth in § 275-9.2 shall be accompanied by an approved site plan.

B. Commencement of activity. Prior to the commencement of any activity set forth in § 275-9.2, the project proponent shall obtain site plan approval from the Planning Board in accordance with the Planning Board Policies and Procedures.

C. Where a special permit is also required, the site plan review and special permit shall be consolidated into a single review and approval process. Accordingly, the Planning Board Policies and Procedures shall require applicants submit special permits and site plan review applications as a consolidated application.

The applicant acknowledges Sections 275-9.5.A through 275-9.5.C. Special permit approval is not required for the project.

§ 275-9.6. Adoption of policies and procedures.

A. The Planning Board shall adopt and may from time to time amend reasonable policies and procedures for the administration of this Article IX, Site Plan Review, provisions. At a minimum, these policies and procedures shall specify:

- (1) Requirements for submissions including but not limited to the size, number, and form of submissions, required contents of application submissions, style, and required narratives and impact assessments.
- (2) Requirements for preparation of site plans and required specifications and contents of site plans.
- (3) Procedures for submission of applications.
- (4) Procedures for review of applications including coordination of application reviews with other boards and departments.
- (5) Application and project review fees and payment of said fees.
- (6) Provisions for use of outside consultants for review of applications in accordance with state law.
- (7) Rules for granting of waivers from strict compliance with the Planning Board Policies and Procedures.

Acknowledged.

B. All site plans and submissions for site plan review shall conform to the Planning Board Policies and Procedures.

Acknowledged.

§ 275-9.7. Procedures.

A. Site plan review applications shall be submitted, processed, and acted upon in accordance with the Planning Board Policies and Procedures on file with the Town Clerk.

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(1) When a variance or finding is also required, the applicant must obtain the variance or finding, and any associated appeal period must have expired without an appeal being filed or the appeal must have been resolved in the applicant's favor prior to submission of an application for site plan review.

Acknowledged.

B. Except for projects qualifying for minor site plan review as provided in § 275-9.12, decisions on a site plan review application shall not be made until after the conclusion of public hearing held in accordance with the requirements set forth herein.

Acknowledged.

C. Applicants for site plan review shall prepare applications and plans and submit materials in accordance with the Planning Board Policies and Procedures.

Acknowledged. The documents provided within this site plan review submittal package adheres to this requirement.

D. The applicant shall also deliver copies of the application to the Building Commissioner/Inspector, Fire and Police Departments and Highway Superintendent for their review and comment at the same time that they are filed with the Planning Board.

(1) Said offices shall have 30 days from their receipt of the site plan to submit their comments to the Planning Board.

(2) Failure to respond within 30 days shall constitute their lack of objections to the project.

A copy of the plan set and application were submitted to the local Fire Chief, Building Commissioner/Inspector, Police Department and Highway Superintendent concurrently with the Planning Board submission in accordance with this requirement and Section 275-9.7.D

E. Decision on a site plan must be made at a public meeting in accordance with the Planning Board Policies and Procedures.

Acknowledged.

F. Decisions on a site plan must be made within 90 calendar days of the date of submission unless the deadline is extended by mutual consent.

(1) Exception: If the site plan is also associated with a special permit, the time constraints of § 275-10.5 shall apply.

Acknowledged.

§ 275-9.8. Public hearing.

A. Where public hearings on applications for site plan review submissions are required, they shall be conducted in accordance with the provisions of MGL c. 40A and the Planning Board Policies and Procedures. Accordingly, at a minimum:

(1) Public hearings shall commence within 45 calendar days of receipt of the site plan review application.

(a) Exception: If the site plan is associated with a special permit, the provision of § 275-10.4A shall apply.

(2) Notice of the public hearing date, time, location, and subject matter shall be posted at Town Hall, published in a newspaper of general circulation, and given to all parties in interest as defined in § 275-2.3 of this Zoning Bylaw and the Planning Board Policies and Procedures.

Acknowledged.

B. Applicant notification of abutters.

(1) It is the applicant's responsibility to provide notification to abutters within 300 feet of the subject land parcel of the date, time, location, and subject matter of the first Planning Board hearing at which the subject application is to be heard in accordance with the Planning Board Policies and Procedures.

(2) Said notice shall be mailed in accordance with the Planning Board Policies and Procedures.

(3) Proof of such abutter notification must be submitted by the applicant in accordance with the Planning Board Policies and Procedures to the Board at or before the first scheduled public hearing on the application.

*The notification to abutters with the above information will be mailed to abutters once a hearing date and time has been confirmed for the project by the Planning Board. A copy of the draft notification to abutters along with the abutters list issued from the Town of Southampton Assessors Office is included in **Appendix J**.*

§ 275-9.9. Decisions.

A. No building permit or certificate of use and occupancy shall be issued by the Building Commissioner/Inspector without the written approval of the site plan by the Planning Board, except in the instance of the Board failing to act as provided in § 275-9.9H below, unless the Board and applicant have agreed to a time extension.

Acknowledged.

B. No building permit shall be issued by the Building Commissioner without the written approval of the site plan by the Planning Board.

Acknowledged.

C. Approval of a site plan submission shall require the affirmative votes of a majority of the qualified members of the Board in attendance at the meeting.

(1) This does not change the requirement for a super majority of the Board to approve a special permit even when the site plan review and special permit are interconnected and undertaken by the same Board.

(2) Qualified members of the Board include all members except for those members who have missed a session of the public hearing or recused from consideration of the application.

Acknowledged.

D. Site plan decisions shall be:

(1) In writing.

(2) Made at a posted public meeting.

(3) Filed with the Town Clerk, mailed to the applicant, and filed with the Building Commissioner.

Acknowledged.

E. Decisions must be filed with the Town Clerk and mailed to the applicant in accordance with the Planning Board Policies and Procedures.

Acknowledged.

F. Extension of deadlines. The applicant may request, and the Planning Board may grant by majority vote, an extension of the time limits set forth herein.

Acknowledged.

G. Written decision options. The Planning Board decision on an application shall consist of either of the following:

- (1) A written approval of the proposed project;
- (2) A written denial of the application, stating reason for such denial; or
- (3) A written approval subject to any reasonable conditions, modifications, and restrictions as the Planning Board may deem necessary to satisfy this bylaw. Such conditions may include provision for a performance guarantee to ensure satisfactory completion of specified elements of the approved plan in accordance with the Planning Board.

Acknowledged.

H. Constructive approval. Failure of the Planning Board to file a decision with the Town Clerk within the time specified herein shall be deemed constructive approval of the site plan as submitted. Where an applicant believes such constructive approval has occurred, they shall follow the procedures below:

- (1) The applicant shall obtain a certification from the Town Clerk that no action has been taken within the specified time required.
- (2) A copy of this Town Clerk certification shall be filed by the applicant with the Building Commissioner and the Planning Board.

Acknowledged.

§ 275-9.10. Review standards.

A. The Planning Board shall review the site plan and supporting data, taking into consideration whether the proposed site plan reasonably fulfills the following objectives (As used in this § 275-9.10, the word "shall" is mandatory and the words "should" and "may" are recommended but optional.):

- (1) Minimize the volume of cut and fill, the number of removed trees six-inch caliper or larger, the length of removed stone walls, the area of wetland vegetation displaced, the extent of stormwater flow increase from the site, soil erosion, and threat of air and water pollution;

*No tree clearing nor stone wall removal is proposed for the project. No soil material is proposed to be removed from or imported into the site. Grading is proposed for the improved access road and upgraded culvert crossing located centrally within the site. All cut/fill materials from this activity will remain on-site. Gravel is proposed to be imported to the site for use in applications such as, but not limited to, the gravel access road, equipment pads, and a gravel riprap apron. No wetlands are proposed to be disturbed as part of the project. No stormwater flow increase will occur as described in the Stormwater Report (**Appendix I**). Site erosion and sedimentation controls have been proposed to capture any potential sediment laden runoff from the site prior to discharging offsite to downstream water resources.*

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- (2) Maximize pedestrian and vehicular safety both on the site and entering and exiting the site;
- (3) Minimize obstruction of scenic views from publicly accessible locations;
- (4) Minimize visual intrusion by controlling the visibility of parking, storage, or other outdoor service areas viewed from public ways or premises residentially used or zoned;
- (5) Minimize glare from headlights and light trespass;
- (6) Minimize unreasonable departure from the character, materials, and scale of buildings in the vicinity, as viewed from public ways and places;

Sections 275-9.10.A.2 through 275-9.10.A.6 are not applicable.

- (7) Prevent contamination of groundwater from operations on the premises involving the use, storage, handling, or containment of hazardous substances;

*No hazardous substances are proposed within the site. Fire Risk Alliance, LLC performed a Hazard Mitigation Analysis (HMA) included in **Appendix L** that demonstrates that the proposed BESS meets all the HMA performance criteria for approval outlined in NFPA 855.*

- (8) Ensure compliance with the provisions of this Zoning Bylaw, including parking and landscaping;

*The project is not proposing any new parking spaces. The proposed screening depicted on the project plan set (**Appendix C**) conforms with the regulations described in Section 275-7.6.G.8.i.*

- (9) Ensure adequate access to each structure for fire and service equipment and adequate provision for utilities and stormwater drainage consistent with the requirements of the Planning Board's Subdivision Regulations; and

The proposed access road provides adequate access to all site features for emergency services.

B. The Planning Board shall consider whether the submission conforms to the relevant requirements of the Planning Board Policies and Procedures.

Acknowledged.

§ 275-9.11. Conformity to approved site plan.

A. No deviation from an approved site plan shall be permitted without prior written approval by the Planning Board.

Acknowledged.

B. The Planning Board Policies and Procedures shall set forth procedures for consideration and acting upon requests to deviate from an approved site plan.

Acknowledged.

C. The Planning Board should be consulted to determine whether such changes are significant enough to require a new public hearing.

Acknowledged.

§ 275-9.12. Minor site plan review.

Not Applicable at this time, the project does not qualify for a minor site plan review.

§ 275-9.13. Lapse.

A. Site plan approval shall lapse after two years from the granting thereof if a substantial use thereof has not sooner commenced, except for good cause. Site plan approval may, for good cause, be extended in writing by the permitting authority upon the written request of the applicant.

(1) The Planning Board Policies and Procedures shall set forth guidelines to be used to determine if the "substantial use" requirement has been satisfied.

Acknowledged.

§ 275-9.14. Appeal.

The appeal of any decision of the permitting authority hereunder shall be made in accordance with the provisions of MGL c. 40A, § 17.

Acknowledged.

§ 275-9.15. Violations and penalties.

Violations of the approved site plan or any conditions of approval shall be subject to the provisions of § 275-3.3 of the Zoning Bylaw.

Acknowledged.

Section 275-7.2 Water Supply Protection District

A. Purpose of district. To promote the health, safety and welfare of the community by protecting and preserving the surface water and groundwater resources of the Town and the region from any use of land or buildings which may reduce the quality of its water resources.

Acknowledged.

B. Definitions. See Article II.

Acknowledged.

C. Scope of authority. The Water Supply Protection District is an overlay district and shall be superimposed on the other districts established by this bylaw. All regulations of the Town of Southampton Zoning Bylaw applicable to such underlying districts shall remain in effect, except that where the Water Supply Protection District imposes additional regulations, such regulations shall prevail.

Acknowledged.

D. District delineation.

(1) The Water Supply Protection District is herein established to include all lands within the Town of Southampton lying within the primary recharge areas of groundwater aquifers and watershed area of the Manhan Reservoir which now or may in the future provide public water supply. The map titled "Water Supply Protection District, Town of Southampton," on file with the Town Clerk, delineates the boundaries of the district.

(2) Where the bounds delineated are in doubt or in dispute, the burden of proof shall be upon the owner(s) of the land in question to show where they should properly be located. At the request of the owner(s), the Town

PROJECT DESCRIPTION

may engage a professional hydrogeologist to determine more accurately the location and extent of an aquifer or primary recharge area and may charge the owner(s) for all or part of the cost of the investigation.

*Acknowledged. The WSPD boundary provided by the Town of Southampton has been included on the project plan set (**Appendix C**). The entirety of the project site is within the WSPD.*

E. Prohibited uses. The following uses are prohibited in the Water Supply Protection District:

- (1) Business and industrial uses, not agricultural, which:
 - (a) Manufacture, use, process, store, or dispose of hazardous materials or wastes as a principal activity, including but not limited to metal plating, chemical manufacturing, wood preserving, furniture stripping, dry cleaning, and auto body repair; or
 - (b) Involve on-site disposal of process wastewaters.
- (2) Trucking terminals, bus terminals, car washes, motor vehicle gasoline sales, and automotive service and repair shops.
- (3) Solid waste landfills, dumps, auto recycling, and junk and salvage yards, with the exception of the disposal of brush or stumps.
- (4) Underground storage and/or transmission of petroleum products excluding liquefied petroleum gas.
- (5) Outdoor storage of salt, de-icing materials, pesticides or herbicides.
- (6) Dumping or disposal on the ground, in water bodies, or in residential septic systems of any toxic chemical, including but not limited to septic system cleaners which contain toxic chemicals such as methylene chloride and 1,1,1-Trichlorethane, or other household hazardous wastes.

Not applicable. None of the uses listed above are proposed with the project.

F. Restricted uses. The following uses are restricted in the Water Supply Protection District:

- (1) Excavation for removal of earth and other soils shall not extend closer than five feet above the annual high groundwater table.
 - (a) A monitoring well shall be installed by the property owner to verify groundwater elevations.
 - (b) This subsection shall not apply to excavations incidental to permitted uses, including but not limited to providing for the installation or maintenance of structural foundations, freshwater ponds, utility conduits or on-site sewage disposal.
 - (c) Access drive(s) to extractive operation sites shall include a gate or other secure mechanism to restrict public access to the site.

No soil excavation for the purpose of removing soil from the site is proposed.

- (2) The use of sodium chloride for ice control shall be minimized consistent with the public highway safety requirements.

Acknowledged.

- (3) Salt storage areas shall be covered and be located on a paved surface, with berms to prevent runoff from leaving the site.

Section 275-7.2.F.3 does not apply. No salt storage is proposed onsite.

- (4) Commercial fertilizers, pesticides, herbicides, or other leachable materials shall be used with all necessary precautions to minimize adverse impacts on surface water and groundwater and shall not result in groundwater concentrations exceeding Massachusetts drinking water standards.

Acknowledged.

(5) Aboveground storage tanks for oil, gasoline or other petroleum products shall be placed in a building in a concrete basement or on a diked, impermeable surface sufficient to contain the volume of the tank to prevent spills or leaks from reaching groundwater. Floor drains shall be plugged to prevent discharges of leaks.

The project does not propose any permanent storage tanks for oil, gasoline, or other petroleum products. Any such material will only be stored onsite relative to construction activities and removed at the end of construction. All storage of such material during construction activities shall be within a water-tight container, covered by plastic sheeting, or other suitable means to minimize exposure of these containers to precipitation and stormwater. Spill kits will be kept onsite during construction.

(6) The storage or stockpiling of manure shall be in an area which is covered and lined in accordance with the U.S. Department of Agriculture's Natural Resources Conservation Service guidelines.

Not Applicable. The project does not propose any storage or stockpiling of manure.

(7) All animal feedlots shall be designed to restrict infiltration or other movement of livestock wastes to the aquifer.

Not Applicable, the project does not propose any animal feedlots.

G. Drainage. For commercial and industrial uses, all runoff from impervious surfaces shall be recharged on the site by being diverted toward areas covered with vegetation for surface infiltration to the extent possible. Dry wells shall be used only where other methods are infeasible and shall be preceded by oil, grease and sediment traps to facilitate removal of contamination. All recharge areas shall be permanently maintained in full working order by the owner(s).

The project, being dual use Ag-solar array, is defined as an "agricultural use" per the Town of Southampton Use Regulations Table. As described in the Stormwater Report (Appendix I), the only change in land coverage are the footprints of the array racking poles, gravel access road, and equipment pad areas. The proposed post-development stormwater analysis shows no increase in peak flow runoff rate to downstream areas associated with the project.

H. Special permit uses.

(1) Uses allowed by special permit by Zoning Board of Appeals. The following uses may be allowed by special permit obtained from the Zoning Board of Appeals:

- (a) Commercial and industrial uses which are allowed in the underlying district.
- (b) Any enlargement, intensification or alteration of an existing commercial or industrial use.
- (c) The rendering impervious of more than 20% of any single residential lot.

The project is being submitted as an agricultural use which is permitted by right with site plan approval, therefore, Section 275-7.2.H does not apply to the project.

(2) Requirements for special permit in the Water Supply Protection District. The applicant shall file six copies of a site plan prepared by a qualified professional with the Zoning Board of Appeals. The site plan shall at a minimum include the following information where pertinent:

The special permit is not applicable to the project.

PROJECT DESCRIPTION

- (a) A complete list of chemicals, pesticides, fuels and other potentially hazardous materials to be used or stored on the premises in quantities greater than those associated with normal household use.

During construction, temporary re-fueling operations for equipment will be performed as needed. Construction maintenance activities will be described in the Stormwater Pollution Prevention Plan (SWPPP) for the project and monitored under the EPA Construction General Permit routine inspections.

*There are no proposed chemicals, pesticides, fuels or other potentially hazardous materials proposed to be stored for this project post construction. The Ag-Solar project associated BESS proposed is LFP (Lithium Iron Phosphate) technology. Fire Risk Alliance, LLC performed a Hazard Mitigation Analysis (HMA) included in **Appendix L** that demonstrates that the proposed BESS meets all the HMA performance criteria for approval outlined in NFPA 855, for both normal BESS operations and during a fire or fault event.*

*The proposed project will be operated and maintained in compliance with the sites Operation and Maintenance Plan included in **Appendix E**.*

- (b) Those businesses using or storing such hazardous materials shall file a hazardous materials management plan with the Zoning Board of Appeals, Hazardous Materials Coordinator, and Board of Health which shall include:

- [1] Provisions to protect against the discharge of hazardous material or wastes to the environment due to spillage, accidental damage, corrosion, leakage or vandalism, including spill containment and cleanup procedures.
- [2] Provisions for indoor, secured storage of hazardous materials and wastes with impervious floor surfaces.
- [3] Evidence of compliance with the regulations of the Massachusetts Hazardous Waste Management Act, 310 CMR 30, including obtaining an EPA identification number from the Massachusetts Department of Environmental Protection.

*The Ag-Solar project associated BESS proposed is LFP (Lithium Iron Phosphate) technology Fire Risk Alliance, LLC performed a Hazard Mitigation Analysis (HMA) included in **Appendix L** that demonstrates that the proposed BESS meets all the HMA performance criteria for approval outlined in NFPA 855 and completed an Emergency Response Plan (ERP) included in **Appendix K**.*

For further information, please see at Mass.gov BESS frequently asked questions web page, that was developed via a cooperative effort between the Executive Office of Energy and Environmental Affairs, the Department of Environmental Protection, the Department of Energy Resources, and Department of Fire Services: <https://www.mass.gov/info-details/battery-energy-storage-systems-frequently-asked-questions-on-fire-safety-and-public-health>

- (c) Drainage recharge features and provisions to prevent loss of recharge.

See response to Section 275-7.2.G Drainage.

- (d) Provisions to control soil erosion and sedimentation and soil compaction and to prevent seepage from sewer pipes.

*Site erosion and sedimentation controls have been proposed to capture any potential sediment laden runoff from the site prior to discharging offsite to downstream water resources and are shown on the project plan set (**Appendix C**).*

- (3) Additional procedures for special permit in the Water Supply Protection District.

(a) The Zoning Board of Appeals shall follow all special permit procedures contained in Article X.

The special permit is not applicable to the project.

(b) The Zoning Board of Appeals may grant the required special permit only upon finding that the proposed use meets the following standards and those specified in Article X of this bylaw. The proposed use must:

- [1] In no way, during construction or thereafter, adversely affect the existing or potential quality or quantity of water that is available in the Water Supply Protection District; and
- [2] Be designed to avoid substantial disturbance of the soils, topography, drainage, vegetation and other water-related natural characteristics of the site to be developed.

The special permit is not applicable to the project. However, the project has been designed to minimize impacts on the water quality or quantity with the WSPD, responsibly manage any site soil disturbance, and maintain all pre-development natural flow paths.

(c) The Zoning Board of Appeals shall not grant a special permit under this section unless the petitioner's application materials include, in the Board's opinion, sufficiently detailed, definite and credible information to support positive findings in relation to the standards given in Article X.

The special permit is not applicable to the project.

I. Nonconforming use. Nonconforming uses which were lawfully existing, begun or in receipt of a building or special permit prior to the first publication of notice of public hearing for this bylaw may be continued. Such nonconforming uses may be extended or altered, as specified in MGL c. 40A, § 6, provided that there is a finding by the Zoning Board of Appeals that such change does not increase the danger of surface water or groundwater pollution from such use.

Not Applicable, this project does not include any continuances of any nonconforming uses.

Chapter 227 Stormwater Management and Erosion and Sediment Control

§ 227-1. Purpose and Authority

A. Purpose.

The applicant acknowledges the subsections of the purpose of Chapter 227.

B. Authority. The Southampton Planning Board will serve as the Stormwater Authority and shall administer, implement, and enforce this bylaw. Any powers granted to or duties imposed upon the Planning Board hereunder may be delegated in writing by the Planning Board to any Town official, including but not limited to the Highway Superintendent.

Acknowledged. The Stormwater Management Permit Application is being submitted concurrently with the site plan review application to the Planning Board.

§ 227-2. Definitions.

The Applicant acknowledges the definitions listed in Section 227-2.

§ 227-3. Applicability.

PROJECT DESCRIPTION

This bylaw shall apply throughout the Town of Southampton. Prior to the issuance of any special permit, site plan approval, or other development permit for any proposed new development or redevelopment projects listed below, a stormwater management permit, or a waiver of the requirement for a stormwater management permit, must be approved by the Southampton Planning Board. No person shall, on or after the effective date of this bylaw, initiate any land clearing, land grading, earthmoving or construction activities without first complying with this bylaw. The following uses and activities shall be required to submit a complete stormwater management permit application which shall include a stormwater management plan, including drainage reports, an erosion and sediment control plan, construction drawings, specifications, operation and maintenance plan, and as-built information in conformance with the requirements of this bylaw and associated regulations:

- A. Multifamily residential developments involving four or more units.
- B. Any new commercial, industrial, and/or institutional structures with at least 5,000 square feet of gross floor area, 10,000 square feet of impervious surface, or that require 10 or more parking spaces.
- C. Redevelopment or additions to existing commercial, industrial, and/or institutional uses that result in an additional impervious surface area or gross floor area of greater than 5,000 square feet, or that result in an increase of 10 or more parking spaces.
- D. Construction of subdivisions and/or construction activities of any kind disturbing greater than 40,000 square feet.
- E. Development or redevelopment involving multiple separate construction activities in discontinuous locations or on different schedules if the activities are part of a larger common plan of development that all together disturbs greater than 40,000 square feet.

*As the project proposes more than 40,000 square feet of disturbance (as shown in Table 1 above) the Stormwater Management Permit Application is required and is included with this submittal package. The Stormwater Management Permit Application form is included in **Appendix A**.*

§ 227-4. Exceptions.

The applicant is not seeking to submit the project under any exception status at this time.

§ 227-5. Administration.

A. As the Stormwater Authority, the Planning Board will review all applications for a stormwater management permit under this bylaw. Upon receipt of a complete application package at a regularly scheduled meeting of the Planning Board, the Board shall transmit one copy of the completed application package to the Highway Department for review and comment and file one copy of the completed application package in the office of the Town Clerk. The date of the regularly scheduled meeting of the Board at which the completed application package is accepted shall become the date of receipt and the start date for all deadlines for action by the Board as set forth herein.

(1) Public hearing.

(a) The Planning Board shall, within 21 days of receipt of a complete application for a stormwater management permit, hold a public hearing on the matter to allow comment from abutters, other boards and commissions and staff. The Board shall take final action on the application within 65 days of the receipt of the complete application unless the time for action is extended by mutual written consent of the applicant and the Planning Board. Notice of the public hearing shall be given by publication in a newspaper of local circulation, by posting at the office of the Town Clerk, and by first-class mailings to abutters at least seven days prior to the initial public hearing. The application and the erosion and

sediment control plan shall be made available for inspection by the public during normal business hours at the office of the Planning Board and the office of the Town Clerk.

(b) The applicant shall submit any additional information in response to all reasonable requests of the Stormwater Authority and/or any duly authorized representatives of the Stormwater Authority.

(2) Project changes. The permittee, or their agent, must notify the Stormwater Authority in writing of any change or alteration of a land disturbance or construction activity authorized in a stormwater management permit before any change or alteration occurs. If the Board determines that the change or alteration is significant, the Board may require that an amended application be filed and a new public hearing held. If any change or alteration from the stormwater management permit occurs during any land disturbing activities, the Board may require the installation of interim erosion and sedimentation control measures before approving the change or alteration as part of a formal application process.

The applicant acknowledges Section 227-5.

B. The Planning Board may adopt and periodically amend rules and regulations relating to the procedures, standards, and administration of this Stormwater Management Bylaw, by majority vote of the Planning Board, after conducting a public hearing to receive comments on any proposed revisions. Such hearing date shall be advertised in a newspaper of general local circulation at least seven days prior to the hearing date.

Acknowledged.

C. The Planning Board may waive strict compliance with any or all of the requirements of this bylaw for a project that will, in its judgment, generate minimal stormwater runoff and erosion and sedimentation, have minimal impact on the municipal stormwater system and nearby surface waters, and if such action is allowed by federal, state, and local statutes, bylaws, and/or regulations; is in the public interest; and is consistent with the purposes of this bylaw.

Acknowledged.

D. The Planning Board's action, rendered in writing, may consist of any of the following as a result of an application for a stormwater management permit: approval; approval subject to conditions; disapproval.

Acknowledged.

E. The Planning Board may establish a permit review fee schedule, based on the type and complexity of projects, and may update this fee schedule as needed, to cover the costs of permit administration for stormwater management permits. The Stormwater Authority may require the applicant to pay reasonable costs to be incurred by the Stormwater Authority for the employment of outside consultants pursuant to Stormwater Authority regulations and as authorized by MGL c. 44, § 53G.

Acknowledged.

F. This bylaw is intended to integrate with other parts of the Town's land use bylaws and regulations and not replace any other such requirements.

Acknowledged.

§ 227-6. Enforcement; violations and penalties.

A. Violations. Any construction activity that has commenced or is conducted contrary to this bylaw may be restrained by injunction or otherwise abated in a manner provided by law.

Acknowledged.

B. Notice of violation. When the Southampton Planning Board determines that an activity is not being carried out in accordance with the requirements of this bylaw or associated regulations, it shall issue a written notice of violation to the owner of the property. The notice of violation shall contain:

- (1) The name and address of the owner applicant.
- (2) The address when available or the description of the building, structure, or land upon which the violation is occurring.
- (3) A statement specifying the nature of the violation.
- (4) A description of the remedial measures necessary to bring the site into compliance with this bylaw and a time schedule for the completion of such remedial action.
- (5) A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed.
- (6) If the Highway Department, Stormwater Authority, or its authorized agent determines that abatement or remediation of adverse impacts is required, the order shall set forth a deadline by which such abatement or remediation must be completed. Said order shall further provide that, should the violator or property owner fail to abate or perform remediation within the specified deadline, the Town may, at its option, pursue a court order allowing the Town to undertake such work, and expenses thereof shall be charged to the violator.
- (7) If the Highway Department or Stormwater Authority takes action upon failure of the violator or owner to abate or remediate, notice shall be given to the violator and owner of the costs, including administrative costs, incurred by the Town. Said notice shall be sent within 30 days of completion of all measures necessary to abate the violation or to perform remediation. The violator or owner shall also be notified that they may, within 30 days of receipt of said notice, file an appeal in writing to the Select Board objecting to either the amount or basis of the costs incurred. If the amount due is not received by the expiration of the time in which to file an appeal or within 30 days following a decision by the Select Board affirming or reducing the costs, or from a final decision of a court of competent jurisdiction, the costs shall become a special assessment against the property owner and shall constitute a lien on the owner's property for the amount of said costs. Interest shall begin to accrue on any unpaid costs at the statutory rate provided by MGL c. 59, § 57, after the 31st day at which the costs first become due.

The applicant acknowledges Section 227-6.B.

C. Stop-work orders. Persons receiving a notice of violation will be required to halt all construction activities. This stop-work order will be in effect until the Southampton Planning Board confirms that the development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a notice of violation in a timely manner can result in civil or monetary penalties in accordance with the enforcement measures authorized in this bylaw. The Southampton Planning Board may utilize the services of a Massachusetts registered engineer to verify compliance at the applicant's expense.

Acknowledged.

D. Noncriminal disposition. The Town of Southampton may elect to utilize the noncriminal disposition procedure set forth in Chapter 203, Noncriminal Disposition, of the General Bylaws. The Planning Board or its designee shall be the enforcing entity and the penalty shall be as provided in Chapter 203, Noncriminal Disposition. Each day or part thereof that such violation occurs or continues shall constitute a separate offense.

Acknowledged.

E. Appeals. Unless otherwise stated herein, the decisions or orders of the Stormwater Authority shall be final. Further relief shall be appealed to a court of competent jurisdiction.

Acknowledged.

§ 227-7. Surety.

The Stormwater Authority may require the applicant to post surety before the start of land disturbance or construction activity. The form of the surety shall be approved by Town Counsel and be in an amount deemed sufficient by the Stormwater Authority to ensure that the work will be completed in accordance with the permit. If the project is phased, the Board may release part of the surety as each phase is completed in compliance with the permit, but the surety may not be fully released until the Board has received the final report as required by § 227-8 and the permittee is issued a certificate of completion. If the permittee defaults on any obligations imposed by the stormwater management permit, the Stormwater Authority may (after providing written notification to the permittee) inform the holder of the surety (and the Municipal Treasurer/Collector if the Treasurer/Collector is not holding the funds) of the default, in which event the Town shall be entitled to use the surety funds to bring the site into compliance with the stormwater management permit.

Acknowledged.

§ 227-8. Final reports.

Upon completion of the work and no later than 180 days after completion of construction, the permittee shall submit a report (including certified as-built construction plans) from a registered professional engineer (PE) certifying that the project has been completed in accordance with the conditions of the stormwater management permit and the plans approved thereunder. The as-built drawings must depict all on-site controls, both structural and nonstructural, designed to manage the stormwater associated with the completed site (post-construction stormwater management). Any discrepancies with the approved permit plans shall be noted in the cover letter submitted with the report and as-built plans.

Acknowledged.

§ 227-9. Certificate of completion.

The Board shall issue a letter certifying completion of a project following receipt and review of a final report and as-built plan showing that all work allowed under the permit has been satisfactorily completed in conformance with this bylaw and any regulations enacted hereunder.

Acknowledged.

§ 227-10. Severability.

The provisions of this bylaw are hereby declared to be severable. If any provision, paragraph, sentence, or clause of this bylaw or the application thereof to any person, establishment, or circumstances shall be held invalid, such invalidity shall not affect the other provisions or application of this bylaw.

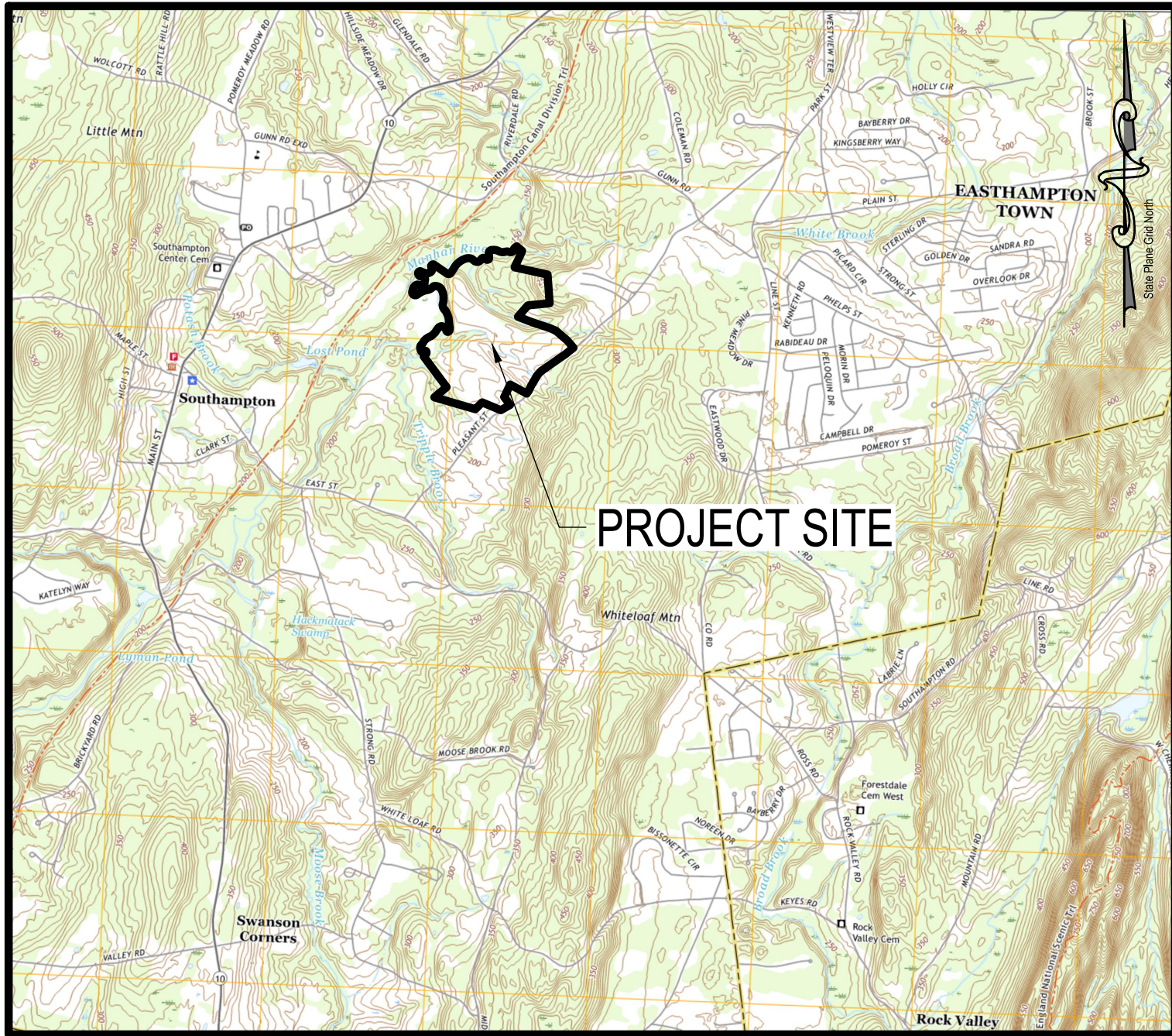
Acknowledged.

Appendix C: Project Plan Set

MANHAN RIVER, LLC

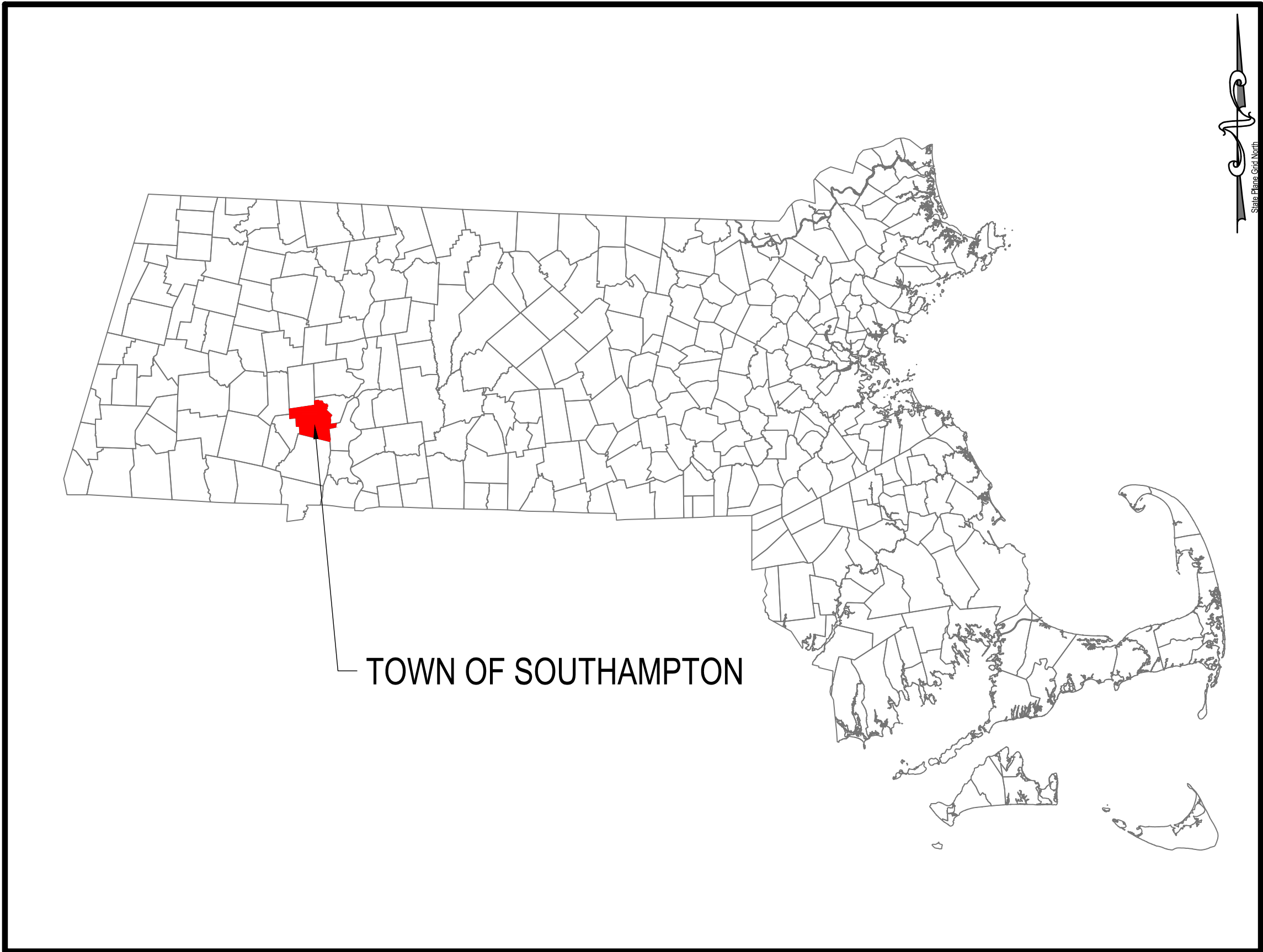
5.49 MW (DC) AGRIVOLTAIC SOLAR DEVELOPMENT & BATTERY ENERGY STORAGE SYSTEM (BESS) FACILITY

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073



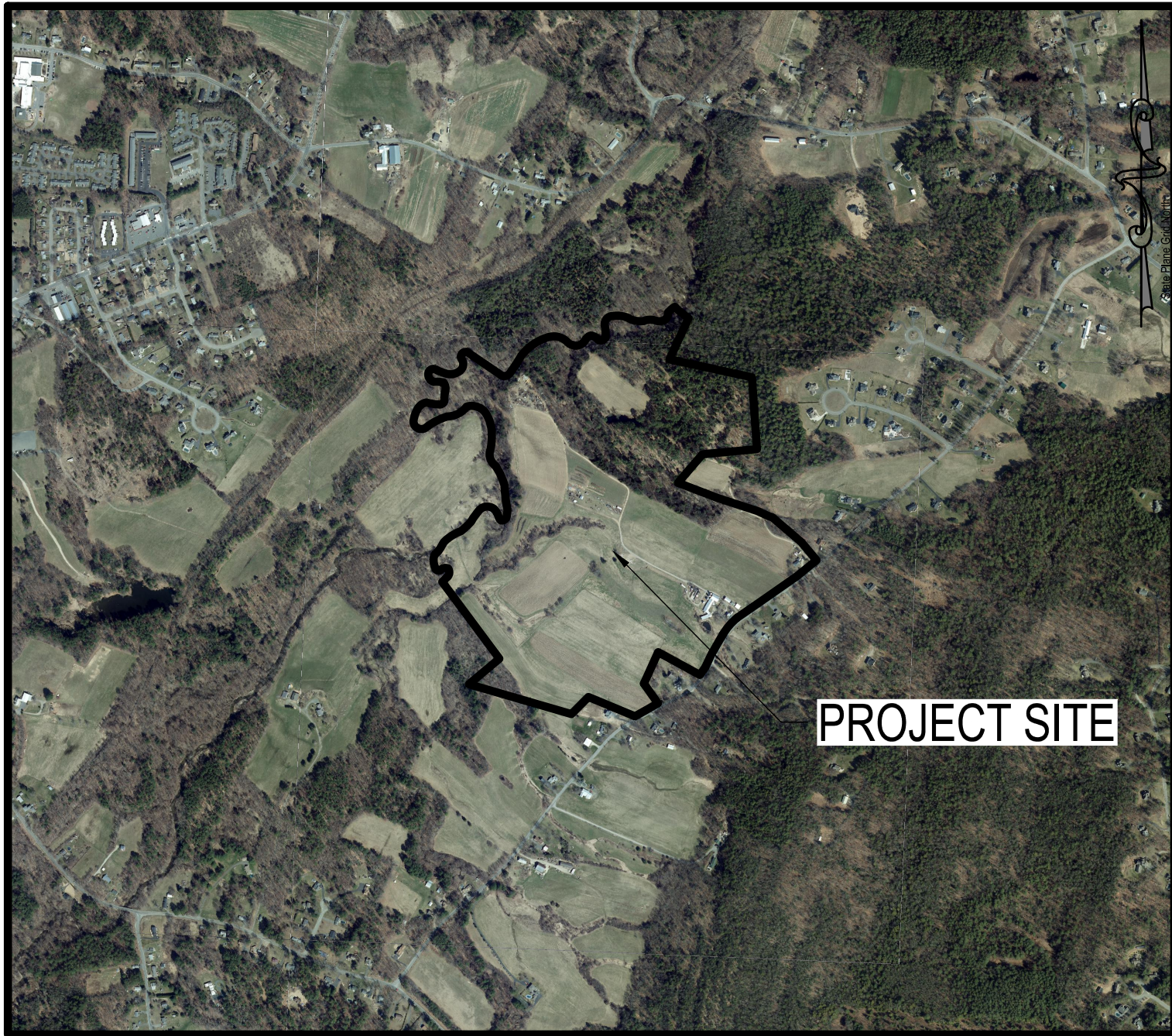
SITE LOCUS MAP

1" = 3,000'±



STATE MUNICIPAL MAP

NOT TO SCALE



SITE AERIAL MAP

1" = 1,200'

PLAN REFERENCES:

- BASE MAPPING AND EXISTING CONDITIONS DERIVED FROM A SURVEY ENTITLED "LIMITED ALTA/NSPS LAND TITLE SURVEY OF LAND IN SOUTHAMPTON, MA" FOR A PROPERTY LOCATED AT 43 AND 53 PLEASANT STREET DATED 9/25/2025 FROM NORTHEAST SURVEY CONSULTANTS.
- WETLAND AND WATER RESOURCE DATA DERIVED FROM WETLAND DELINEATIONS PERFORMED BY FLEETWOOD ENVIRONMENTAL SOLUTIONS, LLC ON JULY 17, 19, 25, AND 26, 2023, AND AN ADDITIONAL DELINEATION PERFORMED ON SEPTEMBER 18, 2025.

PROJECT CONTACT SUMMARY			
PROPERTY OWNER	ADDRESS	CONTACT	TELEPHONE
THE BASHISTA FAMILY IRREVOCABLE TRUST	61 PLEASANT STREET, SOUTHAMPTON MA 01073	STEPHEN E. BASHISTA	
DEVELOPER			
MANHAN RIVER, LLC	116 HUNTINGTON AVENUE, SUITE 601, BOSTON, MA 02116	AARON SIMMS	518.530.0803
CIVIL ENGINEER			
WESTON & SAMPSON ENGINEERS, INC.	55 WALKERS BROOK DRIVE, SUITE 100, READING, MA 01867	MELINDA R. COSTELLO, PE	978.532.1900
SURVEYOR			
NORTHEAST SURVEY CONSULTANTS, LLC	3 FERRY STREET, STUDIO 1, EAST, EASTHAMPTON MA 01027	BRIAN C. FRANETOVICH, PLS	413.203.5144
STRUCTURAL ENGINEER			
TBD	TBD	TBD	TBD
ELECTRICAL ENGINEER			
TBD	TBD	TBD	TBD
JURISDICTIONAL AUTHORITY			
SOUTHAMPTON PLANNING BOARD	210 COLLEGE HIGHWAY, TOWN HALL SUITE 7, SOUTHAMPTON MA 01073	RON LAURIN, ZONING OFFICER	413.535.6068

OWNER / PARCEL DATA	
LAND OWNER:	STEPHEN E. & RONALD S. BASHISTA
PARCEL ID:	25-20
PARCEL AREA:	4,829,358 SF, 110.87 ACRES
DEED REFERENCE:	BOOK 10517, PAGE 155
LAND OWNER:	BASHISTA FAMILY IRREVOCABLE TRUST
PARCEL ID:	24-23D
PARCEL AREA:	464,833 SF, 10.67 ACRES
DEED & PLAN REFERENCE:	BOOK 14467, PAGE 323 PLAN BOOK 76 PLAN 155 PLAN BOOK 88 PLAN 42 PLAN BOOK 241 PLAN 123

DRAWING INDEX	
DRAWING NO.	DRAWING TITLE
GENERAL	
G001	COVER SHEET
G002	GENERAL NOTES
SURVEY	
LIMITED ALTA NSPS LAND TITLE SURVEY OF LAND IN SOUTHAMPTON MA	
CIVIL	
NOTES AND SPECIFICATIONS	
C101	DEMOLITION AND SOIL EROSION AND SEDIMENTATION CONTROL PLAN
C102	OVERALL SITE PLAN
C103	SITE PLAN
C104	SITE PLAN
C105	SITE PLAN
C106	SITE PLAN
C501	SOIL EROSION AND SEDIMENTATION CONTROL DETAILS
C502	CIVIL DETAILS
C503	AGRICULTURAL DETAILS
C504	AGRICULTURAL DETAILS

ZONING ANALYSIS TABLE		
ZONING DISTRICT(S): RESIDENTIAL - RURAL		
OVERLAY DISTRICT(S): WATER SUPPLY PROTECTION OVERLAY DISTRICT		
ZONE CRITERIA	REQUIRED	PROVIDED
MINIMUM LOT AREA	60,000 SF	129 ± ACRES
MINIMUM LOT WIDTH	175 FEET	>175 FEET(4)
MINIMUM LOT DEPTH	150 FEET	>150 FEET(4)
MINIMUM FRONT SETBACK	50 FEET(3)	>60 FEET(5)
MINIMUM SIDE SETBACK	35 FEET	>35 FEET(6)
MINIMUM REAR SETBACK	50 FEET	>200 FEET(5)
MAXIMUM STRUCTURE HEIGHT	35 FEET	14 FEET
MAXIMUM HEIGHT SOLAR PANELS AND ASSOCIATED SUPPORT STRUCTURE	15 FEET	14 FEET(7)
MAXIMUM BUILDING COVERAGE	20%	< 1%
(1) Zoning regulation requirements as set forth in the Town of Southhampton, Massachusetts zoning by-laws, last revised May 7, 2024.		
(2) Lot area based on survey performed by Northeast Survey Consultants, 3 Ferry Street Studio 1 East, Easthampton, MA 01027 dated May 31, 2024.		
(3) No facilities are permitted between the front of the principal building and the front lot line, where no building is located on the lot the minimum front yard setback shall not be less than 50 feet.		
(4) The partial property survey base plan indicated the property conditions exceeded the minimum requirement for lot width and lot depth.		
(5) The proposed solar panels are outside the front yard and rear yard property lines.		
(6) Side yard setbacks measured at solar panel located at nearest side property line.		
(7) Solar panels will spend a majority of the time in a horizontal, not tracking position that is approximately ±10 feet in height.		
N/A - Not Applicable		
N/S - Not Specified		

PROJECT SUMMARY	
SYSTEM SIZE (MWDC, MWAC)	5.49 MW(DC); 4.98 MW(AC)
PANEL COUNT	9,464
PANEL SELECTION	TBD
RACKING TYPE	SINGLE AXIS TRACKER
GROUND COVERAGE RATIO	0.52
INTER-ROW SPACING (FT)	18
PITCH (FT)	26
PROPOSED PANEL HEIGHT (FT)	10 MIN
LIMIT OF WORK AREA (ACRES)	40.4
TREE CLEARING AREA (ACRES)	0
FENCED AREA (ACRES)	21.7
TOTAL IMPERVIOUS AREA (SQFT)	11,100 (EQUIPMENT AREAS)
TOTAL GRAVEL ROAD AREA (SQFT)	53,500
TOTAL GRAVEL ROAD LENGTH (FT)	2,510
UTILITY MV RUN LENGTH (FT)	TBD
EQUIPMENT PAD AREA (SQFT)	11,100
WETLAND IMPACTS (SQFT)	0
EXISTING LAND USE	AGRICULTURAL
PROPOSED DUAL USE	YES

Project:

MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON

Client:

BLUEWAVE

MANHAN RIVER, LLC

116 Huntington Ave, Suite 601
Boston, MA 02116
Tel. (617) 209-3122 https://www.bluewave.energy/

811

Know what's Below.
Call before you dig.

3	PEER REVIEW COMMENTS	05/29/26
2	PEER REVIEW COMMENTS	04/30/26
1	CONS COM / DEP COMMENTS	01/30/26
0	ISSUED FOR PERMITTING	11/25/25
No.	Description	Date

Revisions

Seal:

MELINDA COSTELLO
CIVIL
No. 52956
PROFESSIONAL ENGINEER

Issued For:

PERMITTING

Issued Date: 11/25/2025

Scale: AS NOTED

Drawn By: RJR/AKA

Reviewed By: NVG

Approved By: MRC

W&S Project No.: ENG24-0244

Drawing Title:

COVER SHEET

Sheet Number:

G001

NOT FOR CONSTRUCTION

1. THE CONTRACTOR SHALL CALL DIG SAFE AT 811 OR 1-888-DIG-SAFE AT LEAST 72 HOURS, SATURDAYS, SUNDAYS, AND HOLIDAYS EXCLUDED, PRIOR TO EXCAVATING AT ANY LOCATION. A COPY OF THE DIG SAFE PROJECT REFERENCE NUMBER(S) SHALL BE GIVEN TO THE OWNER PRIOR TO EXCAVATION.
2. LOCATIONS OF EXISTING PIPES, CONDUITS, UTILITIES, FOUNDATIONS AND OTHER UNDERGROUND OBJECTS ARE NOT WARRANTED TO BE CORRECT AND THE CONTRACTOR SHALL HAVE NO CLAIM ON THAT ACCOUNT SHOULD THEY BE OTHER THAN SHOWN.
3. STONE WALLS, FENCES, CURBS, ETC., SHALL BE REMOVED AND REPLACED AS NECESSARY TO PERFORM THE WORK. UNLESS OTHERWISE INDICATED, ALL SUCH WORK SHALL BE INCIDENTAL TO CONSTRUCTION OF THE PROJECT.
4. ALL AREAS DISTURBED BY THE CONTRACTOR BEYOND THE PROJECT AREA SHALL BE RESTORED AT THE CONTRACTOR'S EXPENSE.
5. NOTHING SHOWN OR OMITTED FROM THE DOCUMENTS PROVIDED SHALL RELIEVE THE CONTRACTOR FROM FULL COMPLIANCE WITH ALL APPLICABLE CODES, REGULATIONS, BYLAWS, AND ORDINANCES.
6. CONTRACTOR SHALL VERIFY EXISTING SITE CONDITIONS, INCLUDING TOPOGRAPHY, PRIOR TO CONSTRUCTION. ANY DISCREPANCIES BETWEEN SITE CONDITIONS AND THE DESIGN PLANS SHALL BE REPORTED TO THE ENGINEER UPON DISCOVERY.
7. ELECTRICAL DESIGN, INCLUDING UTILITY POLES, BY OTHERS, POINT OF INTERCONNECTION (POI) UTILITY POLE LINE UP SHOWN ON THE PLANS FOR REFERENCE ONLY. SEE ELECTRICAL PLANS BY OTHERS FOR FINAL LOCATION AND CONFIGURATION (POI) UTILITY POLES.
8. SOLAR ARRAY LAYOUT AND CAPACITY IS SUBJECT TO FINAL DESIGN (BY OTHERS) BUT WILL REMAIN WITHIN THE PROPOSED LIMITS OF WORK. PROPOSED FENCE MAY BE RELOCATED BEYOND THE LIMIT OF WORK PENDING FINAL DESIGN.
9. HE PROPOSED PROJECT SHALL COMPLY WITH THE MASSACHUSETTS DIVISION OF FISHERIES & WILDLIFE CONDITIONAL APPROVAL NHPSP NO. 24-18603 ISSUED ON JANUARY 21, 2026.

GEOSYNTHETICS:

1. GENERAL:
INSTALLATION OF GEOTEXTILE FABRICS SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND SPECIFIC LAYOUT PLANS AND DETAILS REFERRED BY ENGINEER.
1. WOVEN GEOTEXTILE:
THE WOVEN GEOTEXTILE SHALL BE TENCATE MIRAFI HP270 FABRIC, OR APPROVED EQUIVALENT. THE WOVEN GEOTEXTILE SHALL BE COMPOSED OF POLYPROPYLENE STABILIZED WITH CARBON BLACK TO RESIST ULTRAVIOLET DEGRADATION AND BE RESISTANT TO BIOLOGICAL AND CHEMICAL DEGRADATION DUE TO ALL NATURALLY OCCURRING ORGANISMS OR REAGENTS NORMALLY ENCOUNTERED IN NATURAL SOIL ENVIRONMENTS.
2. NON-WOVEN GEOTEXTILE:
THE NON-WOVEN GEOTEXTILE SHALL BE TENCATE MIRAFI 140N FABRIC, OR APPROVED EQUIVALENT. THE NONWOVEN FABRIC SHALL BE INERT TO BIOLOGICAL DEGRADATION AND RESIST NATURALLY ENCOUNTERED CHEMICALS, ALKALIS, AND ACIDS.

MODIFIED ROCK FILL SHALL MEET THE REQUIREMENTS LISTED IN MASSDOT SPECIFICATION M2.02.4.

U.S. STANDARD SIEVE	PERCENT PASSING
8 INCH	95-100
4 INCH	0-25
2 1/2 INCH	0-5

2. CRUSHED STONE:
2-3 INCH CRUSHED STONE SHALL BE USED FOR THE CONSTRUCTION ENTRANCE/EXIT AS SHOWN ON THE DRAWINGS, AND SHALL MEET THE REQUIREMENTS LISTED BELOW.

U.S. STANDARD SIEVE	PERCENT PASSING
4 INCH	95-100
3 INCH	0-25
2 INCH	0-5

3. GRAVEL BORROW:
GRAVEL BORROW SHALL SATISFY THE REQUIREMENTS LISTED IN MASSDOT SPECIFICATION M1.03.0-TYPE B GRAVEL BORROW.

U.S. STANDARD SIEVE	PERCENT PASSING
3 INCH	100
1/2 INCH	50-85
NO. 4	40-75
NO. 50	8-28
NO. 200	0-10
*3 INCH DIAMETER LARGEST DIMENSION	

4. LOAM:

4.1. LOAM SHALL SATISFY THE REQUIREMENTS LISTED IN MASSDOT SPECIFICATION M1.05.0: LOAM.

U.S. STANDARD SIEVE	PERCENT PASSING
NO. 10	85-100
NO. 40	35-85
NO. 200	10-35
<20 MICROMETER	<5

4.2. LOAM SHALL BE A NATURAL, FERTILE, FRIABLE SOIL, TYPICAL OF PRODUCTIVE SOILS IN THE VICINITY, OBTAINED FROM NATURALLY WELL-DRAINED AREAS, NEITHER EXCESSIVELY ACID NOR ALKALINE, AND CONTAINING NO SUBSTANCES HARMFUL TO GRASS GROWTH. LOAM SHALL NOT BE DELIVERED TO THE SITE IN FROZEN OR MUDDY CONDITION AND SHALL BE REASONABLY FREE OF STUMPS, ROOTS, HEAVY OR STIFF CLAY, STONES LARGER THAN 1-INCH IN DIAMETER, LUMPS, COARSE SAND, NOXIOUS WEEDS, STICKS, BRUSH OR OTHER LITTER.

4.3. LOAM SHALL CONTAIN NOT LESS THAN 4 PERCENT OR MORE THAN 10 PERCENT ORGANIC MATTER AS DETERMINED BY THE LOSS OF WEIGHT BY IGNITION OF OVEN-DRIED SAMPLES. TEST SAMPLES SHALL BE OVEN-DRIED TO A CONSTANT WEIGHT AT A TEMPERATURE OF 230 DEGREES F.

5. COMPACTED IMPERVIOUS MATERIAL:

5.1. SHALL SATISFY THE REQUIREMENTS LISTED IN MASSDOT SPECIFICATION M1.08.0: IMPERVIOUS SOIL BORROW WHICH REFERENCES THE SPECIFICATION UNDER AASHTO M 145. THE IMPERVIOUS SOILS SHALL HAVE THE PHYSICAL CHARACTERISTICS OF ONE OF THE FOLLOWING:

5.1.1. A-4, A-5, A-6, A-7 SOILS: OR

5.1.2. A-2 SOILS CONTAINING MORE THAN 20% BY WEIGHT PASSING THE NO. 200 SIEVE.

5.2. AASHTO SOIL CLASSIFICATION SYSTEM INFORMATION IS LISTED BELOW:

GROUP CLASSIFICATION	% PASSING NO. 200 SIEVE	USUAL TYPES OF SIGNIFICANT CONSTITUENT MATERIALS
A-2	35% OR LESS	SILTY OR CLAYEY GRAVEL AND SAND
A-4	36% MINIMUM	SILTY SOILS
A-5	36% MINIMUM	SILTY SOILS
A-6	36% MINIMUM	CLAYEY SOILS
A-7	36% MINIMUM	CLAYEY SOILS

5.3. MATERIAL SHALL BE THOROUGHLY COMPACTED AND SHALL BE FREE FROM DELETERIOUS, ORGANIC, ELASTIC OR FOREIGN MATTER.

1. EROSION CONTROL BLANKET
EROSION CONTROL BLANKET (ECB) SHALL BE NORTH AMERICAN GREEN, BIONET SC150BN OR APPROVED EQUAL. ECB SHALL BE INSTALLED USING STAPLE PATTERN C IN ACCORDANCE WITH THE INSTALLATION DETAIL INCLUDED ON SHEET C501.

1. GRANULAR BORROW:

EMBANKMENT FILL SHALL BE USED IN AREAS WHERE GRADE INCREASES ARE PROPOSED. FILL MATERIAL SHALL MEET THE REQUIREMENTS OF MASSDOT MATERIAL SPECIFICATION M1.1.01 ORDINARY BORROW WITH LESS THAN 15 PERCENT PASSING THE NO. 200 SIEVE.

ON-SITE GRANULAR SOILS FROM CUT AREAS CONTAINING LESS THAN 20 PERCENT FINES AND FREE OF ORGANICS, CONTAMINATION (INCLUDING METALS, VOCs, SVOCs, ETC.), AND OTHER DELETERIOUS MATERIALS MAY BE SUITABLE FOR USE AS EMBANKMENT FILL WITH PROPER MOISTURE CONDITIONS.

FILL MATERIALS SHALL BE PLACED IN MAXIMUM OF 12-INCH LOOSE LIFTS AND COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557 (MODIFIED PROCTOR) FOR THE SPECIFIC FILL MATERIAL.

1. HIGH DENSITY POLYETHYLENE (HDPE) CORRUGATED PIPE WITH SMOOTH INTERIOR AND MITERED EDGE MEETING AASHTO M252, TYPE C.

1. PRIOR TO BACKFILLING, THE CONTRACTOR SHALL COMPACT THE EXPOSED NATURAL SUBGRADE AS SPECIFIED HEREIN.
2. AFTER APPROVAL OF SUBGRADE BY THE ENGINEER, THE CONTRACTOR SHALL BACKFILL AREAS TO REQUIRED CONTOURS AND ELEVATIONS WITH SPECIFIED MATERIALS.
3. THE CONTRACTOR SHALL PLACE AND COMPACT MATERIALS IN CONTINUOUS HORIZONTAL LAYERS UNTIL FIRM. LIFT THICKNESS SHALL NOT EXCEED THE FOLLOWING THICKNESS:
 - 3.1. ACCESS ROADS - 6 INCHES
 - 3.2. EQUIPMENT PADS - 6 INCHES.
4. IF THE MATERIAL REMOVED FROM THE EXCAVATION IS SUITABLE FOR BACKFILL WITH THE EXCEPTION THAT IT CONTAINS STONES LARGER THAN PERMITTED, THE CONTRACTOR HAS THE OPTION TO REMOVE THE OVERSIZED STONES AND USE THE MATERIAL FOR BACKFILL OR TO PROVIDE REPLACEMENT BACKFILL AT NO ADDITIONAL COST TO THE OWNER.

1. CONSTRUCTION ACTIVITIES SHALL BE SCHEDULED TO MINIMIZE AREAS OF DISTURBED SOIL EXPOSED AT ONE TIME.
2. DUST SHALL BE CONTROLLED ON CONSTRUCTION ROUTES AND OTHER DISTURBED AREAS SUBJECT TO SURFACE DUST MOVEMENT AND DUST BLOWING.
3. MAINTAIN DUST CONTROL MEASURES PROPERLY THROUGH DRY WEATHER PERIODS UNTIL ALL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED.
4. DUST CONTROL METHODS SHALL INCLUDE VEGETATIVE COVER, MULCH (INCLUDING GRAVEL MULCH), WATER SPRINKLING, STONE, AND BARRIERS.

PRIOR TO THE DEVELOPMENT OF THE SITE, EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AS NOTED ON THE PLANS. SITE DEVELOPMENT SCHEDULING SHALL TAKE INTO CONSIDERATION THE GROWING SEASON, SUCH THAT BULK OF THE EARTHWORK IS NOT INITIATED DURING A PERIOD WHEN VEGETATIVE STABILIZATION CANNOT BE ACHIEVED WITHIN 14 DAYS OF COMPLETING THE EARTHWORK IN A GIVEN AREA. A TYPICAL SEQUENCE OF CONSTRUCTION IS:

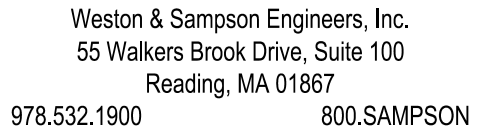
1. CONTRACTOR SHALL CONFIRM FLAGGING FOR WETLANDS, BUFFERS, STREAMS, AND/OR OTHER CRITICAL AREAS. IF FLAGGING IS NOT AVAILABLE CONTRACTOR OR CONTRACTOR'S REPRESENTATIVE SHALL FLAG WETLANDS, BUFFERS, STREAMS, AND/OR OTHER CRITICAL AREAS PRIOR TO STARTING ANY WORK ON SITE.
2. PRIOR TO STARTING ANY WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES AS SHOWN ON THE PLANS. THE CONTRACTOR SHALL OBTAIN ALL PERMITS, NOTIFY APPROPRIATE OFFICIALS OF CONSTRUCTION COMMENCEMENT, AND SUBMIT CONSTRUCTION TIMETABLE.
3. ON-SITE CONSTRUCTION SHALL START WITH THE MINIMUM AMOUNT OF CLEARING REQUIRED TO INSTALL EROSION AND SEDIMENTATION CONTROL MEASURES AS NOTED ON SHEET C101. THIS INCLUDES SILT FENCE AND CONSTRUCTION ENTRANCE/EXIT AND OTHER MEASURES NOTED ON THE PLAN. NO WORK SHALL TAKE PLACE UNTIL THE ENGINEER HAS INSPECTED AND APPROVED INSTALLED MEASURES.
4. REMOVE AND STOCKPILE TOPSOIL AS REQUIRED FOR PROPOSED GRADING ACTIVITY. STOCKPILED TOPSOIL SHALL BE SEEDDED AND MULCHED WHEN IT IS TO BE STORED MORE THAN 30 DAYS FROM DATE OF STOCKPIILING. STOCKPILES SHALL NOT BE PLACED WITHIN THE WETLAND BUFFER ZONE. SEE SHEET C501 FOR A TYPICAL TEMPORARY STOCKPILE DETAIL. CONTRACTOR TO COORDINATE STOCKPILE LOCATION WITH OWNER.
5. CONSTRUCT GRAVEL ACCESS ROADS AND TEMPORARY CONSTRUCTION BMPs. INSTALL ADDITIONAL EROSION AND SEDIMENTATION CONTROL MEASURES AS REQUIRED TO PREVENT EROSION OF GRAVEL SURFACE AND STORMWATER MANAGEMENT FEATURES.
6. REMOVE AND STOCKPILE TOPSOIL IN AREAS OF PROPOSED GRADING TO ACHIEVE REQUIRED RACKING SYSTEM SLOPES. LOAM AND SEED DISTURBED AREAS WITH TEMPORARY SEEDING AND INSTALL INTERMEDIATE EROSION CONTROL MEASURES PARALLEL TO THE SLOPES IMMEDIATELY FOLLOWING COMPLETION OF GRADING.
7. IN AREAS OF PROPOSED GRADING WHERE SEEDING HAS TAKEN PLACE, ALLOW FOR ADEQUATE GROWTH TO ESTABLISH DENSE VEGETATION PRIOR TO SOLAR ARRAY CONSTRUCTION TO LIMIT RISK OF EROSION.
8. PROCEED WITH SOLAR PHOTOVOLTAIC (PV) SYSTEM INSTALLATION/CONSTRUCTION WORK.
9. REMOVE ALL TEMPORARY GRAVEL AREAS, REPAIR ALL DISTURBED AREAS, AND REAPPLY LOAM WHERE NECESSARY. INTER-ROW AREAS SHALL BE DECOMPACTED TO A DEPTH OF 12" WHILE ENSURING PROTECTION OF BURIED CONDUIT. REMOVE ANY ROWS >2' TURNED UP DURING DECOMPACTION.
10. SEED ALL AREAS WITH PERMANENT SEED MIX AND STABILIZE SLOPES IN ACCORDANCE WITH THE CONSTRUCTION SITE PLAN DRAWINGS EROSION AND SEDIMENTATION CONTROL PLAN.
11. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL NOT BE REMOVED UNTIL AFTER THE SITE IS STABILIZED IN ACCORDANCE WITH THE SWPPP.

GROUP CLASSIFICATION	% PASSING NO. 200 SIEVE	USUAL TYPES OF SIGNIFICANT CONSTITUENT MATERIALS
A-2	35% OR LESS	SILT/CLAY OR CLAYEY GRAVEL AND SAND
A-4	36% MINIMUM	SILTY SOILS
A-5	36% MINIMUM	SILTY SOILS
A-6	36% MINIMUM	CLAYEY SOILS
A-7	36% MINIMUM	CLAYEY SOILS

5.3. MATERIAL SHALL BE THOROUGHLY COMPACTED AND SHALL BE FREE FROM DELETRIOUS, ORGANIC, ELASTIC OR FOREIGN MATTER.

Project: MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON,
MASSACHUSETTS 01073



Client



116 Huntington Ave, Suite 601
Boston, MA 02116
tel. (617) 209-3122 <https://www.bluewave.energy/>



3	PEER REVIEW COMMENTS	05/29/26	
2	PEER REVIEW COMMENTS	04/30/26	
1	CONS COM / DEP COMMENTS	01/30/26	
0	ISSUED FOR PERMITTING	11/25/25	
No.	Description	Date	
Revisions			
Seal:			
			
Issued For:			
PERMITTING			
Issued Date:		11/25/2025	
Scale:		N/A	
Drawn By:		RJR/AKA	
Reviewed By:		NVG	
Approved By:		MRC	
W&S Project No.:		ENG24-0244	

Drawing Title:

GENERAL NOTES

Sheet Number:

G002

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NOT FOR CONSTRUCTION

The following encumbrances were taken from a title commitment prepared by Fidelity National Title Insurance Company, file #24-2451, commitment date 4/9/2025.

1. Rights or claims of parties in possession not recorded in the public records. **(not a survey matter)**
2. Easements or claims of easements not recorded in the public records. **(not a survey matter)**
3. Any lien, or right to a lien, for services, labor, or material heretofore or hereafter furnished, imposed by law and not shown by the public records. **(not a survey matter)**
4. Unrecorded easements, discrepancies or conflicts in boundary lines, shortage in area and encroachments, which an accurate and complete survey would disclose. **(see Significant Observations for any such matters found by this survey)**
5. All municipal liens for real estate taxes and assessments which are due and payable as of the date hereof and such as become due and payable heretofore. **(not a survey matter)**
6. Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the public records not attaching subsequent to the effective date of the commitment and until the date that the proposed insured acquires record title, for value, of the estate or interest or mortgage thereon covered by this commitment. **(not a survey matter)**
7. Title and rights of the public and others entitled hereto in and to those portions of the insured premises lying within the bounds of Pleasant Street. **(sidelines of Pleasant Street are plotted)**
8. INTENTIONALLY DELETED.
9. Land Tax Lien issued by the Town of Southampton recorded at Book 1940, Page 186. **(not a survey matter)**
10. Land Tax Lien issued by the Town of Southampton recorded at Book 1940, Page 187. **(not a survey matter)**
11. Land Tax Lien issued by the Town of Southampton recorded at Book 2006, Page 144. **(not a survey matter)**
12. Land Tax Lien issued by the Town of Southampton recorded at Book 2006, Page 145. **(not a survey matter)**
13. Land Tax Lien issued by the Town of Southampton recorded at Book 2085, Page 277. **(not a survey matter)**
14. Land Tax Lien issued by the Town of Southampton recorded at Book 2085, Page 278. **(not a survey matter)**
15. Land Tax Lien issued by the Town of Southampton recorded at Book 12875, Page 279. **(not a survey matter)**
16. Terms and provisions of a lease between Marianne C. Bashista, Trustee of the Bashista Family Irrevocable Trust as Lessor and Southampton River, LLC as Tenant as evidenced by Notice of Lease and Easements recorded in Book 215369, Page 1. **(not plottable due to vague description; covers all of locus parcel 24-23D & a portion of locus parcel 24-23B)**

- The following exceptions were taken from a title commitment prepared by Fidelity National Title Insurance Company, file #24-2452, commitment date 4/11/2025.
1. Rights or claims of parties in possession not recorded in the public records. **(not a survey matter)**
2. Easements or claims of easements not recorded in the public records. **(not a survey matter)**
3. Any lien, or right to a lien, for services, labor, or material heretofore or hereafter furnished imposed by law and not shown by the public records. **(not a survey matter)**
4. Unrecorded easements, discrepancies or conflicts in boundary lines, shortage in area and encroachments, which an accurate and complete survey would disclose. **(see Significant Observations for any such matters disclosed by this survey)**
5. All municipal liens for real estate taxes and assessments which are due and payable as of the date hereof and such as become due and payable hereafter. **(not a survey matter)**
6. Title to and rights of the public and others entitled thereto in and to the portions of the insured premises lying within the bounds of adjacent streets, roads, and ways. **(adjacent streets, roads, and ways are plotted)**
7. Defects, liens, encumbrances, adverse claims or other matters, if any, created, first appearing in the public records or attaching subsequent to the effective date of the commitment and until the date that the proposed insured acquires record title, for value, of the estate or interest or mortgage thereon covered by this commitment. **(not a survey matter)**
8. Flowage rights of the public set forth in Deed from Daisy Brown to Edward Bashista and Stella Bashista recorded in Book 940, Page 296. **(not plottable due to vague description; may impact locus parcel 25-20)**
9. Rights of other to use a right of way as set forth in Deed from Clyde C. Connor and Avis B. Connor to Edward Bashista and Stella Bashista recorded in Book 989, Page 253. **(not plottable due to vague description; may be non-locus)**
10. Grant of water-pipe rights set forth in Easement from Clyde C. Connor and Avis B. Connor recorded in Book 905, Page 12. **(not plottable due to vague description; location of spring and water pipe are not known; may impact locus parcel 25-20)**
11. Agricultural or Horticultural Land Tax Lien issued by the Town of Southampton Board of Assessors recorded in Book 1940, Page 186. **(not a survey matter)**
12. Agricultural or Horticultural Land Tax Lien issued by the Town of Southampton Board of Assessors recorded in Book 1940, Page 187. **(not a survey matter)**
13. Agricultural or Horticultural Land Tax Lien issued by the Town of Southampton Board of Assessors recorded in Book 2006, Page 144. **(not a survey matter)**
14. Agricultural or Horticultural Land Tax Lien issued by the Town of Southampton Board of Assessors recorded in Book 2006, Page 145. **(not a survey matter)**
15. Agricultural or Horticultural Land Tax Lien issued by the Town of Southampton Board of Assessors recorded in Book 2085, Page 277. **(not a survey matter)**
16. Agricultural or Horticultural Land Tax Lien issued by the Town of Southampton Board of Assessors recorded in Book 2085, Page 278. **(not a survey matter)**
17. License No. 907 Granted to Stephen Bashista by the Commonwealth of Massachusetts, Department of Environmental Quality Engineering recorded in Book 2299, Page 1. **(not a survey matter)**
18. Notices and provisions of a lease between Stephen E. Bashista and Ronald E. Bashista of Landford and Manhan River, LLC as Tenant as evidenced by Term, Lease and Easements recorded in Book 15369, Page 11. **(not plottable due to vague description; covers a portion of locus parcel 25-20)**
19. Declaration of Homestead filed by Stephen Bashista recorded in Book 4421, Page 46, as subordinated to the lease to be insured by Subordination of Declaration of Homestead recorded in Book 6181, Page 312. **(not a survey matter)**
- The following documents are of record and are listed for informational purposes:
 - Order of Conditions issued by the Town of Southampton Conservation Commission recorded in Book 2302, Page 212, as affected by Certificate of Compliance recorded in Book , Page . **(not a survey matter)**
21. Decision issued by the Town of Southampton Zoning Board of Appeals recorded in Book 11684, Page 173. **(not a survey matter)**

None found.

CERTIFICATION:

To: Fidelity National Title Insurance Company

This is to certify that this map or plat and the survey on which it is based were made in accordance with the 2021 Minimum Standard Detail Requirements for ALTA/NSPS Land Title Surveys, jointly established and adopted by ALTA and NSPS, and includes items 2, 3, 4, 5, 6, 6a, 6b, 7a, 7b1, 8, 11a, 13, 14, 16 & 17 of Table A thereof. The fieldwork was completed on 11/13/2024. Wetflags W2-121 to 128 were located 9/23/2025.

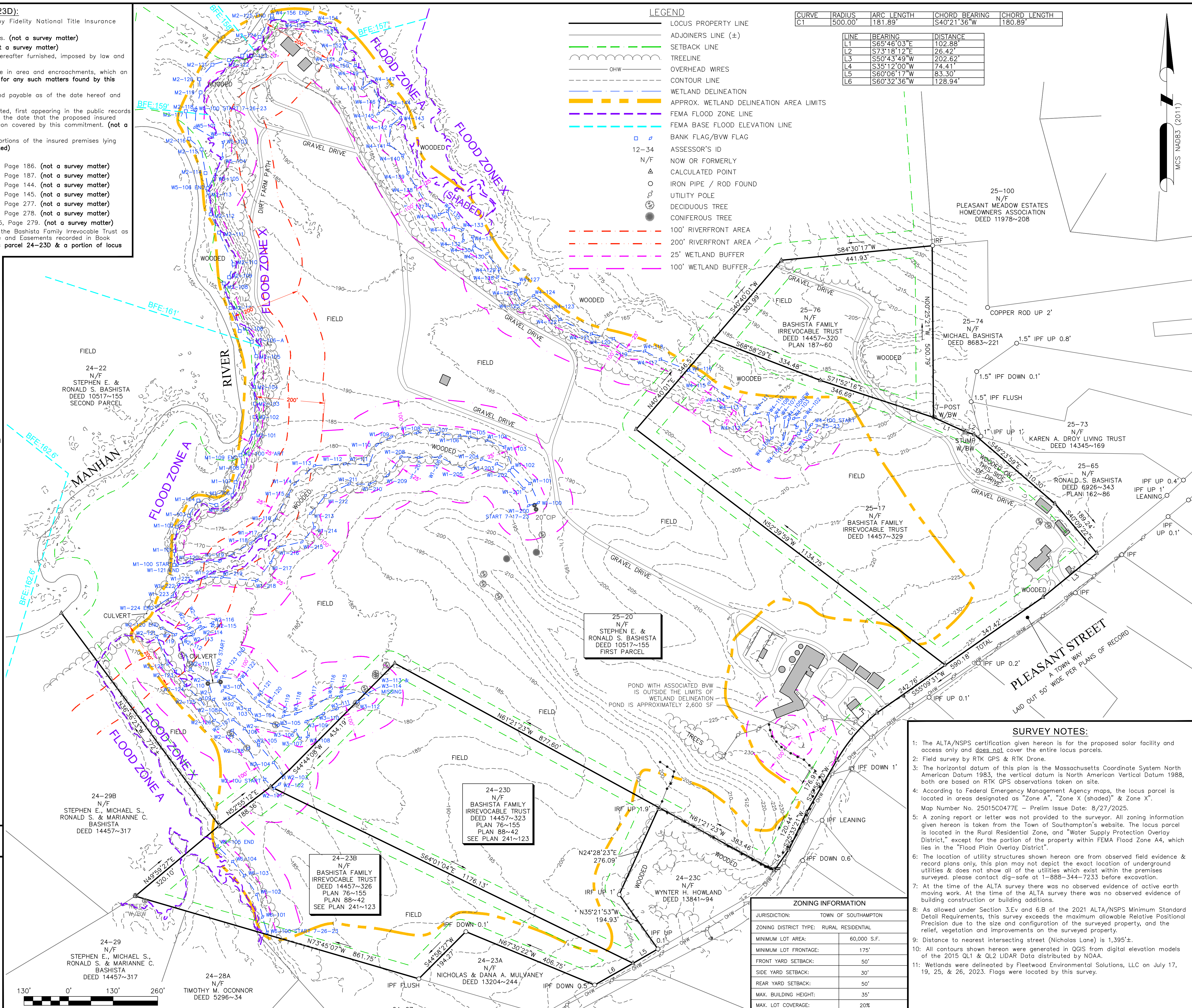
5-29-2026

Date of map or plat

Brian C. Frantovich PLS #54258
brian@northstar-survey.com

	LOCUS PROPERTY LINE	
	ADJOINERS LINE (±)	
	SETBACK LINE	
	TREELINE	
	OVERHEAD WIRES	
	CONTOUR LINE	
	WETLAND DELINEATION	
	APPROX. WETLAND DELINEATION AREA LIMITS	
	FEMA FLOOD ZONE LINE	
	FEMA BASE FLOOD ELEVATION LINE	
	BANK FLAG/BVW FLAG	
12-34	ASSESSOR'S ID	
N/F	NOW OR FORMERLY	
	CALCULATED POINT	
	IRON PIPE / ROD FOUND	
	UTILITY POLE	
	DECIDUOUS TREE	
	CONIFEROUS TREE	
	100' RIVERFRONT AREA	
	200' RIVERFRONT AREA	
	25' WETLAND BUFFER	
	100' WETLAND BUFFER	

CURVE	RADIUS	ARC LENGTH	CHORD BEARING	CHORD LENGTH
C1	500.00'	181.89'	S40°21'36" W	180.89'
L1	BEARING	DISTANCE		
L2	S65°46'03" E	102.88'		
L3	S73°18'12" E	26.42'		
L4	S50°43'49" W	202.62'		
L5	S35°12'00" W	74.41'		
L6	S60°06'17" W	83.30'		
L7	S60°32'36" W	128.94'		



- 1: The ALTA/NSPS certification given herein is for the proposed solar facility and access only and does not cover the entire locus parcels.
- 2: Field survey by RTK GPS & RTK Drone.
- 3: The horizontal datum of this plan is the Massachusetts Coordinate System North American Datum 1983, the vertical datum is North American Vertical Datum 1988, both are based on RTK GPS observations taken on site.
- 4: According to Federal Emergency Management Agency maps, the locus parcel is located in areas designated as "Zone A", "Zone X (shaded)" & "Zone X".
Map Number No. 2501SC0477E – Prelim Issue Date: 8/27/2025.
- 5: A zoning report or letter was not provided to the surveyor. All zoning information given herein is taken from the Town of Southampton's website. The locus parcel is located in the Rural Residential Zone, and "Water Supply Protection Overlay District," except for the portion of the property within FEMA Flood Zone A4, which lies in the "Flood Plain Overlay District".
- 6: The location of utility structures shown herein are from observed field evidence & records only. The surveyor did not inspect the exact location of underground utilities & does not show all of the utilities which exist within the premises surveyed, please contact dig-safe at 1-888-344-7233 before excavation.
- 7: At the time of the ALTA survey there was no observed evidence of active earth moving work. At the time of the ALTA survey there was no observed evidence of building construction or building additions.
- 8: As allowed under Section 3.E.v and 6.B of the 2021 ALTA/NSPS Minimum Standards and Requirements, this survey exceeds the maximum allowable Relative Positional Precision due to the size and combination of the surveyed property, and the relief, vegetation and improvements on the surveyed property.
- 9: Distance to nearest intersecting street (Nicholas Lane) is 1,395'±.
- 10: All contours shown herein were generated in QGIS from digital elevation models of the 2015 QL1 & QL2 UDAR Data distributed by NOAA.
- 11: Wetlands were delineated by Fleetwood Environmental Solutions, LLC on July 17, 19, 25, & 26, 2023. Flags were located by this survey,

JURISDICTION:	TOWN OF SOUTHAMPTON
ZONING DISTRICT TYPE:	RURAL RESIDENTIAL
MINIMUM LOT AREA:	60,000 S.F.
MINIMUM LOT FRONTAGE:	175'
FRONT YARD SETBACK:	50'
SIDE YARD SETBACK:	30'
REAR YARD SETBACK:	50'
MAX. BUILDING HEIGHT:	35'
MAX. LOT COVERAGE:	20%

FROST PROTECTION AND SNOW REMOVAL:

1. THE CONTRACTOR SHALL, AT ITS OWN EXPENSE, KEEP EARTHWORK OPERATIONS CLEAR AND FREE OF ACCUMULATIONS OF SNOW AS REQUIRED TO CARRY OUT THE WORK.
2. THE CONTRACTOR SHALL PROTECT THE SUBGRADE BENEATH NEW STRUCTURES AND PIPES FROM FROST PENETRATION WHEN FREEZING TEMPERATURES ARE EXPECTED.

SOIL STABILIZATION NOTES:

1. THE MAXIMUM ALLOWABLE SLOPE IS 3:1. ALL 3:1 SLOPES SHALL BE STABILIZED WITH A TEMPORARY BIODEGRADABLE EROSION CONTROL BLANKET (SEE SHEET C501).
2. ALL DISTURBED AREAS SHALL HAVE LOAM AND SEED AND STABILIZED WITH GRASS COVER (SEE SHEET C501).
3. IF SUFFICIENT STABILIZATION CANNOT BE ACCOMPLISHED AFTER SEEDING, AT THE CONTRACTOR'S SOLE EXPENSE, SHALL BE RESPONSIBLE FOR ADDING THE NECESSARY SOIL AMENDMENTS AND/OR LOAM UNTIL STABILIZATION IS ACHIEVED IN ACCORDANCE WITH THE REQUIREMENTS OF THE PROJECT STORMWATER POLLUTION PREVENTION PLAN (SWPPP).

GENERAL MAINTENANCE PLAN (DURING CONSTRUCTION):

1. ALL EROSION AND SEDIMENTATION CONTROL PRACTICES SHALL BE INSPECTED AT LEAST ONCE EVERY 7 CALENDAR DAYS, OR EVERY 14 CALENDAR DAYS AND WITHIN 24 HOURS OF THE END OF A STORM EVENT OF 0.25 INCHES OR GREATER, IN ACCORDANCE WITH THE SWPPP.
2. IN THE EVENT WORK IS HALTED, ON SITE INSPECTIONS SHALL CONTINUE AT A REGULAR SCHEDULE, UNLESS TEMPORARY STABILIZATION IS ACHIEVED AND ALL BARE AREAS AND STOCKPILES HAVE INSTALLED STABILIZATION MEASURES.
3. IF CONSTRUCTION ACTIVITIES ARE ENTIRELY SUSPENDED DUE TO FROZEN CONDITIONS, INSPECTIONS MAY BE TEMPORARILY SUSPENDED ONSITE UNTIL THAWING CONDITIONS OCCUR AS LONG AS DISCHARGES ARE UNLIKELY TO OCCUR DUE TO FROZEN CONDITIONS THAT ARE LIKELY TO CONTINUE FOR THREE (3) MONTHS BASED ON HISTORIC DATA. LAND DISTURBANCES HAVE BEEN HALTED, AND ALL DISTURBED AREAS HAVE BEEN ADEQUATELY STABILIZED.
4. IF CONSTRUCTION ACTIVITIES CONTINUE DURING FROZEN CONDITIONS, INSPECTION FREQUENCY MAY BE REDUCED TO MONTHLY INSPECTIONS IF DISCHARGES ARE UNLIKELY TO OCCUR DUE TO FROZEN CONDITIONS THAT ARE LIKELY TO CONTINUE FOR THREE (3) MONTHS BASED ON HISTORIC DATA AND DISTURBED AREAS HAVE BEEN ADEQUATELY STABILIZED EXCEPT FOR AREAS IN WHICH ACTIVE CONSTRUCTION IS TAKING PLACE.
5. ACCUMULATED SEDIMENT SHALL BE REMOVED FROM BEHIND SEDIMENT BARRIERS WHEN IT BECOMES 4 INCHES DEEP OR WHEN ACCUMULATIONS HAVE ADVERSELY AFFECTED ITS FUNCTION. SEDIMENT BARRIERS SHALL BE REPAIRED BY REMOVING SILT AND SEDIMENTS AND THEN TAMPING LOOSE SOIL ALONG BASE, REPLACING DAMAGED OR WEAKENED POSTS AND STAKES, OR AS NECESSARY TO MAINTAIN A BARRIER.
6. ALL DISTURBED AREAS SHALL BE STABILIZED PER THESE SPECIFICATIONS TO MAINTAIN VIGOROUS, DENSE VEGETATION. REPAIR ANY ERODED SLOPES, REAPPLY TOPSOIL, RESEED AND STABILIZE REPAIR AREA AS REQUIRED FOR PERMANENT OR TEMPORARY MEANS. REPAIR SOIL AREAS DAMAGED BY EROSION OR CONSTRUCTION EQUIPMENT.
7. IMMEDIATELY REPAIR ANY DAMAGE CAUSED BY CONSTRUCTION EQUIPMENT, MAINTENANCE OR OTHER ACTIVITY TO ANY EROSION AND SEDIMENTATION CONTROL MEASURE, OR BEST MANAGEMENT PRACTICE (BMP) OR DEVICE.
8. THE PRIME CONTRACTOR IS RESPONSIBLE FOR THE PERFORMANCE AND COMPLIANCE OF ITS SUBCONTRACTOR'S ACTIVITIES RELATING TO THE SWPPP. THEY SHALL MAKE FREQUENT INSPECTIONS OF THEIR WORK AND COORDINATE APPROPRIATE INSTALLATION AND MAINTENANCE OF EROSION AND SEDIMENTATION CONTROL AND WATER QUALITY DEVICES.
9. EMPLOY POLLUTION PREVENTION MEASURES TO CONTROL LITTER, DESTRUCTION CHEMICALS, SEDIMENT, AND CONSTRUCTION DEBRIS INCLUDING, BUT NOT LIMITED TO THE FOLLOWING: SALVAGE AND REUSE OF MATERIALS, MINIMIZING PACKAGING WASTE, RECYCLING, PROPER DISPOSAL AT FREQUENT INTERVALS IN ACCORDANCE WITH PREVAILING LAWS, ONSITE INSTRUCTION REGARDING APPROPRIATE SEPARATION/HANDLING/RECYCLING, PROPER MAINTENANCE OF SEDIMENT EROSION CONTROL SYSTEMS, ROUTINE AND EVENT RELATED INSPECTIONS OF DRAINAGE AND BMP SYSTEMS PER PERMIT REQUIREMENTS, PROVIDE APPROPRIATE SANITARY FACILITIES FOR ONSITE PERSONNEL, PICK UP TRASH AND DEBRIS FREQUENTLY AND USE WATER MIST, CALCIUM CHLORIDE, OR OTHER LEGAL MEANS TO LIMIT THE SPREAD OF DUST AND SOIL PARTICLES.
10. TRUCKS NEED TO BE WASHED OUT.

GENERAL SWPPP NOTES:

1. THE FOLLOWING NOTES ARE PROVIDED AS A SUMMARY REFERENCE FOR THE CONTRACTOR ONLY. THE REQUIREMENTS IN THE FULL SWPPP FOR THE PROJECT SHALL BE FOLLOWED BY THE CONTRACTOR. IN THE EVENT OF A CONFLICT BETWEEN THE DRAWINGS AND THE SWPPP, THE ENGINEER SHALL DETERMINE THE CORRECT REQUIREMENTS.
2. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE PERFORMED IN ACCORDANCE WITH THE MASSACHUSETTS EROSION AND SEDIMENTATION CONTROL GUIDELINES. THE CONTRACTOR SHALL OWN AND MAINTAIN A COPY OF THE GUIDELINES ON-SITE DURING CONSTRUCTION.
3. ALL DISTURBED AREAS SHALL BE KEPT TO A MINIMUM. FINAL GRADING AND RESTORATION SHALL BE ACCOMPLISHED AS SOON AS PRACTICAL.
4. EROSION AND SEDIMENTATION CONTROL STRUCTURES SHALL BE INSTALLED PRIOR TO SITE WORK.
5. SHOULD TRUCKS NEED TO BE WASHED OUT ONSITE, A CONCRETE WASHOUT BASIN SHALL BE INSTALLED. OTHERWISE TRUCKS MUST BE WASHED OUT OFFSITE.
6. ALL CONTROL STRUCTURES SHALL BE MAINTAINED THROUGHOUT CONSTRUCTION AND REMOVED WHEN STABILIZATION HAS BEEN ATTAINED. IF THE PROPOSED CONTROL MEASURES ARE NOT SATISFACTORY TO THE ENGINEER, ADDITIONAL CONTROL MEASURES SHALL BE TAKEN.
7. ALL RUNOFF FROM THE DISTURBED AREA SHALL BE CONTROLLED AND FILTERED. EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED AS SHOWN ON THE DRAWINGS.
8. CONTRACTOR IS RESPONSIBLE FOR OBTAINING NPDES CONSTRUCTION GENERAL PERMIT FOR THE PROPOSED PROJECT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE IMPLEMENTATION AND COMPLIANCE WITH THE APPROVED NPDES NOTICE OF INTENT (NOI) AND STORMWATER POLLUTION PREVENTION PLAN (SWPPP).
9. THE CONTRACTOR MUST OBTAIN COPIES OF SITE SPECIFIC PERMITS PRIOR TO THE START OF WORK.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTATION OF EROSION AND SEDIMENTATION CONTROL MEASURES. THIS RESPONSIBILITY INCLUDES THE ACQUISITION OF MATERIALS, INSTALLATION, AND MAINTENANCE OF EROSION AND SEDIMENTATION STRUCTURES, THE COMMUNICATION AND DETAILED EXPLANATION TO ALL PEOPLE INVOLVED IN THE SITE WORK OF THE REQUIREMENTS AND OBJECTIVE OF THE EROSION AND SEDIMENTATION CONTROL MEASURES.
11. TWO (2) WEEKS PRIOR TO THE START OF WORK, THE CONTRACTOR SHALL PROVIDE THE NAME AND PHONE NUMBER OF THE INDIVIDUAL RESPONSIBLE FOR IMPLEMENTATION OF THE EROSION & SEDIMENTATION CONTROL PLAN TO THE ENGINEER.
12. THE ENGINEER SHALL BE NOTIFIED OF ANY PROPOSED ALTERATION TO THE EROSION AND SEDIMENTATION CONTROL PLAN, PRIOR TO ALTERING, IN ORDER TO ENSURE THE FEASIBILITY OF THE ADDITION, SUBTRACTION, OR CHANGE IN THE PLAN.

SEEDING NOTES:

1. THE SITE IS AN ACTIVELY MANAGED AGRICULTURAL FIELD AND IS INTENDED TO CONTINUE AS THE SAME USE AFTER CONSTRUCTION. SWPPP PRACTICES SHALL PRIORITIZE PROTECTION OF EXISTING VEGETATION, MINIMIZING COMPACTION, AND REPLANTING TO MATCH EXISTING VEGETATION.
2. NO SEEDING OR SOIL PREPARATION SHALL BE DONE IF SOILS ARE MUDDY, DRY, AND/OR COMPACTED. BARE SOILS SHALL BE RAKED TO REMOVE SOIL CLOUDS, LUMPS, BRUSH, ROOTS, STUMP, LITTER AND OTHER FOREIGN MATTER. RUTS AND DEPRESSIONS SHALL BE FILLED WITH ADDITIONAL LOAM AND/OR COMPOST AND THE SOIL SHALL BE RE-GRADED TO A RELATIVELY SMOOTH FINISH CORRESPONDING TO THE REQUIRED GRADES.
3. ALL DISTURBED AREAS OUTSIDE OF PV DEVELOPMENT AREAS SHALL BE RESTORED WITH A VEGETATIVE STABILIZATION MATERIAL (GRASS).
4. THE SOIL SHALL BE ADJUSTED TO A PH OF 5.70 OR HIGHER. THIS CAN BE DONE BY USING THE APPROPRIATE AMOUNT OF GROUND LIMESTONE OR FERTILIZER, AS REQUIRED BY A SOIL TEST. IF A TEST IS NOT PERFORMED, THE AREA SHALL BE FERTILIZED WITH 10-10-10 U.F. OR EQUAL AT A RATE OF 300 POUNDS PER ACRE (11 POUNDS PER 1000 SQUARE FEET). THE LIME OR FERTILIZER SHALL BE WORKED INTO THE SOIL A MINIMUM OF 4 INCHES AND UNIFORMLY BLENDED.
5. AT SLOPES EXCEEDING 33% GRADE, AND IN AREAS DEPICTED WITHIN THE PLANS, SEEDING SHALL BE APPLIED IMMEDIATELY FOLLOWED BY THE INSTALLATION OF THE EROSION CONTROL BLANKET SPECIFIED ON SHEET G002 OR APPLIED VIA HYDROSEED WITH TACIFIER THAT MUST BE EITHER PLANT-BASED OR LIQUID OR DRY POLYMERIC EMULSION BLEND. TO BE APPROVED BY OWNERS ENGINEER PRIOR TO APPLICATION.

6. AT SLOPES EXCEEDING 25% GRADE, SEEDING SHALL OCCUR WITHIN 72 HOURS OF LOAM PLACEMENT TO PREVENT LOSS OF TOPSOIL.
7. ALL DISTURBED AREAS WITHIN THE PHOTOVOLTAIC DEVELOPMENT AREA SHALL BE SEEDED EITHER BY HAND, CYCLONE SEEDER, OR A CULTIPACKER TYPE SEEDER IN ACCORDANCE WITH THE FOLLOWING METHODS.
8. THE LIMING, FERTILIZING, AND SEEDING TO BE ACCOMPLISHED UNDER THIS SECTION SHALL BE DONE DURING A PERIOD OF TIME TO BE APPROVED BY THE ENGINEER OR LANDSCAPE ARCHITECT. CONTRACTOR SHALL NOTIFY THE ENGINEER OR ARCHITECT 30 DAYS PRIOR TO THE TIME THAT HE/SHE INTENDS TO BEGIN THIS WORK.
9. HEAVILY SCARIFYING THE EXISTING TURF GRASS AND OVER SEEDING WITH ADDITIONAL SEED MIX MAY BE NECESSARY IN SOME AREAS.
10. WHERE GRADING IS PROPOSED (AS DEPICTED ON THE GRADING PLANS), AREAS OF BARE SOIL SHALL RECEIVE 4-INCHES OF LOAM PRIOR TO SEEDING. THE EXISTING VEGETATION SHALL BE TOP DRESSED WITH 1 OR 2-INCHES OF LOAM BEFORE SEED IS APPLIED.
11. AFTER ALL SURFACES TO BE SEEDED HAVE BEEN BROUGHT TO FINISHED GRADE, THE CONTRACTOR SHALL FURNISH AND APPLY LIMESTONE AS HEREIN SPECIFIED.
12. LIMESTONE SHALL BE APPLIED AS DETERMINED BY THE RESULTS OF LABORATORY TESTING CONDUCTED BY AN APPROVED TESTING LABORATORY, OR AT A RATE UP TO A MAXIMUM OF 100 POUNDS PER 1000 SQUARE FEET.
13. IT IS RECOMMENDED THAT THE CONTRACTOR COLLECT TOPSOIL SAMPLES FOR LABORATORY ANALYSIS. A MINIMUM OF 4 SUB-SAMPLES, TAKEN TO THE PROPOSED DEPTH OF TOPSOIL, SHALL BE TAKEN PER ACRE OF AREA TO BE LIMED. THESE SAMPLES SHALL BE PLACED IN A SUITABLE CONTAINER OBTAINED FROM THE TESTING LABORATORY AND MARKED SO AS TO CLEARLY INDICATE THE ACRE AREA FROM WHICH THEY WERE TAKEN.
14. THE SAMPLE SHALL BE DELIVERED BY THE CONTRACTOR TO THE TESTING LABORATORY FOR CHEMICAL AND MECHANICAL ANALYSIS. THE TESTING LABORATORY SHALL BE DIRECTED BY THE CONTRACTOR TO FURNISH TEST RESULTS AND RECOMMENDATIONS FOR LIMING AND FERTILIZING TO THE ENGINEER OR ARCHITECT FOR APPROVAL.
15. LIME SHALL BE MECHANICALLY SPREAD IN TWO APPLICATIONS UP TO 50 POUNDS PER 1000 SQUARE FEET, ON ALL AREAS. THE LIME SHALL BE DISTRIBUTED UNIFORMLY.
16. FERTILIZER SHALL BE MECHANICALLY SPREAD SO AS TO OBTAIN UP TO A MINIMUM SOWN FERTILIZER COVERAGE YIELD OF 16 POUNDS PER 1000 SQUARE FEET. THE ACTUAL AMOUNTS AND TYPE OF FERTILIZER APPLIED SHALL BE AS DETERMINED BY THE RESULTS OF LABORATORY TESTS CONDUCTED ABOVE. AT SLOPES EXCEEDING 25% GRADE, THE FERTILIZER SHALL BE APPLIED MANUALLY IN AN APPROVED MANNER.
17. SEEDING SHALL BE UNDERTAKEN IN TWO SEPARATE PASSES AT NINETY DEGREES TO EACH OTHER. ONE-HALF THE SEEDING RATE SHALL BE APPLIED IN EACH DIRECTION (HORIZONTALLY AND VERTICALLY). TO ENSURE SEED-TO-SOIL CONTACT WITH BROADCASTING OF SEED, SEEDING SHALL BE FOLLOWED BY ROLLING OR TRACKING WITH EQUIPMENT APPROVED BY THE ENGINEER OR LANDSCAPE ARCHITECT.
18. SEED SHALL BE INCORPORATED WITH THE MULCHING MATERIAL SO AS TO OBTAIN A MINIMUM SOWN COVERAGE OF 200 POUNDS OF THE SPECIFIED MIX PER ACRE. SEED SUBSTITUTIONS MAY REQUIRE RATE ADJUSTMENTS AS RECOMMENDED BY THE SEED SUPPLIERS, IF APPROVED BY THE ENGINEER OR LANDSCAPE ARCHITECT.
19. AT SLOPES EXCEEDING 25% GRADE, SEEDING AND/OR STABILIZATION SHALL OCCUR AS SOON AS IS REASONABLE GIVEN THE CONSTRUCTION ACTIVITIES OR SEQUENCING WILL PERMIT. REFERENCE SOIL EROSION AND SEDIMENT CONTROL NOTES AND DETAILS.
20. AFTER THE FINE GRADING AND PREPARATIONS FOR SEEDING ARE APPROVED BY THE ENGINEER OR LANDSCAPE ARCHITECT, THE CONTRACTOR SHALL SEED THE AREA INDICATED, AS SPECIFIED HEREIN. THE SEED SHALL BE INCORPORATED WITH MULCHING MATERIALS COMPOSED OF WOOD CELLULOSE FIBERS THAT WILL READILY DISPERSE IN WATER TO FORM A UNIFORM AND HOMOGENEOUS MIXTURE WHEN AGITATED.
21. NO EXPOSED STONES OR WOODY DEBRIS SHALL BE AT THE SURFACE TO IMPROVE SEEDING AND ELIMINATE RISK OF DAMAGE FROM THROWN PROJECTILES WHILE MOWING.

SEEDING MATERIALS:

1. LIME: LIME SHALL BE STANDARD COMMERCIAL GROUND LIMESTONE CONTAINING AT LEAST 50% TOTAL OXIDES (CALCIUM OXIDE AND MAGNESIUM OXIDE) AND 50% PERCENT OF THE MATERIAL MUST PASS THROUGH A #100 MESH SIEVE, WITH 98% PASSING A #20 MESH SIEVE.
2. FERTILIZER: FERTILIZER SHALL BE COMMERCIAL FERTILIZER 10-10-10 U.F. FERTILIZER MIXTURE CONTAINING AT LEAST 80% OF ORGANIC MATERIAL OR TYPE DETERMINED BY CHEMICAL SOIL ANALYSIS AS TESTED BY AN APPROVED LABORATORY. IT SHALL BE DELIVERED AT THE SITE IN THE ORIGINAL SEALED CONTAINERS WITH CONTENTS CLEARLY DESCRIBE.
3. SEED MIXES: THE ARRAY SHALL BE SEEDED WITH TWO DISTINCT SEED MIXES. THE TEMPORARY SEED MIX SHALL BE USED FOR SEEDING DURING CONSTRUCTION ACTIVITIES. THE PERMANENT SEED MIX SHALL BE USED IN THE FINAL SEEDING OF INTERIOR AND EXTERIOR PERIMETER AREAS AND INTER-ROW AREAS AFTER ARRAY CONSTRUCTION.
4. MULCH: MULCH MATERIAL SHALL BE A MANUFACTURED PRODUCT OF NATURAL WOOD CELLULOSE FIBERS. MATERIAL SHALL BE INTERNATIONAL PAPER COMPANY'S "TURFIBER," WEYERHAEUSER COMPANY'S "SILVA-FIBER," OR APPROVED EQUAL AND CLEARLY PACKED IN ORIGINAL CONTAINERS, SEALED AND CLEARLY LABELED WITH BRAND NAME AND MANUFACTURER. IT SHALL HAVE A DELIVERED MOISTURE CONTENT OF NOT OVER 12%.
5. PERMANENT SEED: THE SEED SHALL BE APPLIED BY EITHER HAND, CYCLONE SEEDER, OR A CULTIPACKER TYPE SEEDER. SEED MIX SHALL BE HAY PRODUCTION SEED MIX WITH THE SPECIFICATIONS LISTED BELOW IN THE SEEDING TABLE, OR APPROVED EQUAL. SUBMIT SUPPLIER'S SEED BLEND SPECIFICATIONS TO THE ENGINEER OR LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO COMMENCING WITH SEEDING OPERATIONS. SEEDING SHALL BE APPLIED AT A RATE OF 100-200 LB PER ACRE, OR 3-5 LB PER 1,000 SQ.FT. SEEDING SHALL BE COMPLETED BETWEEN APRIL 15 AND MAY 15 OR AUGUST 15 AND OCTOBER 15. ALL SEEDED AREAS SHALL BE MAINTAINED TO ENSURE PROPER GROWTH AND TO MINIMIZE EROSION.

HAY PRODUCTION SEED MIX		
ITEM #	COMMON NAME	WEIGHT
1	TIMOTHY GRASS / HAY	50%
2	LATE HEADING ORCHARD GRASS	20%
3	RED CLOVER	5%
4	WHITE CLOVER	5%
5	TALL FESCUE	10%
6	KENTUCKY BLUEGRASS	5%
7	MEADOW BROME	5%

6. TEMPORARY SEED: THE SEED MIX WHEN SEEDING OCCURS DURING SPRING/SUMMER MONTHS, SHALL BE GRAIN OATS (ERNMX-181-1) NATIVE STEEP SLOPE MIX WITH THE SPECIFICATIONS LISTED BELOW IN THE SEEDING TABLE, OR APPROVED EQUAL. THE SEED MIX WHEN SEEDING OCCURS DURING WINTER MONTHS, SHALL BE THREE-WAY RYEGRASS MIX (ERNMX-149) WITH THE SPECIFICATIONS LISTED BELOW IN THE SEEDING TABLE, OR APPROVED EQUAL. SUBMIT SUPPLIER'S SEED BLEND SPECIFICATIONS TO THE ENGINEER OR LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO COMMENCING WITH THE SEEDING OPERATIONS. SEEDING SHALL BE APPLIED AT A RATE OF 7-10 LB PER 1,000 SQ.FT.

NATIVE STEEP SLOPE MIX W/ GRAIN OATS (ERNMX-181)			
ITEM #	BOTANICAL (LATIN) NAME	COMMON NAME	WEIGHT
1	AVENA SATIVA	OATS, VARIETY NOT STATED	40.00%
2	ANDROPOGON GERARDII	BIG BLUESTEM, 'SOUTHWLOW-MI ECOTYPE	19.12%
3	SORGHASTRUM NUTANS	INDIANGRASS, PA ECOTYPE	12.00%
4	ELYMUS VIRGINICUS	VIRGINIA WILDRYE, MADISON-NY ECOTYPE	10.72%
5	ELYMUS CANADENSIS	CANADA WILDRYE	5.28%
6	PANICUM VIRGATUM	SWITCHGRASS, 'SHAWNEE'	4.32%
7	AGROSTIS PERANNANS	AUTUMN BENTGRASS, ALBANY PINE BUSH-NY ECOTYPE	3.20%
8	PANICUM CLAUDESTINIUM	DEERTONGUE, TIAGA	2.24%
9	RUDBECKIA HIRTA	BLACKEYED SUSAN	0.80%
10	COREOPSIS LANCEOLATA	LANCELEAF COREOPSIS	0.56%
11	ECHINACEA PURPUREA	PURPLE CONEFLOWER	0.56%
12	HELIOPSIS HELIANTHOIDES	OXEYE SUNFLOWER, PA ECOTYPE	0.56%
13	ASTER PILOSUS	HEATH ASTER, PA ECOTYPE	0.16%
14	MONARDA FISTULOSA	WILD BERGAMOT	0.16%
15	SOLIDAGO RUROGOSA	WRINKLELEAF GOLDENROD, PA ECOTYPE	0.16%
16	APOCYNUM CANNABINUM	INDIANHEMP, PA ECOTYPE	0.08%
17	ASCLEPIAS SYRIACA	COMMON MILKWEED	0.08%
TOTAL			100%

THREE-WAY RYE GRASS MIX (ERNMX-149)			
ITEM #	BOTANICAL (LATIN) NAME	COMMON NAME	WEIGHT
1	LOLIUM PERENNE, 'BIGLEAGUE'	PERENNIAL RYEGRASS	33%
2	LOLIUM PERENNE, 'AMAZING XL'	PERENNIAL RYEGRASS, (TURF TYPE)	33%
3	LOLIUM PERENNE, 'PASCO'	PERENNIAL RYEGRASS, (TURF TYPE)	33%
TOTAL			100%

MAINTENANCE OF SEEDED AREAS:

1. FOLLOWING THE FINAL SEEDING THE CONTRACTOR SHALL CONTINUE TO INSPECT EROSION AND SEDIMENTATION CONTROLS AT LEAST ONCE EVERY 7 CALENDAR DAYS. WITHIN 24 HOURS AFTER A STORM EVENT (RAINFALL OR EXCESS SNOWMELT), ALL MEASURES MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION UNTIL AREAS ARE PERMANENTLY STABILIZED.
2. PERMANENT STABILIZATION IS ACHIEVED WHEN 90% MATURE VEGETATION COVER OF DESIRED SPECIES IS ACHIEVED IN ALL AREAS AND/OR PERMANENT NON-VEGETATIVE STABILIZATION MEASURES ARE IMPLEMENTED TO PROVIDE EFFECTIVE COVER OF ANY AREAS OF EXPOSED SOIL. IN THE EVENT OF ANY UNSATISFACTORY GROWTH, RESEEDING SHALL BE CARRIED OUT, WITH FOLLOW-UP INSPECTION.
3. THE CONTRACTOR SHALL MAINTAIN THE ENTIRE SEEDED AREAS UNTIL FINAL ACCEPTANCE AT THE COMPLETION OF THE PROJECT OR FOR 90 DAYS, WHICHEVER IS LONGER. MAINTENANCE SHALL INCLUDE WATERING ON AN AS-NEEDED BASIS SUCH THAT ESTABLISHMENT OF AT LEAST 70% OF THE SEEDED AREAS IS ACHIEVED AFTER ONE GROWING SEASON. MAINTENANCE SHALL ADDITIONALLY INCLUDE WEEDING, REMOVAL OF STONES WHICH MAY APPEAR, AND REGULAR CUTTINGS OF THE GRASS NO CLOSER THAN 10 DAYS APART. CONTRACTOR SHALL FURNISH ALL TEMPORARY PIPE AND CONNECTIONS FOR SPRINKLING. CONTRACTOR SHALL FURNISH ALL REQUIRED WATER AT NO EXPENSE TO THE OWNER.
4. ALL BARE SPOTS, WHICH BECOME APPARENT AS THE GRASS GERMINATES, SHALL BE RESEEDED BY THE CONTRACTOR AT HIS/HER OWN EXPENSE AS MANY TIMES AS NECESSARY TO SECURE AN ADEQUATE GROWTH, AND THE ENTIRE AREA SHALL BE MAINTAINED AND CUT UNTIL ALL WORK HAS BEEN COMPLETED AND FINAL ACCEPTANCE HAS OCCURRED. RESEEDING SHALL BE ACCOMPLISHED BY MECHANICAL MEANS AS DETERMINED BY THE AREA OF RESEEDING TO BE ACCOMPLISHED.
5. CONTRACTOR SHALL TAKE WHATEVER MEASURES ARE NECESSARY TO PROTECT THE GRASS WHILE IT IS GERMINATING. THESE MEASURES SHALL INCLUDE SPRINKLING STRAW OR WOOD FIBER MULCH TO COVER THE AREA, AND/OR FURNISHING OF WARNING SIGNS, BARRIERS, TEMPORARY FENCE OR ANY OTHER NECESSARY MEASURES OF PROTECTION.
6. CONTRACTOR SHALL FURNISH, PROTECT, AND MAINTAIN ALL TEMPORARY BARRIERS UNTIL FINAL ACCEPTANCE OF THE SEEDED AREAS BY THE OWNER AND SHALL REMOVE THEM UPON SUCH FINAL ACCEPTANCE, THE BARRIERS SHALL REMAIN THE PROPERTY OF CONTRACTOR AT ALL TIMES.
7. AFTER THE ENGINEER, OR LANDSCAPE ARCHITECT HAS DETERMINED THAT THE PROJECT AREA HAS STABILIZED (90% MATURE VEGETATION COVER ACHIEVED), THE CONTRACTOR SHALL REMOVE ALL SEDIMENT BARRIERS AND ANY OTHER TEMPORARY EROSION CONTROL MEASURES WITHIN 30 DAYS.

DRAINAGE PIPE:

1. HIGH DENSITY POLYETHYLENE (HDPE) CORRUGATED PIPE WITH SMOOTH INTERIOR AND MITERED EDGE MEETING AASHTO M252, TYPE C.

Project:

MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
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Client:

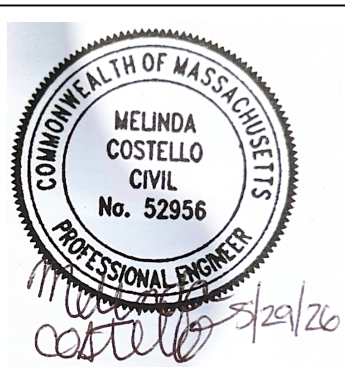
BLUEWAVE

MANHAN RIVER, LLC

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Know what's Below.
Call before you dig.

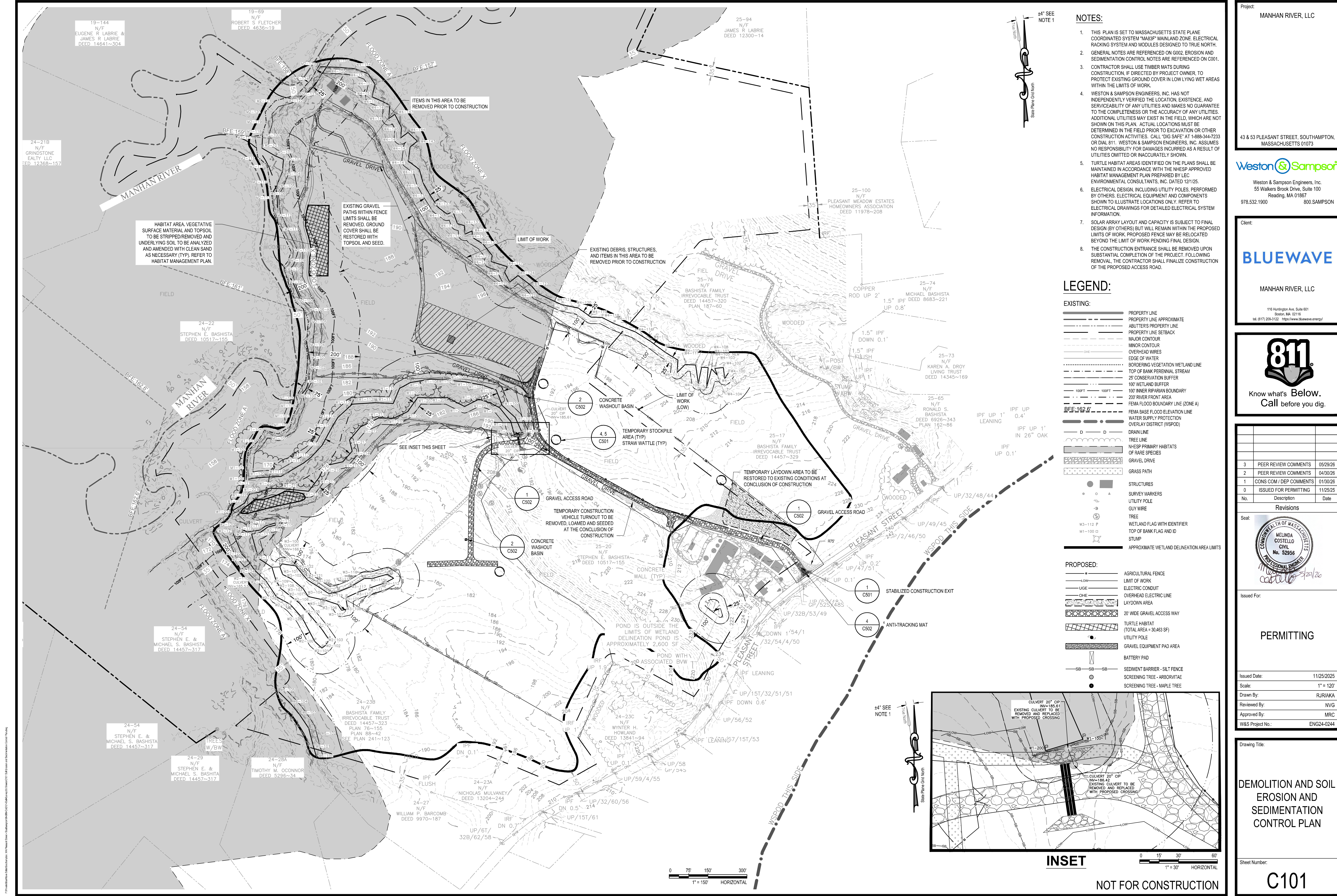
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1	CONS COM / DEP COMMENTS	01/30/26
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No.	Description	Date
Revisions		
Seal:		
Issued For:		
PERMITTING		
Issued Date:	11/25/2025	
Scale:	N/A	
Drawn By:	RJR/AKA	
Reviewed By:	NVG	
Approved By:	MRC	
W&S Project No.:	ENG24-0244	

Drawing Title:

NOTES AND SPECIFICATIONS

C001

Sheet Number:



NOTES:

- THIS PLAN IS SET TO MASSACHUSETTS STATE PLANE COORDINATED SYSTEM "MASS" MAINLAND ZONE. ELECTRICAL RACKING SYSTEM AND MODULES DESIGNED TO TRUE NORTH.
- GENERAL NOTES ARE REFERENCED ON G002. EROSION AND SEDIMENTATION CONTROL NOTES ARE REFERENCED ON C001.
- CONTRACTOR SHALL USE TIMBER MATS DURING CONSTRUCTION, IF DIRECTED BY PROJECT OWNER, TO PROTECT EXISTING GROUND COVER IN LOW LYING WET AREAS WITHIN THE LIMITS OF WORK.
- WESTON & SAMPSON ENGINEERS, INC. HAS NOT INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKES NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. WESTON & SAMPSON ENGINEERS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
- TURTLE HABITAT AREAS IDENTIFIED ON THE PLANS SHALL BE MAINTAINED IN ACCORDANCE WITH THE NHESP APPROVED HABITAT MANAGEMENT PLAN PREPARED BY LEC ENVIRONMENTAL CONSULTANTS, INC. DATED 12/1/25.
- ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM INFORMATION.
- SOLAR ARRAY LOCATION AND CAPACITY IS SUBJECT TO FINAL DESIGN (BY OTHERS) BUT WILL REMAIN WITHIN THE PROPOSED LIMITS OF WORK. PROPOSED FENCE MAY BE RELOCATED BEYOND THE LIMIT OF WORK PENDING FINAL DESIGN.
- THE CONSTRUCTION ENTRANCE SHALL BE REMOVED UPON SUBSTANTIAL COMPLETION OF THE PROJECT. FOLLOWING REMOVAL, THE CONTRACTOR SHALL FINALIZE CONSTRUCTION OF THE PROPOSED ACCESS ROAD.

LEGEND:

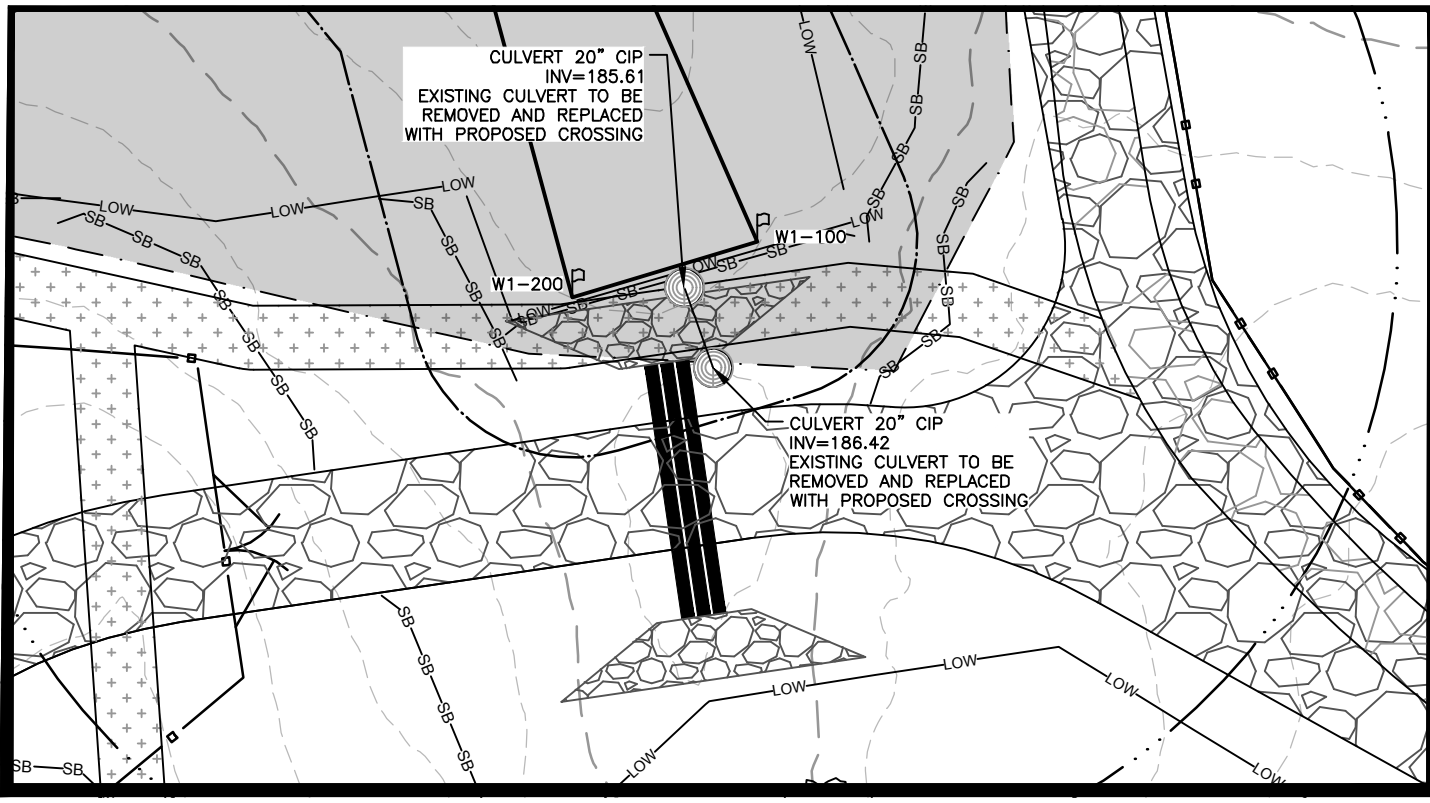
EXISTING:

- PROPERTY LINE
- PROPERTY LINE APPROXIMATE
- ABUTTER'S PROPERTY LINE
- PROPERTY LINE SETBACK
- MAJOR CONTOUR
- MINOR CONTOUR
- OVERHEAD WIRES
- EDGE OF WATER
- BORDERING VEGETATION WETLAND LINE
- TOP OF BANK PERENNIAL STREAM
- 25' CONSERVATION BUFFER
- 100' WETLAND BUFFER
- 100' INNER RIPARIAN BOUNDARY
- 200' RIVER FRONT AREA
- FEMA FLOOD BOUNDARY LINE (ZONE A)
- FEMA BASE FLOOD ELEVATION LINE
- WATER SUPPLY PROTECTION OVERLAY DISTRICT (WSPD)
- DRAIN LINE
- TREE LINE
- NHESP PRIMARY HABITATS OF RARE SPECIES
- GRAVEL DRIVE
- GRASS PATH
- STRUCTURES
- SURVEY MARKERS
- UTILITY POLE
- GUY WIRE
- TREE
- WETLAND FLAG WITH IDENTIFIER
- TOP OF BANK FLAG AND ID
- STUMP
- APPROXIMATE WETLAND DELINEATION AREA LIMITS

PROPOSED:

- AGRICULTURAL FENCE
- LIMIT OF WORK
- ELECTRIC CONDUIT
- OVERHEAD ELECTRIC LINE
- LAYDOWN AREA
- 20' WIDE GRAVEL ACCESS WAY
- TURTLE HABITAT (TOTAL AREA = 30,463 SF)
- UTILITY POLE
- GRAVEL EQUIPMENT PAD AREA
- BATTERY PAD
- SEDIMENT BARRIER - SILT FENCE
- SCREENING TREE - ARBORVITAE
- SCREENING TREE - MAPLE TREE

INSET



NOT FOR CONSTRUCTION

Project:

MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073

Weston & Sampson

Weston & Sampson Engineers, Inc.
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Client:

BLUEWAVE

MANHAN RIVER, LLC

116 Huntington Ave., Suite 601
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No.	Description	Date
3	PEER REVIEW COMMENTS	05/29/26
2	PEER REVIEW COMMENTS	04/30/26
1	CONS COM / DEP COMMENTS	01/30/26
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Revisions

Seal:

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PERMITTING

Issued Date: 11/25/2025

Scale: 1" = 120'

Drawn By: RJR/KA

Reviewed By: NVG

Approved By: MRC

W&S Project No.: ENG24-0244

Drawing Title:

DEMOLITION AND SOIL EROSION AND SEDIMENTATION CONTROL PLAN

Sheet Number:

C101

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NOTES:

- THIS PLAN IS SET TO MASSACHUSETTS STATE PLANE COORDINATED SYSTEM "MA83" MAINLAND ZONE. ELECTRICAL RACKING SYSTEM AND MODULES DESIGNED TO TRUE NORTH.
- GENERAL NOTES ARE REFERENCED ON G002, EROSION AND SEDIMENTATION CONTROL NOTES ARE REFERENCED ON C001.
- CONTRACTOR SHALL USE TIMBER MATS DURING CONSTRUCTION, IF DIRECTED BY PROJECT OWNER, TO PROTECT EXISTING GROUND COVER IN LOW LYING WET AREAS WITHIN THE LIMITS OF WORK.
- WESTON & SAMPSON ENGINEERS, INC. HAS NOT INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKES NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. WESTON & SAMPSON ENGINEERS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
- TURTLE HABITAT AREAS IDENTIFIED ON THE PLANS SHALL BE MAINTAINED IN ACCORDANCE WITH THE WHESP APPROVED HABITAT MANAGEMENT PLAN PREPARED BY LCC ENVIRONMENTAL CONSULTANTS, INC. DATED 12/1/25.
- ELECTRICAL DESIGN, INCLUDING UTILITY POLES, PERFORMED BY OTHERS. ELECTRICAL EQUIPMENT AND COMPONENTS SHOWN TO ILLUSTRATE LOCATIONS ONLY. REFER TO ELECTRICAL DRAWINGS FOR DETAILED ELECTRICAL SYSTEM INFORMATION.
- SOLAR ARRAY LAYOUT AND CAPACITY IS SUBJECT TO FINAL DESIGN (BY OTHERS) BUT WILL REMAIN WITHIN THE PROPOSED LIMITS OF WORK. PROPOSED FENCE MAY BE RELOCATED BEYOND THE LIMIT OF WORK PENDING FINAL DESIGN.
- THE CONSTRUCTION ENTRANCE SHALL BE REMOVED UPON SUBSTANTIAL COMPLETION OF THE PROJECT, FOLLOWING REMOVAL, THE CONTRACTOR SHALL FINALIZE CONSTRUCTION OF THE PROPOSED ACCESS ROAD.
- REFER TO SHEET C106 FOR LANDSCAPING PLAN/ PLANTING SCHEDULE.

LEGEND:

EXISTING:

- PROPERTY LINE
- PROPERTY LINE APPROXIMATE
- ADJUTERS PROPERTY LINE
- PROPERTY LINE SETBACK
- MAJOR CONTOUR
- MINOR CONTOUR
- OVERHEAD WIRES
- EDGE OF WATER
- BORDERING VEGETATION WETLAND LINE
- TOP OF BANK PERENNIAL STREAM
- 25' CONSERVATION BUFFER
- 100' WETLAND BUFFER
- 100' INNER RIPARIAN BOUNDARY
- 200' RIVER FRONT AREA
- FEMA FLOOD BOUNDARY LINE (ZONE A)
- FEMA BASE FLOOD ELEVATION LINE
- WATER SUPPLY PROTECTION OVERLAY DISTRICT (WSPOD)
- DRAIN LINE
- TREE LINE
- WHESP PRIMARY HABITATS OF RARE SPECIES
- GRAVEL DRIVE
- GRASS PATH
- STRUCTURES
- SURVEY MARKERS
- UTILITY POLE
- GUY WIRE
- TREE
- WETLAND FLAG WITH IDENTIFIER
- TOP OF BANK FLAG AND ID
- STUMP
- APPROXIMATE WETLAND DELINEATION AREA LIMITS

PROPOSED:

- AGRICULTURAL FENCE
- LIMIT OF WORK
- ELECTRIC CONDUIT
- OVERHEAD ELECTRIC LINE
- LAYDOWN AREA
- 20' WIDE GRAVEL ACCESS WAY
- TURTLE HABITAT (TOTAL AREA = 30,463 SF)
- UTILITY POLE
- GRAVEL EQUIPMENT PAD AREA
- BATTERY PAD
- SEDIMENT BARRIER - SILT FENCE
- SOLAR PV PANEL
- SCREENING TREE - ARBORVITAE
- SCREENING TREE - MAPLE TREE

Project: MANHAN RIVER, LLC

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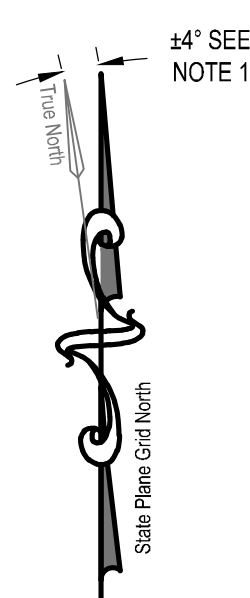
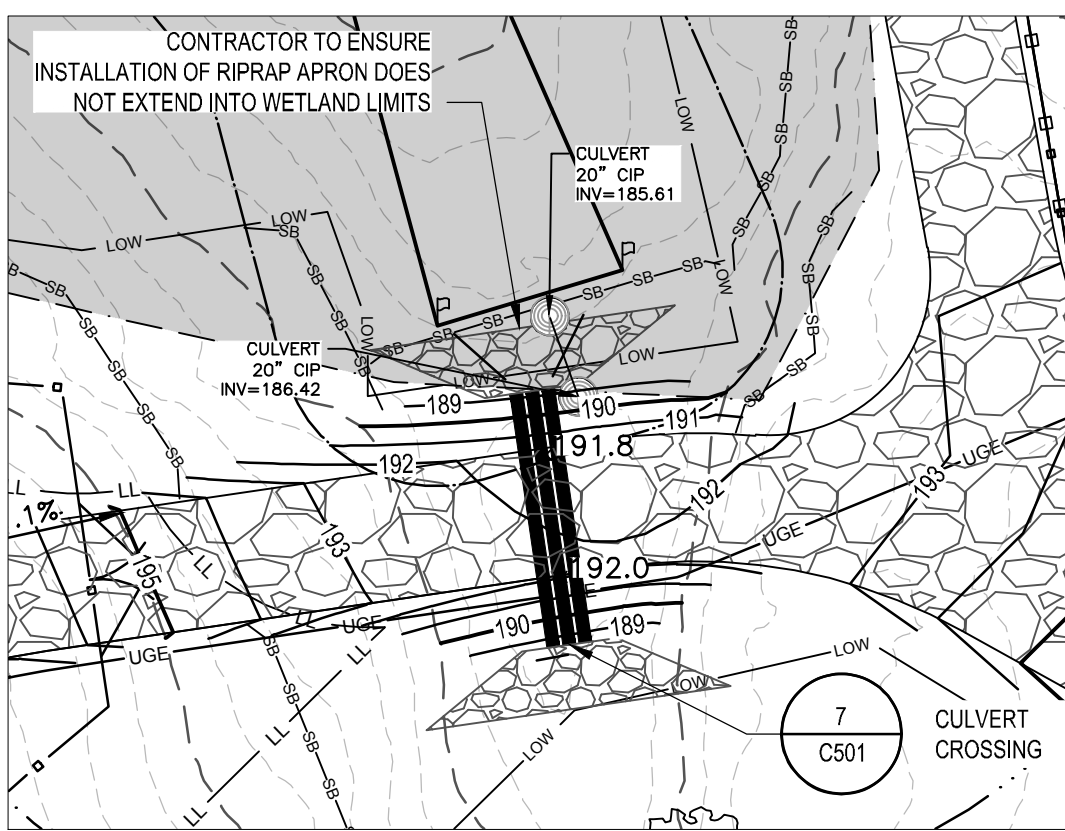
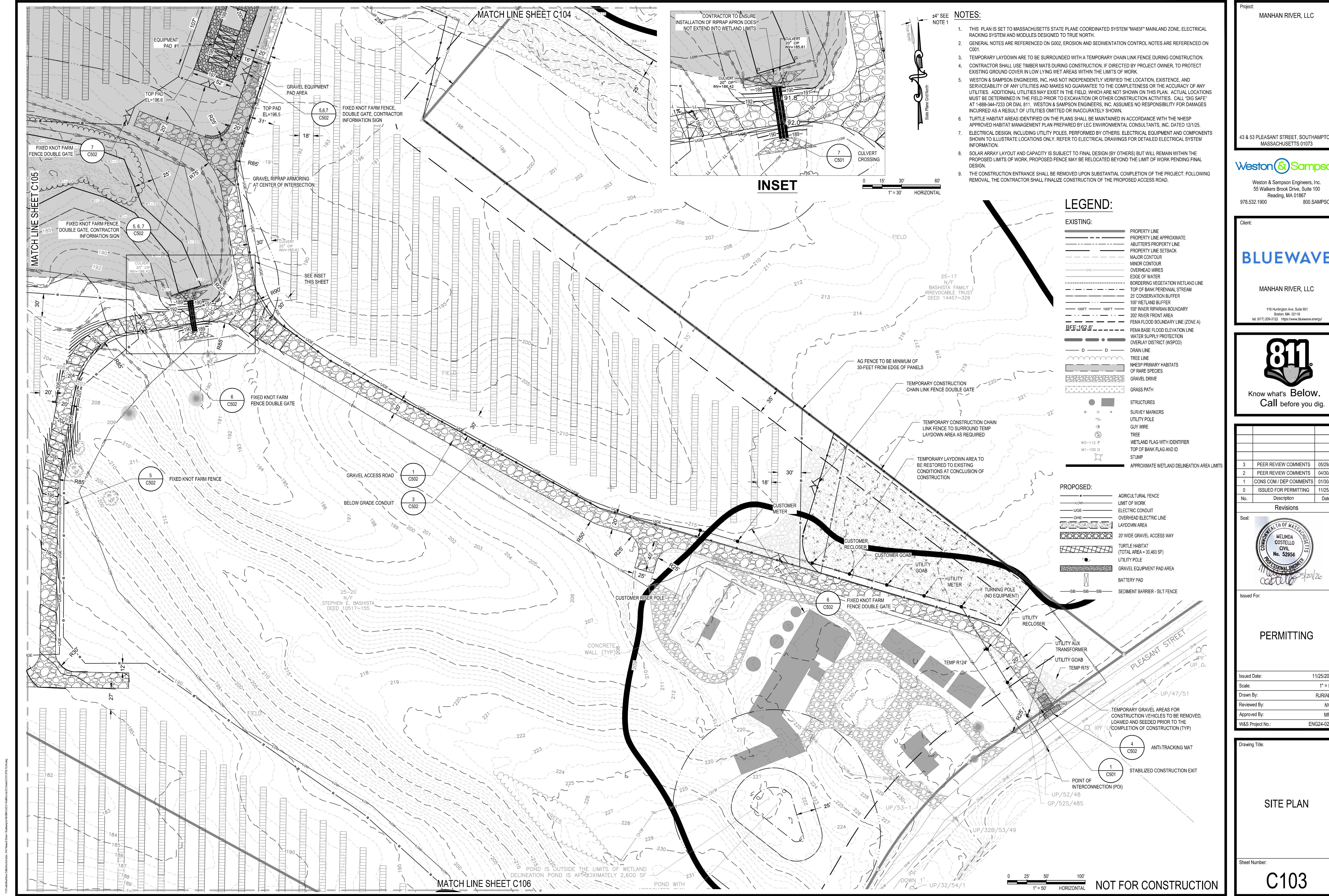
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Reviewed By:	NVG
Approved By:	MRC
W&S Project No.:	ENG24-0244

Drawing Title:

OVERALL SITE PLAN

Sheet Number:

C102



NOTES:

1. THIS PLAN IS SET TO MASSACHUSETTS STATE PLANE COORDINATED SYSTEM "MA83P" MAINLAND ZONE. ELECTRICAL RACKING SYSTEM AND MODULES DESIGNED TO TRUE NORTH.
2. GENERAL NOTES ARE REFERENCED ON G002, EROSION AND SEDIMENTATION CONTROL NOTES ARE REFERENCED ON C001.
3. TEMPORARY LAYDOWN ARE TO BE SURROUNDED WITH A TEMPORARY CHAIN LINK FENCE DURING CONSTRUCTION.
4. CONTRACTOR SHALL USE TIMBER MATS DURING CONSTRUCTION, IF DIRECTED BY PROJECT OWNER, TO PROTECT EXISTING GROUND COVER IN LOW LYING WET AREAS WITHIN THE LIMITS OF WORK.
5. WESTON & SAMPSON ENGINEERS, INC. HAS NOT INDEPENDENTLY VERIFIED THE LOCATION, EXISTENCE, AND SERVICEABILITY OF ANY UTILITIES AND MAKES NO GUARANTEE TO THE COMPLETENESS OR THE ACCURACY OF ANY UTILITIES. ADDITIONAL UTILITIES MAY EXIST IN THE FIELD, WHICH ARE NOT SHOWN ON THIS PLAN. ACTUAL LOCATIONS MUST BE DETERMINED IN THE FIELD PRIOR TO EXCAVATION OR OTHER CONSTRUCTION ACTIVITIES. CALL "DIG SAFE" AT 1-888-344-7233 OR DIAL 811. WESTON & SAMPSON ENGINEERS, INC. ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED OR INACCURATELY SHOWN.
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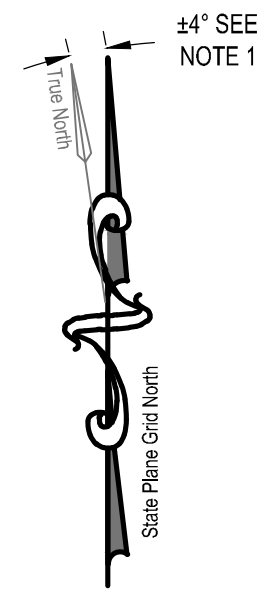
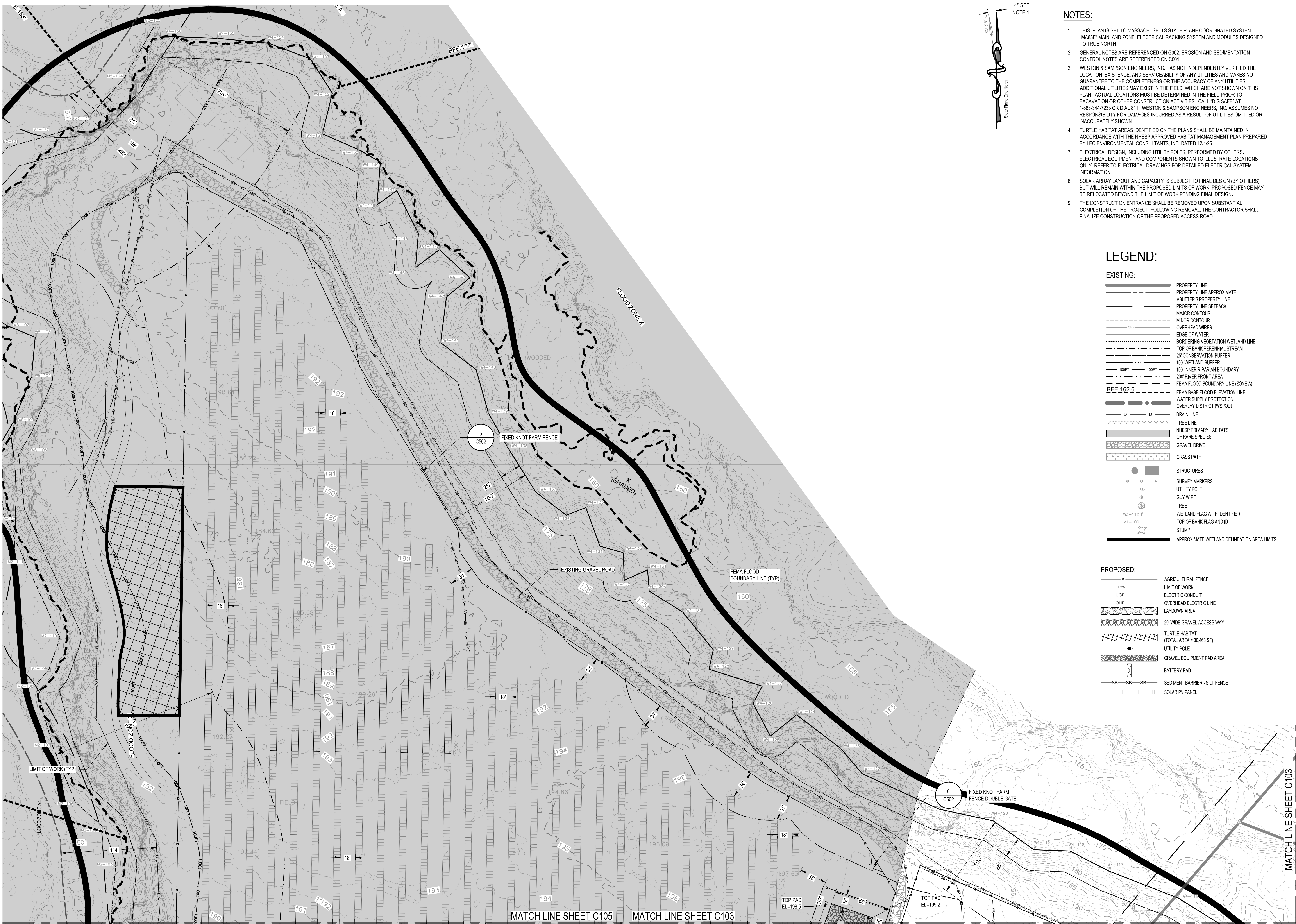
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Drawn By:	RJR/AKA
Reviewed By:	NVG
Approved By:	MRC
W&S Project No.:	ENG24-0244

Drawing Title: SITE PLAN

Sheet Number: C103



NOTES:

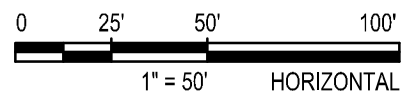
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- SEDIMENT BARRIER - SILT FENCE
- SOLAR PV PANEL



NOT FOR CONSTRUCTION

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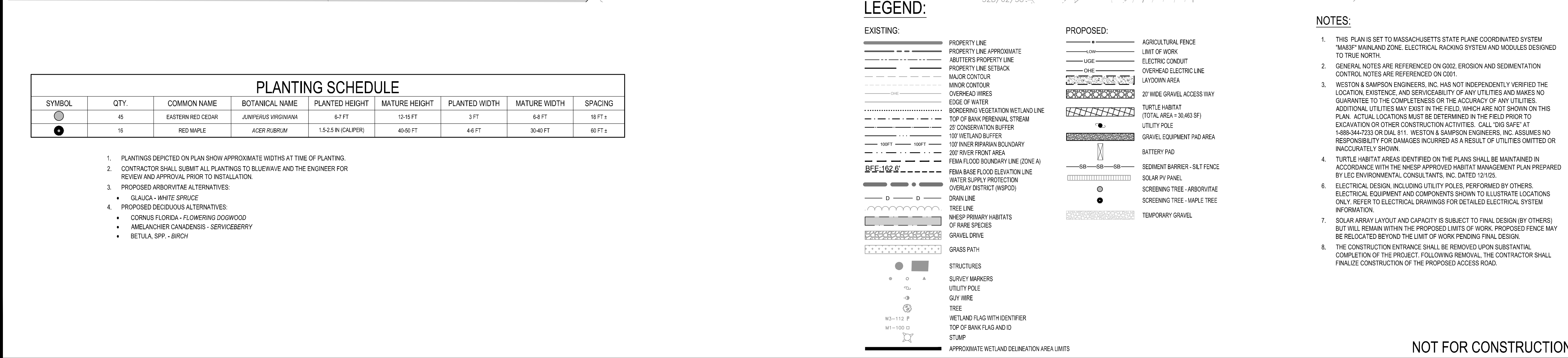
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Scale: 1" = 50'
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Reviewed By: NVG
Approved By: MRC
W&S Project No.: ENG24-0244

Drawing Title:

SITE PLAN

Sheet Number:

C104

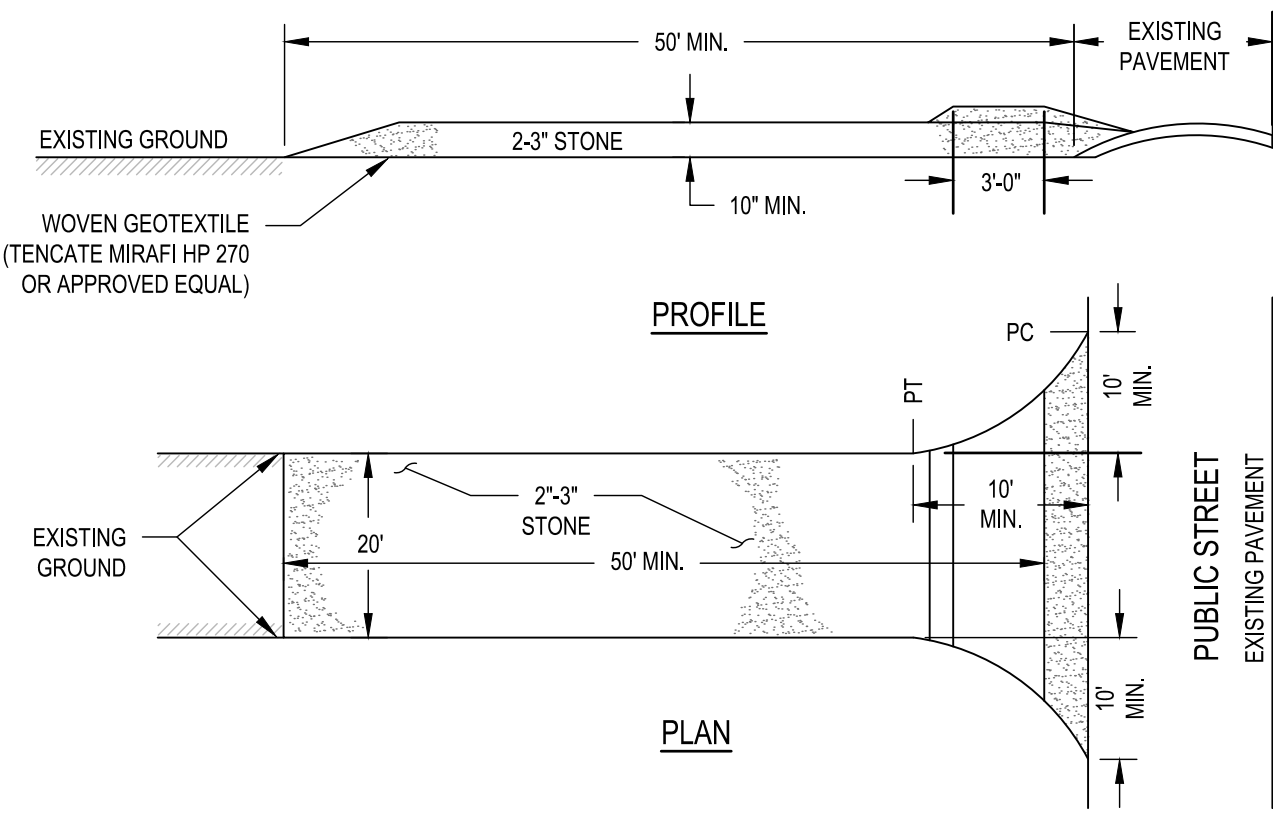


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SITE PLAN

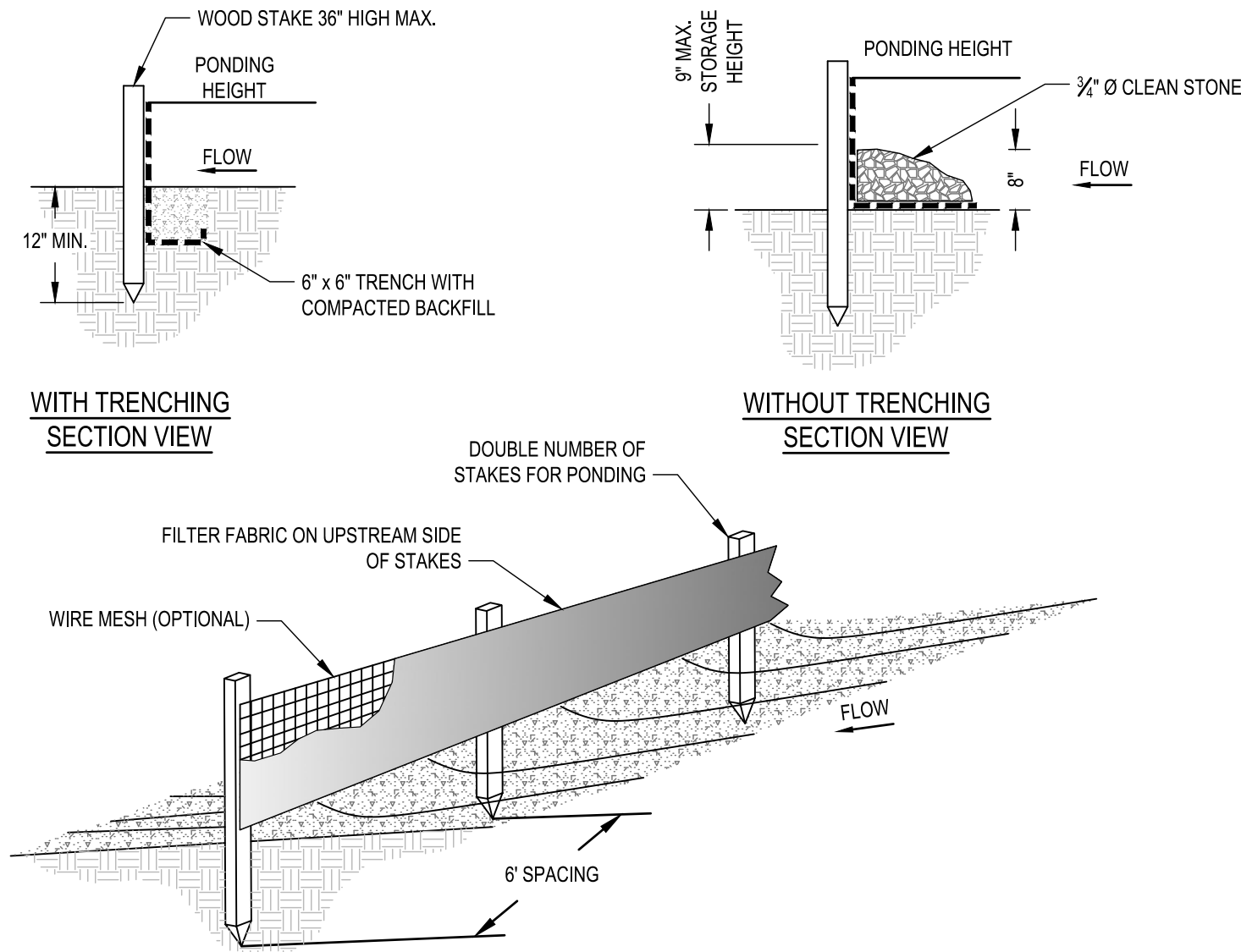
C106

NOT FOR CONSTRUCTION



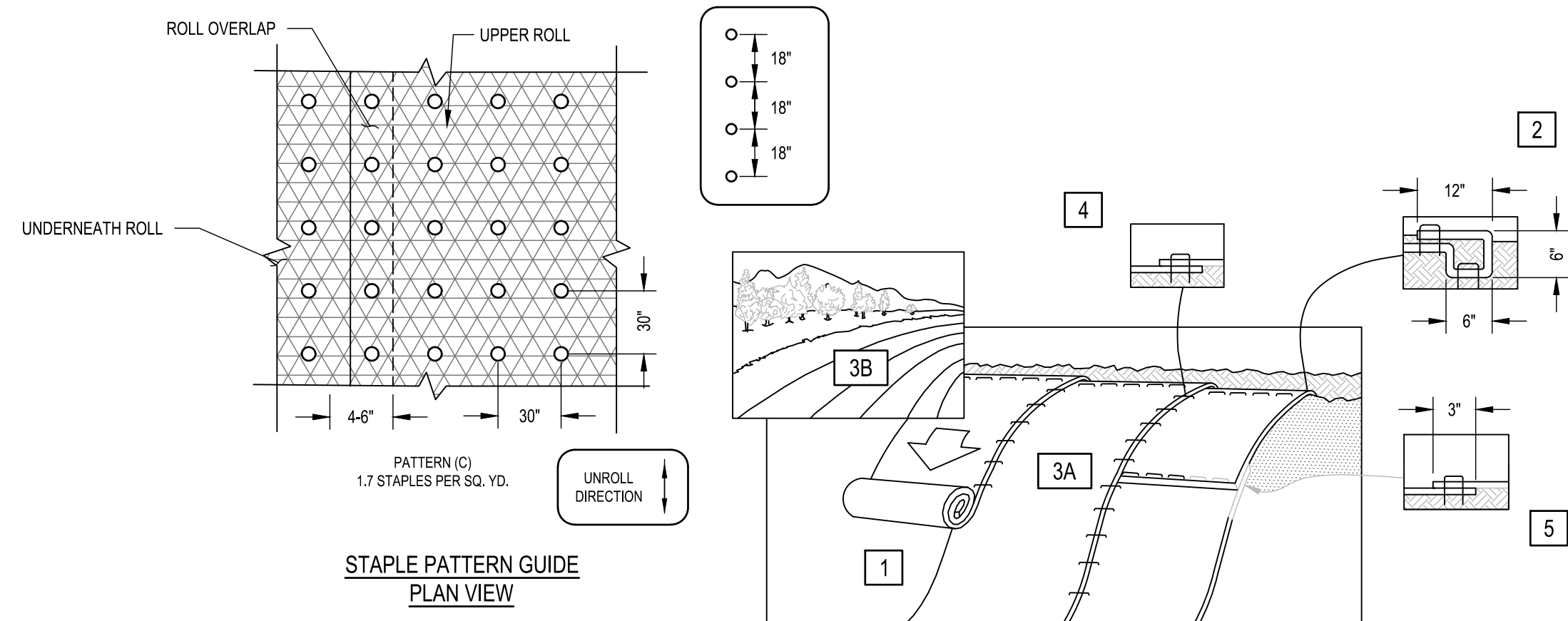
NOTES:

1. FILTER CLOTH - WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
2. CONSTRUCTION MATERIAL PLACEMENT FOR EROSION AND SEDIMENT CONTROLS AND ANY MAINTENANCE THEREOF IS NOT TO BE COMPACTED.
3. SURFACE WATER - ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
4. MAINTENANCE - THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY.
5. WASHING - WHEELS SHALL BE CLEANED TO REMOVE SEDIMENT PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
6. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.
7. STONE SHALL BE REMOVED AT THE CONCLUSION OF PROJECT AND ACCUMULATED SEDIMENT DISPOSED OF IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL CODES AND REGULATIONS. REMOVAL OF STONE SHALL BE AT NO ADDITIONAL COST TO THE OWNER.



NOTES:

1. SILT FENCE SHALL BE PLACED AROUND THE PERIMETER LIMIT OF WORK AS SHOWN ON THE PLANS.
2. PREFABRICATED SILT FENCE MUST BE INSTALLED PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
3. THE FENCE SHALL BE ANCHORED TO RESIST PULL-OUT, AND BE STRETCHED TIGHTLY BETWEEN STAKES TO PREVENT SAGGING.
4. A 6-INCH WIDE AND 6-INCH DEEP TRENCH SHALL BE EXCAVATED UPGRADIENT OF THE FENCE LINE TO KEY THE "FLAP" OF THE FABRIC. THE TRENCH SHALL BE BACKFILLED AND COMPACTED.
5. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED BY WRAPPING END STAKES TOGETHER.
6. IN AREAS WHERE THE FLAP CANNOT BE KEYED PROPERLY (DUE TO FROZEN GROUND, BEDROCK, STONY SOIL, ROOTS NEAR A PROTECTED NATURAL RESOURCE, ETC.) THE SILT FENCE SHALL BE ANCHORED WITH AGGREGATE, CRUSHED STONE, EROSION CONTROL MIX, OR OTHER MATERIAL.

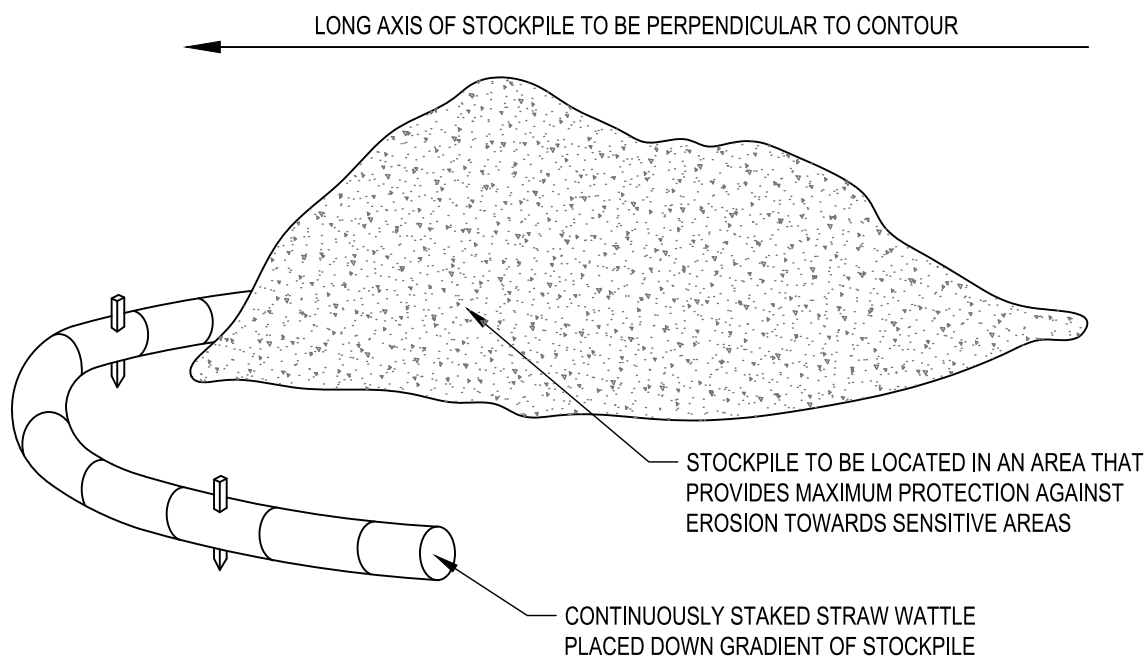


NOTES:

1. EROSION CONTROL BLANKET (ECB) SHALL BE NORTH AMERICAN GREEN, BIONET SC150BN OR APPROVED EQUAL. ECB SHALL BE INSTALLED USING STAPLE PATTERN C IN ACCORDANCE WITH THIS DETAIL.
2. PREPARE SOIL BEFORE INSTALLING ROLLED EROSION CONTROL PRODUCTS (RECPs), INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED. GROUND SURFACE MUST BE FREE OF DEBRIS, ROCKS, CLAY CLODS AND RAKED SMOOTH SUFFICIENT TO ALLOW INTIMATE CONTACT OF THE RECP WITH THE SOIL OVER THE ENTIRETY OF THE INSTALLATION.
3. BEGIN AT THE TOP OF THE SLOPE BY ANCHORING THE RECPs IN A 6\"/>
4. ROLL THE RECPs (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE. WHEN LAYING RECPs HORIZONTAL, A MAXIMUM OF TWO ROLL WIDTHS OR 16 FEET, WHICHEVER IS LESS, MAY BE APPLIED UP THE SLOPE. IF TWO ROLL WIDTHS OR 16 FT IS INSUFFICIENT TO COVER THE SLOPE, MATERIAL SHALL BE PLACED VERTICALLY. RECPs WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL RECPs MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES/PINS IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. ROLLMAX RECPs AND ECBs SHOULD UTILIZE STAPLE PATTERN C.
5. THE EDGES OF PARALLEL RECPs MUST BE STAPLED WITH APPROXIMATELY 4\"/>
6. CONSECUTIVE RECPs SPLICED DOWN THE SLOPE MUST OVERLAPPED WITH THE UPSTREAM MAT ATOP THE DOWNSTREAM MAT (SHINGLE STYLE). THE OVERLAP SHOULD BE 4\"/>
7. AT THE TERMINAL END, SECURE EACH MAT ACROSS THE WIDTH WITH A ROW OF STAPLES/STAKES/PINS SPACED AT 18\"/>
8. FASTENERS SHOULD PROVIDE A MINIMUM OF 20 LBS OF PULLOUT RESISTANCE. 6\"/>

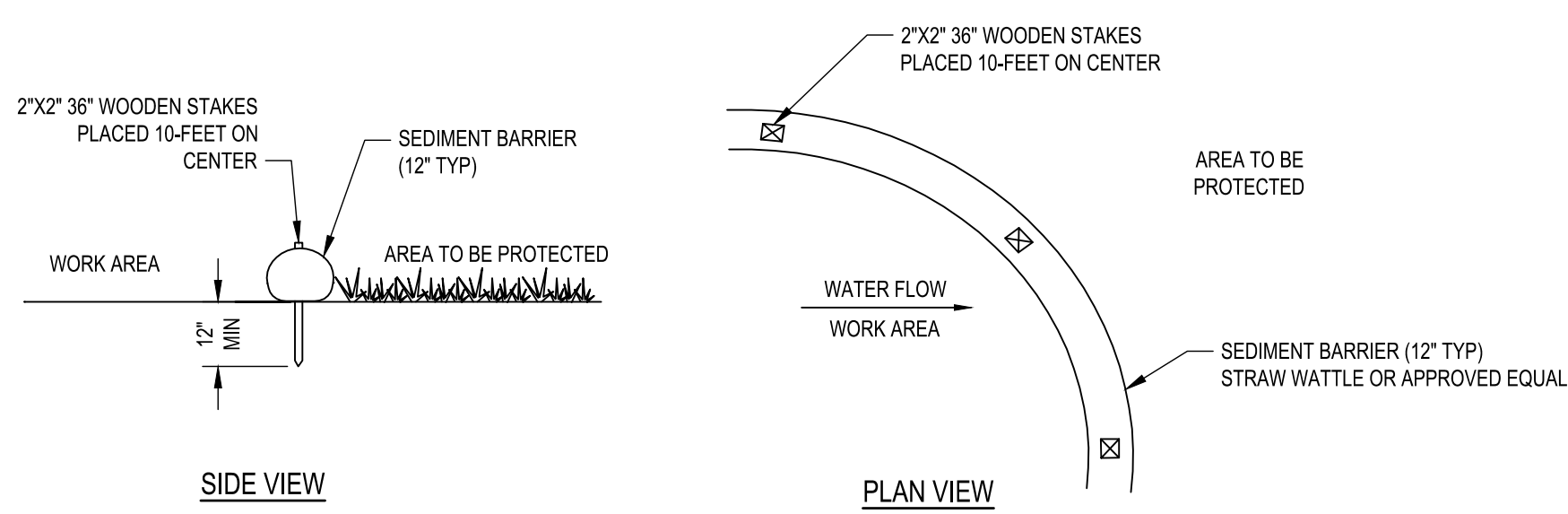
1 STABILIZED CONSTRUCTION EXIT

NOT TO SCALE



NOTES:

1. STOCKPILE AREAS SHALL BE LOCATED OUTSIDE OF NATURAL RESOURCE PROTECTION AREAS AND ASSOCIATED BUFFERS.

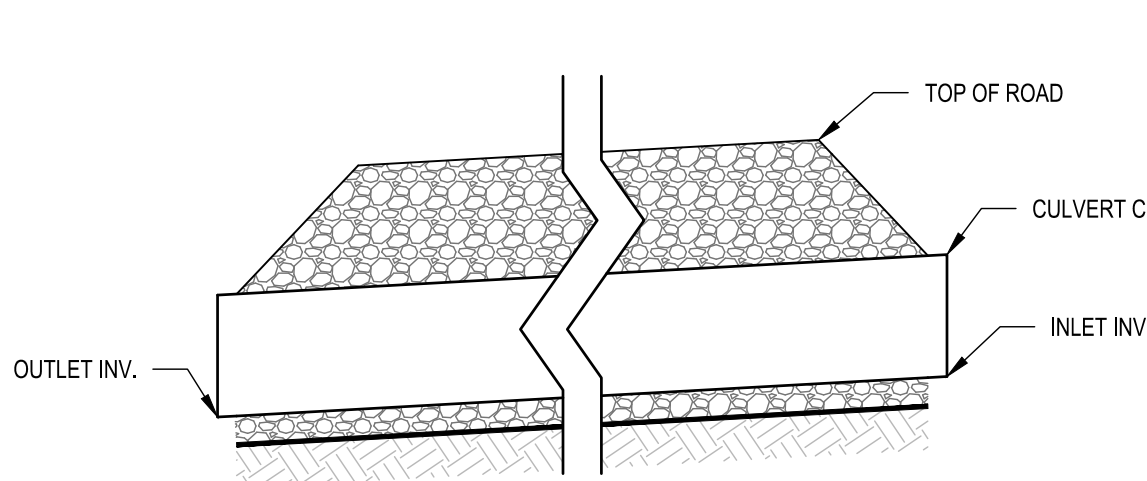


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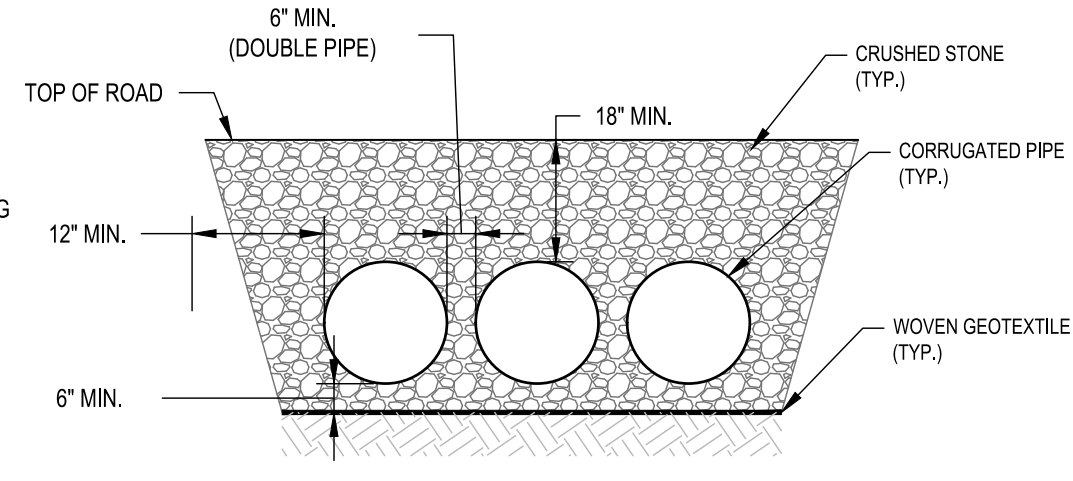
1. SEDIMENT BARRIER SHALL NOT BE PLACED UP SLOPE, OR IN A MANNER THAT WILL CREATE CHANNELIZED FLOW.
2. SEDIMENT BARRIERS SHALL BE INSPECTED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND IN ACCORDANCE WITH THE SITE EROSION AND SEDIMENTATION CONTROL PLAN.

4 TEMPORARY STOCKPILE AREA

NOT TO SCALE



CROSS SECTION VIEW:
PERPENDICULAR TO FLOW



CROSS SECTION VIEW:
PARALLEL TO FLOW

NOTES:

1. ALL CULVERT CROSSINGS SHALL HAVE A MINIMUM SLOPE OF 1%.
2. RIPRAP APRON SHALL BE INSTALLED AT OUTLET END OF CULVERT CROSSING. REFER TO DETAIL 8, THIS SHEET.
3. EXISTING 20\"/>

CULVERT CROSSING TABLE

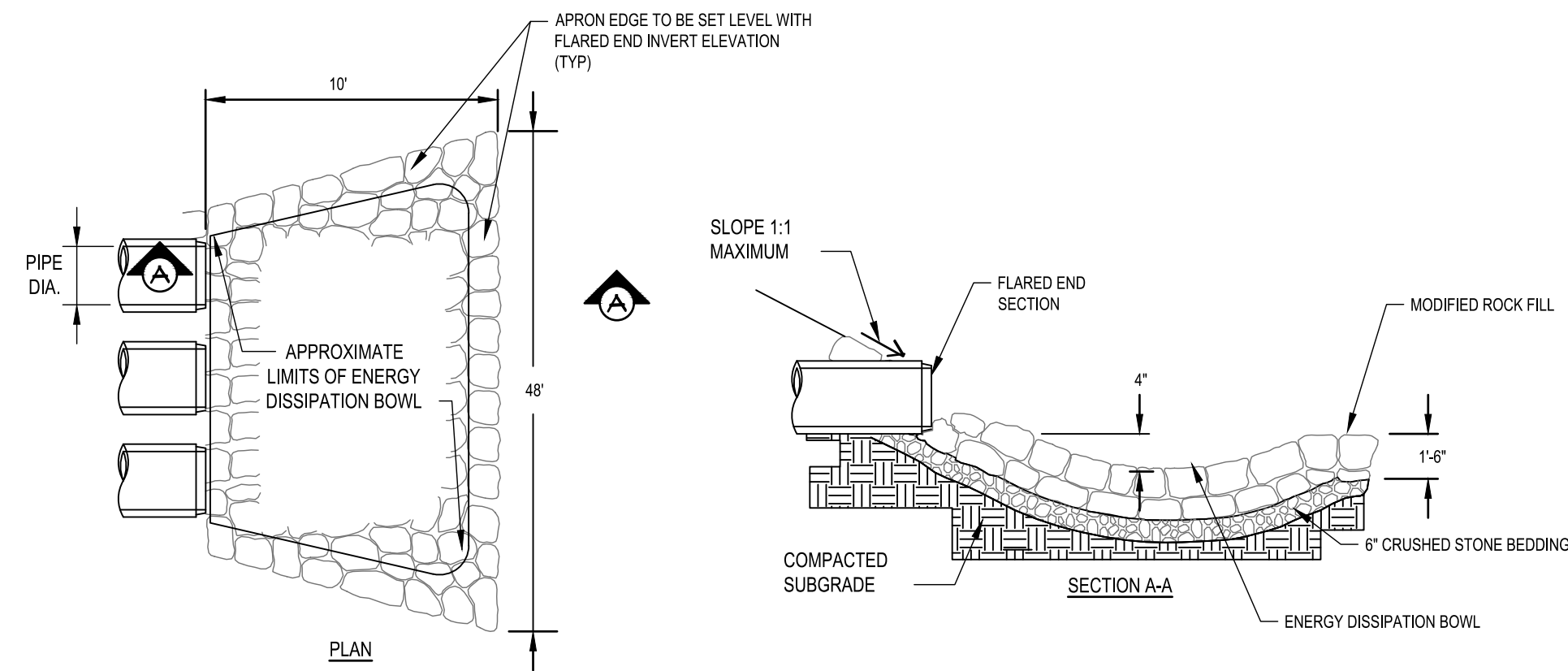
CROSSING NO.	NO. OF PIPES	PIPE LENGTH (FT)	PIPE DIAMETER (IN)	INV.IN ELEV (FT)	INV.OUT ELEV (FT)	SLOPE
1	3	40	24	189.00	188.30	1.75%

7 CULVERT CROSSING

NOT TO SCALE

5 STRAW WATTLE

NOT TO SCALE



NOTE:

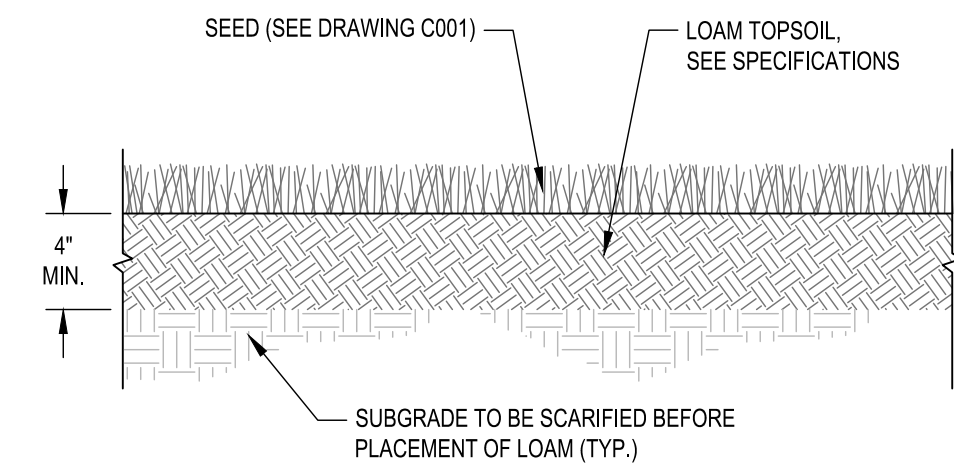
1. RIPRAP APRON SHALL BE INSTALLED AT BOTH THE INLET AND OUTLET ENDS OF THE PROPOSED CULVERT CROSSING (DETAIL 7.)

8 RIPRAP APRON

NOT TO SCALE

3 EROSION CONTROL BLANKET

NOT TO SCALE



6 LOAM AND SEED

NOT TO SCALE

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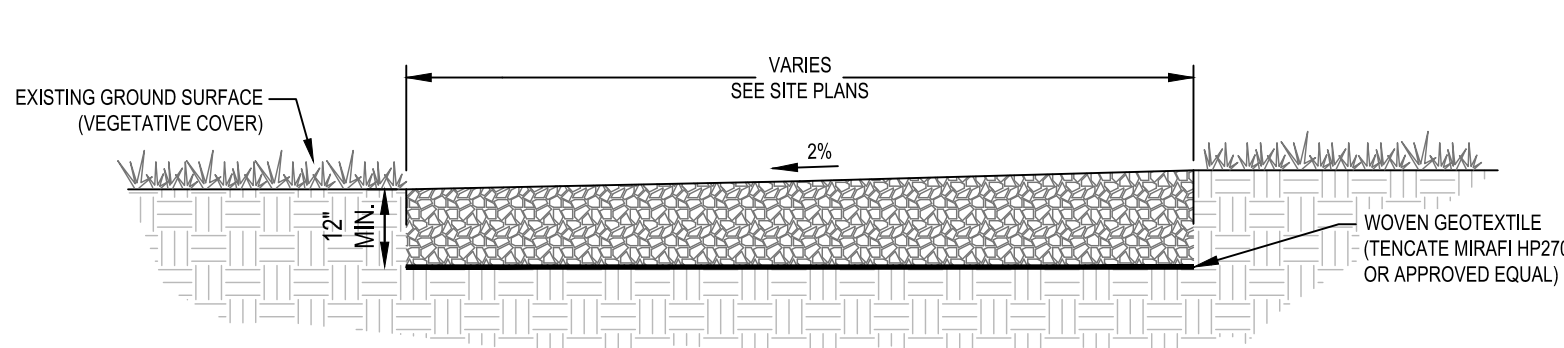
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SOIL EROSION AND SEDIMENTATION CONTROL DETAILS

Sheet Number:

C501

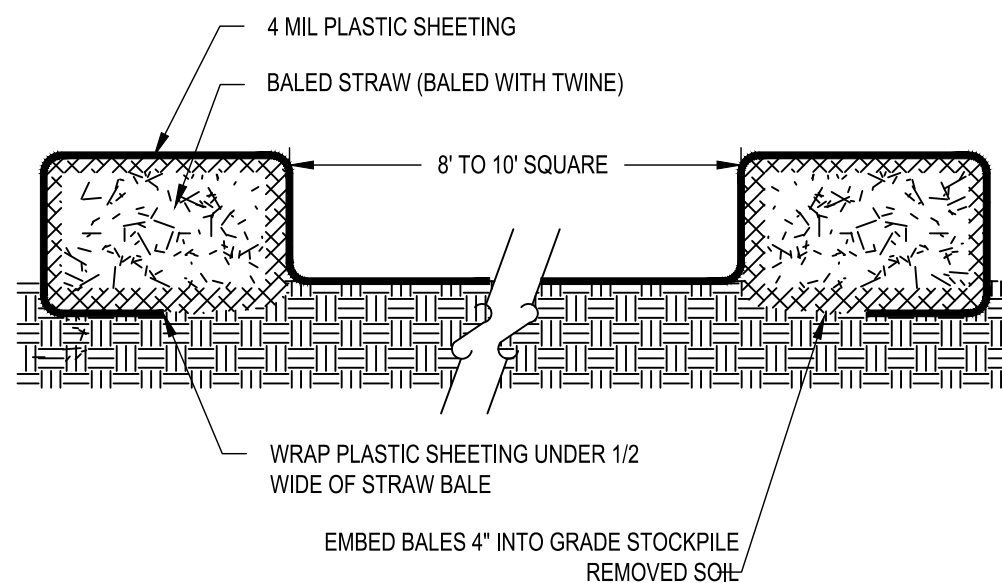
NOT FOR CONSTRUCTION



- NOTES:
- ACCESS ROAD TO BE CONSTRUCTED OF A MINIMUM 12" OF GRAVEL BORROW. SEE G002 FOR MATERIAL SPECIFICATIONS.
 - WOVEN GEOTEXTILE TO BE PLACED BETWEEN THE GROUND SURFACE AND THE GRAVEL BORROW.
 - CRUSHED GRAVEL SHALL BE COMPACTED TO A FIRM AND NON-YIELDING CONDITION.
 - ROAD SHALL BE CONSTRUCTED SO THAT STORMWATER DOES NOT CONCENTRATE ON THE ROAD SURFACE AND IS DISTRIBUTED IN SHEET FLOW TO VEGETATED SHOULDERS WHERE AVAILABLE.

1 GRAVEL ACCESS ROAD

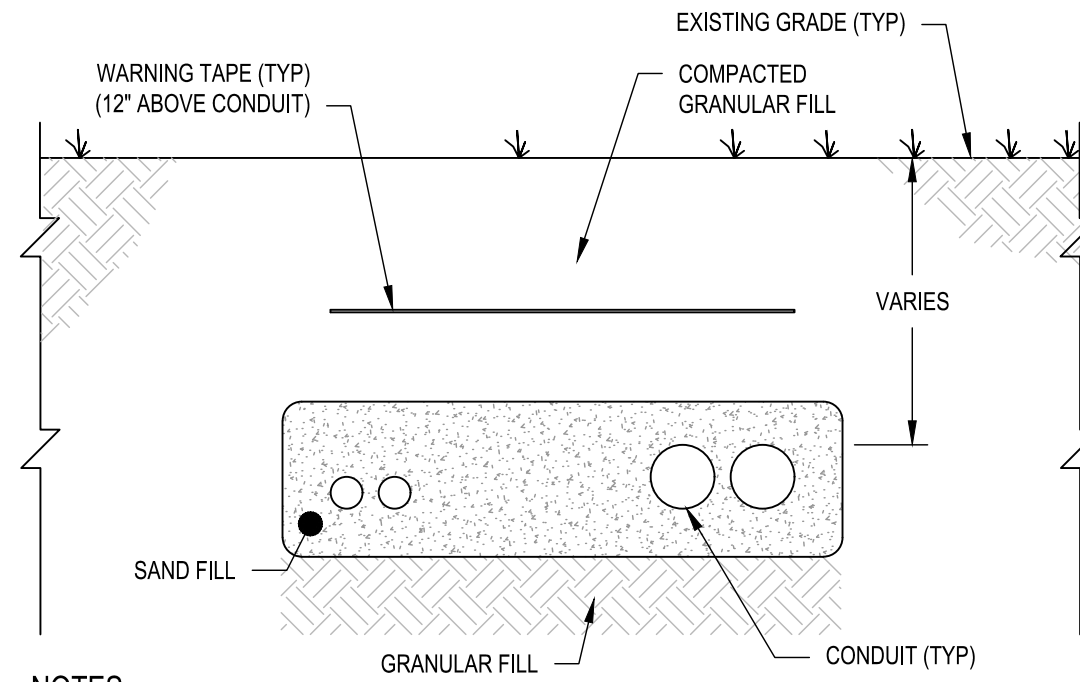
NOT TO SCALE



- NOTES:
- PLASTIC SHEETING SHALL BE FREE OF TEARS OR HOLES. AFTER BASIN IS USED, WASHWATER FROM WASHOUT BASIN SHALL EVAPORATE OR BE VACUUMED OUT. REMOVE REMAINING HARDENED SOLIDS. REPLACE PLASTIC SHEETING AND STRAWBALES AS REQUIRED.

2 CONCRETE WASHOUT BASIN

NOT TO SCALE

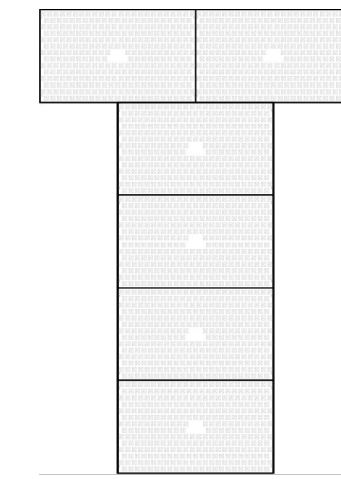


- NOTES:
- TRENCH SHOWN FOR ILLUSTRATIVE PURPOSES ONLY. ELECTRICAL DESIGN AND CONFORMANCE WITH ELECTRICAL CODE REQUIREMENTS BY ELECTRICAL ENGINEER OF RECORD.
 - ALL SIDES OF CONDUITS SHALL HAVE A MINIMUM OF 6" OF SAND BEDDING OFFSET FROM ALL SIDES.
 - FINAL DESIGN TO BE PROVIDED IN ELECTRICAL ENGINEERING PLAN SET.

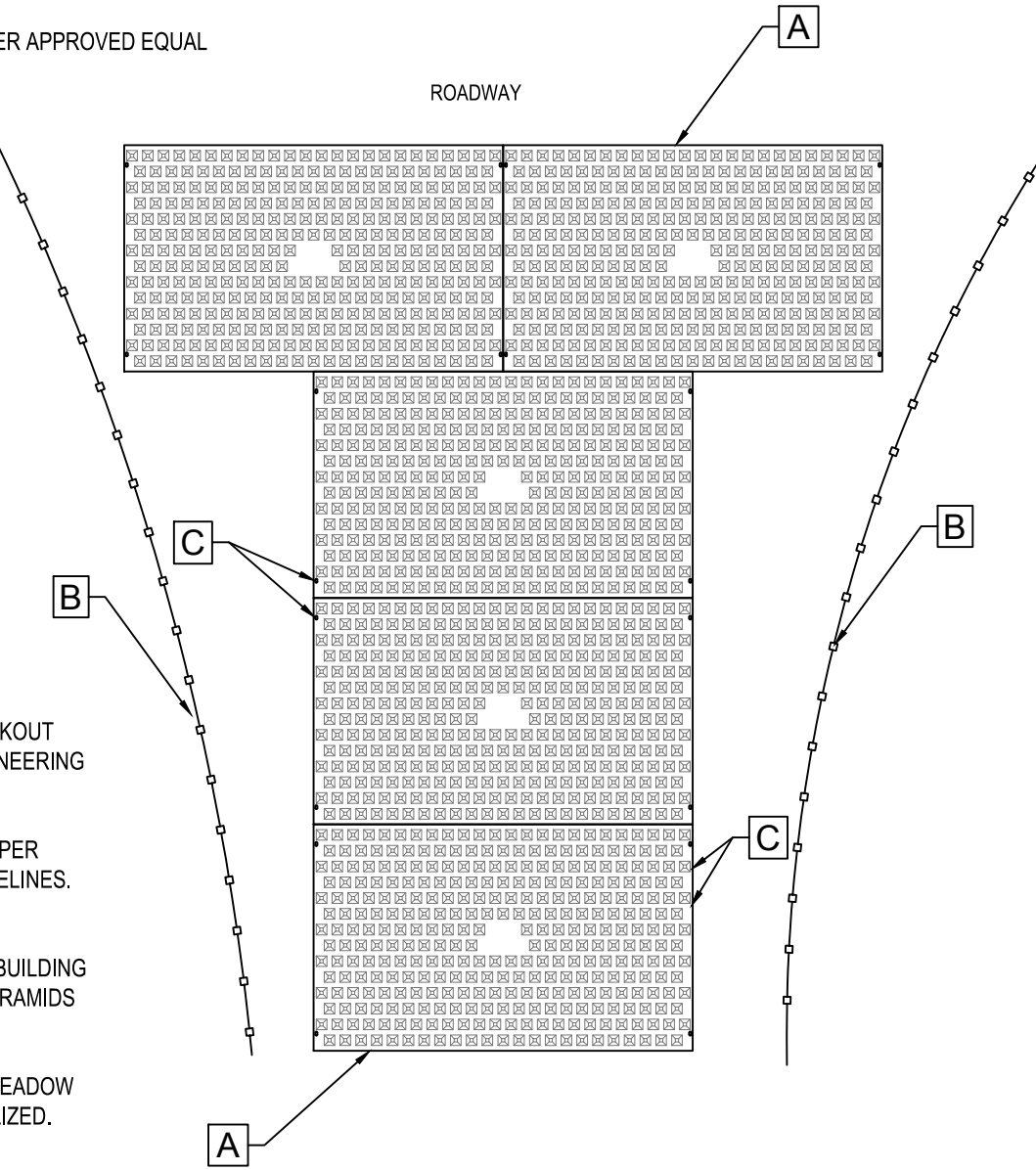
3 BELOW GRADE CONDUIT (TYP)

NOT TO SCALE

- LEGEND:
- FODS TRACKING CONTROL MAT OR ENGINEER APPROVED EQUAL
 - STRAW WATTLE
 - ANCHOR POINTS

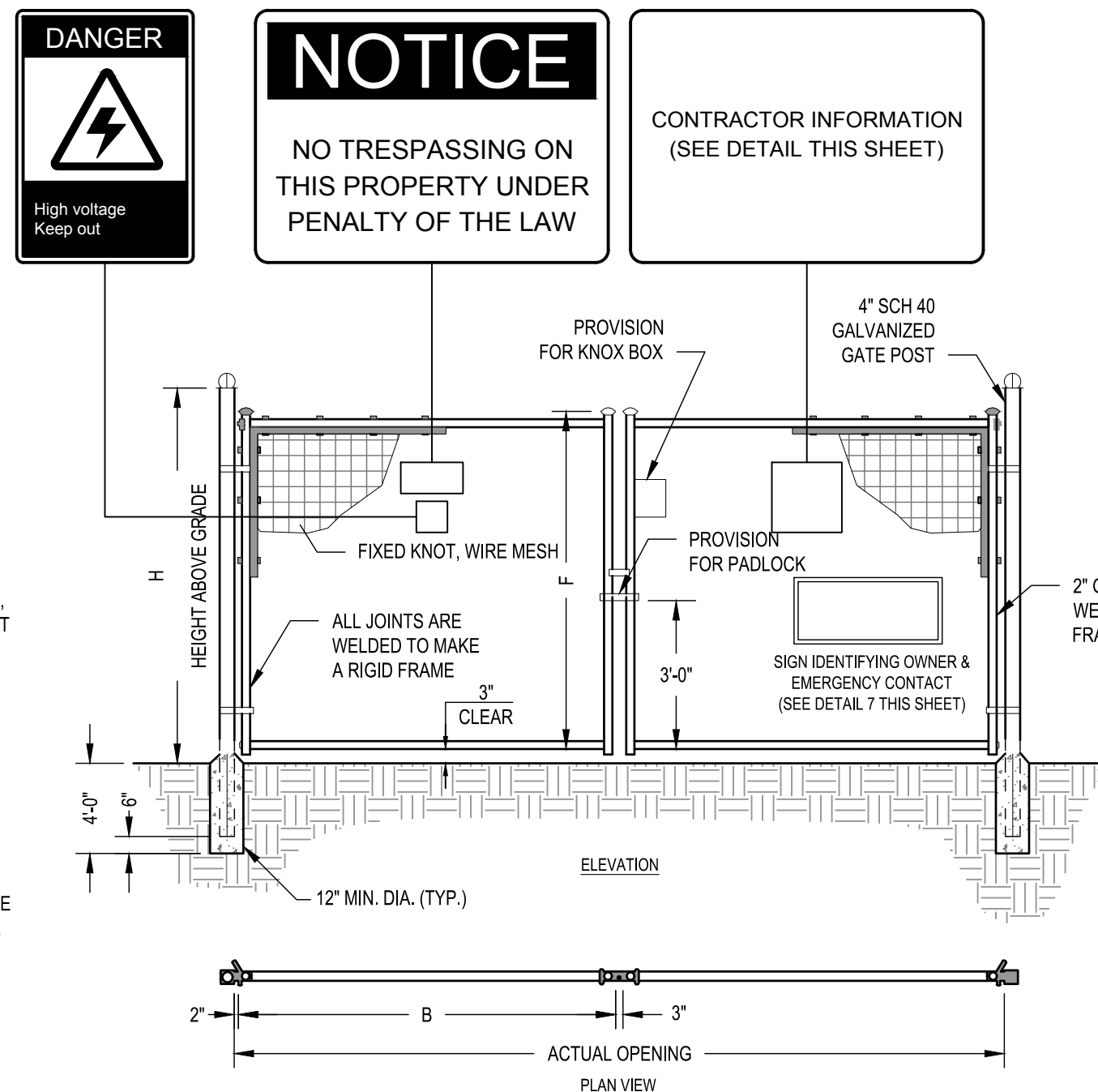


- NOTES:
- ANTI-TRACKING MAT TO BE FODS TRACKOUT CONTROL MATS MODEL #1100 OR ENGINEERING APPROVED EQUAL.
 - ANTI-TRACKING MAT TO BE INSTALLED PER MANUFACTURER'S INSTALLATION GUIDELINES.
 - SEDIMENT TO BE REMOVED FROM ANTI-TRACKING MAT WHEN SEDIMENT BUILDING REACHES HALF THE HEIGHT OF THE PYRAMIDS WITHIN THE ANTI-TRACKING MAT.
 - SEDIMENT TO BE REINTRODUCED TO MEADOW AREAS AMONGST THE SITE AND STABILIZED.



4 ANTI-TRACKING MAT

NOT TO SCALE



- NOTES:
- ALL FENCING AND HARDWARE SHALL BE GALVANIZED.
 - CONCRETE ENCASEMENT AT END AND GATE POSTS ONLY.
 - FIXED KNOT WIRE MESH TO BE BEKAERT SOLIDLOCK (R) PRO 30 (2016-3), 12-SAWG-16 HIGH TENSILE FIXED KNOT GAME FENCE OR APPROVED EQUIVALENT, INSTALLED AND BRACED PER MANUFACTURER'S RECOMMENDATIONS. NOT TO EXCEED 2" GAP ABOVE GRADE.
 - ENTRANCE GATE SHALL BE 24 FEET WIDE. GATE SHALL INCLUDE PROVISIONS FOR KNOX BOX OR SIMILAR LOCKING MECHANISM. LOCKING MECHANISM KEY SHALL BE GIVEN TO THE SOUTHAMPTON FIRE DEPARTMENT.
 - THE GATE POSTS SHALL BE GROUND IN ALL AREAS WHERE THE PV MODULES ARE LOCATED LESS THAN 10'-0" FROM THE FENCE TO LIMIT THE RISE OF HAZARDOUS VOLTAGE (IF APPLICABLE).

6 FIXED KNOT FARM FENCE DOUBLE GATE

NOT TO SCALE

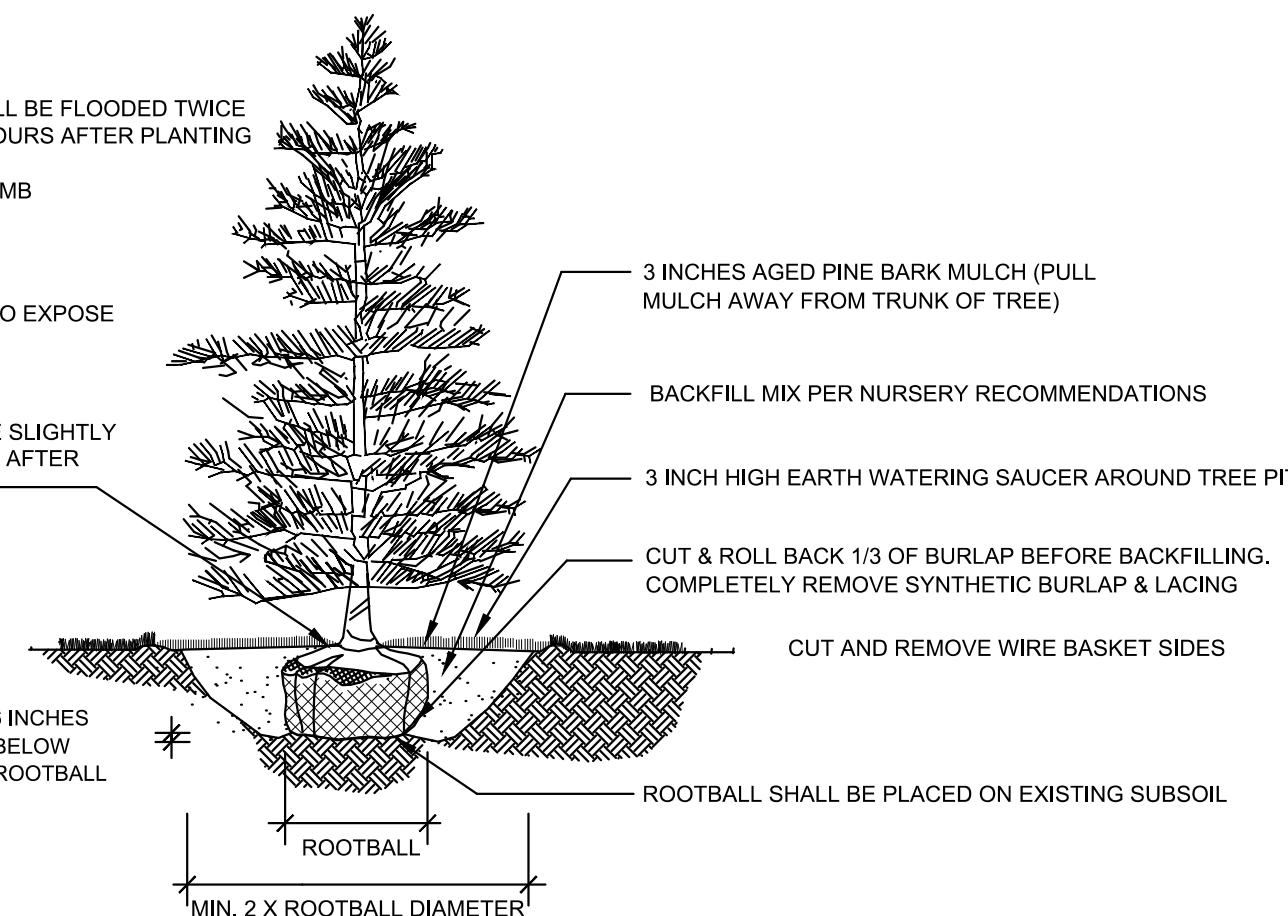
WATERING SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS AFTER PLANTING

TREE SHALL BE SET PLUMB

DO NOT CUT LEADER

REMOVE EXCESS SOIL TO EXPOSE ROOT FLARE

ROOT FLARE SHOULD BE SLIGHTLY ABOVE FINISHED GRADE AFTER SETTLEMENT



- NOTE:
- DETAIL PROVIDED TO SHOW PLANTING REQUIREMENTS.
 - PLANTING SCHEDULE INCLUDED ON C106.

9 VEGETATIVE SCREENING TREE

NOT TO SCALE

# WIRE	NOMENCLATURE	LENGTH	WEIGHT
23	23/120/6	330'	492
20	20/96/6	165'	308
20	20/96/6	330'	295
20	20/96/6	500'	598
17	17/96/6	330'	355
17	17/75/6	330'	326
10	10/60/6	330'	210

# WIRE	NOMENCLATURE	LENGTH	WEIGHT
23	23/120/12	330'	343
20	20/96/12	330'	282
20	20/96/12	660'	564
17	17/96/12	330'	248
17	17/96/12	660'	496
17	17/75/12	330'	235
10	10/60/12	660'	294

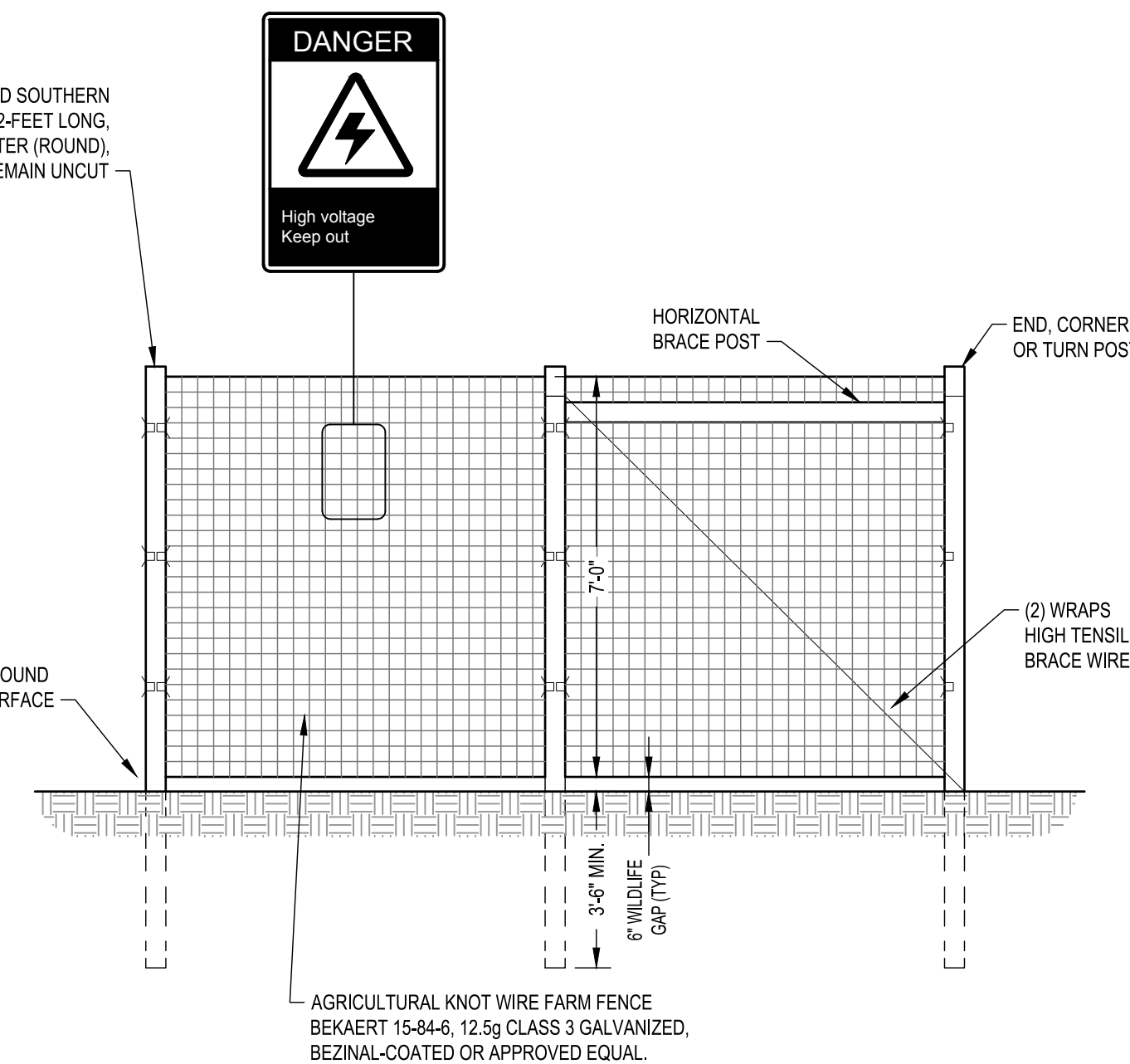
WIRE	GAUGE	TENSILE STRENGTH	BREAKING LOAD	GALVANIZATION
Line Wires	12	Hi-Tensile 190K-212K	1347 lbs-1687 lbs	.85 oz.-1.4 oz. per sq. ft.
Stay Wires	12	Med-Tensile 140K-170K	1048 lbs-1273 lbs	.85 oz.-1.4 oz. per sq. ft.
Knot Wires	13	Low Tensile 57K-76K	311 lbs-456 lbs	.85 oz.-1.4 oz. per sq. ft.

ORDER NOMENCLATURE

The first two numbers indicate the number or horizontal wires, while the second two numbers indicate the height of the fence. The last number is the distance between vertical stays.

Example: 20/96/12 is a roll with 20 horizontal wires, is 96" high, with vertical stays 12" apart.

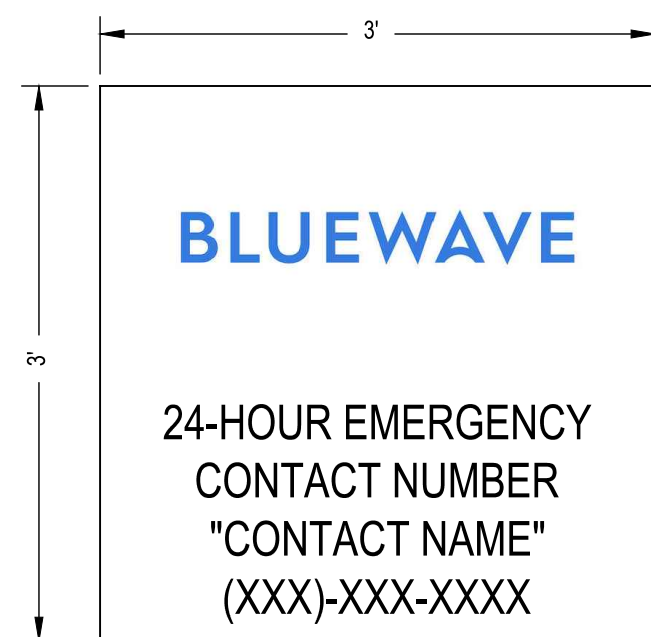
- Note new higher strength vertical stay wire spec.
- Other configurations available on special order basis



- NOTES:
- END, CORNER AND BRACE ASSEMBLIES PER BEKAERT SPECIFICATIONS

5 FIXED KNOT FARM FENCE

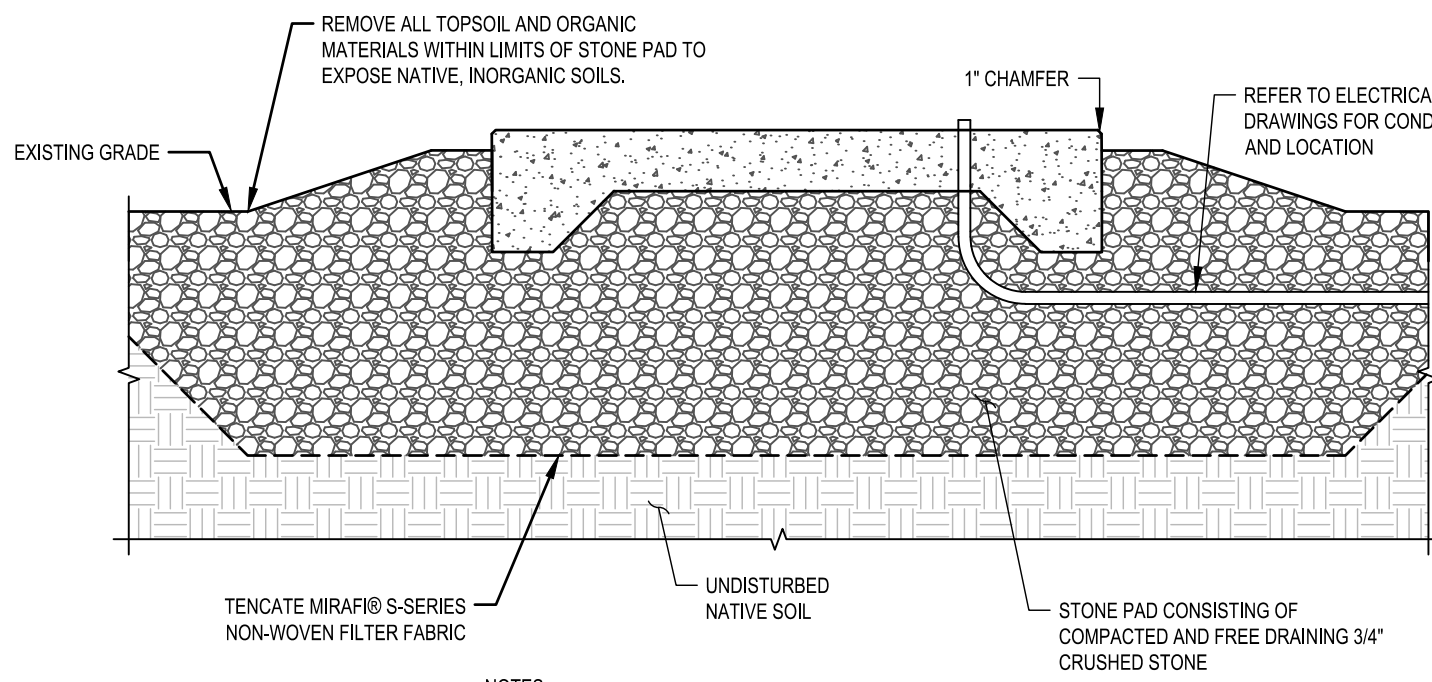
NOT TO SCALE



- NOTE:
- CONTRACTOR TO VERIFY EMERGENCY CONTACT NUMBER

7 CONTRACTOR INFORMATION SIGN

NOT TO SCALE



- NOTES:
- DETAIL SHOWN FOR ILLUSTRATIVE PURPOSES. FINAL EQUIPMENT PAD DESIGN TO BE PERFORMED BY OTHERS.

8 CONCRETE EQUIPMENT PAD SECTION (TYP)

NOT TO SCALE

NOT FOR CONSTRUCTION

Project:
MANHAN RIVER, LLC
43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073

Weston & Sampson
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON

Client:
BLUEWAVE
MANHAN RIVER, LLC
116 Harrington Ave., Suite 601
Boston, MA 02116
Tel. (617) 209-3122 https://www.bluewave.energy/

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No.	Description	Date
3	PEER REVIEW COMMENTS	05/29/26
2	PEER REVIEW COMMENTS	04/30/26
1	CONS COM / DEP COMMENTS	01/30/26
0	ISSUED FOR PERMITTING	11/25/25
Revisions		
Seal:		
COMM. SEAL OF MASSACHUSETTS MELINDA COSTELLO CIVIL No. 52956 PROFESSIONAL ENGINEER 11/25/25		
Issued For:		

PERMITTING

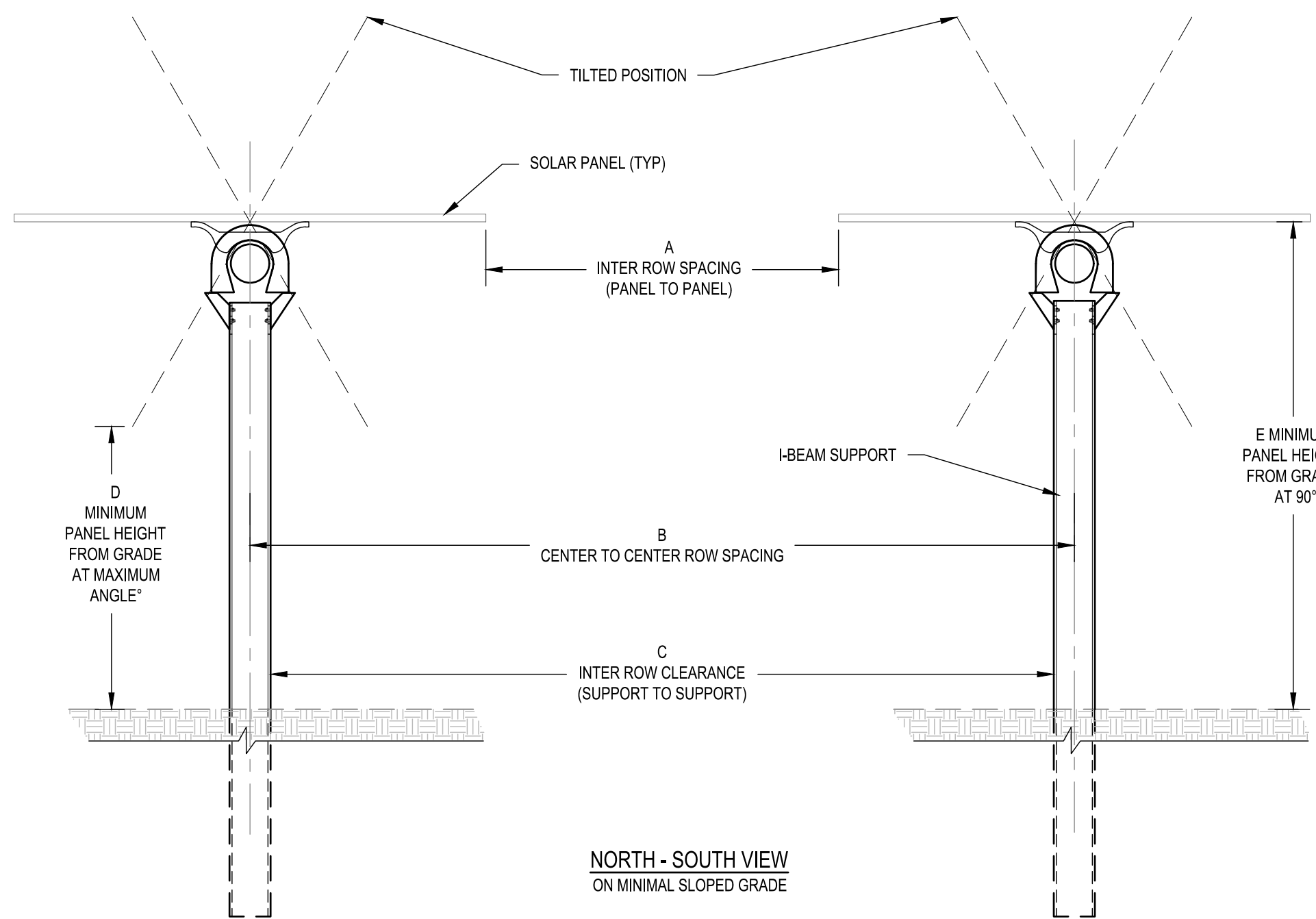
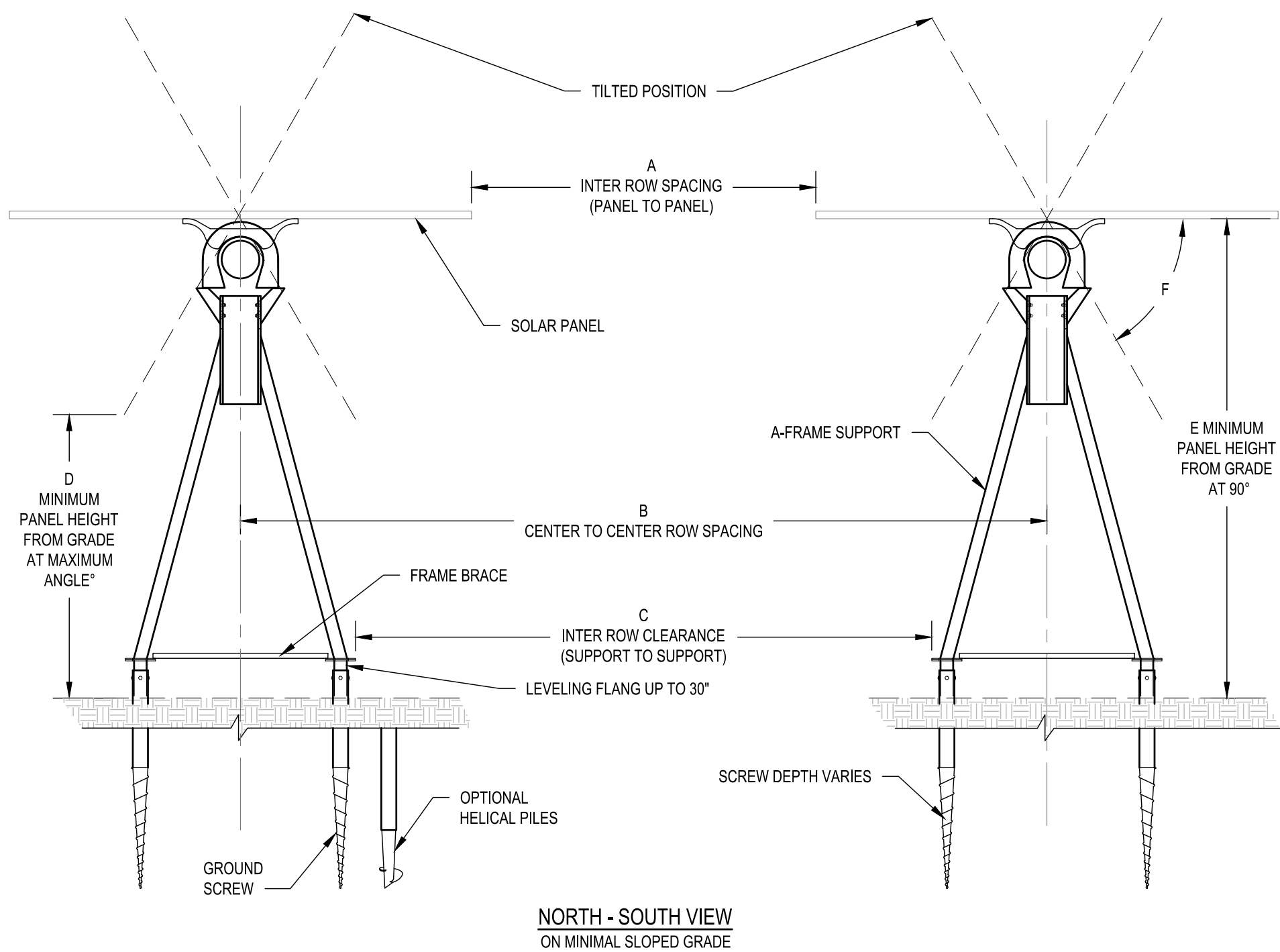
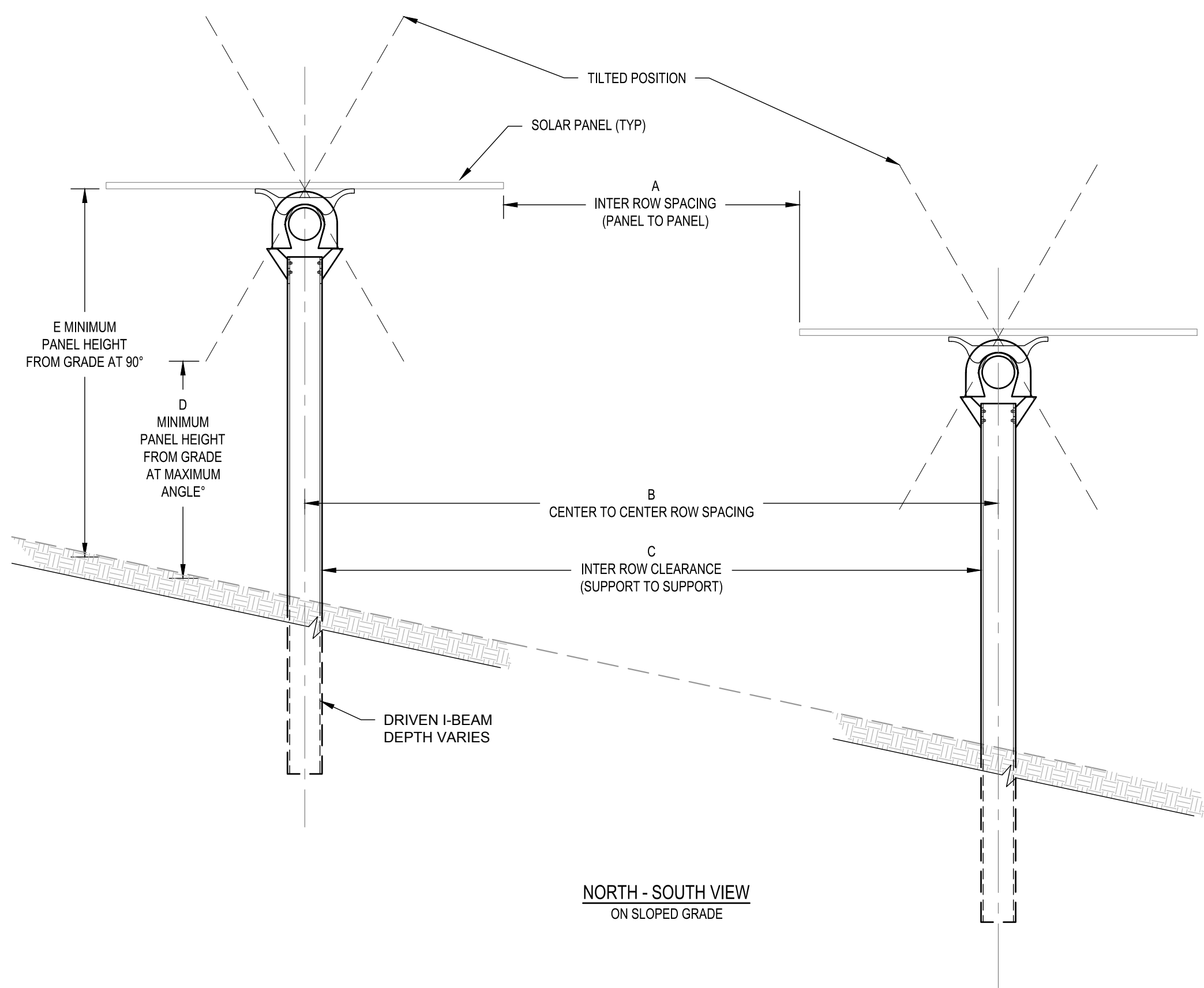
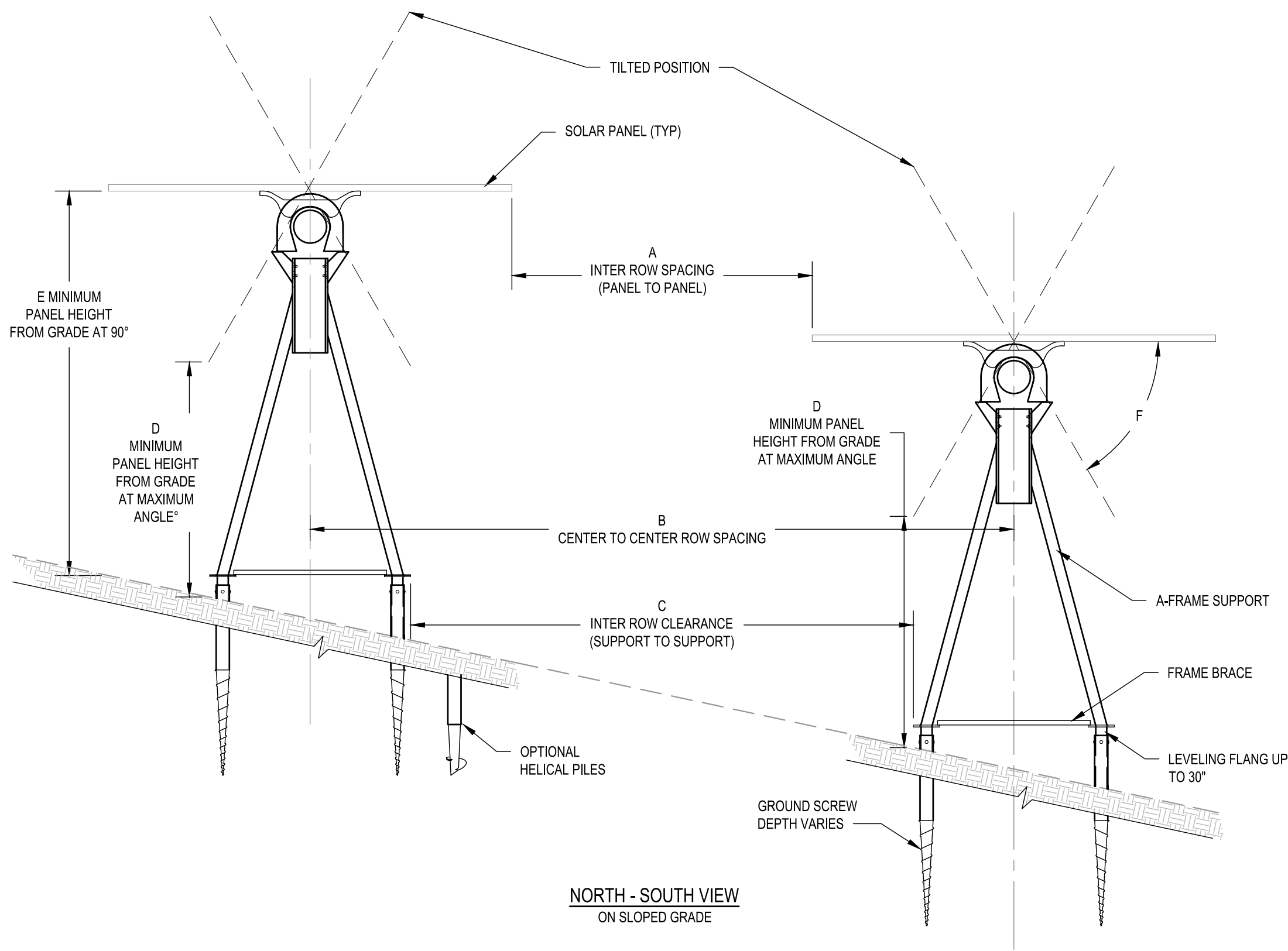
Issued Date:	11/25/2025
Scale:	AS NOTED
Drawn By:	RJR/KA
Reviewed By:	NVG
Approved By:	MRC
W&S Project No.:	ENG24-0244

Drawing Title:
CIVIL DETAILS
Sheet Number:

C502

KEY SYSTEM DIMENSIONS						
NON-SOLAR USE	A (MIN)	B (MIN)	C (MIN)	D (MIN)	E (MIN)	F
HAY PRODUCTION	18'	26'	TBD	TBD	TBD	TBD

- NOTES:
1. DETAIL SHOWN FOR ILLUSTRATION PURPOSES ONLY. RACKING DESIGN BY OTHERS.
 2. REFER TO ELECTRICAL AND STRUCTURAL PLANS FOR FINAL RACKING DESIGN, CONFIGURATION, HEIGHT AND INTER ROW SPACING.



GENERAL ROW SPACING REQUIREMENTS
A-FRAME STYLE SUPPORT SYSTEM

1 NOT TO SCALE

GENERAL ROW SPACING REQUIREMENTS
I-BEAM STYLE SUPPORT SYSTEM

2 NOT TO SCALE

NOT FOR CONSTRUCTION

Project: MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978.532.1900 800.SAMPSON

Client:

BLUEWAVE

MANHAN RIVER, LLC

116 Huntington Ave, Suite 601
Boston, MA 02116
Tel: (617) 209-3122 https://www.bluewave.energy/

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0	ISSUED FOR PERMITTING	11/25/25

Revisions

Seal:

MELINDA COSTELLO
CIVIL
No. 52956
PROFESSIONAL ENGINEER

Issued For:

PERMITTING

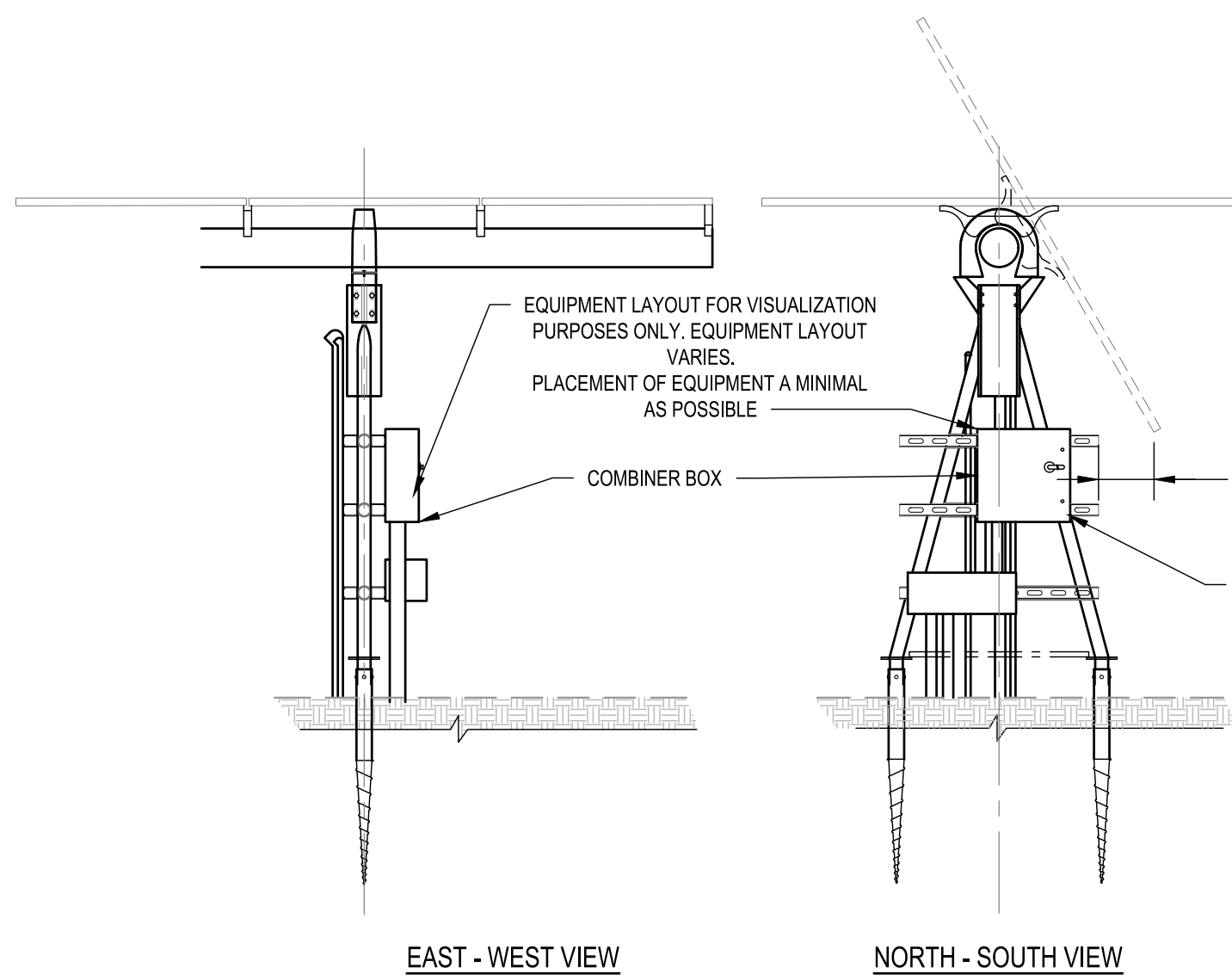
Issued Date: 11/25/2025
Scale: AS NOTED
Drawn By: RJR/KA
Reviewed By: NVG
Approved By: MRC
W&S Project No.: ENG24-0244

Drawing Title:

DUAL USE SOLAR
STANDARD
AGRICULTURAL
DETAILS

Sheet Number:

C503

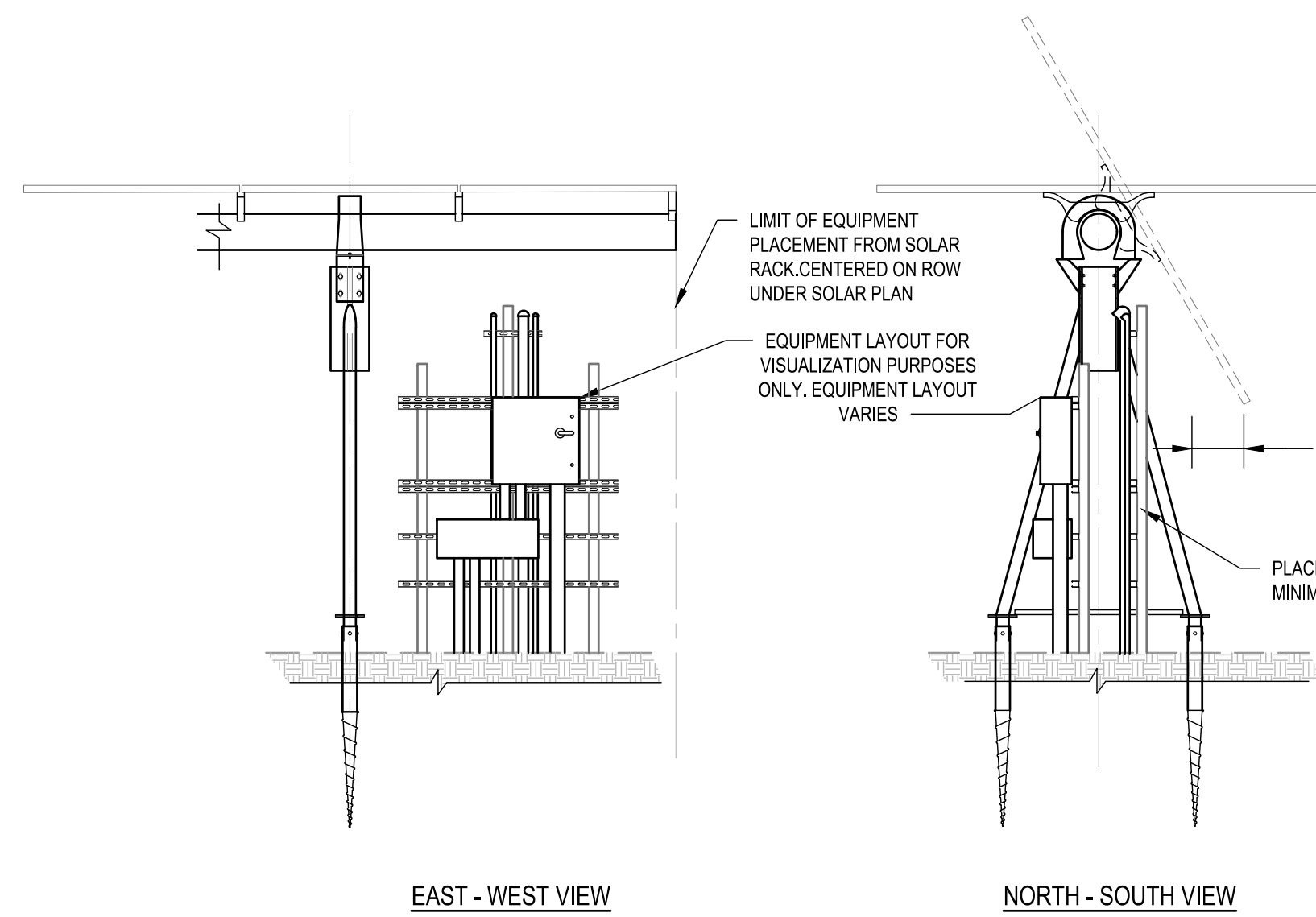


EAST - WEST VIEW

NORTH - SOUTH VIEW

A-FRAME RACK SYSTEM WITH EQUIPMENT MOUNTED ON THE A-FRAME SYSTEM

1
NOT TO SCALE

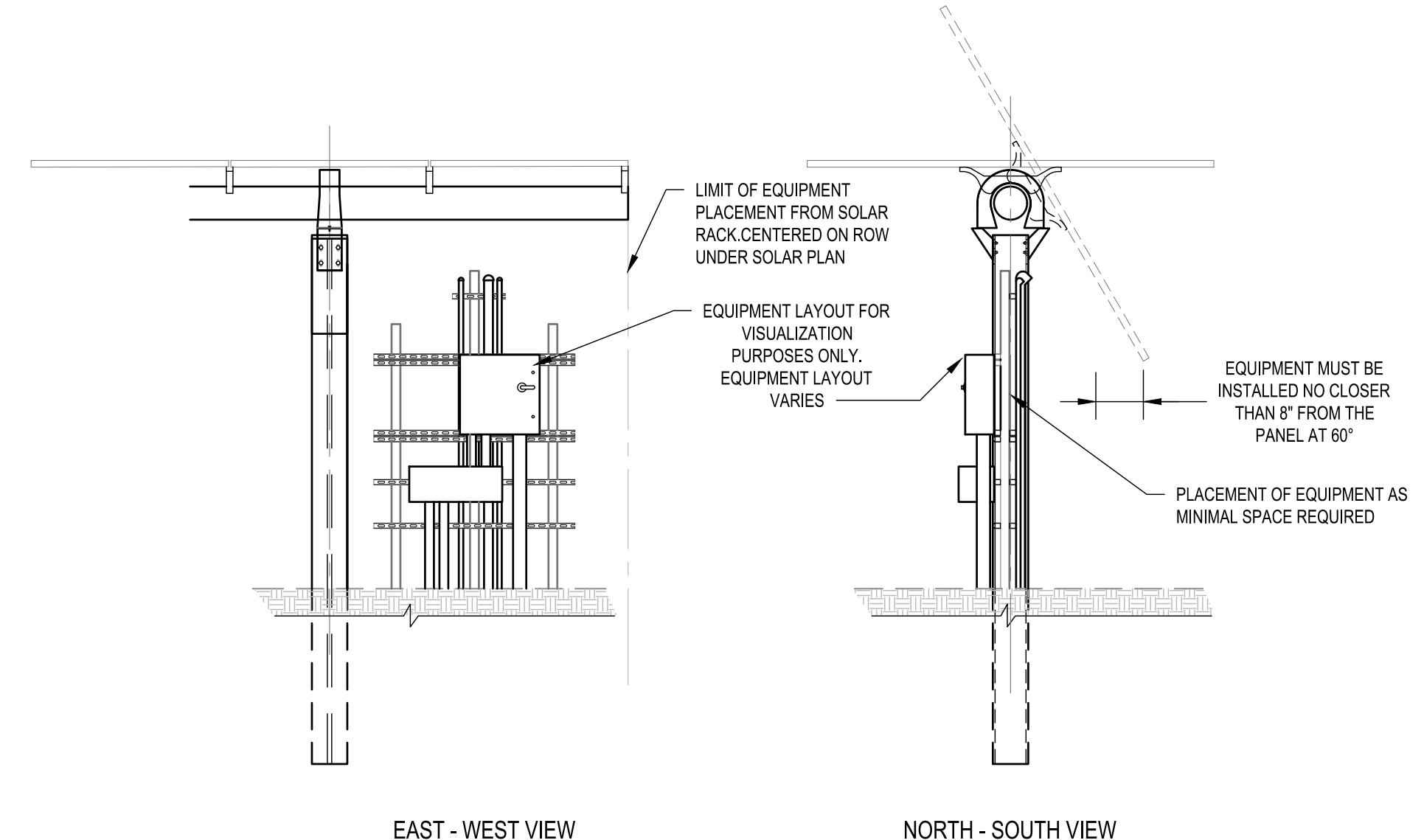


EAST - WEST VIEW

NORTH - SOUTH VIEW

A-FRAME RACK SYSTEM WITH EQUIPMENT PLACEMENT UNDER SOLAR PANELS

2
NOT TO SCALE

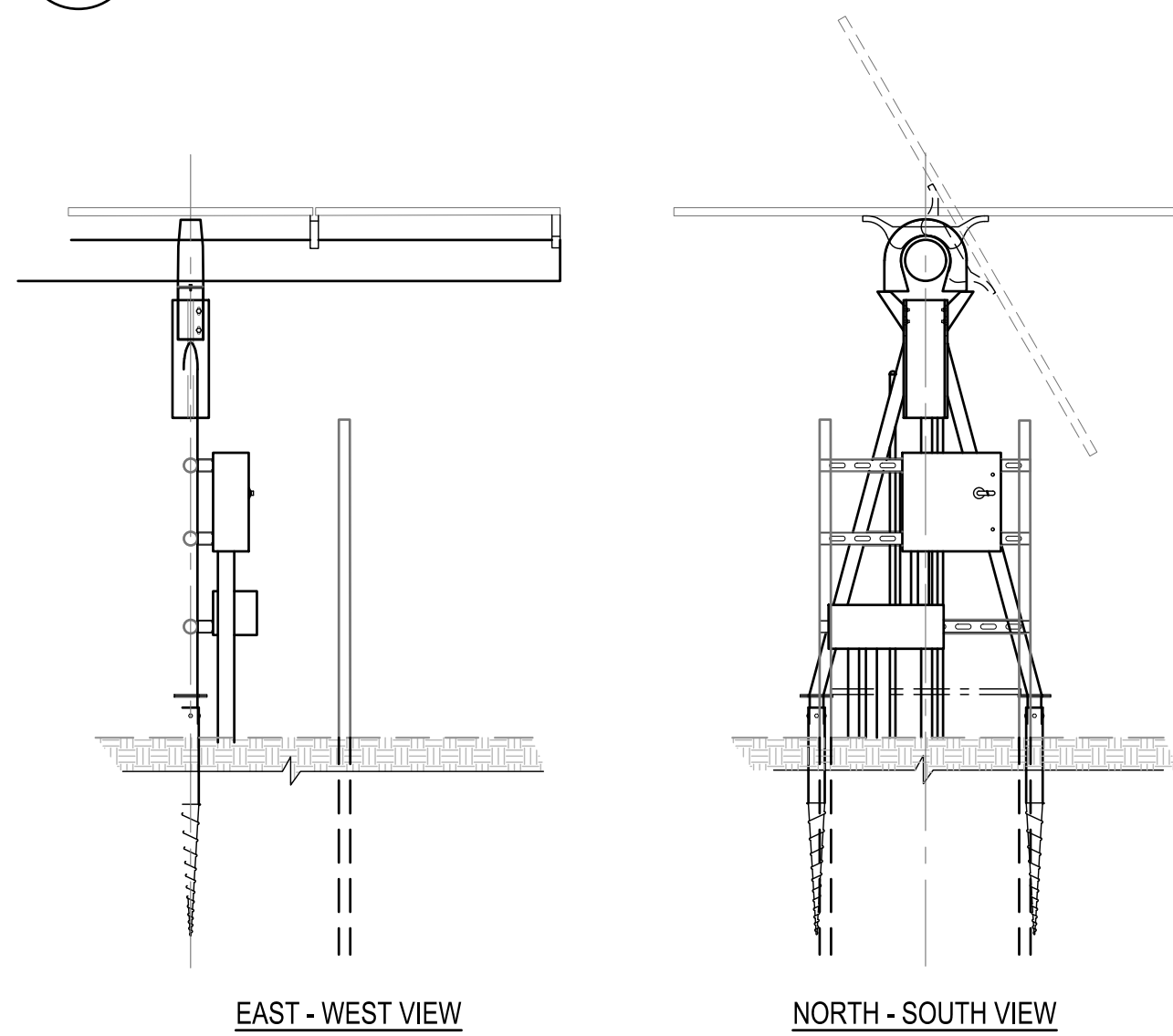


EAST - WEST VIEW

NORTH - SOUTH VIEW

I-BEAM RACK SYSTEM WITH EQUIPMENT PLACEMENT UNDER SOLAR PANELS

3
NOT TO SCALE

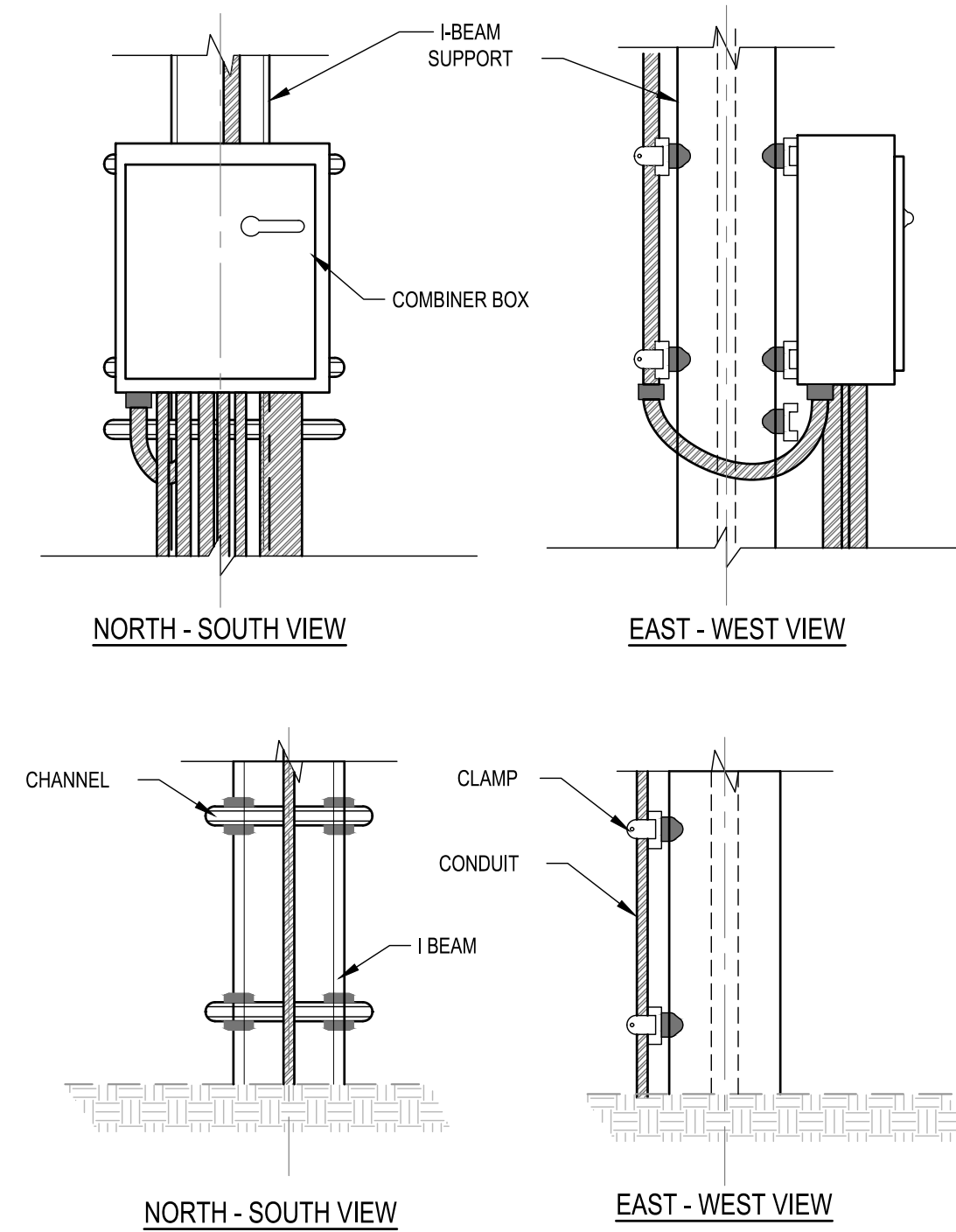


EAST - WEST VIEW

NORTH - SOUTH VIEW

STEEL POST PROTECTION

4
NOT TO SCALE

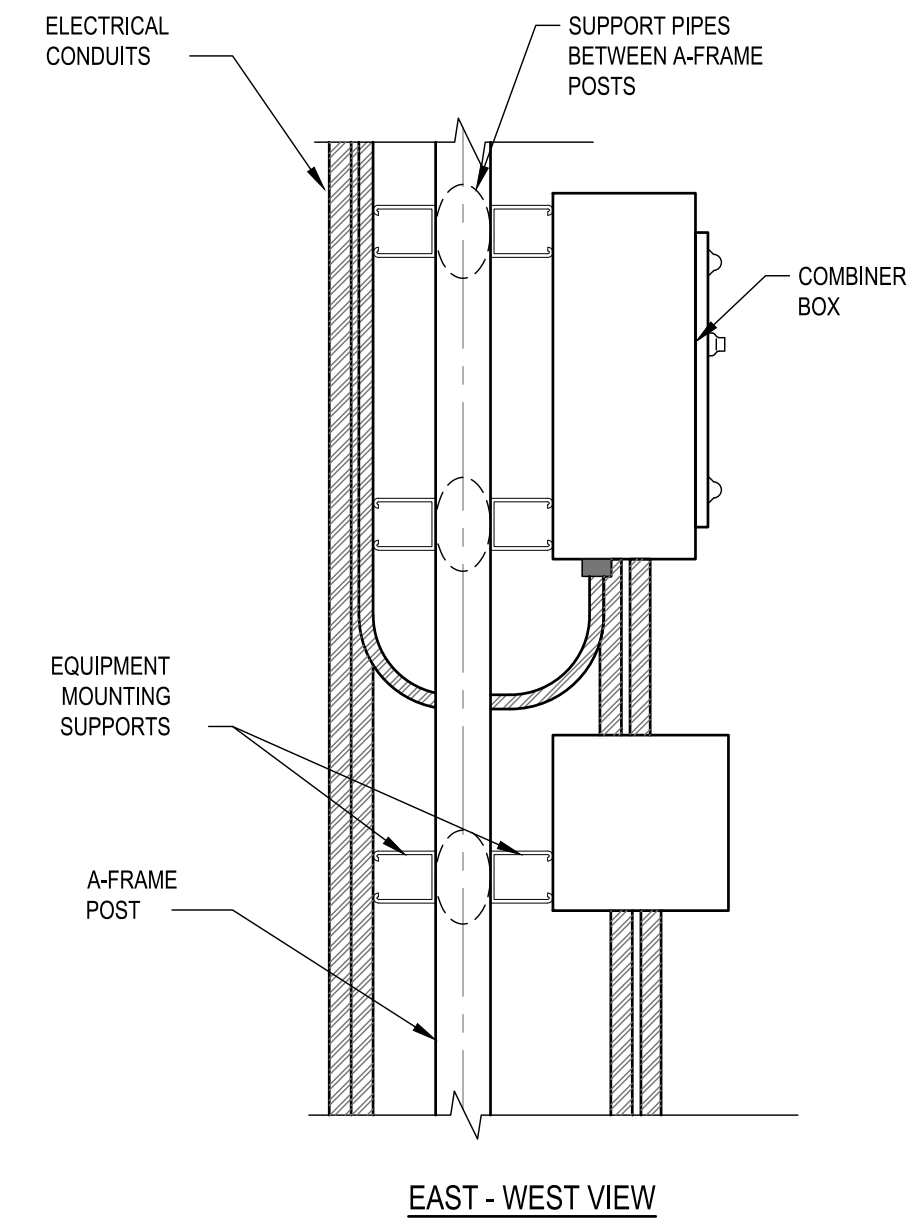


NORTH - SOUTH VIEW

EAST - WEST VIEW

NORTH - SOUTH VIEW

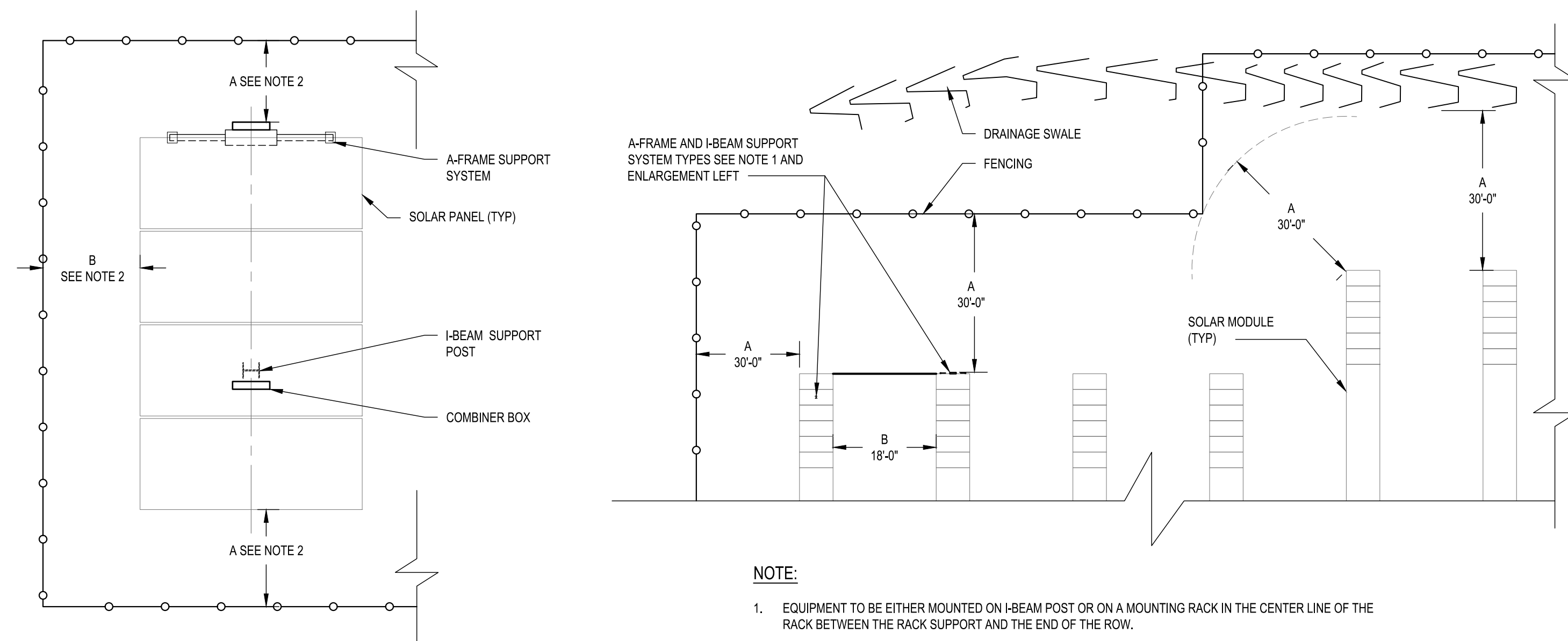
EAST - WEST VIEW



EAST - WEST VIEW

A-FRAME MOUNTED EQUIPMENT ENLARGEMENT

6
NOT TO SCALE



NOTE:

- EQUIPMENT TO BE EITHER MOUNTED ON I-BEAM POST OR ON A MOUNTING RACK IN THE CENTER LINE OF THE RACK BETWEEN THE RACK SUPPORT AND THE END OF THE ROW.
- DISTANCE BETWEEN ANY OBSTRUCTION NOT TO BE LESS THAN A OR B.

FENCE AND ROW BUFFERS

7
NOT TO SCALE

Project:
MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON,
MASSACHUSETTS 01073

Weston & Sampson

Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
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978.532.1900 800.SAMPSON

Client:

BLUEWAVE

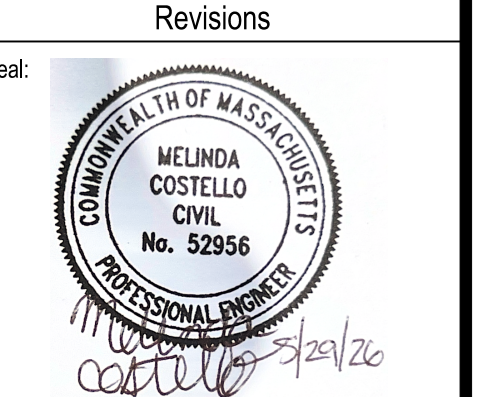
MANHAN RIVER, LLC

116 Huntington Ave., Suite 601
Boston, MA 02116
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0	ISSUED FOR PERMITTING	11/25/25



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Issued Date:	11/25/2025
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Drawn By:	RJR/KA
Reviewed By:	NVG
Approved By:	MRC
W&S Project No.:	ENG24-0244

Drawing Title:

DUAL USE SOLAR
STANDARD
AGRICULTURAL
DETAILS

Sheet Number:

C504

NOT FOR CONSTRUCTION

Appendix D: Noise Analysis

MEMORANDUM

TO: Michael Zhe, Senior Director - Project Development

FROM: Andrew Hamel, Project Manager
Melinda Costello, PE, Senior Team Leader

DATE: March 13, 2026

SUBJECT: Sound Pressure Calculations
Manhan River, LLC
43 & 53 Pleasant Street, Southampton MA

Weston & Sampson Engineers, Inc. (Weston & Sampson), is pleased to provide Manhan River, LLC with the attached sound calculations for the proposed solar photovoltaic (PV) and battery energy storage system (BESS) project located on Pleasant Street, Southampton MA (the site). As proposed, the site is a 5.49 MW (DC) solar array coupled with BESS. This memo and corresponding calculations have been generated in response to the Town of Southampton's Zoning Bylaw sections 275-7.6.C.3 & 4.

Massachusetts Department of Environmental Protection (MassDEP) Policy 310 CMR 7.10 outlines that sounds for proposed projects may not increase sound conditions by more than 10 weighted decibels (dBA) above ambient background noises and prevents "pure tone" conditions measured at the property line and nearest inhabited residence.

As proposed, there are two equipment areas on site, each of which includes 15 inverters, a transformer, and two BESS containers. Manhan River, LLC provided Weston & Sampson with specification sheets for the associated equipment (refer to Appendix H in the Site Plan Review Application). The noise rating for the proposed BESS was not available the time these calculations were performed, therefore, an industry standard of 70 (dBA) at one meter was used as part of these calculations.

By using the Inverse Square Law, the standards set by ISO9613-2: 2024 – Attenuation of Sound During Propagation Outdoors, and the associated decibel ratings for the proposed equipment, we calculated the drop in decibels to the closest adjacent property line / right of way in the four cardinal directions for each equipment pad area. These have been designated as "North Equipment Pad" and "South Equipment Pad". The calculated sound levels were then compared to ambient noise levels, which were collected in the field by Weston & Sampson on February 18, 2026.

The following tables summarize the sound-emitting equipment, as well as the anticipated decibel rating at the closest property line. As a factor of safety, a 5 dB noise penalty was added to account for potential discrepancies between theoretical calculations and real-world scenarios.

Table 1. North Equipment Pad Sound-Emitting Equipment

Equipment	Listed Sound Pressure (dBA)	Number of Equipment Units	Distance of Observed Sound Level (meters, m)	Total Approximate Sound Pressure (dBA)	Equipment Pad Area Total Approximate Sound Pressure (dBA)
Transformer	62	1	1	62	88
Inverter	73	15	1	85	
BESS	70	2	1	73	

Table 2. South Equipment Pad Sound-Emitting Equipment

Equipment	Listed Sound Pressure (dBA)	Number of Equipment Units	Distance of Observed Sound Level (meters, m)	Total Approximate Sound Pressure (dBA)	Equipment Pad Area Total Approximate Sound Pressure (dBA) ¹
Transformer	62	1	1	62	88
Inverter	73	15	1	85	
BESS	70	2	1	73	

Table 3. North Equipment Pad Sound-Emitting Equipment Calculation Summary²

Direction ³	Distance to Property Line (m)	Equipment Noise Level (dBA) at Property Line ⁴	Average Ambient Measured Noise Level (dBA)
East (Receiver-1)	75.4	39	52
North (Receiver-2)	327.7	25	52
South (Receiver-3)	426.7	23	52
West (Receiver-4)	427.0	23	52

¹ Shown Total Approximate Sound Pressure is greater than calculated, as the shown number accounts for temperature and relative humidity (20°C, 70% RH)

² Calculations were performed based on noise level specifications from typical equipment, which are subject to change based on equipment selected during procurement and construction of the project, if approved.

³ (Receiver-#) correlates to the data point referenced in the Noise Mapping Results Report

⁴ Values shown include a 5 dB factor of safety compared to the noise level referenced in the Noise Mapping Results Report (Attachment B)

Table 4. South Equipment Pad Sound-Emitting Equipment Calculation Summary ⁵			
Direction ⁶	Distance to Property Line (m)	Equipment Noise Level (dBA) at Property Line ⁷	Average Ambient Measured Noise Level (dBA)
East (Receiver-1)	193.0	30	52
South (Receiver-2)	224.0	29	52
North (Receiver-3)	226.0	29	52
West (Receiver-4)	321.0	26	52

In summary, with a 5 dB factor of safety increase included, the proposed equipment noise levels will be less than a 10 dBA increase from ambient measured noise levels at the property line. Also, the performed calculations do not account for additional sound dampening that can be associated with vegetation or other structures, therefore these calculations are assumed to be a theoretical maximum.

Attachment:

Attachment A - Equipment Area Decibel Calculations

Attachment B - Noise Mapping Results Report

Attachment C - Noise Mapping Report – Calculations

⁵ Calculations were performed based on noise level specifications from typical equipment, which are subject to change based on equipment selected during procurement and construction of the project, if approved.

⁶ (Receiver-#) correlates to the data point referenced in the Noise Mapping Results Report

⁷ Values shown include a 5 dB factor of safety compared to the noise level referenced in the Noise Mapping Results Report (Attachment B)

Attachment A – Equipment Area Decibel Calculations

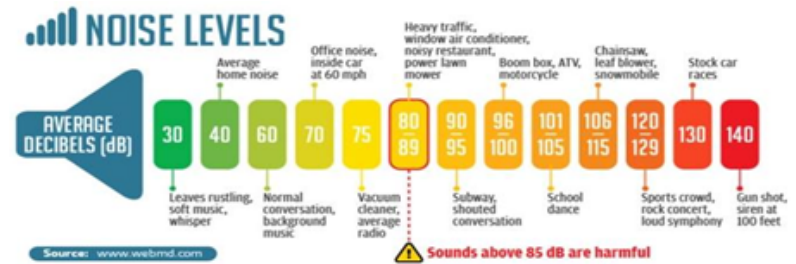
Southampton - Pleasant Street
5.49 MW (DC) With Coupled BESS
Manhan River, LLC
North Equipment Pad Sound Pressure Calculations

BESS				
Noise Source (dB)	W	Total W	Total dB	
BESS x2	70	0.00001	0.00002	73.0103
	70	0.00001		

Invertor				
Noise Source (dB)	Power (W)	Total W	Total dB	
Inverters x15	73	1.9953E-05	0.000299289	84.76
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
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	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		

Transformer				
Noise Source (dB)	W	Total W	Total dB	
Transformers x1	62	1.5849E-06	1.58489E-06	62

Equipment Area 1 Sum				
Noise Source (dB)	Power (W)	Total W	Total dB	
73.0103	2E-05	0.000320811	85.0625	
84.76	0.00029923			
62	1.5849E-06			



Average Maximum Ambient
Sound Pressure Reading
collected on 2/17/2026 between
1:50-3:30pm = 52 dBA



Ambient
reading
recording
location

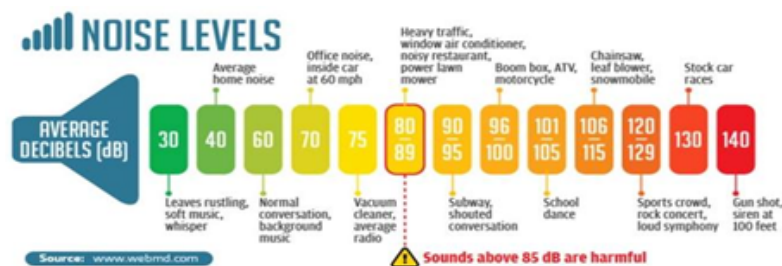
Southampton - Pleasant Street
5.49 MW (DC) With Coupled BESS
Manhan River, LLC
South Equipment Pad Sound Pressure Calculations

BESS				
Noise Source (dB)	W	Total W	Total dB	
BESS x2	70	0.00001	0.00002	73.0103
	70	0.00001		

Invertor				
Noise Source (dB)	Power (W)	Total W	Total dB	
Inverters x15	73	1.9953E-05	0.000299289	84.76
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
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	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		
	73	1.9953E-05		

Transformer				
Noise Source (dB)	W	Total W	Total dB	
Transformers x1	62	1.5849E-06	1.58489E-06	62

Equipment Area 1 Sum				
Noise Source (dB)	Power (W)	Total W	Total dB	
73.0103	2E-05	0.000320811	85.0625	
84.76	0.00029923			
62	1.5849E-06			



Average Maximum Ambient
Sound Pressure Reading
collected on 2/17/2026 between
1:50-3:30pm = 52 dBA



Ambient
reading
recording
location

Attachment B – Noise Mapping Results Report

Noise Mapping Results - North Equipment Pad

--- Receiver Results - Summary ---

Receiver N:	Height (m)	Total dB(A)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Receiver	1.5	33.87				33.87				
Receiver-2	1.5	20.4				20.4				
Receiver-3	1.5	17.92				17.92				
Receiver-4	1.5	17.91				17.91				

--- Receiver Results - Sources Analysis ---

Receiver N:	Height (m)	Total dB(A)	Point
Receiver	1.5	33.87	33.87 East
Receiver-2	1.5	20.4	20.4 North
Receiver-3	1.5	17.92	17.92 South
Receiver-4	1.5	17.91	17.91 West

--- Receiver Results - Full Detail ---

Receiver N:	Source N:	Distance	to Height	incl Source height	Frequency	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge	Ab (lateral	Ab (lateral	Adjustment	Weighting	Lp
Receiver	Point	75.41	1.5	1.5	500	88.2	-48.55	-0.21	-2.37	0	-	-	-	0	-3.2	33.87
Receiver-2	Point	327.66	1.5	1.5	500	88.2	-61.31	-0.91	-2.38	0	-	-	-	0	-3.2	20.4
Receiver-3	Point	426.72	1.5	1.5	500	88.2	-63.6	-1.19	-2.29	0	-	-	-	0	-3.2	17.92
Receiver-4	Point	427	1.5	1.5	500	88.2	-63.61	-1.19	-2.29	0	-	-	-	0	-3.2	17.91

--- Objects ---

Receivers	x	y	Height
Receiver	75.4	1.5	-
Receiver-2	327.66	1.5	-
Receiver-3	426.72	1.5	-
Receiver-4	427	1.5	-

Point Source	x	y	Height	Lw	Hz
Point	0	0	1.5	88.2	500

--- Configuration ---

Calculation Method ISO9613-2:2024 (New)
0.5G Ground Factor
20.0°C Temperature
70% Humidity
Results are A-weighted
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Limited in distance (ISO17534-3 recommendation)
Ground reflections are not screened (ISO17534-3 recommendation)

--- Key ---

Lw	Sound Power Level (dB)
Lp	Sound Pressure Level (dB)
Ad	Distance attenuation (geometric divergence) ISO9613-2 (dB)
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

Attachment C – Noise Mapping Report – Calculations

Noise Mapping Results - South Equipment Pad

--- Receiver Results - Summary ---

Receiver N:	Height (m)	Total dB(A)	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Receiver	1.5	25.18					25.18			
Receiver-2	1.5	23.85					23.85			
Receiver-3	1.5	23.77					23.77			
Receiver-4	1.5	20.59					20.59			

--- Receiver Results - Sources Analysis ---

Receiver N:	Height (m)	Total dB(A)	Point
Receiver	1.5	25.18	25.18 East
Receiver-2	1.5	23.85	23.85 South
Receiver-3	1.5	23.77	23.77 North
Receiver-4	1.5	20.59	20.59 West

--- Receiver Results - Full Detail ---

Receiver N:	Source N:	Distance	tc	Height	incl	Source height	Frequency	Lw	Ad	Aa	Ag	Ab (total)	Ab (top edge	Ab (lateral	Ab (lateral	Adjustment	Weighting	Lp
Receiver	Point	193.01		1.5		1.5	500	88.2	-56.71	-0.54	-2.57	0	-	-	-	0	-3.2	25.18
Receiver-2	Point	224.01		1.5		1.5	500	88.2	-58.01	-0.63	-2.52	0	-	-	-	0	-3.2	23.85
Receiver-3	Point	226		1.5		1.5	500	88.2	-58.08	-0.63	-2.52	0	-	-	-	0	-3.2	23.77
Receiver-4	Point	321		1.5		1.5	500	88.2	-61.13	-0.9	-2.39	0	-	-	-	0	-3.2	20.59

--- Objects ---

Receivers	x	y	Height
Receiver	193		1.5
Receiver-2	224		1.5
Receiver-3	226		1.5
Receiver-4	321		1.5

Point Source	x	y	Height	Lw	Hz
Point	0	0	1.5	88.2	500

--- Configuration ---

Calculation Method ISO9613-2:2024 (New)
0.5G Ground Factor
20.0°C Temperature
70% Humidity
Results are A-weighted
Second order reflections are included
Reflections are only considered at a distance of 1m or greater from a reflector (facade level)
ISO9613-2 barrier attenuation limit (20/25dB) is enabled
Vertical edges (lateral paths) are included
Limited to convex paths
Limited in distance (ISO17534-3 recommendation)
Ground reflections are not screened (ISO17534-3 recommendation)

--- Key ---

Lw	Sound Power Level (dB)
Lp	Sound Pressure Level (dB)
Ad	Distance attenuation (geometric divergence) ISO9613-2 (dB)
Ab	Barrier attenuation ISO9613-2 (dB)
Ag	Ground effect ISO9613-2 (dB)
Aa	Air absorption ISO9613-1 (dB)

Appendix E: Solar Operation and Maintenance Plan

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PRELIMINARY BATTERY ENERGY STORAGE SYSTEM OPERATIONS AND MAINTENANCE PLAN

1 GENERAL PROTOCOL

1.1 Contact Information

The primary points of contact for operations & maintenance related issues are as follows:

Owner

Manhan River, LLC with a facility address of 43& 53 Pleasant Street, Southampton, MA
BlueWave

Phone: 617-209-3122 (General phone number listed here to be updated with project
specific number between Mechanical Completion and Substantial Completion)

Email: assetmgmt@bluewave.energy

[Manufacturer]

XXXXXX (To be finalized prior to construction)

(XXX) XXX-XXXX (To be finalized prior to construction)

XXXX@XXXX.com (To be finalized prior to construction)

1.2 Safety Guidelines & Equipment

In the event of an emergency, immediately call 911 to alert local first responders.
Emergency signage will be posted on-site for both the Local Fire Department and the
contact of the Owner/Operator.

Owner/Operator will dispatch designated operational staff within 2 hours in the event of
an emergency, and approximately 12 hours in the event of a non-emergency. In the event
of an emergency, the Emergency Response Plan (ERP) on file with the Municipality and
Local Fire Department should be referenced and appropriate procedures followed.

The Battery Energy Storage System (BESS) contains a number of high voltage AC and DC
components and equipment. Only certified and [Manufacturer] approved technicians are
authorized to conduct maintenance work on the system. Before performing work on the
system, necessary Lockout-Tagout (LOTO) procedures should be followed to de-energize
the system and fully disconnect the system from AC power. Proper procedures for de-
energization should be referenced in the comprehensive Maintenance Manual provided
by the system manufacturer prior to performing any maintenance tasks.

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Equipment

All technicians and personnel performing work on the system are required to wear personal protective equipment (PPE) including but not limited to:

- Long pants and shirt (FR rated)
- Insulated gloves (See Arc Flash Study for required Protective Category)
- High visibility safety vest (FR Rate)
- Hardhat
- Eye protection
- Safety toe boots
- Arc Flash Personal Protective Equipment as needed or required by manufacturer

The following equipment and hand tools are required when performing work on the system, including but not limited to:

- 1,000V Multimeter
- 1,500Vdc Multimeter
- Proving Unit
- Test Leads
- Data Cable Test Unit
- Infrared Camera
- Electrostatic Discharge (ESD) Ground Wristband
- Insulated wrenches, ratches, and screwdrivers and other tools meeting IEC 60900

Additional equipment and safety procedures may be required and implemented during the operation of the system. All equipment must have valid calibration certifications if applicable.

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2 OPERATION & MAINTENANCE ANNUAL SCHEDULE

O&M ANNUAL SCHEDULE		
Component Category	Service Descriptions	Frequency
Thermal Management System	Thermal management system inspection	Semi-Annual
	Thermal management system maintenance	Semi-Annual
	Motor Lubrication	Semi-Annual
	Clean Filters by rinsing with Water	Semi-Annual
	Electric Heater - Dust accumulation on the coil, signs of overheating on the heater frame, traces of water or rust on the electric heater control box.	Semi-Annual
	Coolant tester Visual inspection	Annual
Fire Safety System	Fire alarm and detection system inspection	Annual
	Fire alarm and detection system maintenance	Annual
	Fire suppression System Inspection	Annual
Battery	Set battery maintenance (system check, cell balancing)	Annual

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	Battery cable, appearance, grounding, dust removal	Annual
	Inspect battery management system alarms	Annual
	Visual inspection of all electrical terminations using thermal imager	Semi-Annual
Enclosure	Dust removal	Annual
	Inspect cable entry, grounding, sealing, dust removal	Annual
Reporting and Diagnostics	Inspection, maintenance reports and recommendations	Monthly
	Technical support and fault diagnosis	As required
	Data server connectivity check	Monthly
	Inspect battery running status, provide operating recommendations and maintain battery	Monthly
	System configuration check	Annual
General/ Miscellaneous	Auxiliary equipment maintenance and inspection	Annual
	Critical sensor calibration check	Annual
	Maintenance report	Annual
24/7 Monitoring	System is remote monitored 24/7 at the cell and enclosure level for voltage, temperature, and atmospheric conditions.	N/A

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Dispatch Commitment	24 hrs. In emergency, first responders will dispatch to site once fire alarm signal received, owner dispatch to follow as soon as possible.	
Three (3) Corrective Maintenance Troubleshooting Dispatches (total of 24 hrs.)	Baseline assumptions of 3 corrective maintenance visits per year	Annually

3 PREVENTATIVE MAINTENANCE AND SYSTEM SERVICES

3.1 Lifetime System Services

PREVENTIVE MAINTENANCE SITE VISITS

One time, annually, additional at request and expense of Project Owner for:

- System testing (voltage/amperage)
- System visual inspection and necessary corrections, excluding cost of replacement components:
- Inspect for stolen, broken or damaged equipment, record damage and location. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal, and wait for authorization on a course of action from the Project Owner.
- Inspect wiring for loose connections and wire condition. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal, and wait for authorization on a course of action from the Project Owner.
- Inspect string controllers for damage and general condition. Inspect AC and DC fuses for replacement if needed. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal, and wait for authorization on a course of action from the Project Owner.
- Inspect HVAC unit components for rust, damage, and general condition. Check condensate drain lines and refrigerant levels as required. Inspect exhaust outlets and bottom of unit for pooling, inspect and replace all filters as needed. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner,

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present proposal and wait for authorization on a course of action from the Project Owner.

- Verify proper system grounding is in place from enclosures to the inverter. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check conduits and raceways for proper anchorage to structures. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect all enclosure metallic parts for corrosion. Inspect ESS labels and insure they match subpanel interior break. Verify that all enclosure doors, hinges and seals are in proper working order. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect all wiring connection for signs of poor contact at terminals (burning, discoloration, etc.). Verify all conductor connections and network cables are tight and solidly connected. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Visually inspect all interior components of the ESS enclosures for signs of damage, discoloration, water ingress, or deterioration. Inspect all batteries and battery management systems for signs of damage, discoloration, water ingress, or deterioration. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect disconnection for proper operation. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal, and wait for authorization on a course of action from the Project Owner.
- Survey entire jobsite for debris or obstructions. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal, and wait for authorization on a course of action from the Project Owner.
- Inspect fasteners for proper torque and corrosion. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner,

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present proposal and wait for authorization on a course of action from the Project Owner.

- Inspect inverter pad for cracking or settling. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect electrical hardware for proper warning and rating labeling. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Review as built documentation as needed and update as built documentation as changes are required.
- Inspect enclosure footings, anchor bolts, and alignment to identify settling foundation or loose attachments. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check proper operation and reporting of monitoring hardware. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect sealed electrical components for condensation buildup. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect wiring and hardware for signs of damage from vandalism or animal damage. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Routine system maintenance to include correction of loose electrical connections, ground connections, replacement of defective fuses, other minor maintenance repair work. Tree trimming, and plant trimming work not included.
- Routine DAS maintenance to include sensor calibration and data integrity check.

TROUBLESHOOTING, INSPECTION AND ADDITIONAL REPAIRS

- Dispatch of field services resources within 12 hours for repairs up to three times per year or as deemed necessary by Operator.
- Major system repairs, not to include mid-voltage switchgear or transformers.
- The Project Owner agrees to permit Town staff to enter the property at reasonable times

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and in a reasonable manner for the purpose of inspection.

REPORTING

- Monthly Production report will be available online to the Project Owner personnel.
- Annual Performance report will be sent electronically to the Project Owner personnel.
- O&M Manual updates. Complete versions of new editions to be delivered electronically to the Project Owner staff as they become available.
- As Built drawing updates, as necessary.

OTHER SYSTEM SERVICES

Facility staff training, one time per site which will include the follow basic training items:

- General Inspection: A full visual and physical inspection of all systems components and their immediate surroundings carried out in accordance with inspection checklists.
- Safety: Operator will train Project Owner staff on how to safely shut down the system.
- Tree Trimming/Plant Trimming: Operator will train Project Owner staff on what vegetation near structures that need to be trimmed as required by local site conditions.
- Structure Maintenance: Necessary preventive maintenance may be performed on system structural components to ensure continued safe and effective operation.
- The basics of performing a visual inspection: Checklist review with Operator.
- Performance characterization, as determined by Operator.
- O&M Manuals – additional copies, as needed. Updated editions of O&M manuals will be sent electronically to the Project Owner as they become available.
- Management of long-term service and warranty agreements, ongoing. Operator shall provide Project Owner local DFD/AFSD with updates as required.
- Stormwater and Drainage Structure Maintenance: See Stormwater Report and associated BMP O&M and Long-Term Maintenance Plan on file with the Municipality for proper stormwater BMP maintenance schedule and procedures.

INVERTER REPAIR

Component replacement and refurbishment as required, in the event of a failure.

INVERTER INSPECTION AND REGULAR SERVICING

As required under inverter manufacturer's warranty specifications. Include but are not limited to the following, one time annually:

- Check appearance/cleanliness of the cabinet, ventilation system and all exposed surfaces.
- Inspect, clean/replace air filter elements.
- Check for corrosion on all terminals, cables and enclosure.
- Check all fuses.
- Perform a complete visual inspection of all internally mounted equipment including subassemblies, wiring harness, contractors, power supplies and all major components.

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- Check condition of all the AC and DC surge suppressors.
- Torque terminals and all fasteners in electrical power connections.
- Check the operation of all safety devices (E-stop, door switches)
- Record all operating voltages and current readings via the front display panel.
- Record all inspections completed.
- Inform Manufacturer of all deficiencies identified.
- Manufacture will be responsible for the In-Warranty replacement of failed inverter components, parts and labor.

SERVICES UNDER THE FOLLOWING WARRANTIES

- 20-year warranty for inverters & batteries.

3.2 Notice of Transfer

Should the property or any portion of the property be transferred to another owner, the relevant Authorized Administrative Agency will be notified. The new owner will be notified of the presence of this Operation and Maintenance Plan and be held responsible for the implementation of this plan and financing as it pertains to their property.

Final O&M plans are subject to revision based on O&M provider or Original Equipment Manufacturer recommendations without notice

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PRELIMINARY GROUND MOUNTED SOLAR SYSTEM OPERATIONS & MAINTENANCE PLAN

1. GENERAL PROTOCOL

1.1 Contact Information

Owner

Manhan River, LLC with a facility address of 43&53 Pleasant Street, Southampton, MA

BlueWave

Phone: 617-209-3122 (General phone number listed here to be updated with project specific number between Mechanical Completion and Substantial Completion)

Email: assetmgmt@bluewave.energy

1.2 OPERATION & MAINTENANCE ANNUAL SCHEDULE

Task	Schedule
Full Site Visual Inspection & Report	Annually
Production Performance Report	Annually
Inverter Preventative Maintenance	Annually
Medium Voltage Gear Maintenance	Annually
String Voc/Imp	As needed
IV Curve Tracing	As needed
Thermal Imaging Combiners, Inverters, Disconnects	100%, Annually
Warranty Enforcement	As needed
Issue Tracking of Unscheduled Service Dispatches	As needed
24/7 Monitoring	24/7
Dispatch Commitment	48 hrs.
Vegetation Management	As needed

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1.3 EXHIBIT A – SYSTEM SERVICES

1.3.1 PREVENTIVE MAINTENANCE SITE VISITS

One time, annually, additional at request and expense of Project Owner for:

- System testing (voltage/ampereage)
- System visual inspection and necessary corrections, excluding cost of replacement components:
- Inspect for stolen, broken or damaged PV modules, record damage and location. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect PV wiring for loose connections and wire condition. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect for wires in contact with the structure or hanging loose from racking. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check mechanical attachment of the PV modules to the racking. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check attachment of racking components to each other and the structure. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Verify proper system grounding is in place from panels to the inverter. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check conduits and raceways for proper anchorage to structures. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.

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- Inspect all metallic parts for corrosion. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check combiner boxes for proper fuse size and continuity. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect all wiring connection for signs of poor contact at terminals (burning, discoloration, etc.). Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect disconnection for proper operation. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Survey entire jobsite for debris or obstructions. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect fasteners for proper torque and corrosion. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect inverter pad for cracking or settling. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect electrical hardware for proper warning and rating labeling. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Review as built documentation as needed and update as built documentation as changes are required.
- Inspect alignment of arrays and racking to identify settling foundation or loose attachments. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.

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- Inspect operation of tracking hinges, pivots, motors and actuators if present. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Check proper operation and reporting of monitoring hardware. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect sealed electrical components for condensation buildup. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Inspect wiring and hardware for signs of damage from vandalism or animal damage. Operator to resolve issues as needed under the terms of this O&M contract, the EPC Contract or Manufacturer's Warranty. If any costs are to be incurred by the Project Owner, Operator will notify the Project Owner, present proposal and wait for authorization on a course of action from the Project Owner.
- Routine system maintenance to include correction of loose electrical connections, ground connections, replacement of defective modules found during testing, other minor maintenance repair work. Tree trimming, and plant trimming work not included.
- Routine DAS maintenance to include sensor calibration and data integrity check.

1.3.2 TROUBLESHOOTING, INSPECTION AND ADDITIONAL REPAIRS

- Dispatch of field services resources within two business days for repairs up to three times per year or as deemed necessary by Operator.
- Major system repairs, not to include mid-voltage switchgear or transformers.
- The Project Owner agrees to permit Town staff to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.

1.3.3 REPORTING

- Monthly Production report will be available online to the Project Owner personnel.
- Annual Performance report will be sent electronically to the Project Owner personnel.
- O&M Manual updates. Complete versions of new editions to be delivered electronically to the Project Owner staff as they become available.
- As Built drawing updates, as necessary.

1.3.4 OTHER SYSTEM SERVICES

Facility staff training, one time per site which will include the follow basic training items:

- General Inspection: A full visual and physical inspection of all systems components and their immediate surroundings carried out in accordance with inspection checklists.

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- Safety: Operator will train Project Owner staff on how to safely shut down the system.
- Tree Trimming/Plant Trimming: Operator will train Project Owner staff on what vegetation near structures that need to be trimmed as required by local site conditions.
- Structure Maintenance: Necessary preventive maintenance may be performed on system structural components to ensure continued safe and effective operation.
- The basics of performing a visual inspection: Checklist review with Operator.
- Performance characterization, as determined by Operator.
- O&M Manuals – additional copies, as needed. Updated editions of O&M manuals will be sent electronically to the Project Owner as they become available.
- Management of long-term service and warranty agreements, ongoing. Operator shall provide Project Owner local DFD/AFSD with updates as required.

1.3.5 INVERTER REPAIR

Component replacement and refurbishment as required, in the event of a failure.

INVERTER INSPECTION AND REGULAR SERVICING

As required under inverter manufacturer's warranty specifications. Include but are not limited to the following, one time annually:

- Check appearance/cleanliness of the cabinet, ventilation system and all exposed surfaces.
- Inspect, clean/replace air filter elements.
- Check for corrosion on all terminals, cables and enclosure.
- Check all fuses.
- Perform a complete visual inspection of all internally mounted equipment including subassemblies, wiring harness, contractors, power supplies and all major components.
- Check condition of all the AC and DC surge suppressors.
- Torque terminals and all fasteners in electrical power connections.
- Check the operation of all safety devices (E-stop, door switches)
- Record all operating voltages and current readings via the front display panel.
- Record all inspections completed.
- Inform Manufacturer of all deficiencies identified.
- Manufacturer will be responsible for the In-Warranty replacement of failed inverter components, parts and labor.

1.3.6 SERVICES UNDER THE FOLLOWING WARRANTIES

- 20-year warranty for inverters.
- 25-year warranty for PV Modules.

Final O&M plans are subject to revision based on O&M provider or Original Equipment Manufacturer recommendations without notice

Appendix F: Decommissioning Estimate

43 & 53 Pleasant Street, Southampton, MA 01073
5.49 MW (DC) Agrivoltaic Solar Development & Battery Energy Storage System (BESS) Facility
Manhan River, LLC
Decommissioning Plan and Estimate

Timeline:

Decommissioning of the system will occur within 150 days following the end of the lease term or if found to have fallen into disuse.

Assumptions:

Key assumptions include the following:

- 1) Fencing, electrical cabinetry, solar racks, solar panels, wiring and all other equipment are 100% recyclable.
- 2) The primary cost of decommissioning is the labor to dismantle and load the equipment plus trucking.
- 3) Concrete pads will be demolished on-site and transported to an ABC recycling facility where it will be accepted at no charge.
- 4) All other recyclables will be transported to the nearest Transfer Station that accepts the material.
- 5) Costs are based on NYSDERDA Solar Guidebook for Local Governments. Estimates below are based on the Massachusetts solar market.
- 6) Stabilization or re-vegetation of the site will occur as necessary to minimize erosion.

Decommissioning Tasks:

Task	Cost
1) Remove Panels The panels are bolted in. A laborer needs to unbolt the panel and remove the panel off the rack.	\$7,785
2) Remove Rack Wiring The panels are plugged together in the same manner as an electrical cord from a light is plugged into a wall socket. A laborer needs only to reach over and pull the plug. The string wires typically lie in a sling. A laborer needs only to reach into the sling and remove the strands of wire.	\$7,814
3) Dismantle Racks Racks will be dismantled and stockpiled for removal.	\$39,244
4) Remove Electrical Equipment (Inverters, Transformers, Switchgear, Storage Containers) Equipment will be removed from the equipment pads.	\$5,879
5) Break Up Concrete Pads Concrete will be broken up using an excavator and jackhammer.	\$4,767
6) Remove Racks Racks will be removed and stockpiled.	\$24,786
7) Remove Cable Cables will be removed and stockpiled.	\$20,655
8) Remove Foundation Posts and Utility Poles Posts and poles will be removed from the ground using appropriate equipment.	\$44,011
9) Remove Battery Energy Storage System (see breakdown next page) Battery Energy Storage System shall be removed and transported to an off site licensed facility.	\$27,353
10) Remove Fence Fencing and posts will be removed.	\$15,730
11) Grading Graded areas (e.g., stormwater basins) will be returned to pre-construction conditions.	\$12,711
12) Seed Disturbed Areas Any graded areas will be seeded to promote revegetation.	\$794
13) Trucking Costs All stockpiled equipment and materials will be removed from the site.	\$7,150
Total Decommissioning Cost Estimate	\$218,678

43 & 53 Pleasant Street, Southampton, MA 01073
5.49 MW (DC) Agrivoltaic Solar Development & Battery Energy Storage System (BESS) Facility
Manhan River, LLC
Decommissioning Plan and Estimate

Timeline:

Decommissioning of the BESS portion system will occur within 365 days following the end of the lease term or if found to have fallen into disuse.

Assumptions:

Key assumptions include the following:

- 1) Utilized BESS are comprised of Lithium-Ion Batteries or similar chemical composition with no recyclable value
- 2) The primary cost of BESS decommissioning is the transportation and disposal of the batteries.
- 3) Concrete pads will be demolished on-site and transported to an ABC recycling facility where it will be accepted at no charge.
- 4) All other recyclables will be transported to the nearest Transfer Station that accepts the material.
- 5) Costs are based on current market averages for battery weights and disposal costs.

Decommissioning Tasks:

Task	Cost
1) Remove Battery Racks Batteries are inserted as racks into the storage container. Batteries will need to be removed and palletized for transportation and disposal.	\$8,400
2) Remove and Dispose HVAC Equipment & Ancillary Wiring HVAC Fluids will be drained, and HVAC equipment and ancillary wiring will be removed and disposed.	\$8,682
3) Load And Dispose Battery Racks At Licensed Facility Equipment will be removed from the equipment pads.	\$2,800
4) Remove Containers Containers will be removed from pads & transported off site.	\$1,171
5) Break Up & Dispose Concrete Pads / Footings Concrete will be broken up using an excavator and jackhammer. Conduits greater than 3' in depth will be buried in place.	\$6,300
Total Decommissioning Cost Estimate	\$27,353

Appendix G: Utility Interconnection Application

Exhibit C - Expedited/Standard Process Interconnection Application**Legal Name and address of Interconnecting Customer**

Interconnecting Customer	BlueWave Origination, LLC
Contact Person	Eric Graber-Lopez
Address	116 Huntington Ave Suite 601 Boston, MA 02116
Email	interconnection@bluewavesolar.com

Host Customer Details

Customer Name	BlueWave Origination, LLC
Customer Entity	
Mailing Address	116 Huntington Ave Suite 601 Boston, MA 02116
Email	interconnection@bluewavesolar.com

Landowner Details

Is Landowner Different than Customer?	Yes
Landowner Company	N/A
Landowner Name	Ron Bashista
Address	65 Pleasant St Southampton, MA 01071
Email	interconnection@bluewavesolar.com

Generating Facility Information

Address	43 & 53 Pleasant St Southampton, MA 01073
----------------	--

Alternative Contact Information

Alternative Company Name	BlueWave Origination, LLC
Alternative Contact Name	Eric Graber-Lopez
Address	116 Huntington Ave Suite 601 Boston, MA 02116

Ownership Information (include % ownership by any electric utility): Interconnecting Customer

Site Control? Yes

Will Facility be constructed on a single parcel of land? No



Confidentiality Statement: “I agree to allow information regarding the processing of my application (without my name and address) to be reviewed by the Massachusetts DG Working Group that is exploring ways to further expedite future interconnections.”: **Yes**

Group Study Agreement: “I understand and agree if my project becomes part of a Group Study, the Company is authorized to share my contact information and project details with other parties that are also involved in the Group Study”: **True**

Need an air quality permit from DEP? - No

Planning to Export Power? - Yes

A Cogeneration Facility? - No

Anticipated Export Power Purchaser: - Eversource

Export Form? - SMART Program

Utility Details

Electric Distribution Company:	WMA
Account Number:	New Service
Meter Number:	New Service

System Details

Type of Generating Unit	Inverter
Phase	Three Phase
AMPS	126
Voltage	Primary Feeder Voltage

Option 1	Yes		
System Design Capacity: (Nominal)	5000 (kW)	5000 (kVA)	
System Design Capacity: (Maximum)	5000 (kW)	5000 (kVA)	
Prime Mover	PhotoVoltaic		
Energy Source	Solar + Battery		
DC STC Rating	7057 (kW DC)		
Generating Unit 1			
Inverter Manufacturer & Model	Inverter: 34 x SMA America 150.0 kW (Model SHP 150-US-20 (600V))		
AC Rating: (Nominal)	5000(KW)	5000(KVA)	600(AC Volts)
AC Rating: (Maximum)	5000(KW)	5000(KVA)	600(AC Volts)
Non-PV Manufacturer			
Non-PV Model			

Non-PV Quantity			
Generating Unit 2			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
Generating Unit 3			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
Storage Information			
Is the proposed system has Battery Storage?	Yes		
Type of Storage Coupled	DC-Coupled		
Storage Technology Type	Lithium Ion		
Energy Storage Manufacture	Other		
Capacity DC (kW)	1750		
Capacity AC (kW)	0		
Storage Inverter	1 Manufacturer: SMA Model Number: SHP-150-US Nameplate Power AC (kVA): 150 Nameplate Power AC (kW): 150 Qty: 34		

Option 2	No		
System Design Capacity: (Nominal)	(kW)	(kVA)	
System Design Capacity: (Maximum)	(kW)	(kVA)	
Prime Mover			
Energy Source			
DC STC Rating	(kW DC)		
Generating Unit 1			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			

Generating Unit 2			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
Generating Unit 3			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
Storage Information			
Is the proposed system has Battery Storage?			
Type of Storage Coupled			
Storage Technology Type			
Energy Storage Manufacture			
Capacity DC (kW)			
Capacity AC (kW)			
Storage Inverter			

Option 3	No		
System Design Capacity: (Nominal)	(kW)	(kVA)	
System Design Capacity: (Maximum)	(kW)	(kVA)	
Prime Mover			
Energy Source			
DC STC Rating	(kW DC)		
Generating Unit 1			
Inverter Manufacturer & Model			
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Generating Unit 2			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)



Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
Generating Unit 3			
Inverter Manufacturer & Model			
AC Rating: (Nominal)	(KW)	(KVA)	(AC Volts)
AC Rating: (Maximum)	(KW)	(KVA)	(AC Volts)
Non-PV Manufacturer			
Non-PV Model			
Non-PV Quantity			
Storage Information			
Is the proposed system has Battery Storage?			
Type of Storage Coupled			
Storage Technology Type			
Energy Storage Manufacture			
Capacity DC (kW)			
Capacity AC (kW)			
Storage Inverter			

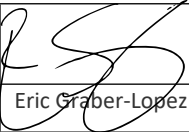
Application Process: I am opting to forego the Expedited Process. Please review this application under the Standard Process – Yes

Est. Install Date: 3/1/2024

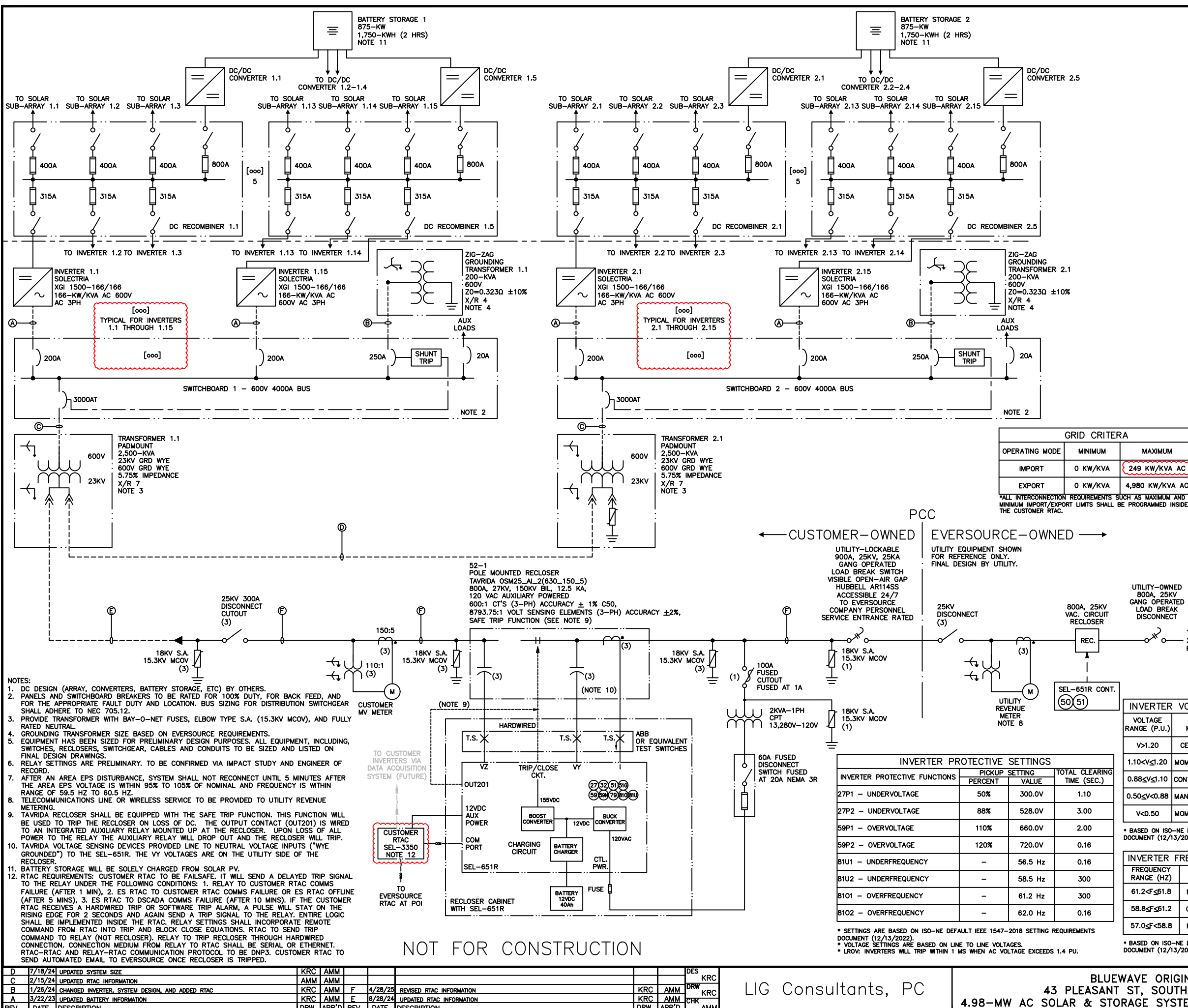
Est. In-Service Date: 4/1/2024

Agreement Needed By:

I hereby certify that, to the best of my knowledge, all of the information provided in this application is true:

Interconnecting Customer Signature:	
Interconnecting Customer Name (Printed):	Eric Graber-Lopez
Title:	
Date:	

Appendix H: Electrical Plans & Specifications



PROTECTIVE RELAY SETTINGS 52-1			
SEL-651R PROTECTIVE FUNCTIONS	PICKUP SETTING		CLEARING TIME (SECONDS)
	PERCENT	VALUE	
27P1 - UNDERVOLTAGE	50%	0.76V (6,640V)	TOTAL: 1.10 RELAY: 1.05
27P2 - UNDERVOLTAGE	88%	1.33V (11,686V)	TOTAL: 3.00 RELAY: 2.95
59P1 - OVERVOLTAGE	110%	1.66V (14,607V)	TOTAL: 2.00 RELAY: 1.95
59P2 - OVERVOLTAGE	120%	1.81V (15,935V)	TOTAL: 0.16 RELAY: 0.11
81UP1 - UNDERFREQUENCY	-	56.5 Hz	TOTAL: 0.16 RELAY: 0.11
81UP2 - UNDERFREQUENCY	-	58.5 Hz	TOTAL: 300.00 RELAY: 299.95
81OP1 - OVERFREQUENCY	-	61.2 Hz	TOTAL: 300.00 RELAY: 299.95
81OP2 - OVERFREQUENCY	-	62.0 Hz	TOTAL: 0.16 RELAY: 0.11
32 - DIRECTIONAL POWER - IMPORT	249 KW (~5% OF OUTPUT)		TOTAL: 0.16 RELAY: 0.11
32 - DIRECTIONAL POWER - EXPORT	4,980 KW		TOTAL: 0.16 RELAY: 0.11
51 - PHASE TIME OVERCURRENT	0.26A (156A PRI.)		CURVE: U4 T.D.: 2.0
51G - GROUND TIME OVERCURRENT	0.11A (66A PRI.)		CURVE: U4 T.D.: 2.0
59N - NEUTRAL OVERVOLTAGE	50%	0.76V (6,640V)	TOTAL: 1.00 RELAY: 0.95
79 - AUTO RESTORE VOLT. RANGE	2.48 (21,850) ≤ V ≤ 2.75 (24,150)		300
79 - AUTO RESTORE FREQ. RANGE	59.5 ≤ f ≤ 60.5		300
ALARM - HARDWARE AND LOSS OF POWER (AC AND DC)	-	-	< 2.00

* 79 FUNCTION A 5-MINUTE HEALTHY GRID FEATURE. IT IS ONLY ENABLED ON VOLTAGE AND FREQUENCY DISTURBANCES. A 5 MINUTE DELAY FOR THE FUNCTION IS ENABLED ON VOLTAGE AND FREQUENCY DISTURBANCES ONLY. A 5 MINUTE DELAY WILL BE SET FOR RECLOSING UPON GOOD QUALITY VOLTAGE. THE FIVE MINUTE TIME INTERVAL WILL RESTART IF THE UTILITY VOLTAGE OR FREQUENCY FALLS OUTSIDE OF THE WINDOW IDENTIFIED IN THE ABOVE CHART. RECLOSER WILL LOCKOUT ON OVERCURRENT OPERATION.

* RECLOSER WILL ONLY BE ALLOWED TO CLOSE WHEN THE VOLTAGE AND FREQUENCY ARE IN COMPLIANCE WITH THE FOLLOWING: VOLTAGE RANGE 95% TO 105% OF NOMINAL VOLTAGE IS BASED ON LINE TO LINE VOLTAGE. FREQUENCY BETWEEN 59.5HZ TO 60.5HZ.

* SETTINGS ARE BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

* RELAY WILL AUTOMATICALLY TRIP AND BLOCK CLOSE IF THERE IS A HARDWARE FAILURE OR POWER SUPPLY FAILURE AND ON ANY OVERCURRENT OPERATION (51 & 51G). THIS WILL BE DONE VIA LOGIC IN THE SEL-651R RELAY.

* TOTAL CLEARING TIME INCLUDES RELAY OPERATING TIME AND RECLOSER OPERATING TIME. RECLOSER OPERATING TIME IS 3.0 CYCLES.

* VOLTAGE SETTINGS BASED ON LINE TO NEUTRAL VOLTAGE.

WIRE AND CONDUIT SCHEDULE				
ID	VOLTAGE	SETS	WIRE	CONDUIT
A	600V	1	(3) 250 KCMIL AL	(1) 3"
B	600V	1	(4) 350 KCMIL AL	(1) 3"
C	600V	10	(4) 500 KCMIL AL	(10) 4"
D	25KV	1	(3) #1 AWG AL, FULL NEUTRAL, XLPE-133%, MV-105	(1) 4"
E	25KV	1	(3) 1/0 AWG AL, FULL NEUTRAL, XLPE-133%, MV-105	(1) 4"
F	25KV	1	(4) #1 AWG ACSR COVERED OVERHEAD WIRE	N/A

AGGREGATE SYSTEM RATING		
INVERTER RATING	QUANTITY	AGGREGATE RATING
166 KW/KVA AC	30	4,980 KW/KVA AC

INVERTER VOLTAGE RIDE-THROUGH CAPABILITY			
VOLTAGE RANGE (P.U.)	OPERATING MODE/RESPONSE	RISE-THROUGH TIME (SEC)	MAXIMUM RESPONSE TIME (SEC)
V>1.20	CEASE TO ENERGIZE	N/A	0.16
1.10<V≤1.20	MOMENTARY CESSATION	2.00	N/A
0.88≤V<1.10	CONTINUOUS OPERATION	INFINITE	N/A
0.50≤V<0.88	MANDATORY OPERATION	3.00	N/A
V<0.50	MOMENTARY CESSATION	1.10	N/A

* BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

INVERTER FREQUENCY RIDE-THROUGH CAPABILITY		
FREQUENCY RANGE (HZ)	OPERATING MODE	RISE-THROUGH TIME (SEC)
61.2<f≤61.8	MANDATORY OPERATION	300
58.8≤f≤61.2	CONTINUOUS OPERATION	INFINITE
57.0≤f<58.8	MANDATORY OPERATION	300

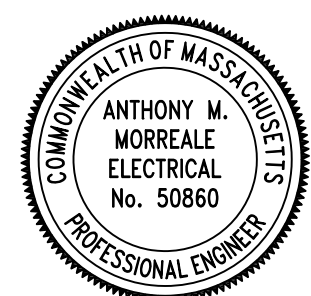
* BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

INVERTER PROTECTIVE SETTINGS			
INVERTER PROTECTIVE FUNCTIONS	PICKUP SETTING		TOTAL CLEARING TIME (SEC.)
	PERCENT	VALUE	
27P1 - UNDERVOLTAGE	50%	300.0V	1.10
27P2 - UNDERVOLTAGE	88%	528.0V	3.00
59P1 - OVERVOLTAGE	110%	660.0V	2.00
59P2 - OVERVOLTAGE	120%	720.0V	0.16
81U1 - UNDERFREQUENCY	-	56.5 Hz	0.16
81U2 - UNDERFREQUENCY	-	58.5 Hz	300
81O1 - OVERFREQUENCY	-	61.2 Hz	300
81O2 - OVERFREQUENCY	-	62.0 Hz	0.16

* SETTINGS ARE BASED ON ISO-NE DEFAULT IEEE 1547-2018 SETTING REQUIREMENTS DOCUMENT (12/13/2022).

* VOLTAGE SETTINGS ARE BASED ON LINE TO LINE VOLTAGES.

* LROV: INVERTERS WILL TRIP WITHIN 1 MS WHEN AC VOLTAGE EXCEEDS 1.4 PU.



FIRM NAME: LIG CONSULTANTS, PC
FIRM REG #: N/A
PROF. ENGINEER: ANTHONY M. MORREALE, P.E.
ENGINEER LICENSE #: 50860

REV	DATE	DESCRIPTION	DRW	APR'D	REV	DATE	DESCRIPTION	DRW	APR'D
D	7/18/24	UPDATED SYSTEM SIZE	KRC	AMM				DES	KRC
C	2/15/24	UPDATED RTAC INFORMATION	KRC	AMM				DRW	KRC
B	1/26/24	CHANGED INVERTER, SYSTEM DESIGN, AND ADDED RTAC	KRC	AMM	F	4/28/25	REVISED RTAC INFORMATION	KRC	AMM
A	3/22/23	UPDATED BATTERY INFORMATION	KRC	AMM	E	8/28/24	UPDATED RTAC INFORMATION	KRC	AMM
REV	DATE	DESCRIPTION	DRW	APR'D	REV	DATE	DESCRIPTION	DRW	APR'D

LIG Consultants, PC

BLUEWAVE ORIGATION, LLC
43 PLEASANT ST, SOUTHAMPTON, MA 01073
4.98-MW AC SOLAR & STORAGE SYSTEM - INTERCONNECTION ONE-LINE

SIZE	DATE
B	03/15/2023
SHEET	SCALE
1 of 1	N/A
FILE NO.	FILE NO.
E-001	

FLEXRACK SERIES

FlexTrack - S Series

Tough, Reliable Tracker & Team of Experts at Your Service

Single row, central slew drive balanced system

Engineered for long term durability and reliability

Low cost to maintain

Flexible to accommodate and optimize all your project design and generation needs

Superior land density with no gaps at the bearings

Available in Self-Powered and Grid-Powered options

Designed with intuitive constructability which translates to superior installation times and lower project costs

Over 500 projects successfully deployed throughout the USA and Canada

Bankable Product and Team. Successfully completed stringent third party bankability review for use on utility, C&I, and DG projects.



Professional engineering & superior quality products

Let us be your hands-on comprehensive partner. FLEXRACK by QCells has the most flexible product offering, customizable to your project needs.

Distributed Drive Reduces Operations And Maintenance Costs

FlexTrack Trackers have no mechanical components between rows, allowing easy access for mowers, cleaning services and other project maintenance.

Smart Backtracking Maximizes Energy Production

FlexTrack trackers can be programmed based on the terrain, to optimize MWh production. Trackers on east-facing slopes get more early-morning sun, and trackers on west-facing slopes get more in the late afternoon, increasing overall yield.

Complete Service Offering Reduces Project Costs And Risks

A tracker solution that comes with all the critical associated services – and an unmatched team of experts – will dramatically reduce your total cost. Project management is simplified, redundancies are eliminated, and we will assist you with optimizing your solar projects



CONTROL SYSTEM

Data Feed	Ethernet to Network Control Unit
Power Consumption	Grid-Powered: 31kWh per tracker per year
Tracker Controller	1 Controller to DC motor per tracker
Size	230 x 100 x 150 mm
Battery (self-powered)	Rechargeable LiFePO4 (Lithium Iron Phosphate 3Ah (standard operating temperatures), 6Ah for low temperature conditions
Battery Charging (self-powered)	Optimum charging through CC/CV algorithm for LiFePO4 Chemistries which contributes to extended battery life
SoC Monitoring (self-powered)	SoC achieved through OCV and Coulomb counting algorithms
Operating Temperatures	Grid Powered:-20C to 60C Self Powered (Standard): -10C to 50C Self Powered (Low Temp): -30C to 40C
Interface	HMI (includes enclosure mounted keypad LED visual interface)
Communication	Zigbee Wireless
PV Module (self-powered)	Standard: 38W Monocrystalline Low Temp: 76W Monocrystalline

SERVICES

Geotechnical Services	Configuration of Tracker Controls
Structural Analysis	Project Management
Layout and Design Services	PE Stamp
Foundation Design Services	On-site Training
Post Driving	Commissioning of Tracker System
Pull Testing	Tracking System Installation

UL COMPLIANCE

All FLEXRACK by Qcell systems have gone through UL testing. Each component-connection point within the system conforms to NEC codes for electrically bonded and conductive systems. Testing is performed by Solar PTL in accordance with UL 3703.

Certification covers both United States and Canada.

TRACKING

Tracking Method	Single-axis horizontal, distributed drive
Backtracking	Smart backtracking - 3D backtracking technology available to reduce row shading and optimize energy production on challenging terrain. Overcast feature intelligently positions trackers to optimize energy yields for diffused light conditions and bifacial modules
Tracking Range	Up to 110° (± 55°)
Ground Coverage Ratio (GCR)	No limitation. Configurable based on site conditions.
Tracking Accuracy	2°
Stow Features	Stow Strategy is customized to meet project specifications to protect system from extreme weather events including wind, snow, hail, and flooding

ARRAY CONFIGURATION

Panels per Tracker	Up to 90 (72 Cell Modules)
Trackers per Controller	1
String Voltage	Up to 1,500 volts
Posts per Tracker	Dependant on tracker size and site conditions, approximately 15 posts for 90 panels
Panel Configurations*	1 in portrait (crystalline) 2 in landscape (crystalline) 4 in landscape (thin film)
Drive Type	Slew 24 Volts DC

OPERATIONS AND MAINTENANCE

Scheduled Maintenance	None
Warranty	10 Years: Structural 5 Years: Drives and Electrical
Certifications	UL 3703
Dynamic Load Management	Integrated frictional dampening and limited progressive dampening technology

INSTALLATION TOLERANCES

North-south Slope Tolerance	Up to 7%
North-south Post Spacing	± 1.5 inches (.038 meter)
East-west Post Alignment	+/- 0.75 inches
Post Height	± 1 inch (0.025 meter)
Post Plumb	± 1°

CONSTRUCTION

Structural Materials	Galvanized Steel. Multiple coatings available.
Bearings	UV-rated engineering plastic, no lubrication needed
Mechanical Connections	Bolted - no welding, drilling or cutting required

ENVIRONMENTAL

Wind (IBC-2012/ASCE 7-10)	Up to 130 mph (Trackers can be customized to higher wind speeds upon request) 35 mph stow position
Snow Load	30 psf (Trackers can be customized to higher snow loads upon request)

TESTING

Rain, wind, sleet, snow, heat – every day and everywhere, our products are battling the elements. We perform ongoing extensive testing in these key areas: wind tunnel, structural load, electrical bonding, and life cycle. FLEXRACK by Qcell trackers also undergo wind tunnel testing performed by RWDI and CPP, per American Society of Civil Engineers Standard ASCE 7.

*Adaptable to all module sizes

**50 YEARS & OVER
4 GIGAWATTS**

FLEXRACK by Qcells is an integrated solar company that offers custom-designed, fixed tilt ground mount and single-axis solar tracking systems in the commercial and utility-scale solar mounting industries. FLEXRACK also offers full services, including engineering, geotechnical, pullout testing, field, and layout design services to address the actual site conditions of a project site. FLEXRACK has completed over 4 GW of solar racking installations in over 40 U.S. states and across the globe.

powered by

Q.ANTUM DUO Z

PRELIMINARY

Q.PEAK DUO XL-G11.3 / BFG 570-585

BIFACIAL DOUBLE GLASS MODULE
WITH EXCELLENT RELIABILITY
AND ADDITIONAL YIELD



BIFACIAL ENERGY YIELD GAIN OF UP TO 20 %

Bifacial Q.ANTUM solar cells make efficient use of light shining on the module rear-side for radically improved LCOE.



LOW ELECTRICITY GENERATION COSTS

Q.ANTUM DUO Z combines cutting edge cell separation and innovative wiring with Q.ANTUM Technology for higher yield per surface area, lower BOS costs, higher power classes, and an efficiency rate of up to 21.5%.



INNOVATIVE ALL-WEATHER TECHNOLOGY

Optimal yields, whatever the weather with excellent low-light and temperature behavior.



ENDURING HIGH PERFORMANCE

Long-term yield security with Anti LID and Anti PID Technology¹, Hot-Spot Protect and Traceable Quality Tra.Q™.



FRAME FOR VERSATILE MOUNTING OPTIONS

High-tech aluminum alloy frame protects from damage, enables use of a wide range of mounting structures and is certified regarding IEC for high snow (5400 Pa) and wind loads (2400 Pa).



A RELIABLE INVESTMENT

Double glass module design enables extended lifetime with 12-year product warranty and improved 30-year performance warranty².

¹ APT test conditions according to IEC/TS 62804-1:2015 method B (-1500 V, 168h) including post treatment according to IEC 61215-1-1 Ed. 2.0 (CD)

² See data sheet on rear for further information

THE IDEAL SOLUTION FOR:



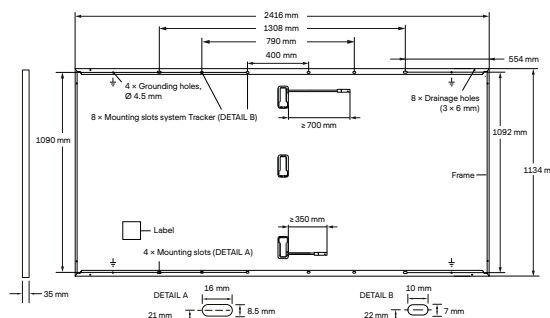
Ground-mounted
solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	2416 mm × 1134 mm × 35 mm (including frame)
Weight	34.4 kg
Front Cover	2 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	2 mm semi-tempered glass
Frame	Anodised aluminium
Cell	6 × 26 monocrystalline Q.ANTUM solar half cells
Junction box	53-101 mm × 32-60 mm × 15-18 mm Protection class IP67, with bypass diodes
Cable	4 mm ² Solar cable; (+) ≥ 700 mm, (−) ≥ 350 mm
Connector	Stäubli MC4-Evo2, Hanwha Q CELLS HQC4; IP68



ELECTRICAL CHARACTERISTICS

POWER CLASS			570	575		580		585			
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC ¹ AND BSC ¹ (POWER TOLERANCE +5 W / –0 W)											
Minimum				BSC*		BSC*		BSC*		BSC*	
	Power at MPP ¹	P _{MPP}	[W]	570	623.5	575	629.0	580	634.4	585	639.9
	Short Circuit Current ¹	I _{SC}	[A]	13.50	14.77	13.52	14.80	13.55	14.83	13.57	14.86
	Open Circuit Voltage ¹	V _{OC}	[V]	53.50	53.69	53.53	53.72	53.56	53.75	53.59	53.78
	Current at MPP	I _{MPP}	[A]	12.83	14.03	12.87	14.09	12.92	14.14	12.97	14.19
	Voltage at MPP	V _{MPP}	[V]	44.44	44.43	44.66	44.65	44.88	44.87	45.10	45.09
	Efficiency ¹	η	[%]	≥20.8	≥22.8	≥21.0	≥23.0	≥21.2	≥23.2	≥21.4	≥23.4

Bifaciality of P_{MPP} and I_{SC} 70% ± 5% • Bifaciality given for rear side irradiation on top of STC (front side) • According to IEC 60904-1-2

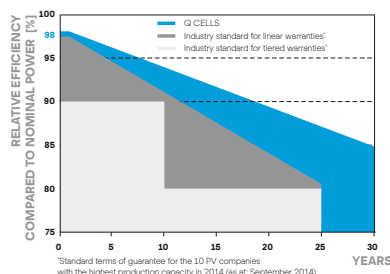
¹ Measurement tolerances P_{MPP} ± 3%; I_{SC}, V_{OC} ± 5% at STC: 1000 W/m²; *at BSC: 1000 W/m² + ϕ × 135 W/m², ϕ = 70% ± 5%, 25 ± 2 °C, AM 1.5 according to IEC 60904-3

MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT²

Minimum	Power at MPP	P _{MPP} [W]	429.1	432.9	436.6	440.4
	Short Circuit Current	I _{SC} [A]	10.87	10.89	10.91	10.93
	Open Circuit Voltage	V _{OC} [V]	50.60	50.63	50.66	50.68
	Current at MPP	I _{MPP} [A]	10.09	10.14	10.18	10.22
	Voltage at MPP	V _{MPP} [V]	42.51	42.71	42.89	43.08

² 800 W/m², NMOT, spectrum AM 1.5

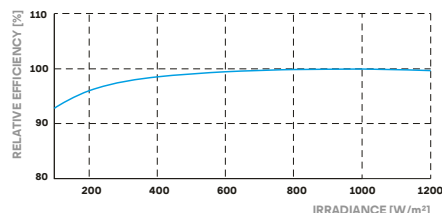
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.45% degradation per year. At least 94% of nominal power up to 10 years. At least 85% of nominal power up to 30 years.

All data within measurement tolerances. Full warranties in accordance with the warranty terms of the Q CELLS sales organisation of your respective country.

PERFORMANCE AT LOW IRRADIANCE



Typical module performance under low irradiance conditions in comparison to STC conditions (25 °C, 1000 W/m²).

TEMPERATURE COEFFICIENTS

Temperature Coefficient of I _{SC}	α	[%/K]	+0.04	Temperature Coefficient of V _{OC}	β	[%/K]	-0.27
Temperature Coefficient of P _{MPP}	γ	[%/K]	-0.34	Nominal Module Operating Temperature	NMOT	[°C]	42 ± 3

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage	V _{sys} [V]	1500	PV module classification	Class II
Maximum Reverse Current	I _R [A]	20	Fire Rating based on ANSI / UL 61730	C / TYPE 29 ³
Max. Design Load, Push / Pull	[Pa]	3600 / 1600	Permitted Module Temperature on Continuous Duty	-40 °C - +85 °C
Max. Test Load, Push / Pull	[Pa]	5400 / 2400	³ New Type is similar to Type 3 but with metallic frame	

QUALIFICATIONS AND CERTIFICATES

IEC 61215:2016, IEC 61730:2016.
This data sheet complies with
DIN EN 50380.



Note: Installation instructions must be followed. See the installation and operating manual or contact our technical service department for further information on approved installation and use of this product.

Hanwha Q CELLS GmbH

Sonnenallee 17-21, 06766 Bitterfeld-Wolfen, Germany | TEL +49 (0)3494 66 99-23444 | FAX +49 (0)3494 66 99-23000 | EMAIL sales@q-cells.com | WEB www.q-cells.com

Engineered in Germany



e-STORAGE

A subsidiary of Canadian Solar

UTILITY-SCALE ENERGY STORAGE



SolBank 3.0

ENERGY STORAGE SYSTEM

S-5016-2H-NA | S-5016-4H-NA

Capacity: 5.0 MWh

e-STORAGE, a subsidiary of **Canadian Solar**, is a world-class energy storage solution provider, specializing in storage system design, manufacturing, and integration of battery energy storage systems for utility-scale applications.

The company offers value-added system consulting and turnkey EPC services, in addition, we provide customers with our proprietary LFP battery solution SolBank.

Together, we are building a brighter, greener future for all.

Key Features

Enhanced Energy Density

- Utilizes 314 Ah battery cells and compact integration, increases single container energy density up to 45%
- Reduces land cost by up to 35% in a 100MWh project

Safety

- IP67-rated pack design
- Up to 20% faster detection of abnormal and automatic protection
- Advanced pack thermal isolation, electrical redundancy protection, and multi-level fire protection, effectively minimize potential issues

SolBank 3.0 Highlights

- **Cutting-Edge Technology:** SolBank 3.0 features high-density LFP cells, an active balancing BMS, and an innovative liquid cooling TMS, ensuring optimal safety.
- **Compliance and Certifications:** SolBank 3.0 adheres to all industry standards: NFPA855, NFPA69, NFPA72, NFPA70E, and optional NFPA68. Certified under UL1973, UL9540, UL9540A, UN38.3/UN3536, ensuring rigorous safety and performance criteria.

Intelligent Control

- Liquid cooling cuts auxiliary consumption up to 30%
- Active balance and string-level management, guarantee high efficiency and availability

Compatibility & Installation

- Supports various PCS topologies
- Turn-key integration and stationery certification, reduce project schedule risks by up to 40%
- Plug-and-play setup for streamlined commissioning

SolBank 3.0

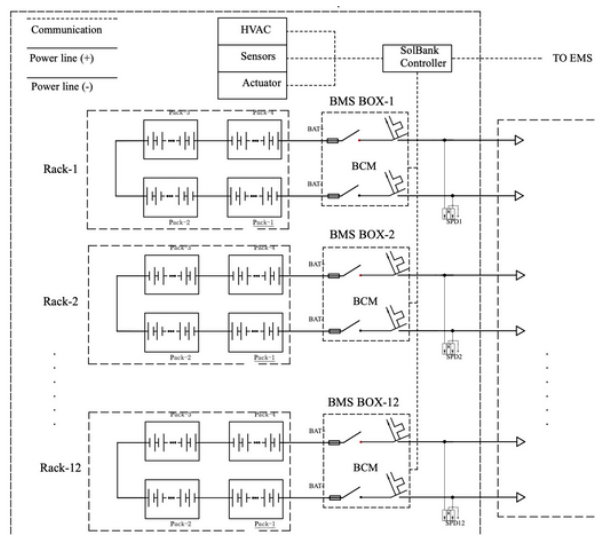
System Parameter

e-STORAGE
A subsidiary of Canadian Solar

General		
Product Model	CSI-SolBank-S-5016-2h-NA	
	CSI-SolBank-S-5016-4h-NA	
Battery Chemistry	Lithium Iron Phosphate (LFP)	
Pack Configuration	1P104S (104 Cells)	
Rack Configuration	1P416S (4 Packs)	
System Configuration	12P416S (12 Racks)	
Nominal DC Voltage	1331.2 V	
Operation DC Voltage Range	1164.8 V ~ 1497.6 V	
Performance		
Rated DC Power	2350 kW	1200 kW
Initial Storage Capacity	4700 kWh	4800 kWh
Charging/Discharging Mode	0.5 P / 0.5 P	0.25 P / 0.25 P
Duration @Rated Power	2hrs	4hrs
Round Trip Efficiency (RTE)	93%	94%
Max. Short Circuit Current	10 kA*12	10 kA*12

SolBank 3.0

Circuit Diagram



Notes

1. The unit is rated at 1164.8V~1497.6V for optimized product performance, the maximum voltage range for the battery system is 1060.8V~1497.6V
2. Rated DC Power is measured at the product DC terminal, the Rated DC Power and Initial Storage Capacity is limited to the use of two SolBank 3.0 units connected in parallel
3. Initial Storage Capacity is the usable product capacity at FAT, contact e-STORAGE for capacity at COD per project schedule
4. DC RTE is measured during capacity test at Rated DC Power, refer to the product warranty document for the complete procedure

Due to ongoing innovation, improvements, and product enhancements, the technical specifications in this document are subject to change and are not guaranteed. Canadian Solar reserves the right to update or change its products or this technical data without prior notice and customers should not rely upon these or any technical specifications which are not made part of a definitive binding agreement.

Aux Systems	
Auxiliary Power Interface	AC480 V / 60 Hz, 3P5W
Thermal Management System	Smart liquid cooling/heating for battery system
Aux Load (Standby/Peak)	1.5 kVA / 50 kVA
	1.5 kVA / 22 kVA
Operating Temperature (Ambient)	-30 °C to 55 °C (derating from 45°C to 55°C)
Relative Humidity	≤95% (non-condensing)
Altitude	< 2000 m (derating from 2000 m to 4000 m)
External Communication Interface	Ethernet connection, Modbus TCP/IP protocol
Safety	
Fire Detection and Alarm	Fire alarm panel, heat and smoke detection, alarm bell and strobe
Explosion Prevention	Combustible gas detector with active ventilation
Uninterrupted Power Reserve	Container level UPS for 2-hr control system backup; dedicated fire safety UPS for 24-hr fire alarm backup
Fire Suppression Options	Aerosol-based suppression system. Dry pipe sprinkler system.
Emergency Stop/Automatic Shut-off	Local and Remote
Mechanical	
Enclosure	20ft. high-cube container
Dimensions (L*W*H)	6058*2438*2896 mm (238.50*95.98*114.02 in)
Weight (Battery Included)	43,000 kg (94,800 lbs)
Enclosure Ingress Rating	IP55 / NEMA 3R
Painting/Coating	RAL9003 / C4 Coating
Seismic Parameter	Zone 4
Noise @1m distance	≤ 75 dB @1m distance

A

B

C

D

E

F

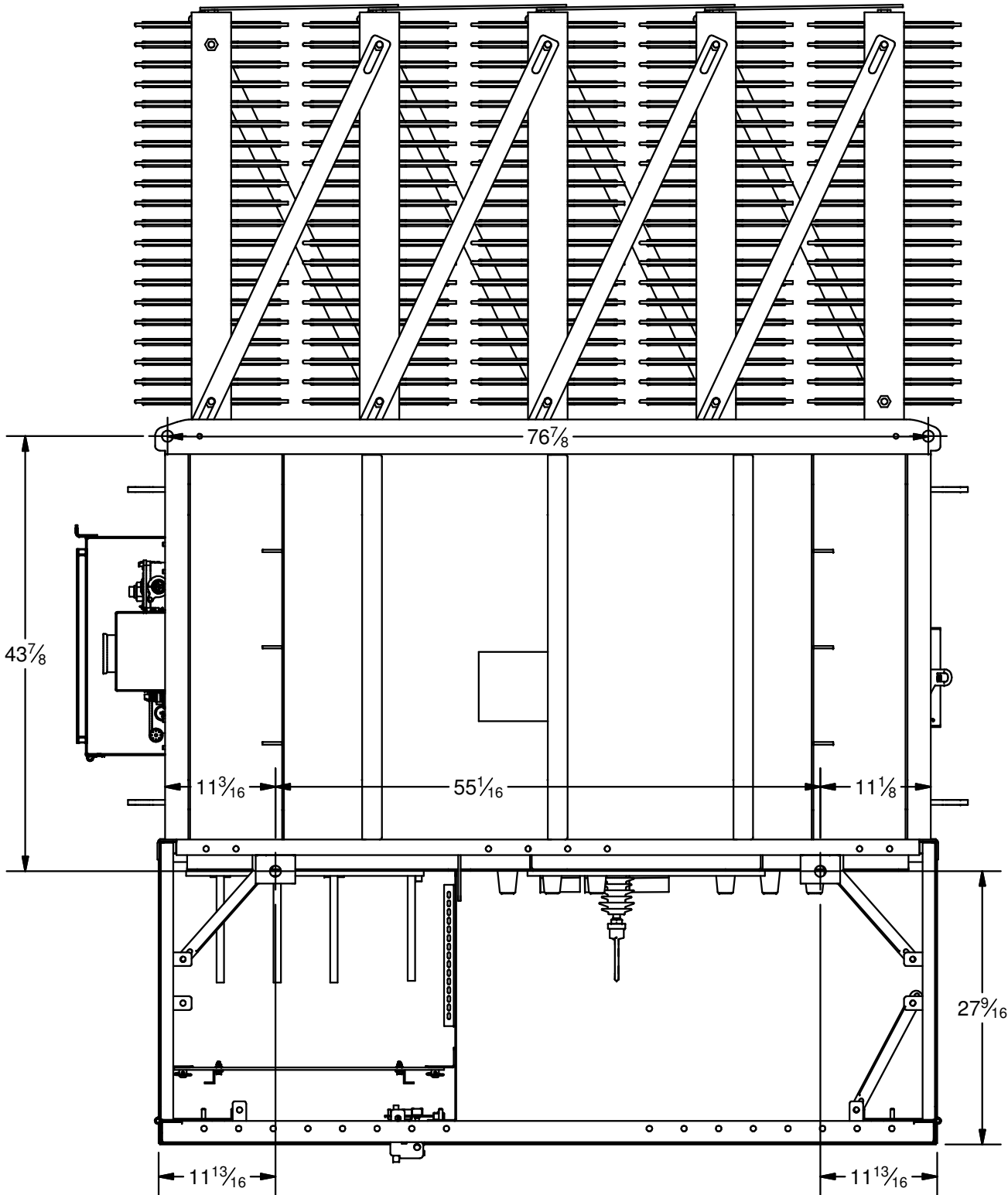
1

2

3

4

BOTTOM OF TRANSFORMER
 SEISMIC ANCHORING HOLE LOCATIONS
 Ø1.125" QTY. 4



DIVISION			TITLE						
DT			3ph Pad Transformer						
TOLERANCE			PART NUMBER			MATERIAL			
	mm	in.	TopLevel						
STD	± 3	± 0.10	DRAWN BY	APPROVED	DATE	SCALE	UNITS		
*	± 1	± 0.04							
**	± 0.5	± 0.02							
ANGULAR	± 2°								
apanico					9/16/2025	NTS	IN		



A

B

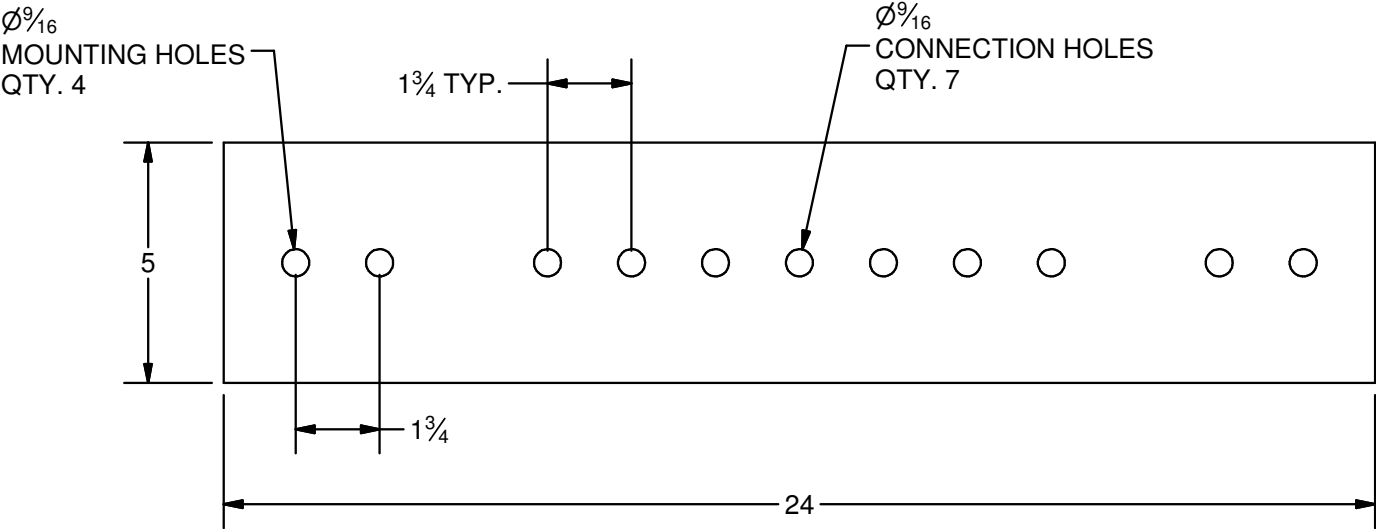
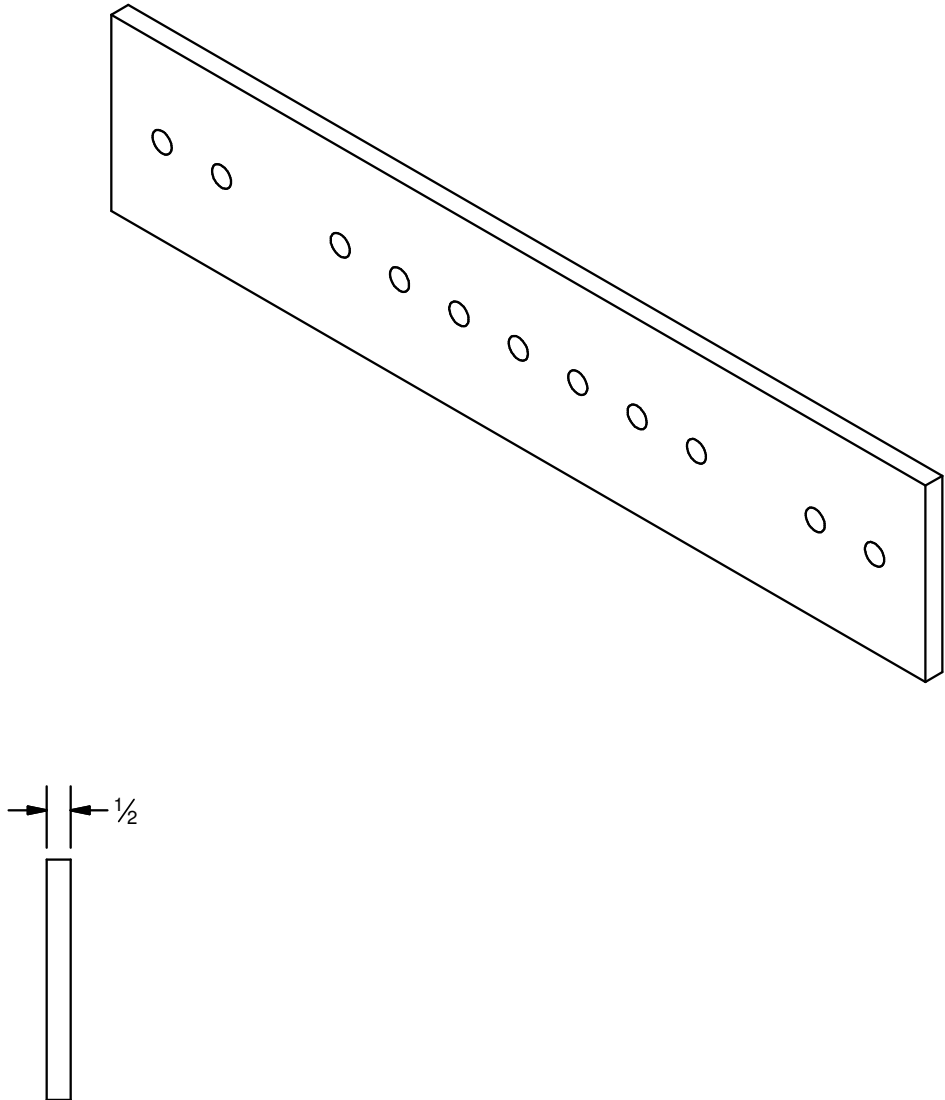
C

D

E

F

COPPER GROUND BAR IN HV & LV COMPARTMENTS



DIVISION			TITLE					
DT			COPPER GROUND BAR M50 24L 5W					
TOLERANCE			PART NUMBER			MATERIAL		
	mm	in.	951			Copper		
STD	± 3	± 0.10	DRAWN BY	APPROVED	DATE	SCALE	UNITS	
*	± 1	± 0.04						
**	± 0.5	± 0.02						
ANGULAR	± 2°		apanico			9/16/2025	NTS	IN



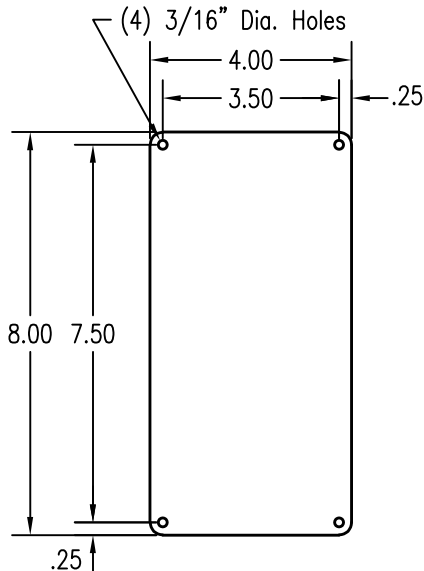
S.O.# 496921501-1

Design X/R
7.45Design Impedance
5.75 %

Approval Block

☐ Approved as Submitted☐ Approved as Noted☐ Resubmit

Sign & Date



(4).1875" DIA. MTG.
HOLES ON CENTERLINE
3.5" x 7.5" APART.
SIZE OF PLATE 4.0"
x 8.0" WITH .25"
CORNER RADIUS.

55°/65°C

ENVIROTEMP FR3

NON-DOE 2016 COMPLIANT



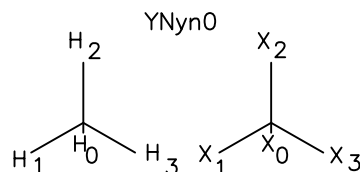
MANUFACTURED IN WASHINGTON MO 63090 USA

THREE PHASE TRANSFORMER 55/65 °C RISE 60 HZ CLASS KNAN ENVIROTEMP FR3 FLUID

2500/2800 kVA HV (AL) 34500Y/19920
LV (AL) 600Y/346

S/N
MODEL M0215179-0100

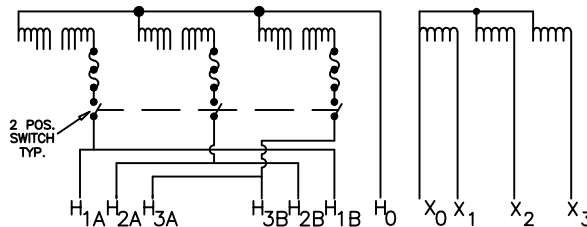
CORE & COIL (UNTANKING) 6892 LBS
TANK & FITTINGS 4521 LBS
LIQUID 762 GAL 5854 LBS
TOTAL 17267 LBS
DATE OF MFG. MM/YYYY



HV BIL WNDGS/ACSS: 150/200 KV
LV BIL WNDGS/ACSS: 45/30 KV



LIQUID CONTAINS LESS THAN 1 PPM PCB'S AT TIME OF MANUFACTURE.
LIQUID LEVEL AT 25°C IS 6" BELOW TOP OF HANDHOLE FLANGE.
LIQUID LEVEL CHANGES 0.5" PER 10°C CHANGE IN LIQUID TEMPERATURE.
OPERATING PRESSURES OF PRESERVATION SYSTEM ARE 7 PSIG MAX & -2 PSIG MIN.
TANK IS DESIGNED FOR 3 PSIG VACUUM FILLING AND MUST BE SOLIDLY GROUNDED.
BEFORE INSTALLATION AND OPERATION READ INSTRUCTION BOOK. +7-1801



496921501-1

NON-DOE 2016 COMPLIANT

DESIGN FOR STEP-UP OPERATION @ < 3300 FT ASL



NAME: WEG NAMEPLATE

MODEL: SST

DATE: 9/12/2025 PART NUMBER: 496921501-1

REV: 0

WASHINGTON, MO 63090, USA

DECIMAL ± .032	ANGULAR ± 2'	FRACTIONAL ± 1/32	SCALE NTS	TOLERANCES (except as noted) ± .032	DRAWN BY: PR	APPROVED ZW
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R0	PR	ZW	----	9/12/2025
FOR APPROVAL				

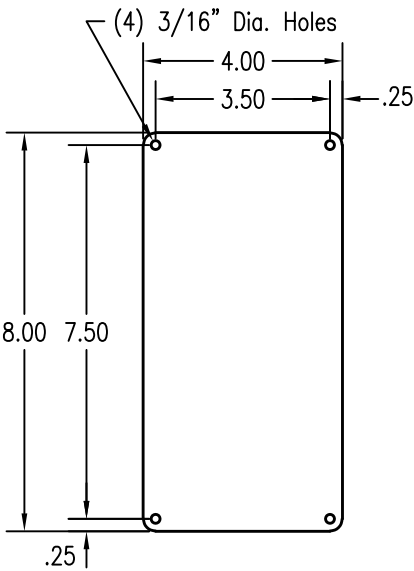


MANUFACTURED IN WASHINGTON MO 63090 USA

Approval Block

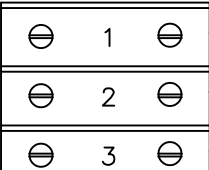
- ☐ Approved as Submitted
☐ Approved as Noted
☐ Resubmit

Sign & Date



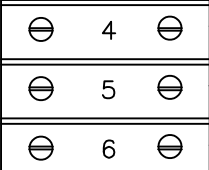
MATERIAL: ALUMINUM
(4).1875" DIA. MTG.
HOLES ON CENTERLINE
3.5" x 7.5" APART.
SIZE OF PLATE 4.0"
x 8.0" WITH .25"
CORNER RADIUS.

OIL HIGH
TEMPERATURE
ALARM



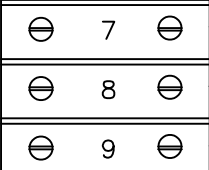
26T SW#1
SET @ 75 °C

OIL HIGH
TEMPERATURE
TRIP



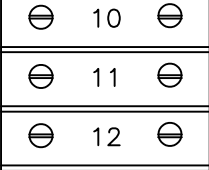
26T SW#2
SET @ 90 °C

OIL HIGH LEVEL
ALARM



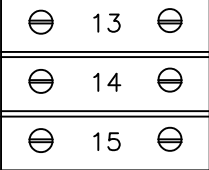
71Q SW#1
SET @ HIGH

VACUUM
ALARM



VACUUM SW#1
SET @ -5.0 PSIG

PRESSURE
ALARM



PRESSURE SW#2
SET @ +7.0 PSIG

CIRCLED NUMBERS ARE DEVICES # I.D.

496921501-1A



NAME:		WEG CONTROL NAMEPLATE	
MATERIAL:		SST	
DATE:	PART NUMBER:	REV:	
9/12/2025	496921501-1A	0	

R0	PR	ZW	----	9/12/2025	WASHINGTON, MO 63090, USA	DECIMAL ± .032	ANGULAR ± 2°	FRACTIONAL ± 1/32	SCALE 1:1	TOLERANCES (except as noted) ± .032	DRAWN BY: PR	APPROVED ZW
FOR APPROVAL												

SOLECTRIA® XGI 1500-166 SERIES

PREMIUM 3-PHASE TRANSFORMERLESS UTILITY-SCALE INVERTERS

FEATURES

- Made in the USA with global components
- Buy American Act (BAA) compliant
- Four models:
 - 125kW/125kVA,
 - 125kW/150kVA,
 - 150kW/166kVA,
 - 166kW/166kVA
- Additional models available certified to UL1699b, Photovoltaic DC Arc-Fault Circuit Protection
- 99.0% peak efficiency
- Flexible solution for distributed and centralized system architecture
- Advanced grid-support functionality Rule 21/UL1741SB
- Robust, dependable, & built to last
- Lowest O&M and installation costs
- Access all inverters on site via WiFi from one location
- Remote diagnostics and firmware upgrades
- SunSpec Modbus Certified
- Tested compatible with the TESLA PowerPack Microgrid System app for system visibility

OPTIONS

- String combiners for distributed and centralized systems
- Web-based monitoring
- Extended warranty



Yaskawa Solectria Solar's XGI 1500 utility-scale string inverters are designed for high reliability and built of the highest quality components that were selected, tested and proven to last beyond their warranty.

XGI 1500 inverters provide advanced grid-support functionality and meet the latest IEEE 1547 and UL1741SB standards for safety. They are the most powerful 1500 VDC string inverters in the PV market and have been engineered for both distributed and centralized system architecture.

Designed and engineered in Lawrence, MA, XGI inverters are assembled and tested at Yaskawa America's facilities in Buffalo Grove, IL. They are Made in the USA with global components and are compliant with the Buy American Act.

SOLECTRIA® XGI 1500-166 SERIES TECHNICAL DATA

SPECIFICATIONS

SOLECTRIA XGI 1500 Model		XGI 1500-125/125-UL XGI 1500-125/125-UL-A	XGI 1500-125/150-UL XGI 1500-125/150-UL-A	XGI 1500-150/166-UL XGI 1500-150/166-UL-A	XGI 1500-166/166-UL XGI 1500-166/166-UL-A
DC Input	Absolute Max Input Voltage	1500 VDC	1500 VDC	1500 VDC	1500 VDC
	Max Power Input Voltage Range (MPPT)	860-1250 VDC	860-1250 VDC	860-1250 VDC	860-1250 VDC
	Operating Voltage Range (MPPT)	860-1450 VDC	860-1450 VDC	860-1450 VDC	860-1450 VDC
	Number of MPP Trackers	1 MPPT	1 MPPT	1 MPPT	1 MPPT
	Max Operating Input Current	148.3 A	148.3 A	178.0 A	197.7 A
	Max Operating PV Power	128 kW	128 kW	153 kW	170 kW
	Max DC/AC Ratio Max Rated PV Power	2.6 332 kW	2.6 332 kW	2.2 332 kW	2.0 332 kW
	Max Rated PV Short-Circuit Current (ΣIsc x 1.25)	500 A	500 A	500 A	500 A
AC Output	Nominal Output Voltage	600 VAC, 3-Ph	600 VAC, 3-Ph	600 VAC, 3-Ph	600 VAC, 3-Ph
	AC Voltage Range	-12% to +10%	-12% to +10%	-12% to +10%	-12% to +10%
	Continuous Real Output Power	125 kW	125 kW	150 kW	166 kW
	Continuous Apparent Output Power	125 kVA	150 kVA	166 kVA	166 kVA
	Max Output Current	120 A	144 A	160 A	160 A
	Nominal Output Frequency	60 Hz	60 Hz	60 Hz	60 Hz
	Power Factor (Unity default)	+/- 0.80 Adjustable	+/- 0.80 Adjustable	+/- 0.80 Adjustable	+/- 0.80 Adjustable
	Total Harmonic Distortion (THD) @ Rated Load	<3%	<3%	<3%	<3%
	Grid Connection Type	3-Ph + N/GND	3-Ph + N/GND	3-Ph + N/GND	3-Ph + N/GND
	Fault Current Contribution (1 cycle RMS)	144 A	173 A	192 A	192 A
Efficiency	Peak Efficiency	98.9%	98.9%	99.0%	99.0%
	CEC Average Efficiency	98.5%	98.5%	98.5%	98.5%
	Tare Loss	2.75 W	2.75 W	2.75 W	2.75 W
Temperature	Ambient Temp Range	-40°F to 140°F (-40C to 60C)		-40°F to 140°F (-40C to 60C)	
	De-Rating Temperature	122°F (50C)		113°F (45C)	
	Storage Temperature Range	-40°F to 167°F (-40C to 75C)		-40°F to 167°F (-40C to 75C)	
	Relative Humidity (non-condensing)	0 - 95%		0 - 95%	
	Operating Altitude	Full Power up to 9,840 ft (3.0 km); De-Rate to 70% of Full Power at 13,123 ft (4.0 km)			
Communications	Advanced Graphical User Interface	WiFi			
	Communication Interface	Ethernet			
	Third-Party Monitoring Protocol	SunSpec Modbus TCP/IP			
	Web-Based Monitoring	Optional			
	Firmware Updates	Remote and Local			
Testing & Certifications	Safety Listings & Certifications	UL1741SB, IEEE 1547, UL 1998 (All models) UL 1699b Photovoltaic Arc-Fault Circuit Protection Certified (-A models)			
	Advanced Grid Support Functionality	Rule 21, UL 1741SB			
	Testing Agency	ETL			
	FCC Compliance	FCC Part 15 (Subpart B, Class A)			
Warranty	Standard and Options	5 Years Standard; Option for 10 Years			
Enclosure	Acoustic Noise Rating	73 dBA @ 1 m ; 67dBA @ 3 m			
	DC Disconnect	Integrated 2-Pole 250 A DC Disconnect			
	Mounting Angle	Vertical only			
	Dimensions	Height: 29.5 in. (750 mm) Width: 39.4 in. (1000 mm) Depth: 15.1 in. (380 mm)			
	Weight	270 lbs (122 kg)			
	Enclosure Rating and Finish	Type 4X, Polyester Powder-Coated Aluminum			



Appendix I: Stormwater Report



westonandsampson.com

55 Walkers Brook Drive, Suite 100
Reading, MA 01867
tel: 978.532.1900

REPORT

November 2025

Proposed 5.49 MW (DC) Solar
Photovoltaic (PV) Development

43 & 53 Pleasant Street,
Southampton, Massachusetts

Stormwater Report

TABLE OF CONTENTS

MassDEP Stormwater Checklist and Stormwater Report

Attachment A - Locus Map

Attachment B - NRCS Soil Report, FEMA FIRM Map, NOAA Precipitation Rainfall Data

Attachment C - Drainage Area Maps, HydroCAD Reports, Riprap Apron Sizing Calculations

Attachment D - Long Term Pollution Prevention Plan

Attachment E - Stormwater Operation and Maintenance Plan

Attachment F - Construction Period Pollution and Erosion and Sedimentation Control Plan

Attachment G - Illicit Discharge Statement



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the [Massachusetts Stormwater Handbook](#). The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

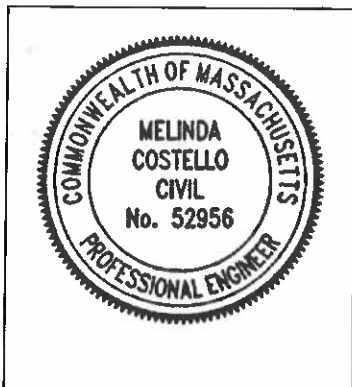
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



Melinda Costello 11/25/2025
Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☒ New development
- ☐ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☐ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☒ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☒ Other (describe): Vegetated Filter Strip

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☐ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☐ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
- ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
- ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
- ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
- ☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☐ The BMP is sized (and calculations provided) based on:
 - ☐ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☒ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☒ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☒ Description and delineation of public safety features;
 - ☐ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☒ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☒ An Illicit Discharge Compliance Statement is attached;
- ☐ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

Applicant/Project Name: Manhan River, LLC
Proposed 5.49 MW (DC) Solar Agrivoltaic Development

Project Location: 43 & 53 Pleasant Street, Southampton, MA 01073

Application Prepared by:
Firm: Weston & Sampson Engineers, Inc.
Registered PE: Melinda Costello, P.E.

Date: 11/25/2025
(Revised 04/20/2026)

Description of Revision

This revised stormwater report incorporates the northern expansion of the array and the widening of the proposed gravel access road (west of the proposed utility poles) from 16-feet to 20-feet. The changes include the northern expansion of drainage areas E-3 and E-4 (along w/ P-3 and P-4 respectively) which can be seen on the revised drainage area maps and HydroCAD calculations (**Attachment C**). Consistent with the original design, there are no increases in peak flow runoff rates from pre- to post-development conditions as shown in Table 4.

General

The proposed project is located at 43 & 53 Pleasant Street in Southampton, Massachusetts. The site is located on three adjacent parcels; parcels#24-23B and 24-23D, both owned by Bashista Family Irrevocable Trust, and parcel#25-20 owned by Stephen E. Bashista. Combined, the parcels have a collective land area of approximately 129 acres. Currently, the property is being used as both hay and corn fields, with existing gravel and dirt access road spanning throughout the property. The project proposes to install a solar agrivoltaic array within the existing fields. The property is bounded by residential properties and woodlands to the north, Pleasant Street to the east, agricultural fields and residential properties to the south, and agricultural fields and the Manhan River to the west. A Locus Map is included in **Attachment A**.

Project and Site Description

The project proposes constructing a solar agrivoltaic array with an associated battery energy storage system (BESS). The proposed solar agrivoltaic array is dual-use in nature and consists of a single-axis tracking solar photovoltaic (PV) array installed at a height and with adequate row spacing to allow continual agricultural operations beneath the array. The total limit of work is approximately 40 acres. Based on site topographic features and the existing operational use of the property, the site can be segmented into three distinct fields; the northern field, eastern field, and southern field. The project proposes installing an agrivoltaic array within each of these three fields; in essence creating three arrays as part of the overall array.

Access to the site is proposed via improvements to the existing gravel access road extending into the site from Pleasant Street, and new gravel access roads extending further into the site for electrical equipment access. No tree clearing is proposed for the project. Site grading is limited to the construction of the equipment pads and the western portion of the proposed gravel access road to provide an adequate longitudinal slope for maintenance vehicles to access the site. Underground conduit is proposed to extend from the two equipment pad areas, along the proposed access road, to the proposed utility poles (installed by others) prior to interconnection via the existing utility pole near the site entrance along Pleasant Street. No permanent stormwater best management practices (BMPs) are proposed. A 7-foot-tall perimeter farm knot fence with double swing gates at array entrances are proposed to encompass the array and equipment pad areas, with a minimum 18-foot gap (offset) between the fence and array, to meet electrical code requirements. Perimeter erosion and sedimentation (E&S) controls are proposed along the downhill side of the site to prevent sediment laden runoff from leaving the site during construction.

A wetland delineation was performed by Fleetwood Environmental Solutions, LLC on July 17, 19, 25 and 26, 2023 with an additional delineation performed on September 18, 2025 where the Mean Annual High-Water Line (MAHWL) for two perennial streams (Tripple Brook and the Manhan River), three intermittent streams, and six bordering vegetated wetlands (BVWs) were delineated. All water resource areas are located along the southwestern, western and northwestern perimeter project site and are described further below:

- Tripple Brook is a tributary of the Manhan River and outlets to the Manhan River at a confluence point centrally located along the western perimeter site.
- BVW-1 surrounds an intermittent stream that has a westerly flow path, is wooded, and is located centrally amongst the site separating the northern and southern fields. BVW-1 and this associated intermittent stream outlet near the confluence point of Tripple Brook and the Manhan River.
- BVW-2 and BVW-3 are both located centrally within the southern field, have a northwesterly flow pattern, and outlet near the confluence point of Tripple Brook and the Manhan River.
- BVW-4 is associated with the northern intermittent stream which flows northwesterly north of, and adjacent to, the northern field. Both BVW-4 and the associated intermittent stream outlet to the Manhan River north of the site.
- BVW-5 is located in the northwest corner of the site and is directly associated with the Manhan River.
- BVW-6 is associated with the southwestern intermittent stream which flows northwesterly and outlets near the confluence point of Tripple Brook and the Manhan River. BVW-6 is located southwest of the southern field.

Stormwater Analysis

Pre- and post-development peak flow rates were assessed using the United States Department of Agriculture National Resources Conservation Service (USDA NRCS) Technical Release 20 (TR-20) methodology. HydroCAD® version 10.20-5c stormwater modeling software was used to analyze and compare pre- and post-development stormwater conditions for the 2-, 10-, and 100-year 24-hour Type-III storm events. HydroCAD® is a comprehensive hydrodynamic modeling program used to analyze systems such as, but not limited to, site hydrology, water conveyance infrastructure, and stormwater management systems.

According to the NRCS Web Soil Survey online soil mapping data, the site primarily consists of hydrologic soil group (HSG)-C soils with HSG-A soils along the northern border of the site, HSG-B soils in the southern and eastern fields, and HSG-D soils within the southern field and along the western border of the site. The full NRCS soil report is included in **Attachment B**.

There is a Federal Emergency Management Agency (FEMA) Flood Hazard Zone A4 (1% chance annual flood zone) along the western border of the site associated with the Manhan River. The Zone A4 also briefly extends into the confluence area where BVW-1, BVW-2, and BVW-3 outlet near the Manhan River, into the intermittent stream associated with BVW-6 located south of the site, and into the intermittent stream associated with BVW-4 located north of the site. There is a limited area directly east of and adjacent to the Zone A4 that is Zone B (0.2% chance annual flood zone). Neither Zone A4 nor Zone B extend within the limits of work associated with the project. The FEMA FIRM map for the project site is included in **Attachment B**.

Rainfall data is referenced from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10, Version 3 and is included in **Attachment B**.

A summary of the analysis is provided below. The full HydroCAD® reports for pre- and post-development conditions with associated drainage area maps are included in **Attachment C**.

Existing Hydrology

The property's highpoint is generally along Pleasant Street with the overall site topography sloping in a westerly/northwesterly direction. The site has multiple topographic valleys and ridgelines, however, the overall site topography can be segmented based on the northern, eastern, and southern fields mentioned above. The northern field slopes either in a northwesterly direction towards the Manhan River, or southerly towards BVW-1. The eastern field slopes westerly towards BVW-1. The southern field encompasses, and therefore drains to, BVW-2 and BVW-3. The southern section of the southern field slopes southwesterly towards BVW-6. On average, site slopes range from approximately 2-8% slopes with few locations having slopes upwards of 26%. The eastern and northern perimeter of the southern field experience the more severe slopes within the site.

The stormwater analysis for this project was modeled using a defined watershed area bounded by the existing woodlands along the western and northern perimeter of the site, the eastern property boundary along Pleasant Street, and the southern boundary of the southern field.

Based on the site topography, a point-of-analysis (POA) was associated with each of the downstream locations that runoff drains to, and each POA has a corresponding drainage area. The POAs and drainage areas are described below. Figure 1 of **Attachment C** is the pre-development conditions drainage area map, which displays the limits of the pre-development conditions drainage areas, time of concentration flow paths, and existing land coverages.

- **POA-1** – BVW-2 and BVW-3,
- **POA-2** – BVW-1,
- **POA-3** – A topographic low point northwest of the site that drains directly to the Manhan River,
- **POA-4** – BVW-4,
- **POA-5** – BVW-6,
- **E1** – The southern field that drains to POA-1,
- **E2** – The eastern field, site entrance, and southern half of the northern field that drains to POA-2,
- **E3** – The northern half of the northern field that drains to POA-3,
- **E4** – The northern perimeter of the site that drains to POA-4,
- **E5** – The southern section of the southern field that drains to POA-5.

A description of the land coverage curve numbers (CN) associated with the pre-development analysis is listed in Table 1 below. For reference, the CN represents water retention and runoff capabilities of the soil based on HSG and ground cover. A higher CN reflects lower retention and higher runoff (ex. impervious areas), while a lower CN reflects higher retention and lower runoff (ex. wooded areas).

Table 1 – Pre-Development Analysis Runoff Curve Numbers

Description	HSG	CN	Associated Area
Dirt Roads	A	72	Existing throughout the northern and western borders of the site.
	B	82	
	C	87	
	D	89	
Gravel	B	85	Existing access road entering the site from Pleasant Street.
	C	89	
Meadow	A	30	Throughout the site.
	B	58	
	C	71	
	D	78	
Roofs	C	98	Farm and residential buildings within parcel.
Row Crops	B	75	Existing corn fields within the northern, eastern, and southern fields.
	C	82	
	D	85	
Woods	A	30	Along wetlands and perimeter of the site.
	B	55	
	C	70	
	D	77	

Proposed Hydrology

The post-development conditions analysis includes the land coverage changes associated with the solar agrivoltaic array. This includes the upgraded gravel access road, the additional gravel access roads, and the removal of some dirt access roads as existing dirt access roads within the agrivoltaic array footprint will be converted into meadow coverage. There is an increase in disconnected impervious coverage associated with the post-development conditions due to the array racking posts and equipment pads. The array racking posts are assumed to be 3-inch diameter posts; the total square-footage of these posts is therefore assumed to be negligible. Accordingly, the footprint of the array racking posts were not included within the post-development conditions model.

All other land coverage will remain consistent from the pre-development conditions. As site grading is limited to the equipment pad and a small section of the western access road to meet slope requirements, the site's natural drainage paths and hydrologic efficacy will be maintained.

The POAs and their associated drainage areas will remain consistent from pre- to post-development conditions. Figure 2 of **Attachment C** is the post-development conditions drainage area map, which displays the limits of the post-development conditions drainage areas, time of concentration flow paths, and proposed land coverages.

A description of the land coverage CNs associated with the post-development analysis is listed in Table 2 below. Primary changes are additional gravel and impervious coverages.

Table 2 – Post-Development Analysis Runoff Curve Numbers

Description	HSG	CN	Associated Area
Dirt Roads	A	72	Existing throughout the northern and western borders of the site.
	C	87	
	D	89	
Gravel	B	85	Existing and proposed access throughout the site.
	C	89	
	D	91	
Meadow	A	30	Throughout the site.
	B	58	
	C	71	
	D	78	
Roofs	C	98	Farm and residential buildings within parcel.
Row Crops	B	75	Existing corn fields within the northern, eastern, and southern fields.
	C	82	
	D	85	
Unconnected Pavement	C	98	Proposed equipment pads.
	D	98	
Woods	A	30	Along wetlands and perimeter of the site.
	B	55	
	C	70	
	D	77	

Proposed Culvert Crossing

In the central section of the site, a topographical valley exists that separates the southern and eastern fields, and discharges at a localized low-point into the eastern origin of BVW-1. This localized low-point has an effective drainage area of approximately 10-acres and is also where the proposed gravel access road is intended to pass through.

The existing culvert at this crossing has the potential to wash-out in future storm events. Therefore, to protect against this from occurring, an upgraded culvert crossing at this location has been designed that conveys up to the 100-year storm event without ponding runoff upstream of the culvert or overtopping the access road.

The proposed culvert crossing is a triple, 24-inch corrugated plastic pipe with a riprap apron at the outlet side to mitigate potentially erosive flows. Figure 3 of **Attachment C** is the drainage area map corresponding to the proposed culvert crossing design. Riprap apron sizing calculations and HydroCAD calculations for the proposed culvert crossing have been included in **Attachment C** for more information.

Massachusetts Stormwater Management Standards

The project site is within Massachusetts Wetland Protection Act Resource Area buffer zones and therefore, the project was designed to comply with the Massachusetts Stormwater Standards. As no permanent stormwater BMPs are proposed, there are no BMP outfalls located within the 100-ft buffer zone associated with the BVWs nor the 200-ft riverfront area associated with the Manhan River.

Below is a summary of the proposed stormwater management system's compliance with the Massachusetts Stormwater Management Standards 1-10.

Standard 1: No New Untreated Discharges

The proposed project is a new development. As the land coverage and site's natural drainage pathways will be consistent from pre- to post-development conditions, no new untreated discharges are anticipated. The post-development HydroCAD model nodes discharging off-site to each POA were analyzed to ensure that the discharging velocities of stormwater runoff from the 2-year, 24-hour storm event was below the maximum threshold as described in Volume 3.1 of the Stormwater Handbook per the slope at each location summarized in Table 3.

Table 3 – Post-Development POA Receiving Velocities

HydroCAD Node	2-yr 24-hr Discharge Velocity (fps)	Discharge Location	Slope at Discharge Location	Permissible Velocity ⁽¹⁾ (fps)	Ground Cover at Discharge Location
P1	0.72	POA-1	1.05%	5	Meadow
P2	1.91	POA-2	7.41%	4	Meadow
P3	2.90	POA-3	17.14%	3	Meadow
P4	2.18	POA-4	19.05%	3	Woodland
P5	1.42	POA-5	4.13%	5	Meadow

1. Permissible velocities relative to tall-fescue grass coverage. 0 – 5% slopes have a maximum of 5 fps; 5 – 10% slopes have a maximum of 4 fps; greater than 10% slopes have a maximum of 3 fps.

Standard 2: Peak Rate Attenuation

Table 4 below shows the comparison between pre- and post-development peak flow rates (cubic feet per second – cfs). All POAs experience no change in peak flow rate for all design storms from pre- to post-development conditions.

Table 4 – Stormwater Peak Flow Rate Comparison

Point of Analysis	24 Hr Storm	Peak Flow Rate (cfs)		Difference in Peak Flow Rate (cfs)
		Pre-	Post-	
POA-1	2-yr	22.0	22.0	0.0
	10-yr	59.8	59.8	0.0
	100-yr	128.8	128.8	0.0
POA-2	2-yr	21.4	21.4	0.0
	10-yr	59.9	59.9	0.0
	100-yr	131.1	131.1	0.0
POA-3	2-yr	7.6	7.6	0.0
	10-yr	17.7	17.7	0.0
	100-yr	34.8	34.8	0.0
POA-4	2-yr	0.4	0.4	0.0
	10-yr	3.5	3.5	0.0
	100-yr	11.3	11.3	0.0
POA-5	2-yr	0.4	0.4	0.0
	10-yr	2.9	2.9	0.0
	100-yr	8.5	8.5	0.0

Standard 3: Recharge

As the project does not propose any impervious coverage requiring treatment (as explained below in Standard 4), the Required Recharge Volume is not required.

Standard 4: Water Quality

Added impervious area for the project includes the equipment pads and solar array racking posts, and in accordance with the Massachusetts Stormwater Handbook Volume 3.1, these features do not qualify as impervious coverage requiring treatment. Therefore, the water quality volume nor the total suspended solids removal calculations are required for this project.

Source control and pollution prevention measures are identified in the Long Term Pollution Prevention Plan (**Attachment D**) and the proposed culvert crossing will be maintained in accordance with the site specific Stormwater Operation and Maintenance Plan (**Attachment E**).

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

Not Applicable. There are no LUHPPLs in the work area.

Standard 6: Critical Areas

The project is within a Zone II Wellhead Protection Area (WPA), and both Tripple Brook and the Manhan River are designated as Coldwater Fisheries. As the project experiences no increases in peak flows nor includes any impervious coverage requiring treatment, the project is not anticipated to have any negative impacts on the critical areas listed above.

Standard 7: Redevelopments and Other Projects Subject to the Standards Only to the Maximum Extent Practicable

Not applicable, this project is not a redevelopment project.

Standard 8: Construction Period Pollution Prevention and Erosion and Sediment Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan is included in **Attachment F**. To ensure that the work incorporates the performance standards recommended in MassDEP's Stormwater Management Policy, necessary erosion and sedimentation control measures will be utilized during construction as shown on the site plans.

The project will be covered under the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP). A Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the project for use during construction. A copy of the SWPPP will be submitted prior to the start of construction.

Standard 9: Operation and Maintenance Plan

A Stormwater Operation and Maintenance Plan for the proposed culvert crossing is provided with this report in **Attachment E**.

Standard 10: Prohibition of Illicit Discharges

There will be no illicit discharges associated with the project. An Illicit Discharge Compliance Statement is included in **Attachment G**.

Attachment A - Locus Map

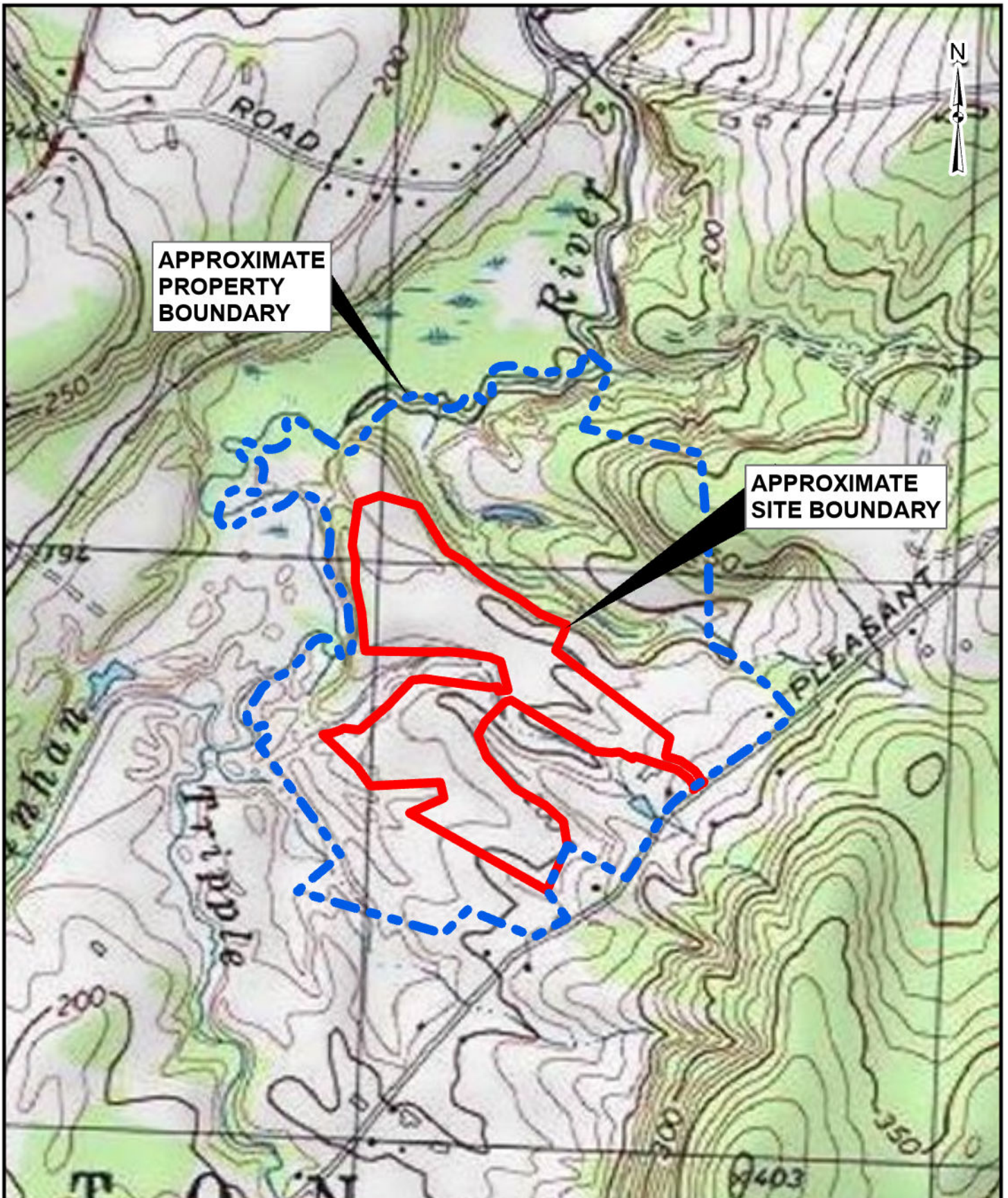


FIGURE 1 - LOCUS MAP
PROPOSED SOLAR PHOTOVOLTAIC DEVELOPMENT
43 & 53 PLEASANT STREET, SOUTHAMPTON, MA 01073
BLUEWAVE ORIGATION, LLC



Attachment B - NRCS Soil Report,
FEMA FIRM Map,
NOAA Precipitation Rainfall Data



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

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

Custom Soil Resource Report for Hampshire County, Massachusetts, Central Part



Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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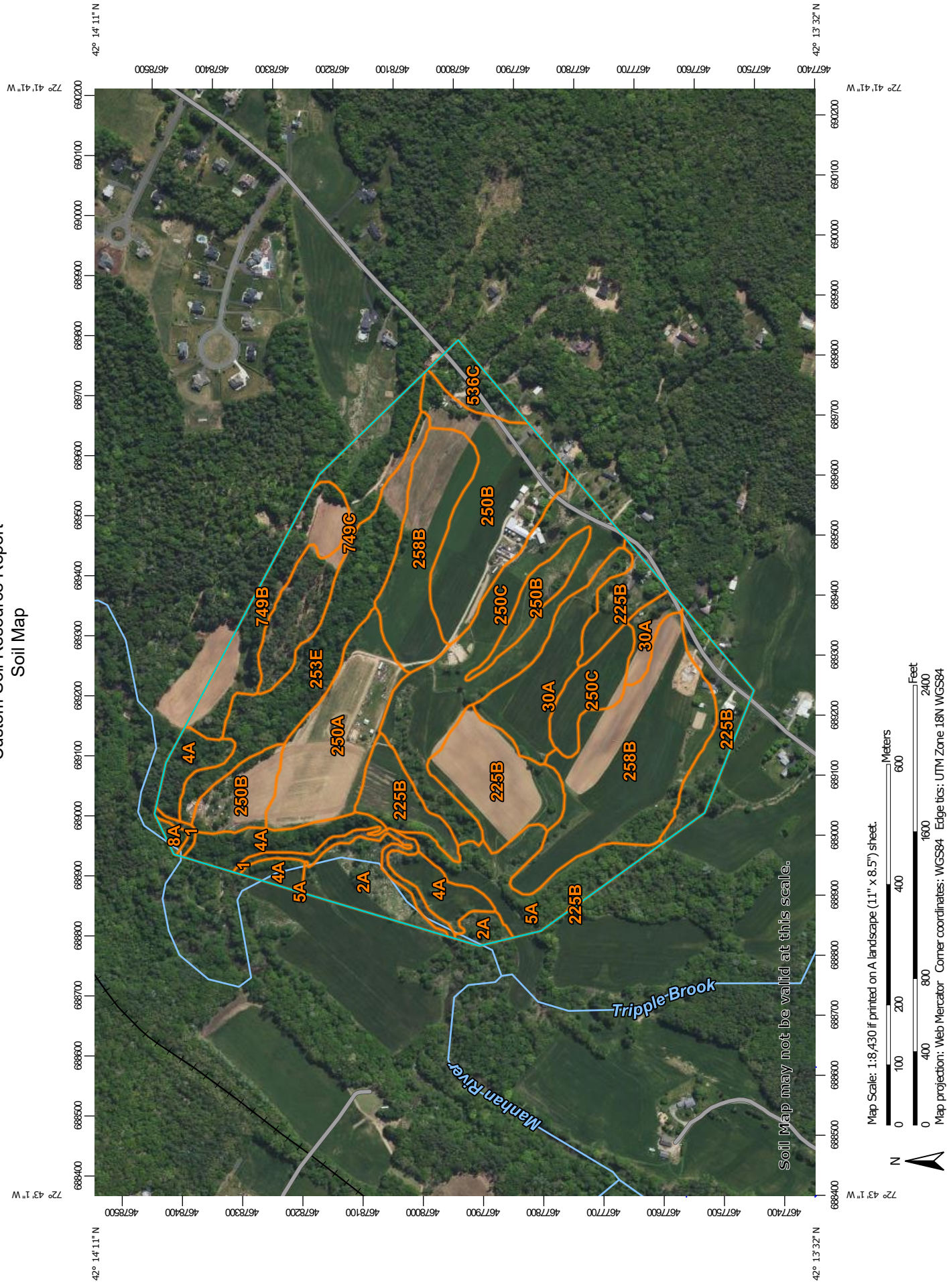
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

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

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Soil Map



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 19, Aug 28, 2024

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

Date(s) aerial images were photographed: May 24, 2020—Aug 6, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	2.1	1.4%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded	5.3	3.6%
4A	Rippowam fine sandy loam, 0 to 3 percent slopes, frequently flooded	8.8	5.9%
5A	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	7.1	4.8%
8A	Limerick silt loam, 0 to 3 percent slopes, frequently flooded	0.4	0.2%
30A	Raynham silt loam, 0 to 3 percent slopes	7.7	5.2%
225B	Belgrade silt loam, 3 to 8 percent slopes	17.9	12.1%
250A	Pollux fine sandy loam, 0 to 3 percent slopes	10.0	6.8%
250B	Pollux fine sandy loam, 3 to 8 percent slopes	17.9	12.1%
250C	Pollux fine sandy loam, 8 to 15 percent slopes	18.0	12.1%
253E	Hinckley loamy sand, 25 to 35 percent slopes	11.1	7.5%
258B	Amostown fine sandy loam, 3 to 8 percent slopes	24.7	16.7%
536C	Wethersfield fine sandy loam, 8 to 15 percent slopes, stony	2.3	1.6%
749B	Windsor loamy sand, silty substratum, 3 to 8 percent slopes	6.4	4.3%
749C	Windsor loamy sand, silty substratum, 8 to 15 percent slopes	8.5	5.7%
Totals for Area of Interest		148.2	100.0%

Map Unit Descriptions

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

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

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

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps.

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The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

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

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

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

Hampshire County, Massachusetts, Central Part

1—Water

Map Unit Setting

National map unit symbol: 9b24
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 120 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

2A—Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2zvdq
Elevation: 100 to 800 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Pootatuck

Setting

Landform: Flood plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy alluvium over sandy and gravelly alluvium derived from granite and gneiss

Typical profile

H1 - 0 to 10 inches: fine sandy loam
H2 - 10 to 34 inches: fine sandy loam
H3 - 34 to 60 inches: stratified sand to loamy fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very low

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Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 6.00 in/hr)

Depth to water table: About 19 to 23 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B

Ecological site: F144AY012CT - Sandy Low Floodplain

Hydric soil rating: No

Minor Components

Rippowam

Percent of map unit: 15 percent

Landform: Alluvial flats

Hydric soil rating: Yes

4A—Rippowam fine sandy loam, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2zvdr

Elevation: 100 to 920 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Rippowam and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rippowam

Setting

Landform: Alluvial flats

Landform position (three-dimensional): Dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy alluvium over sandy and gravelly alluvium derived from granite and gneiss

Typical profile

H1 - 0 to 5 inches: fine sandy loam

H2 - 5 to 24 inches: fine sandy loam

H3 - 24 to 60 inches: loamy sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 6.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Ecological site: F144AY014CT - Wet Sandy Low Floodplain
Hydric soil rating: Yes

Minor Components

Saco

Percent of map unit: 5 percent
Landform: Alluvial flats
Hydric soil rating: Yes

Pootatuck

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

Limerick

Percent of map unit: 5 percent
Landform: Alluvial flats
Hydric soil rating: Yes

5A—Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2zvds
Elevation: 100 to 560 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Saco

Setting

Landform: Alluvial flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-silty alluvium

Typical profile

H1 - 0 to 12 inches: silt loam
H2 - 12 to 44 inches: silt loam
H3 - 44 to 60 inches: stratified fine sand to very fine sand to very fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 2 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Ecological site: F144AY016MA - Very Wet Low Floodplain
Hydric soil rating: Yes

Minor Components

Limerick

Percent of map unit: 10 percent
Landform: Alluvial flats
Hydric soil rating: Yes

Swansea

Percent of map unit: 5 percent
Landform: Bogs
Hydric soil rating: Yes

8A—Limerick silt loam, 0 to 3 percent slopes, frequently flooded

Map Unit Setting

National map unit symbol: 2zvd
Elevation: 50 to 500 feet
Mean annual precipitation: 40 to 50 inches

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Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Limerick and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Limerick

Setting

Landform: Alluvial flats

Landform position (three-dimensional): Dip

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Silty alluvium

Typical profile

H1 - 0 to 12 inches: silt loam

H2 - 12 to 20 inches: very fine sandy loam

H3 - 20 to 60 inches: silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.60 to 2.00 in/hr)

Depth to water table: About 6 to 10 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very high (about 13.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: B/D

Ecological site: F144AY015NY - Wet Silty Low Floodplain

Hydric soil rating: Yes

Minor Components

Winooski

Percent of map unit: 10 percent

Hydric soil rating: No

Saco

Percent of map unit: 5 percent

Landform: Alluvial flats

Hydric soil rating: Yes

30A—Raynham silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9b1h

Elevation: 50 to 500 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Raynham and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raynham

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Silty glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam

H2 - 10 to 37 inches: silt loam

H3 - 37 to 60 inches: stratified loamy fine sand to fine sandy loam to silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 31 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent

Available water supply, 0 to 60 inches: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: C/D

Ecological site: F145XY004CT - Wet Lake Plain

Hydric soil rating: Yes

Minor Components

Belgrade

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

Maybid

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Scitico

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

225B—Belgrade silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 99z4
Elevation: 100 to 850 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Belgrade

Setting

Landform: Terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-silty glaciolacustrine deposits

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 51 inches: very fine sandy loam
H3 - 51 to 60 inches: loamy very fine sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.06 to 2.00 in/hr)

Depth to water table: About 18 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: C

Ecological site: F145XY006CT - Semi-Rich Moist Lake Plain

Hydric soil rating: No

Minor Components

Raynham

Percent of map unit: 15 percent

Landform: Depressions

Hydric soil rating: Yes

250A—Pollux fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9b1b

Elevation: 110 to 230 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Pollux and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pollux

Setting

Landform: Outwash plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy glaciofluvial deposits over hard silty
glaciolacustrine deposits derived from granite and gneiss

Typical profile

H1 - 0 to 4 inches: fine sandy loam

H2 - 4 to 30 inches: fine sandy loam

H3 - 30 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C
Ecological site: F145XY009CT - Well Drained Outwash
Hydric soil rating: No

Minor Components

Enosburg

Percent of map unit: 10 percent
Landform: Terraces
Hydric soil rating: Yes

Amostown

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

250B—Pollux fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9b1c
Elevation: 130 to 310 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Pollux

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope

Custom Soil Resource Report

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy glaciofluvial deposits over hard silty glaciolacustrine deposits derived from granite and gneiss

Typical profile

H1 - 0 to 4 inches: fine sandy loam

H2 - 4 to 30 inches: fine sandy loam

H3 - 30 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Ecological site: F145XY009CT - Well Drained Outwash

Hydric soil rating: No

Minor Components

Amostown

Percent of map unit: 10 percent

Hydric soil rating: No

Enosburg

Percent of map unit: 10 percent

Landform: Terraces

Hydric soil rating: Yes

250C—Pollux fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9b1d

Elevation: 110 to 310 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Pollux and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pollux

Setting

Landform: Outwash plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Riser

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy glaciofluvial deposits over hard silty glaciolacustrine deposits derived from granite and gneiss

Typical profile

H1 - 0 to 4 inches: fine sandy loam

H2 - 4 to 30 inches: fine sandy loam

H3 - 30 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 8 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Ecological site: F145XY009CT - Well Drained Outwash

Hydric soil rating: No

Minor Components

Amostown

Percent of map unit: 15 percent

Hydric soil rating: No

253E—Hinckley loamy sand, 25 to 35 percent slopes

Map Unit Setting

National map unit symbol: 2svmf

Custom Soil Resource Report

Elevation: 0 to 1,200 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Hinckley and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hinckley

Setting

Landform: Outwash deltas, outwash terraces, moraines, eskers, kames, outwash plains, kame terraces

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Nose slope, side slope, crest, head slope, riser

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Parent material: Sandy and gravelly glaciofluvial deposits derived from gneiss and/or granite and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 8 inches: loamy sand

Bw1 - 8 to 11 inches: gravelly loamy sand

Bw2 - 11 to 16 inches: gravelly loamy sand

BC - 16 to 19 inches: very gravelly loamy sand

C - 19 to 65 inches: very gravelly sand

Properties and qualities

Slope: 25 to 35 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Windsor

Percent of map unit: 10 percent

Custom Soil Resource Report

Landform: Moraines, eskers, kames, outwash deltas, outwash terraces, outwash plains, kame terraces

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Crest, head slope, nose slope, side slope, riser

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

Merrimac

Percent of map unit: 3 percent

Landform: Kame terraces, outwash terraces, kames, outwash plains, moraines, eskers

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope, crest, head slope, nose slope, riser

Down-slope shape: Concave, convex, linear

Across-slope shape: Convex, linear, concave

Hydric soil rating: No

Sudbury

Percent of map unit: 2 percent

Landform: Outwash deltas, moraines, outwash plains, kame terraces, outwash terraces

Landform position (two-dimensional): Toeslope, footslope, backslope

Landform position (three-dimensional): Base slope, tread

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Hydric soil rating: No

258B—Amostown fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 99z1

Elevation: 100 to 840 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Amostown and similar soils: 75 percent

Minor components: 25 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amostown

Setting

Landform: Terraces, deltas, outwash plains

Landform position (two-dimensional): Summit, footslope

Custom Soil Resource Report

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable sandy glaciofluvial deposits over silty glaciolacustrine deposits

Typical profile

H1 - 0 to 7 inches: fine sandy loam

H2 - 7 to 32 inches: fine sandy loam

H3 - 32 to 60 inches: stratified very fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)

Depth to water table: About 18 to 36 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2w

Hydrologic Soil Group: B

Ecological site: F145XY005MA - Moist Lake Plain

Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 15 percent

Hydric soil rating: No

Agawam

Percent of map unit: 10 percent

Hydric soil rating: No

536C—Wethersfield fine sandy loam, 8 to 15 percent slopes, stony

Map Unit Setting

National map unit symbol: 9b29

Elevation: 150 to 480 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Wethersfield and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wethersfield

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Friable coarse-loamy eolian deposits over firm loamy basal till derived from sandstone and shale

Typical profile

H1 - 0 to 9 inches: fine sandy loam

H2 - 9 to 16 inches: fine sandy loam

H3 - 16 to 23 inches: loam

H4 - 23 to 26 inches: gravelly loam

H5 - 26 to 60 inches: very gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent

Surface area covered with cobbles, stones or boulders: 0.6 percent

Depth to restrictive feature: 20 to 31 inches to densic material

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: C

Ecological site: F145XY012CT - Well Drained Dense Till Uplands

Hydric soil rating: No

Minor Components

Ridgebury

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Woodbridge

Percent of map unit: 5 percent

Hydric soil rating: No

Paxton

Percent of map unit: 5 percent

Hydric soil rating: No

749B—Windsor loamy sand, silty substratum, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9b2l

Elevation: 110 to 920 feet

Mean annual precipitation: 40 to 50 inches

Mean annual air temperature: 45 to 52 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Windsor and similar soils: 80 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor

Setting

Landform: Outwash plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loose sandy glaciofluvial deposits over silty glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: loamy sand

H2 - 8 to 21 inches: loamy sand

H3 - 21 to 45 inches: sand

H4 - 45 to 60 inches: silt loam

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3s

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Enosburg

Percent of map unit: 10 percent
Landform: Terraces
Hydric soil rating: Yes

Amostown

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

Pollux

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

749C—Windsor loamy sand, silty substratum, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9b2m
Elevation: 100 to 890 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

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

Description of Windsor

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loose sandy glaciofluvial deposits over silty glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: loamy sand
H2 - 8 to 21 inches: loamy sand
H3 - 21 to 45 inches: sand
H4 - 45 to 60 inches: silt loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained

Custom Soil Resource Report

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

Minor Components

Pollux

Percent of map unit: 10 percent

Hydric soil rating: No

Amostown

Percent of map unit: 10 percent

Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

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

Soil Qualities and Features

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

Hydrologic Soil Group

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

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

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

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

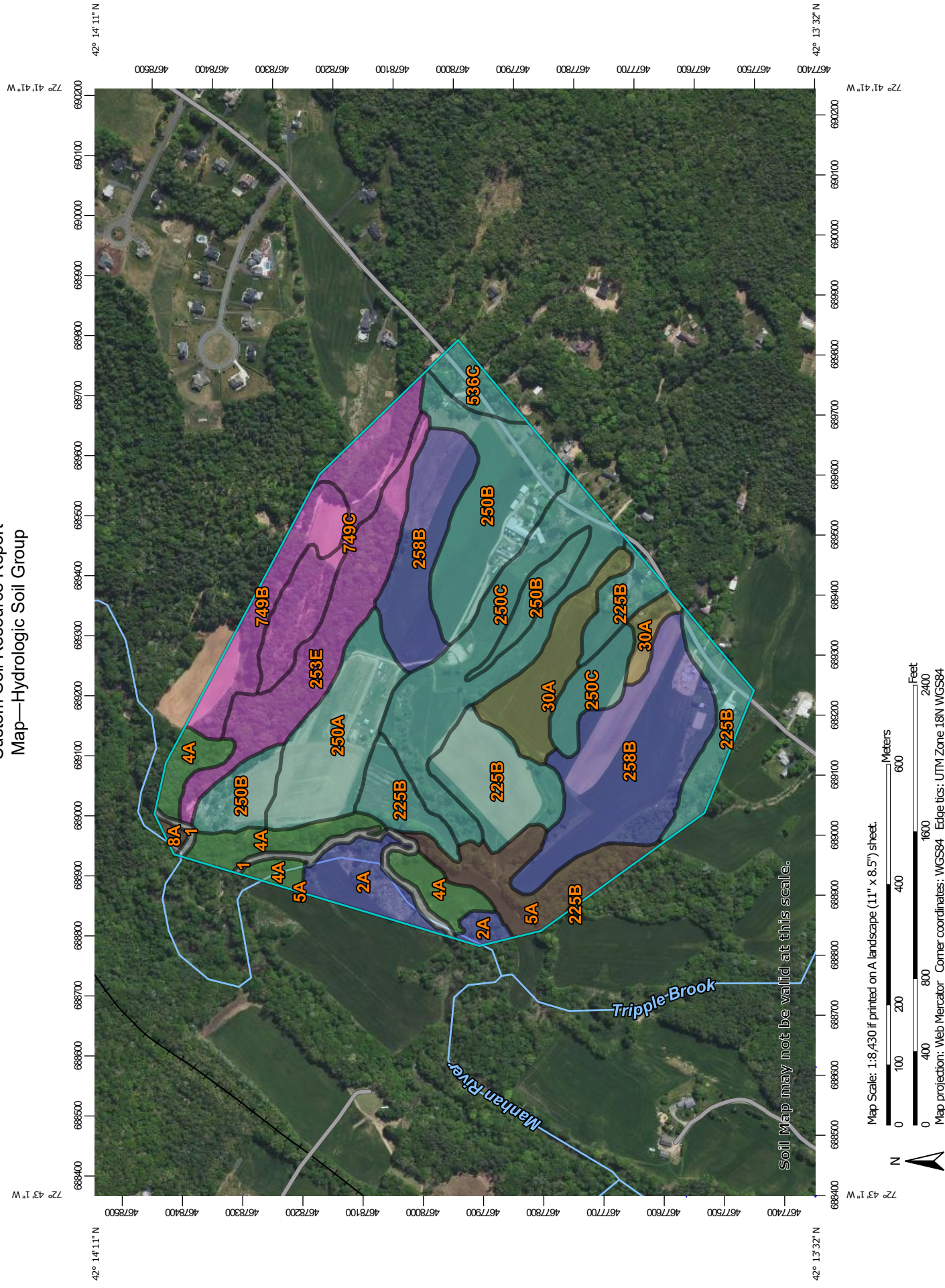
Custom Soil Resource Report

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

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

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

Custom Soil Resource Report Map—Hydrologic Soil Group



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 19, Aug 28, 2024

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

Date(s) aerial images were photographed: May 24, 2020—Aug 6, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		2.1	1.4%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded	B	5.3	3.6%
4A	Rippowam fine sandy loam, 0 to 3 percent slopes, frequently flooded	A/D	8.8	5.9%
5A	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	B/D	7.1	4.8%
8A	Limerick silt loam, 0 to 3 percent slopes, frequently flooded	B/D	0.4	0.2%
30A	Raynham silt loam, 0 to 3 percent slopes	C/D	7.7	5.2%
225B	Belgrade silt loam, 3 to 8 percent slopes	C	17.9	12.1%
250A	Pollux fine sandy loam, 0 to 3 percent slopes	C	10.0	6.8%
250B	Pollux fine sandy loam, 3 to 8 percent slopes	C	17.9	12.1%
250C	Pollux fine sandy loam, 8 to 15 percent slopes	C	18.0	12.1%
253E	Hinckley loamy sand, 25 to 35 percent slopes	A	11.1	7.5%
258B	Amostown fine sandy loam, 3 to 8 percent slopes	B	24.7	16.7%
536C	Wethersfield fine sandy loam, 8 to 15 percent slopes, stony	C	2.3	1.6%
749B	Windsor loamy sand, silty substratum, 3 to 8 percent slopes	A	6.4	4.3%
749C	Windsor loamy sand, silty substratum, 8 to 15 percent slopes	A	8.5	5.7%
Totals for Area of Interest			148.2	100.0%

Rating Options—Hydrologic Soil Group*Aggregation Method: Dominant Condition**Component Percent Cutoff: None Specified*

Tie-break Rule: Higher

Depth to Bedrock

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

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

- 1) Lithic Bedrock
- 2) Paralithic Bedrock
- 3) Densic Bedrock

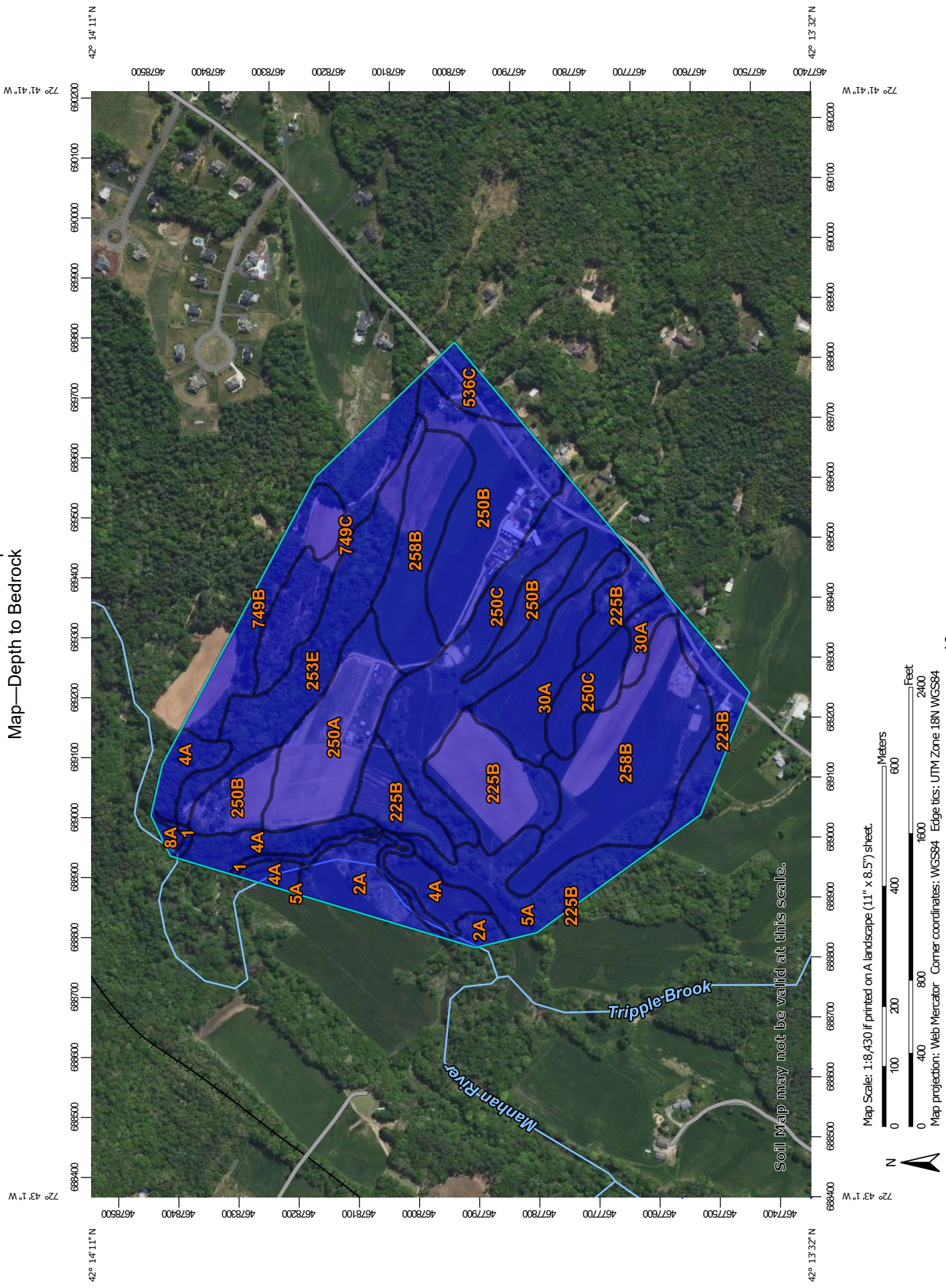
Lithic bedrock and paralithic bedrock are comprised of igneous, metamorphic, and sedimentary rocks, which are coherent and consolidated into rock through pressure, heat, cementation, or fusion. Lithic bedrock represents the hardest type of bedrock, with a hardness of strongly coherent to indurated. Paralithic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

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

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

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

Custom Soil Resource Report
Map—Depth to Bedrock



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Lines

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

Not rated or not available

Soil Rating Points

0 - 25

25 - 50

50 - 100

100 - 150

150 - 200

> 200

☐ Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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

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

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

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

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

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

Soil Survey Area: Hampshire County, Massachusetts, Central Part
Survey Area Data: Version 19, Aug 28, 2024

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

Date(s) aerial images were photographed: May 24, 2020—Aug 6, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Bedrock

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
1	Water	>200	2.1	1.4%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded	>200	5.3	3.6%
4A	Rippowam fine sandy loam, 0 to 3 percent slopes, frequently flooded	>200	8.8	5.9%
5A	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	>200	7.1	4.8%
8A	Limerick silt loam, 0 to 3 percent slopes, frequently flooded	>200	0.4	0.2%
30A	Raynham silt loam, 0 to 3 percent slopes	>200	7.7	5.2%
225B	Belgrade silt loam, 3 to 8 percent slopes	>200	17.9	12.1%
250A	Pollux fine sandy loam, 0 to 3 percent slopes	>200	10.0	6.8%
250B	Pollux fine sandy loam, 3 to 8 percent slopes	>200	17.9	12.1%
250C	Pollux fine sandy loam, 8 to 15 percent slopes	>200	18.0	12.1%
253E	Hinckley loamy sand, 25 to 35 percent slopes	>200	11.1	7.5%
258B	Amostown fine sandy loam, 3 to 8 percent slopes	>200	24.7	16.7%
536C	Wethersfield fine sandy loam, 8 to 15 percent slopes, stony	>200	2.3	1.6%
749B	Windsor loamy sand, silty substratum, 3 to 8 percent slopes	>200	6.4	4.3%
749C	Windsor loamy sand, silty substratum, 8 to 15 percent slopes	>200	8.5	5.7%
Totals for Area of Interest			148.2	100.0%

Rating Options—Depth to Bedrock*Units of Measure:* centimeters*Aggregation Method:* Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Water Features

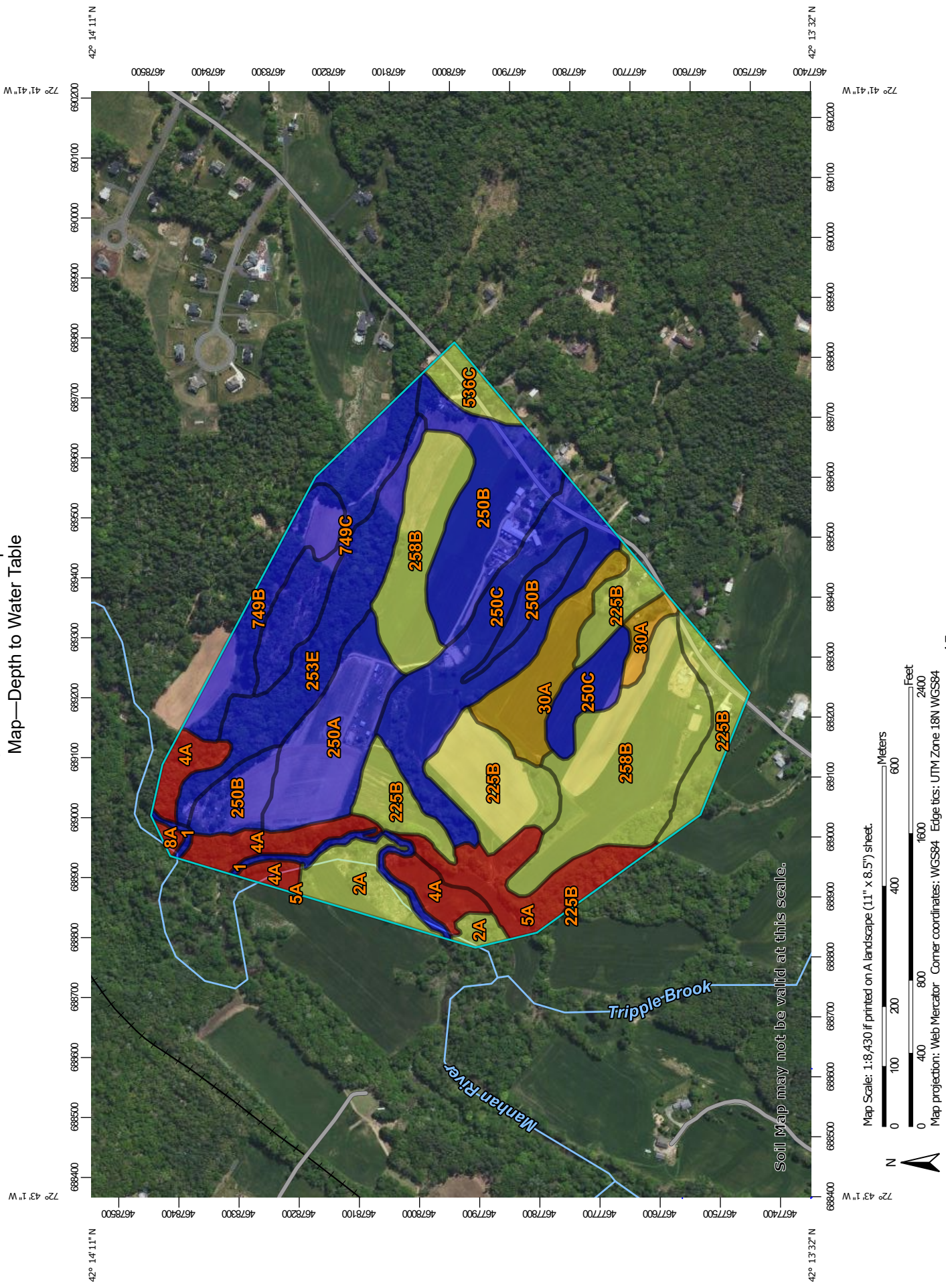
Water Features include ponding frequency, flooding frequency, and depth to water table.

Depth to Water Table

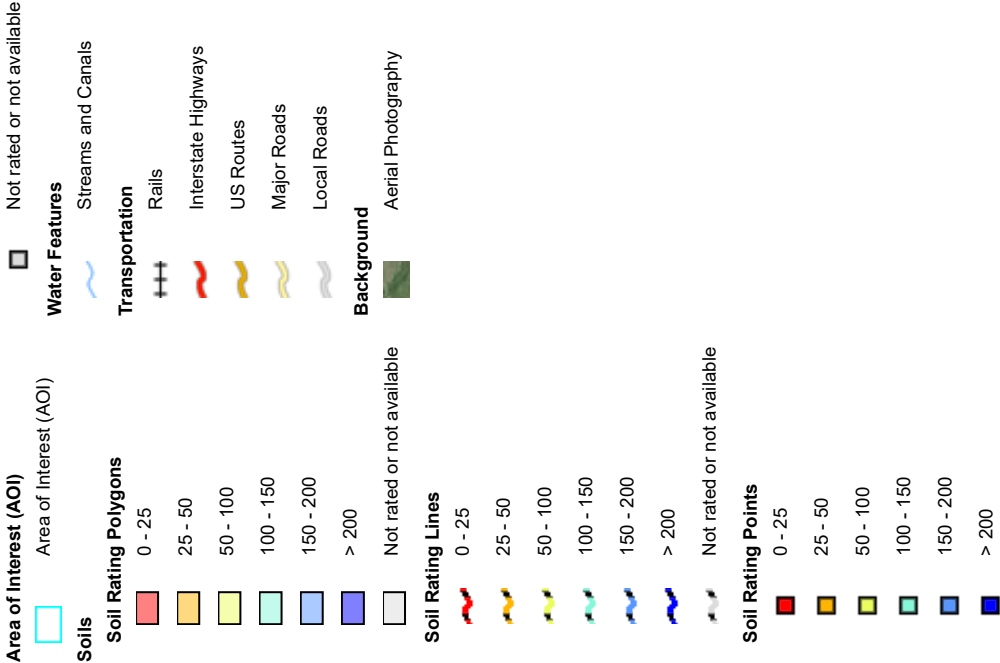
"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone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

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

Custom Soil Resource Report
Map—Depth to Water Table



MAP LEGEND



MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Depth to Water Table

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
1	Water	>200	2.1	1.4%
2A	Pootatuck fine sandy loam, 0 to 3 percent slopes, occasionally flooded	53	5.3	3.6%
4A	Rippowam fine sandy loam, 0 to 3 percent slopes, frequently flooded	23	8.8	5.9%
5A	Saco silt loam, frequently ponded, 0 to 2 percent slopes, frequently flooded	0	7.1	4.8%
8A	Limerick silt loam, 0 to 3 percent slopes, frequently flooded	20	0.4	0.2%
30A	Raynham silt loam, 0 to 3 percent slopes	39	7.7	5.2%
225B	Belgrade silt loam, 3 to 8 percent slopes	77	17.9	12.1%
250A	Pollux fine sandy loam, 0 to 3 percent slopes	>200	10.0	6.8%
250B	Pollux fine sandy loam, 3 to 8 percent slopes	>200	17.9	12.1%
250C	Pollux fine sandy loam, 8 to 15 percent slopes	>200	18.0	12.1%
253E	Hinckley loamy sand, 25 to 35 percent slopes	>200	11.1	7.5%
258B	Amostown fine sandy loam, 3 to 8 percent slopes	69	24.7	16.7%
536C	Wethersfield fine sandy loam, 8 to 15 percent slopes, stony	61	2.3	1.6%
749B	Windsor loamy sand, silty substratum, 3 to 8 percent slopes	>200	6.4	4.3%
749C	Windsor loamy sand, silty substratum, 8 to 15 percent slopes	>200	8.5	5.7%
Totals for Area of Interest			148.2	100.0%

Rating Options—Depth to Water Table

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

References

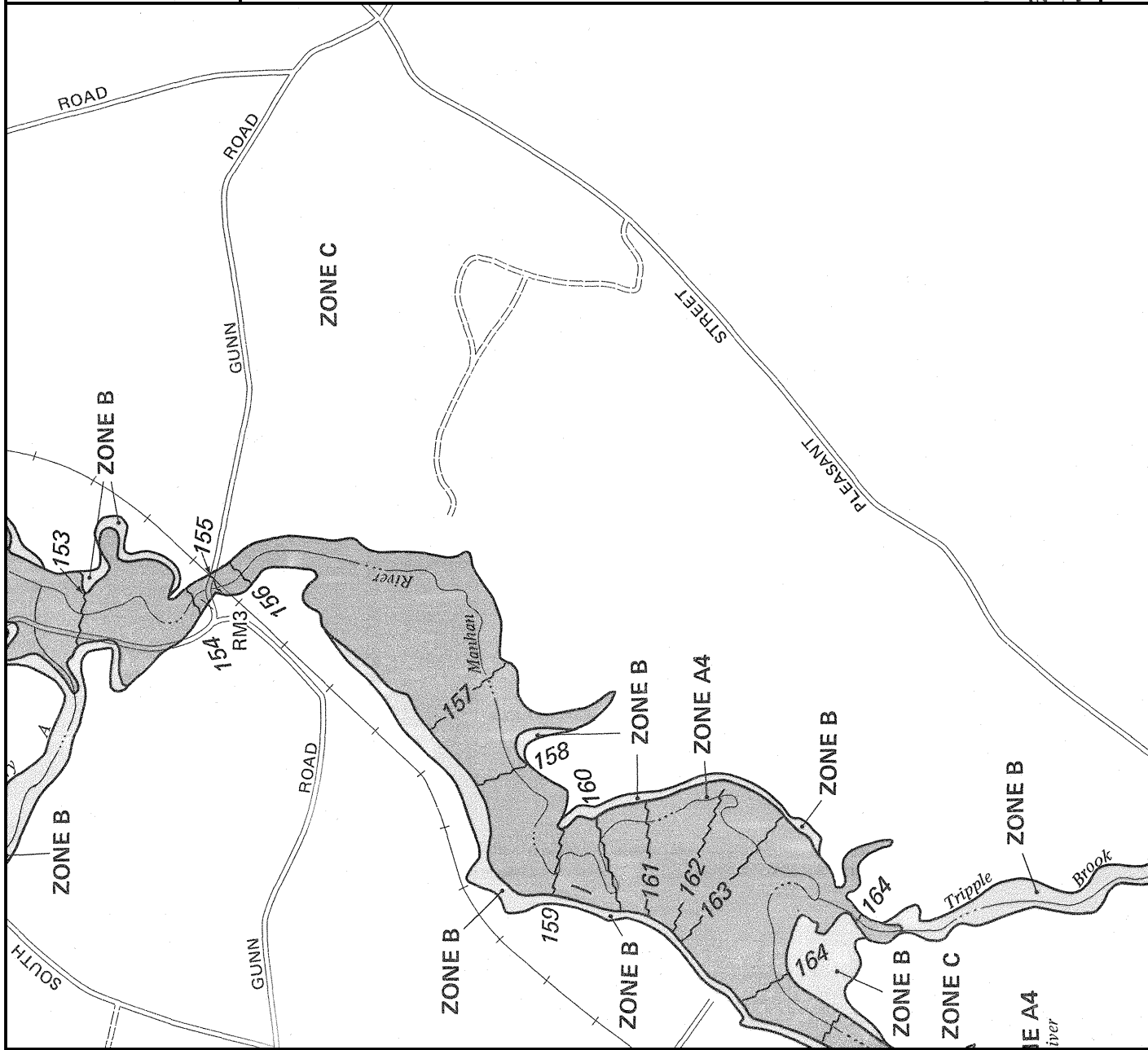
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Custom Soil Resource Report

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APPROXIMATE SCALE



NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
SOUTHAMPTON,
MASSACHUSETTS
HAMPSHIRE COUNTY

PANEL 10 OF 20

COMMUNITY-PANEL NUMBER
250171 0010 A

EFFECTIVE DATE:
DECEMBER 4, 1979



U.S. DEPARTMENT OF HOUSING
AND URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

COUNTY
BOUNDARY
NE A5
LIMITS
ZONE
C

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.



NOAA Atlas 14, Volume 10, Version 3
Location name: Southampton, Massachusetts,
USA*
Latitude: 42.2291°, Longitude: -72.7074°
Elevation: 191 ft**
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orian White

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aeries](#)

PF tabular

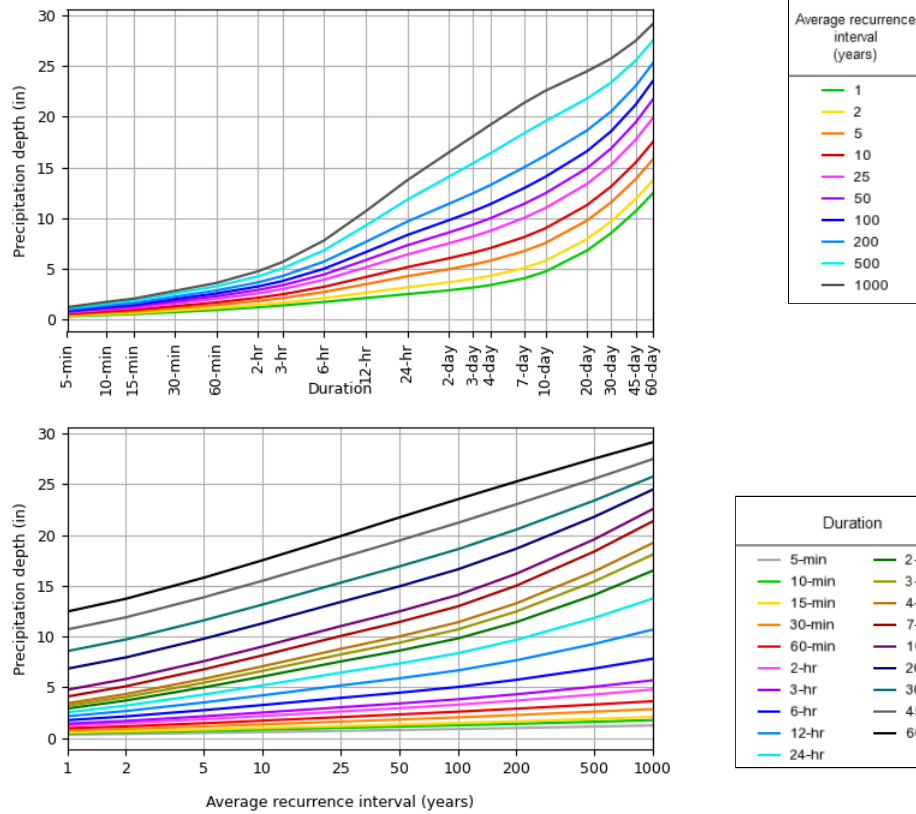
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.335 (0.257-0.432)	0.398 (0.305-0.515)	0.502 (0.363-0.651)	0.589 (0.447-0.767)	0.708 (0.522-0.966)	0.799 (0.577-1.11)	0.892 (0.627-1.29)	0.993 (0.666-1.48)	1.14 (0.734-1.75)	1.25 (0.790-1.97)
10-min	0.474 (0.363-0.612)	0.564 (0.432-0.729)	0.712 (0.544-0.922)	0.834 (0.633-1.09)	1.00 (0.739-1.37)	1.13 (0.817-1.58)	1.26 (0.888-1.83)	1.41 (0.943-2.09)	1.61 (1.04-2.48)	1.77 (1.12-2.79)
15-min	0.558 (0.428-0.720)	0.664 (0.509-0.858)	0.838 (0.640-1.08)	0.982 (0.746-1.28)	1.18 (0.870-1.61)	1.33 (0.961-1.86)	1.49 (1.04-2.15)	1.66 (1.11-2.46)	1.89 (1.22-2.92)	2.08 (1.32-3.28)
30-min	0.763 (0.585-0.985)	0.910 (0.697-1.18)	1.15 (0.877-1.49)	1.35 (1.02-1.76)	1.62 (1.19-2.21)	1.83 (1.32-2.55)	2.04 (1.44-2.95)	2.27 (1.53-3.38)	2.60 (1.68-4.01)	2.86 (1.81-4.51)
60-min	0.969 (0.743-1.25)	1.16 (0.885-1.49)	1.46 (1.12-1.89)	1.71 (1.30-2.24)	2.06 (1.52-2.81)	2.33 (1.68-3.24)	2.60 (1.82-3.76)	2.90 (1.94-4.31)	3.31 (2.14-5.10)	3.64 (2.30-5.74)
2-hr	1.24 (0.956-1.58)	1.47 (1.14-1.89)	1.86 (1.43-2.39)	2.18 (1.66-2.82)	2.61 (1.94-3.55)	2.94 (2.15-4.09)	3.29 (2.34-4.77)	3.69 (2.49-5.47)	4.29 (2.78-6.59)	4.78 (3.04-7.51)
3-hr	1.42 (1.10-1.80)	1.69 (1.31-2.16)	2.14 (1.65-2.74)	2.51 (1.93-3.24)	3.03 (2.26-4.10)	3.41 (2.50-4.74)	3.82 (2.74-5.55)	4.31 (2.91-6.37)	5.06 (3.29-7.76)	5.70 (3.62-8.92)
6-hr	1.76 (1.38-2.23)	2.14 (1.67-2.70)	2.75 (2.14-3.49)	3.25 (2.52-4.16)	3.95 (2.98-5.34)	4.47 (3.31-6.20)	5.03 (3.65-7.33)	5.74 (3.88-8.44)	6.85 (4.47-10.5)	7.82 (4.99-12.2)
12-hr	2.15 (1.69-2.69)	2.66 (2.10-3.34)	3.51 (2.75-4.42)	4.21 (3.28-5.34)	5.17 (3.93-6.97)	5.88 (4.39-8.14)	6.66 (4.88-9.70)	7.67 (5.21-11.2)	9.27 (6.06-14.1)	10.7 (6.84-16.6)
24-hr	2.53 (2.01-3.15)	3.20 (2.54-3.98)	4.29 (3.38-5.36)	5.19 (4.08-6.54)	6.43 (4.92-8.62)	7.34 (5.53-10.1)	8.35 (6.17-12.2)	9.68 (6.60-14.1)	11.8 (7.76-17.9)	13.7 (8.82-21.2)
2-day	2.91 (2.33-3.59)	3.70 (2.95-4.57)	4.99 (3.97-6.19)	6.06 (4.80-7.57)	7.54 (5.82-10.1)	8.60 (6.54-11.8)	9.81 (7.32-14.3)	11.4 (7.82-16.6)	14.1 (9.28-21.2)	16.5 (10.6-25.4)
3-day	3.18 (2.56-3.91)	4.04 (3.24-4.97)	5.45 (4.36-6.73)	6.62 (5.26-8.23)	8.22 (6.37-10.9)	9.38 (7.16-12.9)	10.7 (8.02-15.5)	12.5 (8.55-18.0)	15.4 (10.2-23.2)	18.1 (11.7-27.7)
4-day	3.42 (2.76-4.19)	4.34 (3.49-5.32)	5.83 (4.68-7.18)	7.06 (5.63-8.76)	8.77 (6.82-11.6)	10.0 (7.65-13.7)	11.4 (8.56-16.5)	13.3 (9.12-19.1)	16.4 (10.8-24.6)	19.2 (12.4-29.4)
7-day	4.09 (3.32-4.97)	5.10 (4.14-6.22)	6.76 (5.46-8.28)	8.14 (6.53-10.0)	10.0 (7.84-13.2)	11.4 (8.76-15.5)	13.0 (9.74-18.6)	15.0 (10.4-21.5)	18.4 (12.2-27.4)	21.4 (13.8-32.6)
10-day	4.75 (3.87-5.76)	5.82 (4.73-7.06)	7.57 (6.13-9.22)	9.02 (7.26-11.1)	11.0 (8.61-14.4)	12.5 (9.57-16.8)	14.1 (10.6-20.0)	16.2 (11.2-23.1)	19.6 (13.0-29.1)	22.6 (14.6-34.3)
20-day	6.83 (5.61-8.20)	7.95 (6.52-9.56)	9.78 (7.99-11.8)	11.3 (9.17-13.7)	13.4 (10.5-17.2)	14.9 (11.5-19.8)	16.6 (12.4-23.1)	18.7 (13.0-26.5)	21.8 (14.5-32.2)	24.5 (15.9-37.1)
30-day	8.56 (7.06-10.2)	9.71 (8.00-11.6)	11.6 (9.51-13.9)	13.1 (10.7-15.9)	15.3 (12.0-19.5)	16.9 (13.0-22.1)	18.6 (13.8-25.5)	20.5 (14.4-29.0)	23.4 (15.7-34.5)	25.8 (16.8-38.9)
45-day	10.7 (8.87-12.7)	11.9 (9.85-14.2)	13.9 (11.4-16.6)	15.5 (12.7-18.7)	17.7 (14.0-22.4)	19.4 (15.0-25.2)	21.2 (15.7-28.6)	23.0 (16.2-32.3)	25.5 (17.2-37.4)	27.5 (17.9-41.4)
60-day	12.5 (10.4-14.8)	13.7 (11.4-16.3)	15.8 (13.1-18.8)	17.5 (14.4-21.0)	19.9 (15.7-24.9)	21.7 (16.7-27.9)	23.5 (17.3-31.4)	25.3 (17.8-35.4)	27.5 (18.5-40.2)	29.1 (19.1-43.8)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 42.2291°, Longitude: -72.7074°



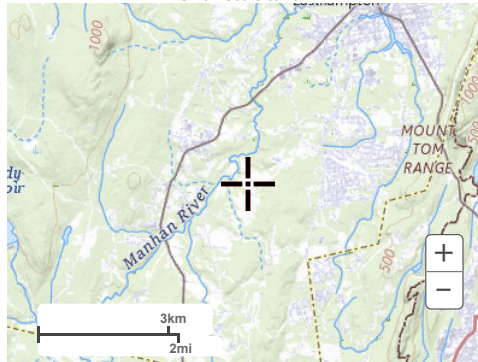
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Thu Jul 31 21:24:07 2025

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Maps & aerals

Small scale terrain



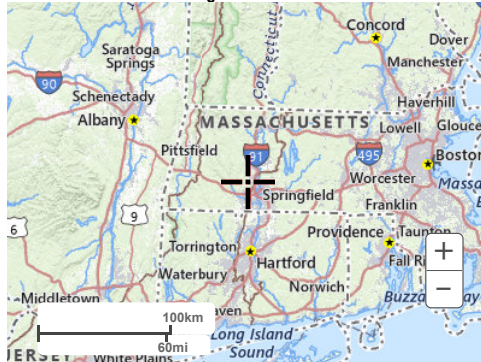
Large scale terrain



Large scale map



Large scale aerial

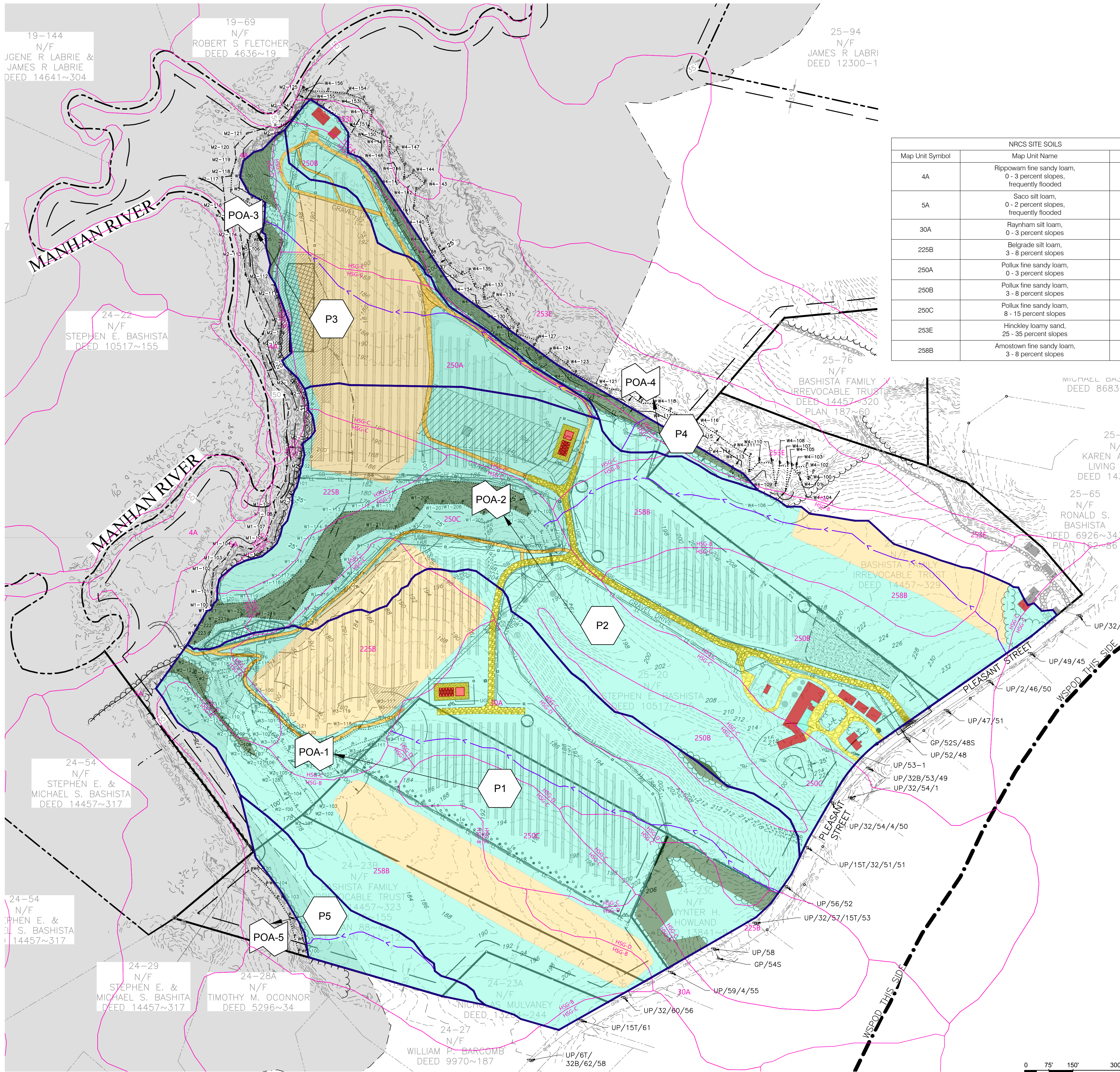


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Silver Spring, MD 20910
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Attachment C - Drainage Area Maps, HydroCAD Reports,
Riprap Apron Sizing Calculations



NOTES:

1. SOIL BOUNDARY DATA DERIVED FROM MASS-GIS PUBLICLY AVAILABLE GIS DATA.
2. SURVEY FROM A PLAN ENTITLED "PLAN OF LAND IN SOUTHAMPTON, MA, PLEASANT STREET, PREPARED FOR WESTON & SAMPSON ENGINEERS, INC." DEVELOPED BY NORTHEAST SURVEY CONSULTANTS AND DATED MAY 31, 2024.

Map Unit Symbol	NRCS SITE SOILS Map Unit Name	HSG
4A	Rippowam fine sandy loam, 0 - 3 percent slopes, frequently flooded	A/D
5A	Saco silt loam, 0 - 2 percent slopes, frequently flooded	B/D
30A	Raynham silt loam, 0 - 3 percent slopes	C/D
225B	Belgrade silt loam, 3 - 8 percent slopes	C
250A	Pollux fine sandy loam, 0 - 3 percent slopes	C
250B	Pollux fine sandy loam, 3 - 8 percent slopes	C
250C	Pollux fine sandy loam, 8 - 15 percent slopes	C
253E	Hinckley loamy sand, 25 - 35 percent slopes	A
258B	Amstow fine sandy loam, 3 - 8 percent slopes	B

POST-DEVELOPMENT TC LIST				
Drainage Area	Flow Type	Ground Cover	Length (ft)	Slope
P-1	SHEET	MEADOW	50	26.00%
	SCF	MEADOW	408	5.88%
	SCF	MEADOW	419	2.63%
P-2	SCF	MEADOW	474	1.05%
	SHEET	MEADOW	44	7.95%
	SHEET	CORN ROWS	6	8.33%
	SCF	CORN ROWS	266	4.51%
	SCF	CORN ROWS	492	2.24%
	SCF	MEADOW	755	2.42%
	SCF	GRAVEL ROAD	20	3.50%
P-3	SCF	MEADOW	79	7.41%
	SHEET	MEADOW	27	3.70%
	SHEET	DIRT ROAD	23	4.35%
	SCF	DIRT ROAD	509	1.57%
	SCF	MEADOW	73	1.37%
	SCF	DIRT ROAD	17	1.76%
	SCF	CORN ROWS	169	2.19%
P-4	SCF	CORN ROWS	311	0.58%
	SCF	MEADOW	39	0.51%
	SCF	MEADOW	70	17.14%
	SHEET	MEADOW	50	4.00%
P-5	SCF	MEADOW	45	6.67%
	SCF	WOODS	42	19.05%
	SHEET	MEADOW	50	4.00%
	SCF	MEADOW	400	4.13%

HYDROLOGY:

- FLOW PATH
- SUBCATCHMENT LABEL
- POINT OF ANALYSIS
- MEADOW
- WOODLAND
- GRAVEL
- DIRT ROAD
- CORN FIELD
- IMPERVIOUS
- NRCS SOIL BOUNDARY
- NRCS MAP UNITS
- WATERSHED BOUNDARY

LEGEND:

EXISTING:

- PROPERTY LINE
- PROPERTY LINE APPROXIMATE
- ABUTTER'S PROPERTY LINE
- PROPERTY LINE SETBACK
- MAJOR CONTOUR
- MINOR CONTOUR
- OVERHEAD WIRES
- EDGE OF WATER
- WETLAND LINE
- TOP OF BANK PERENNIAL STREAM
- 25' CONSERVATION BUFFER
- 100' WETLAND BUFFER
- 200' RIVER FRONT AREA
- FEMA FLOOD BOUNDARY LINE
- WATER SUPPLY PROTECTION OVERLAY DISTRICT (WSPOD)
- DRAIN LINE
- TREE LINE
- NHESP PRIMARY HABITATS OF RARE SPECIES
- GRAVEL DRIVE
- GRASS PATH
- STRUCTURES
- SURVEY MARKERS
- UTILITY POLE
- GUY WIRE
- TREE
- WETLAND FLAG WITH IDENTIFIER
- TOP OF BANK FLAG AND ID
- STUMP

PROPOSED:

- AGRICULTURAL FENCE
- LIMIT OF WORK
- ELECTRIC CONDUIT
- OVERHEAD ELECTRIC LINE
- LAYDOWN AREA
- 20' WIDE GRAVEL ACCESS WAY
- TURTLE HABITAT (TOTAL AREA = 30,463 SF)
- UTILITY POLE
- GRAVEL EQUIPMENT PAD AREA
- BATTERY PAD
- SEDIMENT BARRIER - SILT FENCE
- LEASE LINE
- SOLAR PV PANEL
- SCREENING TREE - ARBORVITAE
- SCREENING TREE - MAPLE TREE

NOT FOR CONSTRUCTION

Project: MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073



55 Walkers Brook Drive, Suite 100
Reading, MA 01867

978.532.1900 800.SAMPSON

Client:

BLUEWAVE

MANHAN RIVER, LLC

116 Harrington Ave., Suite 601
Boston, MA 02116
Tel: (617) 209-3122 https://www.bluwave.energy/



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No.	Description	Date
1	REV. GRAVEL ACCESS ROAD	04/20/26
0	ISSUED FOR PERMITTING	11/25/25

No.	Description	Date
1	REV. GRAVEL ACCESS ROAD	04/20/26
0	ISSUED FOR PERMITTING	11/25/25

Revisions

Seal:

Issued For:

PERMITTING

Issued Date: 11/25/2025

Scale: 1" = 150'

Drawn By: RJR

Reviewed By: NVG

Approved By: MRC

W&S Project No.: ENG24-0244

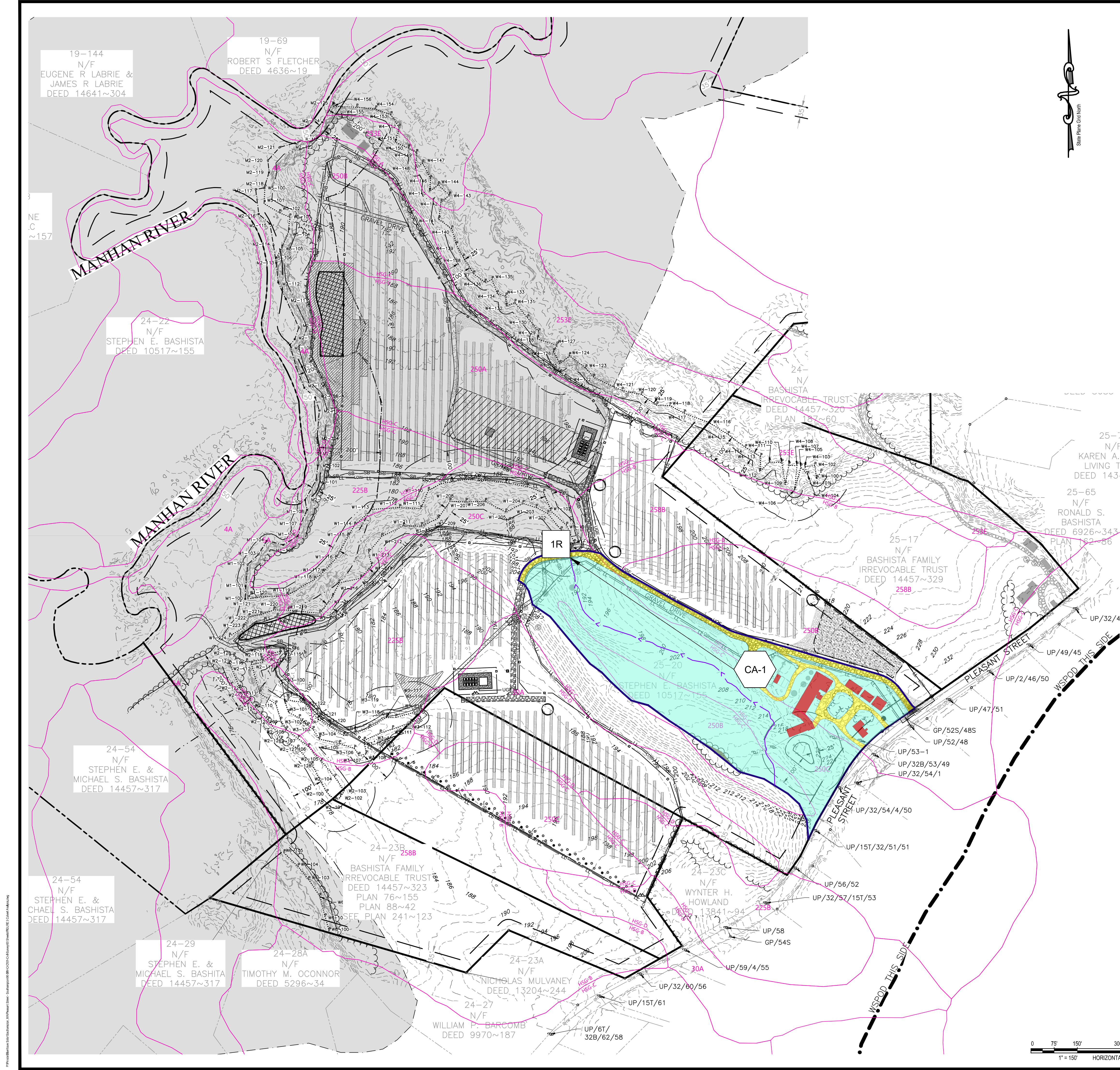
Drawing Title:

POST-DEVELOPMENT DRAINAGE AREA MAP

Sheet Number:

FIGURE 2

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- NOTES:
1. SOIL BOUNDARY DATA DERIVED FROM MASS-GIS PUBLICLY AVAILABLE GIS DATA.
 2. SURVEY FROM A PLAN ENTITLED "PLAN OF LAND IN SOUTHAMPTON, MA, PLEASANT STREET, PREPARED FOR WESTON & SAMPSON ENGINEERS, INC." DEVELOPED BY NORTHEAST SURVEY CONSULTANTS AND DATED MAY 31, 2024.

CULVERT ANALYSIS TC LIST				
Drainage Area	Flow Type	Ground Cover	Length (ft)	Slope
CA-1	SHEET	MEADOW	50	4.00%
	SCF	MEADOW	84	4.76%
	SCF	MEADOW	47	10.64%
	SCF	MEADOW	41	14.63%
	SCF	MEADOW	911	2.96%

NRCS SITE SOILS		
Map Unit Symbol	Map Unit Name	HSG
4A	Rippowam fine sandy loam, 0 - 3 percent slopes, frequently flooded	A/D
5A	Saco silt loam, 0 - 2 percent slopes, frequently flooded	B/D
30A	Raynham silt loam, 0 - 3 percent slopes	C/D
225B	Belgrade silt loam, 3 - 8 percent slopes	C
250A	Pollux fine sandy loam, 0 - 3 percent slopes	C
250B	Pollux fine sandy loam, 3 - 8 percent slopes	C
250C	Pollux fine sandy loam, 8 - 15 percent slopes	C
253E	Hinckley loamy sand, 25 - 35 percent slopes	A
258B	Amostown fine sandy loam, 3 - 8 percent slopes	B

HYDROLOGY:

- CA-1 SUBCATCHMENT LABEL
- 1R POINT OF ANALYSIS
- POA-1 POINT OF ANALYSIS
- MEADOW
- WOODLAND
- GRAVEL
- DIRT ROAD
- CORN FIELD
- IMPERVIOUS
- NRCS SOIL BOUNDARY
- NRCS MAP UNITS
- WATERSHED BOUNDARY

EXISTING:

- PROPERTY LINE
- PROPERTY LINE APPROXIMATE
- ABUTTER'S PROPERTY LINE
- PROPERTY LINE SETBACK
- MAJOR CONTOUR
- MINOR CONTOUR
- OVERHEAD WIRES
- EDGE OF WATER
- WETLAND LINE
- TOP OF BANK PERENNIAL STREAM
- 25' CONSERVATION BUFFER
- 100' WETLAND BUFFER
- 200' RIVER FRONT AREA
- FEMA FLOOD BOUNDARY LINE
- WATER SUPPLY PROTECTION OVERLAY DISTRICT (WSPOD)
- DRAIN LINE
- TREE LINE
- NHESP PRIMARY HABITATS OF RARE SPECIES
- GRAVEL DRIVE
- GRASS PATH
- STRUCTURES
- SURVEY MARKERS
- UTILITY POLE
- GUY WIRE
- TREE
- WETLAND FLAG WITH IDENTIFIER
- TOP OF BANK FLAG AND ID
- STUMP

PROPOSED:

- AGRICULTURAL FENCE
- LIMIT OF WORK
- ELECTRIC CONDUIT
- OVERHEAD ELECTRIC LINE
- LAYDOWN AREA
- 20' WIDE GRAVEL ACCESS WAY
- TURTLE HABITAT (TOTAL AREA = 30,463 SF)
- UTILITY POLE
- GRAVEL EQUIPMENT PAD AREA
- BATTERY PAD
- SEDIMENT BARRIER - SILT FENCE
- LEASE LINE
- SOLAR PV PANEL
- SCREENING TREE - ARBORVITAE

NOT FOR CONSTRUCTION

Project: MANHAN RIVER, LLC

43 & 53 PLEASANT STREET, SOUTHAMPTON, MASSACHUSETTS 01073

Weston & Sampson
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Client:

BLUEWAVE

MANHAN RIVER, LLC

116 Harrington Ave, Suite 601
Boston, MA 02116
Tel: (617) 209-3122 https://www.bluewave.energy/

811
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Revisions

Seal:

COMMONWEALTH OF MASSACHUSETTS
MELINDA COSTELLO
CIVIL
No. 52956
11/25/2025

Issued For:

PERMITTING

Issued Date: 11/25/2025
Scale: 1" = 150'
Drawn By: RJR
Reviewed By: NVG
Approved By: MRC
W&S Project No.: ENG24-0244

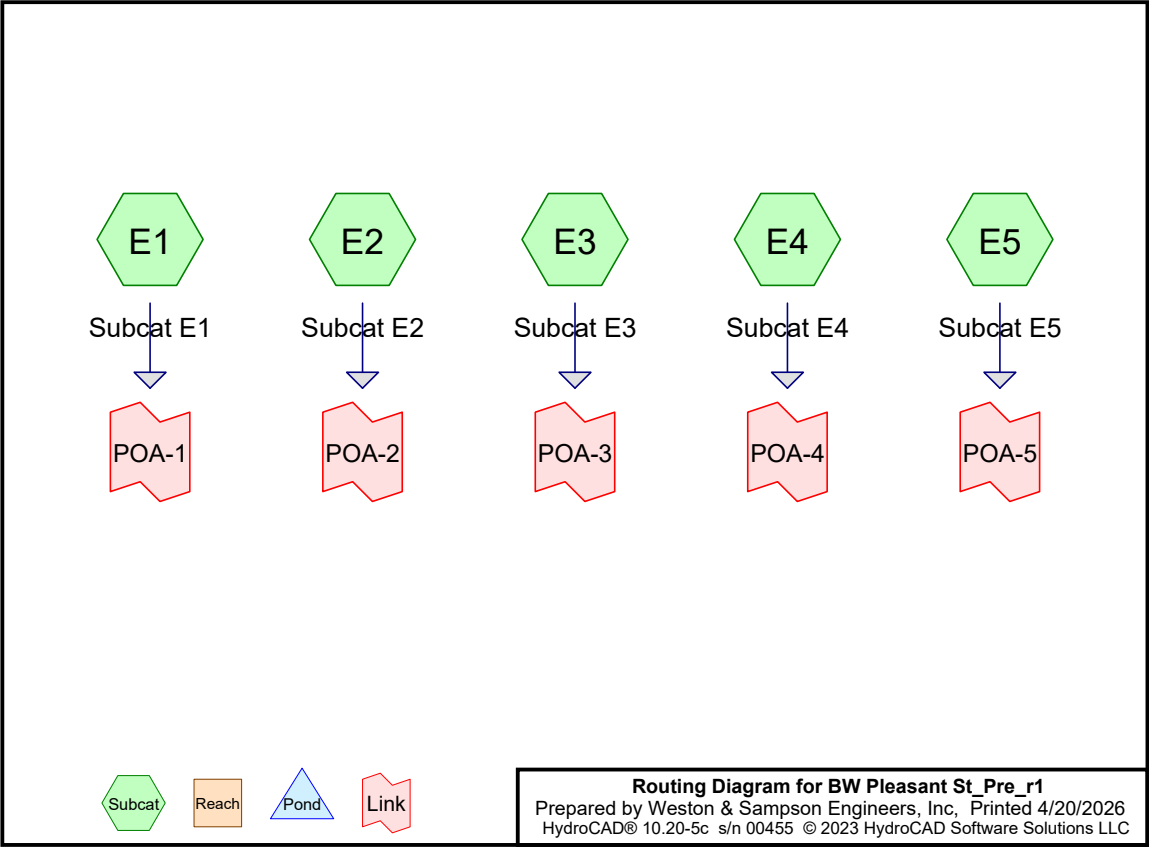
Drawing Title:

CULVERT ANALYSIS

Sheet Number:

FIGURE 3

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.20	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.19	2
3	100-yr	Type III 24-hr		Default	24.00	1	8.35	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.035	72	Dirt roads, HSG A (E3)
0.051	82	Dirt roads, HSG B (E2)
1.618	87	Dirt roads, HSG C (E1, E2, E3, E4)
0.150	89	Dirt roads, HSG D (E1)
0.028	85	Gravel roads, HSG B (E2)
0.623	89	Gravel roads, HSG C (E2)
0.466	30	Meadow, non-grazed, HSG A (E3, E4)
15.300	58	Meadow, non-grazed, HSG B (E1, E2, E4, E5)
37.463	71	Meadow, non-grazed, HSG C (E1, E2, E3, E4)
7.756	78	Meadow, non-grazed, HSG D (E1, E2, E3)
0.051	98	Roofs, HSG A (E4)
0.397	98	Roofs, HSG C (E2, E4)
4.920	75	Row crops, SR + CR, Good, HSG B (E1, E2)
12.439	82	Row crops, SR + CR, Good, HSG C (E1, E2, E3, E4)
0.724	85	Row crops, SR + CR, Good, HSG D (E1)
0.934	30	Woods, Good, HSG A (E4)
0.046	55	Woods, Good, HSG B (E1, E4)
2.728	70	Woods, Good, HSG C (E1, E2, E3, E4)
1.368	77	Woods, Good, HSG D (E1, E2, E3)
87.098	71	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.486	HSG A	E3, E4
20.345	HSG B	E1, E2, E4, E5
55.268	HSG C	E1, E2, E3, E4
9.998	HSG D	E1, E2, E3
0.000	Other	
87.098		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.035	0.051	1.618	0.150	0.000	1.855	Dirt roads	E1, E2, E3, E4
0.000	0.028	0.623	0.000	0.000	0.651	Gravel roads	E2
0.466	15.300	37.463	7.756	0.000	60.985	Meadow, non-grazed	E1, E2, E3, E4, E5
0.051	0.000	0.397	0.000	0.000	0.448	Roofs	E2, E4
0.000	4.920	12.439	0.724	0.000	18.083	Row crops, SR + CR, Good	E1, E2, E3, E4
0.934	0.046	2.728	1.368	0.000	5.076	Woods, Good	E1, E2, E3, E4
1.486	20.345	55.268	9.998	0.000	87.098	TOTAL AREA	

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Type III 24-hr 2-yr Rainfall=3.20"

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Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: Subcat E1 Runoff Area=1,539,483 sf 0.00% Impervious Runoff Depth=0.93"
Flow Length=1,351' Tc=24.1 min CN=72 Runoff=22.04 cfs 2.738 af

SubcatchmentE2: Subcat E2 Runoff Area=1,648,918 sf 1.03% Impervious Runoff Depth=0.88"
Flow Length=1,662' Tc=25.7 min CN=71 Runoff=21.39 cfs 2.770 af

SubcatchmentE3: Subcat E3 Runoff Area=349,063 sf 0.00% Impervious Runoff Depth=1.27"
Flow Length=1,238' Tc=21.4 min CN=78 Runoff=7.63 cfs 0.850 af

SubcatchmentE4: Subcat E4 Runoff Area=143,227 sf 1.73% Impervious Runoff Depth=0.28"
Flow Length=137' Tc=6.9 min CN=56 Runoff=0.41 cfs 0.077 af

SubcatchmentE5: Subcat E5 Runoff Area=113,306 sf 0.00% Impervious Runoff Depth=0.34"
Flow Length=450' Tc=10.9 min CN=58 Runoff=0.43 cfs 0.074 af

Link POA-1: Inflow=22.04 cfs 2.738 af
Primary=22.04 cfs 2.738 af

Link POA-2: Inflow=21.39 cfs 2.770 af
Primary=21.39 cfs 2.770 af

Link POA-3: Inflow=7.63 cfs 0.850 af
Primary=7.63 cfs 0.850 af

Link POA-4: Inflow=0.41 cfs 0.077 af
Primary=0.41 cfs 0.077 af

Link POA-5: Inflow=0.43 cfs 0.074 af
Primary=0.43 cfs 0.074 af

Total Runoff Area = 87.098 ac Runoff Volume = 6.509 af Average Runoff Depth = 0.90"
99.49% Pervious = 86.650 ac 0.51% Impervious = 0.448 ac

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Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Subcatchment E1: Subcat E1

Runoff = 22.04 cfs @ 12.37 hrs, Volume= 2.738 af, Depth= 0.93"
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
10,420	87	Dirt roads, HSG C
6,543	89	Dirt roads, HSG D
312,091	58	Meadow, non-grazed, HSG B
454,657	71	Meadow, non-grazed, HSG C
317,640	78	Meadow, non-grazed, HSG D
139,280	75	Row crops, SR + CR, Good, HSG B
203,421	82	Row crops, SR + CR, Good, HSG C
31,554	85	Row crops, SR + CR, Good, HSG D
1,977	55	Woods, Good, HSG B
31,803	70	Woods, Good, HSG C
30,096	77	Woods, Good, HSG D
1,539,483	72	Weighted Average
1,539,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	50	0.2600	0.28		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.0	408	0.0588	1.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	419	0.0263	1.14		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.0	474	0.0105	0.72		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
24.1	1,351	Total			

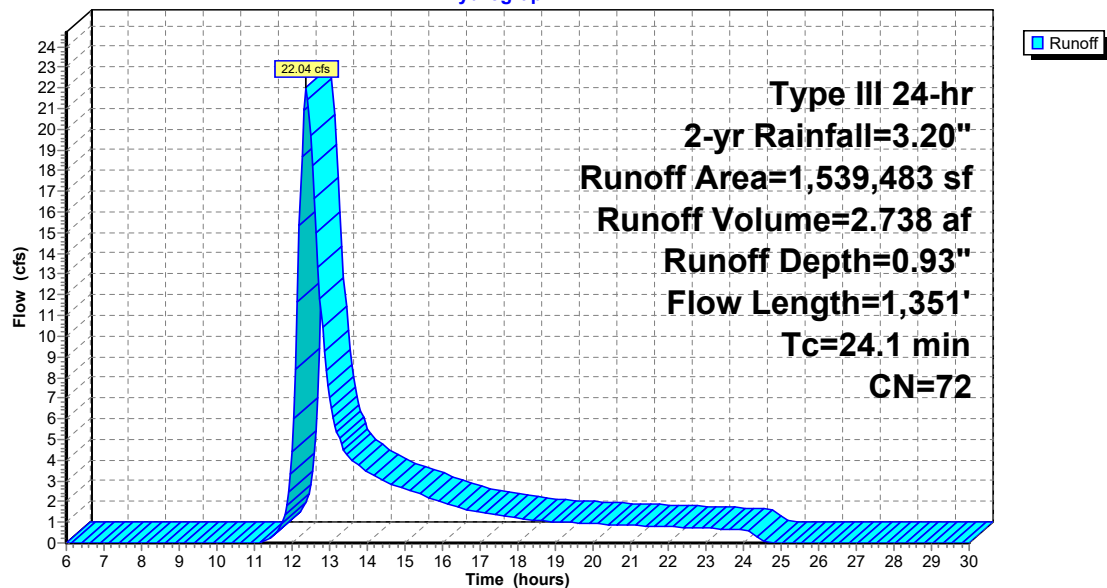
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Subcatchment E1: Subcat E1**Hydrograph**

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Summary for Subcatchment E2: Subcat E2

Runoff = 21.39 cfs @ 12.40 hrs, Volume= 2.770 af, Depth= 0.88"
Routed to Link POA-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
2,236	82	Dirt roads, HSG B
21,864	87	Dirt roads, HSG C
1,239	85	Gravel roads, HSG B
27,139	89	Gravel roads, HSG C
236,817	58	Meadow, non-grazed, HSG B
1,027,645	71	Meadow, non-grazed, HSG C
12,429	78	Meadow, non-grazed, HSG D
17,046	98	Roofs, HSG C
75,033	75	Row crops, SR + CR, Good, HSG B
139,897	82	Row crops, SR + CR, Good, HSG C
76,921	70	Woods, Good, HSG C
10,652	77	Woods, Good, HSG D
1,648,918	71	Weighted Average
1,631,871		98.97% Pervious Area
17,046		1.03% Impervious Area

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Type III 24-hr 2-yr Rainfall=3.20"

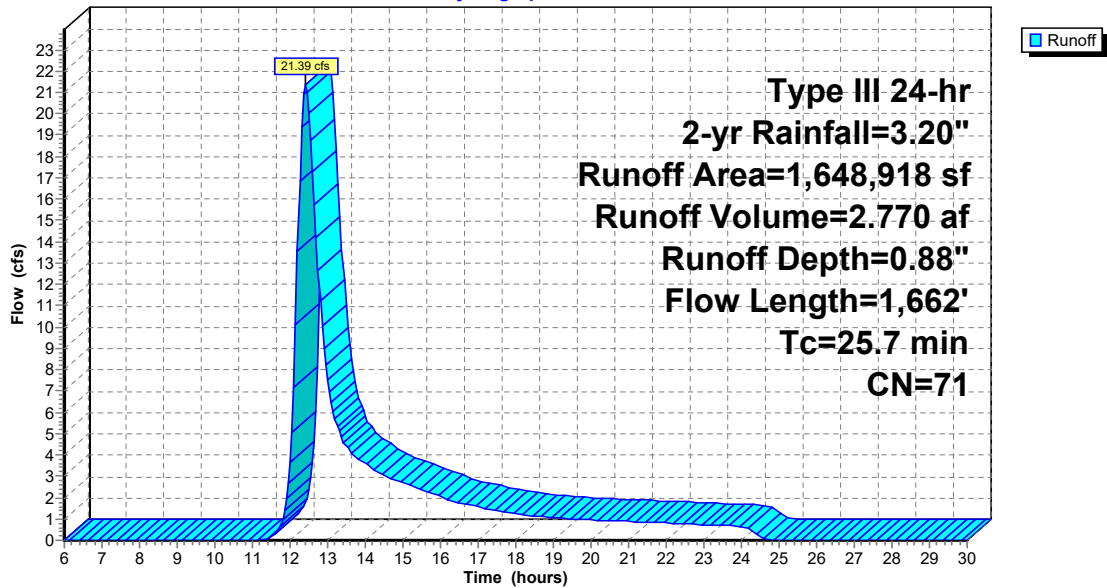
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	44	0.0795	0.17		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	6	0.0833	0.16		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 3.20"
2.3	266	0.0451	1.91		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
6.1	492	0.0224	1.35		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
11.6	758	0.0241	1.09		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	12	0.0417	3.29		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	84	0.0738	1.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.7	1,662	Total			

Subcatchment E2: Subcat E2

Hydrograph



Summary for Subcatchment E3: Subcat E3

Runoff = 7.63 cfs @ 12.31 hrs, Volume= 0.850 af, Depth= 1.27"
Routed to Link POA-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
1,534	72	Dirt roads, HSG A
25,919	87	Dirt roads, HSG C
2,445	30	Meadow, non-grazed, HSG A
99,707	71	Meadow, non-grazed, HSG C
7,792	78	Meadow, non-grazed, HSG D
192,241	82	Row crops, SR + CR, Good, HSG C
600	70	Woods, Good, HSG C
18,825	77	Woods, Good, HSG D
349,063	78	Weighted Average
349,063		100.00% Pervious Area

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Type III 24-hr 2-yr Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	27	0.0370	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	23	0.0435	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
4.2	509	0.0157	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	73	0.0137	0.82		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0176	2.14		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.1	169	0.0219	1.33		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
7.6	311	0.0058	0.69		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
1.3	39	0.0051	0.50		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1714	2.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	1,238	Total			

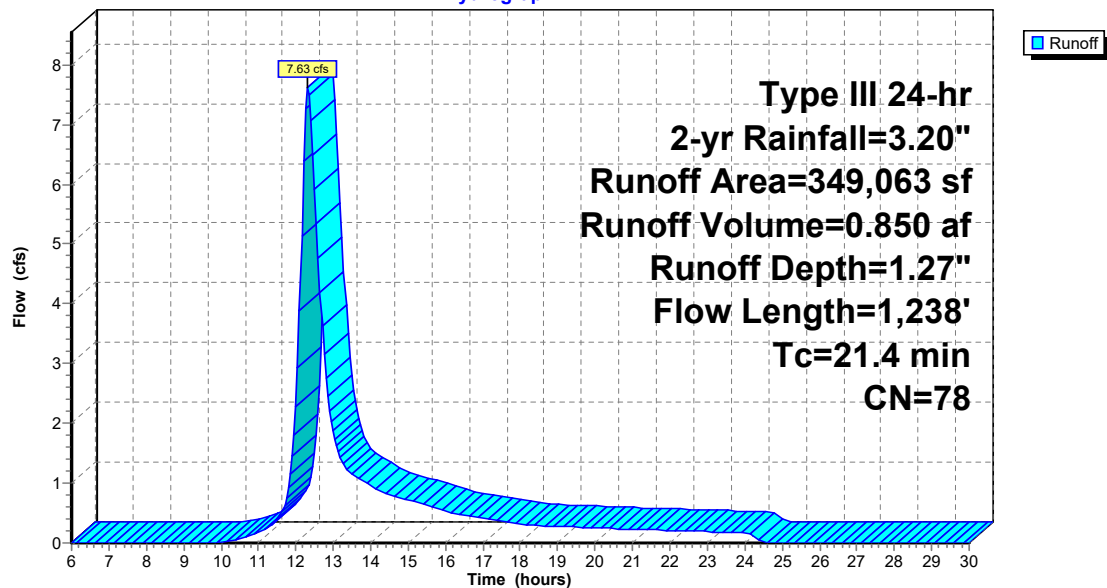
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Subcatchment E3: Subcat E3**Hydrograph**

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Summary for Subcatchment E4: Subcat E4

Runoff = 0.41 cfs @ 12.32 hrs, Volume= 0.077 af, Depth= 0.28"
Routed to Link POA-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (sf)	CN	Description
12,288	87	Dirt roads, HSG C
17,847	30	Meadow, non-grazed, HSG A
4,241	58	Meadow, non-grazed, HSG B
49,875	71	Meadow, non-grazed, HSG C
2,221	98	Roofs, HSG A
254	98	Roofs, HSG C
6,271	82	Row crops, SR + CR, Good, HSG C
40,699	30	Woods, Good, HSG A
29	55	Woods, Good, HSG B
9,501	70	Woods, Good, HSG C
143,227	56	Weighted Average
140,752		98.27% Pervious Area
2,476		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	45	0.0667	1.81		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	42	0.1905	2.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	137	Total			

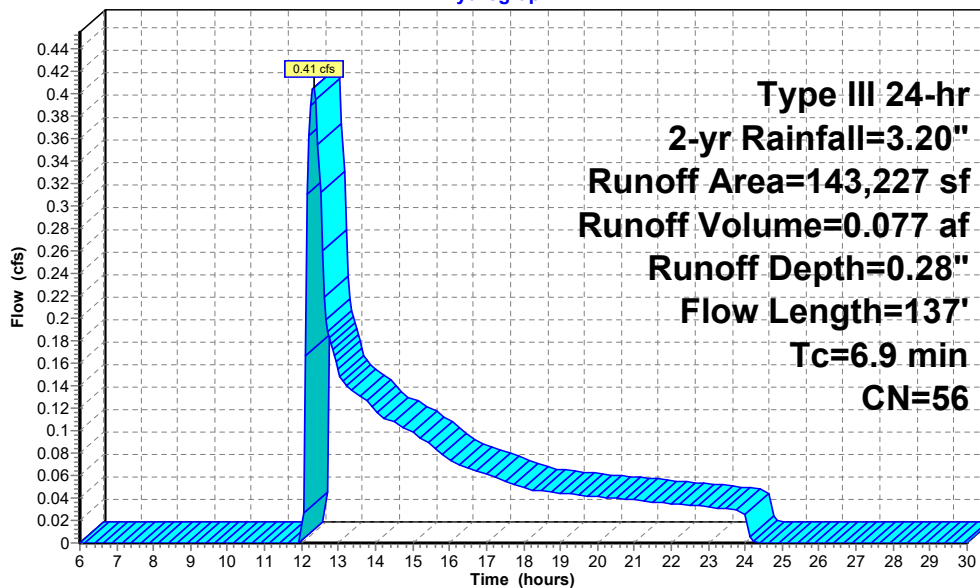
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Subcatchment E4: Subcat E4**Hydrograph**

Runoff

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Summary for Subcatchment E5: Subcat E5

Runoff = 0.43 cfs @ 12.32 hrs, Volume= 0.074 af, Depth= 0.34"
Routed to Link POA-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
113,306	58	Meadow, non-grazed, HSG B
113,306		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.7	400	0.0413	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.9	450	Total			

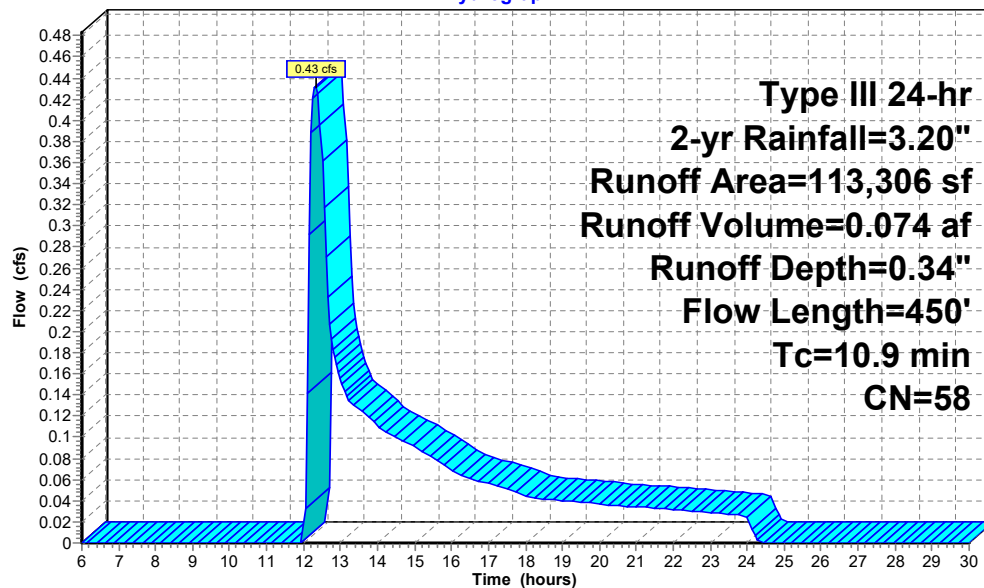
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Subcatchment E5: Subcat E5**Hydrograph**

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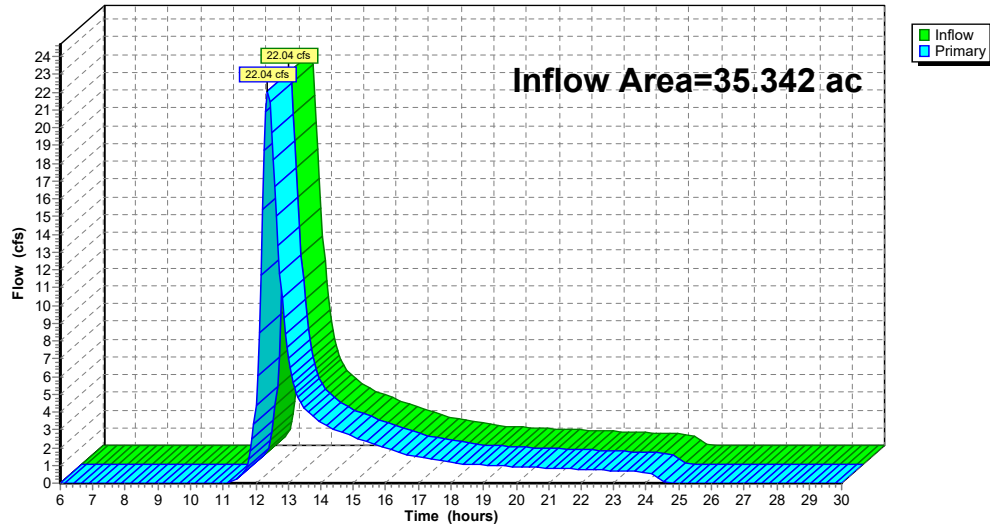
Summary for Link POA-1:

Inflow Area = 35.342 ac, 0.00% Impervious, Inflow Depth = 0.93" for 2-yr event
Inflow = 22.04 cfs @ 12.37 hrs, Volume= 2.738 af
Primary = 22.04 cfs @ 12.37 hrs, Volume= 2.738 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-1:

Hydrograph

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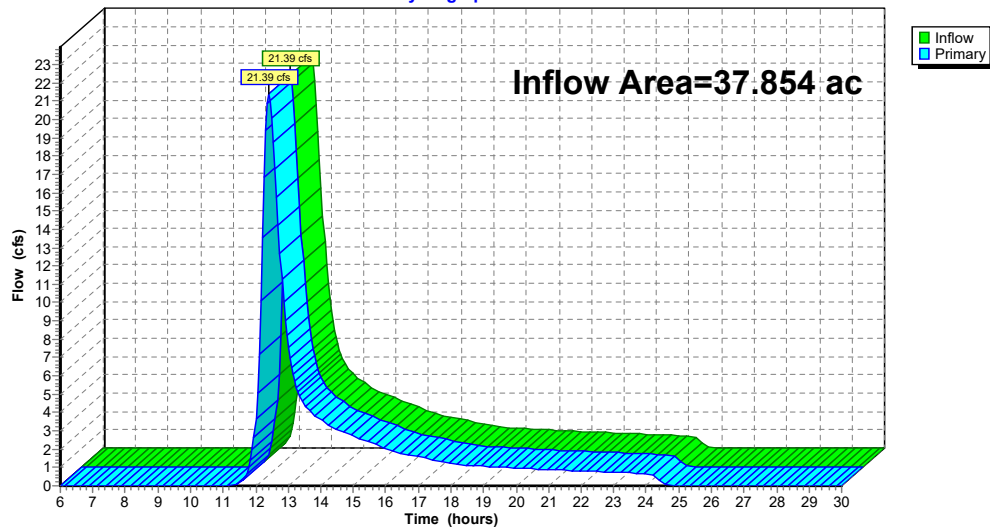
Summary for Link POA-2:

Inflow Area = 37.854 ac, 1.03% Impervious, Inflow Depth = 0.88" for 2-yr event
Inflow = 21.39 cfs @ 12.40 hrs, Volume= 2.770 af
Primary = 21.39 cfs @ 12.40 hrs, Volume= 2.770 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-2:

Hydrograph



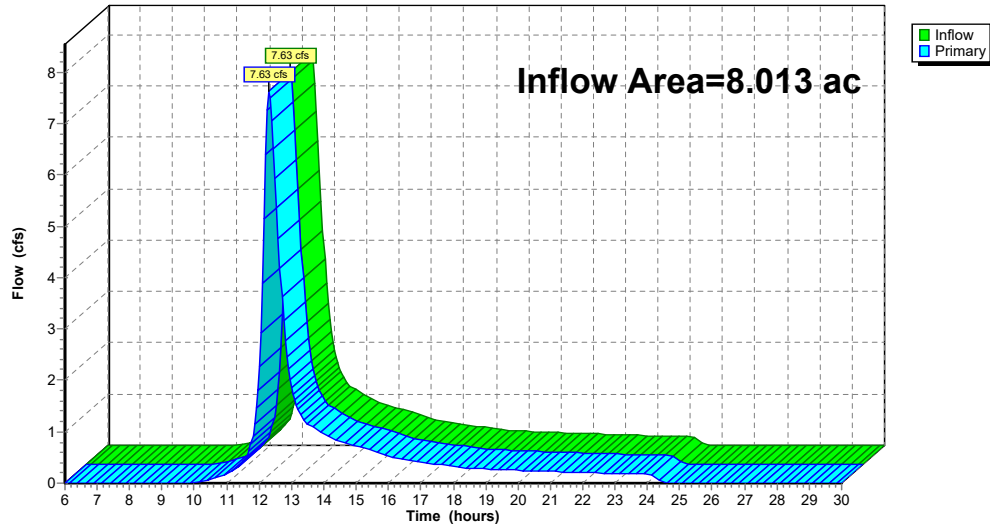
Summary for Link POA-3:

Inflow Area = 8.013 ac, 0.00% Impervious, Inflow Depth = 1.27" for 2-yr event
Inflow = 7.63 cfs @ 12.31 hrs, Volume= 0.850 af
Primary = 7.63 cfs @ 12.31 hrs, Volume= 0.850 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-3:

Hydrograph



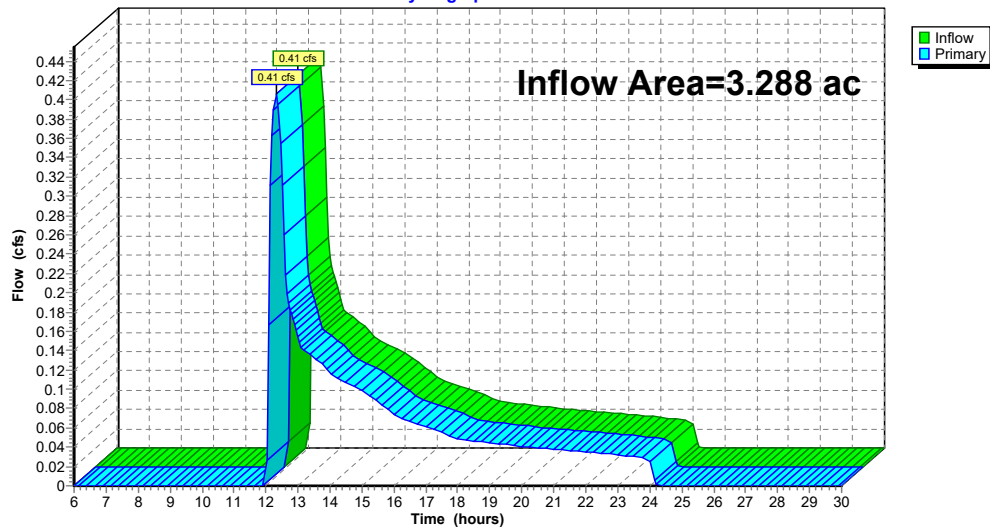
Summary for Link POA-4:

Inflow Area = 3.288 ac, 1.73% Impervious, Inflow Depth = 0.28" for 2-yr event
Inflow = 0.41 cfs @ 12.32 hrs, Volume= 0.077 af
Primary = 0.41 cfs @ 12.32 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-4:

Hydrograph



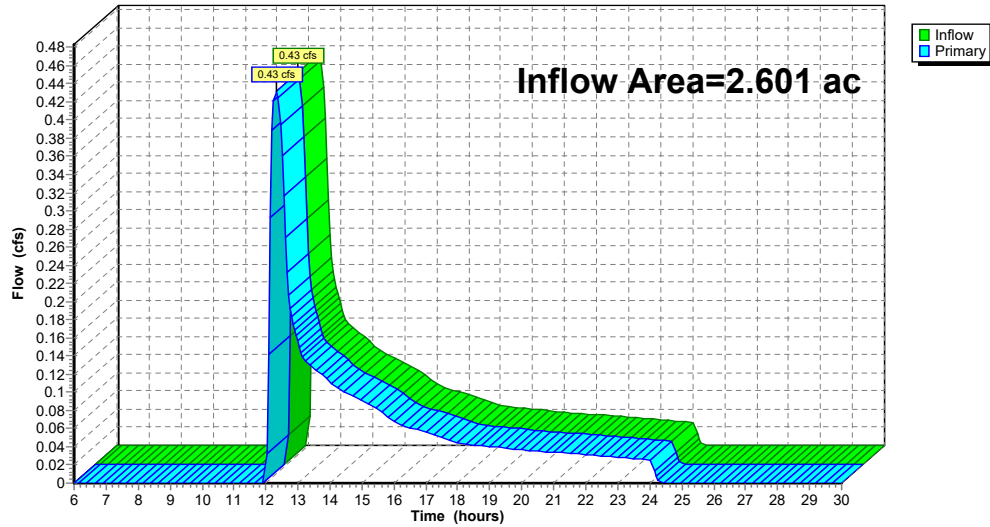
Summary for Link POA-5:

Inflow Area = 2.601 ac, 0.00% Impervious, Inflow Depth = 0.34" for 2-yr event
Inflow = 0.43 cfs @ 12.32 hrs, Volume= 0.074 af
Primary = 0.43 cfs @ 12.32 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-5:

Hydrograph



Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: Subcat E1	Runoff Area=1,539,483 sf 0.00% Impervious Runoff Depth=2.35" Flow Length=1,351' Tc=24.1 min CN=72 Runoff=59.75 cfs 6.907 af
SubcatchmentE2: Subcat E2	Runoff Area=1,648,918 sf 1.03% Impervious Runoff Depth=2.26" Flow Length=1,662' Tc=25.7 min CN=71 Runoff=59.85 cfs 7.133 af
SubcatchmentE3: Subcat E3	Runoff Area=349,063 sf 0.00% Impervious Runoff Depth=2.87" Flow Length=1,238' Tc=21.4 min CN=78 Runoff=17.65 cfs 1.919 af
SubcatchmentE4: Subcat E4	Runoff Area=143,227 sf 1.73% Impervious Runoff Depth=1.14" Flow Length=137' Tc=6.9 min CN=56 Runoff=3.54 cfs 0.313 af
SubcatchmentE5: Subcat E5	Runoff Area=113,306 sf 0.00% Impervious Runoff Depth=1.27" Flow Length=450' Tc=10.9 min CN=58 Runoff=2.86 cfs 0.276 af
Link POA-1:	Inflow=59.75 cfs 6.907 af Primary=59.75 cfs 6.907 af
Link POA-2:	Inflow=59.85 cfs 7.133 af Primary=59.85 cfs 7.133 af
Link POA-3:	Inflow=17.65 cfs 1.919 af Primary=17.65 cfs 1.919 af
Link POA-4:	Inflow=3.54 cfs 0.313 af Primary=3.54 cfs 0.313 af
Link POA-5:	Inflow=2.86 cfs 0.276 af Primary=2.86 cfs 0.276 af

Total Runoff Area = 87.098 ac Runoff Volume = 16.548 af Average Runoff Depth = 2.28"
99.49% Pervious = 86.650 ac 0.51% Impervious = 0.448 ac

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Type III 24-hr 10-yr Rainfall=5.19"

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Summary for Subcatchment E1: Subcat E1

Runoff = 59.75 cfs @ 12.35 hrs, Volume= 6.907 af, Depth= 2.35"
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
10,420	87	Dirt roads, HSG C
6,543	89	Dirt roads, HSG D
312,091	58	Meadow, non-grazed, HSG B
454,657	71	Meadow, non-grazed, HSG C
317,640	78	Meadow, non-grazed, HSG D
139,280	75	Row crops, SR + CR, Good, HSG B
203,421	82	Row crops, SR + CR, Good, HSG C
31,554	85	Row crops, SR + CR, Good, HSG D
1,977	55	Woods, Good, HSG B
31,803	70	Woods, Good, HSG C
30,096	77	Woods, Good, HSG D
1,539,483	72	Weighted Average
1,539,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	50	0.2600	0.28		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.0	408	0.0588	1.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	419	0.0263	1.14		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.0	474	0.0105	0.72		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
24.1	1,351	Total			

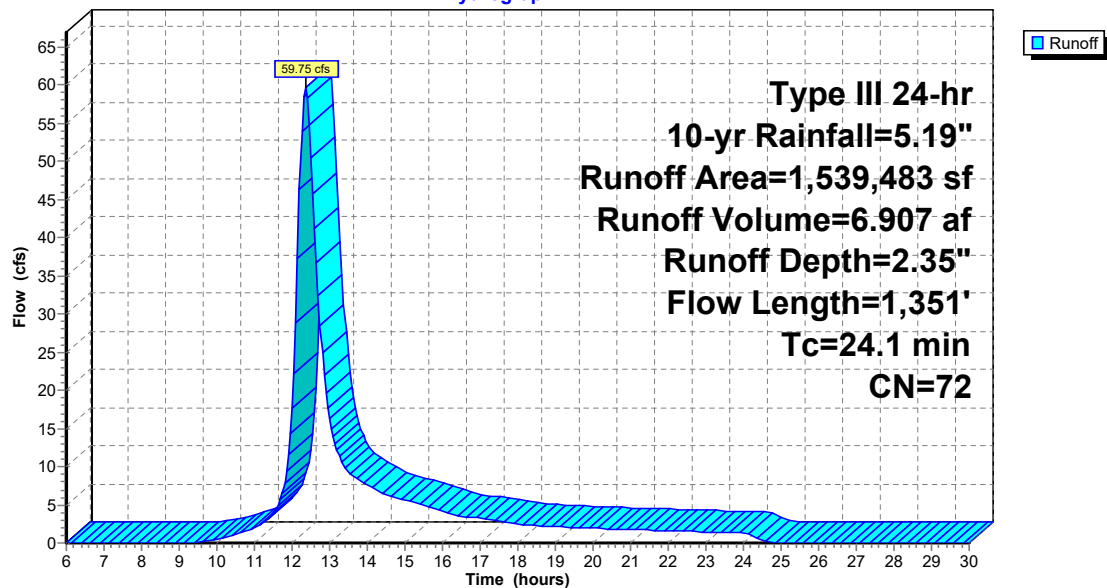
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Subcatchment E1: Subcat E1**Hydrograph**

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Summary for Subcatchment E2: Subcat E2

Runoff = 59.85 cfs @ 12.37 hrs, Volume= 7.133 af, Depth= 2.26"
Routed to Link POA-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
2,236	82	Dirt roads, HSG B
21,864	87	Dirt roads, HSG C
1,239	85	Gravel roads, HSG B
27,139	89	Gravel roads, HSG C
236,817	58	Meadow, non-grazed, HSG B
1,027,645	71	Meadow, non-grazed, HSG C
12,429	78	Meadow, non-grazed, HSG D
17,046	98	Roofs, HSG C
75,033	75	Row crops, SR + CR, Good, HSG B
139,897	82	Row crops, SR + CR, Good, HSG C
76,921	70	Woods, Good, HSG C
10,652	77	Woods, Good, HSG D
1,648,918	71	Weighted Average
1,631,871		98.97% Pervious Area
17,046		1.03% Impervious Area

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Type III 24-hr 10-yr Rainfall=5.19"

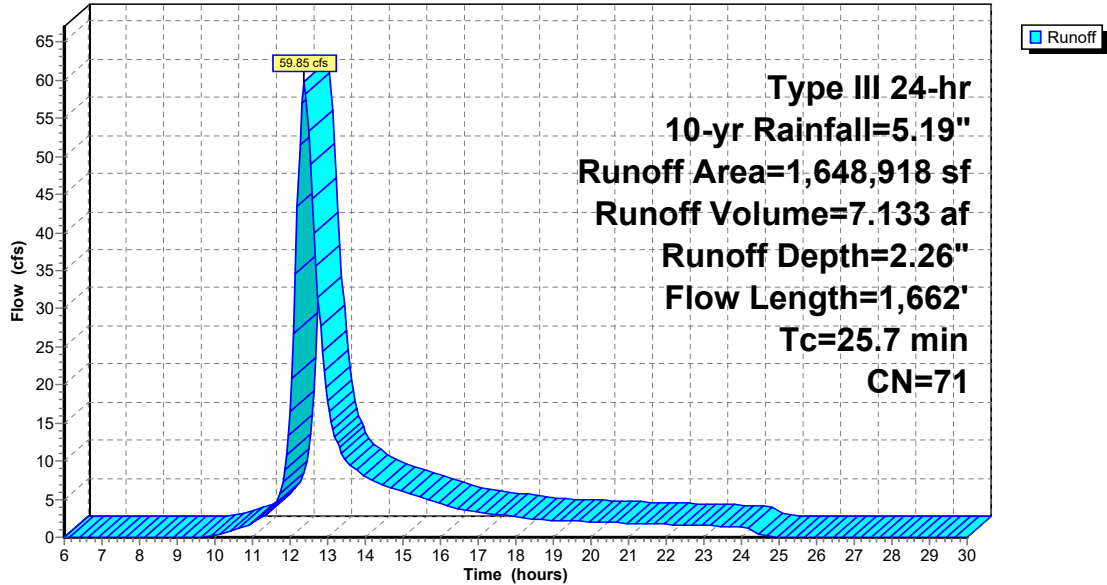
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	44	0.0795	0.17		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	6	0.0833	0.16		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 3.20"
2.3	266	0.0451	1.91		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
6.1	492	0.0224	1.35		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
11.6	758	0.0241	1.09		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	12	0.0417	3.29		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	84	0.0738	1.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.7	1,662	Total			

Subcatchment E2: Subcat E2

Hydrograph



Summary for Subcatchment E3: Subcat E3

Runoff = 17.65 cfs @ 12.30 hrs, Volume= 1.919 af, Depth= 2.87"
Routed to Link POA-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
1,534	72	Dirt roads, HSG A
25,919	87	Dirt roads, HSG C
2,445	30	Meadow, non-grazed, HSG A
99,707	71	Meadow, non-grazed, HSG C
7,792	78	Meadow, non-grazed, HSG D
192,241	82	Row crops, SR + CR, Good, HSG C
600	70	Woods, Good, HSG C
18,825	77	Woods, Good, HSG D
349,063	78	Weighted Average
349,063		100.00% Pervious Area

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	27	0.0370	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	23	0.0435	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
4.2	509	0.0157	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	73	0.0137	0.82		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0176	2.14		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.1	169	0.0219	1.33		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
7.6	311	0.0058	0.69		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
1.3	39	0.0051	0.50		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1714	2.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	1,238	Total			

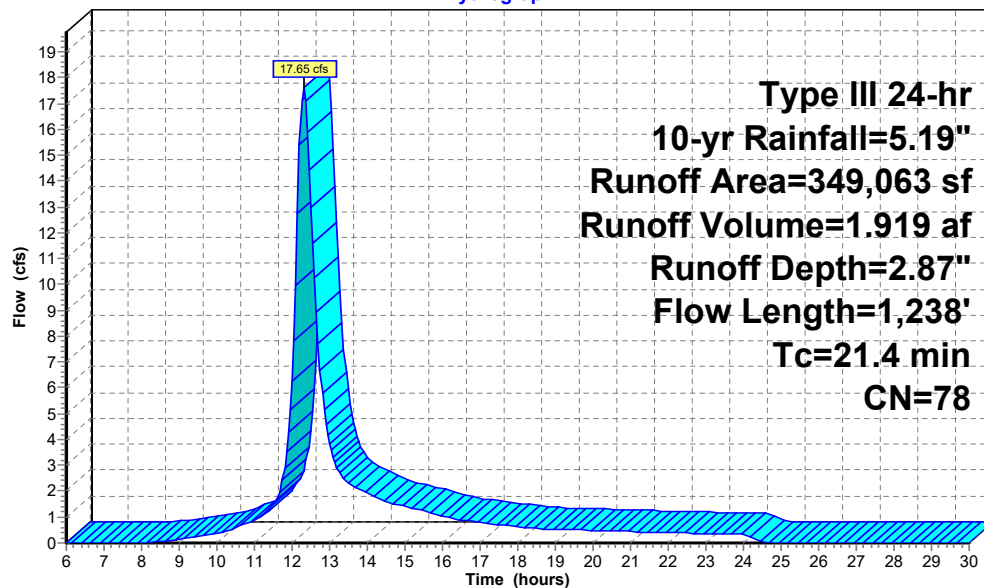
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Subcatchment E3: Subcat E3**Hydrograph**

Runoff

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Summary for Subcatchment E4: Subcat E4

Runoff = 3.54 cfs @ 12.12 hrs, Volume= 0.313 af, Depth= 1.14"
Routed to Link POA-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
12,288	87	Dirt roads, HSG C
17,847	30	Meadow, non-grazed, HSG A
4,241	58	Meadow, non-grazed, HSG B
49,875	71	Meadow, non-grazed, HSG C
2,221	98	Roofs, HSG A
254	98	Roofs, HSG C
6,271	82	Row crops, SR + CR, Good, HSG C
40,699	30	Woods, Good, HSG A
29	55	Woods, Good, HSG B
9,501	70	Woods, Good, HSG C
143,227	56	Weighted Average
140,752		98.27% Pervious Area
2,476		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	45	0.0667	1.81		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	42	0.1905	2.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	137	Total			

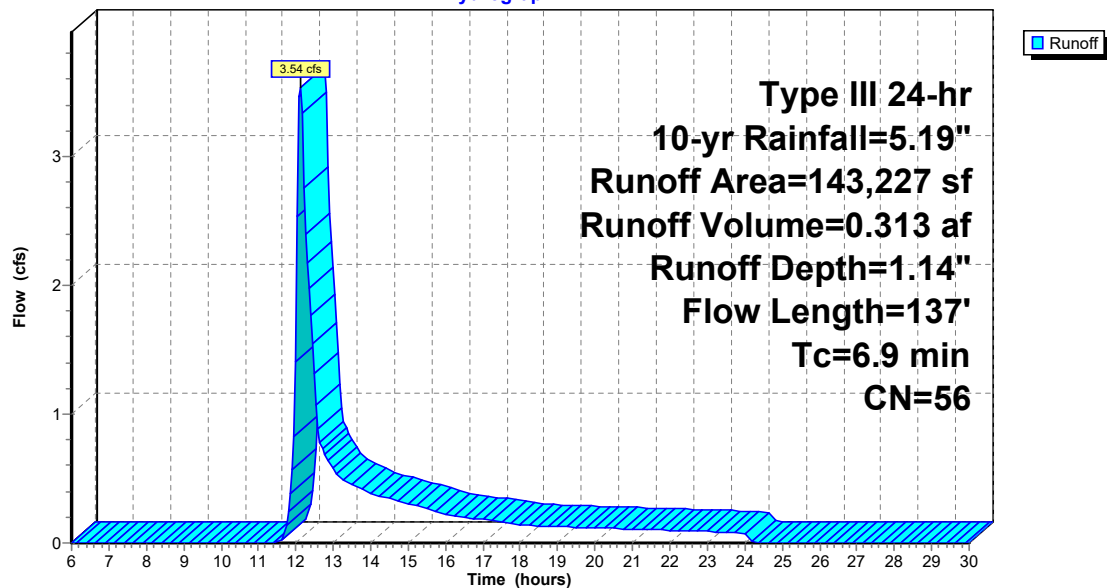
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Subcatchment E4: Subcat E4**Hydrograph**

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Summary for Subcatchment E5: Subcat E5

Runoff = 2.86 cfs @ 12.17 hrs, Volume= 0.276 af, Depth= 1.27"
Routed to Link POA-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
113,306	58	Meadow, non-grazed, HSG B
113,306		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.7	400	0.0413	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.9	450	Total			

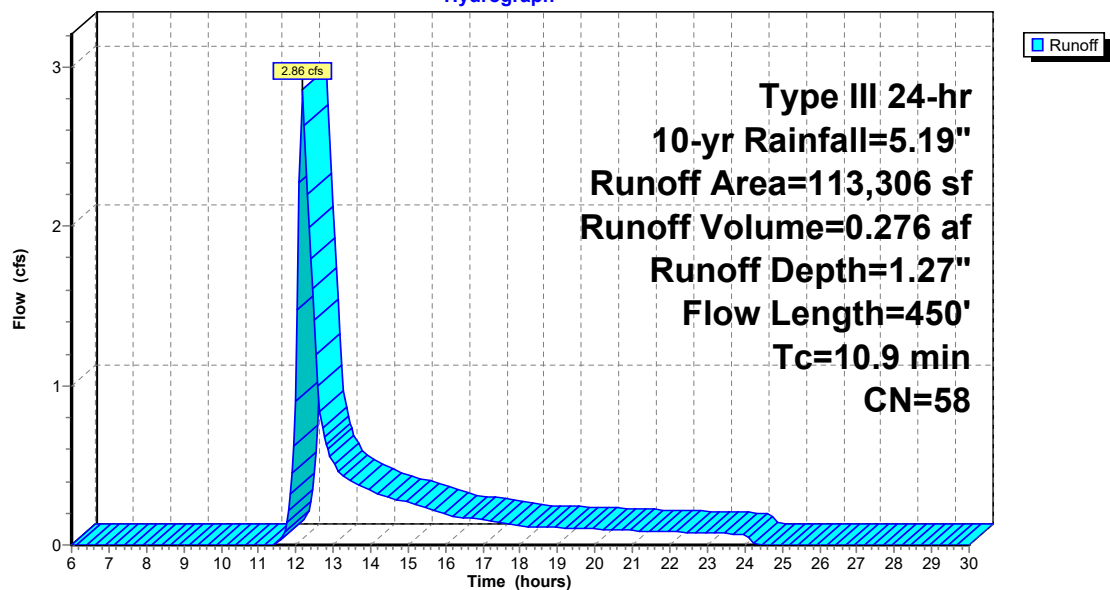
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Type III 24-hr 10-yr Rainfall=5.19"

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Subcatchment E5: Subcat E5**Hydrograph**

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Type III 24-hr 10-yr Rainfall=5.19"

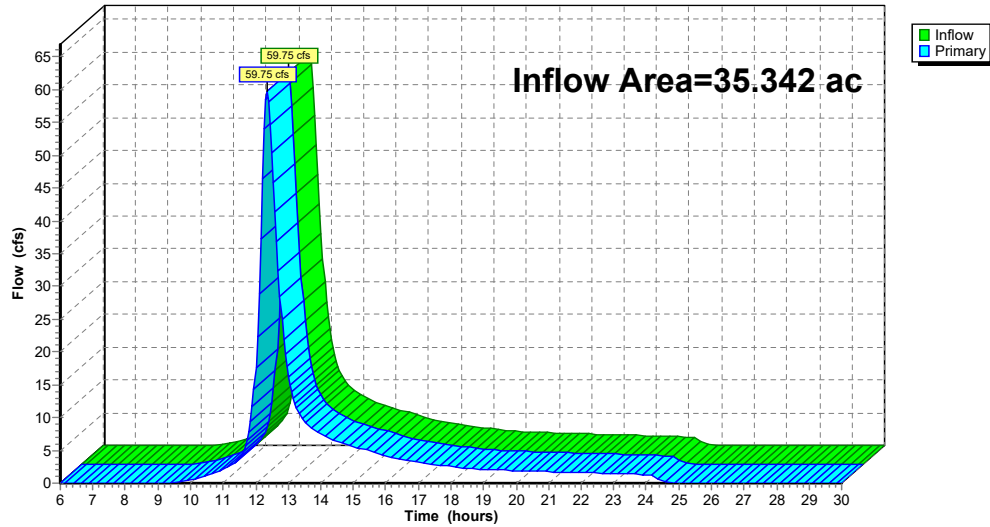
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Summary for Link POA-1:

Inflow Area = 35.342 ac, 0.00% Impervious, Inflow Depth = 2.35" for 10-yr event
Inflow = 59.75 cfs @ 12.35 hrs, Volume= 6.907 af
Primary = 59.75 cfs @ 12.35 hrs, Volume= 6.907 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-1:**Hydrograph****BW Pleasant St_Pre_r1**

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Type III 24-hr 10-yr Rainfall=5.19"

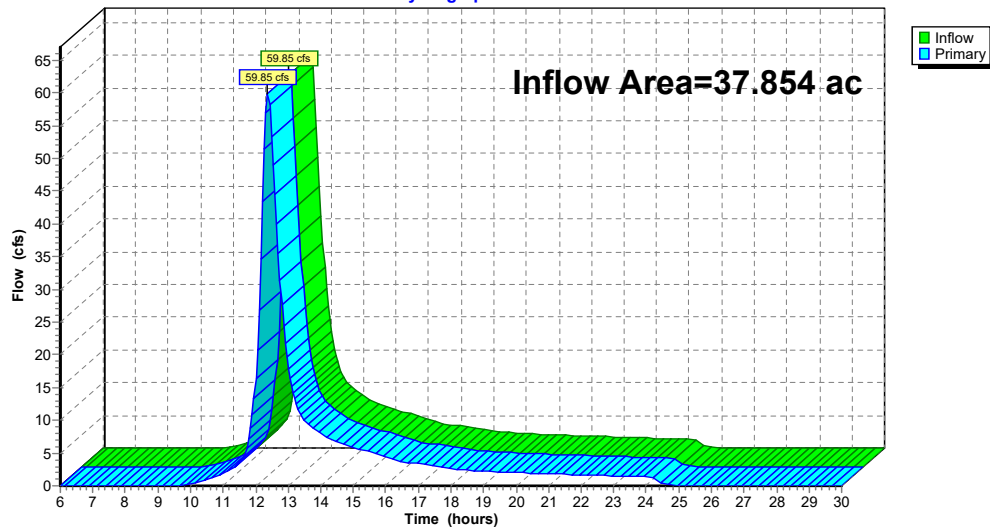
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Summary for Link POA-2:

Inflow Area = 37.854 ac, 1.03% Impervious, Inflow Depth = 2.26" for 10-yr event
Inflow = 59.85 cfs @ 12.37 hrs, Volume= 7.133 af
Primary = 59.85 cfs @ 12.37 hrs, Volume= 7.133 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-2:**Hydrograph**

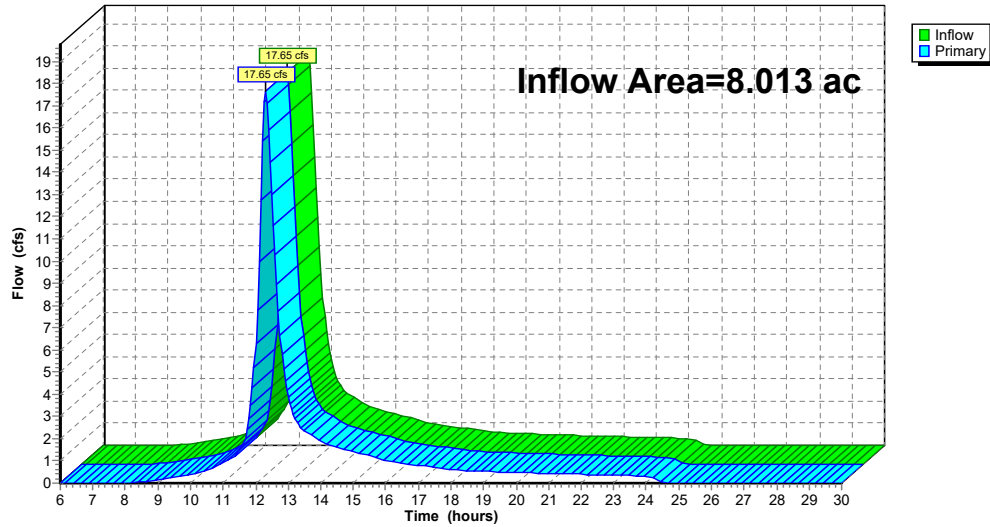
Summary for Link POA-3:

Inflow Area = 8.013 ac, 0.00% Impervious, Inflow Depth = 2.87" for 10-yr event
Inflow = 17.65 cfs @ 12.30 hrs, Volume= 1.919 af
Primary = 17.65 cfs @ 12.30 hrs, Volume= 1.919 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-3:

Hydrograph



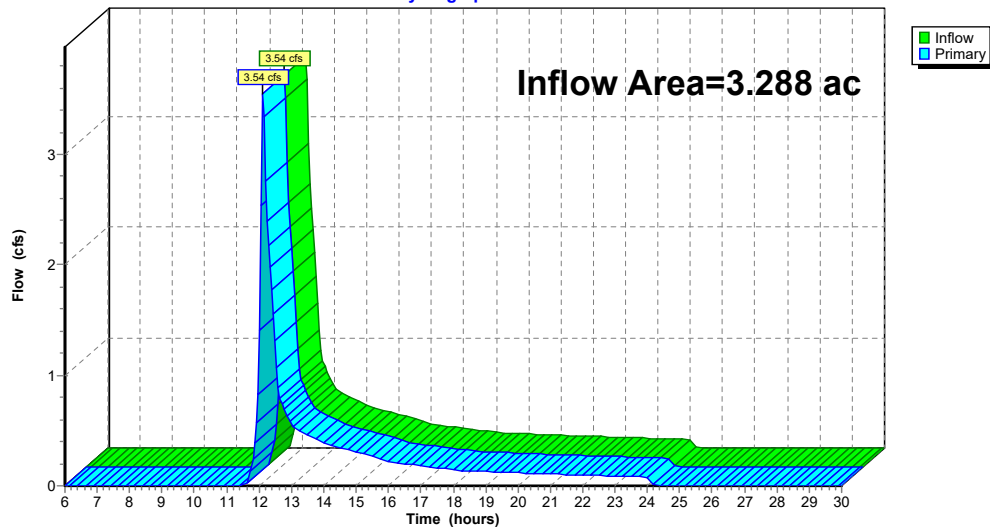
Summary for Link POA-4:

Inflow Area = 3.288 ac, 1.73% Impervious, Inflow Depth = 1.14" for 10-yr event
Inflow = 3.54 cfs @ 12.12 hrs, Volume= 0.313 af
Primary = 3.54 cfs @ 12.12 hrs, Volume= 0.313 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-4:

Hydrograph

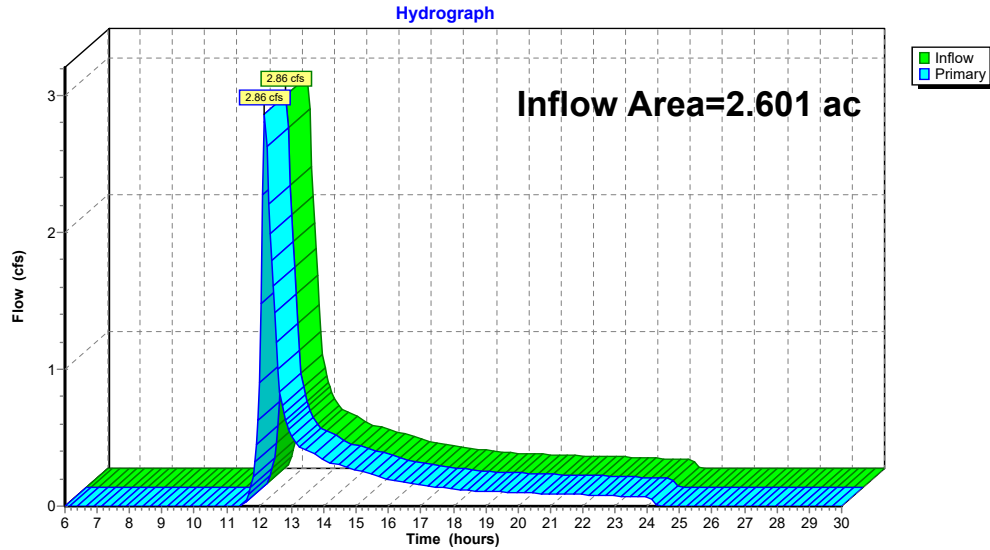


Summary for Link POA-5:

Inflow Area = 2.601 ac, 0.00% Impervious, Inflow Depth = 1.27" for 10-yr event
Inflow = 2.86 cfs @ 12.17 hrs, Volume= 0.276 af
Primary = 2.86 cfs @ 12.17 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-5:



Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentE1: Subcat E1	Runoff Area=1,539,483 sf 0.00% Impervious Runoff Depth=5.00" Flow Length=1,351' Tc=24.1 min CN=72 Runoff=128.77 cfs 14.734 af
SubcatchmentE2: Subcat E2	Runoff Area=1,648,918 sf 1.03% Impervious Runoff Depth=4.88" Flow Length=1,662' Tc=25.7 min CN=71 Runoff=131.13 cfs 15.409 af
SubcatchmentE3: Subcat E3	Runoff Area=349,063 sf 0.00% Impervious Runoff Depth=5.72" Flow Length=1,238' Tc=21.4 min CN=78 Runoff=34.79 cfs 3.817 af
SubcatchmentE4: Subcat E4	Runoff Area=143,227 sf 1.73% Impervious Runoff Depth=3.14" Flow Length=137' Tc=6.9 min CN=56 Runoff=11.25 cfs 0.860 af
SubcatchmentE5: Subcat E5	Runoff Area=113,306 sf 0.00% Impervious Runoff Depth=3.37" Flow Length=450' Tc=10.9 min CN=58 Runoff=8.47 cfs 0.730 af
Link POA-1:	Inflow=128.77 cfs 14.734 af Primary=128.77 cfs 14.734 af
Link POA-2:	Inflow=131.13 cfs 15.409 af Primary=131.13 cfs 15.409 af
Link POA-3:	Inflow=34.79 cfs 3.817 af Primary=34.79 cfs 3.817 af
Link POA-4:	Inflow=11.25 cfs 0.860 af Primary=11.25 cfs 0.860 af
Link POA-5:	Inflow=8.47 cfs 0.730 af Primary=8.47 cfs 0.730 af

Total Runoff Area = 87.098 ac Runoff Volume = 35.550 af Average Runoff Depth = 4.90"
99.49% Pervious = 86.650 ac 0.51% Impervious = 0.448 ac

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Summary for Subcatchment E1: Subcat E1

Runoff = 128.77 cfs @ 12.33 hrs, Volume= 14.734 af, Depth= 5.00"
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
10,420	87	Dirt roads, HSG C
6,543	89	Dirt roads, HSG D
312,091	58	Meadow, non-grazed, HSG B
454,657	71	Meadow, non-grazed, HSG C
317,640	78	Meadow, non-grazed, HSG D
139,280	75	Row crops, SR + CR, Good, HSG B
203,421	82	Row crops, SR + CR, Good, HSG C
31,554	85	Row crops, SR + CR, Good, HSG D
1,977	55	Woods, Good, HSG B
31,803	70	Woods, Good, HSG C
30,096	77	Woods, Good, HSG D
1,539,483	72	Weighted Average
1,539,483		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	50	0.2600	0.28		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.0	408	0.0588	1.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	419	0.0263	1.14		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.0	474	0.0105	0.72		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
24.1	1,351	Total			

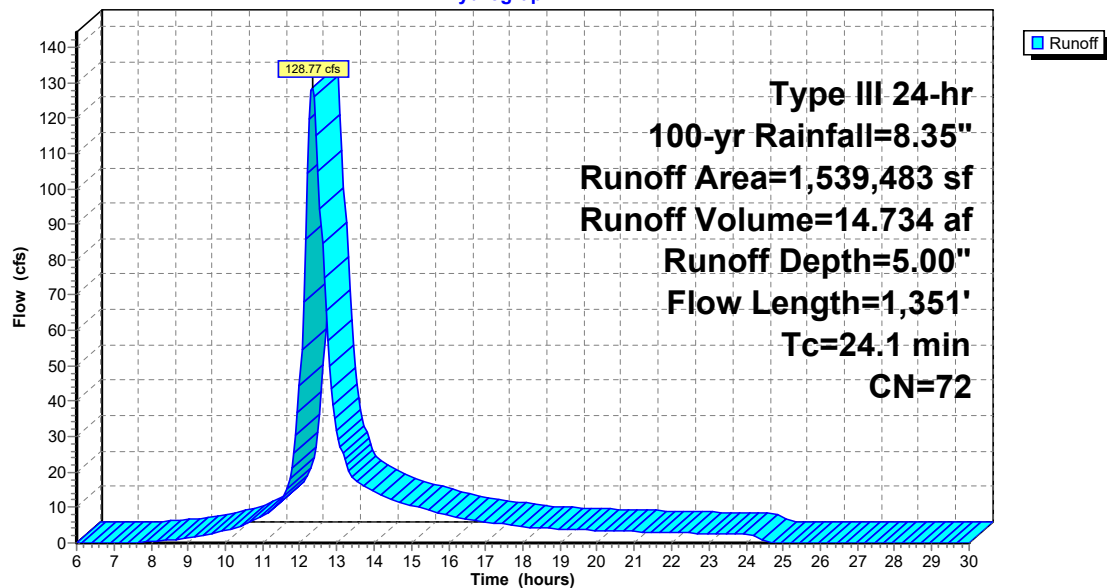
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Subcatchment E1: Subcat E1**Hydrograph**

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Subcatchment E2: Subcat E2

Runoff = 131.13 cfs @ 12.36 hrs, Volume= 15.409 af, Depth= 4.88"
 Routed to Link POA-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
2,236	82	Dirt roads, HSG B
21,864	87	Dirt roads, HSG C
1,239	85	Gravel roads, HSG B
27,139	89	Gravel roads, HSG C
236,817	58	Meadow, non-grazed, HSG B
1,027,645	71	Meadow, non-grazed, HSG C
12,429	78	Meadow, non-grazed, HSG D
17,046	98	Roofs, HSG C
75,033	75	Row crops, SR + CR, Good, HSG B
139,897	82	Row crops, SR + CR, Good, HSG C
76,921	70	Woods, Good, HSG C
10,652	77	Woods, Good, HSG D
1,648,918	71	Weighted Average
1,631,871		98.97% Pervious Area
17,046		1.03% Impervious Area

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Type III 24-hr 100-yr Rainfall=8.35"

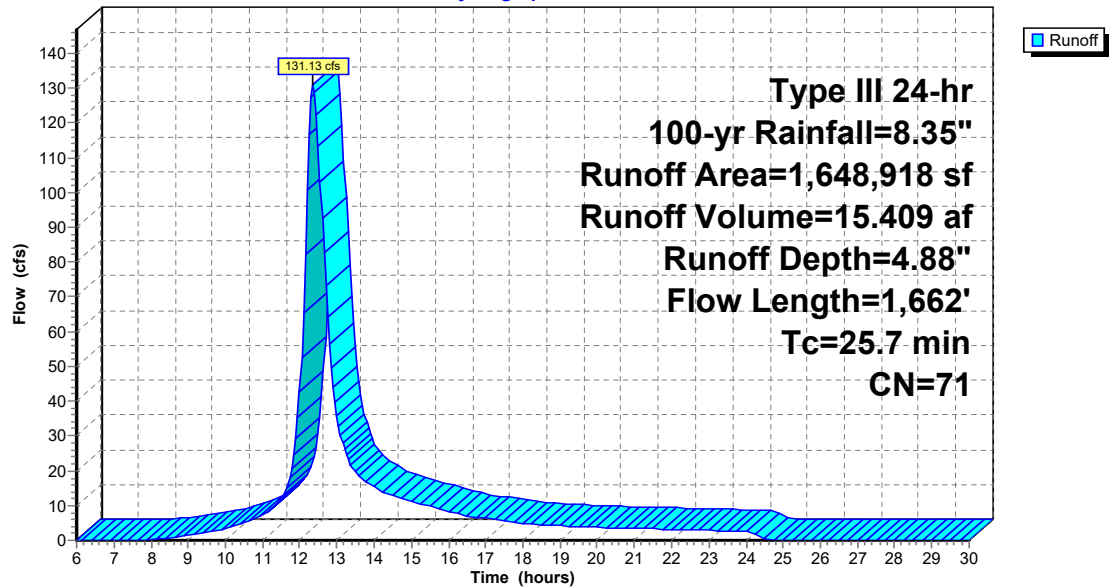
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	44	0.0795	0.17		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	6	0.0833	0.16		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 3.20"
2.3	266	0.0451	1.91		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
6.1	492	0.0224	1.35		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
11.6	758	0.0241	1.09		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	12	0.0417	3.29		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	84	0.0738	1.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.7	1,662	Total			

Subcatchment E2: Subcat E2

Hydrograph



Summary for Subcatchment E3: Subcat E3

Runoff = 34.79 cfs @ 12.29 hrs, Volume= 3.817 af, Depth= 5.72"
Routed to Link POA-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
1,534	72	Dirt roads, HSG A
25,919	87	Dirt roads, HSG C
2,445	30	Meadow, non-grazed, HSG A
99,707	71	Meadow, non-grazed, HSG C
7,792	78	Meadow, non-grazed, HSG D
192,241	82	Row crops, SR + CR, Good, HSG C
600	70	Woods, Good, HSG C
18,825	77	Woods, Good, HSG D
349,063	78	Weighted Average
349,063		100.00% Pervious Area

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Type III 24-hr 100-yr Rainfall=8.35"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	27	0.0370	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	23	0.0435	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
4.2	509	0.0157	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	73	0.0137	0.82		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0176	2.14		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.1	169	0.0219	1.33		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
7.6	311	0.0058	0.69		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
1.3	39	0.0051	0.50		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1714	2.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	1,238	Total			

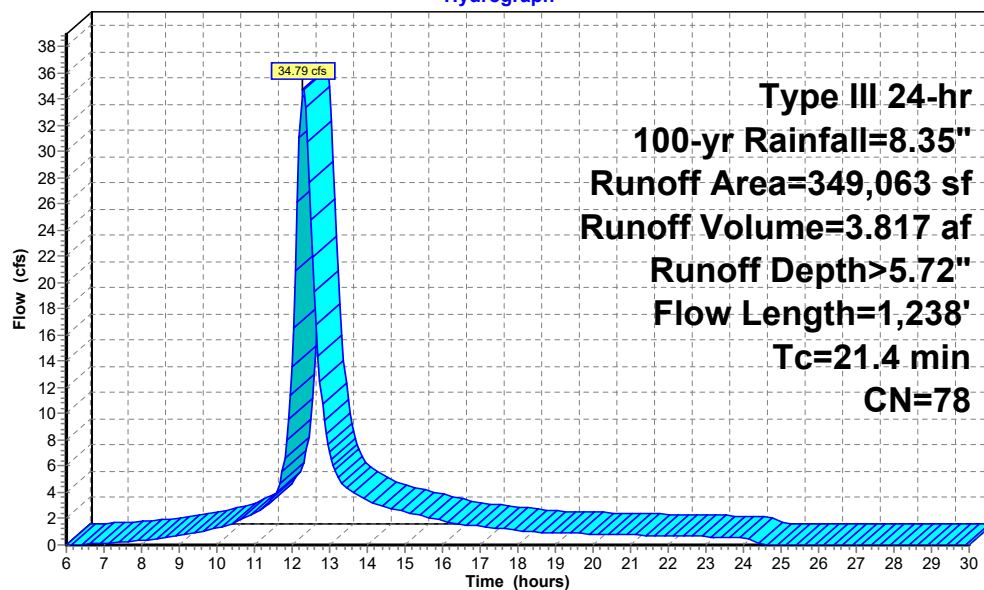
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Type III 24-hr 100-yr Rainfall=8.35"

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Subcatchment E3: Subcat E3**Hydrograph**

Runoff

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Subcatchment E4: Subcat E4

Runoff = 11.25 cfs @ 12.11 hrs, Volume= 0.860 af, Depth= 3.14"
Routed to Link POA-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
12,288	87	Dirt roads, HSG C
17,847	30	Meadow, non-grazed, HSG A
4,241	58	Meadow, non-grazed, HSG B
49,875	71	Meadow, non-grazed, HSG C
2,221	98	Roofs, HSG A
254	98	Roofs, HSG C
6,271	82	Row crops, SR + CR, Good, HSG C
40,699	30	Woods, Good, HSG A
29	55	Woods, Good, HSG B
9,501	70	Woods, Good, HSG C
143,227	56	Weighted Average
140,752		98.27% Pervious Area
2,476		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	45	0.0667	1.81		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	42	0.1905	2.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	137	Total			

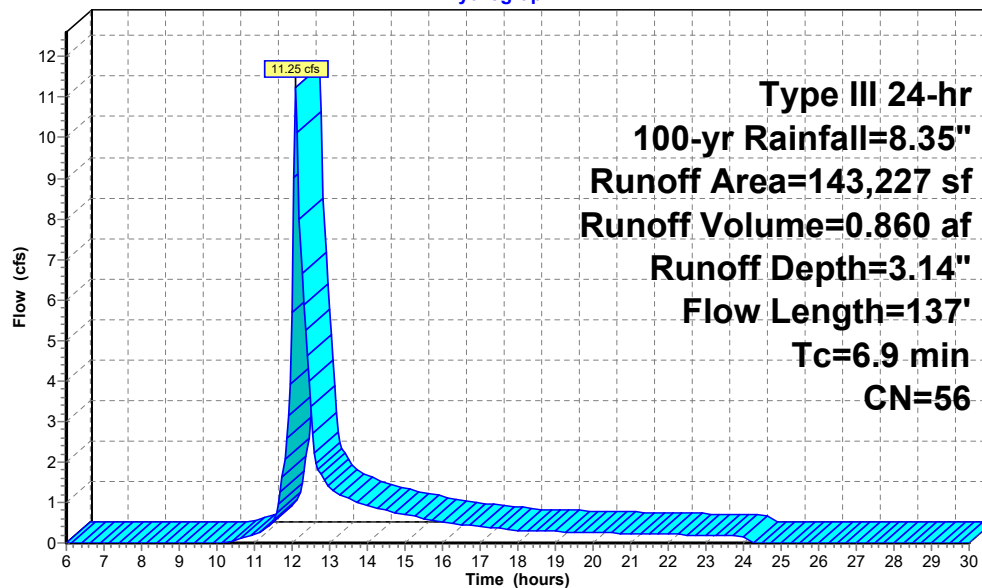
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Type III 24-hr 100-yr Rainfall=8.35"

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Subcatchment E4: Subcat E4**Hydrograph**

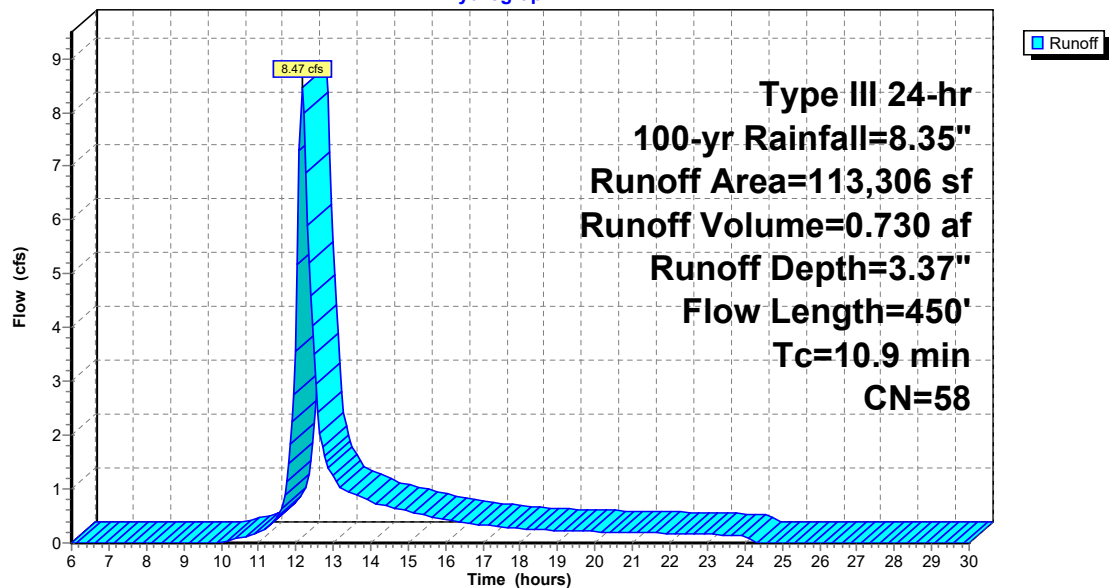
Summary for Subcatchment E5: Subcat E5

Runoff = 8.47 cfs @ 12.16 hrs, Volume= 0.730 af, Depth= 3.37"
Routed to Link POA-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
113,306	58	Meadow, non-grazed, HSG B
113,306		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.7	400	0.0413	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.9	450	Total			

Subcatchment E5: Subcat E5**Hydrograph**

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Type III 24-hr 100-yr Rainfall=8.35"

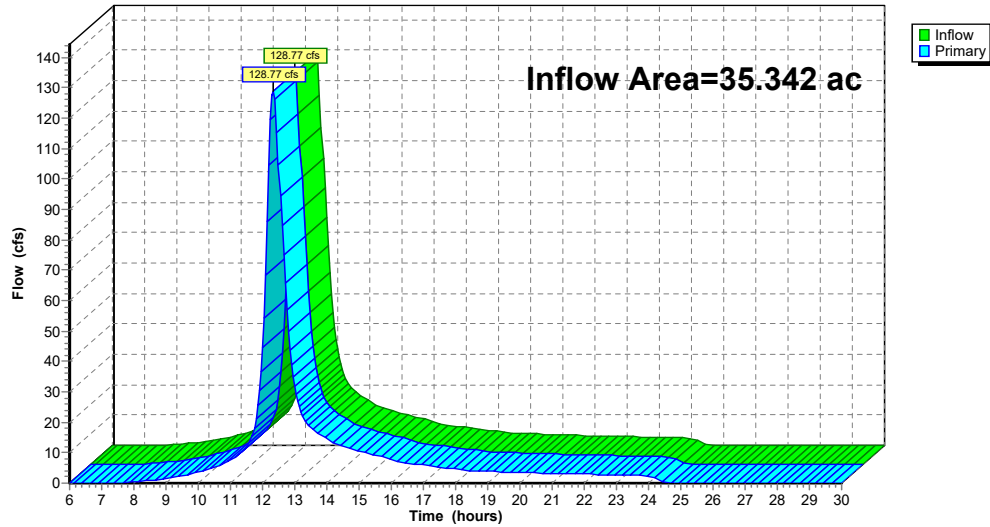
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Summary for Link POA-1:

Inflow Area = 35.342 ac, 0.00% Impervious, Inflow Depth = 5.00" for 100-yr event
Inflow = 128.77 cfs @ 12.33 hrs, Volume= 14.734 af
Primary = 128.77 cfs @ 12.33 hrs, Volume= 14.734 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-1:**Hydrograph****BW Pleasant St_Pre_r1**

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Type III 24-hr 100-yr Rainfall=8.35"

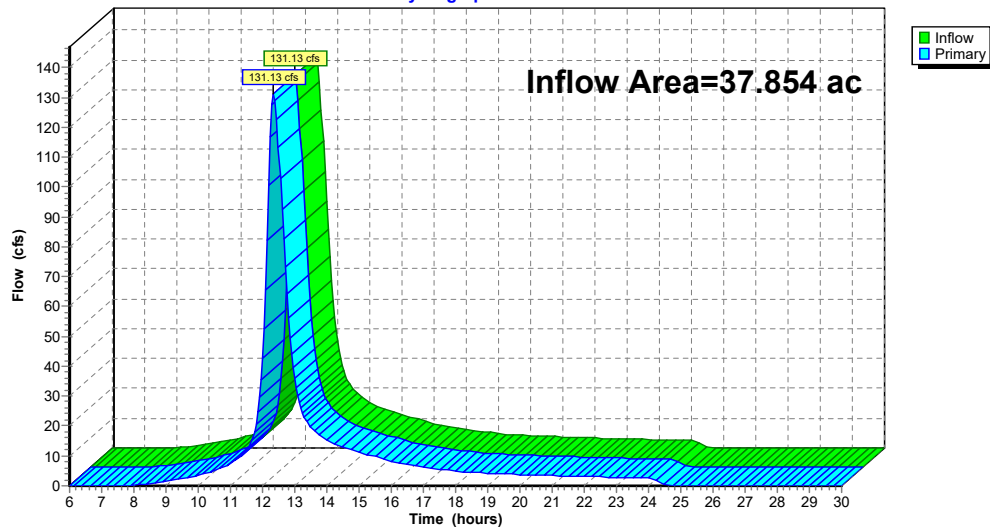
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Summary for Link POA-2:

Inflow Area = 37.854 ac, 1.03% Impervious, Inflow Depth = 4.88" for 100-yr event
Inflow = 131.13 cfs @ 12.36 hrs, Volume= 15.409 af
Primary = 131.13 cfs @ 12.36 hrs, Volume= 15.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-2:**Hydrograph**

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Type III 24-hr 100-yr Rainfall=8.35"

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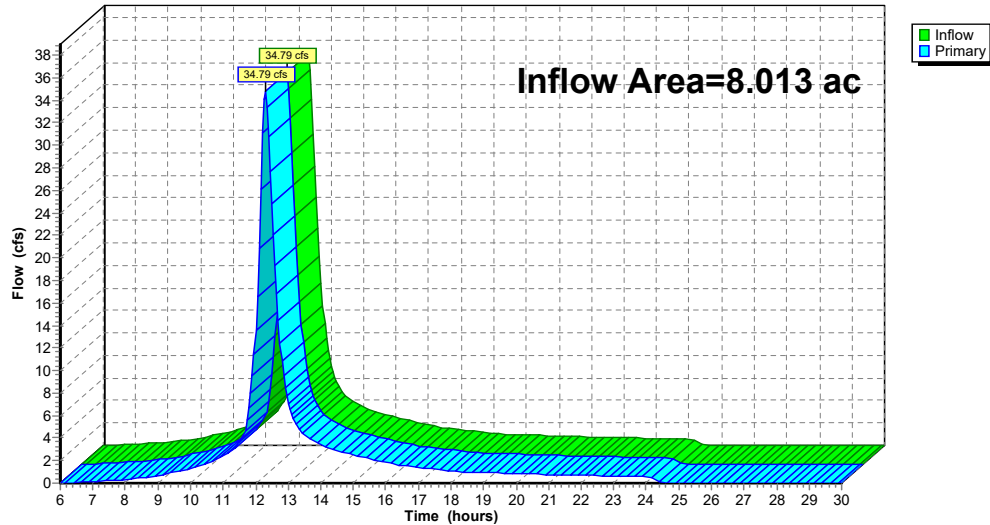
Summary for Link POA-3:

Inflow Area = 8.013 ac, 0.00% Impervious, Inflow Depth > 5.72" for 100-yr event
Inflow = 34.79 cfs @ 12.29 hrs, Volume= 3.817 af
Primary = 34.79 cfs @ 12.29 hrs, Volume= 3.817 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-3:

Hydrograph

**BW Pleasant St_Pre_r1**

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Type III 24-hr 100-yr Rainfall=8.35"

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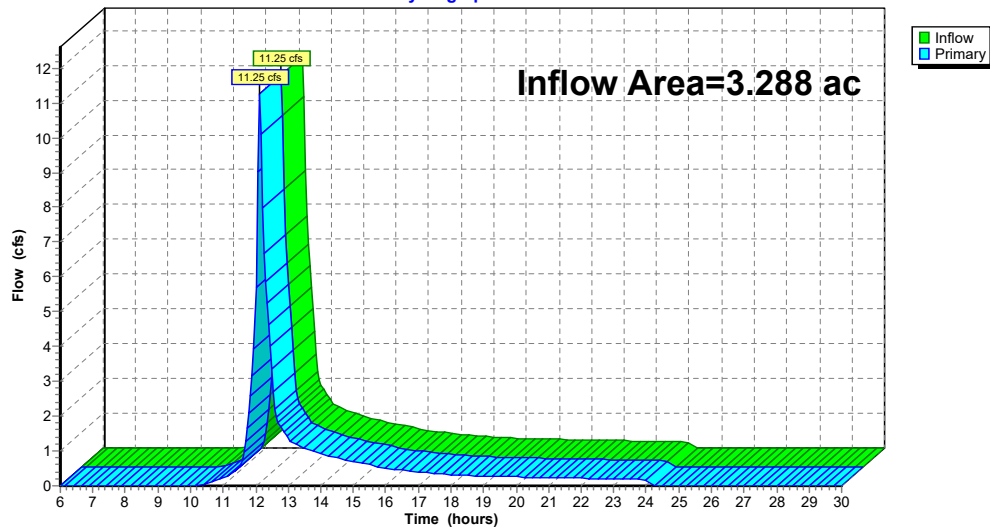
Summary for Link POA-4:

Inflow Area = 3.288 ac, 1.73% Impervious, Inflow Depth = 3.14" for 100-yr event
Inflow = 11.25 cfs @ 12.11 hrs, Volume= 0.860 af
Primary = 11.25 cfs @ 12.11 hrs, Volume= 0.860 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-4:

Hydrograph



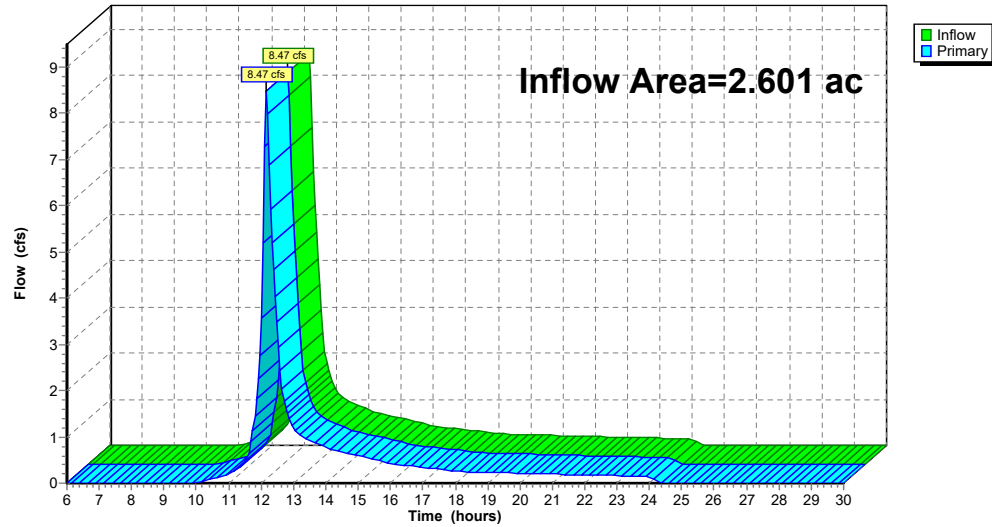
Summary for Link POA-5:

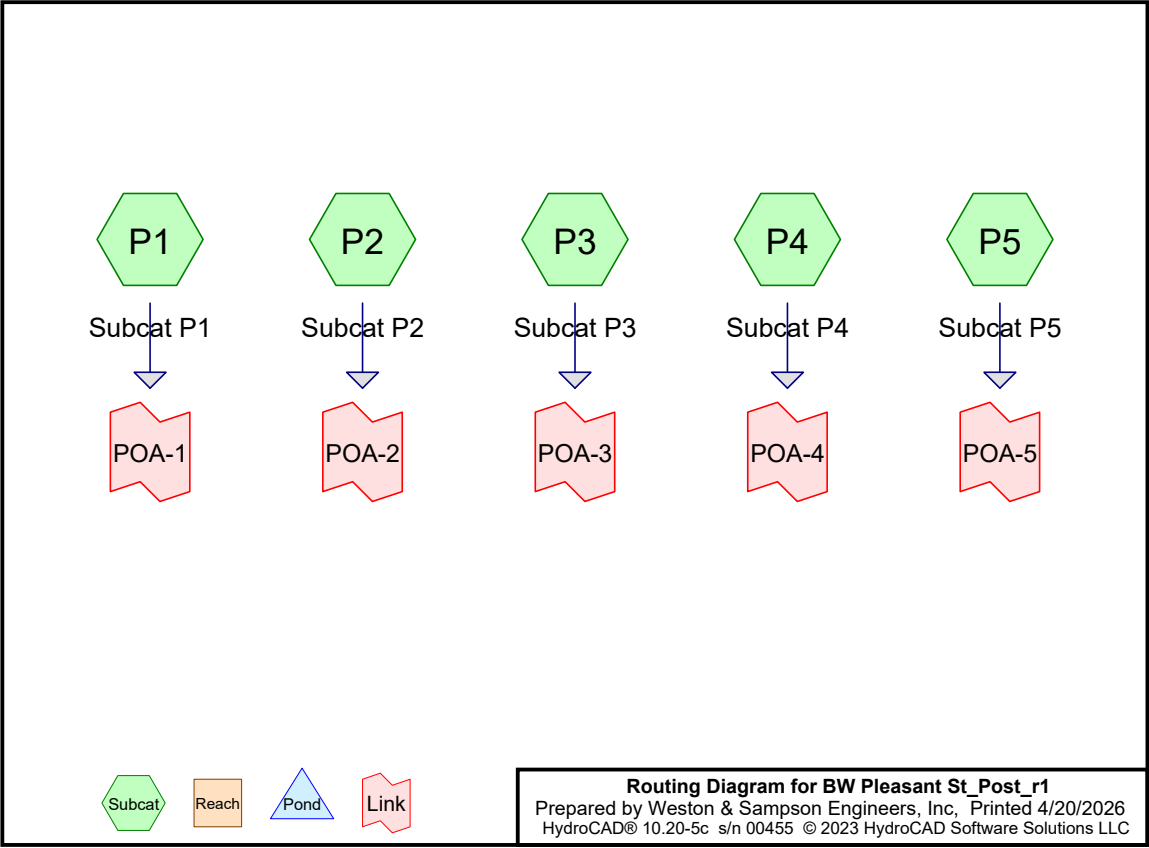
Inflow Area = 2.601 ac, 0.00% Impervious, Inflow Depth = 3.37" for 100-yr event
 Inflow = 8.47 cfs @ 12.16 hrs, Volume= 0.730 af
 Primary = 8.47 cfs @ 12.16 hrs, Volume= 0.730 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-5:

Hydrograph





Rainfall Events Listing (selected events)								
Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.20	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.19	2
3	100-yr	Type III 24-hr		Default	24.00	1	8.35	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.035	72	Dirt roads, HSG A (P3)
1.192	87	Dirt roads, HSG C (P1, P2, P3, P4)
0.099	89	Dirt roads, HSG D (P1)
0.129	85	Gravel roads, HSG B (P2)
1.366	89	Gravel roads, HSG C (P1, P2)
0.342	91	Gravel roads, HSG D (P1)
0.466	30	Meadow, non-grazed, HSG A (P3, P4)
15.250	58	Meadow, non-grazed, HSG B (P1, P2, P4, P5)
37.109	71	Meadow, non-grazed, HSG C (P1, P2, P3, P4)
7.428	78	Meadow, non-grazed, HSG D (P1, P2, P3)
0.051	98	Roofs, HSG A (P4)
0.397	98	Roofs, HSG C (P2, P4)
4.920	75	Row crops, SR + CR, Good, HSG B (P1, P2)
12.439	82	Row crops, SR + CR, Good, HSG C (P1, P2, P3, P4)
0.724	85	Row crops, SR + CR, Good, HSG D (P1)
0.038	98	Unconnected pavement, HSG C (P2)
0.038	98	Unconnected pavement, HSG D (P1)
0.934	30	Woods, Good, HSG A (P4)
0.046	55	Woods, Good, HSG B (P1, P4)
2.728	70	Woods, Good, HSG C (P1, P2, P3, P4)
1.368	77	Woods, Good, HSG D (P1, P2, P3)
87.098	71	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.486	HSG A	P3, P4
20.345	HSG B	P1, P2, P4, P5
55.268	HSG C	P1, P2, P3, P4
9.998	HSG D	P1, P2, P3
0.000	Other	
87.098		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.035	0.000	1.192	0.099	0.000	1.326	Dirt roads	P1, P2, P3, P4
0.000	0.129	1.366	0.342	0.000	1.837	Gravel roads	P1, P2
0.466	15.250	37.109	7.428	0.000	60.253	Meadow, non-grazed	P1, P2, P3, P4, P5
0.051	0.000	0.397	0.000	0.000	0.448	Roofs	P2, P4
0.000	4.920	12.439	0.724	0.000	18.083	Row crops, SR + CR, Good	P1, P2, P3, P4
0.000	0.000	0.038	0.038	0.000	0.075	Unconnected pavement	P1, P2
0.934	0.046	2.728	1.368	0.000	5.076	Woods, Good	P1, P2, P3, P4
1.486	20.345	55.268	9.998	0.000	87.098	TOTAL AREA	

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Type III 24-hr 2-yr Rainfall=3.20"

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Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1: Subcat P1	Runoff Area=1,539,483 sf 0.11% Impervious Runoff Depth=0.93" Flow Length=1,351' Tc=24.1 min CN=72 Runoff=22.04 cfs 2.738 af
SubcatchmentP2: Subcat P2	Runoff Area=1,648,918 sf 1.13% Impervious Runoff Depth=0.88" Flow Length=1,662' Tc=25.7 min CN=71 Runoff=21.39 cfs 2.770 af
SubcatchmentP3: Subcat P3	Runoff Area=349,063 sf 0.00% Impervious Runoff Depth=1.27" Flow Length=1,238' Tc=21.4 min CN=78 Runoff=7.63 cfs 0.850 af
SubcatchmentP4: Subcat P4	Runoff Area=143,227 sf 1.73% Impervious Runoff Depth=0.28" Flow Length=137' Tc=6.9 min CN=56 Runoff=0.41 cfs 0.077 af
SubcatchmentP5: Subcat P5	Runoff Area=113,306 sf 0.00% Impervious Runoff Depth=0.34" Flow Length=450' Tc=10.9 min CN=58 Runoff=0.43 cfs 0.074 af
Link POA-1:	Inflow=22.04 cfs 2.738 af Primary=22.04 cfs 2.738 af
Link POA-2:	Inflow=21.39 cfs 2.770 af Primary=21.39 cfs 2.770 af
Link POA-3:	Inflow=7.63 cfs 0.850 af Primary=7.63 cfs 0.850 af
Link POA-4:	Inflow=0.41 cfs 0.077 af Primary=0.41 cfs 0.077 af
Link POA-5:	Inflow=0.43 cfs 0.074 af Primary=0.43 cfs 0.074 af

Total Runoff Area = 87.098 ac Runoff Volume = 6.509 af Average Runoff Depth = 0.90"
99.40% Pervious = 86.575 ac 0.60% Impervious = 0.523 ac

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Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Subcatchment P1: Subcat P1

Runoff = 22.04 cfs @ 12.37 hrs, Volume= 2.738 af, Depth= 0.93"
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
8,079	87	Dirt roads, HSG C
4,311	89	Dirt roads, HSG D
2,119	89	Gravel roads, HSG C
14,900	91	Gravel roads, HSG D
312,091	58	Meadow, non-grazed, HSG B
454,879	71	Meadow, non-grazed, HSG C
303,333	78	Meadow, non-grazed, HSG D
139,280	75	Row crops, SR + CR, Good, HSG B
203,421	82	Row crops, SR + CR, Good, HSG C
31,554	85	Row crops, SR + CR, Good, HSG D
1,641	98	Unconnected pavement, HSG D
1,977	55	Woods, Good, HSG B
31,803	70	Woods, Good, HSG C
30,096	77	Woods, Good, HSG D
1,539,483	72	Weighted Average
1,537,842		99.89% Pervious Area
1,641		0.11% Impervious Area
1,641		100.00% Unconnected

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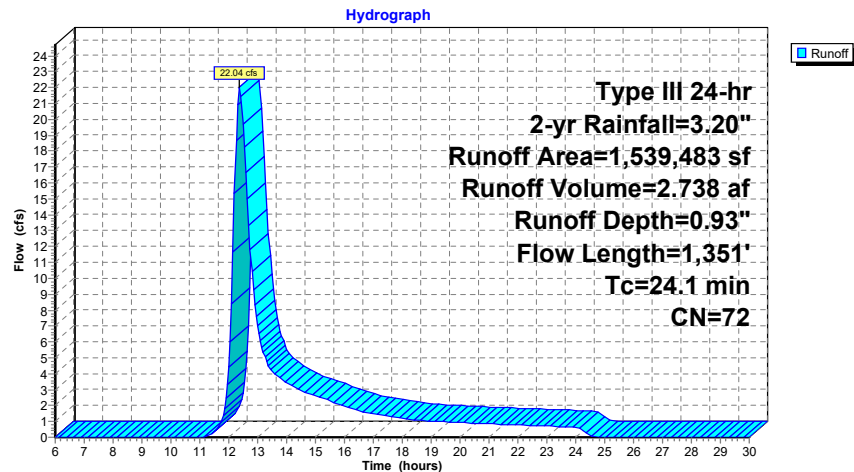
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Type III 24-hr 2-yr Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	50	0.2600	0.28		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.0	408	0.0588	1.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	419	0.0263	1.14		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.0	474	0.0105	0.72		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
24.1	1,351	Total			

Subcatchment P1: Subcat P1

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Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Subcatchment P2: Subcat P2

Runoff = 21.39 cfs @ 12.40 hrs, Volume= 2.770 af, Depth= 0.88"
 Routed to Link POA-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
17,371	87	Dirt roads, HSG C
5,619	85	Gravel roads, HSG B
57,383	89	Gravel roads, HSG C
234,672	58	Meadow, non-grazed, HSG B
1,000,253	71	Meadow, non-grazed, HSG C
12,429	78	Meadow, non-grazed, HSG D
17,046	98	Roofs, HSG C
75,033	75	Row crops, SR + CR, Good, HSG B
139,897	82	Row crops, SR + CR, Good, HSG C
1,641	98	Unconnected pavement, HSG C
76,921	70	Woods, Good, HSG C
10,652	77	Woods, Good, HSG D
1,648,918	71	Weighted Average
1,630,231		98.87% Pervious Area
18,687		1.13% Impervious Area
1,641		8.78% Unconnected

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Type III 24-hr 2-yr Rainfall=3.20"

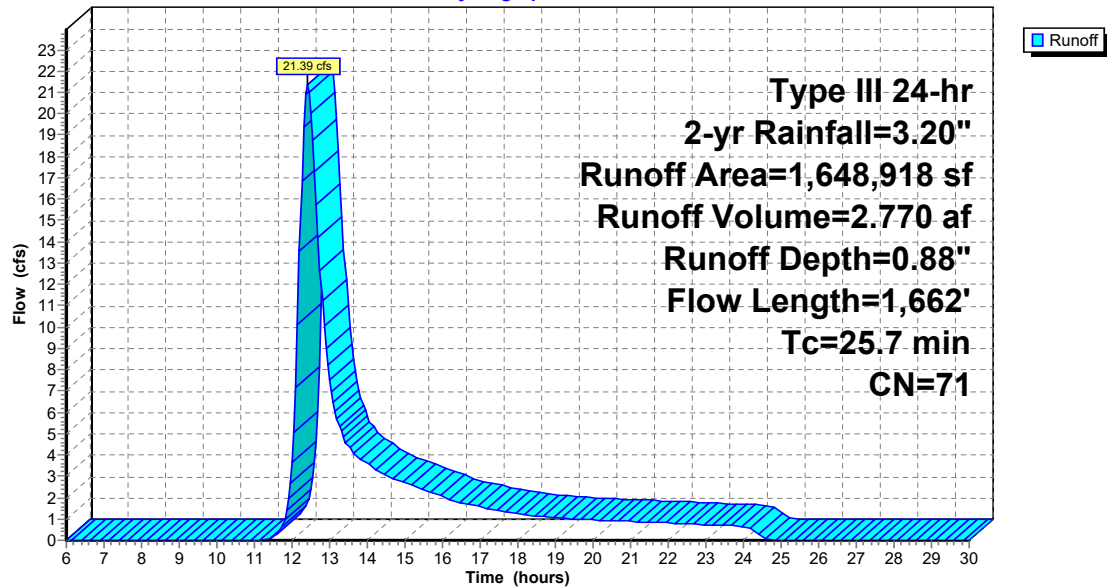
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	44	0.0795	0.17		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	6	0.0833	0.16		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 3.20"
2.3	266	0.0451	1.91		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
6.1	492	0.0224	1.35		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
11.6	755	0.0242	1.09		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	20	0.0350	3.01		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	79	0.0741	1.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.7	1,662	Total			

Subcatchment P2: Subcat P2

Hydrograph



Summary for Subcatchment P3: Subcat P3

Runoff = 7.63 cfs @ 12.31 hrs, Volume= 0.850 af, Depth= 1.27"
Routed to Link POA-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
1,534	72	Dirt roads, HSG A
17,375	87	Dirt roads, HSG C
2,445	30	Meadow, non-grazed, HSG A
108,251	71	Meadow, non-grazed, HSG C
7,792	78	Meadow, non-grazed, HSG D
192,241	82	Row crops, SR + CR, Good, HSG C
600	70	Woods, Good, HSG C
18,825	77	Woods, Good, HSG D
349,063	78	Weighted Average
349,063		100.00% Pervious Area

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Type III 24-hr 2-yr Rainfall=3.20"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	27	0.0370	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	23	0.0435	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
4.2	509	0.0157	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	73	0.0137	0.82		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0176	2.14		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.1	169	0.0219	1.33		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
7.6	311	0.0058	0.69		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
1.3	39	0.0051	0.50		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1714	2.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	1,238	Total			

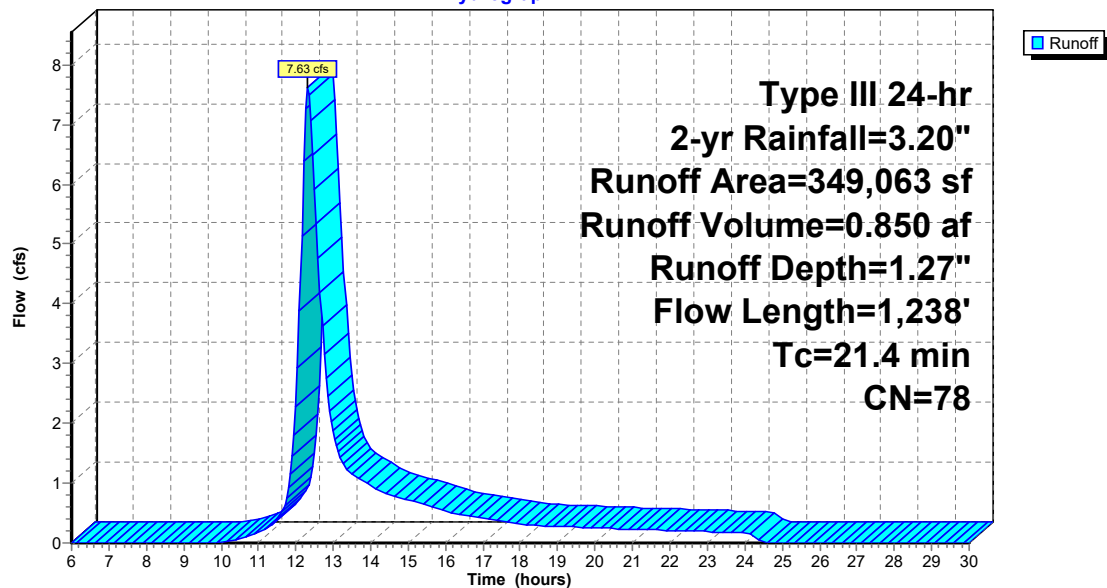
BW Pleasant St_Post_r1

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Type III 24-hr 2-yr Rainfall=3.20"

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Subcatchment P3: Subcat P3**Hydrograph**

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Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Subcatchment P4: Subcat P4

Runoff = 0.41 cfs @ 12.32 hrs, Volume= 0.077 af, Depth= 0.28"
Routed to Link POA-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr Rainfall=3.20"

Area (sf)	CN	Description
9,086	87	Dirt roads, HSG C
17,847	30	Meadow, non-grazed, HSG A
4,241	58	Meadow, non-grazed, HSG B
53,078	71	Meadow, non-grazed, HSG C
2,221	98	Roofs, HSG A
254	98	Roofs, HSG C
6,271	82	Row crops, SR + CR, Good, HSG C
40,699	30	Woods, Good, HSG A
29	55	Woods, Good, HSG B
9,501	70	Woods, Good, HSG C
143,227	56	Weighted Average
140,752		98.27% Pervious Area
2,476		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	45	0.0667	1.81		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	42	0.1905	2.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	137	Total			

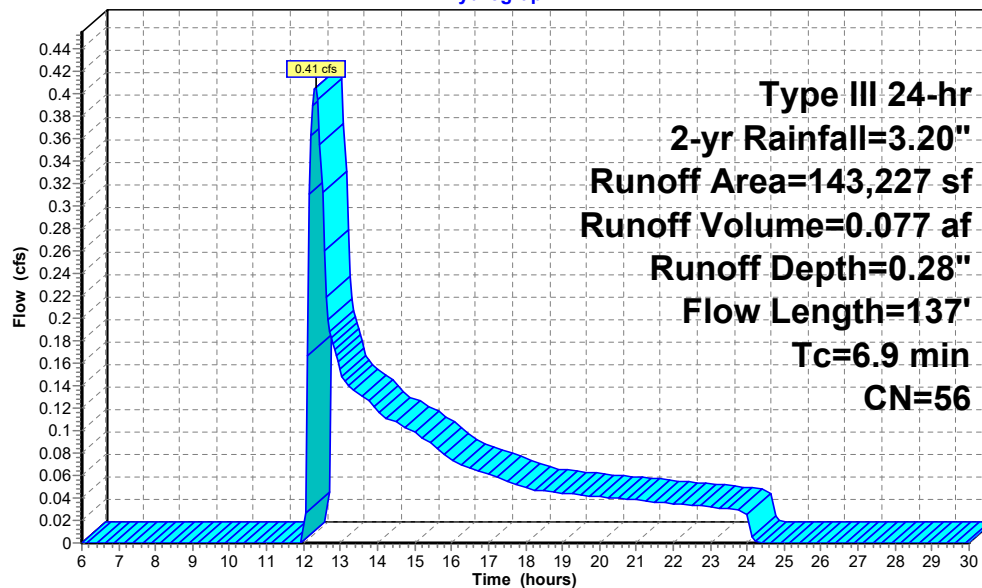
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Subcatchment P4: Subcat P4**Hydrograph**

Runoff

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Summary for Subcatchment P5: Subcat P5

Runoff = 0.43 cfs @ 12.32 hrs, Volume= 0.074 af, Depth= 0.34"
Routed to Link POA-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
113,306	58	Meadow, non-grazed, HSG B
113,306		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.7	400	0.0413	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.9	450	Total			

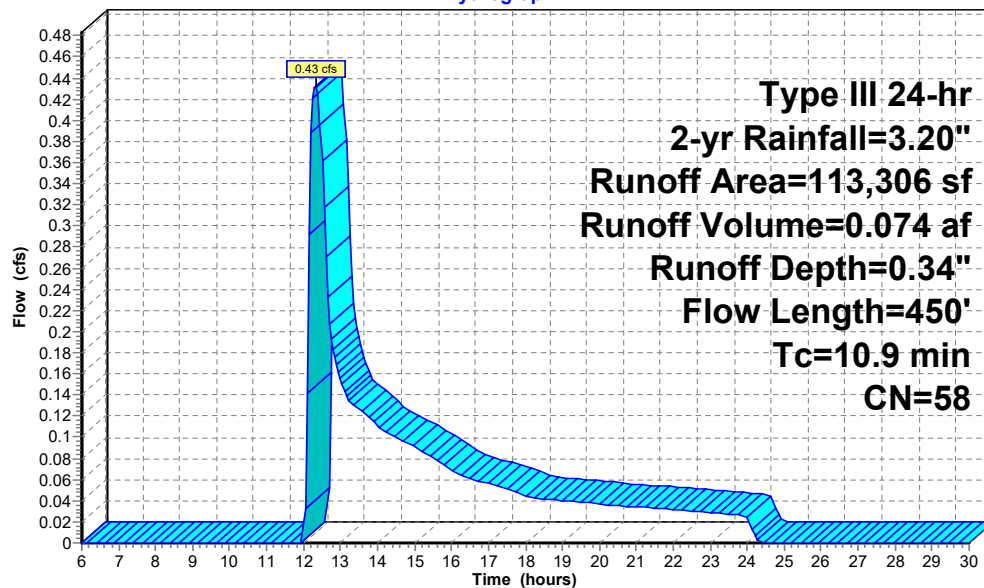
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Type III 24-hr 2-yr Rainfall=3.20"

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Subcatchment P5: Subcat P5**Hydrograph**

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Type III 24-hr 2-yr Rainfall=3.20"

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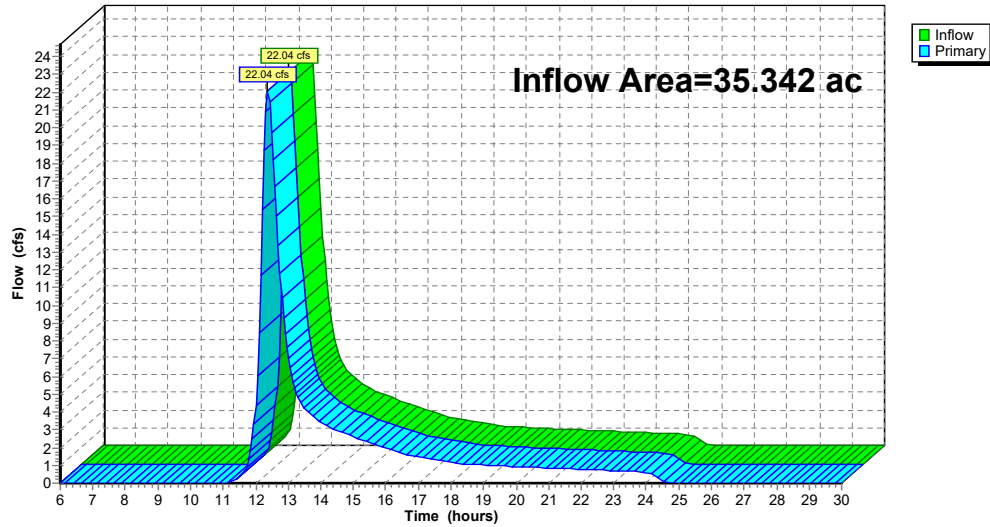
Summary for Link POA-1:

Inflow Area = 35.342 ac, 0.11% Impervious, Inflow Depth = 0.93" for 2-yr event
Inflow = 22.04 cfs @ 12.37 hrs, Volume= 2.738 af
Primary = 22.04 cfs @ 12.37 hrs, Volume= 2.738 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-1:

Hydrograph

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Type III 24-hr 2-yr Rainfall=3.20"

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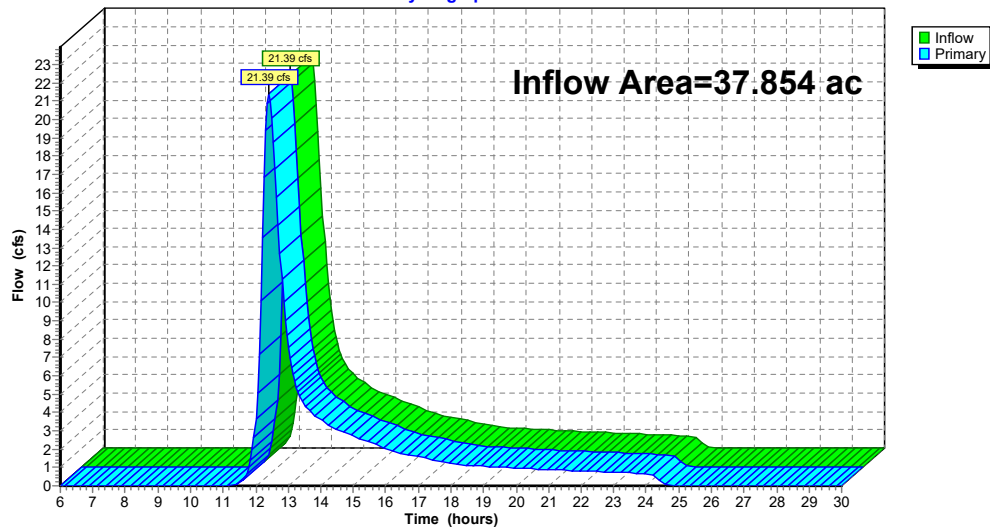
Summary for Link POA-2:

Inflow Area = 37.854 ac, 1.13% Impervious, Inflow Depth = 0.88" for 2-yr event
Inflow = 21.39 cfs @ 12.40 hrs, Volume= 2.770 af
Primary = 21.39 cfs @ 12.40 hrs, Volume= 2.770 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-2:

Hydrograph



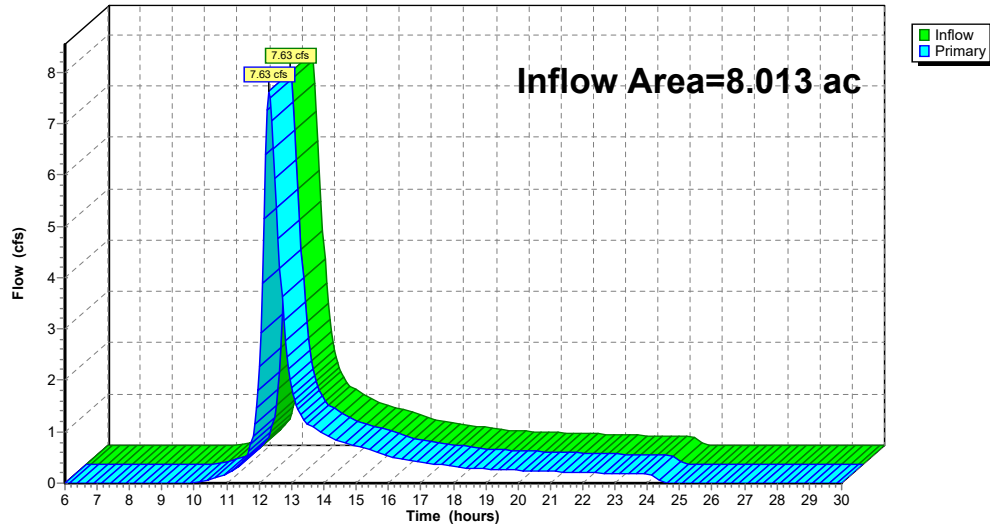
Summary for Link POA-3:

Inflow Area = 8.013 ac, 0.00% Impervious, Inflow Depth = 1.27" for 2-yr event
Inflow = 7.63 cfs @ 12.31 hrs, Volume= 0.850 af
Primary = 7.63 cfs @ 12.31 hrs, Volume= 0.850 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-3:

Hydrograph



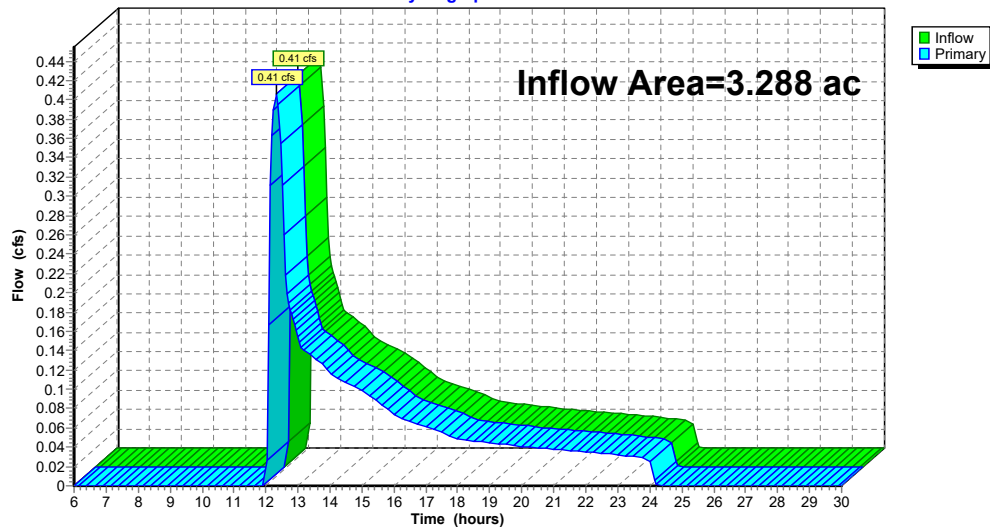
Summary for Link POA-4:

Inflow Area = 3.288 ac, 1.73% Impervious, Inflow Depth = 0.28" for 2-yr event
Inflow = 0.41 cfs @ 12.32 hrs, Volume= 0.077 af
Primary = 0.41 cfs @ 12.32 hrs, Volume= 0.077 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-4:

Hydrograph



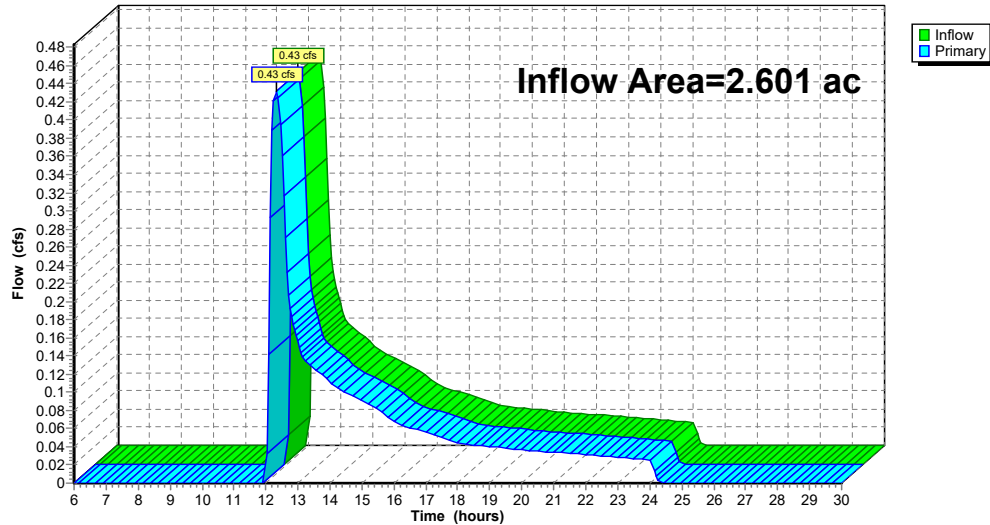
Summary for Link POA-5:

Inflow Area = 2.601 ac, 0.00% Impervious, Inflow Depth = 0.34" for 2-yr event
Inflow = 0.43 cfs @ 12.32 hrs, Volume= 0.074 af
Primary = 0.43 cfs @ 12.32 hrs, Volume= 0.074 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-5:

Hydrograph



Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1: Subcat P1	Runoff Area=1,539,483 sf 0.11% Impervious Runoff Depth=2.35" Flow Length=1,351' Tc=24.1 min CN=72 Runoff=59.75 cfs 6.907 af
SubcatchmentP2: Subcat P2	Runoff Area=1,648,918 sf 1.13% Impervious Runoff Depth=2.26" Flow Length=1,662' Tc=25.7 min CN=71 Runoff=59.85 cfs 7.133 af
SubcatchmentP3: Subcat P3	Runoff Area=349,063 sf 0.00% Impervious Runoff Depth=2.87" Flow Length=1,238' Tc=21.4 min CN=78 Runoff=17.65 cfs 1.919 af
SubcatchmentP4: Subcat P4	Runoff Area=143,227 sf 1.73% Impervious Runoff Depth=1.14" Flow Length=137' Tc=6.9 min CN=56 Runoff=3.54 cfs 0.313 af
SubcatchmentP5: Subcat P5	Runoff Area=113,306 sf 0.00% Impervious Runoff Depth=1.27" Flow Length=450' Tc=10.9 min CN=58 Runoff=2.86 cfs 0.276 af
Link POA-1:	Inflow=59.75 cfs 6.907 af Primary=59.75 cfs 6.907 af
Link POA-2:	Inflow=59.85 cfs 7.133 af Primary=59.85 cfs 7.133 af
Link POA-3:	Inflow=17.65 cfs 1.919 af Primary=17.65 cfs 1.919 af
Link POA-4:	Inflow=3.54 cfs 0.313 af Primary=3.54 cfs 0.313 af
Link POA-5:	Inflow=2.86 cfs 0.276 af Primary=2.86 cfs 0.276 af

Total Runoff Area = 87.098 ac Runoff Volume = 16.548 af Average Runoff Depth = 2.28"
99.40% Pervious = 86.575 ac 0.60% Impervious = 0.523 ac

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Type III 24-hr 10-yr Rainfall=5.19"

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Summary for Subcatchment P1: Subcat P1

Runoff = 59.75 cfs @ 12.35 hrs, Volume= 6.907 af, Depth= 2.35"
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
8,079	87	Dirt roads, HSG C
4,311	89	Dirt roads, HSG D
2,119	89	Gravel roads, HSG C
14,900	91	Gravel roads, HSG D
312,091	58	Meadow, non-grazed, HSG B
454,879	71	Meadow, non-grazed, HSG C
303,333	78	Meadow, non-grazed, HSG D
139,280	75	Row crops, SR + CR, Good, HSG B
203,421	82	Row crops, SR + CR, Good, HSG C
31,554	85	Row crops, SR + CR, Good, HSG D
1,641	98	Unconnected pavement, HSG D
1,977	55	Woods, Good, HSG B
31,803	70	Woods, Good, HSG C
30,096	77	Woods, Good, HSG D
1,539,483	72	Weighted Average
1,537,842		99.89% Pervious Area
1,641		0.11% Impervious Area
1,641		100.00% Unconnected

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Type III 24-hr 10-yr Rainfall=5.19"

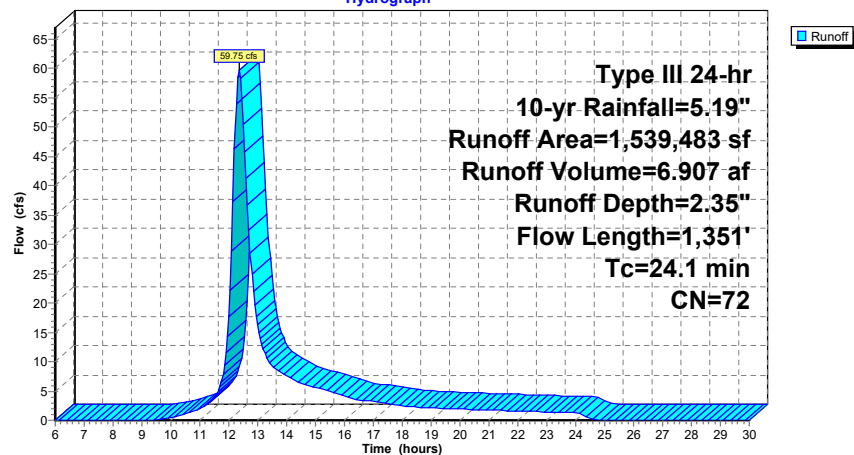
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	50	0.2600	0.28		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.0	408	0.0588	1.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	419	0.0263	1.14		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.0	474	0.0105	0.72		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
24.1	1,351	Total			

Subcatchment P1: Subcat P1

Hydrograph



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Summary for Subcatchment P2: Subcat P2

Runoff = 59.85 cfs @ 12.37 hrs, Volume= 7.133 af, Depth= 2.26"
 Routed to Link POA-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
17,371	87	Dirt roads, HSG C
5,619	85	Gravel roads, HSG B
57,383	89	Gravel roads, HSG C
234,672	58	Meadow, non-grazed, HSG B
1,000,253	71	Meadow, non-grazed, HSG C
12,429	78	Meadow, non-grazed, HSG D
17,046	98	Roofs, HSG C
75,033	75	Row crops, SR + CR, Good, HSG B
139,897	82	Row crops, SR + CR, Good, HSG C
1,641	98	Unconnected pavement, HSG C
76,921	70	Woods, Good, HSG C
10,652	77	Woods, Good, HSG D
1,648,918	71	Weighted Average
1,630,231		98.87% Pervious Area
18,687		1.13% Impervious Area
1,641		8.78% Unconnected

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Type III 24-hr 10-yr Rainfall=5.19"

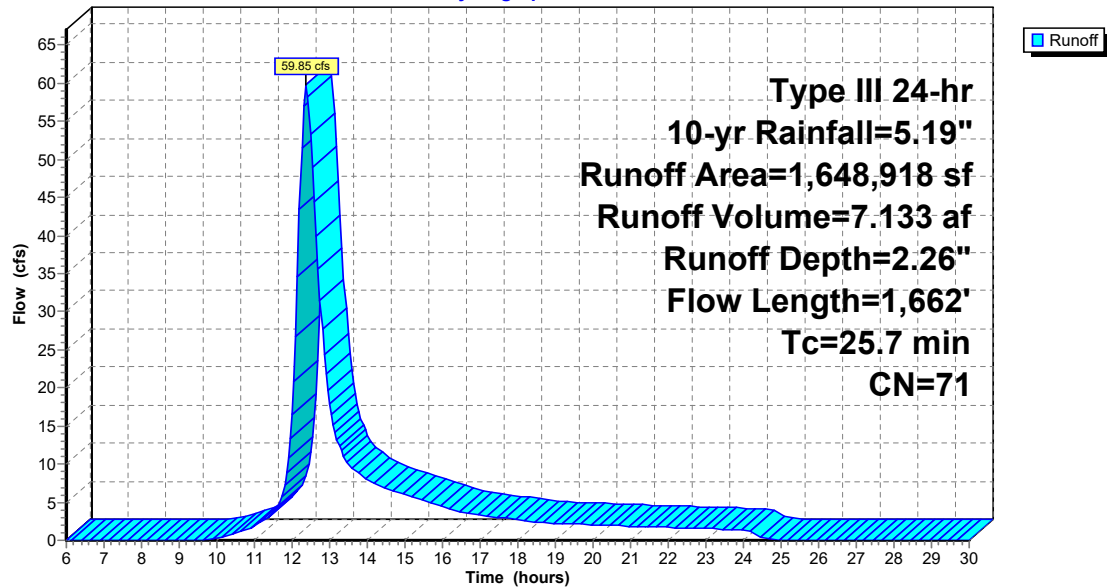
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	44	0.0795	0.17		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	6	0.0833	0.16		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 3.20"
2.3	266	0.0451	1.91		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
6.1	492	0.0224	1.35		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
11.6	755	0.0242	1.09		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	20	0.0350	3.01		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	79	0.0741	1.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.7	1,662	Total			

Subcatchment P2: Subcat P2

Hydrograph



Summary for Subcatchment P3: Subcat P3

Runoff = 17.65 cfs @ 12.30 hrs, Volume= 1.919 af, Depth= 2.87"
Routed to Link POA-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
1,534	72	Dirt roads, HSG A
17,375	87	Dirt roads, HSG C
2,445	30	Meadow, non-grazed, HSG A
108,251	71	Meadow, non-grazed, HSG C
7,792	78	Meadow, non-grazed, HSG D
192,241	82	Row crops, SR + CR, Good, HSG C
600	70	Woods, Good, HSG C
18,825	77	Woods, Good, HSG D
349,063	78	Weighted Average
349,063		100.00% Pervious Area

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Type III 24-hr 10-yr Rainfall=5.19"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	27	0.0370	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	23	0.0435	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
4.2	509	0.0157	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	73	0.0137	0.82		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0176	2.14		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.1	169	0.0219	1.33		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
7.6	311	0.0058	0.69		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
1.3	39	0.0051	0.50		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1714	2.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	1,238	Total			

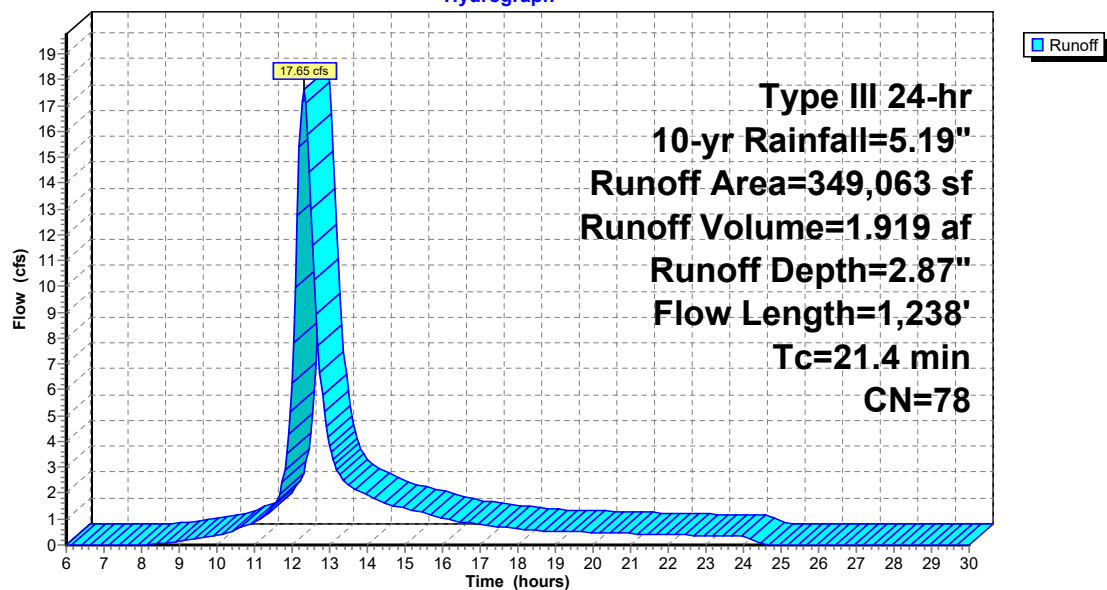
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Type III 24-hr 10-yr Rainfall=5.19"

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Subcatchment P3: Subcat P3**Hydrograph**

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Summary for Subcatchment P4: Subcat P4

Runoff = 3.54 cfs @ 12.12 hrs, Volume= 0.313 af, Depth= 1.14"
Routed to Link POA-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
9,086	87	Dirt roads, HSG C
17,847	30	Meadow, non-grazed, HSG A
4,241	58	Meadow, non-grazed, HSG B
53,078	71	Meadow, non-grazed, HSG C
2,221	98	Roofs, HSG A
254	98	Roofs, HSG C
6,271	82	Row crops, SR + CR, Good, HSG C
40,699	30	Woods, Good, HSG A
29	55	Woods, Good, HSG B
9,501	70	Woods, Good, HSG C
143,227	56	Weighted Average
140,752		98.27% Pervious Area
2,476		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	45	0.0667	1.81		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	42	0.1905	2.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	137	Total			

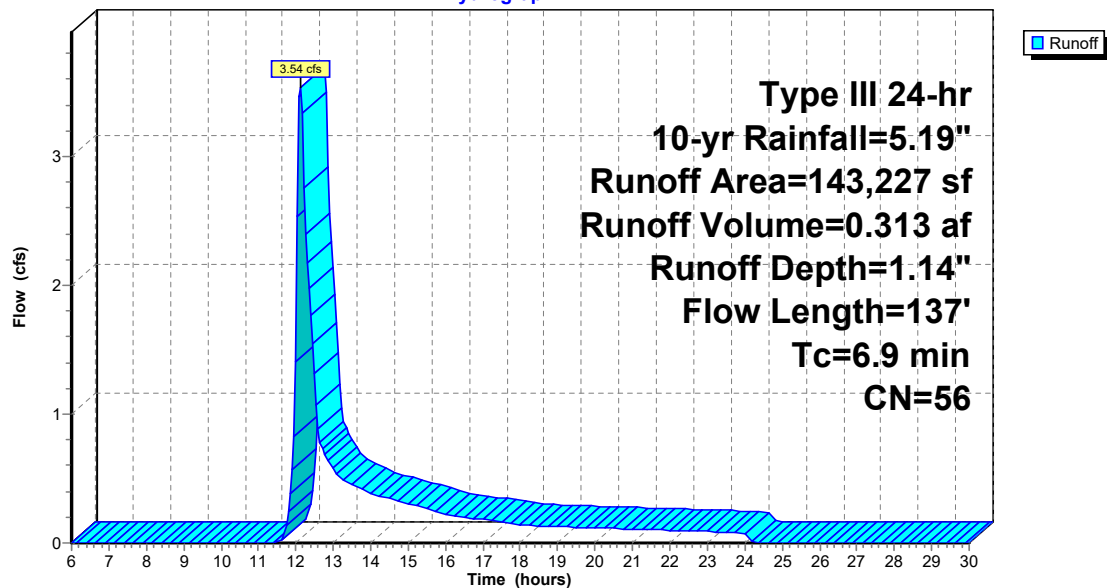
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Type III 24-hr 10-yr Rainfall=5.19"

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Subcatchment P4: Subcat P4**Hydrograph**

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Type III 24-hr 10-yr Rainfall=5.19"

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Summary for Subcatchment P5: Subcat P5

Runoff = 2.86 cfs @ 12.17 hrs, Volume= 0.276 af, Depth= 1.27"
Routed to Link POA-5 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
113,306	58	Meadow, non-grazed, HSG B
113,306		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.7	400	0.0413	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.9	450	Total			

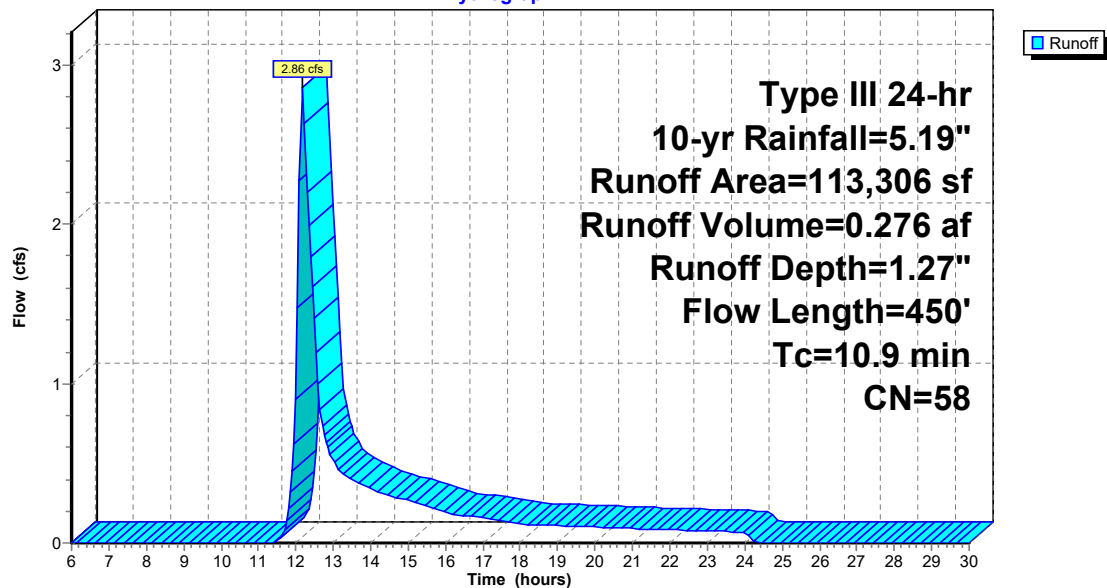
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Type III 24-hr 10-yr Rainfall=5.19"

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Subcatchment P5: Subcat P5**Hydrograph**

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Type III 24-hr 10-yr Rainfall=5.19"

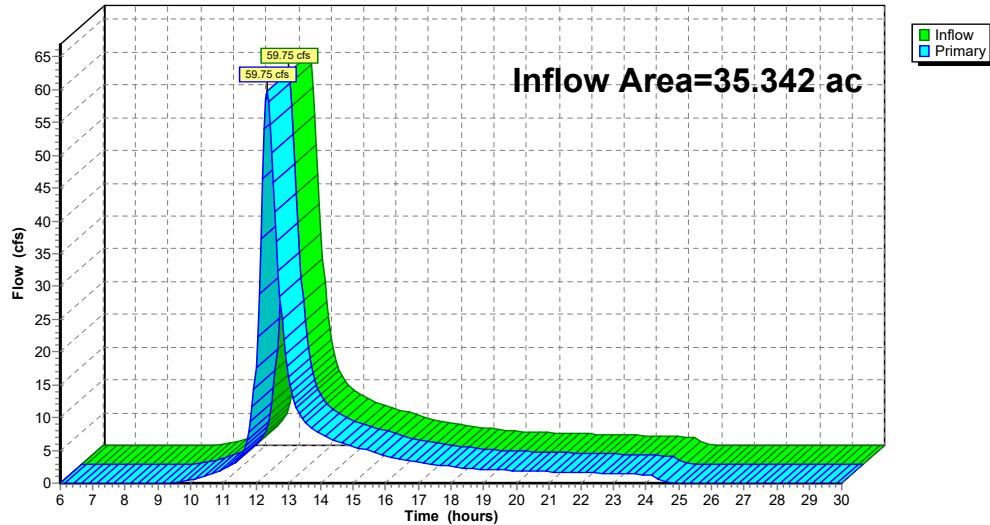
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Summary for Link POA-1:

Inflow Area = 35.342 ac, 0.11% Impervious, Inflow Depth = 2.35" for 10-yr event
Inflow = 59.75 cfs @ 12.35 hrs, Volume= 6.907 af
Primary = 59.75 cfs @ 12.35 hrs, Volume= 6.907 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-1:**Hydrograph****BW Pleasant St_Post_r1**

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Type III 24-hr 10-yr Rainfall=5.19"

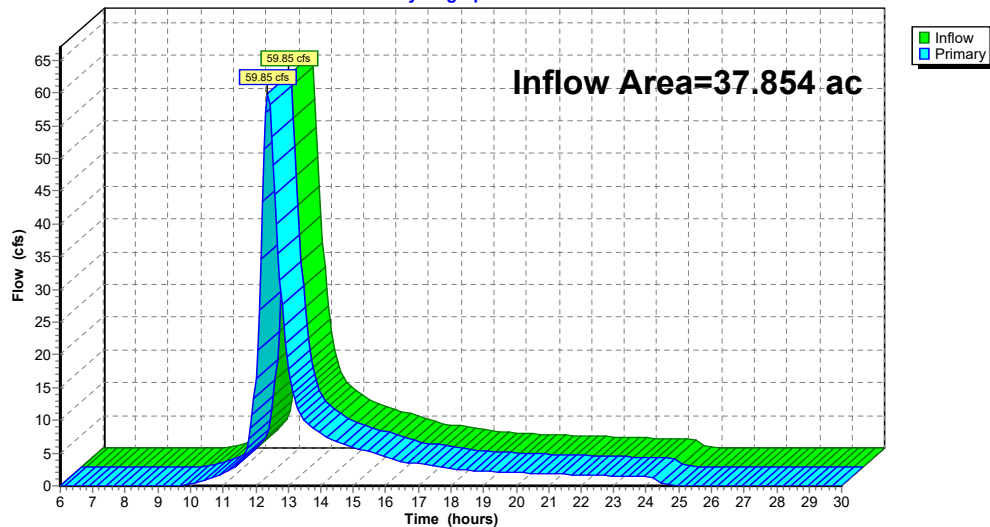
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Summary for Link POA-2:

Inflow Area = 37.854 ac, 1.13% Impervious, Inflow Depth = 2.26" for 10-yr event
Inflow = 59.85 cfs @ 12.37 hrs, Volume= 7.133 af
Primary = 59.85 cfs @ 12.37 hrs, Volume= 7.133 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-2:**Hydrograph**

BW Pleasant St_Post_r1

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Type III 24-hr 10-yr Rainfall=5.19"

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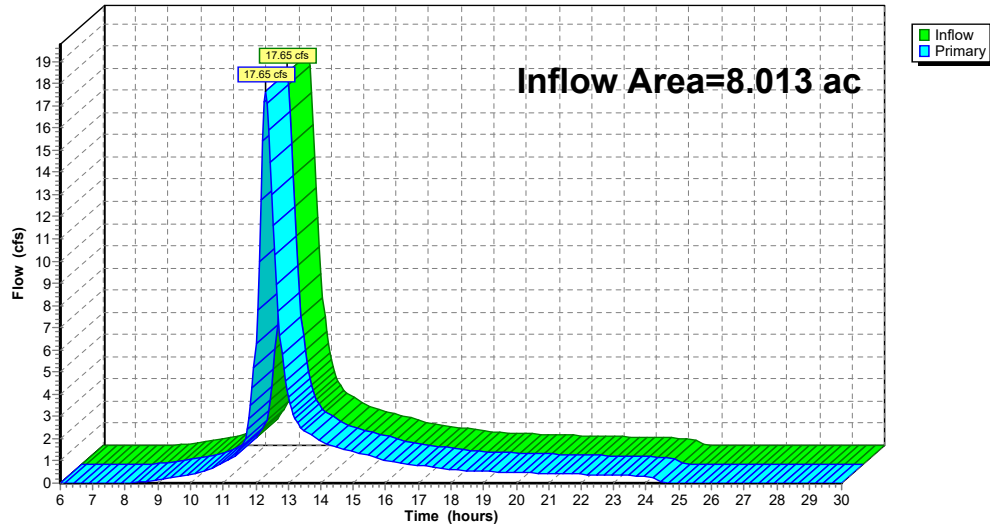
Summary for Link POA-3:

Inflow Area = 8.013 ac, 0.00% Impervious, Inflow Depth = 2.87" for 10-yr event
Inflow = 17.65 cfs @ 12.30 hrs, Volume= 1.919 af
Primary = 17.65 cfs @ 12.30 hrs, Volume= 1.919 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-3:

Hydrograph

**BW Pleasant St_Post_r1**

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Type III 24-hr 10-yr Rainfall=5.19"

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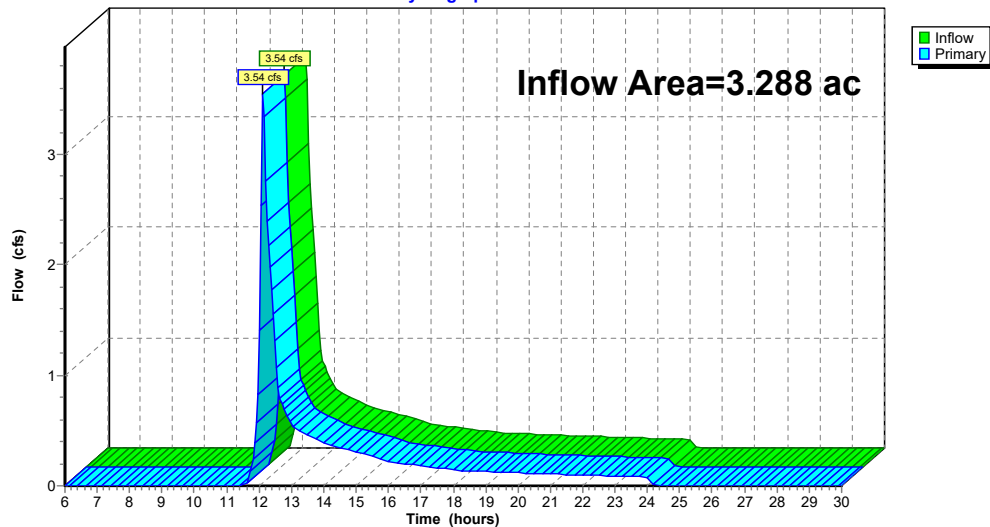
Summary for Link POA-4:

Inflow Area = 3.288 ac, 1.73% Impervious, Inflow Depth = 1.14" for 10-yr event
Inflow = 3.54 cfs @ 12.12 hrs, Volume= 0.313 af
Primary = 3.54 cfs @ 12.12 hrs, Volume= 0.313 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-4:

Hydrograph



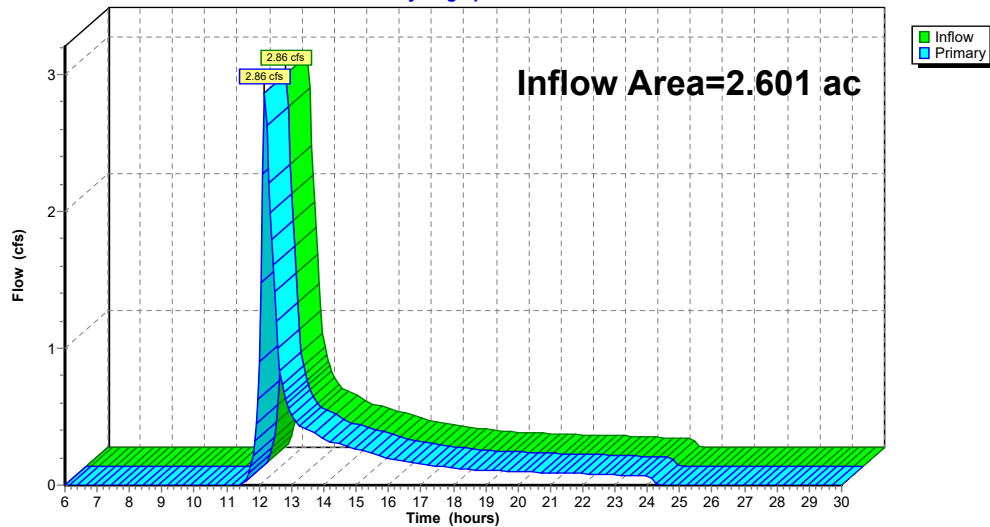
Summary for Link POA-5:

Inflow Area = 2.601 ac, 0.00% Impervious, Inflow Depth = 1.27" for 10-yr event
Inflow = 2.86 cfs @ 12.17 hrs, Volume= 0.276 af
Primary = 2.86 cfs @ 12.17 hrs, Volume= 0.276 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-5:

Hydrograph



Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentP1: Subcat P1	Runoff Area=1,539,483 sf 0.11% Impervious Runoff Depth=5.00" Flow Length=1,351' Tc=24.1 min CN=72 Runoff=128.77 cfs 14.734 af
SubcatchmentP2: Subcat P2	Runoff Area=1,648,918 sf 1.13% Impervious Runoff Depth=4.88" Flow Length=1,662' Tc=25.7 min CN=71 Runoff=131.13 cfs 15.409 af
SubcatchmentP3: Subcat P3	Runoff Area=349,063 sf 0.00% Impervious Runoff Depth=5.72" Flow Length=1,238' Tc=21.4 min CN=78 Runoff=34.79 cfs 3.817 af
SubcatchmentP4: Subcat P4	Runoff Area=143,227 sf 1.73% Impervious Runoff Depth=3.14" Flow Length=137' Tc=6.9 min CN=56 Runoff=11.25 cfs 0.860 af
SubcatchmentP5: Subcat P5	Runoff Area=113,306 sf 0.00% Impervious Runoff Depth=3.37" Flow Length=450' Tc=10.9 min CN=58 Runoff=8.47 cfs 0.730 af
Link POA-1:	Inflow=128.77 cfs 14.734 af Primary=128.77 cfs 14.734 af
Link POA-2:	Inflow=131.13 cfs 15.409 af Primary=131.13 cfs 15.409 af
Link POA-3:	Inflow=34.79 cfs 3.817 af Primary=34.79 cfs 3.817 af
Link POA-4:	Inflow=11.25 cfs 0.860 af Primary=11.25 cfs 0.860 af
Link POA-5:	Inflow=8.47 cfs 0.730 af Primary=8.47 cfs 0.730 af

Total Runoff Area = 87.098 ac Runoff Volume = 35.550 af Average Runoff Depth = 4.90"
99.40% Pervious = 86.575 ac 0.60% Impervious = 0.523 ac

BW Pleasant St_Post_r1

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Subcatchment P1: Subcat P1

Runoff = 128.77 cfs @ 12.33 hrs, Volume= 14.734 af, Depth= 5.00"
Routed to Link POA-1 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
8,079	87	Dirt roads, HSG C
4,311	89	Dirt roads, HSG D
2,119	89	Gravel roads, HSG C
14,900	91	Gravel roads, HSG D
312,091	58	Meadow, non-grazed, HSG B
454,879	71	Meadow, non-grazed, HSG C
303,333	78	Meadow, non-grazed, HSG D
139,280	75	Row crops, SR + CR, Good, HSG B
203,421	82	Row crops, SR + CR, Good, HSG C
31,554	85	Row crops, SR + CR, Good, HSG D
1,641	98	Unconnected pavement, HSG D
1,977	55	Woods, Good, HSG B
31,803	70	Woods, Good, HSG C
30,096	77	Woods, Good, HSG D
1,539,483	72	Weighted Average
1,537,842		99.89% Pervious Area
1,641		0.11% Impervious Area
1,641		100.00% Unconnected

BW Pleasant St_Post_r1

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Type III 24-hr 100-yr Rainfall=8.35"

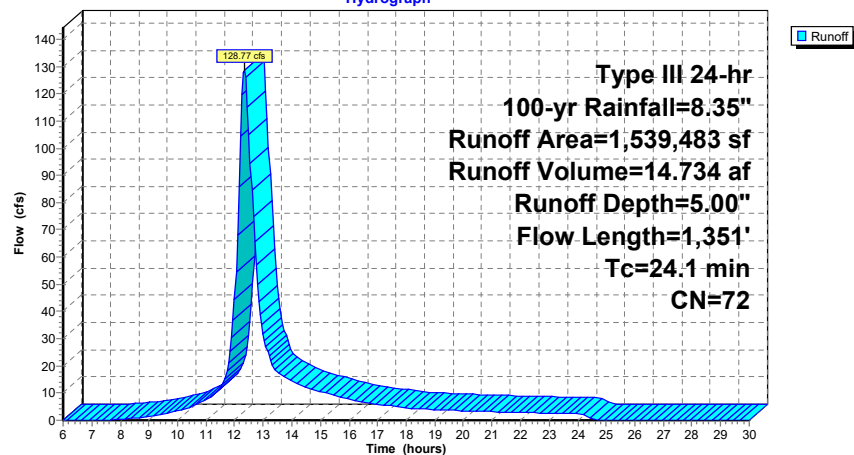
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.9	50	0.2600	0.28		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.0	408	0.0588	1.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
6.2	419	0.0263	1.14		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
11.0	474	0.0105	0.72		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
24.1	1,351	Total			

Subcatchment P1: Subcat P1

Hydrograph



BW Pleasant St_Post_r1

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Subcatchment P2: Subcat P2

Runoff = 131.13 cfs @ 12.36 hrs, Volume= 15.409 af, Depth= 4.88"
Routed to Link POA-2 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
17,371	87	Dirt roads, HSG C
5,619	85	Gravel roads, HSG B
57,383	89	Gravel roads, HSG C
234,672	58	Meadow, non-grazed, HSG B
1,000,253	71	Meadow, non-grazed, HSG C
12,429	78	Meadow, non-grazed, HSG D
17,046	98	Roofs, HSG C
75,033	75	Row crops, SR + CR, Good, HSG B
139,897	82	Row crops, SR + CR, Good, HSG C
1,641	98	Unconnected pavement, HSG C
76,921	70	Woods, Good, HSG C
10,652	77	Woods, Good, HSG D
1,648,918	71	Weighted Average
1,630,231		98.87% Pervious Area
18,687		1.13% Impervious Area
1,641		8.78% Unconnected

BW Pleasant St_Post_r1

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Type III 24-hr 100-yr Rainfall=8.35"

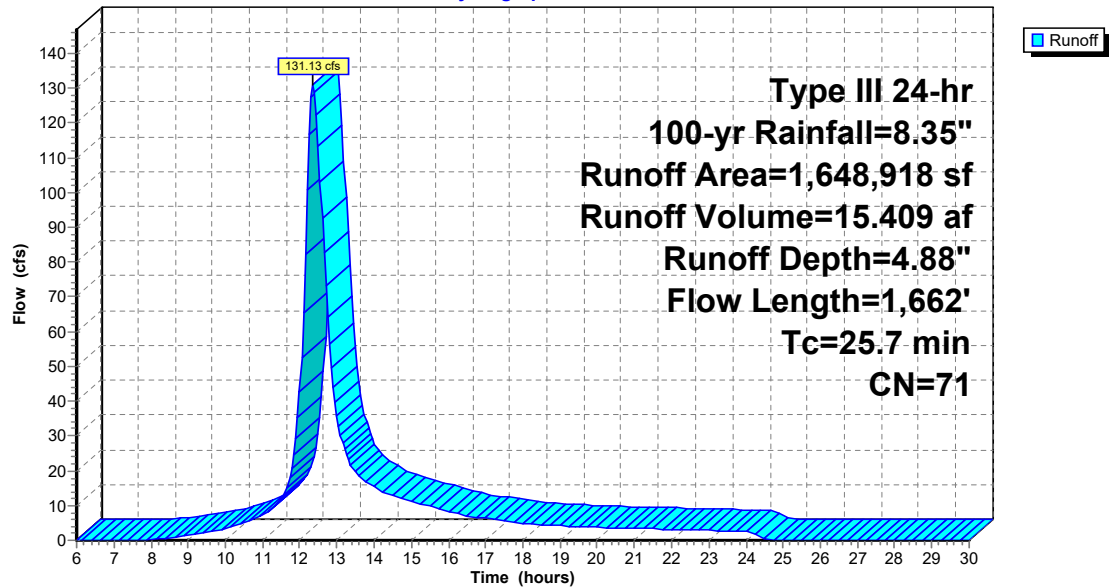
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	44	0.0795	0.17		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.6	6	0.0833	0.16		Sheet Flow, Cultivated: Residue>20% n= 0.170 P2= 3.20"
2.3	266	0.0451	1.91		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
6.1	492	0.0224	1.35		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
11.6	755	0.0242	1.09		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	20	0.0350	3.01		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.7	79	0.0741	1.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
25.7	1,662	Total			

Subcatchment P2: Subcat P2

Hydrograph



Summary for Subcatchment P3: Subcat P3

Runoff = 34.79 cfs @ 12.29 hrs, Volume= 3.817 af, Depth= 5.72"
Routed to Link POA-3 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
1,534	72	Dirt roads, HSG A
17,375	87	Dirt roads, HSG C
2,445	30	Meadow, non-grazed, HSG A
108,251	71	Meadow, non-grazed, HSG C
7,792	78	Meadow, non-grazed, HSG D
192,241	82	Row crops, SR + CR, Good, HSG C
600	70	Woods, Good, HSG C
18,825	77	Woods, Good, HSG D
349,063	78	Weighted Average
349,063		100.00% Pervious Area

BW Pleasant St_Post_r1

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Type III 24-hr 100-yr Rainfall=8.35"

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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	27	0.0370	0.11		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.3	23	0.0435	1.40		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.20"
4.2	509	0.0157	2.02		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
1.5	73	0.0137	0.82		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	17	0.0176	2.14		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
2.1	169	0.0219	1.33		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
7.6	311	0.0058	0.69		Shallow Concentrated Flow, Cultivated Straight Rows Kv= 9.0 fps
1.3	39	0.0051	0.50		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.4	70	0.1714	2.90		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	1,238	Total			

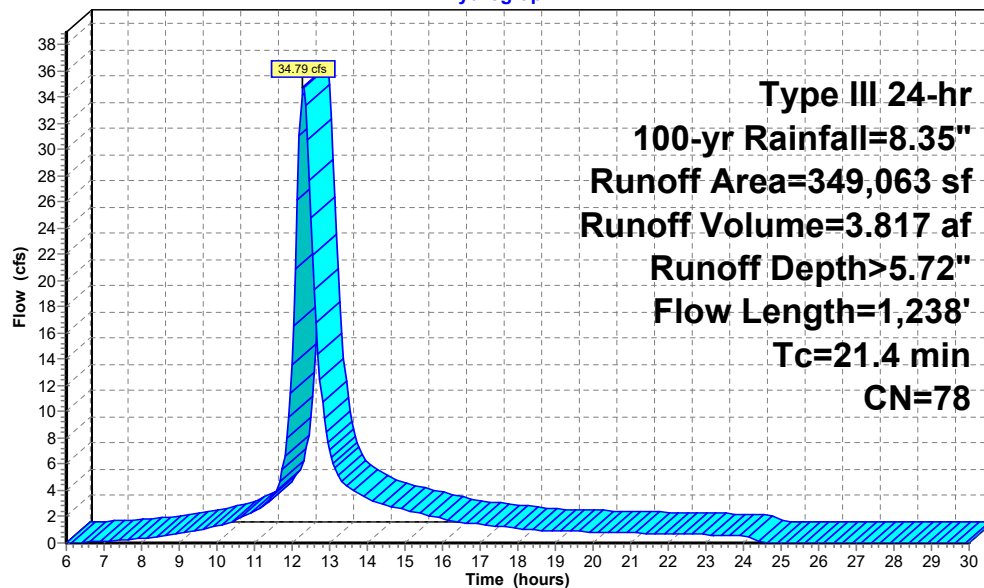
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Subcatchment P3: Subcat P3**Hydrograph**

Runoff

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Subcatchment P4: Subcat P4

Runoff = 11.25 cfs @ 12.11 hrs, Volume= 0.860 af, Depth= 3.14"
Routed to Link POA-4 :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
9,086	87	Dirt roads, HSG C
17,847	30	Meadow, non-grazed, HSG A
4,241	58	Meadow, non-grazed, HSG B
53,078	71	Meadow, non-grazed, HSG C
2,221	98	Roofs, HSG A
254	98	Roofs, HSG C
6,271	82	Row crops, SR + CR, Good, HSG C
40,699	30	Woods, Good, HSG A
29	55	Woods, Good, HSG B
9,501	70	Woods, Good, HSG C
143,227	56	Weighted Average
140,752		98.27% Pervious Area
2,476		1.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.4	45	0.0667	1.81		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	42	0.1905	2.18		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
6.9	137	Total			

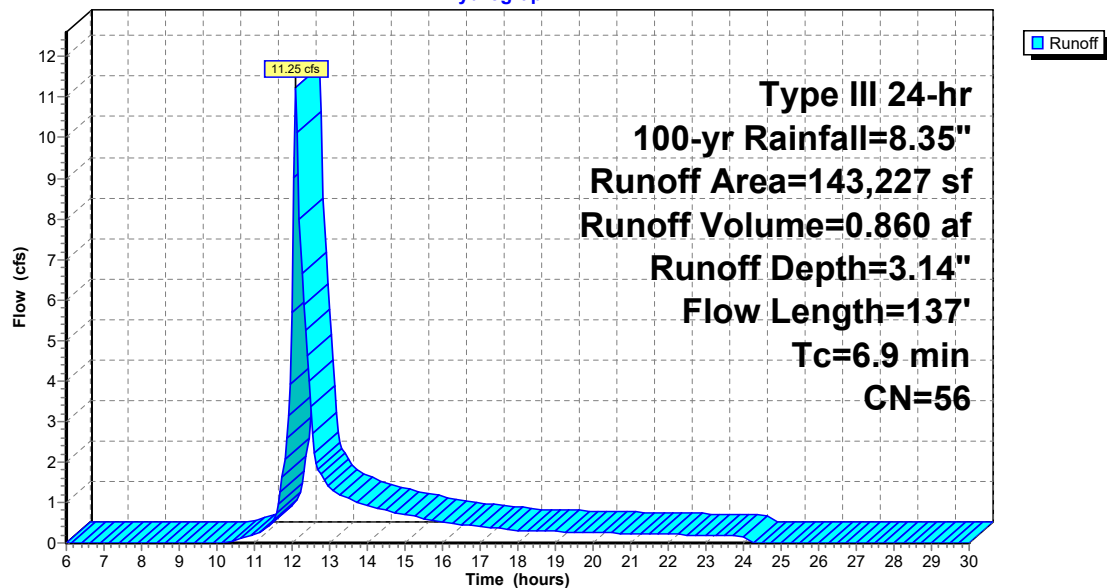
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Type III 24-hr 100-yr Rainfall=8.35"

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Subcatchment P4: Subcat P4**Hydrograph**

Summary for Subcatchment P5: Subcat P5

Runoff = 8.47 cfs @ 12.16 hrs, Volume= 0.730 af, Depth= 3.37"
Routed to Link POA-5 :

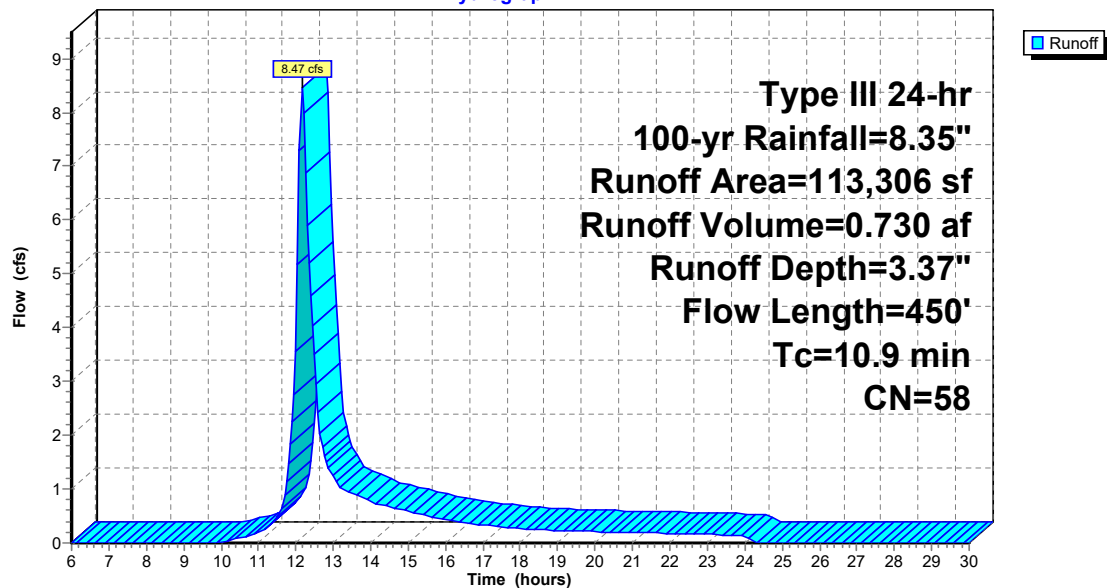
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
113,306	58	Meadow, non-grazed, HSG B
113,306		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
4.7	400	0.0413	1.42		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
10.9	450	Total			

Subcatchment P5: Subcat P5

Hydrograph



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Type III 24-hr 100-yr Rainfall=8.35"

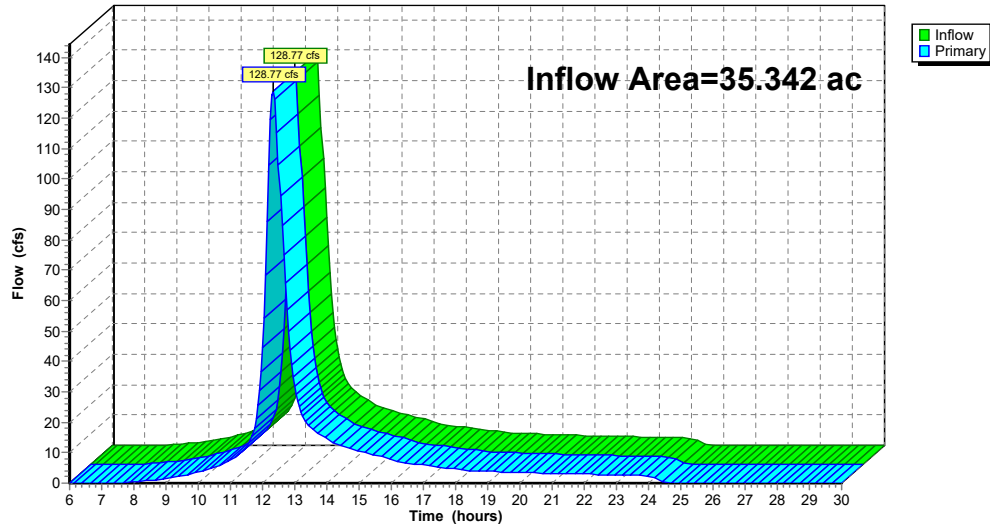
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Summary for Link POA-1:

Inflow Area = 35.342 ac, 0.11% Impervious, Inflow Depth = 5.00" for 100-yr event
Inflow = 128.77 cfs @ 12.33 hrs, Volume= 14.734 af
Primary = 128.77 cfs @ 12.33 hrs, Volume= 14.734 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-1:**Hydrograph****BW Pleasant St_Post_r1**

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Type III 24-hr 100-yr Rainfall=8.35"

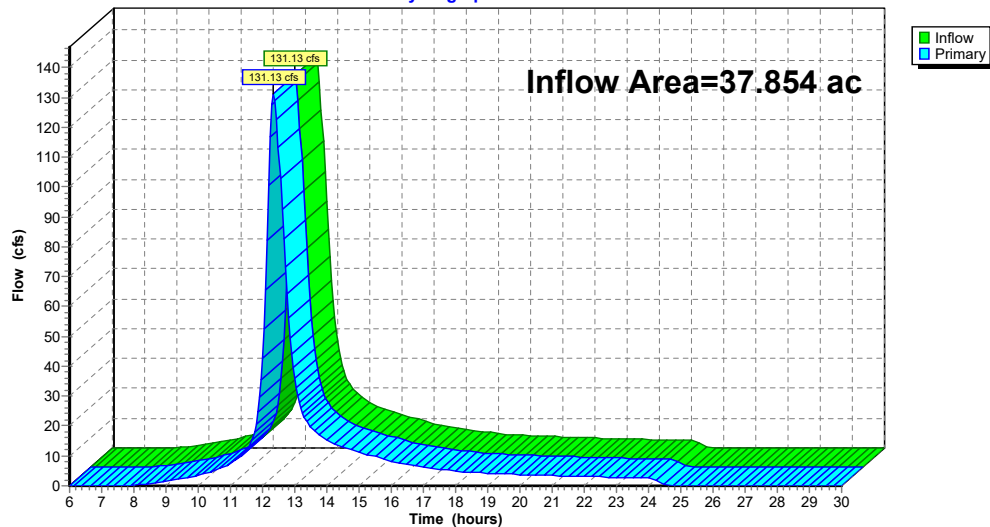
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Summary for Link POA-2:

Inflow Area = 37.854 ac, 1.13% Impervious, Inflow Depth = 4.88" for 100-yr event
Inflow = 131.13 cfs @ 12.36 hrs, Volume= 15.409 af
Primary = 131.13 cfs @ 12.36 hrs, Volume= 15.409 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-2:**Hydrograph**

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Type III 24-hr 100-yr Rainfall=8.35"

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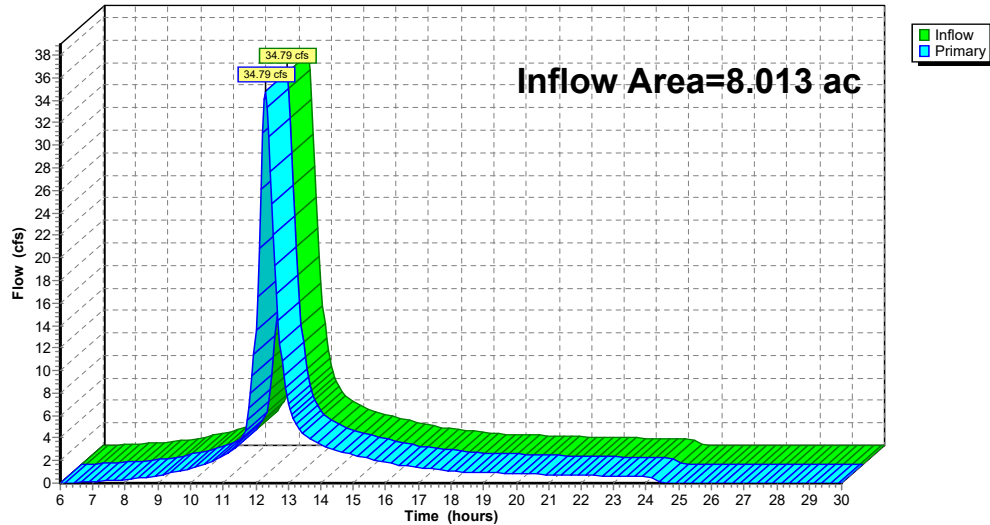
Summary for Link POA-3:

Inflow Area = 8.013 ac, 0.00% Impervious, Inflow Depth > 5.72" for 100-yr event
Inflow = 34.79 cfs @ 12.29 hrs, Volume= 3.817 af
Primary = 34.79 cfs @ 12.29 hrs, Volume= 3.817 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-3:

Hydrograph

**BW Pleasant St_Post_r1**

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Type III 24-hr 100-yr Rainfall=8.35"

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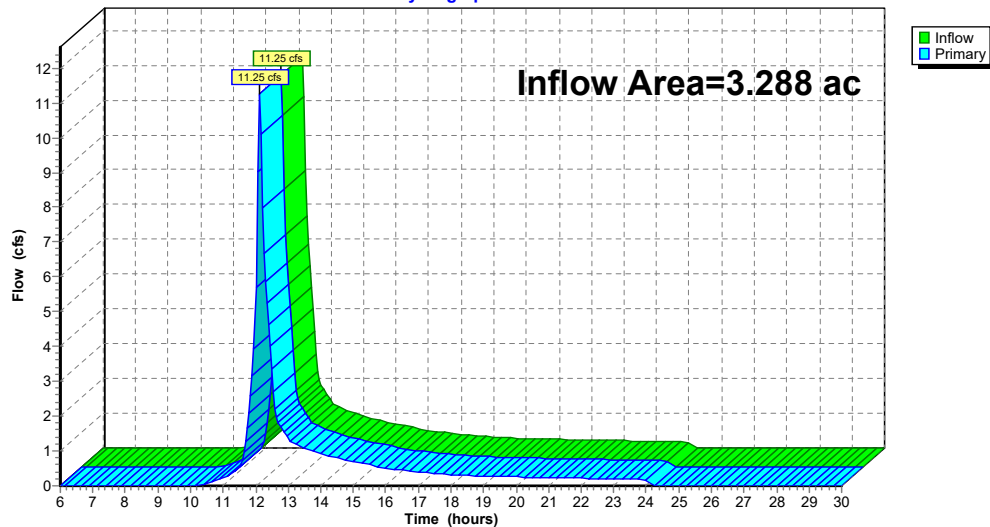
Summary for Link POA-4:

Inflow Area = 3.288 ac, 1.73% Impervious, Inflow Depth = 3.14" for 100-yr event
Inflow = 11.25 cfs @ 12.11 hrs, Volume= 0.860 af
Primary = 11.25 cfs @ 12.11 hrs, Volume= 0.860 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-4:

Hydrograph



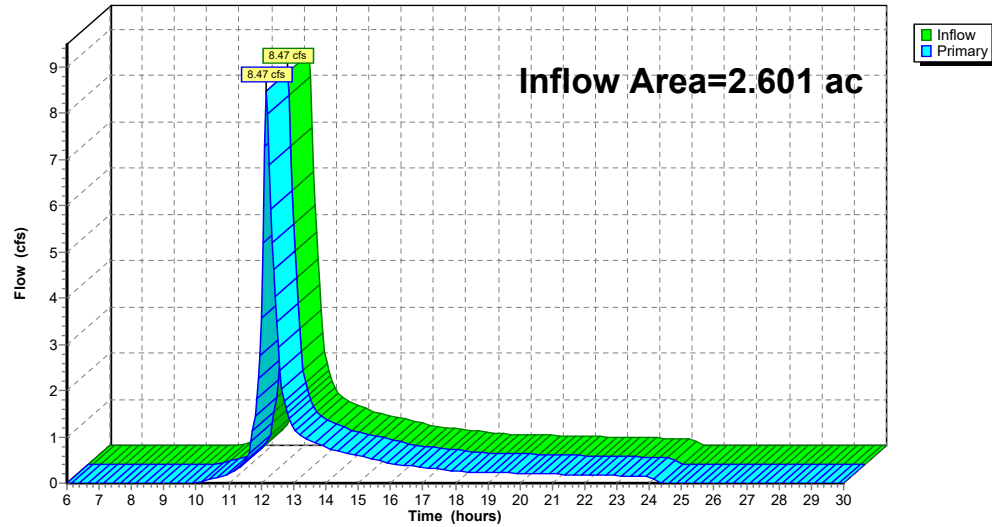
Summary for Link POA-5:

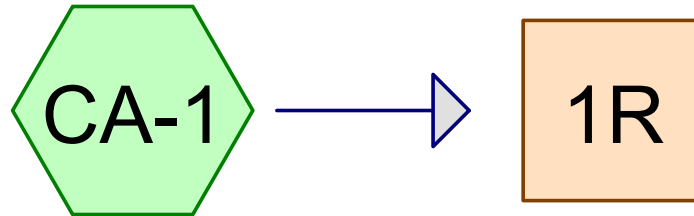
Inflow Area = 2.601 ac, 0.00% Impervious, Inflow Depth = 3.37" for 100-yr event
Inflow = 8.47 cfs @ 12.16 hrs, Volume= 0.730 af
Primary = 8.47 cfs @ 12.16 hrs, Volume= 0.730 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Link POA-5:

Hydrograph





Culvert Analysis



Routing Diagram for BW Pleasant St_Culvert Analysis
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BW Pleasant St_Culvert Analysis

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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-yr	Type III 24-hr		Default	24.00	1	3.20	2
2	10-yr	Type III 24-hr		Default	24.00	1	5.19	2
3	25-yr	Type III 24-hr		Default	24.00	1	6.43	2
4	100-yr	Type III 24-hr		Default	24.00	1	8.35	2

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.131	89	Gravel roads, HSG C (CA-1)
8.660	71	Meadow, non-grazed, HSG C (CA-1)
0.373	98	Unconnected pavement, HSG C (CA-1)
10.164	74	TOTAL AREA

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Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
10.164	HSG C	CA-1
0.000	HSG D	
0.000	Other	
10.164		TOTAL AREA

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	1.131	0.000	0.000	1.131	Gravel roads	CA-1
0.000	0.000	8.660	0.000	0.000	8.660	Meadow, non-grazed	CA-1
0.000	0.000	0.373	0.000	0.000	0.373	Unconnected pavement	CA-1
0.000	0.000	10.164	0.000	0.000	10.164	TOTAL AREA	

BW Pleasant St_Culvert Analysis

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Type III 24-hr 2-yr Rainfall=3.20"

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Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentCA-1: Culvert Analysis

Runoff Area=442,733 sf 3.67% Impervious Runoff Depth=1.04"
Flow Length=1,133' Tc=20.3 min CN=74 Runoff=7.78 cfs 0.879 af

Reach 1R:

Avg. Flow Depth=0.40' Max Vel=5.84 fps Inflow=7.78 cfs 0.879 af
24.0" Round Pipe x 3.00 n=0.013 L=40.0' S=0.0175 '/' Capacity=89.78 cfs Outflow=7.77 cfs 0.879 af

Total Runoff Area = 10.164 ac Runoff Volume = 0.879 af Average Runoff Depth = 1.04"
96.33% Pervious = 9.790 ac 3.67% Impervious = 0.373 ac

BW Pleasant St_Culvert Analysis

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Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Subcatchment CA-1: Culvert Analysis

Runoff = 7.78 cfs @ 12.31 hrs, Volume= 0.879 af, Depth= 1.04"
Routed to Reach 1R :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-yr Rainfall=3.20"

Area (sf)	CN	Description
377,213	71	Meadow, non-grazed, HSG C
49,261	89	Gravel roads, HSG C
16,259	98	Unconnected pavement, HSG C
442,733	74	Weighted Average
426,474		96.33% Pervious Area
16,259		3.67% Impervious Area
16,259		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.9	84	0.0476	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	47	0.1064	2.28		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	41	0.1463	2.68		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.6	911	0.0296	1.20		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
20.3	1,133	Total			

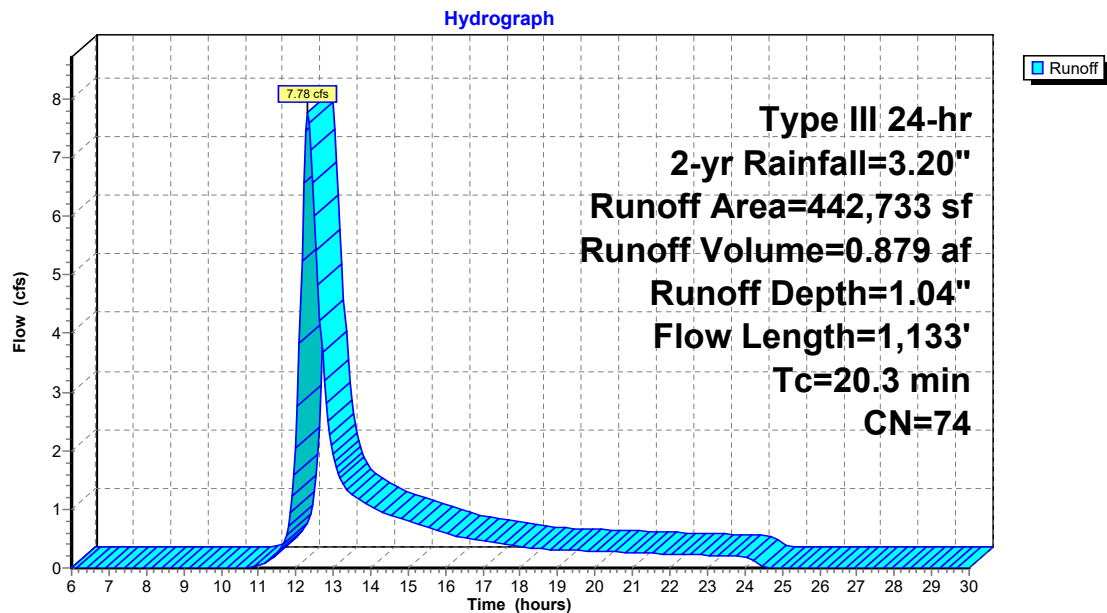
BW Pleasant St_Culvert Analysis

Prepared by Weston & Sampson Engineers, Inc
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Type III 24-hr 2-yr Rainfall=3.20"

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Subcatchment CA-1: Culvert Analysis

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Type III 24-hr 2-yr Rainfall=3.20"

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Summary for Reach 1R:

Inflow Area = 10.164 ac, 3.67% Impervious, Inflow Depth = 1.04" for 2-yr event
Inflow = 7.78 cfs @ 12.31 hrs, Volume= 0.879 af
Outflow = 7.77 cfs @ 12.31 hrs, Volume= 0.879 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 5.84 fps, Min. Travel Time= 0.1 min

Avg. Velocity = 2.48 fps, Avg. Travel Time= 0.3 min

Peak Storage= 53 cf @ 12.31 hrs

Average Depth at Peak Storage= 0.40' , Surface Width= 4.79'

Bank-Full Depth= 2.00' Flow Area= 9.4 sf, Capacity= 89.78 cfs

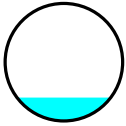
A factor of 3.00 has been applied to the storage and discharge capacity

24.0" Round Pipe

n= 0.013 Corrugated PE, smooth interior

Length= 40.0' Slope= 0.0175 '/'

Inlet Invert= 189.00', Outlet Invert= 188.30'



BW Pleasant St_Culvert Analysis

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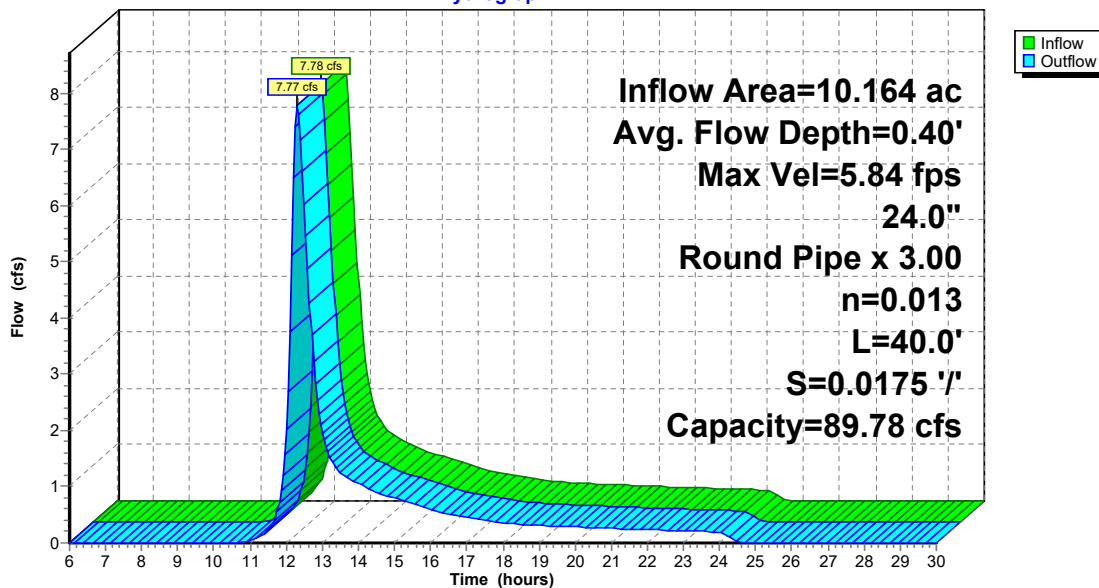
Type III 24-hr 2-yr Rainfall=3.20"

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Reach 1R:

Hydrograph



BW Pleasant St_Culvert Analysis

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Type III 24-hr 10-yr Rainfall=5.19"

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Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentCA-1: Culvert Analysis

Runoff Area=442,733 sf 3.67% Impervious Runoff Depth=2.52"
 Flow Length=1,133' Tc=20.3 min CN=74 Runoff=19.91 cfs 2.132 af

Reach 1R:

Avg. Flow Depth=0.64' Max Vel=7.65 fps Inflow=19.91 cfs 2.132 af
 24.0" Round Pipe x 3.00 n=0.013 L=40.0' S=0.0175 ' Capacity=89.78 cfs Outflow=19.89 cfs 2.132 af

Total Runoff Area = 10.164 ac Runoff Volume = 2.132 af Average Runoff Depth = 2.52"
96.33% Pervious = 9.790 ac 3.67% Impervious = 0.373 ac

BW Pleasant St_Culvert Analysis

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Type III 24-hr 10-yr Rainfall=5.19"

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Summary for Subcatchment CA-1: Culvert Analysis

Runoff = 19.91 cfs @ 12.29 hrs, Volume= 2.132 af, Depth= 2.52"
 Routed to Reach 1R :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10-yr Rainfall=5.19"

Area (sf)	CN	Description
377,213	71	Meadow, non-grazed, HSG C
49,261	89	Gravel roads, HSG C
16,259	98	Unconnected pavement, HSG C
442,733	74	Weighted Average
426,474		96.33% Pervious Area
16,259		3.67% Impervious Area
16,259		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.9	84	0.0476	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	47	0.1064	2.28		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	41	0.1463	2.68		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.6	911	0.0296	1.20		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
20.3	1,133	Total			

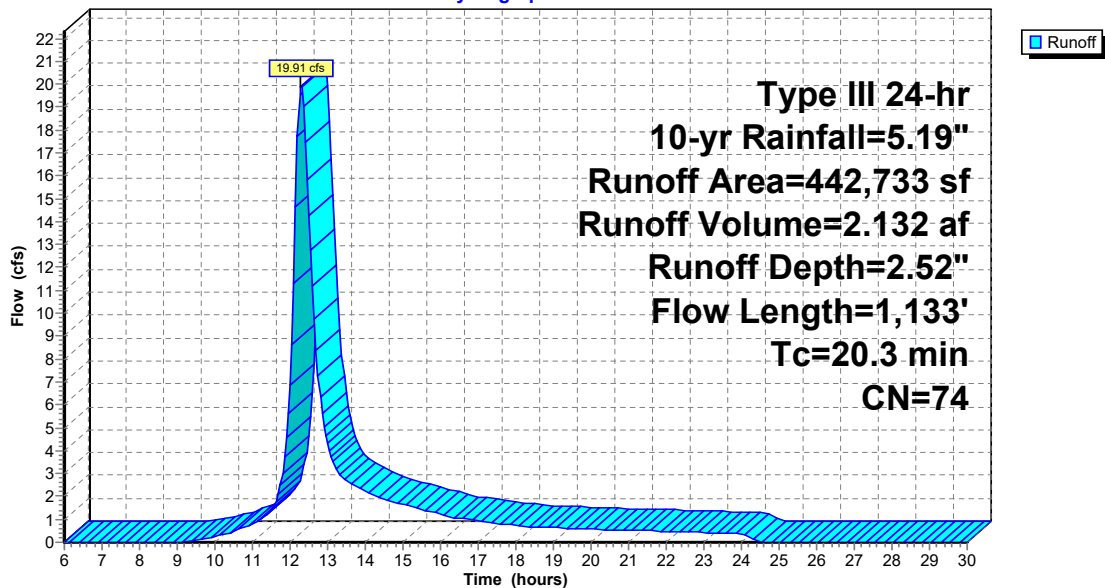
BW Pleasant St_Culvert Analysis

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Type III 24-hr 10-yr Rainfall=5.19"

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Subcatchment CA-1: Culvert Analysis**Hydrograph****BW Pleasant St_Culvert Analysis**

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Type III 24-hr 10-yr Rainfall=5.19"

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Summary for Reach 1R:

Inflow Area = 10.164 ac, 3.67% Impervious, Inflow Depth = 2.52" for 10-yr event
Inflow = 19.91 cfs @ 12.29 hrs, Volume= 2.132 af
Outflow = 19.89 cfs @ 12.29 hrs, Volume= 2.132 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 7.65 fps, Min. Travel Time= 0.1 min

Avg. Velocity = 3.03 fps, Avg. Travel Time= 0.2 min

Peak Storage= 104 cf @ 12.29 hrs

Average Depth at Peak Storage= 0.64', Surface Width= 5.60'

Bank-Full Depth= 2.00' Flow Area= 9.4 sf, Capacity= 89.78 cfs

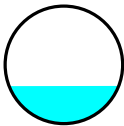
A factor of 3.00 has been applied to the storage and discharge capacity

24.0" Round Pipe

n= 0.013 Corrugated PE, smooth interior

Length= 40.0' Slope= 0.0175 '/'

Inlet Invert= 189.00', Outlet Invert= 188.30'



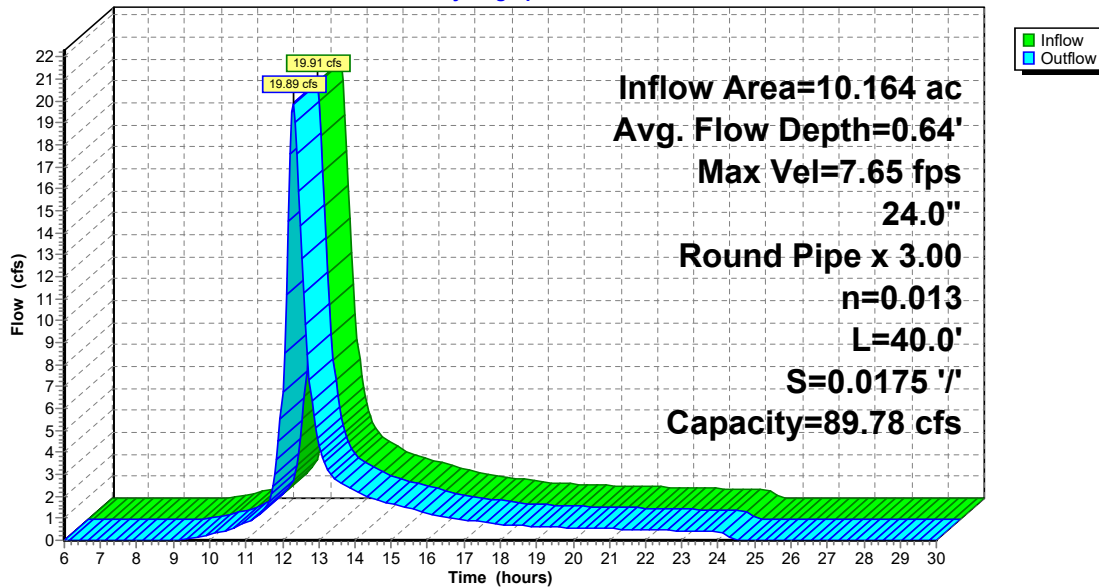
BW Pleasant St_Culvert Analysis

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Type III 24-hr 10-yr Rainfall=5.19"

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Reach 1R:**Hydrograph****BW Pleasant St_Culvert Analysis**

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Type III 24-hr 25-yr Rainfall=6.43"

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Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

SubcatchmentCA-1: Culvert Analysis

Runoff Area=442,733 sf 3.67% Impervious Runoff Depth=3.55"
Flow Length=1,133' Tc=20.3 min CN=74 Runoff=28.23 cfs 3.007 af

Reach 1R:

Avg. Flow Depth=0.77' Max Vel=8.43 fps Inflow=28.23 cfs 3.007 af
24.0" Round Pipe x 3.00 n=0.013 L=40.0' S=0.0175 '/' Capacity=89.78 cfs Outflow=28.21 cfs 3.007 af

Total Runoff Area = 10.164 ac Runoff Volume = 3.007 af Average Runoff Depth = 3.55"
96.33% Pervious = 9.790 ac 3.67% Impervious = 0.373 ac

BW Pleasant St_Culvert Analysis

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Type III 24-hr 25-yr Rainfall=6.43"

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Summary for Subcatchment CA-1: Culvert Analysis

Runoff = 28.23 cfs @ 12.28 hrs, Volume= 3.007 af, Depth= 3.55"
Routed to Reach 1R :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-yr Rainfall=6.43"

Area (sf)	CN	Description
377,213	71	Meadow, non-grazed, HSG C
49,261	89	Gravel roads, HSG C
16,259	98	Unconnected pavement, HSG C
442,733	74	Weighted Average
426,474		96.33% Pervious Area
16,259		3.67% Impervious Area
16,259		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.9	84	0.0476	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	47	0.1064	2.28		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	41	0.1463	2.68		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.6	911	0.0296	1.20		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
20.3	1,133	Total			

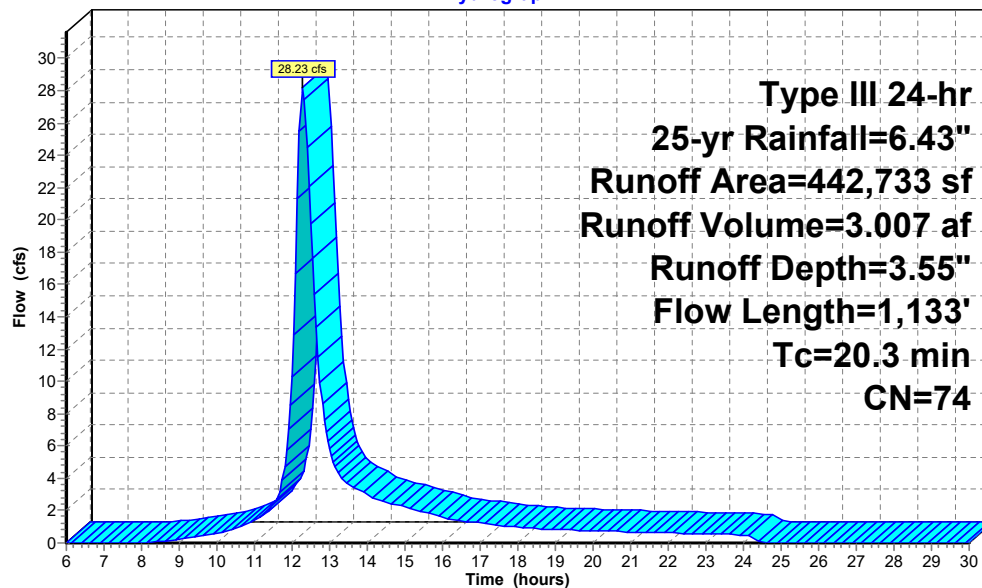
BW Pleasant St_Culvert Analysis

Prepared by Weston & Sampson Engineers, Inc
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Type III 24-hr 25-yr Rainfall=6.43"

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Subcatchment CA-1: Culvert Analysis**Hydrograph**

BW Pleasant St_Culvert Analysis

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Type III 24-hr 25-yr Rainfall=6.43"

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Summary for Reach 1R:

Inflow Area = 10.164 ac, 3.67% Impervious, Inflow Depth = 3.55" for 25-yr event
Inflow = 28.23 cfs @ 12.28 hrs, Volume= 3.007 af
Outflow = 28.21 cfs @ 12.29 hrs, Volume= 3.007 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 8.43 fps, Min. Travel Time= 0.1 min

Avg. Velocity = 3.28 fps, Avg. Travel Time= 0.2 min

Peak Storage= 134 cf @ 12.28 hrs

Average Depth at Peak Storage= 0.77' , Surface Width= 5.84'

Bank-Full Depth= 2.00' Flow Area= 9.4 sf, Capacity= 89.78 cfs

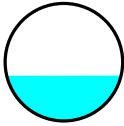
A factor of 3.00 has been applied to the storage and discharge capacity

24.0" Round Pipe

n= 0.013 Corrugated PE, smooth interior

Length= 40.0' Slope= 0.0175 '/'

Inlet Invert= 189.00', Outlet Invert= 188.30'



BW Pleasant St_Culvert Analysis

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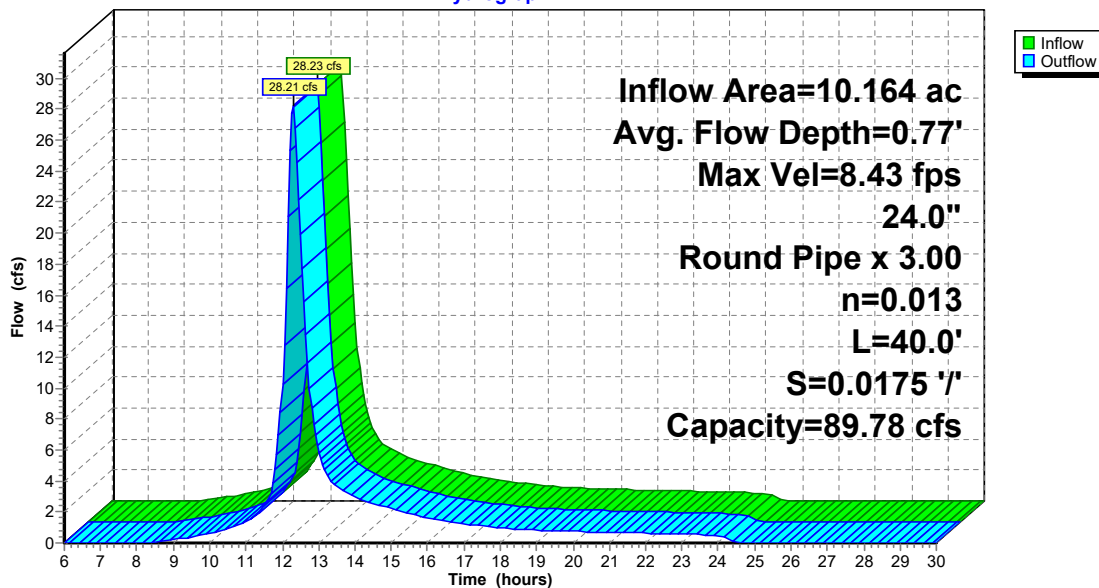
Type III 24-hr 25-yr Rainfall=6.43"

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Reach 1R:

Hydrograph



BW Pleasant St_Culvert Analysis

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Type III 24-hr 100-yr Rainfall=8.35"

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Time span=6.00-30.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment CA-1: Culvert Analysis

Runoff Area=442,733 sf 3.67% Impervious Runoff Depth=5.24"
Flow Length=1,133' Tc=20.3 min CN=74 Runoff=41.60 cfs 4.438 af

Reach 1R:

Avg. Flow Depth=0.96' Max Vel=9.33 fps Inflow=41.60 cfs 4.438 af
24.0" Round Pipe x 3.00 n=0.013 L=40.0' S=0.0175 ' / ' Capacity=89.78 cfs Outflow=41.57 cfs 4.438 af

Total Runoff Area = 10.164 ac Runoff Volume = 4.438 af Average Runoff Depth = 5.24"
96.33% Pervious = 9.790 ac 3.67% Impervious = 0.373 ac

BW Pleasant St_Culvert Analysis

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Subcatchment CA-1: Culvert Analysis

Runoff = 41.60 cfs @ 12.28 hrs, Volume= 4.438 af, Depth= 5.24"
Routed to Reach 1R :

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-yr Rainfall=8.35"

Area (sf)	CN	Description
377,213	71	Meadow, non-grazed, HSG C
49,261	89	Gravel roads, HSG C
16,259	98	Unconnected pavement, HSG C
442,733	74	Weighted Average
426,474		96.33% Pervious Area
16,259		3.67% Impervious Area
16,259		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	50	0.0400	0.13		Sheet Flow, Grass: Dense n= 0.240 P2= 3.20"
0.9	84	0.0476	1.53		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	47	0.1064	2.28		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.3	41	0.1463	2.68		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
12.6	911	0.0296	1.20		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
20.3	1,133	Total			

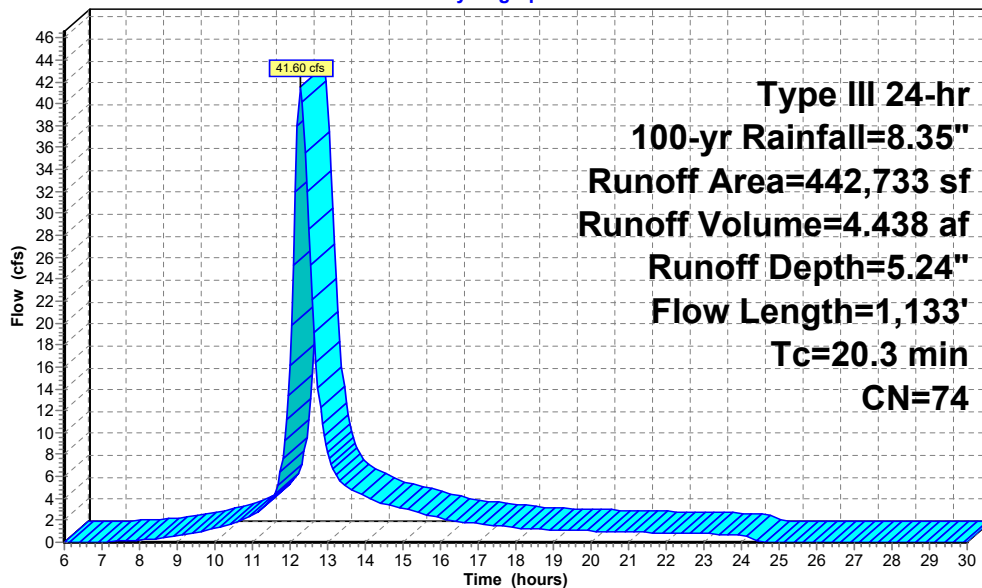
BW Pleasant St_Culvert Analysis

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Type III 24-hr 100-yr Rainfall=8.35"

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Subcatchment CA-1: Culvert Analysis**Hydrograph****BW Pleasant St_Culvert Analysis**

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Type III 24-hr 100-yr Rainfall=8.35"

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Summary for Reach 1R:

Inflow Area = 10.164 ac, 3.67% Impervious, Inflow Depth = 5.24" for 100-yr event
Inflow = 41.60 cfs @ 12.28 hrs, Volume= 4.438 af
Outflow = 41.57 cfs @ 12.28 hrs, Volume= 4.438 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 6.00-30.00 hrs, dt= 0.05 hrs

Max. Velocity= 9.33 fps, Min. Travel Time= 0.1 min

Avg. Velocity = 3.58 fps, Avg. Travel Time= 0.2 min

Peak Storage= 178 cf @ 12.28 hrs

Average Depth at Peak Storage= 0.96', Surface Width= 5.99'

Bank-Full Depth= 2.00' Flow Area= 9.4 sf, Capacity= 89.78 cfs

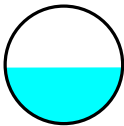
A factor of 3.00 has been applied to the storage and discharge capacity

24.0" Round Pipe

n= 0.013 Corrugated PE, smooth interior

Length= 40.0' Slope= 0.0175 '/'

Inlet Invert= 189.00', Outlet Invert= 188.30'



BW Pleasant St_Culvert Analysis

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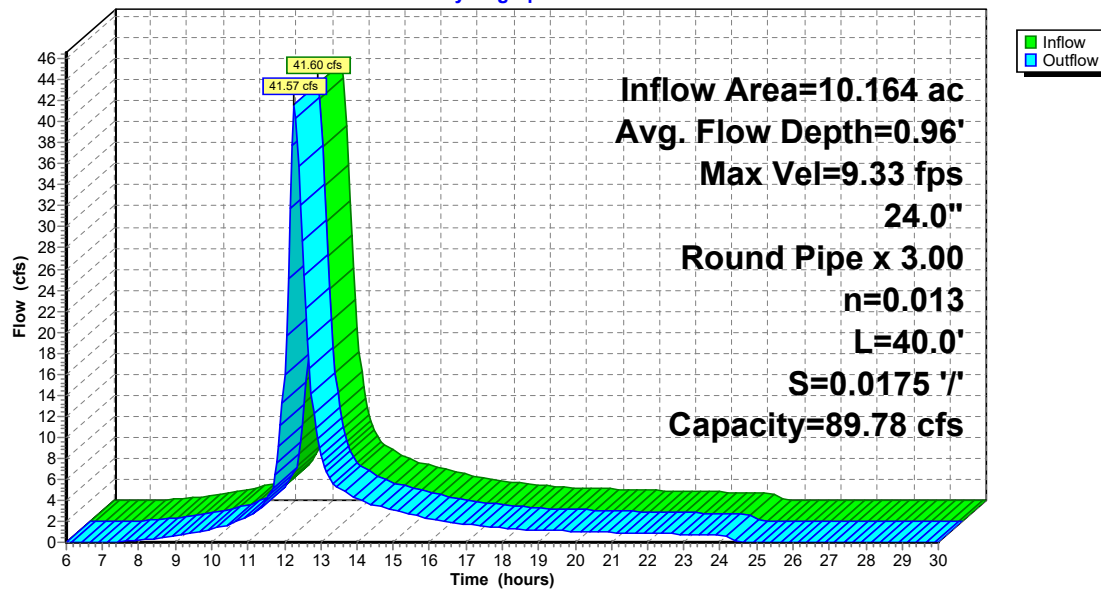
Type III 24-hr 100-yr Rainfall=8.35"

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Reach 1R:

Hydrograph



Proposed Solar PV Development
 Manhan River, LLC
 46 & 56 Pleasant St, Southampton, MA

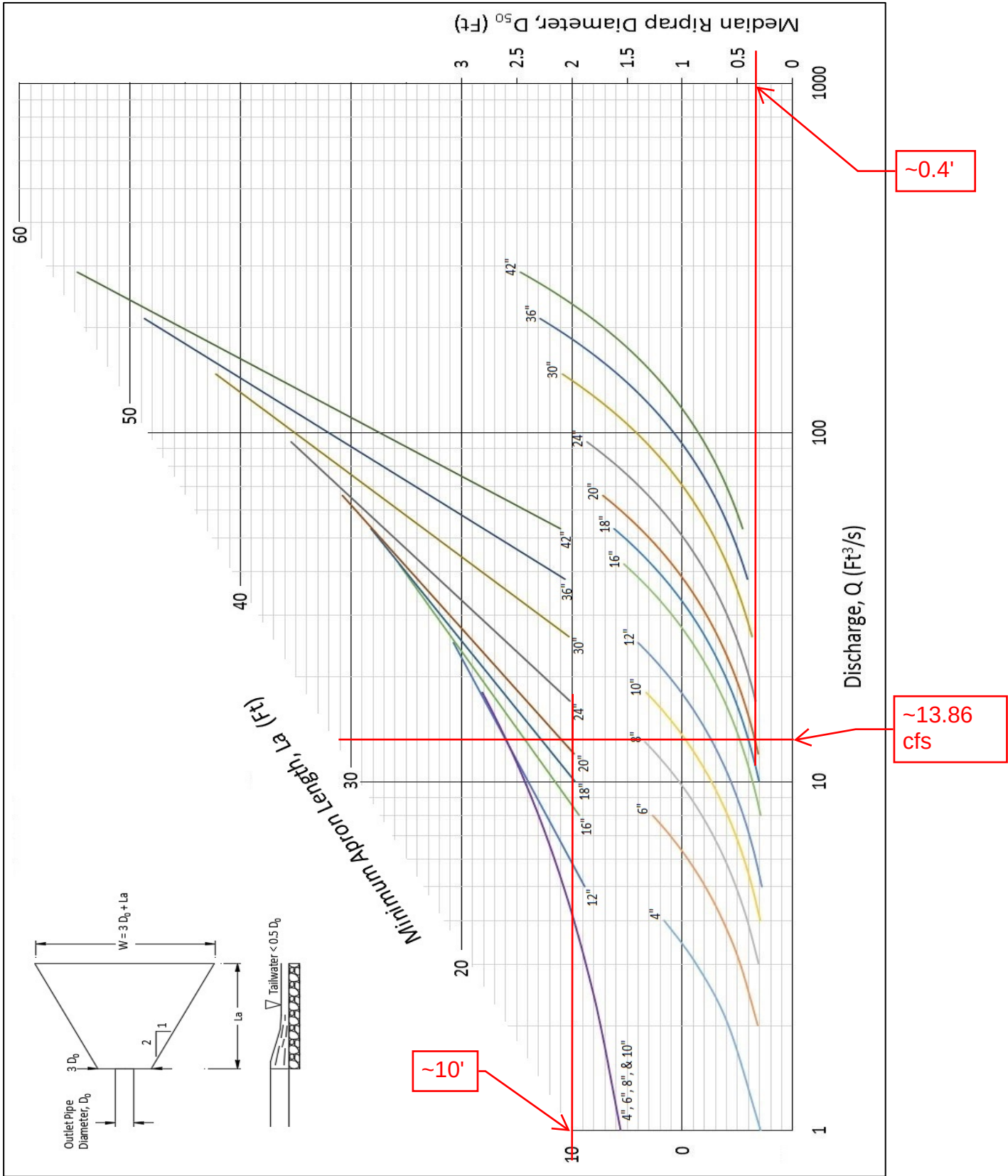
Culvert Discharge Riprap Apron Sizing

Purpose / Introduction:
The Natural Resources Conservation Service (NRCS) released the West Virginia Design Note: Riprap-Lined Outlet Protection where the design method for determining an effective riprap apron located immediately downstream of a culvert outlet was discussed. The intent of the riprap apron is to dissipate discharge velocities to a non-eroding capacity to protect downstream resource areas.
The figure included is used to determine the length (La), width (W), and median riprap size (d_{50}) of the riprap apron based on culvert pipe diameter and discharge volumetric flow rate.
Q = Discharge Volumetric Flow Rate (cubic feet per second - cfs)* D_0 = Culvert Pipe Diameter (in) d_{50} = Median Riprap size by weight $3D_0$ = Beginning Width of Apron (three times the culvert pipe diameter) La = Length of Riprap Apron (ft) W = Width of Downstream End of Riprap Apron ($=3D_0 + La$) Notes: *Q is derived from the 100-year 24-hour storm event discharge calculated in the HydroCAD model for the proposed project.

Data Inputs & Results						
	Q (cfs)	D_0 (in)	$3D_0$ (ft)	d_{50} (in)	La (ft)	W (ft)
C1	13.86 ⁽²⁾	24	6	4.8	10	48

Results / Discussion
1. The minimum output values are represented above with a designed riprap size of approximately 0.4-inches. Regardless, a larger riprap size has been specified on the project plans.
2. The culvert proposes three 24-inch culverts with a total outlet flow for the 100-year storm of 41.57 cfs. The figure included is based on a single culvert pipe, therefore, a third of the total outlet flow is 13.86 cfs.
3. The width of the downstream end of the riprap apron was modified to be three times the width to account for the three drainage pipes $3*(3D_0 + La)$.

Figure 1a: Minimum Tailwater Condition



Attachment D - Long Term Pollution Prevention Plan

Long Term Pollution Prevention Plan

To meet the requirements of Standard 4 of the Massachusetts Stormwater Handbook, this Long Term Pollution Prevention Plan is provided to identify the proper procedures and practices for source control and pollution prevention.

Storage and Handling of Oil and other Hazardous Materials

There will be no hazardous materials stored or handled onsite with the exception of fuel for construction equipment. Fuel will be stored in approved storage containers, outside of wetland resource areas and associated buffer zones.

Operation and Maintenance of Stormwater Control Structures

The Stormwater Operation and Maintenance Plan for the site, included within the Stormwater Report, describes maintenance requirements for the culvert crossing. The owner — Manhan River, LLC — or their Contractor, will be responsible for the implementation of the plan.

Landscaping

The landscaped areas will be maintained by the owner. There is no intent to use herbicides or pesticides for this project, nor will they be stored on site.

Septic System

There will be no septic system or wastewater produced on site.

Snow Management

Following construction, the solar system will be monitored remotely, and routine site visits will be performed 1-2 times per year. Snow removal will be performed as needed along the gravel access road for site access. Salt and/or sand will not be stored on-site.

Non-Hazardous Waste Management/Good Housekeeping Practices

All non-hazardous waste is to be stored in designated trash or recycling containers onsite for periodic collection by the local trash collector, or Contractor during construction. Following construction, all non-hazardous waste should not be stored onsite. The owner's maintenance staff should inspect the site during maintenance visits. If trash is observed it should be collected and removed from the site.

Prohibition of Illicit Discharges

Illicit discharges to the on-site stormwater management system are strictly prohibited. Illicit discharges are defined as any direct or indirect non-stormwater discharge to the on-site stormwater system. There are no illicit discharges associated with the project.

Contact Information/Responsible Parties

Owner/Operator:
Manhan River, LLC
116 Huntington Ave, Suite 601
Boston, MA 02116
617-209-3112

Attachment E - Stormwater Operation & Maintenance Plan

Stormwater Operation and Maintenance Plan

1.0 Introduction

The following document has been written to comply with the stormwater guidelines set forth by the Massachusetts Department of Environmental Protection (MassDEP). The intent of these guidelines is to encourage Low Impact Development techniques to improve the quality of the stormwater runoff. These techniques, also known as Best Management Practices (BMPs), collect, store, and treat the runoff before discharging to adjacent environmental resources.

2.0 Purpose

This Stormwater Operation and Maintenance Plan (O&M Plan) is intended to provide a mechanism for the consistent inspection and maintenance of the proposed culvert crossing. Included in this O&M Plan is a description and an inspection form for the culvert crossing. Manhan River, LLC is the owner and operator of the system and is responsible for its upkeep and maintenance. This work will be funded on an annual basis through the owner's operating budget.

Owner/Operator:
Manhan River, LLC
116 Huntington Ave, Suite 601
Boston, MA 02116
617-209-3112

In the event the Owner sells the project, it is the Owner's responsibility to transfer this plan as well as the past three years of operation and maintenance records to the new project owner.

3.0 BMP Descriptions and Locations

Proposed stormwater BMPs are identified on the attached Site Plan and described below.

3.1 Culvert Crossing, Riprap Apron

The proposed culvert crossing will convey site overland runoff from the uphill to the downhill side of the proposed gravel access road. A riprap apron is proposed immediately downhill of the culvert outfall to mitigate any potentially erosive flows.

4.0 Inspection, Maintenance Checklist and Schedule

Inspection and maintenance of the culvert crossing shall be conducted at the frequencies outlined below.

4.1 Culvert Crossing, Riprap Apron

The culvert crossing and riprap apron are to be inspected semi-annually during the first year, and annually thereafter. Any vegetation, soil, or debris within the culvert and/or the riprap apron shall be removed and disposed of in accordance with local, state, and federal regulations. Any signs of erosion shall be repaired by regrading the damaged location to match existing grade followed by seeding.

4.4 Inspections and Record Keeping

- An inspection form must be filled out every time maintenance work is performed.
- A binder is to be kept that contains all of the completed inspection forms and any other related materials.

Stormwater Operation and Maintenance Plan

- A review of Operation & Maintenance actions should take place annually such that the Stormwater BMPs and vegetative cover are being maintained in accordance with this Operation & Maintenance Plan.
- Operation & Maintenance log forms for the last three years, at a minimum, should be maintained.
- The inspection and maintenance schedule may be refined in the future based on the findings and results of this Operation & Maintenance program or policy.

Stormwater Operation and Maintenance Plan

INSPECTION CHECKLIST SHEETS

☐ Culvert Crossing, Riprap Apron

Frequency: The culvert crossing and riprap apron are to be inspected semi-annually during the first year, and annually thereafter.

Location: _____

Inspected By: _____ Date: _____

Observations: _____

Actions Taken: _____

Instructions: All vegetation, soil, or debris within the culvert and/or the riprap apron shall be removed and disposed of in accordance with local, state, and federal regulations. Any signs of erosion shall be repaired by regrading the damaged location to match existing grade followed by seeding.

Attachment F - Construction Period Pollution & Erosion & Sedimentation Control Plan

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

SECTION 1: Introduction

The project applicant proposes construction of a solar agrivoltaic array with an associated gravel access driveway and electrical appurtenances.

SECTION 2: Construction Period Pollution Prevention Measures

Construction period best Management Practices (BMPs) will be utilized as Construction Period Pollution Prevention Measures to reduce potential pollutants and prevent any off-site discharge. The objectives of the BMPs for construction activity are to minimize the disturbed areas, stabilize any disturbed areas, control the site perimeter, and retain sediment. Erosion and sedimentation control measures will be used to minimize site disturbance and ensure compliance with the performance standards of the Wetlands Protection Act and any state and local stormwater standards. Measures will be taken to minimize the area disturbed by construction activities to reduce the potential for soil erosion and stormwater pollution problems. In addition, good housekeeping measures will be followed for the day-to-day operation of the construction site under the control of the contractor to minimize the impact of construction. This section describes the control practices that will be in place during construction activities. Recommended control practices will comply with the standards set in the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Policy Handbook.

2.1 Minimize Disturbed Area and Protect Natural Features and Soil

To minimize disturbed areas, work will be completed within well-defined work limits. These work limits are shown on the construction plans. The Contractor will be responsible to make sure that their workers and any subcontractors know the proper work limits and do not extend their work into the undisturbed areas. The protective measures are described in more detail in the following sections.

2.2 Control Stormwater Flowing onto and through the Project

Perimeter erosion controls shall be installed on-site to control stormwater discharges as depicted on the site plans. The barriers will be inspected at least once every 7 calendar days, or every 14 calendar days and within 24 hours of a storm event of 0.25 inches or greater, and accumulated silt will be removed as needed.

2.3 Stabilize Soils

The Contractor should limit the area of land which is exposed and unvegetated during construction. In areas where the period of exposure will be greater than two weeks, mulching, the use of erosion control mats, or other protective measures will be provided as specified on the plans.

The Contractor should follow the seeding requirements outlined on the plans and will be responsible for maintaining the seeded areas until final acceptance is received. Final acceptance after 90 days following construction, or until the site reaches 70% stabilization, whichever is longer.

CONSTRUCTION PERIOD POLLUTION PREVENTION AND EROSION AND SEDIMENTATION CONTROL PLAN

2.4 Proper Storage and Cover of Any Stockpiles

The location of the Contractor's storage areas for equipment and/or materials should be upon cleared portions of the job site or areas to be cleared as a part of this project.

Adequate measures for erosion and sediment control such as the placement of straw wattle sediment barriers around the downstream perimeter of stockpiles will be employed to protect any downstream areas from siltation.

There will be no storage of equipment or materials in wetlands or wetland buffers.

2.5 Perimeter Controls and Sediment Barriers

Silt fence and straw wattle (as detailed in the site plans) will be utilized to ensure that sedimentation does not occur outside the perimeter of the work area.

2.6 Storm Drain Inlet Protection

No existing or proposed catch basins are impacted as part of the project and therefore no storm drain inlet protection will be required.

2.7 Retain Sediment On-Site

The Contractor will be responsible for monitoring erosion control measures. Whenever necessary, the Contractor will clear sediment from the sediment barriers that have been silted up during construction. Inspections must be documented using the attached Monitoring Form.

2.8 Material Handling and Waste Management

Materials stored on-site will be stored in a neat, orderly manner in appropriate containers. Materials will be kept in their original containers with the original manufacturer's label. Substances will not be mixed with one another unless recommended by the manufacturer.

Waste materials will be collected and stored in a securely lidded metal container from a licensed management company. The waste and any construction debris from the site will be hauled off-site and disposed of properly. The contractor will be responsible for waste removal. Manufacturer's recommendations for proper use and disposal will be followed for materials. If portable sanitary waste facilities will be used on-site, sanitary waste will be collected from the units a minimum of once a week, by a licensed sanitary waste management contractor.

2.9 Designated Washout Areas

The Contractor shall use the designated areas on the project plans for concrete washout.

2.10 Proper Equipment/Vehicle Fueling and Maintenance Practices

On-site vehicles will be monitored for leaks and receive regular preventative maintenance to reduce the risk of leakage. To ensure that leaks from stored equipment do not contaminate the site, oil-absorbing mats will be placed under oil-containing equipment during storage. Regular fueling and service of the equipment may be performed using approved methods and with care taken to minimize chance of spills. Repair of equipment or machinery within 100 feet of any water resources is not allowed. Any petroleum products will be stored in tightly sealed containers that are clearly labeled with spill control pads/socks placed under/around their perimeters.

2.11 Equipment/Vehicle Washing

The Contractor will be responsible to ensure that no equipment is washed on-site.

SECTION 3: Spill Prevention and Control Plan

The Contractor will be responsible for preventing spills in accordance with the project drawings and applicable federal, state, and local regulations. The Contractor will identify a properly trained site employee, involved with the day-to-day site operations to be the spill prevention and cleanup coordinator. The name(s) of the responsible spill personnel will be posted on-site. Each employee will be instructed that all spills are to be reported to the spill prevention and cleanup coordinator.

3.1 Spill Control Equipment

Spill control/containment equipment will be kept in the work area. Materials and equipment necessary for spill cleanup will be kept either in the work area or in an otherwise accessible on-site location. Equipment and materials will include, but not be limited to, absorbent booms/mats, brooms, dust pans, mops, rags, gloves, sand, plastic and metal containers specifically for this purpose. It is the responsibility of the Contractor to ensure the inventory will be readily accessible and maintained.

3.2 Notification

Workers will be directed to inform the on-site supervisor of a spill event. The supervisor will assess the incident and initiate proper containment and response procedures immediately upon notification. Workers should avoid direct contact with spilled materials during the containment procedures. Primary notification of a spill should be made to the local Fire Department, Police Departments, Planning Board, and Highway Department. Secondary Notification will be to the certified cleanup contractor if deemed necessary by Fire and/or Police personnel. The third level of notification (within 1 hour), if required, is to the DEP or municipality's Licensed Site Professional (LSP) if the spill exceeds the reportable quantity for the material spilt. The specific cleanup contractor to be used will be identified by the Contractor prior to commencement of construction activities.

3.3 Spill Containment and Clean-Up Measures

Spills will be contained with granular sorbent material, sand, sorbent pads, booms or all of the above to prevent spreading. Certified cleanup contractors should complete spill cleanup. The material manufacturer's recommended methods for spill cleanup will be clearly posted and on-site personnel will be made aware of the procedures and the location of the information and cleanup supplies.

3.4 Hazardous Materials Spill Report

The Contractor will report and record any spill. The spill report will present a description of the release, including the quantity and type of material, date of the spill, circumstances leading to the release, location of spill, response actions and personnel, documentation of notifications and corrective measures implemented to prevent reoccurrence.

This document does not relieve the Contractor of the Federal reporting requirements of 40 CFR Part 110, 40 CFR Part 117, 40 CFR Part 302 and the State requirements specified under the Massachusetts Contingency Plan (M.C.P) relating to spills or other releases of oils or hazardous substances. Where a release containing a hazardous substance or oil in an amount equal to or in excess of a reportable quantity established under either 40 CFR Part 110, 40 CFR Part 117 or 40 CFR Part 302, occurs during a twenty-four (24) hour period, the Contractor is required to comply with the response requirements of the above mentioned regulations. Spills of oil or hazardous material in excess of the reportable quantity will be reported to the National Response Center (NRC).

SECTION 4: Contact Information/Responsible Parties

Owner/Operator:

Manhan River, LLC
116 Huntington Ave, Suite 601
Boston, MA 02116

Engineer:

Melinda Costello, PE
Weston & Sampson Engineers, Inc.
55 Walkers Brook Drive, Suite 100
Reading, MA 01867
978-532-1900

Site Inspector:

TBD

Contractor:

TBD

SECTION 5: Erosion and Sedimentation Control

Erosion and sedimentation control features can be found in the project plans which include specifications for installation and monitoring control devices.

SECTION 6: Site Development Plan

The proposed site development plan is included in the project plans.

SECTION 7: Operation and Maintenance of Erosion Control

The erosion control measures will be installed as detailed in project plans. If there is a failure of the controls, the Contractor is required to stop work until the failure is repaired.

Periodically throughout the work, the sediment that has been deposited against the controls will be removed to ensure that the controls are working properly.

SECTION 8: Inspection Schedule

During construction, the erosion and sedimentation controls will be inspected at least once every 7 calendar days, or once every 14 calendar days and within 24 hours of the end of a storm event of 0.25 inches or greater. Once the Contractor is selected, an on-site inspector will be identified to ensure that erosion and sedimentation controls are in place and working properly. A Monitoring Form is included for use by the on-site inspector.

CONSTRUCTION PERIOD POLLUTION PREVENTION AND
EROSION AND SEDIMENTATION CONTROL PLAN

Monitoring Form

Inspected By: _____ Date: _____ Time: _____

YES	NO	DOES NOT APPLY	ITEM
			Do any erosion/siltation control measures require repair or clean out to maintain adequate function?
			Is there any evidence that sediment is leaving the site?
			Are any temporary soil stockpiles or construction materials located in non-approved areas?
			Are on-site construction traffic routes, parking, and storage of equipment and supplies located in areas not specifically designed for them?
			Are storage of fuels located outside of resource areas and associated buffer zones? Are fuels stored in proper storage containers?

Specific location, current weather conditions, and action to be taken:

Other Comments:

Pending the actions noted above I certify that the erosion and sedimentation controls at the site are in compliance with the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan.

Signature: _____ Date: _____

Attachment G - Illicit Discharge Statement

ILLICIT DISCHARGE COMPLIANCE STATEMENT

Illicit Discharge Compliance Statement

Section I – Purpose/Intent

Standard 10 of the Massachusetts Stormwater Handbook prohibits illicit discharges to stormwater management systems. A stormwater management system is the system for conveying, treating, and infiltrating stormwater on-site, including stormwater best management practices (BMPs) and any pipes intended to transport stormwater to the groundwater, a surface water, or municipal separate storm sewer system. Illicit discharges to the stormwater management system are discharges that are not entirely comprised of stormwater.

There are no permanent stormwater management systems associated with the project.

This Illicit Discharge Statement is related to work performed by Manhan River, LLC and their subcontractor(s). Site maintenance will be performed in accordance with the Site's Operation and Maintenance Plan and Long-Term Pollution Prevention Plan.

Section II - Prohibitions

Prohibition of Illicit Discharges

No person shall dump, discharge, cause or allow to be discharged any pollutant or non-stormwater discharge into the site, into the on-site wetlands, into a watercourse, or into waters of the United States and/or Commonwealth.

Exemptions

The following activities are considered exempt: firefighting, water line flushing, landscape irrigation, uncontaminated groundwater, potable water sources, foundation drains, air conditioning condensation, footing drains, individual resident car washing, flows from riparian habitats and wetlands, dechlorinated water from swimming pools, water used for street washing and water used to clean residential buildings without detergents.

Section III - Notification of Spills

In the event of a spill or release which may result in a discharge of pollutants or non-stormwater discharge to the on-site wetlands, waters of the United States, and/or waters of the Commonwealth, the responsible parties, potentially responsible parties, or any person or persons managing the Site shall take all necessary steps to ensure containment and provide the required notification under local, state and/or federal law.

Aaron Simms

Representative of Manhan River, LLC

09/04/25

Date

Illicit Discharge and Illegal Connection Statement

Final Audit Report

2025-09-04

Created:	2025-09-04
By:	Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
Status:	Signed
Transaction ID:	CBJCHBCAABAA9in4SFi0IoPgWadY_xOqpsRVlqtaTOcX

"Illicit Discharge and Illegal Connection Statement" History

-  Document created by Brie Fortmuller (brie.fortmuller@bluewavesolar.com)
2025-09-04 - 1:55:45 PM GMT
-  Document emailed to Aaron Simms (asimms@bluewavesolar.com) for signature
2025-09-04 - 1:55:48 PM GMT
-  Email viewed by Aaron Simms (asimms@bluewavesolar.com)
2025-09-04 - 2:37:25 PM GMT
-  Document e-signed by Aaron Simms (asimms@bluewavesolar.com)
Signature Date: 2025-09-04 - 2:38:33 PM GMT - Time Source: server
-  Agreement completed.
2025-09-04 - 2:38:33 PM GMT

Appendix J: Certified Abutters List and Notification to Abutters

June XX,2026

Abutter Notification Letter

Re: **Site Plan Review Application**
Proposed 5.49 MW DC Solar Electric Generating Facility, Dual-Use and Agriculture Use
43 & 53 Pleasant Street, Southampton, MA 01073

Dear Property Abutter:

Notice is hereby given that the Southampton Planning Board will hold a public hearing on [DATE] in accordance with the Town of Southampton Zoning Bylaw Section 275-9.8 to process an application for a site plan review and a stormwater management permit for a 5.49 MW DC Solar Electric Generating Facility, Dual-Use and Agriculture Use proposed by Manhan River, LLC. Weston & Sampson Engineers, Inc. is the engineer for the proposed development. The reason you are receiving this notice is because your property is within 300 feet of the site.

The plans and accompanying documentation are available for inspection at the office of the Planning Board and the office of the Town Clerk during normal business hours. (210 College Highway, Southampton, MA, 01073)

The public hearing will be held in person at [LOCATION]. For those who wish to participate virtually, a Zoom link will be made available on the agenda posted on the Planning Board's website in advance of the meeting.

Sincerely,

WESTON & SAMPSON ENGINEERS, INC., agent / Engineer for Manhan River, LLC

Melinda Costello, PE
Project Manager

cc: Michael Zhe – Manhan River, LLC

TOWN OF SOUTHAMPTON, MA
Certified Abutters List

Contiguous parcels: Map 25, Lot 20 and Map 24, Lot 23D

53 Pleasant Street and 0 Pleasant Street

Owner: 53 Pleasant St: Stephen E Bashista and Ronald Bashista

Owner: 0 Pleasant St: Marianne C Bashista, Trustee of the Bashista Family Irrevocable Trust
300 Feet

Parcel ID	Site Address	Owner	Owner Address	City, State	Zip
19 144	0 COLLEGE HWY REAR	TOWN OF SOUTHAMPTON	210 COLLEGE HWY	SOUTHAMPTON, MA	01073
24 21 B	COLLEGE HWY REAR	GRINDSTONE REALTY LLC	187 COLLEGE HWY	SOUTHAMPTON, MA	01073
19 69	42 GUNN RD	FLETCHER ROBERT S & CHERYL A	22 GUNN RD	SOUTHAMPTON, MA	01073
25 100	NICHOLAS LANE	PLEASANT MEADOW ESTATES HOMEOWNERS ASSOC	12 NICHOLAS LN	SOUTHAMPTON, MA	01073
24 23 B	0 PLEASANT ST	BASHISTA, MARIANNE C, TRUSTEE of the BASHISTA FAMILY IRREV TRUST	61 PLEASANT ST	SOUTHAMPTON, MA	01073
24 29	0 PLEASANT ST	BASHISTA,STEPHEN E, MICHAEL S, RONALD & MARIANNE C	61 PLEASANT ST	SOUTHAMPTON, MA	01073
24 28 A	0 PLEASANT ST	OCONNOR TIMOTHY M	20 PLEASANT ST	SOUTHAMPTON, MA	01073
24 29 B	0 PLEASANT ST REAR	BASHISTA STEPHEN E, MICHAEL S, RONALD & MARIANNE C	61 PLEASANT ST	SOUTHAMPTON, MA	01073
24 26	34 PLEASANT ST	PETER J GIROUARD, JOAN M GIROUARD, ANN GIROUARD	26 PLEASANT ST	SOUTHAMPTON, MA	01073
24 25	36 PLEASANT ST	ANN GIROUARD, NANCY KAYE, KATHLEEN HANLEY, LINDA HYJEK	36 PLEASANT ST	SOUTHAMPTON, MA	01073
24 27	37 PLEASANT ST	BARCOMB WILLIAM P & EVELYN L	37 PLEASANT ST	SOUTHAMPTON, MA	01073
24 24	38 PLEASANT ST	BERGERON PAUL J JR	38 PLEASANT ST	SOUTHAMPTON, MA	01073
24 23 A	39 PLEASANT ST	MULVANEY NICHOLAS & DANA A	39 PLEASANT ST	SOUTHAMPTON, MA	01073
24 24 A	40 PLEASANT ST	ADAMS RICHARD K & CASSANDRA L	40 PLEASANT ST	SOUTHAMPTON, MA	01073
25 23	42 PLEASANT ST	COUTURE DARREN L & COUTURE ERIN L	42 PLEASANT ST	SOUTHAMPTON, MA	01073
24 23 B	43 PLEASANT ST	BASHISTA, MARIANNE C, TRUSTEE of the BASHISTA FAMILY IRREV TRUST	61 PLEASANT ST	SOUTHAMPTON, MA	01073
24 23 C	45 PLEASANT ST	HOWLAND WYNTER H & EMILY MAE	45 PLEASANT ST	SOUTHAMPTON, MA	01073
25 21	46 PLEASANT ST	BODEUR, EILEEN W & JEFFREY, TRUSTEES, EILEEN W BODEUR REV TRUST	46 PLEASANT ST	SOUTHAMPTON, MA	01073
25 36	48 PLEASANT ST	KEITH D SALTMARSH & KELLY A SALTMARSH	48 PLEASANT ST	SOUTHAMPTON, MA	01073
25 37	50 PLEASANT ST	OVIIT CHRISTINE M	50 PLEASANT ST	SOUTHAMPTON, MA	01073
25 22	52 PLEASANT ST	JENSEN, HANS ERIK & PLOYPAN THONGPRADIT JENSEN	52 PLEASANT ST	SOUTHAMPTON, MA	01073
25 87	56 PLEASANT ST	INGRAM CAROL LESLIE & INGRAM JR WILLIAM ALLAN	56 PLEASANT ST	SOUTHAMPTON, MA	01073
25 82	58 PLEASANT ST	113 MAPLE STREET LLC	528 EAST ST	EASTHAMPTON, MA	01027
25 17	61 PLEASANT ST	BASHISTA MARIANNE C TRUSTEE of the BASHISTA FAMILY IRREV TRUST	61 PLEASANT ST	SOUTHAMPTON, MA	01073
25 74	73 PLEASANT ST	BASHISTA MICHAEL	61 PLEASANT ST	SOUTHAMPTON, MA	01073

TOWN OF SOUTHAMPTON, MA
Certified Abutters List
Contiguous parcels: Map 25, Lot 20 and Map 24, Lot 23D

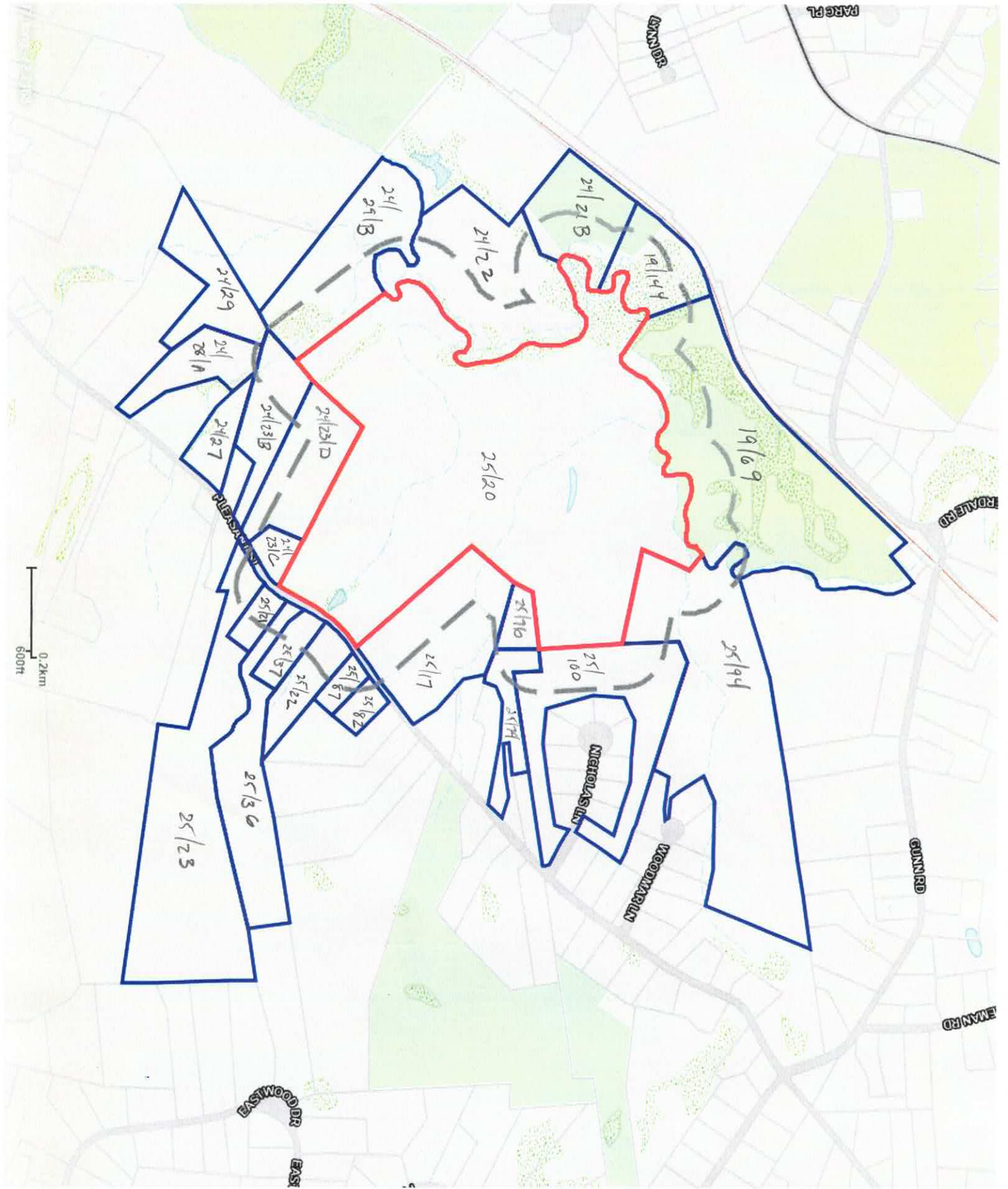
25 76	PLEASANT ST REAR	BASHISTA MARIANNE C TRUSTEE of the BASHISTA FAMILY IRREV TRUST	61 PLEASANT ST	SOUTHAMPTON, MA	01073
24 22	PLEASANT ST REAR	BASHISTA, STEPHEN E & RONALD	61 PLEASANT ST	SOUTHAMPTON, MA	01073
25 94	OFF WOODMAR LN	LABRIE JAMES R	66 GUINN RD	SOUTHAMPTON, MA	01073

CERTIFICATION

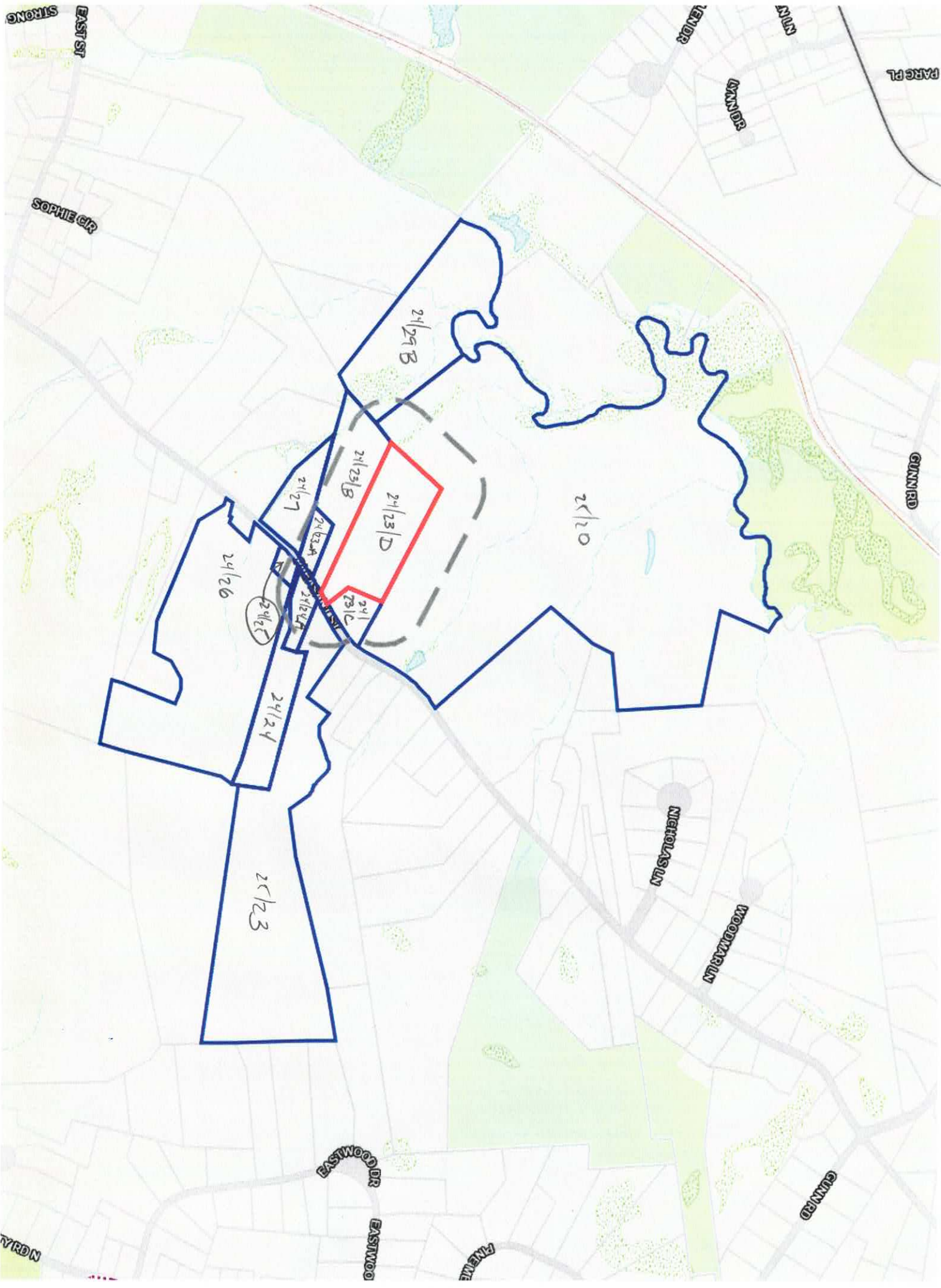
The Southampton Board of Assessors certifies that the above list of abutters contains the names and addresses of all property owners in the Town of Southampton abutting the subject parcel as measured on the Assessors maps and that the data is the current information in our database of Taxpayers as of February 19, 2026.


Authorized Signature for the Board

25/20
300'
Abatters



24-23-D 300' Abutters



Appendix K: Emergency Response Plan

Manhan River, LLC BESS

Emergency Response Plan

Canadian Solar Solbank 3.0

Southampton, MA



Revision: Rev0

Date: March 10, 2026

**The distribution of this document to third parties is prohibited
without written approval from Fire & Risk Alliance, LLC**



FIRE & RISK
★ ★ ALLIANCE ★ ★

☎ (301) 658-3060 | ✉ info@fireriskalliance.com | 🌐 www.fireriskalliance.com

Fire & Risk Alliance

7620 Standish Place, Rockville, MD 20855



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1. GENERAL INFORMATION

1.1 Scope

This document is an emergency response plan (ERP) for the Manhan River, LLC battery energy storage system (BESS) facility. The ERP provides a facility overview, site design, type of equipment, safety features, suppression, and detection information along with response recommendations for potential BESS facility failure scenarios.

1.2 Purpose

The purpose of this ERP is to provide information to BESS subject matter experts (SMEs) and fire department personnel about potential hazards at BESS facilities. This guidance outlines the size-up and response tactics necessary to ensure safety and mitigate risks during emergency operations.

1.3 Site Owner

Site Owner: BlueWave Energy

Owner Address: 116 Huntington Ave, Suite 601, Boston, MA 02116

HQ Telephone: 617.209.3122

1.4 Location

43 and 53 Pleasant Street, Southampton, Massachusetts, 01073 (42°13'48.2"N, 72°42'08.4"W)

1.5 Emergency Contact

The remote operations center (ROC) for the Manhan River, LLC BESS will be BlueWave Assessment Management reachable at 617.209.3122 or assetmgmt@bluewave.energy.

The Southampton Police Department can be reached for non-emergencies at 413.527.8776.

Table 1: Emergency Services Contact Information

Emergency Services Agency	Address
All Emergencies	Call 911
Southampton Fire Department	204 College Hwy, Southampton, MA 01073
Southampton Police Department	8 East St G, Southampton, MA 01073
Holyoke Medical Center	575 Beech St, Holyoke, MA 01040



2. SITE OVERVIEW

2.1 General Site Overview

The Manhan River, LLC BESS facility will be located at 43 and 53 Pleasant Street, in Southamptn, Massachusetts. The BESS facility has provisions for the installation of two BESS yards, each with an area of approximately 0.27 acres. It will be located in a predominantly rural area, east of the town of Southamptn. To the north of the site is a patch of densely distributed trees and several residential structures. To the east, the facility will be bound by Pleasant Street. A large, wooded area is located further east, across Pleasant Street. To the south of the project there are more residential structures. To the west there is a mixture of agricultural fields and undeveloped rural land, as well as the Manhan River.

The BESS facility includes the installation of SolBank 3.0 (SB3) BESS cabinets manufactured by e-STORAGE, which is a subsidiary of Canadian Solar. The BESS facility is anticipated to be normally unstaffed and will be monitored by the ROC.

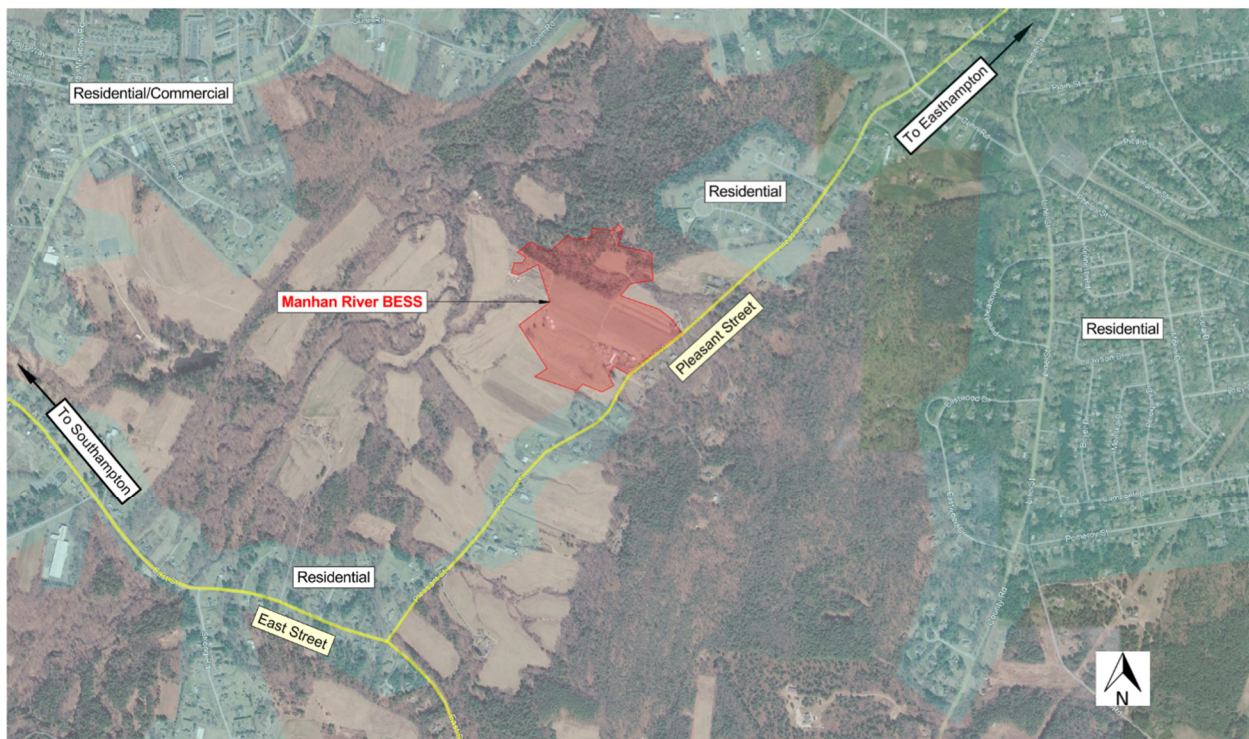


Figure 1: Area Overview



2.2 Energy Storage System Site Overview

The BESS facility is anticipated to contain two (2) SB3 cabinets per BESS yard. The SB3 BESS cabinets will be connected to a power conversion system (PCS) unit, that is equipped with inverters and a medium voltage transformer (MVT).

The exact equipment layout for the BESS facility has not yet been established. As the project nears completion, Figure 2 will be updated to include the location of SB3 cabinets and PCS units, as well as any other structures of interest for this ERP.

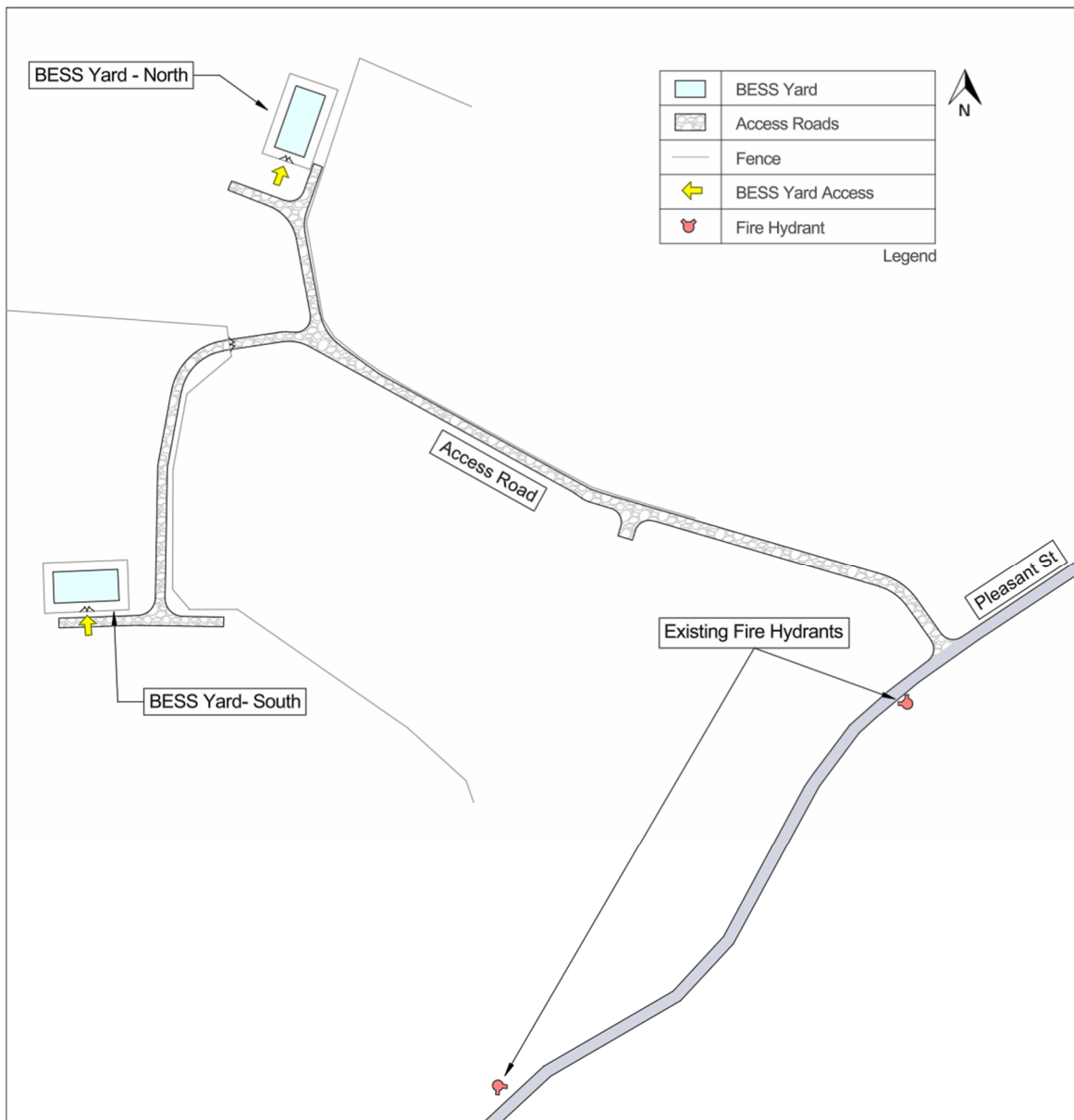


Figure 2: Manhan River, LLC BESS Facility Overview



3. MITIGATION

3.1 Battery Cabinet Equipment Overview

The smallest component of a BESS is a cell. Cells are combined into modules which are combined into racks. Cabinets contain multiple racks and additional protection, monitoring and isolation features powered by on-site auxiliary power.

The SB3 container is a rigid metal (steel) enclosure designed to house the batteries, associated controllers, and appurtenances. The container supports the safe operation of the BESS through its exterior rigid housing structure that helps to protect the batteries from mechanical damage and weather conditions. Each SB3 container has an ingress protection (IP) rating of 55 and contains twelve (12) battery racks, each containing four (4) modules (battery packs). Batteries are lithium iron phosphate (LFP) chemistry.

Additional features of the SB3 container include battery management systems (BMS), a liquid cooling and heating system, and the integration of all power electronics, controls, and safety features required to support the DC side of the BESS.

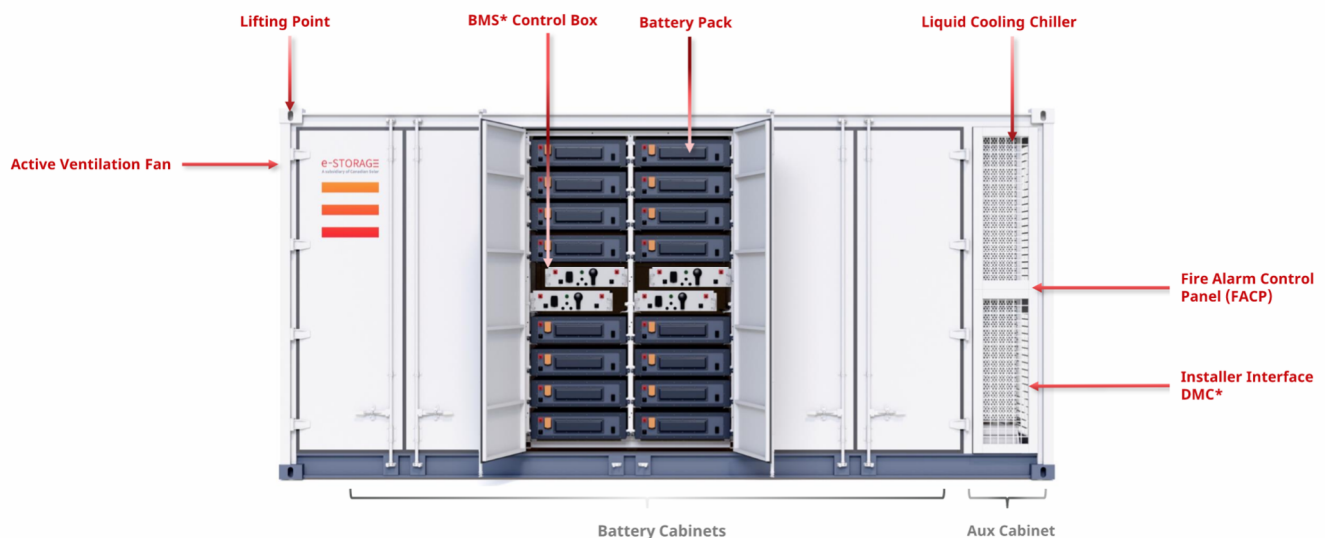


Figure 3: SB3 Container

3.2 Battery Management System

The battery management system monitors, protects, and manages the BESS, ensuring battery health parameters are maintained for efficient and continual operation.

The SB3 BESS cabinets are equipped with a dedicated BMS for each battery rack, with a total of twelve (12) rack-mounted BMS per enclosure. The location of the BMS control boxes is provided and shown in Figure 3.



Table 2: BMS Functions

Function	Description
Monitoring	The BMS continuously monitors key parameters such as voltage, current, temperature, and state of charge (SOC).
Protection	The BMS protects the battery from over-charging, over-discharging, over-current, over-temperature, and short circuits by isolating batteries that exceed predetermined operating parameters.
Balancing	The BMS helps to equalize the SOC across all cells.
Thermal Management	The BMS regulates the battery temperature by controlling heating or cooling systems, keeping the battery within the predetermined temperature range.
Power Control	The BMS regulates the power in and out of the batteries.
Communication	The BMS remotely communicates the status of monitored parameters and autonomously performed functions.

3.3 Fire Protection Overview

3.3.1 Site Access

Access to the site will be provided via a gravel road that connects to both BESS yards, as shown in Figure 2. The BESS yards will be surrounded by a fixed knot farm fence and will be provided with access gates. Fire apparatus access roads will be provided throughout the BESS yard.

3.3.2 Fire Alarm and Detection System

The SB3 container is provided with fire and gas detection. The fire and gas detection system includes three photoelectric smoke detectors (two in the battery cabinets and one in the aux cabinet), three heat detectors (two in the battery compartment and one in the electrical compartment), and two hydrogen gas detectors in the battery compartment. The fire and gas detection system are connected to a fire alarm control panel (FACP) located in the aux cabinet of the SB3, shown in Figure 3. Any alarm or supervisory condition from the SB3 FACP is relayed to the site energy management system (EMS) and will be monitored by a third-party fire alarm (FA) contractor. The FA contractor for the Manhan River, LLC BESS has not yet been determined. This ERP will be updated to include the FA contact information as the project nears completion. For local notification, an alarm bell and an audible/visible appliance are installed on the exterior of the SB3 container.

3.3.3 First Responder Station

The design of the first responder station is currently under development. This ERP will be updated to include details upon design completion.

3.3.4 Fire Suppression System

The SB3 containers will not come equipped with a fire suppression system. Additionally, no fire suppression systems external to the BESS cabinets will be present on site.



3.3.5 Fire Protection Water Supply

Fire protection water will be supplied to the facility via existing fire hydrants. The nearest fire hydrant is located near the intersection between the proposed gravel access road and Pleasant Street. Another hydrant can be found south of the facility, along Pleasant Street. The locations of existing fire hydrants are shown in Figure 2.

3.4 Explosion Control and Prevention System

The SB3 BESS container has an explosion control system. The system is a combustible gas concentration reduction system and consists of gas detection, an explosion-proof exhaust fan, and two air intake louvers that provide make-up air for the cabinet.

Upon the flammable gas detector sensing 10% of the lower explosive limit (LEL), the exhaust system activates, ventilating the SB3 cabinet to keep the gas concentration of the container below 25% LEL. In addition, the BMS receives an alarm, the horn/strobe on the exterior of the container activates, the BMS shuts down the battery system, and the HVAC system shuts down.

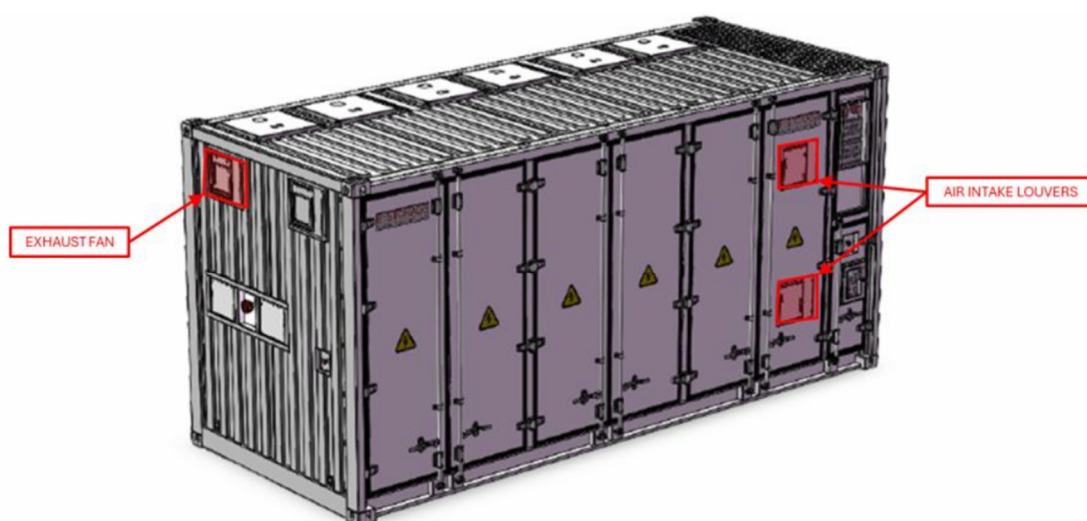


Figure 4: Explosion Control System



3.5 Emergency Stop

An emergency stop (E-Stop) push button is provided at each end of the SB3 enclosure. The operation of a BESS E-Stop isolates the BESS cabinet. Though isolated, the BESS batteries still maintain their SOC. The operation of a PCS E-Stop isolates the PCS. Operation of a site E-Stop isolates the site from the grid.

Never approach a trouble cabinet for manual activation of the E-Stop.

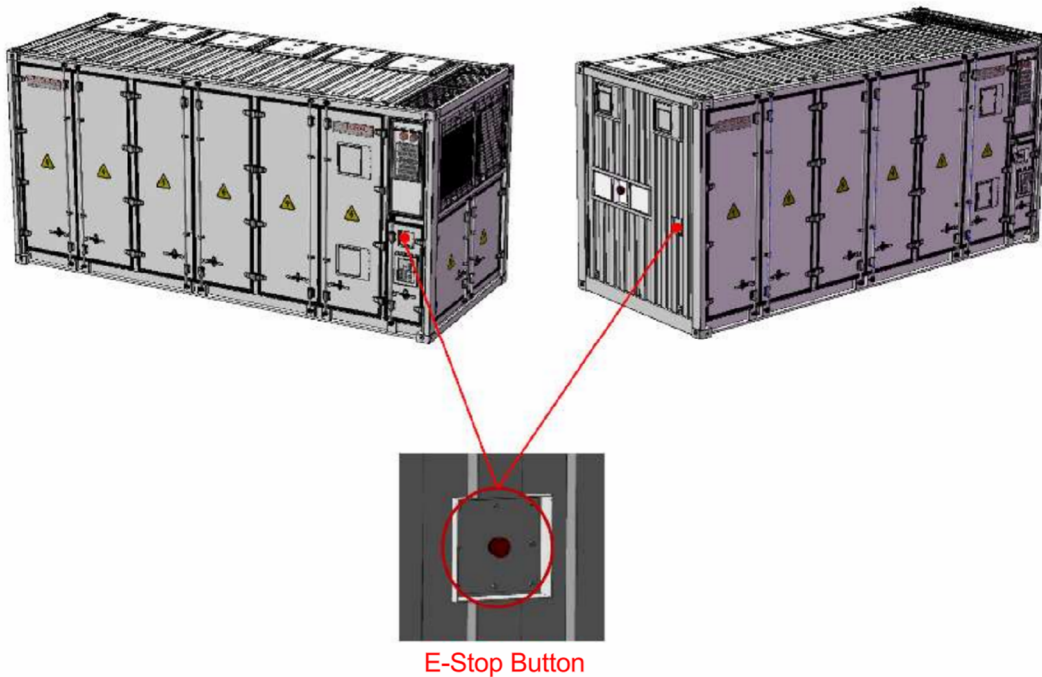


Figure 5: SB3 BESS Cabinet E-Stop



4. PREPAREDNESS

4.1 Chemical Hazards

4.1.1 Cell Vent Gas

During a failure event, battery cells produce toxic gases that have the potential to be harmful to site personnel and first responders. If the failure spreads to other BESS components, it can produce additional toxic gases similar to those released during the combustion of ordinary manufactured products. Although outdoor BESS cabinets are not occupiable, site personnel and first responders can still be exposed to these toxic gases while operating near a BESS during a failure or fire event. In the event of a gas release, these toxic gases are expected to be diluted by the entrainment of outside air. Fire department personnel should wear the appropriate personal protective equipment (PPE), as outlined in Section 4.5.

4.1.2 Hydrogen

When the temperature of a cell reaches the venting stage, the primary hazard is the production of hydrogen gas (H₂). The gas is odorless, colorless, and requires internal sensors or external meters for detection. H₂ is flammable and lighter than air.

Table 3: Hydrogen Characteristics

Characteristic	Description/Value
Appearance	Colorless Gas
Odor	Odorless
LFL	4%
UFL	76%
Auto Ignition	500°C/932°F
25% LFL	1% or 10,000 ppm
Vapor Density	0.69 (Air = 1)

4.1.3 Carbon Monoxide

CO is an odorless, colorless gas, and requires internal sensors or external meters for detection. CO is produced during incomplete combustion and/or cell failure.

Table 4: Carbon Monoxide Characteristics

Characteristic	Description/Value
Appearance	Colorless Gas
Odor	Odorless
LFL	12.5 %



Characteristic	Description/Value
UFL	74.2%
Auto Ignition	607°C (1125°F)
25% LFL	3.125% or 31,250 ppm
Vapor Density	0.97 (Air = 1)

4.1.4 Transformer Dielectric Fluid

Dielectric fluid is used to insulate and cool site transformers such as medium voltage transformers and auxiliary power transformers. During a transformer failure, arcing and sustained fire can lead to heat retention in the windings and metal cabinet of the transformer, making this a persistent fire.

4.1.5 Refrigerant

Refrigerant is commonly used within the BESS thermal management system. Refrigerants are nonflammable under normal operating conditions. However, refrigerants are pressurized and can become combustible when mixed with air at elevated temperatures and pressures. Refrigerants can also release toxic by-products as a result of heating and decomposition. In high concentrations, refrigerants can also become an asphyxiation hazard.

Table 5: Refrigerant Characteristics

Characteristic	Description
Appearance	Colorless Liquid
Odor	Faintly Sweet

4.2 Electrical Hazards

Shielded electrical hazards at the BESS facility include battery cabinets, inverters, and transformers. Outer covers around the equipment eliminate casual contact and locks prevent access to energized areas.

Unshielded electrical hazards at the facility include exposed bus within a substation or overhead electrical connections to the surrounding grid. OSHA regulations require a minimum standoff distance of 10 feet from equipment and power lines. The minimum clearance should be increased by 4 inches for every 10kV over 50kV.

BESS products contain batteries that are ALWAYS energized and present an electrical hazard even when disconnected from an electrical source. The operation of breakers or E-Stops will serve to isolate trouble equipment. However, the operation of these devices will not remove stranded energy. Class C electrical hazards constantly exist at BESS facilities.

NFPA 1970 structural firefighting ensemble is not rated for arc flash hazards. Maintain a 10-foot standoff distance from any open doors on BESS cabinets.

E-field detectors are commonly used to identify potential AC hazards. These devices do not have the ability to detect DC voltage from battery cabinets. Do not use E-field detectors within a BESS facility.



4.3 Thermal Runaway and Fire Hazards

Thermal runaway occurs when an electrochemical battery cell's temperature increases at an accelerating rate in an uncontrollable fashion sufficient to result in damage to the cell. The thermal runaway progresses when the cell's generation of heat is at a higher rate than the heat it can dissipate.

During thermal runaway, flammable gas and heat is produced. Failure may spread to adjacent cells or modules and the gas may ignite. Due to the high pressure at which these gases vent and the lack of a listed suppression agent, no attempt should be made to suppress this fire.

4.4 Explosion Hazard

The failure of a cell will begin with the venting stage; this is the precursor to thermal runaway. Accumulation of flammable gases within a confined space, such as a BESS cabinet, can lead to an explosive atmosphere where the gas concentration falls within its upper and lower flammability limits. An explosion can occur when cell vent gases accumulate and contact a competent ignition source. While safety features are present to decrease the risk of an explosion, always assume that they are non-operational. Maintain an exclusion zone from the trouble equipment for the duration of the incident.

4.5 Recommended PPE

The recommended PPE is NFPA 1970 structural firefighting gear and the use of a self-contained breathing apparatus (SCBA) when exposed to respiratory hazards. All chemicals associated with the failure of BESS equipment and ancillary electrical components present dermal and respiratory hazards.

The PPE recommendation is for emergency response operations and life safety. PPE recommendations for the post-fire removal of damaged modules will be defined by conditions found at the time of decommissioning. In addition, structural firefighting ensembles are not designed to provide protection from arc flash hazards.

4.6 BESS Subject Matter Expert

Typically, a BESS SME is a person or group familiar with the SB3 BESS equipment, the site layout and equipment, installation guides and manuals, the BMS architecture, passive and active protection systems, notification sequencing, and this ERP.

The BESS SME, equipment owner, and site operator play a critical role guiding fire department personnel responding to a BESS emergency by coordinating the following:

- Ensuring security of the site and limit access to only authorized personnel.
- Ensuring accountability of non-fire department personnel inside the facility.
- Ensuring authorized personnel have PPE that is appropriate to their assigned role/task.
- Reviewing and interpreting BMS data including SOC, state of health (SOH), temperature, and status of equipment.



- Locating and isolating trouble equipment.
- Ensuring an exclusion zone has been established around the troubled equipment.
- Expanding exclusion zone in the event additional battery cabinets sustain alarms or direct fire impingement.
- Evaluating the status of the explosion control and prevention system (if applicable).
- Identifying need for exposure protection.
- Leading post-incident operations.
- Administering decommissioning plan.



5. RESPONSE

5.1 Tactics

DO NOT FORCE ENTRY

Fire department personnel should not encroach within 100 feet of the facility fence line or trouble equipment until the troubled battery cabinet has been identified.

The remote operations center (ROC) for the Manhan River, LLC BESS will be BlueWave Assessment Management reachable at 617.209.3122 or assetmgmt@bluewave.energy.

Upon arrival, fire department incident command should contact the ROC to obtain preliminary information including the following:

- Accountability
 - Were any personnel present at the site?
 - If personnel are present, what is the status of their accountability?
- Location of Equipment in Alarm
 - What is the type and location of the troubled equipment?
- Alarm Type
 - What type of alarm has generated the initial response and have any alarms been received that would suggest conditions are deteriorating?
- Equipment Status
 - Has trouble equipment been isolated autonomously or manually?
 - What is the SOC of the trouble equipment and facility?
- Explosion Control and Prevention Systems
 - What is the status of the explosion control and prevention system?

5.1.1 Life Safety

Obvious line of sight rescues are the priority for responding fire department personnel. Fire department personnel shall not enter the facility for recovery operations.

Unescorted Rescue Considerations:

- Is there a confirmed victim location?
 - No confirmed location – No rescue advised
- How far is the victim from the electrical equipment?
 - Electrical contact – No rescue advised
- How far is the victim from the trouble battery cabinet?
 - Explosion hazard increases as distance to trouble battery cabinet doors decreases
 - Special consideration needed within 100 ft of battery cabinet doors



5.1.2 Community Air Monitoring

Establish air monitoring 100 feet downwind from the facility fence line to evaluate gas dispersion from failed equipment. Visually observe smoke plume to ensure it is not encroaching on exposure structures. If metering equipment detects abnormal levels, consider evacuating affected areas.

5.1.3 Exclusion Zone

Once the troubled equipment is identified, establish a 100-foot exclusion zone from the impacted cabinet. Expand the exclusion zone if failure conditions spread to adjacent equipment.

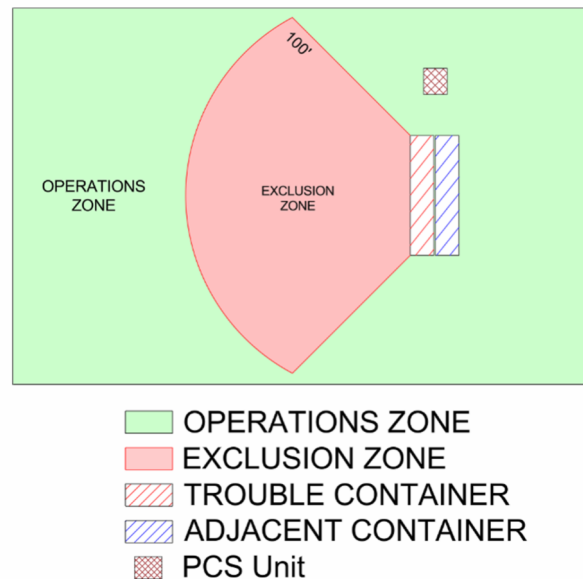


Figure 6: General 100' Exclusion Zone

5.1.4 Alarm Monitoring

Monitor input alarms from the FACP and the BMS for the trouble equipment. Receipt of additional alarms can indicate deteriorating conditions within the troubled equipment. A review of the BMS can indicate the possible origin location and further impacted internal equipment.

5.1.5 Isolation of Trouble Equipment

Confirm trouble equipment has been autonomously isolated. If recommended by the BESS SME, remotely isolate adjacent equipment.

Fire Department personnel should never operate equipment or controls within the site. The BESS SME will coordinate all operational requests.

Never approach a trouble cabinet for manual activation of the E-Stop.



5.1.6 Condition Monitoring

From outside the exclusion zone, visually and audibly monitor the conditions of the trouble cabinet. Look for the presence of white gas, smoke, fire, and damage to the cabinet. Even if there are no visible or audible indications of failure, hazards to responding fire department personnel may still be present.

5.1.7 Exposure Assessment

Assess the adjacent equipment to determine if exposure protection is necessary. Evaluate the following:

- Are there any alarms in adjacent equipment?
 - Expand exclusion zone if adjacent equipment becomes involved.
- Based on thermal imaging camera readings, is there any increase in temperature on adjacent equipment?
 - If temperatures reach 50% (approximately 200°F) of the average cell vent temperature (399°F) as determined by UL9540A testing, see Section 5.1.8.
- Is there any direct flame impingement on adjacent equipment?

5.1.8 Exposure Protection

Exposure protection should be considered if conditions warrant or if recommended by the BESS SME. While maintaining the exclusion zone, establish a continuous water supply. From outside the exclusion zone, using a rain down method, apply water in a fog pattern to cool the exposure equipment. Do not use a solid or straight stream to ensure fire department personnel safety and limit water intrusion into uninvolved equipment.

5.2 Incident Stabilization

5.2.1 Under Control

The incident may be considered under control when:

- Fire is contained to the equipment involved with no exposure concerns
- No new alarms have been generated
- The volume of fire or gas has decreased

Once the incident has been placed under control, establish continuous fire-watch for the facility.



6. RECOVERY

Recovery focuses on equipment assessments for determining repair, replacement, or restoration as part of the facility owner/operator's recovery plan. Implementation of the recovery plan is the responsibility of the facility owner/operator and should be overseen by the BESS SME. Fire department involvement in the recovery plan is at the discretion of the BESS SME and the facility owner/operator.

Typical facility recovery plans can include:

- Facility fire watch
- Post-incident equipment assessment including:
 - Grid connectivity
 - BMS status
 - Fire alarm status
 - Fire suppression status
 - Explosion control status
- Lock out/Tag out
- Decommissioning
- Installation of new equipment
- Recommissioning



7. REVISIONS

Date	Revision	Reason for Issue	Developed By	Reviewed By	Approved By
03/10/2026	Rev0	Initial ERP	TL	KL	AFB

Appendix L: Hazard Mitigation Analysis

Manhan River, LLC BESS



Hazard Mitigation Analysis

Outdoor Ground Mounted Battery Energy Storage System

Canadian Solar Solbank 3.0

Southampton, MA



Revision Rev00

April 16, 2026

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EXECUTIVE SUMMARY

Fire and Risk Alliance, LLC, (FRA) performed a hazard mitigation analysis (HMA) for the battery energy storage system (BESS) proposed for installation at the Manhan River, LLC BESS site located at 43 & 53 Pleasant St., Southamptton, MA (Manhan River, LLC BESS). The HMA was performed in accordance with the 2020 Edition of NFPA 855 which is referenced by 527 CMR (Massachusetts Comprehensive Fire Safety Code) pursuant the 2021 Edition of NFPA 1. The Manhan River, LLC BESS is anticipated to include four SolBank 3.0 (SB3) cabinets manufactured by e-STORAGE of Canadian Solar and will have an approximate capacity of 5 megawatts (MW)/10 megawatt hours (MWh). It is anticipated that the Manhan River, LLC BESS will comprise two separate BESS yards (north/south yards) containing two cabinets each (subject to change as the design progresses). This HMA report is intended to be used as a tool for a fire code official (FCO) or an authority having jurisdiction (AHJ) to assist in their review of the Manhan River, LLC BESS.

Based on a review of the SB3 and the IFP drawing package dated 11/04/2025 (the drawing set), the SB3 installation at the Manhan River, LLC BESS site design can meet the NFPA 855 installation level requirements for an outdoor, NWI style BESS when it is installed in accordance with the manufacturer's instructions, its listing, the approved drawings, and NFPA 855. However, as the final site design is developed, several items were identified in this analysis that still need modification/confirmation to ensure compliance. These include:

- Approved signage must be provided at the site per NFPA 855 §4.3.5.
- Increase minimum unobstructed fire apparatus access roadway width from 16 ft to 20 ft.
- Remove the fire apparatus access dead end that exceeds 150 ft in length or provide an approved turnaround.
- Obtain FCO approval for the fire protection water supply at the site per NFPA 855 §4.13.

The HMA demonstrates the Manhan River, LLC BESS meets all the HMA performance criteria for approval outlined in NFPA 855 §4.1.4.3, as follows:

- Fires will be contained to a single SB3 as demonstrated through UL 9540A unit level testing and should a fully developed fire event occur, site level emergency response procedures (such as exposure protection) could be utilized during a fire event, based on real time fire conditions and observations (i.e., wind direction/speed, fire intensity, proximity of flames to adjacent cabinets), to minimize the potential for fire to spread to adjacent cabinets.
- Suitable deflagration protection is provided for the SB3 cabinet via the NFPA 69 CCR explosion control system.
- Fires will be detected in time to allow personnel to safely evacuate via the fire alarm system and internal sensors of the SB3.
- Toxic and highly toxic gases will not be released during normal charging, discharging, and operation of the SB3 given the listed lithium-ion cells utilized in the SB3 are hermetically sealed and do not vent during charging, discharging or normal operation.
- Toxic and highly toxic gases released during fires and other fault conditions will not reach concentrations in excess of IDLH levels within a building or an adjacent means of egress given the nearest building is approximately 1,000 ft away.



- Flammable gases will not be released during charging, discharging and normal operation of the SB3 given the listed lithium-ion cells utilized in the SB3 are hermetically sealed and do not vent during charging, discharging or normal operation.

In summary, based on the UL 9540A testing and a review of the drawing set, the Manhan River, LLC BESS meets the Hazard Mitigation Analysis approval criteria presented in NFPA 855. In addition, as the site design is still under development, it is assumed that all the code required items, as listed above, will be addressed prior to commercial operational of the facility.

This executive summary is an abbreviated list of findings. Refer to the main report for details of the analysis.



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1. INTRODUCTION

Fire and Risk Alliance, LLC, (FRA) performed a hazard mitigation analysis (HMA) for the battery energy storage system (BESS) proposed for installation at the Manhan River, LLC BESS site located at 43 & 53 Pleasant St., Southampton, MA (Manhan River, LLC BESS). The HMA was performed in accordance with the 2020 Edition of NFPA 855 which is referenced by 527 CMR (Massachusetts Comprehensive Fire Safety Code) pursuant the 2021 Edition of NFPA 1. The Manhan River, LLC BESS is anticipated to include four SolBank 3.0 (SB3) cabinets manufactured by e-STORAGE of Canadian Solar and will have an approximate capacity of 5 megawatts (MW)/10 megawatt hours (MWh). It is anticipated that the Manhan River, LLC BESS will comprise two separate BESS yards (north/south yards) containing two cabinets each (subject to change as the design progresses). This HMA report is intended to be used as a tool for a fire code official (FCO) or an authority having jurisdiction (AHJ) to assist in their review of the Manhan River, LLC BESS.

1.1 Purpose and Scope

NFPA 855 §4.1.4.2 requires an HMA to evaluate the consequences associated with the following failure modes, and others deemed necessary by the FCO. Note, only single failure modes must be considered in this analysis:

1. Thermal runaway condition in a single module, array, or unit.
2. Failure of an energy storage management system.
3. Failure of a required ventilation or exhaust system.
4. Failure of a required smoke detection, fire detection, fire suppression, or gas detection system.

After analyzing these single failure modes and analyzing their potential consequences per NFPA 855 §4.1.4.3, the AHJ is authorized to approve the HMA provided that it demonstrates all of the following:

1. Fires will be contained within unoccupied ESS rooms for the minimum duration of the fire resistance rating specified in NFPA 855 §4.3.6.
2. Suitable deflagration protection is provided where required.
3. ESS cabinets in occupied work centers allow occupants to safely evacuate in fire conditions.
4. Toxic and highly toxic gases released during normal charging, discharging, and operation will not exceed the permissible exposure limit (PEL) in the area where the ESS is contained.
5. Toxic and highly toxic gases released during fires and other fault conditions will not reach concentrations in excess of immediately dangerous to life or health (IDLH) level in the building or adjacent means of egress routes during the time deemed necessary to evacuate from that area.
6. Flammable gases released during charging, discharging, and normal operation will not exceed 25 percent of the lower flammability limit (LFL).

To perform this evaluation for the Manhan River, LLC BESS, the framework of FRA's HMA is as follows:

- **Review the SB3 and UL 9540A Test Data:** FRA reviewed the SB3, its construction, design, fire safety features, listings, and UL 9540A fire test data (see Sections 2.0 and 3.0).
- **Review Site Specifications:** FRA reviewed the proposed Manhan River, LLC BESS site layout including the areas surrounding the BESS yards (see Section 4.0).



- **Prescriptive Code Compliance Review:** The proposed site layout and BESS plans were reviewed for compliance with NFPA 855 requirements. Where gaps were identified in the BESS site design, recommendations are provided (see Sections 5.0 and 6.0).
- **Hazard Mitigation Analysis:** The HMA evaluates the BESS failure modes as required by NFPA 855. The consequence-based analysis considers product level and site level barriers to prevent failure or reduce the consequences of a failure scenario. Based on the provided barriers, the consequences of a failure event are analyzed. NFPA 855 outlines acceptance criteria for which the FCO or AHJ is authorized to approve the HMA provided the consequences of the analysis meet or exceed the criteria (see Section 7.0).
- **Recommendations:** Recommendations are provided throughout the report where gaps exist between the site design and code requirements and where the consequences of failure modes exceed the approval criteria (see Section 8.0).

1.2 Codes, Standards, and Test Methods

The following code and standards are applicable to this analysis:

- Massachusetts Comprehensive Fire Safety Code, based on the 2021 Edition of NFPA 1, *Fire Code* (527 CMR).
- NFPA 855, *Standard for the Installation of Stationary Energy Storage Systems* – 2020 Edition (NFPA 855).

The following standards and test methods are also relevant to this analysis:

- NFPA 68, *Standard on Explosion Protection by Deflagration Venting* – 2018 Edition (NFPA 68).
- NFPA 69, *Standard for Explosion Control Systems* - 2019 Edition (NFPA 69).
- UL 1973, *Standard for Batteries for Use in Stationary, Vehicle Auxiliary Power and Light Electric Rail (LER) Applications* – 2018 Edition (UL 1973).
- UL 9540, *Standard for Safety of Energy Storage Systems and Equipment* - 2016 Edition (UL 9540).
- UL 9540A, *Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems* - 2018 (UL 9540A).

1.3 Reference Materials

In addition to the standards and test methods listed above, the following reference materials were reviewed as part of this analysis:

- IFP drawing package dated 11/04/2025 (the drawing set).
- UL 1973 Certificate #CU7230247601, Hithium Model LFP71173207, dated 01/11/2023.
- UL 1973 Certificate #CU724059830001, CSI Models SolBank-R-418-2h-H and SolBank-R-418-4h-H, dated 07/18/2024.
- UL 9540 Certificate #CU724062740001, CSI Model SolBank-S-5016-2h-NA, dated 07/18/2024.
- UL9540A Cell Test Report #CN23F118001, Hithium Model LFP71173207, TÜV Rheinland (Shenzhen), dated 12/06/2023.



- UL9540A Module Test Report #CN248UKE001, CSI Models SolBank-P-104.5-2h-H and SolBank-P-104.5-4h-H, TÜV Rheinland (Shanghai), dated 06/28/2024.
- UL9540A Unit Test Report #CN24M32L001, CSI Models SolBank-R-418-2h-H and SolBank-R-418-4h-H, TÜV Rheinland (Shanghai), dated 06/28/2024.
- NFPA 69 System Evaluation Report #CN24SBF7001, CSI Models SolBank-S-5016-2h-NA and SolBank-S-5016-4h-NA, TÜV Rheinland (Shanghai), dated 08/09/2024.
- SolBank 3.0 BESS HMA, ESRG, V2, dated 12/19/2021
- SolBank 3.0 Datasheet, CSI Models SolBank-S-5016-2h-NA and SolBank-S-5016-4h-NA
- SolBank 3.0 Installation Manual, V1.3, e-STORAGE of Canadian Solar, 2024.
- SolBank 3.0 Commissioning Manual, V1.0, e-STORAGE of Canadian Solar, 2024.
- SolBank 3.0 User Manual, V1.5, e-STORAGE of Canadian Solar, 2024.
- SolBank 3.0 Safety Manual, V1.1, e-STORAGE of Canadian Solar, 2024.
- SolBank 3.0 Maintenance Manual, V1.3, e-STORAGE of Canadian Solar, 2024.
- SolBank 3.0 Decommissioning Manual, V1.0, e-STORAGE of Canadian Solar, 2024.
- SolBank 3.0 Fire Safety System and BMS Overview, e-STORAGE of Canadian Solar, September 2023.



2. SB3 DESCRIPTION

The SB3 is a fully integrated BESS consisting of battery modules, power electronics, control systems, battery management system (BMS), thermal management system (TMS), fire detection and notification system, and explosion prevention system all pre-assembled within a single, non-occupiable cabinet. It is meant for outdoor installations, mounted to the ground. Below is a brief description of the SB3, its components, design listing, and fire safety features. For a more detailed discussion of the SB3 components, their location, functionality, and purpose, refer to the SB3 installation manual.

2.1 Cell

The cell is the smallest anatomy of the battery assembly. The SB3 utilizes a lithium iron phosphate (LFP) prismatic cell, as shown in Figure 1. The cells are Model LFP71173207 manufactured by Xiamen Hithium Energy Storage Technology Co. Ltd. (Hithium) and are UL 1973 compliant. Each cell has a nominal capacity of 314 amp-hour (Ah), a nominal voltage of 3.2 volts (V), and is prismatic in geometry. The cell has overall dimensions of 6.9 in (175 mm) × 8.2 in (207 mm) × 2.8 in (72 mm). This cell is manufactured for use in the SB3 and is intended to be part of the module assembly. Passive safety features include material reliability and manufacturing process. Known hazards of the cell during normal operation consist of either electrical, thermal, or mechanical failures which could result in gas release, flaming electrical fluid, electrical shorting, thermal heating, and/or thermal runaway.

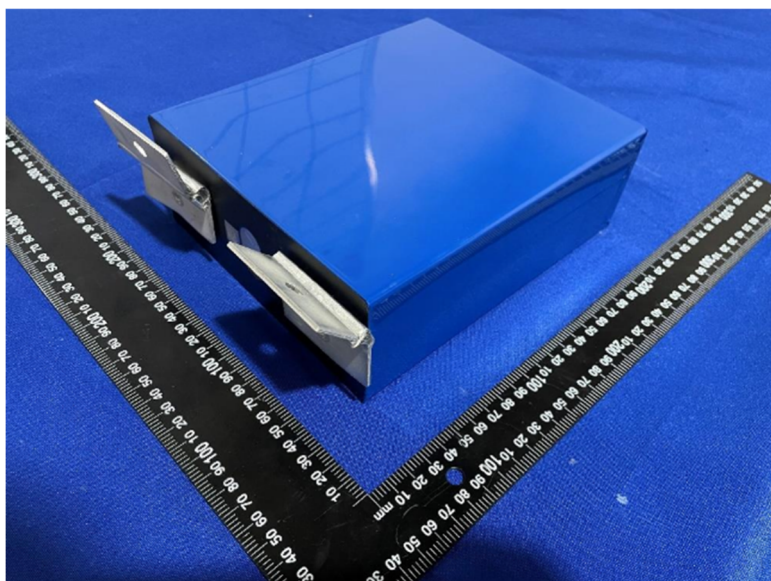


Figure 1: SB3 Cell



2.2 Module (Pack)

The battery module, also known as the pack, is the second smallest level of the BESS anatomy. The SB3 module is Model SolBank-P-104.5-4h-H manufactured by CSI Energy Storage Co., Ltd. (CSI), which is liquid-cooled with a metal enclosure. The module has a 1P104S cell configuration which comprises 104 LFP71173207 cells in series, as shown in Figure 2. The module has a nominal capacity of 314 Ah, a nominal voltage of 332.8 V, and a nominal energy capacity of 104.5 kWh. Each module has overall dimensions of 7.2 ft (2,180 mm) × 2.6 ft (790 mm) × 0.8 ft (248 mm).



Figure 2: SB3 Module

This module is manufactured for use in the SB3 and is intended to be part of the unit-level assembly. The module assembly supports safe operation through its material insulation and internal cooling. Aerogel spacers are installed between each cell to insulate each cell from one another. Passive safety features include material reliability and manufactured assembly process. The module itself does not have any active emergency functions for disconnection from the charging source or discharging stored potential energy.

2.3 Unit (Rack)

The battery unit, also known as the rack, is the third level of BESS anatomy. Each unit holds 4 modules and a BMS box, as shown in Figure 3. The unit is Model SolBank-R-418-4h-H manufactured by CSI with a nominal capacity of 314 Ah, a nominal voltage of 1,331.2 V, and a nominal energy capacity of 418 kWh. The unit is manufactured for use in the SB3 and is intended to be part of the cabinet-level assembly.



Figure 3: SB3 Unit

2.4 Cabinet

The cabinet is the final and largest level of the BESS. The SB3 cabinet is a rigid metal (steel) enclosure designed to house the batteries, associated controllers, and appurtenances. The cabinet supports the safe operation of the BESS through its exterior rigid housing structure that helps to protect the batteries from mechanical damage and weather conditions. It is 2438 mm (8.0 ft) wide, 2896 mm (9.5 ft) tall, and 6058 mm (19.9 ft) long and is intended for ground-mounted, outdoor installations, with an IP-55 rating. The SB3 is equipped with 12 battery racks, as shown in Figure 4.

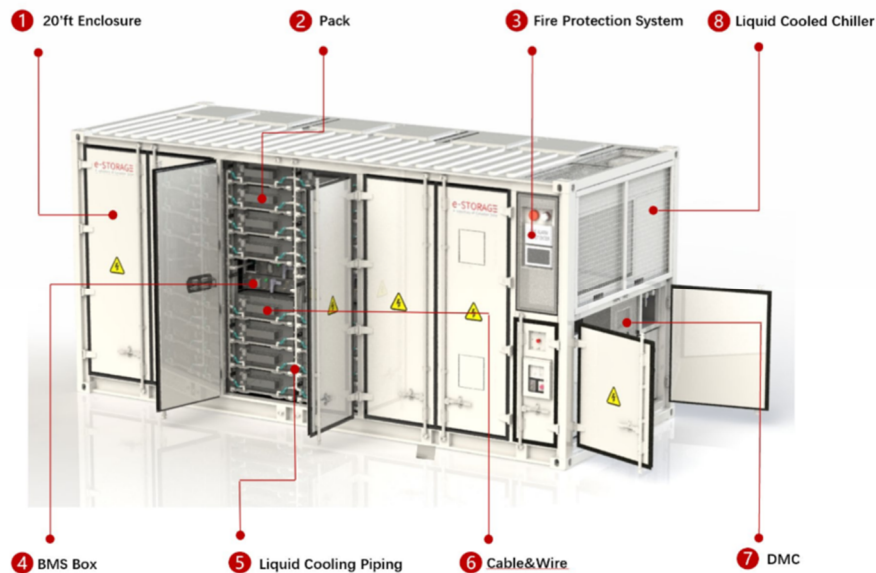


Figure 4: SB3 Cabinet



As described above, each unit contains 4 modules, and each module contains 104 LFP cells. In total, the SB3 has 4,992 cells with an energy capacity of 4,800 kWh and weighs approximately 43,000 kg (94,799 lbs.). Additional features of the SB3 cabinet include 12 rack-mounted BMS, a liquid cooling and heating system, and the integration of all power electronics, controls, and safety features required to support the DC side of the BESS.

2.5 Thermal Management System

Each SB3 is equipped with a TMS which utilizes a liquid cooling and heating system to maintain optimum cell temperature, between 20°C and 35°C. A temperature-regulated ethylene glycol solution is distributed throughout the cabinet using a piping system that connects the battery modules to the chiller in the HVAC cabinet of the BESS, as seen in Figure 5.

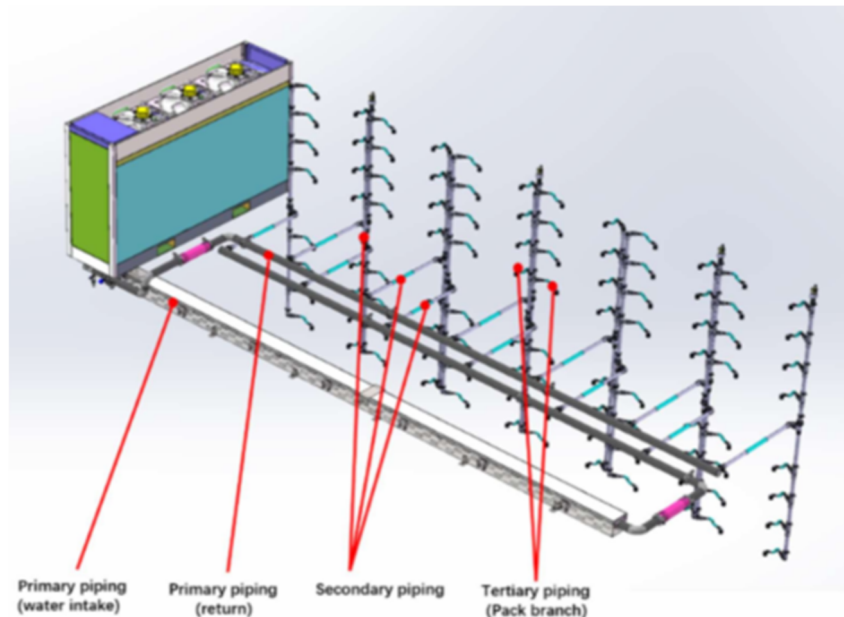


Figure 5: SB3 TMS

After passing through each device and absorbing or releasing heat, the refrigerant flows back into the HVAC cabinet where it is cooled, if necessary. The cabinet is continuously monitored for temperature and liquid chiller operation and will send alerts if either critical levels are reached or if loss of communication from the system occurs.

2.6 Battery Management System

Each SB3 is equipped with a dedicated BMS for each battery unit, with a total of 12 rack-mounted BMS per cabinet. The BMS is an electronic system that can identify possible risks to the battery system by monitoring battery cell performance, temperature, voltage, and current, and state-of-charge (SOC) in real-time. It is used to monitor and maintain the health and capacity of a battery to ensure optimal battery functionality and safety.



The BMS ensures early detection of pre-fault conditions and immediate direction of fault events. If a parameter exceeds pre-determined permissible values, the BMS will open the integrated DC contactors to automatically disconnect the affected string and send an alarm to the site's energy management system (EMS).

The BMS also interfaces with the fire alarm control panel (FACP) and can control the disconnection of the module(s) from the system in the event of abnormal conditions. When the FACP receives an alarm, such as combustible gas, heat, or smoke, this notification is routed to the EMS, which autonomously isolates the trouble battery cabinet.

The BMS function is intended to prevent the risk of thermal runaway by preventing the risks of overcharge, over-discharge, over-temperature, and overcurrent. It provides thermal runaway risk protection by safely disconnecting the batteries in case of fault conditions.

2.7 Electrical Fault Protection

In addition to BMS protections, electrical fault protection devices are provided for the SB3 and the power conversion system (PCS). The cabinet's DC junction box contains all primary DC busbars, fuses, surge protection devices, and power monitoring required to safely exchange power between the SB3 and the PCS. All SB3 electrical circuits are protected by overcurrent protection devices. Site-level electrical fault protection devices are provided by the UL 1741 listed inverter, including insulation monitoring devices for ground fault protection, medium voltage (MV) switchgear, DC switch disconnectors, and Type 2 protection for AC and DC overvoltage protection. The BESS MV switchgear typically includes protection and switching equipment to sufficiently protect both the BESS facility as well as the grid from faults: relays, meters, breakers (motorized or non-motorized), fuses, and other distribution gear.

2.8 Fire and Gas Detection System

The SB3 cabinet is provided with a fire and gas detection system that includes three photoelectric smoke detectors (two in the battery compartment and one in the electrical compartment), three heat detectors (two in the battery compartment and one in the electrical compartment), and two hydrogen gas detectors in the battery compartment, as shown in Figure 6. The fire and gas detection system is connected to a FACP. Any alarm or supervisory condition from the FACP is relayed to the site EMS.

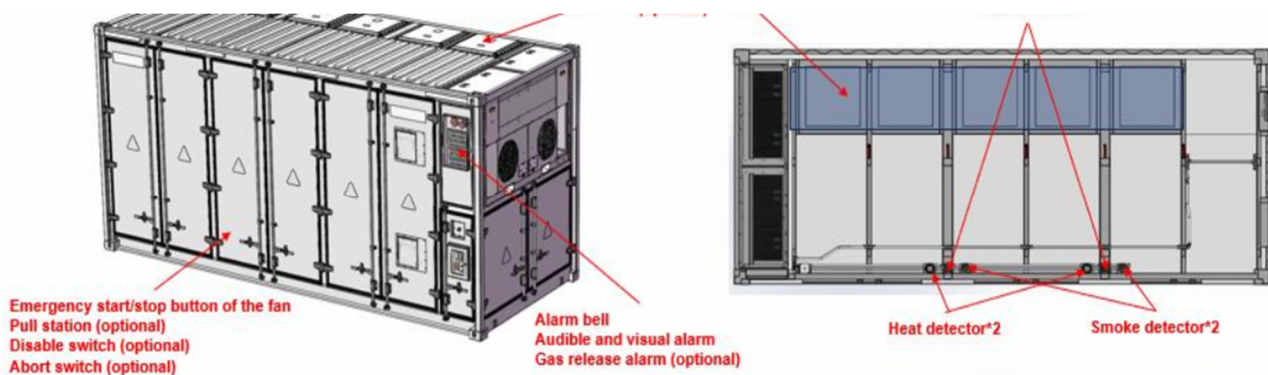


Figure 6: SB3 Fire and Gas Detection System



For local notification, an alarm bell and an audible/visible appliance are installed on the exterior of the SB3 cabinet. An emergency start/stop (E-stop) button is provided within each end of the cabinet, which will shut down the SB3 cabinet when pressed. Additional safety features are available optionally, including a pull station, disable switch, abort switch, and gas release alarm.

2.9 Fire Suppression System

The SB3 can come equipped with an optional aerosol suppression system or an optional dry sprinkler system. The SB3 cabinets at the Manhan River, LLC BESS will not be equipped with the optional fire suppression system.

2.10 Explosion Control System

The SB3 cabinet is equipped with a combustible gas concentration reduction (CCR) system that consists of gas detection, an explosion-proof exhaust fan, and two air intake louvers that provide make-up air for the cabinet, as shown in Figure 7. This system utilizes two flammable gas detectors calibrated to hydrogen. Upon detection of 10% of the LFL, the explosion control system activates, ventilating the SB3 to maintain the gas concentration of the cabinet below 25% LFL. In addition, the BMS receives an alarm, the horn/strobe on the exterior of the cabinet activates, the BMS shuts down the battery system, and the HVAC system shuts down.

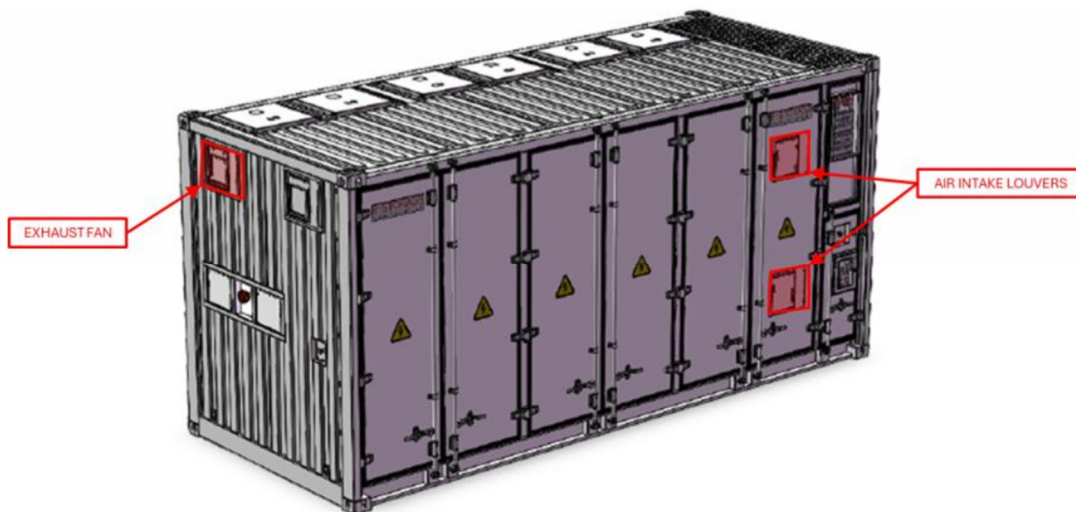


Figure 7: SB3 Explosion Control System

2.11 Site Controller and Monitoring

The SB3 is monitored and controlled by a site EMS or local plant controller (LPC) during normal operations. The EMS or LPC will communicate with an offsite fleet controller, SCADA operations center, or other third-party dispatch and monitoring entity to allow remote control and operations of the system. System status and alarms are communicated to the EMS and remote operations personnel. In the event of emergency conditions, the SB3 can be remotely shut down.



3. UL 9540A SUMMARY & ANALYSIS

UL 9540A provides a method to evaluate thermal runaway and fire propagation of a lithium-ion BESS at the cell level, module level, unit level, and installation level. The data generated from the test method can be used to determine the fire and explosion protection systems/features required for a BESS installation. This includes, but is not limited to, thermal runaway characteristics of the cell; cell thermal runaway gas composition; the fire propagation potential from cell to cell, module to module, and unit to unit; products of combustion; heat release rate; smoke release rate; and performance of fire protection systems.

Initially, cells are tested to determine if further testing is required. Module level testing is required if the following observations are recorded during cell level testing:

- Thermal runaway is induced in the cell; and,
- The cell vent gas is flammable in air when tested in accordance with ASTM E918.

Module level testing examines the module design, heat release rate, gas generation, external debris, and flying debris hazards. Unit level testing is required if the following observations are recorded during module level testing:

- Module design is unable to contain thermal runaway; and,
- Cell vent gas is flammable.

Unit level testing assesses the BESS design of the unit, heat release rate, gas generation and composition, deflagration and flying debris hazards, BESS and wall surface temperatures, heat flux at the target walls, and reignition. Installation level testing is required if the following observations are recorded during unit level testing:

- Flaming is observed outside the initiating BESS unit;
- Surface temperature of the modules in the adjacent BESS unit exceeds the temperature at which cell level gas venting occurred;
- Surface temperatures of wall surfaces increase more than 175°F (97°C) from ambient; and,
- Explosion hazards are observed.

Installation level testing assesses the effectiveness of fire protection systems installed as mitigation methods for the BESS in its intended installation configuration.

A summary of the cell, module, unit, and installation level test results for the SB3 are provided below.

3.1 UL 9540A Cell Level Testing

Cell-level testing was completed at TÜV Rheinland (Shenzhen) Co., Ltd. (TÜV) September through November 2023. TÜV is an OSHA-approved Nationally Recognized Testing Laboratory (NRTL) and offers the cTÜVus mark, which is equivalent to other NRTL marks such as UL, ETL or CSA. Testing was performed on five Model LFP71173207, 3.2 V, 314 Ah, LFP cells manufactured by Hithium and used in the SB3. Each cell was charged to 100% state of charge (SOC) prior to testing. Thermal runaway was initiated via an external film heater installed



on each cell, as shown in Figure 8. The cell sample and heater were clamped by two steel plates together during the test to simulate the constraint in the BESS module to prevent excessive swelling during the test. The heater was programmed to increase the temperature of the cell's surface at a rate from 4°C-7°C per minute until the cell vented and went into thermal runaway. The cell was placed within a sealed enclosure and the products released during testing were collected and analyzed.

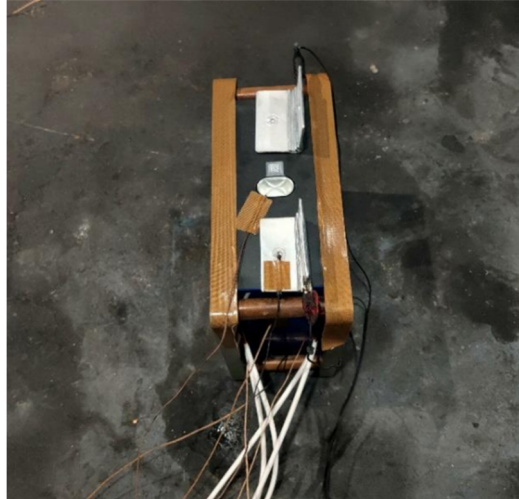


Figure 8: Cell Test Setup

3.1.1 Key Results & Takeaways

Key takeaways from the tests include:

- The average cell vent and thermal runaway temperature was determined to be 203.7°C (399°F) and 295.7°C (564°F), respectively, as listed Table 1.
- 130 liters of cell vent gases were released.
- The cell vent gas mixture is flammable and has an LFL of 8.1% at ambient temperature.
- The cell vent gases were predominantly (approximately 95%) Carbon Monoxide (CO), Carbon Dioxide (CO₂), Hydrogen (H₂), and Methane (CH₄), as listed in Table 2.

Table 1: UL 9540A Cell Level Testing: Key Flammability Characteristics

Flammability Property	Value
Average cell surface temperature at gas venting	203.7°C
Average cell surface temperature at thermal runaway	295.7°C
Cell vent gas volume released	130 L
LFL, % volume in air at the ambient temperature	8.1%
LFL, % volume in air at the venting temperature	6.5%
Burning velocity (S_u)	0.779 m/s
Maximum pressure (P_{max})	0.78 MPa



Table 2: UL 9540A Cell Level Testing: Cell Vent Gas Composition (Excluding O₂ and N₂)

Gas Name	Chemical Structure	Measured %	Component LFL %
Carbon Monoxide	CO	16.202	10.9
Carbon Dioxide	CO ₂	26.861	N/A
Hydrogen	H ₂	49.875	4.0
Methane	CH ₄	3.671	4.4
Ethylene	C ₂ H ₄	1.389	2.4
Ethane	C ₂ H ₆	0.548	2.4
Propene	C ₃ H ₆	0.745	1.8
Propane	C ₃ H ₈	0.18	1.7
-	n-C ₄ H ₁₀	0.068	-
-	n-C ₄ H ₈	0.22	-
-	n-C ₅ H ₁₂	0.076	-
-	iso-C ₅ H ₁₂	0.112	-
-	n-C ₅ H ₁₀	0.053	-
Total	-	100	-

3.1.2 Performance Criteria

UL 9450A Section 7.7 outlines the performance criteria for the cell level test. If all these conditions are met, further tests (such as module, unit, or installation level tests) are not required. The acceptable performance criteria during the UL 9540A cell level test are as follows:

1. Thermal runaway cannot be induced in the cell; and
2. The cell vent gas does not present a flammability hazard when mixed with any volume of air, at both ambient and vent temperatures.

Given that the cell went into thermal runaway and vented flammable gases, UL 9540A module level testing was required.

3.2 UL 9540A Module Level Testing

Module level testing was completed at TÜV Rheinland (Shanghai) Co., Ltd. April through May 2024. Testing was performed on a 332.8 V, 314 Ah, Model SolBank-R-418-2h-H module manufactured by Hithium and used in the SB3, as shown in Figure 9. The module consisted of 104 Model LFP71173207, 3.2 V, 314 Ah, LFP cells manufactured by Hithium which were charged to 100% SOC prior to testing. During the test, the module was not connected to the BMS or TMS, i.e., they are not actively operating to prevent thermal runaway in a cell or to prohibit the propagation of thermal runaway from cell to cell. Thermal runaway was initiated via film strip



heaters installed on both of the wide side surfaces of cell #40 within the module. This resulted in the simultaneous heating of three cells forcing multiple cells into thermal runaway at approximately the same time. The heaters were programmed to increase the cell surface temperature until the cells vented and went into thermal runaway. The module was placed under an instrumented hood and the products released during combustion were collected for analysis.

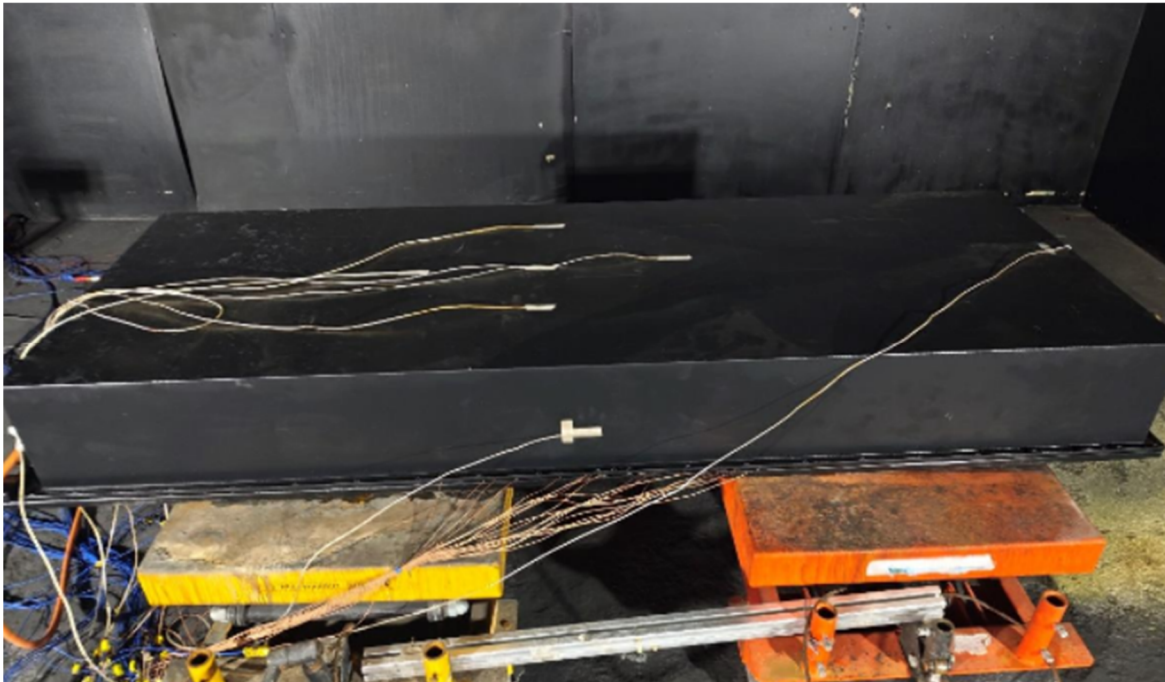


Figure 9: Module Test Setup

3.2.1 Key Results & Takeaways

This simultaneous heating of three cells forced multiple cells to go into thermal runaway that propagated from the initiating cells to two additional cells in the module. Key takeaways from the UL 9540A module level test include:

- Thermal runaway propagated from the three initiating cells to two additional cells in the module.
- No sparks, flying debris, or flaming was observed during the test.
- Products of combustion were collected, as listed in Table 3.
- Toxic gases sometimes associated with lithium-ion batteries, such as HF, HCl, and HCN, were not detected during the combustion of the module.

Table 3: UL 9540A Module Level Testing: Products of Combustion

Gas Name	Chemical Structure	Total Volume (L)	Detection Method
Carbon Monoxide	CO	157.10	FTIR
Carbon Dioxide	CO ₂	388.98	FTIR
Methane	CH ₄	85.54	FTIR



Gas Name	Chemical Structure	Total Volume (L)	Detection Method
Acetylene	C_2H_2	3.05	FTIR
Ethene	C_2H_4	56.26	FTIR
Ethane	C_2H_6	12.22	FTIR
Propylene	C_3H_6	29.24	FTIR
Propane	C_3H_8	20.11	FTIR
Hydrogen	H_2	262.16	Hydrogen Sensor
Total Hydrocarbons	(Propane Equivalent)	285.55	FID

3.2.2 Performance Criteria

UL 9540A Section 8.4 outlines the performance criteria for the module level test. If all these conditions are met, further testing (such as unit or installation level tests) is not required. The acceptable performance criteria during the UL 9450A module level test are as follows:

1. Thermal runaway is contained by module design; and
2. Cell vent gas is nonflammable as determined by the cell level test.

Given the cell vent gases are flammable (as summarized previously), UL 9540A unit level testing was required.

3.3 UL 9540A Unit Level Testing

The unit level fire test was completed at TÜV Rheinland (Shanghai) Co., Ltd. in May 2024. Below is a summary of the UL 9540A unit level fire test results as well as a description of the performance of key fire safety features and systems during the test. This discussion is a summary of the test setup, test data and results. For a full description of the test, please refer to TÜV's UL 9540A unit level test report.

3.3.1 Test Setup and Initiation

The SB3 test unit consisted of 4 battery modules, with a capacity of 418 kWh, tested at 100% SOC. During the test, the BMS and TMS were disabled, i.e., they were not actively operating to prevent thermal runaway in a cell or to prohibit the propagation of thermal runaway from cell-to-cell, or module-to-module. As such, the UL 9540A unit level fire test can be considered a worst-case scenario fire scenario, where the unit tested was at the highest energy density possible (100% SOC), and the BMS and TMS were disabled and, therefore, unable to actively respond to the thermal runaway condition.

The initiating battery module was chosen to be the second battery module from the bottom in the initiating unit (Unit 1), as shown in Figure 10. This location was deemed to be the worst case, given there are battery modules directly above it and below it. In addition, by initiating in the battery module second from the bottom, there are two battery modules installed directly above the initiation location. Within the battery module itself, three interior cells were simultaneously heated via two film heaters. The number of cells and the location were selected to provide the greatest thermal exposure to adjacent cells to ensure cell to cell propagation during the



test. The objective of this initiation method is to simulate a mass failure of multiple cells in a localized area within the same battery module.

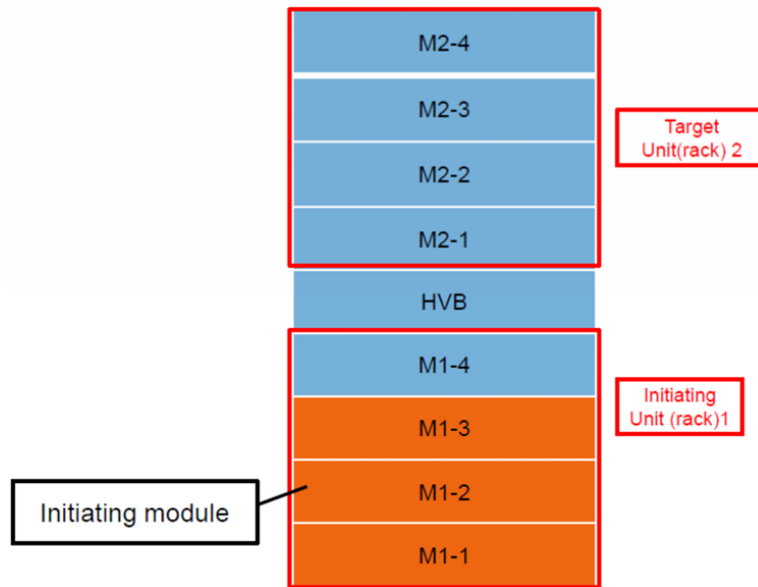


Figure 10: Initiating Module Location

Two additional target SB3 units were installed approximately 4.4 in (112 mm) to the side of the initiating unit, as shown in Figure 11. The two target SB3 units to the side simulate a multiple SB3 installation to determine if thermal runaway and/or fire will propagate from one SB3 cabinet to adjacent cabinets at separation distances of 4.4 in (112 mm). Additionally, the units were enclosed by three walls installed as close as 1.5 in (40 mm) from the initiating unit to demonstrate if fire could spread to a combustible surface during the test.

Note: this testing was performed as an indoor BESS. Therefore, not tested as specifically prescribed by NFPA 855. However, the testing arrangement can be considered conservative for an outdoor ground mounted BESS.

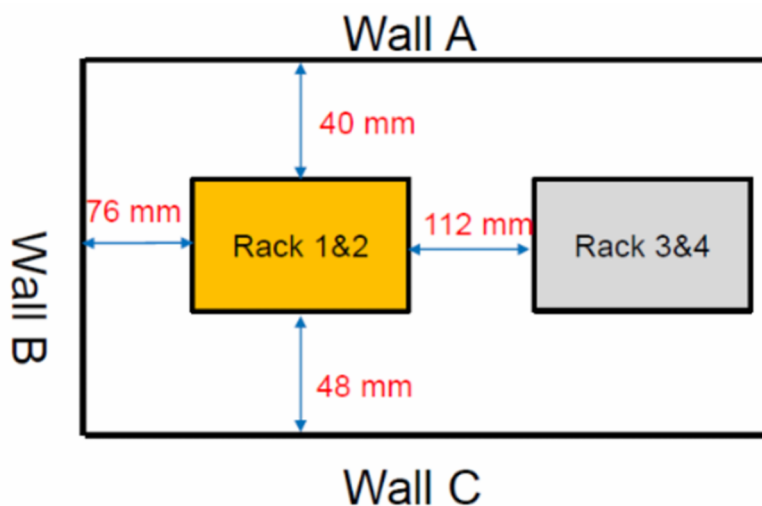


Figure 11: Instrumentation and Target SB3 Unit Setup (Top View)



3.3.2 Key Results & Takeaways

Table 4 provides a summary of key events from the UL 9540A unit level fire test of the SB3.

Table 4: UL 9540A Unit Level Testing: Timeline of Key Events

Locations (Cell #)	Event	Time
-	Test Start	15:45
40	Vent	16:40
40	Thermal Runaway	16:55
39	Thermal Runaway	17:04
41	Thermal Runaway	17:06
38	Thermal Runaway	17:09
42	Thermal Runaway	17:14

After the test, analysis of the data and a visual inspection of the initiating SB3 yielded the following observations:

- Over the duration of the test, five cells went into thermal runaway: the three that were forcibly heated and two additional cells. This demonstrated that cell to cell propagation had occurred during the test, as is required by UL 9540A.
- No other signs of distress were observed in the initiating battery module. Thermal runaway did not propagate beyond the three cells within the initiating module, nor did it spread to the module above or below it within the battery rack.
- Visible clues of fire damage were not observed to components (plastics, electronics, etc.) adjacent to the five failed cells. Based on this observation, it is likely that a sustained fire did not occur around the initiating battery module, even with the failure of five cells occurring.
- The battery modules within the target unit installed above and below were unaffected.
- Heat flux measurements were recorded throughout the UL 9540A unit level fire test on each wall and the target units to the side of the initiating unit. Since flames did not occur outside the initiating unit, predictably, these measurements were 0.0 kW/m² throughout the entire test.
- Explosion hazards, including but not limited to, observations of a deflagration, projectiles, flying debris, detonation, or other explosive discharge of gases were not observed during the test when a near simultaneous failure of up to five cells occurs within the same battery module.

These test results meet all five of UL 9540A's performance criteria for outdoor ground mounted BESS units. The unit level test demonstrated that the near simultaneous failure of five cells within the same battery unit did not lead to flaming combustion nor to a propagating thermal runaway event throughout the SB3 cabinet.

3.4 Large-Scale Fire Testing

This fire test information will be included once provided.



4. MANHAN RIVER, LLC BESS SITE

The Manhan River, LLC BESS is being proposed for installation in Southampton, MA. It is bounded by Pleasant Street to the east, Gunn Road to the north, East Street to the south, and Route 10 to the west, as shown in Figure 12. As such, the Manhan River, LLC BESS will be located in a rural area in Southampton primarily surrounded by residential neighborhoods and undeveloped land.

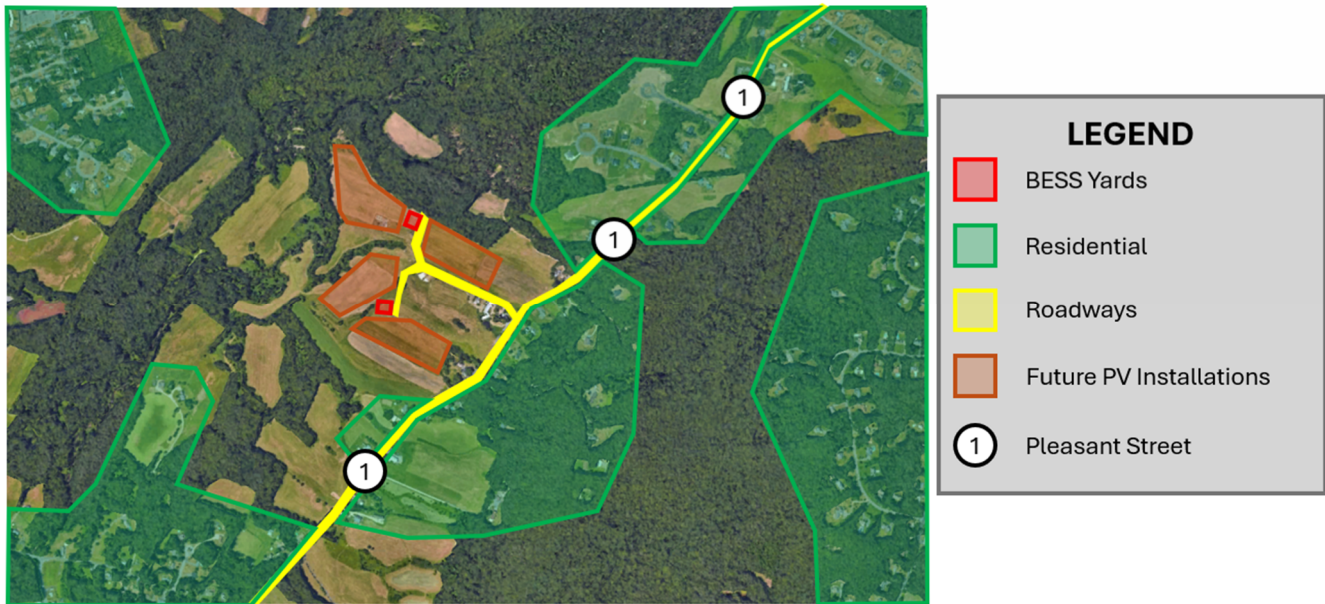


Figure 12: Aerial Map (Near View)

4.1 Site Level Fire Safety Features

Based on a review of the IFP drawing package dated 11/04/2025 (the drawing set) and discussion with the Blue Wave Energy, the Manhan River, LLC BESS is anticipated to include four SB3 cabinets split between two separate BESS yards (north/south yards) with an approximate capacity of 10 MWh, as shown in Figure 13. Fire apparatus access roadways will be constructed which connect the north/south BESS yards to Pleasant Street. These roadways also provide access to the landowner for agricultural purposes. The nearest fire hydrant is located near the site entrance along Pleasant Street as shown in Figure 13 with an approximate hose pull distance of 1,500 ft. and 2,000 ft. to the north and south BESS yards, respectively.

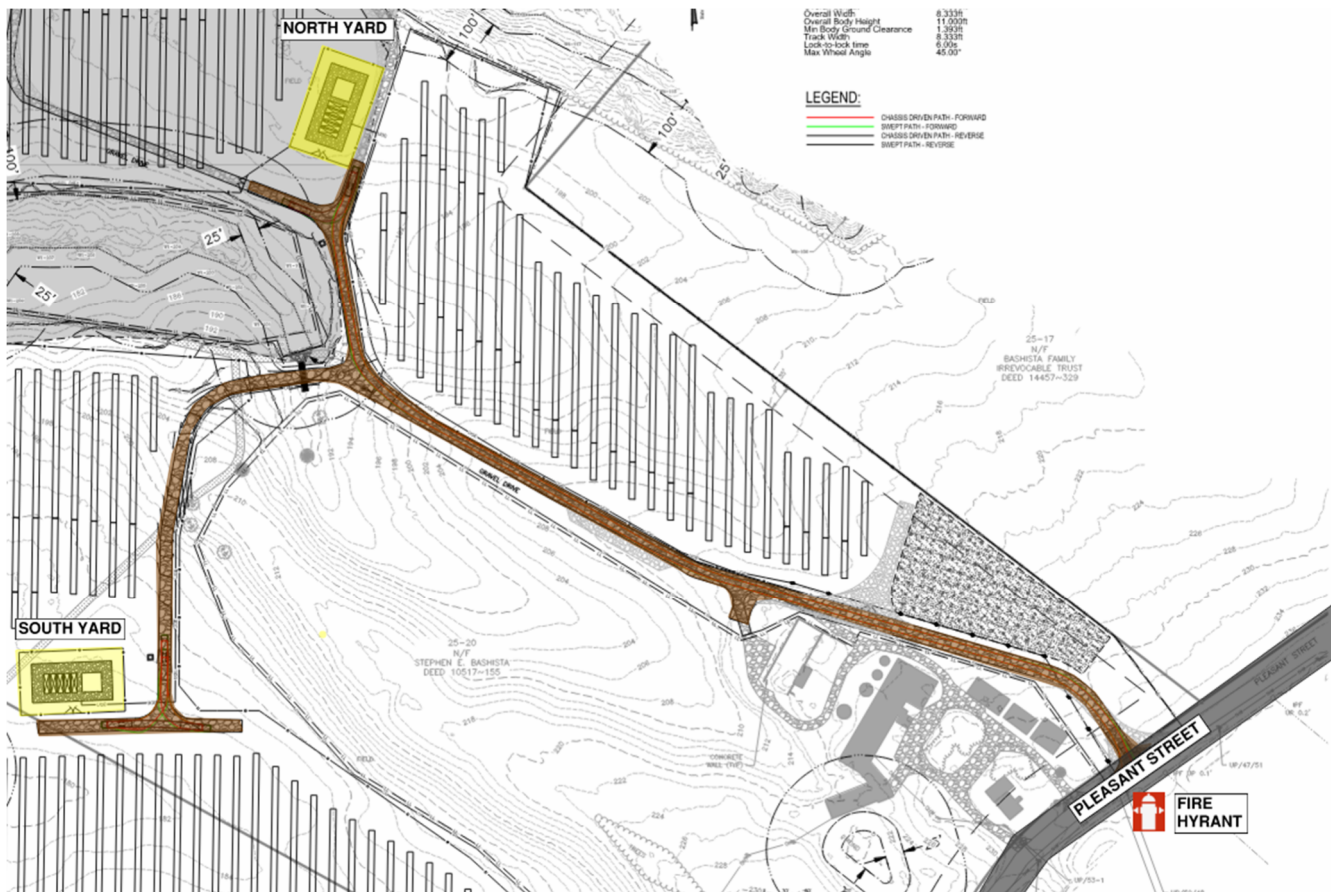


Figure 13: Site Plan

As shown in the drawing set and the SB3 product documentation, the Manhan River, LLC BESS will have a number of site-level fire safety systems and features as described in the following sections.

4.1.1 BESS Monitoring and Emergency Notification

It is anticipated that the Manhan River, LLC BESS will be remotely monitored. If an abnormal signal is received, the O&M management organization and the responsible service personnel (O&M service personnel) would be notified in such a case. However, additional details of the BESS monitoring and emergency notification are forthcoming as the design progresses.

4.1.2 Periodic Maintenance

It is anticipated that the Manhan River, LLC BESS will be periodically inspected and serviced by trained O&M service personnel.



4.1.3 BESS Security

A 7-ft tall fixed knot farm fence will be installed around the perimeter of the north and south BESS yards at the Manhan River, LLC BESS to prohibit access to the SB3 cabinets. Also, the secured area around each BESS yard will include one 24-ft wide personnel access gate on the yard's south side.

4.1.4 Fire Department Access

The Southampton Fire Department is the closest fire department to the Manhan River, LLC BESS and is approximately 2 miles away from the BESS installation. The closest access road to the Manhan River, LLC BESS is Pleasant Street which connects to the fire apparatus access roadways within the site as shown in Figure 13 above. The fire apparatus access roadways have the following design features:

- Extend to within 150 ft of each SB3 cabinet contained in the BESS yards.
- Minimum unobstructed width of 16 ft with suitable turning radius/angles of approach/departure and an unobstructed vertical clearance.
- Constructed of gravel to provide all-weather driving capabilities.
- Dead end exceeding 150 ft. in length without an approved turnaround at the south BESS yard.
- It is anticipated that the grade of the fire apparatus access roadways will not exceed 10%.

4.1.5 Emergency Water

As discussed in Section 4.1 above, the Manhan River, LLC BESS site has access to an emergency water supply via the fire hydrant located near the site entrance with an approximate hose pull distance of 1,500 ft and 2,000 ft to the north and south BESS yards, respectively.

Note, based on the UL 9540A unit level fire testing, manual fire suppression (hose lines) is not required to suppress a SB3 fire.

4.1.6 Fire Alarm and Notification System

The SB3 cabinet is provided with fire and gas detection. The fire and gas detection system includes three photoelectric smoke detectors (two in the battery compartment and one in the electrical compartment), three heat detectors (two in the battery compartment and one in the electrical compartment), and two hydrogen gas detectors in the battery compartment. The fire and gas detection system is connected to a FACP. For local notification, an alarm bell and an audible/visible appliance are installed on the exterior of the SB3 cabinet. Additional safety features are available optionally, including a pull station, disable switch, abort switch, and gas release alarm.

As the site design is still under development, fire alarm design drawings have not been provided. It is anticipated that the fire alarm system will be monitored locally by a FACP. It is anticipated that the FACP will be monitored 24/7 by a remote monitoring station. Should a fire or other thermal event occur at the Manhan River, LLC BESS that triggers an alarm at the FACP, the remote monitoring station would receive that alarm signal and could then notify the site contact and the fire department.



4.1.7 Fire Suppression System

No external nor internal fire suppression system will be provided on or in the SB3 cabinets.

4.1.8 Emergency Stop

An emergency start/stop (E-stop) button is provided at each end of the SB3 cabinet, which will shut down the SB3 cabinet when pressed. This E-Stop can be used for maintenance purposes or during an emergency to isolate the SB3 cabinets from connected energy sources. Note, a site-wide E-Stop should never be initiated without first coordinating with the site and the Utility.

4.2 Permanent BESS or Electrical Grid Exposures

The Manhan River, LLC BESS and its associated equipment are intended to operate year-round, 24 hours a day, 365 days a year. It is anticipated that each SB3 cabinet will be installed on a concrete pad surrounded by gravel. As the design for the BESS yards are progressed, the clearance distances to permanent electrical exposures associated with the Manhan River, LLC BESS and/or electrical grid will be confirmed.

4.3 Permanent Public Exposure Hazards

All permanently installed public exposures (lot lines, public ways, buildings, stored combustible materials, hazardous materials, high-piled stock, and exposure hazards not associated with electrical grid infrastructure) are greater than 10 ft from the closest SB3 cabinet. As described in the drawing set and aerial map, clearance distances to public exposures are summarized in Figure 14 and Table 5.

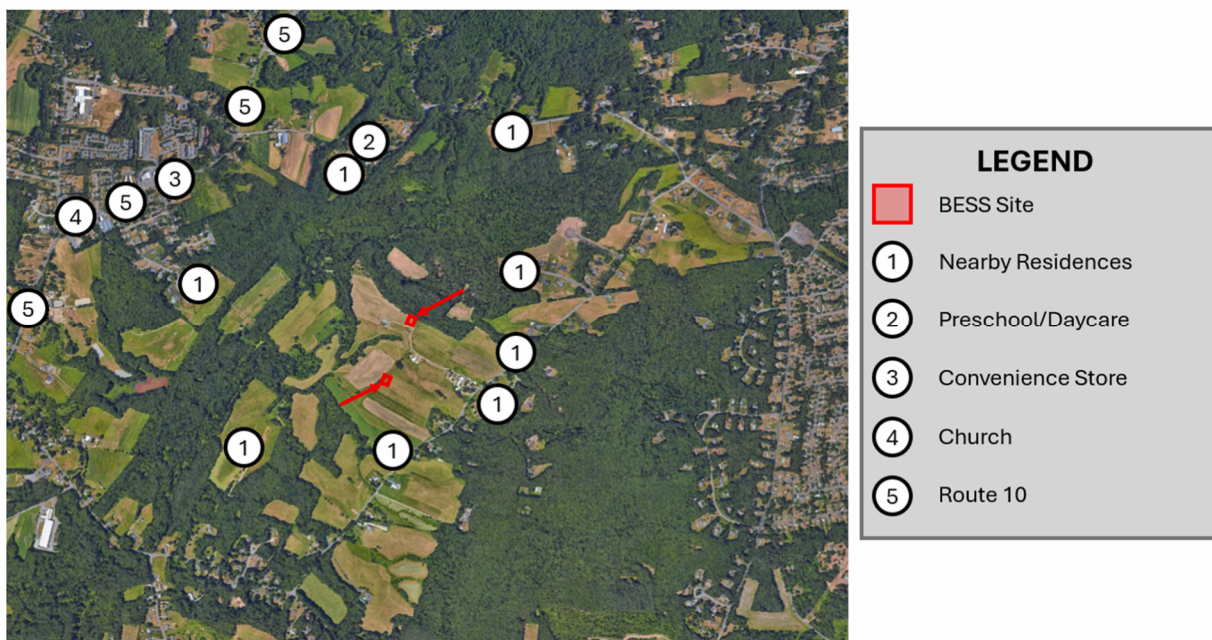


Figure 14: Aerial Map (Far View)

*Table 5: Distance to Permanent Public Exposures*

Exposure	Approximate Distance
Nearest Property Line Boundary	400 ft.
Nearest Roadway (Pleasant Street)	1,000 ft.
Closest Residence	1,000 ft.
Other Nearby Residences	1,400 ft.
Clown Around Preschool/Daycare	1/2 mile
Cumberland Farms Convenience Store	1 mile
Christ Community of Hampshire County	1 mile
Route 10	1 mile



5. SITE DESIGN CODE ANALYSIS

527 CMR (Massachusetts Comprehensive Fire Safety Code) adopts/amends the 2021 Edition of NFPA 1. As amended by 527 CMR, NFPA 1 Chapter 52 (Energy Storage Systems) references the 2020 Edition of NFPA 855. Accordingly, the code analysis herein is conducted in accordance with NFPA 855 (2020).

Compliance with NFPA 855 is required when a lithium-ion BESS installation has an energy capacity greater than 20 kWh (NFPA 855 Table 1.3). Since the Manhan River, LLC BESS is anticipated to have an energy capacity of 10 MWh, NFPA 855 requirements apply. Below is a review of the Manhan River, LLC BESS site design for compliance with NFPA 855. Note, this code analysis applies only to site design elements of the Manhan River, LLC BESS pertaining to fire and life safety. Other aspects of the site design, including the electrical or structural design, are outside the scope of this review. As this is a site design review, elements related to the installation itself are also outside the scope of this analysis. It is assumed that the BESS and its associated equipment, including all fire protection systems, will be installed, commissioned, inspected, tested, and maintained as required by the manufacturer(s), NFPA 855, and/or other applicable codes and standards.

5.1 Outdoor BESS Classifications

The Manhan River, LLC BESS is anticipated to include two BESS yards containing two SB3 containers each (subject to change as the design progresses). The SB3 is a NWI style BESS that is unoccupiable, with all internal components accessible via exterior doors. NFPA 855 defines this type of BESS as an Energy Storage System Cabinet, which is an enclosure containing components of the ESS where personnel cannot enter the enclosure other than reaching in to access components for maintenance purposes. For outdoor BESS installations, NFPA 855 provides code requirements based on the proximity and location of the BESS equipment from adjacent exposures (NFPA 855 §4.4.3.1). The two relevant outdoor installation classifications are as follows:

- **Remote locations** – BESS located more than 100 ft from buildings, lot lines that can be built upon, public ways, stored combustible materials, hazardous materials, high-piled stock, and other exposure hazards not associated with electrical grid infrastructure.
- **Locations near exposures** – BESS locations that do not comply with remote outdoor location requirements.

Based on the drawing set, there is greater than a 100 ft separation distance between the SB3 cabinets and the nearest exposures not associated with the electrical grid infrastructure. As such, the Manhan River, LLC BESS is classified as a remote, outdoor BESS for this analysis. Table 6 summarizes code requirements pertaining to a remote, outdoor lithium-ion BESS installation, which are discussed in detail within the following sections. Other NFPA 855 requirements that apply to all facilities, BESS or otherwise, include fire apparatus access roads (NFPA 855 §4.4.3.8).



Table 6: NFPA 855 Outdoor BESS Installation Requirements

Requirement	Remote Exposures	NFPA 855 Reference
All ESS Installations	Yes	§4.1-4.3
Maximum Size	Yes	§4.4.3.2
Clearance to Exposures	N/A	§4.4.3.3
Means of Egress Separation	N/A	§4.4.3.4
Vegetation Control	Yes	§4.4.3.6
Size and Separation	No	§4.6
Maximum Stored Energy	No	§4.8
Smoke and Fire Detection	Yes	§4.10
Fire Control and Suppression	Yes	§4.11
Fire Protection Water Supply	Yes	§4.13
Technology Specific Protection – Lithium-Ion Batteries		
Thermal Runaway	Yes	§9.3
Explosion Control	Yes	§4.12
Other NFPA 855 Requirements – All Facilities		
Fire Department Access Roads	Yes	§4.4.3.8

5.2 All ESS Installations

NFPA 855 §4.1 through §4.3 apply to all ESS installations: indoor, outdoor, stationary, and mobile. Only the fire and life safety general installation requirements applicable to the site design of a remote, outdoor, NWI style BESS installation are summarized in the following sections. Requirements unrelated to fire and life safety (such as electrical or structural) or pertaining to other types of BESS installations (such as indoor) are not discussed. These include electrical installations (NFPA 855 §4.3.1), seismic and structural design (NFPA 855 §4.3.3), design loads (NFPA 855 §4.3.4), egress (NFPA 855 §4.3.10), open rack installations (NFPA 855 §4.3.11), fire-resistance rated separations/barriers (NFPA 855 §4.3.6), and occupied work centers (NFPA 855 §4.7).

5.2.1 Combustible Storage

NFPA 855 §4.1.6 does not permit combustible materials to be stored in ESS rooms, cabinets, enclosures, areas, or walk-in units. In addition, combustible materials cannot be stored within 3 ft of the ESS. The SB3 is a NWI style BESS that is unoccupiable with all internal components accessible via exterior doors. It does not have free open space within the cabinet to store additional combustible materials. Based on a review of the drawing set, no combustible materials will be stored within 3 ft of the SB3 cabinets. As such, the Manhan River, LLC BESS site design complies with NFPA 855 combustible storage requirements.



5.2.2 Equipment

NFPA 855 §4.2.1 requires ESS to be listed in accordance with UL 9540. The SB3 is listed to UL 9540. As such, the Manhan River, LLC BESS site design complies with NFPA 855 equipment listing requirements.

5.2.3 Environment

NFPA 855 §4.2.6 requires the temperature, humidity, and other environment conditions in which the ESS is located to be maintained in accordance with the listing and the manufacturer's specifications. The SB3 is provided with a TMS that maintains suitable environmental conditions for the ESS, as described in Section 2.5. As such, the Manhan River, LLC BESS site design complies with NFPA 855 environment requirements.

5.2.4 Energy Storage Management System (ESMS)

NFPA 855 §4.2.9 requires ESS to be provided with an ESMS or a BMS. The SB3 is provided with a BMS that monitors battery cell temperatures, voltages, currents, and dry contact switching in real-time, as described in Section 2.6. As such, the Manhan River, LLC BESS complies with NFPA 855 ESMS requirements.

5.2.5 Toxic and Highly Toxic Gases

NFPA 855 §4.1.1 does not permit ESS to release toxic and highly toxic gas during normal charging, discharging, and use. The SB3 uses listed lithium-ion cells that do not vent toxic or highly toxic gases, or any gases, during charging, discharging, or normal use conditions. As such, the Manhan River, LLC BESS site design complies with NFPA 855 toxic and highly toxic gas requirements.

5.2.6 Enclosures

NFPA 855 §4.4.3.7 requires enclosures to be noncombustible and weatherproof. The SB3 is a noncombustible cabinet with an IP66 rating. As such, the Manhan River, LLC BESS site design complies with NFPA 855 enclosures requirements.

5.2.7 Signage

NFPA 855 §4.3.5 requires approved signage to be provided in the following locations:

1. On the front of doors to rooms or areas containing ESS or in approved locations near entrances to ESS rooms.
2. On the front of doors to outdoor occupiable ESS.
3. In approved locations on outdoor ESS that are not enclosed in occupiable containers or otherwise enclosed.

The signage required must be in compliance with ANSI Z535 and include the following information:

1. "Energy Storage Systems" with symbol of lightning bolt in a triangle.
2. Type of technology associated with the ESS.
3. Special hazards associated as identified in Chapters 9 through 15.
4. Type of suppression system installed in the area of the ESS.



5. Emergency contact information.

A permanent plaque denoting the location of all electric power source disconnecting means on or in the premises shall be installed at each service equipment location and at the location(s) of the system disconnect(s) for all energy sources capable of being interconnected.

The Manhan River, LLC BESS is capable of being installed in accordance with these requirements; however, signage will be evaluated once additional site design details are provided to confirm compliance.

5.2.8 Impact Protection

NFPA 855 §4.3.7 requires ESS to be located or protected to prevent physical damage, including impact by a motor vehicle. Based on a review of the drawing set, vehicle impact protection is not being provided at the Manhan River, LLC BESS. However, the Manhan River, LLC BESS is a secure, remote installation that does not have personnel on site each day. In addition, there is no motor vehicle traffic moving through the site other than the occasional maintenance vehicle (i.e., there are no public roads/ways on the site) and landowner access for agricultural purposes. Therefore, vehicle impact protection is not necessary for the Manhan River, LLC BESS. As such, the Manhan River, LLC BESS site design complies with NFPA 855 impact protection requirements.

5.2.9 Security of Installation

NFPA 855 §4.3.8 requires rooms, areas, and walk-in units in which electrochemical ESS are located to be secured against unauthorized entry and safeguarded in an approved manner. Security barriers, fences, landscaping, and other enclosures shall not inhibit the required air flow to or exhaust from the electrochemical ESS and its components. As described in Section 4.1.3, a gated, 7-ft tall, fixed knot farm fence will be installed around the perimeter of each BESS yard to prohibit access to the SB3 cabinets. This fencing shall not, however, prohibit the required air flow to the cabinets. As such, the Manhan River, LLC BESS site design complies with NFPA 855 security of installation requirements.

5.2.10 Access Roads

NFPA 855 §4.4.3.8 requires fire department access roads to be provided to outdoor ESS installations in accordance with the local fire code. NFPA 1 Chapter 18 requires fire apparatus roads to be provided in accordance with §18.2.3 for every facility, building, or portion of a building hereafter constructed or relocated. At a minimum, the fire apparatus access roads must meet the following:

- Extend to within 150 ft of all portions of the facility and all portions of the exterior walls of the first story of the building as measured by an approved route around the exterior of the building or facility (§18.2.3.2.2).
- Have an unobstructed width of not less than 20 ft and an unobstructed vertical clearance of not less than 13 ft 6 inches (§18.2.3.5.1.1 and §18.2.3.5.1.2).
- Be designed and maintained to support the imposed loads of fire apparatus and shall be surfaced so as to provide all-weather driving capabilities (§18.2.3.5.2).
- Have a turning radius, angles of approach and departure that are approved by the FCO (§18.2.3.5.3).
- Minimum inside turning radius of 25 ft. (§18.2.3.5.3.1 as amended by 527 CMR).



- Dead-end fire apparatus access roads in excess of 150 ft in length shall be provided with an approved area for turning around fire apparatus (§18.2.3.5.4).
- The grade of the fire apparatus access road shall not exceed 10% unless approved by the FCO (§18.2.3.5.6.1 as amended by 527 CMR).

The Manhan River, LLC BESS is capable of compliance with these requirements; however, the following modifications would be required:

- Increase minimum unobstructed roadway width from 16 ft to 20 ft.
- Remove the dead end that exceeds 150 ft in length or provide an approved turnaround.

5.3 Outdoor ESS Installations

5.3.1 Size and Separation

NFPA 855 §4.6 requires near exposures, outdoor BESS to be segregated into groups not exceeding 50 kWh with each group to be separated by minimum 3 ft from other groups. However, these requirements do not pertain to the Manhan River, LLC BESS as it is classified as a remote, outdoor BESS.

5.3.2 Maximum Stored Energy

NFPA 855 §4.8 requires near exposures, outdoor BESS to meet the maximum allowable quantities threshold of 600 kWh. However, this requirement does not pertain to the Manhan River, LLC BESS as it is classified as a remote, outdoor BESS.

5.3.3 Maximum Size

NFPA 855 §4.4.3.2 does not permit outdoor ESS cabinets to exceed 53 ft × 8.5 ft × 9.5 ft, not including HVAC and other equipment. The SB3 is a NWI style cabinet with dimensions 19.9 ft × 8.0 ft × 9.5 ft, which is smaller than the maximum permitted size for outdoor cabinets per NFPA 855. As such, the Manhan River, LLC BESS site design complies with the NFPA 855 maximum size requirements.

5.3.4 Clearance to Exposures

NFPA 855 §4.4.3.3 requires ESS located outdoors to be separated by a minimum of 10 ft (3048 mm) from the following exposures: lot lines, public ways, buildings, stored combustible materials, hazardous materials, high-piled stock, and other exposure hazards. Note, the *other exposure hazards* applies to other exposure hazards not associated with the electrical grid infrastructure. Based on a review of the drawing set, no exposure is within 10 ft of the nearest SB3. As such, the Manhan River, LLC BESS site design complies with the clearance to exposures requirements.

5.3.5 Means of Egress Separation

NFPA 855 §4.4.3.4 requires ESS located outdoors to be separated from any accessible means of egress as required by the FCO to ensure safe egress under fire conditions, but not less than 10 ft. The FCO is authorized



to approve a reduced separation distance to 3 ft where large-scale fire testing complying with NFPA 855 §4.1.5 is conducted and demonstrates that a fire involving the ESS will not adversely impact occupant egress. Based on a review of the drawing set, the Manhan River, LLC BESS site design complies with the means of egress separation requirement.

5.3.6 Vegetation Control

NFPA 855 §4.4.3.6 requires areas within 10 ft on each side of outdoor ESS to be cleared of combustible vegetation and other growth. It is anticipated that each SB3 cabinet will be installed on a concrete pad surrounded by gravel. This design would provide at least 10 ft on each side of all SB3 cabinets free of combustible vegetation. As such, the Manhan River, LLC BESS site design complies with the vegetation control requirements.

5.3.7 Smoke and Automatic Fire Detection

NFPA 855 §4.10 requires areas containing ESS located within buildings or structures to be provided with a smoke detection or radiant energy sensing system in accordance with NFPA 72. The SB3 is a NWI style BESS that is unoccupiable, with all internal components accessible via exterior doors. It is not being installed inside a room, indoor areas, or walk-in units. Therefore, the SB3 installation at the Manhan River, LLC BESS does not require smoke and automatic fire detection. As such, the Manhan River, LLC BESS site design complies with the smoke and automatic fire detection requirements.

However, the SB3 is equipped with a smoke and heat detection system. In addition, the SB3 is equipped with an audible/visual notification appliance located on the exterior of the cabinet. It is anticipated that any alarm state communicated from a SB3 BMS would be seen at the full site network's EMS as described in Section 2.6. Although this system is not required by NFPA 855, FRA recommends that any fire alarm system be designed, commissioned, and installed in accordance with NFPA 72.

5.3.8 Fire Suppression System

NFPA 855 §4.11 requires an automatic fire suppression system to be installed in rooms and areas within buildings and walk-in units containing ESS. The SB3 is a NWI style BESS that is unoccupiable with all internal components accessible via exterior doors. It is not being installed inside a room or within a building. Therefore, the SB3 installation at the Manhan River, LLC BESS does not require fire suppression systems. As such, the Manhan River, LLC BESS site design complies with fire suppression system requirements.

5.3.9 Water Supply

NFPA 855 §4.13 requires sites where non-mechanical ESS are installed to be provided with a permanent source of water for fire protection. Where no permanent and reliable water supply exists for firefighting purposes, the requirements of NFPA 1142, *Standard on Water Supplies for Suburban and Rural Firefighting*, apply. As discussed in Section 4.1 above, the Manhan River, LLC BESS site has access to an emergency water supply via the fire hydrant located near the site entrance with an approximate hose pull distance of 1,500 ft. and 2,000 ft. to the north and south BESS yards, respectively. As such, the Manhan River, LLC BESS meets NFPA 855 water supply requirements subject to FCO approval.



Note, typical BESS firefighting response procedures do not require or recommend offensive firefighting tactics to manually suppress a BESS fire. In addition, UL 9540A unit level fire testing (see Section 3.3) demonstrated that a fire will not spread from module to module within the SB3 cabinet or to adjacent SB3 cabinets. This result was without a fire suppression system installed inside the SB3 cabinet and without manual fire suppression via hose lines.

5.4 Technology Specific Protection – Lithium-Ion Batteries

NFPA 855 requires electrochemical ESS to comply with the thermal runaway requirements of NFPA 855 §9.3 and the explosion control requirements of NFPA 855 §4.12. Note, lithium-ion batteries do not need to meet the exhaust ventilation requirements of NFPA 855 §4.9, the spill control and neutralization requirements NFPA 855 §4.14 and §4.15, or the safety cap requirements NFPA 855 §9.4.

5.4.1 Explosion Control

NFPA 855 Table 9.2 requires lithium-ion ESS installed within a room, building, ESS cabinet, ESS walk-in unit, or otherwise unoccupiable enclosure to be provided with one of the following per §4.12:

- (1) Explosion prevention systems designed, installed, operated, maintained, and tested in accordance with NFPA 69; or
- (2) Deflagration venting installed and maintained in accordance with NFPA 68.

The SB3 is equipped with a CCRS that is designed per NFPA 69 to maintain the flammable gas concentration inside the SB3 cabinet below 25% of the LFL, thereby minimizing the deflagration potential. To detect flammable gases, two combustible gas detectors are installed at the top interior of each cabinet and are activated when the concentration of hydrogen at the detector location reaches 10% of the LFL. Once activated, the FACP receives an alarm signal, which activates the alarm bell, exhaust fan, and intake air louvers.

TÜV performed a review of the explosion control system and associated fluid dynamics (CFD) simulations for the SB3 and determined the system complies with NFPA 69. This NFPA 69 evaluation report is not endorsed by a registered design professional. A detailed compliance review of these systems was not part of this scope of work. Based on the TÜV CFD modeling, the SB3 installation at the Manhan River, LLC BESS can meet the NFPA 855 explosion control requirements. FRA recommends that the NFPA 69 compliance evaluation be signed and sealed by a registered design professional.

5.4.2 Thermal Runaway Protection

NFPA 855 §9.3 requires thermal runaway protection for lithium-ion BESS. This protection can be provided with a listed device or other approved method to prevent, detect, and minimize the impact of thermal runaway. The thermal runaway protection is permitted to be part of the BMS that has been evaluated with the battery as part of the evaluation to UL 1973 or UL 9540. The SB3 is equipped with a BMS that was tested and verified to UL 9540. As such, the Manhan River, LLC BESS site design complies with NFPA 855 thermal runaway requirements.



5.5 Product Design Code Analysis Summary

Based on a review of the SB3 and the IFP drawing package dated 11/04/2025 (the drawing set), the SB3 installation at the Manhan River, LLC BESS site design can meet the NFPA 855 installation level requirements for an outdoor, NWI style BESS when it is installed in accordance with the manufacturer's instructions, its listing, the approved drawings, and NFPA 855. However, as the final site design is developed, several items were identified in this analysis that still need modification/confirmation to ensure compliance. These include:

- Approved signage must be provided at the site per NFPA 855 §4.3.5.
- Increase minimum unobstructed fire apparatus access roadway width from 16 ft to 20 ft.
- Remove the fire apparatus access dead end that exceeds 150 ft in length or provide an approved turnaround.
- Obtain FCO approval for the fire protection water supply at the site per NFPA 855 §4.13.



6. BESS PLANS & TRAINING

NFPA 855 requires several plans to be developed for a BESS site. Often times, these documents are developed during construction or after substantial completion of the facility, such that they include site specific details that would not be available prior (such as during the design phase of the project).

6.1 Commissioning, Operation, Decommissioning, and ITM

NFPA 855 requires commissioning, decommissioning, and inspection, testing, and maintenance (ITM) requirements for all BESS installations. It states that the operation, inspection, testing, and maintenance must follow the manufacturer's instructions.

A commissioning plan must be developed for the integration of the new BESS equipment into the electrical utility grid. The commissioning documentation is to capture the commissioning roles and responsibilities, list of equipment, conditions, BESS operation compliance, fire protection feature compliance, and operability (NFPA 855 Chapter 6). An operation and maintenance manual must be developed and provided to both the owner, or their authorized agent, and the BESS operator before the BESS is put into operation (NFPA 855 Chapter 7). A decommissioning plan must be developed to provide the organization, documentation requirements, contingencies, and methods and tools necessary to indicate how the safety systems, ESS, and components will be decommissioned and removed from the site (NFPA 855 Chapter 8). In addition, all fire protection systems must be designed, installed, commissioned, inspected, tested, and maintained as required by each respective NFPA standard.

6.2 Emergency Operations Plan

NFPA 855 §4.1.3.2.1 requires an emergency operations plan (EOP) to be readily available at a BESS site for use by facility operations and maintenance personnel. The EOP is a living document that should be updated when conditions change that affect the response considerations and procedures. At a minimum, the EOP shall include the following: procedures for safe operational shutdown, inspection testing and maintenance, BESS response procedures, fire response procedures, safety data sheets, emergency contact information, procedures for dealing with damaged equipment, and procedures for conducting drills [NFPA 855 §4.1.3.2.1.4].

6.3 Emergency Response Plan

An ERP is typically developed to be readily available at the Manhan River, LLC BESS for use by facility operations and maintenance personnel. The ERP is a living document that should be updated when conditions change that would affect the response considerations and procedure changes. It should be written using terminology that the fire department and first responders are familiar with and should consider them as the primary reader. The BESS ERP, at a minimum, should include: contact information, a site overview, BESS details, site fire protection system details, site hazards, response tactics and recovery/post incident operations.



6.4 Emergency Response Training

NFPA 855 §4.1.3.1 requires the owner of the BESS or their authorized representative to engage in emergency planning and training of ESS facility operations and maintenance personnel and emergency responders so that they can effectively address foreseeable hazards associated with the on-site systems. Additionally, NFPA 855 §4.1.3.2.2 requires all personnel responsible for the operation, maintenance, repair, servicing, and response of the ESS to be trained in the procedures included in the EOP. In addition, annual refresher training must be provided, and records of the training must be retained.

6.5 Plans and Training Summary

Canadian Solar has developed commissioning, installation, user, maintenance manuals, safety and decommissioning manuals for the SB3 to provide guidance to anyone designing, installing, commissioning, operating, maintaining, servicing, decommissioning, or responding to an emergency involving an SB3. These manuals can be utilized by site owners/operators to develop their own site-specific documents. As the site is still in the design phase, more details related to these plans will be included once provided. It is anticipated that a commissioning plan, operations and maintenance manual, a decommissioning plan, EOP, or an ERP will be developed for the Manhan River, LLC BESS to meet the NFPA 855 requirements. FRA recommends that all of these plans be finalized and approved prior to energizing the Manhan River, LLC BESS and that all site personnel and emergency response personnel, who could be responsible for responding to a Manhan River, LLC BESS emergency, be trained prior to energizing the Manhan River, LLC BESS. In addition, refresher training should be provided as appropriate, typically annually, as required by NFPA 855.



7. HAZARD MITIGATION ANALYSIS

This HMA is being prepared following the guidance by NFPA 855. The HMA evaluates the fire safety features of the SB3, the findings of the UL 9540A cell, module, and unit level tests, and the site level fire safety features of the Manhan River, LLC BESS.

Based on the product level and site level safety features, the fire and life safety consequences associated with typical BESS failure modes can be evaluated to determine the impact to site personnel, the general public, and adjacent exposures.

NFPA 855 §4.1.4.2 requires an HMA to evaluate the consequences associated with the following failure modes, and others deemed necessary by the FCO. Note, only single failure modes must be considered in this analysis:

1. Thermal runaway condition in a single module, array, or unit.
2. Failure of an energy storage management system.
3. Failure of a required ventilation or exhaust system.
4. Failure of a required smoke detection, fire detection, fire suppression, or gas detection system.

The consequences of each failure mode are evaluated in Sections 7.1 through 7.4 of this report.

7.1 Thermal Runaway Condition

7.1.1 Description

Thermal runaway is a condition in which a self-heating chemical reaction occurs within a battery cell. This occurs when the battery cell generates heat faster than the battery cell is able to dissipate heat. Thermal runaway can be caused by physical damage (e.g. puncture, crushing), electrical malfunctions (e.g. overcharging), exposure to elevated ambient temperatures (e.g. adjacent cells in thermal runaway with elevated temperatures), manufacturing defects, and other internal conditions which may develop inside of aging battery cells (e.g. dendrites).

Thermal runaway typically results in an overpressure event within the battery cell due to internal heat generation inside the casing causing battery gases to be ejected from the cell through the pressure relief valve. Depending on the conditions, thermal runaway may be limited to the initiating cell(s) or thermal runaway may propagate to adjacent cells. Thermal runaway propagation typically occurs through conductive and convective heating or physical damage of adjacent cells due to swelling of the initiating cell. Conductive heating is the primary mode of heat transfer to adjacent cells for a non-flaming event and convective heating is the primary mode of heat transfer to adjacent cells for a flaming event.

Based on cell level and module level testing, the SB3 cells generate toxic and flammable gases. Depending on the conditions of release, flammable gases released during a thermal runaway event may present an explosion or fire hazard. An explosion hazard exists when sufficient flammable gases are released in the absence of an ignition source and build up within the cabinet. A fire hazard exists when the flammable gases are released in



the presence of an ignition source or self-ignite. It should be noted, the fire hazard and explosion hazard are not mutually exclusive, and both may exist at different time periods throughout a propagating thermal runaway event. In addition, toxic gases present a health exposure hazard to site personnel and first responders located in the vicinity of a BESS failure.

7.1.2 Barriers

Passive and active mitigation strategies are provided to prevent batteries from entering thermal runaway and cool adjacent batteries to prevent thermal runaway propagation. The following barriers are provided in the SB3:

- The cells and modules utilized in the SB3 are certified to UL 1973.
- The SB3 is equipped with a BMS which monitors cell health and shuts down power to modules/cabinets with cells operating outside of their operating conditions, as described in Section 2.6.
- The SB3 is equipped with a TMS which automatically activates to provide cooling and prevent batteries from overheating and escalating to a thermal runaway event, as described in Section 2.5. Additionally, the TMS cools adjacent batteries in a thermal runaway scenario to prevent thermal runaway propagation.
- The SB3 modules are equipped with passive barriers to minimize the likelihood of thermal runaway of spreading from cell to cell.
- The SB3 is equipped with a series of electrical fault protection devices, as described in Section 2.7.
- The SB3 will be regularly maintained to ensure it is operating within its specific parameters and to verify the batteries are in good working condition, as described in Section 4.1.2.

7.1.3 Consequences

The consequences of thermal runaway can vary widely depending on the gas release scenario and level of confinement; however, the primary consequences of thermal runaway can be grouped into the following hazard categories: fire and radiant heat, deflagrations and explosions, and toxic gases.

7.1.3.1 Fire & Radiant Heat Exposure Hazard

UL 9540A unit level testing did not result in a fire (i.e., flaming thermal runaway). During that test, five cells went into thermal runaway: the three that were forcibly heated and two additional cells. Thermal runaway did not propagate beyond the fifth cell, and no sustained fire event occurred. However, a large-scale fire test (LSFT) and/or fire modeling has not been performed to explicitly evaluate the potential for thermal runaway to propagate from one SB3 cabinet to adjacent SB3 cabinets or to determine the minimum approach distances (MAD) should a fully involved SB3 fire occur. In the absence of this data, FRA recommends that site level emergency response procedures be utilized during a fire event to minimize the potential for fire to spread to adjacent cabinets and exposures.

Note, typical BESS firefighting response procedures do not require or recommend offensive firefighting tactics to manually suppress a BESS fire. If manual firefighting tactics are used, water is considered the preferred agent for managing lithium-ion battery fires, suppressing nearby combustibles, cooling nearby exposures, and controlling smoke. Other fire suppression methods, such as gaseous agents (CO₂, Halon), dry chemical suppressants, or foams, are unlikely to be effective. As such, FRA recommends defensive firefighting tactics to be utilized during a fire event involving a SB3 cabinet, and first responders should be trained on these tactics.



Accordingly, FRA recommends that fire responders remain at an initial MAD of 100 ft during a battery emergency. Note, these aspects provide mitigation only in the case in which multiple failures occur, including all of the battery system barriers identified in Section 7.1.2.

7.1.3.2 Deflagration & Explosions Hazard

The SB3 has been tested to UL 9540A, as described in Section 3.0. These test results demonstrated that flammable gases are released from the cells during thermal runaway which can pose a deflagration hazard within the SB3. To mitigate the impact of this hazard, the SB3 is equipped with a CCR system as described in Section 2.10. The CCR system is activated upon receiving signals from the gas detection sensors within the cabinet. Upon gas detection of 10% of the LFL, the ventilation system activates, pulling in outside air and exhausting internal air, to reduce the concentrations of flammable gases to under 25% of the LFL. In addition, the activation of the CCR system would also trigger the sounding of local fire notification appliances installed on the exterior of the SB3. These appliances can alert local site personnel and/or first responders, should any be in the area, of the hazard. Per the EOP/ERP and the training of site personnel/first responders, all personnel would be prompted to evacuate the area immediately upon activation of a fire alarm notification appliance. By immediately evacuating to a designated safe area, site personnel and first responders would provide physical separation between them and the potential deflagration and explosion hazard. This provides a second mitigation feature, physical separation of people from the SB3 cabinets, in addition to the CCR system. Note, these aspects provide mitigation only in the case in which multiple failures occur, including all of the battery system barriers identified in Section 7.1.2 and the CCR system. Accordingly, FRA recommends that first responders remain at an initial MAD of 100 ft from the distressed SB3 cabinet during a battery emergency.

7.1.3.3 Toxic Gas Hazard

The SB3 is not occupiable; therefore, toxic or highly toxic gas exposure is limited to individuals standing outside, in the open ambient air, in proximity to the SB3 cabinet during a failure/fire event. The toxic gases collected during the module level testing include typical fire byproducts, such as CO and CO₂. The fire alarm notification system is one mitigation feature installed at the cabinet level to address this hazard. This system can alert local site personnel and/or first responders, should any be in the area, of the hazard. Per the EOP/ERP and the training of site personnel/first responders, all personnel would be prompted to evacuate the area immediately upon activation of a fire alarm notification appliance. By immediately evacuating to a designated safe area, site personnel and first responders would provide physical separation between them and the potential toxic gas hazard. In addition, an ERP should direct first responders to wear proper Personal Protective Equipment (PPE), including a self-contained breathing apparatus (SCBA) and turnout gear, when responding to a battery emergency should they need to approach a distressed cabinet. Given the Manhan River, LLC BESS is installed outdoors, any gas release would be diluted by the entrainment of outside air. At the quantities measured during UL 9540A module level fire testing, such gases would not be expected to have an adverse effect on individuals during the time deemed necessary to evacuate from the area (i.e., approximately 30 seconds to walk 100 ft away/evacuate from a burning SB3) nor expected to have an adverse effect on emergency response personnel wearing appropriate PPE including a SCBA while responding to an SB3 fire. Note, these aspects provide mitigation only in the case in which multiple failures occur, including all of the battery system barriers identified in Section 7.1.2. Accordingly, FRA recommends that first responders remain at an initial MAD of 100 ft from the distressed SB3 cabinet during a battery emergency.



Note, toxic gases sometimes associated with lithium-ion batteries, such as HF, HCl, and HCN, were not detected during the UL 9540A module level testing of the SB3. However, the internal components of the SB3 (plastics, printed circuit boards, wiring, coolants, refrigerants, and the lithium-ion cells) could experience thermal decay that contributes to the fuel load, heat release rate, and production of trace toxic components. These could include the release of HF gas upon thermal degradation/decomposition of the lithium-ion cells. Additionally, thermal decomposition of refrigerants included in the TMS and wire insulation can be other potential contributing sources of HF. Acid gases like HCN could also form from the incomplete combustion of nitrogen-containing materials (such as wool, silk, cotton, paper, and plastics) and HCl could be released from the pyrolysis of chlorinated plastics, particularly polyvinyl chloride (PVC), and other chlorine-containing materials/plastics. Note, these hazards are not exclusive to battery fires. As the modern built environment has expanded the use of plastic goods, materials, and electronics to a wide variety of household products, HF, HCl, HCN and other products of combustion are also found in modern day fires. As such, the gases mentioned above are similar to gases first responders would encounter in a typical Class A structure or vehicle fire and do not contain any unique, or atypical, gases beyond what you would find in the combustion of modern combustible materials, such as plastics and other electronics. Therefore, although these gases were not detected during the UL 9540A module level testing of the SB3, FRA recommends that monitoring of these gases in addition to CO and CO₂ be conducted during a battery emergency.

7.2 Failure of the Energy Management System

7.2.1 Description

The SB3 is equipped with a BMS. The BMS tracks the performance, voltage, current, and SOC of the cells to ensure they are operating within manufacturer specifications. Per NFPA 855 §4.2.9.2 the BMS is required to disconnect electrical connections to the ESS if potentially hazardous conditions occur. Additionally, the BMS can initiate other controls based on the hazard detected as described in Section 2.6. Consequences due to BMS failure are evaluated in this section.

7.2.2 Barriers

The following barriers are provided to prevent BMS failure and minimize the consequences of BMS failure:

- The BMS is certified as part of the battery module to UL 1973.
- The BMS will be monitored as described in Section 2.6.
- Electrical fault protection is provided as described in Section 2.7.
- The BMS will be regularly maintained to ensure it is operating within its specific parameters, as described in Section 4.1.2.

7.2.3 Consequences

Failure of the BMS will prevent active monitoring of battery cell conditions. The BMS will be monitored such that a failure will be quickly detected and remediated reducing the duration a SB3 is operating with deficient safety features. Additionally, remote capabilities will be provided to discharge batteries from an affected SB3 cabinet or shut down modules/entire cabinets, depending on the severity of the issue and the operational capabilities



of the system at the time. Discharging the batteries reduces the consequences of a potential thermal event while the BMS is offline because the fire and explosion hazard is a direct correlation to battery SOC. It should be noted, BMS failure alone will not cause battery failure. In a worst-case scenario, a BMS failure in conjunction with a secondary failure condition (such as over voltage, excess temperature, etc.) may result in a thermal runaway event. Barriers and consequences of thermal runaway are provided in Sections 7.1.2 and 7.1.3 of this report.

7.3 Failure of Any Required Ventilation System

7.3.1 Description

A failure scenario involving any required ventilation or exhaust may expose the batteries to elevated operating temperatures. Depending on the resulting ambient temperature, ventilation failure may cause batteries to be exposed to temperatures outside of the manufacturer recommended operating conditions or temperatures at which the cell fails. The SB3 is not provided with any required ventilation or exhaust system beyond that utilized for explosion prevention. However, the SB3 is provided with a closed loop liquid cooling TMS for the battery modules, as described in Section 2.5. The cooling system performs a similar function to ventilation such that it is provided to cool battery cells and maintain battery operating temperatures within the manufacturer's recommended range. This failure scenario evaluates the consequences associated with a failure of the liquid cooling system.

7.3.2 Barriers

The SB3 is equipped with the following barriers to prevent ventilation system failure and reduce the consequences of a failure event:

- The TMS is monitored as described in Section 2.5.
- The TMS will be regularly maintained to ensure it is operating within its specific parameters, as described in Section 4.1.2.

7.3.3 Consequences

Failure of the cooling system may expose batteries to ambient temperatures. The average peak ambient temperature in Southampton, MA is 83°F (28°C) and occurs in July. The peak temperature is less than the cell venting temperature 399°F (203.7°C); therefore, failure of the cooling system is not anticipated to lead to a thermal runaway event. The TMS is monitored such that a failure will be quickly detected and remediated reducing the duration a SB3 is operating with deficient safety features. Additionally, remote capabilities will be provided to discharge batteries from an affected SB3 cabinet or shut down modules/entire cabinets, depending on the severity of the issue and the operational capabilities of the system at the time. Discharging the batteries reduces the consequences of a potential thermal event while the TMS is offline because the fire and explosion hazard is a direct correlation to battery SOC. In a worst-case scenario, batteries operating at elevated temperatures for extended periods of time may degrade and have a higher likelihood of failure over time, possibly leading to thermal runaway. Barriers and consequences of thermal runaway are provided in Sections 7.1.2 and 7.1.3 of this report.



7.4 Failure of a Fire Protection System

7.4.1 Description

The SB3 is equipped with a fire and gas detection system and a CCRS, as described in Sections 2.8 and 2.10. The fire and gas detection system includes three photoelectric smoke detectors (two in the battery compartment and one in the electrical compartment), three heat detectors (two in the battery compartment and one in the electrical compartment), two hydrogen gas detectors in the battery compartment, and an addressable FACP. For local notification, an alarm bell and an audible/visible appliance are installed on the exterior of the SB3 cabinet. Failure of the fire and gas detection system may result in a delay in fire/gas detection, a delay in the activation of the CCRS, and a delay in on-site and off-site notification of the thermal event. This failure scenario evaluates the consequences associated with failure of the fire and gas detection system and the CCRS.

7.4.2 Barriers

The following barriers are provided to prevent fire and gas detection system and CCRS failure and minimize the associated consequences:

- The fire and gas detection system will be designed in accordance with NFPA 72.
- Three smoke detectors are installed throughout the cabinet providing coverage throughout.
- Three heat detectors are installed throughout the cabinet providing coverage throughout.
- Two gas detectors are installed throughout the cabinet providing coverage throughout.
- The smoke and gas detectors are continuously monitored by the FACP.
- Integral backup power supply will be provided in case of a loss of auxiliary power, as required by NFPA 72.
- Remote monitoring will be provided; if power is lost, O&M service personnel will be notified to remediate the issue.
- Regular inspection, testing, and maintenance (IT&M) performed on the fire and gas detection system through its lifespan, as required by NFPA 72.
- The CCRS is designed in accordance with NFPA 69.
- Regular inspection, testing, and maintenance should be performed on the CCRS throughout its lifespan, as required by NFPA 69.

7.4.3 Consequences

Potential fire and gas detection system failure could produce two primary consequences: (1) a delay or complete failure to operate the explosion prevention system and/or (2) a delay in detection/notification of a thermal event to on-/off-site personnel. The primary potential causes for this failure would be a fault in a listed fire alarm initiating device, an initial installation error, or degradation of a fire alarm device/wiring over time. The likelihood of these occurring with a properly designed, installed, commissioned, monitored, inspected, tested, and maintained fire alarm system is historically low based on data from the National Fire Protection Association (NFPA). Also, the fire alarm system is an addressable system where the status of each device is monitored by the FACP and BMS; therefore, failure of a system component would be reported and can be remediated. Lastly, IT&M would be periodically performed to inspect the fire alarm system for damage/degradation and to test the



devices for proper performance. Each of these fire alarm system mitigation aspects would be in place to minimize the likelihood of system failure over the life span of the SB3.

Failure of the CCRS may result in the accumulation of flammable gases in the cabinet and subsequent deflagration. However, the CCRS is expected to be properly designed, installed, commissioned, monitored, inspected, tested, and maintained to minimize likelihood of failure. In the case that the CCRS malfunctions, notification by the fire and gas detection system would alert local site personnel and/or first responders, should any be in the area, of the hazard. Per the EOP/ERP and the training of site personnel/first responders, all personnel would be prompted to evacuate the area immediately upon activation of a fire alarm notification appliance. By immediately evacuating to a designated safe area, site personnel and first responders would provide physical separation between them and the potential toxic gas hazard. In addition, an ERP should direct first responders to wear proper PPE, including a SCBA and turnout gear, when responding to a battery emergency should they need to approach a distressed cabinet.

7.5 HMA Analysis Approval

Based on the analysis above, the Manhan River, LLC BESS meets all of the HMA approval criteria for FCO or AHJ approval per NFPA 855 §4.1.4.3, as it has demonstrated that:

1. Fires will be contained within unoccupied ESS rooms for the minimum duration of the fire resistance rating specified in NFPA 855 §4.3.6.

The Manhan River, LLC BESS meets this approval criteria. The SB3 is a non-occupiable cabinet that is installed outdoors, not within unoccupied ESS rooms. However, it should be noted that the SB3 has a number of protection schemes in place to prohibit fire from spreading from one SB3 cabinet to another. As demonstrated in UL 9540A unit level testing, thermal runaway was contained to a single module within a SB3 cabinet. As discussed in 7.1.3.1, a LSFT and/or fire modeling has not been performed to explicitly evaluate the potential for thermal runaway to propagate from one SB3 cabinet to adjacent SB3 cabinets. Therefore, site level emergency response procedures (such as exposure protection) could be utilized during a fire event, based on real time fire conditions and observations (i.e., wind direction/speed, fire intensity, proximity of flames to adjacent cabinets), to minimize the potential for fire to spread to adjacent cabinets.

2. Suitable deflagration protection is provided where required.

The Manhan River, LLC BESS meets this approval criteria. The SB3 is equipped with a CCRS which activates upon receiving signals from the gas detection sensors contained within the cabinet. Upon gas detection of 10% of the LFL, the ventilation system activates, pulling in outside air and exhausting internal air, to reduce the concentrations of flammable gases to under 25% of the LFL. In addition, the activation of the CCRS would also trigger the sounding of local fire notification appliances installed on the exterior of the SB3. These appliances can alert local site personnel and/or first responders, should any be in the area, of the hazard. Per the EOP/ERP and the training of site personnel/first responders, all personnel would be prompted to evacuate the area immediately upon activation of a fire alarm



notification appliance. By immediately evacuating to a designated safe area, site personnel and first responders would provide physical separation between them and the potential deflagration and explosion hazard. This provides a second mitigation feature, physical separation of people from the SB3 cabinets, in addition to the CCRS.

3. ESS cabinets in occupied work centers allow occupants to safely evacuate in fire conditions.

The Manhan River, LLC BESS meets this approval criteria. The SB3 is a non-occupiable cabinet that is installed outdoors, not within occupied work centers (or any other room). However, it should be noted that the SB3 has numerous internal sensors that are monitored by the BMS that can detect abnormal events and/or failures of the unit. The SB3 also includes smoke, heat, and gas detection systems with an alarm bell and audible/visible appliance installed on the exterior of the cabinet to provide local notification. These systems are also monitored remotely, providing off-site notification in the unlikely event of a fire. Although this applies to occupied work centers (and not an outdoor installation), the Manhan River, LLC BESS still meets the intent of the approval criteria through the internal sensors, fire and gas detection system, the remote monitoring provided, and the local notification appliances installed in each SB3 cabinet.

4. Toxic and highly toxic gases released during normal charging, discharging, and operation will not exceed the PEL in the area where the ESS is contained.

The Manhan River, LLC BESS meets this approval criteria. The SB3 utilizes listed lithium-ion cells that are hermetically sealed and do not vent during charging, discharging or normal operation. Unlike other battery types, no toxic gases are released during normal operation of the lithium-ion batteries. As such, no toxic gases will be released from the Manhan River, LLC BESS during charging, discharging, and normal operation.

5. Toxic and highly toxic gases released during fires and other fault conditions will not reach concentrations in excess of the IDLH level in the building or adjacent means of egress routes during the time deemed necessary to evacuate from that area.

The Manhan River, LLC BESS meets this approval criteria. The SB3 is installed outdoors, not within a building or adjacent to any means of egress. The nearest building/structure is an individual residence, which is approximately 1,000 ft from a SB3 cabinet. This distance is greater than the 10-ft clearance distance required by NFPA 855 from the BESS to adjacent buildings and/or means of egress. The fire alarm notification system is one mitigation feature installed at the cabinet level to address this hazard. This system can alert local site personnel and/or first responders, should any be in the area, of the hazard. Per the EOP/ERP and the training of site personnel/first responders, all personnel would be prompted to evacuate the area immediately upon activation of a fire alarm notification appliance. By immediately evacuating to a designated safe area, site personnel and first responders would provide physical separation between them and the potential toxic gas hazard. In addition, an ERP should direct first responders to wear proper PPE, including a SCBA and turnout gear, when responding to a battery emergency should they need to approach a distressed cabinet. Given the Manhan River, LLC BESS is installed outdoors, any gas release would be diluted by the entrainment of outside air. At the quantities



measured during UL 9540A module level fire testing, such gases would not be expected to have an adverse effect on individuals during the time deemed necessary to evacuate from the area (i.e., approximately 30 seconds to walk 100 ft away/evacuate from a burning SB3) nor expected to have an adverse effect on emergency response personnel wearing appropriate PPE including a SCBA while responding to an SB3 fire. Although this applies to a building or to an installation that is immediately adjacent to a means of egress route, the Manhan River, LLC BESS still meets the intent of the approval criteria.

6. Flammable gases released during charging, discharging, and normal operation will not exceed 25 percent of the LFL.

The Manhan River, LLC BESS meets this approval criteria. The SB3 utilizes listed lithium-ion cells that are hermetically sealed and do not vent during charging, discharging or normal operation. Unlike other battery types, no flammable gases are released during normal operation of the lithium-ion batteries. As such, no flammable gases exceeding 25% of their LFL will be released from the Manhan River, LLC BESS during charging, discharging, and normal operation.



8. RECOMMENDATIONS

Throughout the report, FRA provided several recommendations related to the Manhan River, LLC BESS installation and emergency response to mitigate the hazards of a fire event. These recommendations are based on our review of the available materials, our background, experience and training, the analyses performed to date described above, common industry best practices for responding to a thermal event involving lithium-ion BESS, as well as from FRA's experience with lithium-ion battery hazards, lithium-ion battery BESS hazards, and previous BESS fires. These recommendations do not provide opinions or conclusions meant to address specific circumstances or all possible scenarios of an emergency. As with all emergency events, emergency response actions should be evaluated and performed based on real time fire conditions and observations (i.e., wind direction/speed, fire intensity, proximity of flames to adjacent electrical equipment and structures) during the actual emergency. Below is a summarized list of the recommendations provided throughout the report:

1. **Site Design Elements:** As the design of the site is finalized, FRA recommends the following:
 - a. Approved signage must be provided at the site per NFPA 855 §4.3.5.
 - b. Increase minimum unobstructed fire apparatus access roadway width from 16 ft to 20 ft.
 - c. Remove the fire apparatus access dead end that exceeds 150 ft in length or provide an approved turnaround.
 - d. Obtain FCO approval for the fire protection water supply at the site per NFPA 855 §4.13.
2. **BESS Plans:** FRA recommends that prior to energizing the Manhan River, LLC BESS, develop commissioning, operations and maintenance, decommissioning and EOP/ERP plans, as required by NFPA 855.
3. **Emergency Response Training:** FRA recommends that all site personnel and emergency response personnel, who could be responsible for responding to a Manhan River, LLC BESS emergency, be trained on the EOP/ERP prior to energizing the Manhan River, LLC BESS. Refresher training should be provided as appropriate, typically annually, as required by NFPA 855.
4. **Fire Protection Systems:** FRA recommends that all fire protection systems be designed, installed, commissioned, and periodically inspected, tested, and maintained as required by each respective NFPA standard.
5. **Minimum Approach Distance (MAD):** When responding to a battery emergency, FRA recommends that all site personnel and first responders remain at a safe distance, upwind from a distressed SB3 cabinet, as should be designated in an ERP, to ensure they are not momentarily exposed to dangerous conditions. Initially, this MAD should be a minimum of 100 feet. In addition, site personnel and first responders should not approach the front of distressed SB3 cabinets, and all first responders should wear proper PPE when approaching a distressed SB3 cabinet during a battery emergency.



9. CONCLUSIONS

Based on our review of the available materials, our background, experience and training, and the analysis performed to date described above, the following conclusions are submitted with a reasonable degree of scientific and engineering certainty:

- The SB3 and the Manhan River, LLC BESS site design can meet NFPA 855 requirements for an outdoor BESS installation when it is installed in accordance with the SB3 instructions, its listing, the approved drawings, and NFPA 855. Several aspects were identified in this analysis that require modification/confirmation to ensure compliance as identified in Section 5.5.
- As described in detail in Section 7.5, the HMA demonstrates the Manhan River, LLC BESS meets all the HMA performance criteria for approval outlined in NFPA 855 §4.1.4.3, as follows:
 - Fires will be contained to a single SB3 as demonstrated through UL 9540A unit level testing and should a fully developed fire event occur, site level emergency response procedures (such as exposure protection) could be utilized during a fire event, based on real time fire conditions and observations (i.e., wind direction/speed, fire intensity, proximity of flames to adjacent cabinets), to minimize the potential for fire to spread to adjacent cabinets.
 - Suitable deflagration protection is provided for the SB3 cabinet via the NFPA 69 CCR explosion control system.
 - Fires will be detected in time to allow personnel to safely evacuate via the fire alarm system and internal sensors of the SB3.
 - Toxic and highly toxic gases will not be released during normal charging, discharging, and operation of the SB3 given the listed lithium-ion cells utilized in the SB3 are hermetically sealed and do not vent during charging, discharging or normal operation.
 - Toxic and highly toxic gases released during fires and other fault conditions will not reach concentrations in excess of IDLH levels within a building or an adjacent means of egress given the nearest building is approximately 1,000 feet away.
 - Flammable gases will not be released during charging, discharging and normal operation of the SB3 given the listed lithium-ion cells utilized in the SB3 are hermetically sealed and do not vent during charging, discharging or normal operation.



10. LIMITATIONS

At the request of BlueWave Energy, FRA performed an HMA in accordance with the requirements of NFPA 855 2020 Edition for the Manhan River, LLC BESS located at 43 & 53 Pleasant St., Southampton, MA. The scope of services performed during this analysis may not adequately address the needs of other users of this report, and any re-use of this report or its conclusions presented herein are at the sole risk of the user. The opinions and comments formulated during this assessment are based on observations and information available at the time of the analysis, which has been provided to FRA by others. No guarantee or warranty as to future performance of any reviewed condition is expressed or implied.

As the Manhan River, LLC BESS site is still under development, this analysis assumed that the BESS and its associated equipment, as well as all fire protection systems, will be installed, commissioned, inspected, tested, and maintained as required by the manufacturer(s), NFPA 855, and/or other applicable codes and standards throughout the lifetime of the BESS. The accuracy and applicability of this report's findings are subject to change based on changes to the site. FRA assumes no liability for performance, errors, omissions, or failures that may arise during construction or operation, and no warranty of fitness for a particular purpose is implied.



11. REVISIONS

Date	Revision	Reason for Issue	Developed By	Reviewed By	Approved By
04/16/2026	REV00	Client Submission	KL	AB	AB



APPENDIX 1: ACRONYMS AND NOMENCLATURE

Acronyms and Abbreviations

Authority Having Jurisdiction	AHJ
Battery Energy Storage System	BESS
Battery Management System	BMS
Emergency Response Plan	ERP
Energy Storage System	ESS
Fire & Risk Alliance, LLC	FRA
Fire Code Official	FCO
Hazard Mitigation Analysis	HMA
Lithium Iron Phosphate	LFP
Lower Flammability Limit	LFL
National Fire Protection Association	NFPA
Non-Walk-In	NWI
Operations and Maintenance	O&M
Personal Protective Equipment	PPE
State of Charge	SOC
Thermal Management System	TMS
Underwriters Laboratory, LLC	UL

Nomenclature

Ampere-hour	Ah
Degree Celsius	°C
Degree Fahrenheit	°F
feet	ft
inch	in
kilopascal	kPa
kilowatt-hour	kWh
Megawatt	MW
Megawatt-hour	MWh



Millimeter	mm
Liter	L
Pounds per square inch absolute	psia
Parts per million	ppm
Volt	V