TOWN OF CASCO

PLANNING BOARD MEETING AGENDA

JULY 8, 2024 at 6:30pm

COMMUNITY CENTER MEETING ROOM

First Order of Business

- Call Meeting to Order
- Determine a Quorum
- Review and Approval of the Meeting Agenda
- Approval of the June 10, 2004 Meeting Minutes
- Public Participation for Non-Agenda Items

Old Business

Open Public Hearing

- Spring Mountain Solar Power, LLC. 143 Highland Shores Road, Casco
  will be proposing a 0.996 MWac Utility scale solar power generation facility located within a parcel owned by Carolyn Drew Represented by Acheron Engineering & Environmental Consultants
- Comments
- Close Public Hearing

New Business

- Minor Subdivision Submitted by OMM24, LLC, for a 2 Lot subdivision of property at 72 Heath. Map 11- Lot 11 & 11-3

Comments

Future meeting dates (subject to change)

August 12, 2024 at 6:30pm

Adjourn Meeting:

Reminders to the Attending Public: Planning Board Meetings are open to the public, but the public may not speak unless recognized by the Board Chair or Vice Chair in their absence. Except during a public hearing, comment time is limited to 2 minutes per speaker during public participation. Matters related to personnel shall not be heard.

TOWN OF CASCO, MAINE

Site Plan Application

Spring Mountain Solar

SUBMITTED BY:

Spring Mountain Solar, LLC
143 Highland Shores Road
Casco, Maine 04015

WITH ASSISTANCE BY:

Acheron Engineering, LLC
Engineering and Environmental Consultants
www.AcheronEngineering.com

153 Main Street	320 Gogan Road
Newport, Maine 04953	Benton, Maine 04901
(207) 341-2590	(207) 341-2590

SUBMITTAL DATE:
MAY, 2024

TOWN OF CASCO PLANNING BOARD
APPLICATION FORM

APPLICANT:

Name David Fowler, Spring Mountain Solar, LLC

Address 143 Highland Shores Road

Casco, Maine 04015

Email dfowler@nextphaseenergyservices.com

Telephone Number – Home 207-615-5850
PLEASE PROVIDE AT LEAST TWO NUMBERS Office 207-461-0666
Cell 207-615-5850

Interest in Property Memorandum of Solar Power Lease Agreement
(attach documentation)

Interest in abutting property, if any None

OWNER:

Name Carolyn Drew

Address 791 Roosevelt Trail, Casco, Maine 04015

PLEASE CHECK THE ADDRESS TO WHICH THE TOWN SHOULD DIRECT ALL CORRESPONDENCE.

TYPE OF PROSPECTIVE ACTIVITY:

_____ **Minor Subdivision Plan Review**
_____ **Major Subdivision Preliminary Plan Review**
_____ **Major Subdivision Final Plan Review**
X **Site Plan Review – List Type** Grid Scale Solar Power Facility
_____ **Other (specify)**

PROJECT ____ **Single Family** _____ **Multiplex** X **Other**

LOCATION
Street Address Spring Mountain Drive
Registry of Deeds Book 24782 **Page** 75
Assessor's Office Map 3 **Lot** 39 or 40

OTHER PROJECT INFORMATION

Size of Parcel (acres) 52.37

Is Zoning Board of Appeals Approval required? X No ____ Yes

Does the applicant intend to request any waivers of Subdivision or Zoning Ordinance provisions? ____ No X Yes.

If yes, list and give reasons why:
Section 215-7.4.A.(2), requires plan scale of 1-inch = 50-feet. The size and geometry of the parcel will not fit on a standard 24-inch by 36-inch plan sheet. Site plan is presented at a scale of 1-inch = 100-feet. The proposed access driveway to the project is presented at 1-inch = 40-feet.

FEES:

The current schedule of Town fees is attached or available online. ***Please note: If the Board requests consultation with the Town's lawyer, fees will be passed off to the applicant.***

MAPS:

Digital Map Files need to be provided at the time of Planning Board approval. If available, digital map files including level of detail typically occurring on our tax maps (such as base line work, boundary dimensions, lot #'s, areas, road names, etc…).

DEP NOTIFICATION:

1. If land development over 20 acres or 5 lots or more, the request requires DEP review.

2. DEP approval must be obtained *PRIOR* to final Planning Board approval.

OTHER:

1. Any WETLAND must be reviewed by the Army Corps of Engineers.

ABUTTOR NOTIFICATION:

1. Applicant ***MUST*** notify all landowners within 500' of the property by CERTIFIED MAIL RETURN RECEIPT REQUESTED.

2. Landowners **MUST BE NOTIFIED AT LEAST 10 CALENDAR DAYS PRIOR TO SCHEDULED MEETING.**

3. the list of landowners with ALL RECEIPTS MUST BE TURNED IN TO THE PLANNING BOARD SECRETARY NO LATER THAN SEVEN (7) DAYS PRIOR TO THE DATE OF THE MEETING.

The undersigned, being the applicant, owner or legally authorized representative, states that all information contained in this application is true and correct to the best of his/her knowledge and hereby does submit the information for review by the Town and in accordance with applicable ordinances, statutes and regulations of the Town, State, and Federal Government.

✸ **All materials to be considered by the Planning Board will be received no later than NOON on the due date for the specific Planning Board meeting. Any material or information received thereafter will not be heard by the Planning Board until a later meeting.**

PLEASE TAKE NOTE OF THE FOLLOWING PROVISION OF THE SUBDIVISION ORDINANCE:

§6.1.1 Within six (6) months of the Planning board's classification of the proposal as a Major Subdivision, the applicant shall submit an application for approval of a Preliminary Plan. The Preliminary Plan shall approximate the layout shown on the sketch plan plus any recommendations made by the Planning Board. Substantial redesign of the sketch plan or failure to meet the six (6) month deadline shall require resubmission of the sketch plan to the Planning Board.

5/15/2025
DATE

David Fowler
SIGNATURE OF APPLICANT/OWNER OR REPRESENTATIVE

APPLICANT'S NAME Spring Mt. Solar Power, LLC **(Please print). DATE**_____

CASCO SITE PLAN REVIEW SUBMISSIONS CHECKLIST

Unless expressly waived by the Planning Board, the following items are required for all applications for Site Plan Review.

		Applicant (check complete)	Planning Board (date complete)
A.	**A fully executed and signed copy of the application for Site Plan Review.**	✔	
B.	**Fifteen (15) copies of a site plan showing the following at a scale not to exceed 50' to the inch.**	✔	
	1. Owner's name, address and signature.	✔	
	2. Names and addresses of all abutters.	✔	
	3. Sketch map showing general location of site within town.	✔	
	4. Boundaries of contiguous properties under control of owner or applicant.	✔	
	5. Bearing and distances of all property lines and source of this information.	✔	
	6. Zoning classifications(s) and boundaries.	✔	
	7. Soil types and locations.	✔	
	8. The location of all building setbacks as required by zoning ordinance.	✔	
	9. The location, size and character of all signs and exterior lighting.	✔	
	10. The lot area of the parcel, street frontages, and zoning requirements for minimum lot.	✔	
	11. The location of all existing and proposed buildings (including size and height), driveways, sidewalks, parking spaces, loading areas, open spaces, large trees, open drainage courses, signs and exterior lighting, utilities, services areas, easements and landscaping.	✔	

12. The location of all buildings within 50 feet of the parcel to be developed and the location of intersecting roads or driveways within 200 feet of the parcel. ✔

13. Existing and proposed topography of the site at 2-foot contour intervals if major changes to existing topography are being proposed. ✔

C. A stormwater drainage plan showing:

1. The existing and proposed method of handling stormwater runoff. ✔

2. **The direction of flow of runoff through use of arrows.** ✔

3. **The location, elevation, and size of all catch basins, dry wells, drainage ditches, swales, retention basins, culverts and storm sewers.** ✔

4. **Engineering calculations used to determine drainage requirements based on a 25-year storm frequency, if the project will significantly alter the existing drainage pattern due to such factors as the amount of new impervious surface (such as paving and building area) being proposed.** ✔

D. A utility plan showing provisions for water supply and wastewater disposal, including a completed HHE 200 form completed by a licensed site evaluator or Maine Certified Soils Scientist, and the size and location of all test pits, piping, holding tanks, leachfields, etc. N/A

E. A planting schedule keyed to the site plan and indicating the varieties of trees, shrubs and other plants to be planted on the site. N/A

F. Building plans, properly scaled, showing all elevations, together with a schedule detailing the type, color and texture of all proposed principal buildings and structures and all accessory buildings and structures. N/A

G. Copies of any proposed or existing easements, covenants, and deed restrictions. ✔

H. Copies of all applicable State approvals and permits.

I. Other information as requested by the Planning Board. Please note below.

Project Description:

Spring Mountain Solar Power, LLC is proposing a 0.996 MWac utility scale solar power generation facility, located within a parcel owned by Carolyn Drew. Spring Mountain Solar and Carolyn Drew have established a Memorandum of Solar Option and Lease, granting Spring Mountain Solar, LLC exclusive option to lease the land associated with the project area for solar development.

The project will occupy 9.9 acres of the 53.37 acre parcel identified by the Town of Casco as Map 3 Lot 40. and is 53.37 acres in size.

Currently, the project area is utilized for timber harvesting and includes a gravel timber harvesting road. The project includes the installation a single access tilt tracking system, solar panels, transformer, inverters, upgrading the access drive and installation of a barrier fence that will surround the project area. Please refer to the design plans attached for specific details.

Sebago Solar's project plans include:

- Clearing and grubbing approximately 9.9 acres.
- Upgrading the existing access drive to include; increasing the travel width to 16 feet with 2 foot gravel shoulders, construction of road side ditches, installation of three cross culverts, and construction of eleven ditch turnouts with level spreaders.
- Installation of utility line below grade.
- Installation of two utility poles to support connection to Central Maine Power's local grid.
- Install ground mounted solar array system and equipment.
- Revegetate all disturbed areas with pollinator friendly vegetation.

Spring Mountain Solar, LLC requests that the planning board consider waiving the following requirements of the application. Each request is followed by the justification for these requests.

1. Relax the requirement of a plan scale of 1" = 50' of § 215-7.4.A(2), to 1" = 100' for the site plan. The size and geometry of the entire parcel will not fit on a single 24" x 36" plan. Please note that the details of the road design are depicted on a plan at 1" = 40'.
2. Waive the requirement for the submission of pre-development noise measurement required by §215-5.35.A(10). Please refer to the environmental considerations section of the application for the justification for this request.

Abutters:

Spring Mt. Solar Power, LLC has complied the following list of abutters within 500 feet of the project parcel. All abutters were notified of the filing of the application and planning board meeting via certified mail.

Name	Address	Map/Lot
Waugh, Walsemar Co-Owner Heuiser, Elaine	PO Box 7, South Casco, ME 04077	3/14
Casco Timber Company, INC	1267 Poland Spring Road, Casco, ME 04015	3/15
Morton, Russell	PO Box 311, South Casco, ME 04077	3/14-2
Heuiser, Elaine	PO Box 7, South Casco, ME 04077	3/14-3
Webb, Jacob	7 Spring Mr. Drive, Casco, ME 04015	3/41
Henry P Watkins JR Revocable Trust	886 Roosevelt Trail, Casco, ME 04015	3/11A & 3/12
Dingley, Raymond	605 Roosevelt Trail, Casco, ME 04015	5/1
Henry P Watkins, JR	820 Roosevelt Trail, Casco, ME 04015	5/1-1
Hunter Ridge, LLC	791 Roosevelt Trail, Casco, ME 04015	3/38
Hancock, Matt	PO Box 295, Casco, ME 04015	3/17-1

§ 215-5.35 Solar Energy Systems: Performance Standards Ground-Mounted Large-Scale

Owner:
MAINELY SOLAR (Spring Mountain Solar Project) – OPERATIONS TEAM
Spring Mountain Solar, LLC is a subsidiary of Mainely Solar, located in Casco, Maine. Mainely Solar, LLC, the owner of Spring Mountain Solar Project, is a Delaware limited liability company that was formed in 2019 with initial funding support from PPL Renewables, a subsidiary of PPL Corporation. Since then, Mainely Solar has been developing several solar projects in Maine and other states and have recently formed an investment partnership with a large nationwide developer and operator of solar projects totaling over 500MWs. Mainely Solar team has several decades of experience in developing and operating large scale power projects in different countries and in different power generation technologies. Please see below biographies of the key persons.

Dave Fowler
Dave Fowler is Co-Founder of Mainely Solar. Mr. Fowler has over 25 years' experience in development, with over a decade in renewable energy development. Mr. Fowler began his renewable energy career at First Wind as a land manager. Dave was responsible for lease acquisitions, public outreach, and overseeing permitting engineering and design, and the interconnection process. In his time at First Wind, his ability to close deals made him an indispensable asset to the company, where he rose to Senior Director of Development. In his time leading development at First Wind, later acquired by Sun Edison, Dave cultivated 420 MW of energy in the State of Maine from origination to commercial operation. Following his time with Sun Edison, Dave founded an independent consulting company, Next Phase Energy Services, focused on providing expertise in renewables development for companies exploring projects in Maine and beyond. Next Phase clients have included Pattern Energy, Calpine, Clearway, Summit Utilities, Novatus, and Longroad Energy. Next Phase Energy Services has been in exclusivity with Swift Current Energy since 2017 during which time Dave lead the development of the 202.5 MW Glacier Sands Wind Farm in Mason County, Illinois. Dave is also leading development of three solar projects in Illinois, a wind project in Ohio, and solar farms located in Pennsylvania, Kentucky, and Maine. Since founding Mainely Solar, Dave has acquired numerous landowners with interest and site potential for the development of distributed generation solar facilities.

Lucy Fowler
Lucy Fowler is the Lead Developer for Mainely Solar. Lucy is responsible for lease acquisitions, public outreach, and landowner relations, as well as overseeing permitting, engineering and design, and the interconnection process. Prior to Mainely Solar, Lucy performed as a Project Manager for Next Phase Energy Services where she works exclusively with Swift Current Energy on numerous projects throughout the U.S. Lucy has led the development of the Three Rivers Solar project located in Maine, including successfully converting a portion of the parcel to a Commercial Industrial Development Subdistrict and drafted the permit application while working directly with local and state agencies. Lucy has also assisted with the development of a

wind project in Ohio and a solar project in Kentucky. Lucy joined the Next Phase team upon graduating from Keene State College in May 2018, where she earned her undergraduate bachelor's degree in Business Management and Environmental Studies. As the lead developer for Mainely Solar, Lucy has worked with various landowners to acquire leases, as well as advance permitting and interconnection for respective sites.

Sachin Patel, P.E.
Sachin Patel is a licensed Professional Engineer with over 20 years of experience building and operating large power plants of over 2,500 MWs combined capacity, in different counties, utilizing conventional and renewable technologies. Sachin started his career as a field engineer with Enron and SNC Lavalin in southern US where he contributed to the development and commissioning of two 2,250MW combined-cycle gas fired power plants. Subsequently, he worked as an energy investment banker at Merrill Lynch, NY and Finance Manager at First Wind, Boston, MA executing numerous project financing transactions for wind and solar projects. Most recently, Sachin held the roles of a CEO, Solar Business at Reliance Power Limited, an Indian utility, where he led the development and construction of one of India's first utility scale 40MW solar PV project and a 125 MW advanced technology solar thermal project. Prior to founding LastMile Energy, Sachin was a Director of US-based SunEdison, leading it's India wind development portfolio of ~300MWs.

Sachin serves as an Adjunct Faculty at Northeastern University's College of Engineering and is a NABCEP certified Solar PV Professional. He holds a BS in Engineering, an MS from Arizona State University and an MBA from the Wharton School, University of Pennsylvania.

Lease Agreement:
Please refer to Appendix A

Interconnection:
Please see Appendix F for copies of the Level 2 Application, Spring Mountain Solar, LLC, Additional Report, Distribution Interconnection Review, Dated September 27, 2022 and the interconnection agreement.

Description of Components:
The components of the proposed solar energy system to support the project are listed and briefly described below. Manufacture specification sheets are included in Appendix B

Panel Supports: TerraTrak manufactured by Terrasmart. TerraTrak is a single axis tracker system that rotates panels to follow the sun for maximizing energy output. Typically, racks are supported by screw anchors.

Solar Panels: Q.Peak DUO XL-G11.3, 590W manufactured by Q.Antum Duo Z. The proposed panels are high efficient with an extreme weather rating and anti-reflection technology.

Inverters: Solectria XGI 1500 manufactured by Yaskawa. Several inverters will be installed to convert the DC power to AC power. In most cases the inverters are mounted to the solar panel racking supports.

Transformer: CA202003EN manufactured by Eaton. A pad mounted three-phase power transformer is proposed to convert the power to three-phase so the energy produced is compatible for connection to the local grid.

Medium Voltage Connection Lines: Connection lines are required to be installed to connect the transformer to the local power grid. All MV connection lines will be installed below grade from the transformer to the point of interconnection (POI).

POI: Two utility poles are proposed near CMP's existing utility pole to support the overhead installation of an air-brake switch and metering cluster, both of which are provided by Central Maine Power.

Construction Plan:
The project anticipated schedule includes start of construction during the forth quarter of 2024 and startup during the fourth quarter of 2025.

Operations and Maintenance Plan:
An operations and maintenance plan will be provided to the Town of Casco for review at the time of applying for the building permit and requests that the board include this as a condition of approval.

Emergency Management Plan:
An operations and maintenance plan will be provided to the Town of Casco for review at the time of applying for the building permit and requests that the board include this as a condition of approval.

Stormwater Management Plan:
Please refer to Appendix C for the stormwater management plan and the erosion and sedimentation control plan prepared by Acheron Engineering.

Proof of Financial Capacity:
Please refer to Appendix D for proof of financial capacity to construct and operate the Spring Mountain Solar project.

Pre-Development Noise Measurement:
Spring Mountain Solar requests that this submission requirement be waived by the planning board. The noise assessment for the project described in the environmental section of the application is the basis for this request.

Decommissioning Plan:
The project will occupy more than 3-acres requiring a decommissioning plan per the Casco SES ordinance and the Maine DEP Solar Decommissioning Law. Please refer to Appendix E for the proposed decommissioning plan.

Landscaping Plan:
A specific landscaping plan is not proposed for this project, a 35 foot vegetated buffer will be maintained along the abutting property boundaries adjacent to the solar project.

Erosion & Sedimentation Control Plan (ESCP):
Please refer to Appendix C for the stormwater management plan and the erosion and sedimentation control plan prepared by Acheron Engineering.

§ 215-7.5 Criteria and Standards

The following demonstrates that the project as proposed meets the criteria and standards of section 215-5.35 & 215-7.5 Criteria and Standards of the Casco Land Use Ordinance.

Preservation of landscape:
Spring Mountain Solar retained the services of Watershed Resource Consultants (WRC) to perform a Protected Natural Resource (PNR) survey of the parcel. Please refer to Appendix G for the protected natural resource (PNR) report. The purpose of the PNR survey was to identify resources as defined by the Maine Department of Environmental Protection (DEP) and the U.S. Army Corps of Engineers (ACOE) so that the project will limit resource impacts to the greatest extent practicable. Results of the survey shows the presence of twenty (20) freshwater wetlands, two (2) intermittent streams, and three (3) vernal pools, one of which is classified as a significant vernal pool (SVP). The project has been designed to maintain a 250 foot critical triserial habitat (CTH) buffer, a 100 foot stream buffer and limits impacts to freshwater wetlands to clearing, not grubbing an 1,010 square foot isolated wetland.

The potential State listed, rare, threatened, or endangered wildlife habitat resources within the parcel were identified by WRC. Species identified are, the northern long eared bat (State Endangered), little brown bat (State Endangered), eastern small footed bat (State Threatened) and Deer Wintering Area (DWA).

Maine Inland Fisheries and Wildlife's (IFW) consultation letter indicates that a 250 foot buffer be maintained from any talus and rocky features to mitigate and impact to the bat species. There are no talus or rocky features within 250 feet of the proposed project. Per consultation if theses features are not present then IFW does not anticipate any significant impacts.

IFW maps a Deer Wintering Area (DWA) (a Significant Wildlife Habitat) intersecting much of the site. IFW recommends that "development projects be designed to avoid losses or impacts to the continued availability of coniferous winter shelter." Upon review of IFW maps and aerial

imagery, the proposed project will avoid losses and impacts to the availability of coniferous winter shelter. Review of aerial imagery indicates that canopy within the project footprint is a mix of small hardwood and mature conifer trees where the conifer density is not sufficient to provide winter shelter. Additional reasons for this conclusion are the project area abuts residential & small commercial uses, is less than 1% of the mapped DWA and the recent (within 20 years) forestry activities of the surrounding areas.

Relation of proposed buildings to the environment:
There are no buildings proposed to support the project. All structures including solar panels, transformer and inverters proposed will maintain a 50 foot setback from all parcel boundaries. A 35 foot natural vegetation buffer will be maintained from abutting parcels. A seven (7) foot tall wildlife permeable fence will surround the project along the vegetated buffer.

Vehicular access:
Access to the project area will be via Spring Mountain Drive. After construction, vehicular access by maintenance personnel is estimated to be one trip per month. Due to the limited need for access, existing vehicle and pedestrian patterns will not be impacted. An access easement is required for O&M of stormwater BMPs and access through the undeveloped 1.84 acre lot owned by Carolyn & Gary Drew. The easement will be filed with the registry once all applicable permits are obtained.

Parking and circulation:
The improvements to the existing woods road are based on NFPA 1141 Standards for Fire Protection Infrastructures for Land Development in Wildland, Rural and Suburban Areas. Improvements include widening of the driving lanes, including road shoulders, providing an adequate parking area and hammerhead.

Surface water drainage:
Acheron Engineering has provided design plans for the project. Plans submitted depicts the existing and proposed methods of handling stormwater. Proposed plans indicated the size of road side ditches and cross culverts. The stormwater design was based on the 25 year type III storm frequency for SE Cumberland County (N. Windham area) as found in Maine DEP Chapter 500 Appendix H. The design includes widening of the existing woods road, design of road side ditches, cross culverts and ditch turnouts with level spreaders.

As designed, stormwater from the project will not adversely affect abutting properties or downstream conditions. Peak runoff from the project area will be less after development of the project area. Reduction of peak run off is a result of the change in land cover of the solar field and use of level spreaders to convert channelized flow to sheet flow prior to reaching abutting parcels.

As proposed the project includes 17,925 square feet of impervious area, will occupy 9.9 acres of the 53.37 acre parcel identified by the Town of Casco as Map 3 Lot 40 and within the direct

watershed of Sebago Lake. Sebago Lake is identified by the Maine Department of Environment Protection (MDEP) as a waterbody most at risk of development. As proposed the project is not required to obtain an individual stormwater permit from the MDEP. However, the project includes soil disturbance over 20,000 square feet and is required to file a stormwater PBR with the MDEP prior to construction.

Utilities:
Utilities such as potable water and wastewater disposal are not required to support the project. Powerlines required to connect the project to the local CMP grid will be below grade from the battery storage structure to the point of interconnection (POI) near Roosevelt Trail.

Advertising features:
A single four and one half (4.5) square foot project sign is proposed at or near the location of the gate to the project on Spring Mountain Drive (private drive). The sign will be approximately four (4) feet above grade and include the name of the project and 24 hr. emergency contact information.

Special Features:
All special features including solar panels, transformer and inverters proposed will maintain the applicable setbacks from all parcel boundaries. A 35 foot natural vegetation buffer will be maintained feet from abutting parcels. A seven (7) foot tall wildlife permeable fence will surround the project along the vegetated buffer. These features will prevent the project from being incongruous with the existing environment and surrounding properties.

Exterior Lighting:
A single exterior light is proposed to support the project. Lighting will include a LED cut off fixture mounted ten (10) feet above grade and the equipment pad location. The lighting will be wired with motion detection.

Emergency Vehicle Access:
The improvements to the existing woods road are based on NFPA 1141 Standards for Fire Protection Infrastructures for Land Development in Wildland, Rural and Suburban Areas. Improvements include widening of the driving lanes, including road shoulders, providing an adequate parking area and hammerhead. In addition, a project access gate with a knox box for emergency access is proposed.

Landscaping:
A specific landscaping plan is not necessary soften or screen the project from the abutting properties or public rights-of-ways. A thirty five (35) foot natural vegetated buffer will be maintained feet from abutting parcels for softening and screening purposes. The project will not be seen from a great pond or Hacker’s Hill.

Environmental Considerations:
As proposed, during construction and operations a solar project will not produce vibrations, smoke, heat, fumes, toxic matter, or electromagnetic interference.

Glare is often a concern for solar projects. Glare from solar panels is often caused during low sun angle conditions by inexpensive stationary roof mounted systems. In the case of the Spring Mountain. Solar project glare is mitigated in two ways. First, the project will utilize a tracking mounting system, where the panels rotate on a single axis maintaining a near perpendicular angle to the sun. Second, the panels proposed for use on the project include anti-reflection coating.

Dust is an environmental condition for all construction projects when site work is proposed. Dust control and mitigation are addressed in the erosion, sedimentation and control plan attached and described on the drawings submitted.

There are three sources of noise emissions from a solar facility, transformers, inverters and solar tracking motors. The manufacturer's testing of the transformer proposed indicates a noise emission of sixty (60) dBa at 3 meters, which is lower than the only noise emission standard found in the land use ordinance. §215-5.15 light industrial uses include a standard of sixty five (65) dBa and the property boundary. In general, the state's standard is fifty five (55) dBa daytime and forty five (45) dBa night time when abutting a residential use. When applying the inverse square law, the day time state standard is met at six (6) meters or twenty (20) feet for the transformer. As proposed the transformer is located approximately 417 feet from the closest parcel boundary. There will be no noise emissions from the transformer during the night. When applying the same evaluation for the inverters (56 dBa @ 3M) the state standard is met when the inverter is located 13 feet from the parcel boundary. Inherently, when the 50 foot setback is met the states noise emissions will be met. Noise emissions from tracker motors are considered de minimis and solar racking manufactures do not publish any noise emission testing results. Tracker motors are mounted approximately three (3) feet above grade and rotate several rows of panels. The motors slowly rotate the panel a few degrees every few minutes. The rotation takes approximately 10 seconds. Because of the short time frame and intermittent nature tracking motors are not considered a significant noise source. Please refer to the equipment specifications and the emission calculation attached.

Storage of hazardous materials is not required for operations of that project. Storage and handling of hazardous materials during construction is addressed in the attached erosion and sedimentation control plan.

Appendix A
Memorandum of Solar Lease Agreement

MEMORANDUM OF SOLAR OPTION AND LAND LEASE

By this Memorandum of Solar Option and Land Lease (this "Memorandum"), **Carolyn M. Drew** ("Lessor") evidences that it has entered into a Solar Option and Land Lease dated as of the 14th day of May, 2024 (the "Agreement") with **Spring Mountain Solar, LLC**, a Maine limited liability company ("Lessee"), granting Lessee an exclusive option to lease and acquire certain easements over real property of Lessor situated in the Town of Casco, Cumberland County, State of Maine, as more particularly described on Exhibit A attached hereto and made a part hereof (the "Premises"), on terms and conditions set forth in the Agreement.

The term of the option granted in the Agreement commenced on May 14, 2024, and shall expire, unless earlier terminated, at midnight on May 14, 2029 (the "Expiration Date"). Unless this Memorandum has been terminated or amended and restated prior to the Expiration Date by the recordation of a Release of Solar Option and Land Lease in the Cumberland County Registry of Deeds, signed by Lessee and specifically referencing this Memorandum, this Memorandum shall automatically cease to impart constructive notice of the Agreement from and after the Expiration Date.

The parties have executed and recorded this instrument for the purpose of imparting notice to all third parties of the Agreement. This Memorandum and the Agreement shall bind and inure to the benefit of the parties and their respective heirs, successors and assigns. This Memorandum and the Agreement are governed by Maine law. This Memorandum may be executed in multiple counterparts, which when assembled together shall constitute one instrument.

The addresses of Lessor and Lessee for purposes of notice are:

Lessor:
Carolyn M. Drew
791 Roosevelt Trail
Casco, ME 04015

Lessee:
Spring Mountain Solar, LLC
c/o Next Phase Energy Services, LLC
143 Highland Shores Road
Casco, ME 04015

IN WITNESS WHEREOF, Lessor and Lessee have caused this this Memorandum to be executed as of the 14 day of May, 2024.

LESSOR:

Carolyn M. Drew

Carolyn M. Drew

STATE OF MAINE §
§
COUNTY OF Cumberland §

05/14/, 2024

PERSONALLY APPEARED the above-named Carolyn M. Drew and acknowledged the foregoing instrument to be her free act and deed.

Before me,

STEPHANIE FOWLER
Notary Public-Maine
My Commission Expires
July 11, 2025

Stephanie Fowler

Print Name: Stephanie Fowler
Notary Public/Attorney at Law
My commission expires: 7/11/25

EXHIBIT A

DESCRIPTION OF PREMISES

Certain real property in the Town of Casco, Cumberland County, Maine, more particularly described in a deed from Martha Glassford to Carolyn M. Drew, dated January 20, 2007 and recorded in the Cumberland County Registry of Deeds in Book 24782, Page 75 and a second deed from Martha Glassford to Carolyn M. Drew dated June 19, 2017 and recorded in the Cumberland County Registry of Deeds Book 34117, Page 236.

Appendix B
Financial Capacity

M&T Bank

April 11, 2024

Dave Fowler
Owner
Mainely Solar, LLC
143 Highland Shores Road
Casco, ME 04015

RE: Spring Mtn. Solar

Dear Dave,

Mainely Solar, LLC has informed M&T Bank of its intention to permit and build its Spring Mt. Solar project, located in Casco, ME. Once these project details are addressed and should they need financing, we would enter into negotiations with the company to provide a summary of terms and conditions offering financing for the project, not to exceed an appropriate loan to value.

M&T Bank has a long-standing relationship with Dave Fowler and we have high praise for Mainely Solar, LLC and how they conduct business.

This letter is for discussion purposes only and is not an offer of financing or any commitment on the part of the Bank, nor is it intended to be legally binding or to give rise to any legal or fiduciary relationship between M&T Bank or its affiliates and any other person. Such a commitment, if any, will be delivered upon receipt of all requisite internal approvals and completion of due diligence.

I hope this letter demonstrates the high regard we have for Mainely Solar, LLC's management team.

Sincere Regards,

Darryl Wright
Vice President
Senior Branch Manager
207-892-8008 option 3
Dwright2@mtb.com

Appendix C
Interconnection Agreement

Level 2 Interconnection Agreement

This Agreement is made and entered into this 19th day of October 2022, by and between SPRING MOUNTAIN SOLAR LLC, ("Interconnection Customer") located at 791 Roosevelt Trail, Casco and Central Maine Power Company, a Maine corporation having its office and principal place of business in Augusta, Kennebec County, Maine, existing under the laws of the State of Maine, (" T & D Utility "). Interconnection Customer and T & D Utility each may be referred to as a "Party," or collectively as the "Parties."

Recitals:

Whereas, Interconnection Customer is proposing to develop a Small Generator Facility, consisting of a 996 kW photovoltaic generator, consistent with the Interconnection Request completed by Interconnection Customer on August 2, 2022; and

Whereas, Interconnection Customer desires to interconnect the Small Generator Facility with T & D Utility 's Electric Distribution System.

Now, therefore, in consideration of and subject to the mutual covenants contained herein, the Parties agree as follows:

Article 1. Scope and Limitations of Agreement

1.1 This Agreement shall be used for all approved Level 2, Level 3, and Level 4 Interconnection Requests according to the procedures set forth in the Standard Small Generator Interconnection Rule.

1.2 This Agreement governs the terms and conditions under which the Small Generator Facility will interconnect to, and operate in Parallel with, T & D Utility 's Electric Distribution System.

1.3 This Agreement does not constitute an agreement to purchase or deliver the Interconnection Customer's power.

1.4 Nothing in this Agreement is intended to affect any other agreement between T & D Utility and the Interconnection Customer. However, in the event that the provisions of this agreement are in conflict with the provisions of the T & D Utility tariff, the T & D Utility tariff shall control.

1.5 Responsibilities of the Parties

1.5.1 The Parties shall perform all obligations of this Agreement in accordance with all Applicable Laws and Regulations, and Operating Requirements.

1.5.2 The Interconnection Customer shall construct, interconnect, operate and maintain its Small Generator Facility, and construct, operate, and maintain its Interconnection Equipment in accordance with the applicable manufacturer's recommended maintenance schedule, in accordance with this Agreement.

1.5.3 T & D Utility shall construct, own, operate, and maintain its Electric Distribution System and Interconnection Facilities in accordance with this Agreement.

1.5.4 The Interconnection Customer agrees to construct its facilities or systems in accordance with applicable specifications that meet or exceed the National Electrical Code, the American National Standards Institute, IEEE, Underwriters Laboratories, and any other Operating Requirements.

1.5.5 Each Party shall operate, maintain, repair, and inspect, and shall be fully responsible for the facilities that it now or subsequently may own unless otherwise specified in the Exhibits to this Agreement and shall do so in a manner as to reasonably minimize the likelihood of a disturbance adversely affecting or impairing the other party

1.5.6 Each Party shall be responsible for the safe installation, maintenance, repair and condition of their respective lines and appurtenances on their respective sides of the Point of Common Coupling.

1.6 Parallel Operation Obligations Once the Small Generator Facility has been authorized to commence parallel operation, the Interconnection Customer shall abide by all written rules and procedures developed by the T & D Utility which pertain to the parallel operation of the Small Generator Facility, copies of which are provided as an Exhibit [1] to this Agreement.

1.7 Reactive Power
The Interconnection Customer shall design its Small Generator Facility to maintain a composite power delivery at continuous rated power output at the Point of Common Coupling at a power factor within the range of 0.95 leading to 0.95 lagging.

Article 2. Inspection, Testing, Authorization, and Right of Access

2.1 Equipment Testing and Inspection
The Interconnection Customer shall test and inspect its Small Generator Facility and Interconnection Facilities prior to interconnection, and in accordance with IEEE 1547 Standards.

2.2 Certificate of Completion
Prior to commencing parallel operation, the Interconnection Customer shall provide T & D Utility with a Certificate of Completion in the form of Attachment 6 of the Interconnection Forms and Agreements. The Certificate of Completion must either be signed by an electrical inspector with the authority to approve the interconnection or be accompanied by the electrical inspector's own form authorizing interconnection of the Small Generation Facility.

2.3 Parallel Operation Obligations
The Interconnection Customer shall abide by all permissible written rules and procedures developed by the T & D Utility which pertain to the parallel operation of the Small Generation Facility. In the event of conflicting provisions, the Interconnection Procedures shall take precedence over the T & D Utility's rule or procedure. Copies of the Utilities rules and procedures for parallel operation are either provided as an Exhibit to this Agreement or an Exhibit that provides a reference to a website where copies of the rule or procedure is maintained (Exhibit 1).

2.4 Right of Access
At reasonable hours, and upon reasonable notice, or at any time without notice in the event of an emergency or hazardous condition, Company shall have access to Customer's premises for any reasonable purpose in connection with the performance of the obligations imposed on it by this Agreement or if necessary to meet its legal obligation to provide service to its Customers.

Article 3. Effective Date, Term, Termination, and Disconnection

3.1 Effective Date
This Agreement shall become effective upon execution by the Parties.

3.2 Term of Agreement
This Agreement shall become effective on the Effective Date and shall remain in effect perpetually, unless terminated earlier in accordance with Article 3.3 of this Agreement.

3.3 Termination
No termination shall become effective until the Parties have complied with all Applicable Laws and Regulations applicable to such termination.

3.3.1 The Interconnection Customer may terminate this Agreement at any time by giving T & D Utility 20 Business Days written notice.

3.32 Either Party may terminate this Agreement after Default pursuant to Article 6.6.

3.33 Upon termination of this Agreement, the Small Generator Facility will be disconnected from T & D Utility's Electric Distribution System. The termination of this Agreement shall not relieve either Party of its liabilities and obligations, owed or continuing at the time of the termination.

3.3.4 The provisions of this Article shall survive termination or expiration of this Agreement.

3.4 Temporary Disconnection
The T & D Utility may temporarily disconnect the Small Generator Facility from its Electric Distribution System for so long as reasonably necessary in the event one or more of the following conditions or events occurs:

3.4.1 Emergency Conditions
"Emergency Condition" shall mean a condition or situation: (1) that in the judgment of the Party making the claim is imminently likely to endanger life or property; or (2) that, in the case of T & D Utility, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to the Electric Distribution System, T & D Utility 's Interconnection Facilities or (3) that, in the case of the Interconnection Customer, is imminently likely (as determined in a non-discriminatory manner) to cause a material adverse effect on the security of, or damage to, the Small Generator Facility or the Interconnection Equipment . Under Emergency Conditions, T & D Utility or the Interconnection Customer may immediately suspend interconnection service and temporarily disconnect the Small Generator Facility. T & D Utility shall notify the Interconnection Customer promptly when it becomes aware of an Emergency Condition that may reasonably be expected to affect the Interconnection Customer's operation of the Small Generator Facility. The

Interconnection Customer shall notify T & D Utility promptly when it becomes aware of an Emergency Condition that may reasonably be expected to affect T & D Utility's Electric Distribution System. To the extent information is known, the notification shall describe the Emergency Condition, the extent of the damage or deficiency, the expected effect on the operation of both Parties' facilities and operations, its anticipated duration, and the necessary corrective action.

3.4.2 Routine Maintenance, Construction, and Repair
T & D Utility may interrupt interconnection service or curtail the output of the Small Generator Facility and temporarily disconnect the Small Generator Facility from T & D Utility's Electric Distribution System when necessary for routine maintenance, construction, and repairs on T & D Utility's Electric Distribution System. T & D Utility shall provide the Interconnection Customer with five Business Days notice prior to such interruption. T & D Utility shall use reasonable efforts to coordinate such reduction or temporary disconnection with the Interconnection Customer.

3.4.3 Forced Outages
During any forced outage, T & D Utility may suspend interconnection service to effect immediate repairs on T & D Utility's Electric Distribution System. T & D Utility shall use reasonable efforts to provide the Interconnection Customer with prior notice. If prior notice is not given, T & D Utility shall, upon request, provide the Interconnection Customer written documentation after the fact explaining the circumstances of the disconnection.

3.4.4 Adverse Operating Effects
T & D Utility shall provide the Interconnection Customer with a written notice of its intention to disconnect the Small Generator Facility if, based on Good Utility Practice, the T & D Utility determines that operation of the Small Generator Facility will likely cause disruption or deterioration of service to other Customers served from the same electric system, or if operating the Small Generator Facility could cause damage to T & D Utility's Electric Distribution System. Supporting documentation used to reach the decision to disconnect shall be provided to the Interconnection Customer upon request. T & D Utility may disconnect the Small Generator Facility if, after receipt of the notice, the Interconnection Customer fails to remedy the adverse operating effect within a reasonable time which shall be at least five Business Days from the date the Interconnection Customer receives the T & D Utility's written notice supporting the decision to disconnect, unless Emergency Conditions exist in which case the provisions of Article 3.4.1 apply.

3.4.5 Modification of the Small Generator Facility
The Interconnection Customer must receive written authorization from T & D Utility before making any change to the Small Generator Facility that may have a material impact on the safety or reliability of the Electric Distribution System. Such authorization shall not be unreasonably withheld. Modifications shall be done in accordance with Good Utility Practice. If the Interconnection Customer makes such modification without T & D Utility's prior written authorization, the latter shall have the right to temporarily disconnect the Small Generator Facility.

3.4.6 Reconnection
The Parties shall cooperate with each other to restore the Small Generator

Facility, Interconnection Facilities, and T & D Utility 's Electric Distribution System to their normal operating state as soon as reasonably practicable following a temporary disconnection.

Article 4. Cost Responsibility for Interconnection Facilities and Distribution Upgrades

4.1 Interconnection Facilities

4.1.1 The Interconnection Customer shall pay for the cost of the Interconnection Facilities itemized in the Exhibits to this Agreement. If a Facilities Study was performed, T & D Utility shall identify its Interconnection Facilities necessary to safely interconnect the Small Generator Facility with T & D Utility's Electric Distribution System, the cost of those facilities, and the time required to build and install those facilities.

4.1.2 The Interconnection Customer shall be responsible for its share of all reasonable expenses, including overheads, associated with (1) owning, operating, maintaining, repairing, and replacing its Interconnection Equipment, and (2) operating, maintaining, repairing, and replacing T & D Utility's Interconnection Facilities as set forth in the Exhibits to this Agreement.

4.2 Distribution Upgrades
T & D Utility shall design, procure, construct, install, and own any Distribution Upgrades. The actual cost of the Distribution Upgrades, including overheads, shall be directly assigned to the Interconnection Customer.

Article 5. Billing, Payment, Milestones, and Financial Security

5.1 Billing and Payment Procedures and Final Accounting

5.1.1 T & D Utility shall bill the Interconnection Customer for the design, engineering, construction, and procurement costs of T & D Utility provided Interconnection Facilities and Distribution Upgrades contemplated by this Agreement as set forth in the Exhibit (2) to this Agreement, on a monthly basis, or as otherwise agreed by the Parties. The Interconnection Customer shall pay each bill within thirty (30) calendar days of receipt, or as otherwise agreed to by the Parties.

5.1.2 Within ninety (90) calendar days of completing the construction and installation of T & D Utility 's Interconnection Facilities and Distribution Upgrades described in the Exhibits to this Agreement, T & D Utility shall provide the Interconnection Customer with a final accounting report of any difference between (1) the actual cost incurred to complete the construction and installation and the budget estimate provided to the Interconnection Customer and a written explanation for any significant variation. (2) the Interconnection Customer's previous deposit and aggregate payments to T & D Utility for such Interconnection Facilities and Distribution Upgrades. If the Interconnection Customer's cost responsibility exceeds its previous deposit and aggregate payments, T & D Utility shall invoice the Interconnection Customer for the amount due and the Interconnection Customer shall make payment to T & D Utility within thirty (30) calendar days. If the Interconnection Customer's previous deposit and aggregate payments exceed its cost responsibility under this Agreement, T & D Utility shall refund to the Interconnection Customer an amount equal to the

difference within thirty (30) calendar days of the final accounting report.

5.2 Interconnection Customer Deposit
At least twenty (20) Business Days prior to the commencement of the design, procurement, installation, or construction of a discrete portion of T & D Utility 's Interconnection Facilities and Distribution Upgrades, the Interconnection Customer shall provide T & D Utility with a deposit equal to 50 percent of the cost estimated for its Interconnection Facilities prior to its beginning design of such facilities.

Article 6. Assignment, Liability, Indemnity, Force Majeure, Consequential Damages, and Default

6.1 Assignment
This Agreement may be assigned by either Party upon fifteen (15) Business Days prior written notice, and with the opportunity to object by the other Party. When required, consent to assignment shall not be unreasonably withheld; provided that:

6.1.1 Either Party may assign this Agreement without the consent of the other Party to any affiliate of the assigning Party with an equal or greater credit rating and with the legal authority and operational ability to satisfy the obligations of the assigning Party under this Agreement;

6.1.2 The Interconnection Customer shall have the right to assign this Agreement, without the consent of T & D Utility, for collateral security purposes to aid in providing financing for the Small Generator Facility;

6.1.3 Any attempted assignment that violates this Article is void and ineffective. Assignment shall not relieve a Party of its obligations, nor shall a Party's obligations be enlarged, in whole or in part, by reason thereof. An assignee is responsible for meeting the same obligations as the Interconnection Customer.

6.2 Limitation of Liability
Each Party's liability to the other Party for any loss, cost, claim, injury, liability, or expense, including reasonable attorney's fees, relating to or arising from any act or omission in its performance of this Agreement, shall be limited to the amount of direct damage actually incurred. In no event shall either Party be liable to the other Party for any indirect, special, consequential, or punitive damages, except as authorized by this Agreement.

6.3 Indemnity

6.3.1 This provision protects each Party from liability incurred to third Parties as a result of carrying out the provisions of this Agreement. Liability under this provision is exempt from the general limitations on liability found in Article 6.2.

6.3.2 The Parties shall at all times indemnify, defend, and hold the other Party harmless from, any and all damages, losses, claims, including claims and actions relating to injury to or death of any person or damage to property, demand, suits, recoveries, costs and expenses, court costs, attorney fees, and all other obligations by or to third Parties, arising out of or resulting from the indemnified Party's action or failure to meet its obligations under this Agreement on behalf of the indemnifying Party, except in cases of gross negligence or intentional wrongdoing by the indemnified Party.

6.3.3 If an indemnified person is entitled to indemnification under this Article as a result of a claim by a third party, and the indemnifying Party fails, after notice and reasonable opportunity to proceed under this Article, to assume the defense of such claim, such indemnified person may at the expense of the indemnifying Party contest, settle or consent to the entry of any judgment with respect to, or pay in full, such claim.

6.3.4 If an indemnifying party is obligated to indemnify and hold any indemnified person harmless under this Article, the amount owing to the indemnified person shall be the amount of such indemnified person's actual loss, net of any insurance or other recovery.

6.3.5 Promptly after receipt by an indemnified person of any claim or notice of the commencement of any action or administrative or legal proceeding or investigation as to which the indemnity provided for in this Article may apply, the indemnified person shall notify the indemnifying party of such fact. Any failure of or delay in such notification shall not affect a Party's indemnification obligation unless such failure or delay is materially prejudicial to the indemnifying party.

6.4 Consequential Damages

Neither Party shall be liable under any provision of this Agreement for any losses, damages, costs or expenses for any special, indirect, incidental, consequential, or punitive damages, including but not limited to loss of profit or revenue, loss of the use of equipment, cost of capital, cost of temporary equipment or services, whether based in whole or in part in contract, in tort, including negligence, strict liability, or any other theory of liability; provided, however, that damages for which a Party may be liable to the other Party under another agreement will not be considered to be special, indirect, incidental, or consequential damages hereunder.

6.5 Force Majeure

6.5.1 As used in this Article, a Force Majeure Event shall mean "any act of God, labor disturbance, act of the public enemy, war, acts of terrorism, insurrection, riot, fire, storm or flood, explosion, breakage or accident to machinery or equipment, any order, regulation or restriction imposed by governmental, military or lawfully established civilian authorities, or any other cause beyond a Party's control. A Force Majeure Event does not include an act of negligence or intentional wrongdoing."

6.5.2 If a Force Majeure Event prevents a Party from fulfilling any obligations under this Agreement, the Party affected by the Force Majeure Event (Affected Party) shall promptly notify the other Party of the existence of the Force Majeure Event. The notification must specify in reasonable detail the circumstances of the Force Majeure Event, its expected duration, and the steps that the Affected Party is taking to mitigate the effects of the event on its performance, and if the initial notification was verbal, it should be promptly followed up with a written notification. The Affected Party shall keep the other Party informed on a continuing basis of developments relating to the Force Majeure Event until the event ends. The Affected Party will be entitled to suspend or modify its performance of obligations under this Agreement (other than the obligation to make payments) only to the extent that the effect of the Force Majeure Event cannot be reasonably mitigated. The Affected Party will use reasonable efforts to resume its performance as soon as possible.

6.6 Default

6.6.1 No Default shall exist where such failure to discharge an obligation (other than the payment of money) is the result of a Force Majeure Event as defined in this Agreement, or the result of an act or omission of the other Party. Upon a Default, the non-defaulting Party shall give written notice of such Default to the defaulting Party. Except as provided in Article 6.6.2, the defaulting Party shall have 60 calendar days from receipt of the Default notice within which to cure such Default; provided however, if such Default is not capable of cure within 60 calendar days, the defaulting Party shall commence such cure within 20 calendar days after notice and continuously and diligently complete such cure within six months from receipt of the Default notice; and, if cured within such time, the Default specified in such notice shall cease to exist.

6.6.2 If a Default is not cured as provided for in this Article, or if a Default is not capable of being cured within the period provided for herein, the non-defaulting Party shall have the right to terminate this Agreement by written notice at any time until cure occurs, and be relieved of any further obligation hereunder and, whether or not that Party terminates this Agreement, to recover from the defaulting Party all amounts due hereunder, plus all other damages and remedies to which it is entitled at law or in equity. The provisions of this Article will survive termination of this Agreement.

Article 7. Insurance

The Interconnection Customer may be required by the T & D Utility to carry liability insurance for its interconnection subject to the restrictions and limitations found in Maine Public Utility Commission Rule Ch. 324 §12(F). To the extent T & D Utility requires liability insurance, its requirements for the Interconnecting Customer and any required documentation of coverage shall be included herewith under Exhibit (3).

Article 8. Dispute Resolution (see provisions in the Maine Public Utility Commission's Standard Small Generator Interconnection Rules)

Article 9. Miscellaneous

9.1 Governing Law, Regulatory Authority, and Rules
The validity, interpretation and enforcement of this Agreement and each of its provisions shall be governed by the laws of the State of Maine, without regard to its conflicts of law principles. This Agreement is subject to all Applicable Laws and Regulations. Each Party expressly reserves the right to seek changes in, appeal, or otherwise contest any laws, orders, or regulations of a Governmental Authority.

9.2 Amendment
The Parties may amend this Agreement by a written instrument duly executed by both Parties.

9.3 No Third-Party Beneficiaries
This Agreement is not intended to and does not create rights, remedies, or benefits of any character whatsoever in favor of any persons, corporations, associations, or entities other than the Parties, and the obligations herein assumed are solely for the use and benefit of the Parties, their successors in interest and where permitted, their assigns.

9.4 Waiver

9.4.1 The failure of a Party to this Agreement to insist, on any occasion, upon strict performance of any provision of this Agreement will not be considered a waiver of any obligation, right, or duty of, or imposed upon, such Party.

9.4.2 Any waiver at any time by either Party of its rights with respect to this Agreement shall not be deemed a continuing waiver or a waiver with respect to any other failure to comply with any other obligation, right, duty of this Agreement. Termination or default of this Agreement for any reason by Interconnection Customer shall not constitute a waiver of the Interconnection Customer's legal rights to obtain an interconnection from T & D Utility. Any waiver of this Agreement shall, if requested, be provided in writing.

9.5 Entire Agreement

This Agreement, including all Exhibits, constitutes the entire Agreement between the Parties with reference to the subject matter hereof, and supersedes all prior and contemporaneous understandings or agreements, oral or written, between the Parties with respect to the subject matter of this Agreement. There are no other agreements, representations, warranties, or covenants which constitute any part of the consideration for, or any condition to, either Party's compliance with its obligations under this Agreement.

9.6 Multiple Counterparts

This Agreement may be executed in two or more counterparts, each of which is deemed an original, but all constitute one and the same instrument.

9.7 No Partnership

This Agreement shall not be interpreted or construed to create an association, joint venture, agency relationship, or partnership between the Parties or to impose any partnership obligation or partnership liability upon either Party. Neither Party shall have any right, power or authority to enter into any agreement or undertaking for, or act on behalf of, or to act as or be an agent or representative of, or to otherwise bind, the other Party.

9.8 Severability

If any provision or portion of this Agreement shall for any reason be held or adjudged to be invalid or illegal or unenforceable by any court of competent jurisdiction or other Governmental Authority, (1) such portion or provision shall be deemed separate and independent, (2) the Parties shall negotiate in good faith to restore insofar as practicable the benefits to each Party that were affected by such ruling, and (3) the remainder of this Agreement shall remain in full force and effect.

9.9 Environmental Releases

Each Party shall notify the other Party, first orally and then in writing, of the release any hazardous substances, any asbestos or lead abatement activities, or any type of remediation activities related to the Small Generator Facility or the Interconnection Facilities, each of which may reasonably be expected to affect the other Party. The notifying Party shall (1) provide the notice as soon as practicable, provided such Party makes a good faith effort to provide the notice no later than 24 hours after such Party becomes aware of the occurrence, and (2) promptly furnish to the other Party copies of any publicly available reports filed with any governmental authorities addressing such events.

9.10 Subcontractors

Nothing in this Agreement shall prevent a Party from utilizing the services of any subcontractor as it deems appropriate to perform its obligations under this Agreement; provided, however, that each Party shall require its subcontractors to comply with all applicable terms and conditions of this Agreement in providing such services and each Party shall remain primarily liable to the other Party for the performance of such subcontractor.

9.10.1 The creation of any subcontract relationship shall not relieve the hiring Party of any of its obligations under this Agreement. The hiring Party shall be fully responsible to the other Party for the acts or omissions of any subcontractor the hiring Party hires as if no subcontract had been made; provided, however, that in no event shall T & D Utility be liable for the actions or inactions of the Interconnection Customer or its subcontractors with respect to obligations of the Interconnection Customer under this Agreement. Any applicable obligation imposed by this Agreement upon the hiring Party shall be equally binding upon, and shall be construed as having application to, any subcontractor of such Party.

9.10.2 The obligations under this Article will not be limited in any way by any limitation of subcontractor's insurance.

Article 10. Notices

10.1 General

Unless otherwise provided in this Agreement, any written notice, demand, or request required or authorized in connection with this Agreement ("Notice") shall be deemed properly given if delivered in person, delivered by recognized national currier service, or sent by first class mail, postage prepaid, to the person specified below:

If to Interconnection Customer:

SPRING MOUNTAIN SOLAR LLC
143 Highland Shores Rd.
Casco, ME 04015
781-686-2729

If to T & D Utility:

Central Maine Power Company
Attention: Nathan Pelletier, Manager
83 Edison Drive
Augusta, ME 04336
Phone: 207-621-4732
Fax: 207-621-4778

With Copy to:

Legal Department
Central Maine Power Company
83 Edison Drive
Augusta, ME 04336
Phone: 207-621-6546
Fax: 207-621-6538

10.2.1 Billing and Payment

Billings and payments shall be sent to the addresses set out below:

If to Interconnection Customer:

SPRING MOUNTAIN SOLAR LLC
143 Highland Shores Rd.
Casco, ME 04015
781-686-2729

If to T & D Utility:

Central Maine Power Company
Attention: Nathan Pelletier, Manager
83 Edison Drive
Augusta, ME 04336
Phone: 207-621-4732
Fax: 207-347-4148

10.3 Designated Operating Representative

The Parties may also designate operating representatives to conduct the communications which may be necessary or convenient for the administration of this Agreement. This person will also serve as the point of contact with respect to operations and maintenance of the Party's facilities.

If to Interconnection Customer:

SPRING MOUNTAIN SOLAR LLC
143 Highland Shores Rd.
Casco, ME 04015
781-686-2729

If to T & D Utility:

Central Maine Power Company
Attention: Nathan Pelletier, Manager
83 Edison Drive
Augusta, ME 04336
Phone: 207-621-4732
Fax: 207-621-4778

Article 11. Signatures

IN WITNESS WHEREOF, the Parties have caused this Agreement to be executed by their respective duly authorized representatives.

For the Transmission Provider: Central Maine Power Company

Name: Andrea Vanluling
Andrea Vanluling

Date: 10/24/2022

Title: Vice President – Treasurer & Controller

Name: Keith Radonis

10/24/2022

Title: Director – Interconnection Services

For the Interconnection Customer: SPRING MOUNTAIN SOLAR LLC

Name: Sachin Patel Date: 10/21/22

Title: Manager

Exhibits

1. **Transmission & Distribution Interconnection Requirements for Generation**
2. **Schedule D**
3. **Insurance Requirements**

Exhibit 1

Transmission & Distribution Interconnection Requirements for Generation: The customer is required to be interconnected per CMP's Transmission & Distribution Interconnection Requirements for Generation (also known as the "Blue Book") which is updated annually and can be found on CMP's website.

Exhibit 2
Schedule D (Draft)

Schedule D - MONTHLY METERING O&M COST-------DRAFT

SPRING MOUNTAIN SOLAR LLC
Account # 30013224081

Monthly O&M Cost for Metering Equipment

Item	Type	Meter Serial Numbers	Qty	Equipment Cost	Installation Cost	Customer Maintenance
METER KWH IN/OUT	EMR	TBD	1	$ 282.20	$ 100.81	$ 383.01

Sub-Total Installed Equipment Cost	$ 383.01
General Expense @ 6%	22.98
Total Installed Cost	$ 405.99
Monthly Maintenance Charge @ 1.38% of Total Installed Cost	$ 5.60
Monthly Translation	$ 25.00
Total Monthly Meter Charges	$ 30.60

Note: The Interconnection Customer is responsible for providing a phone line for the metering equipment and is responsible for all associated costs for this phone line.

.

Exhibit 3
Insurance Requirements

Insurance Requirement: The customer is responsible for having insurance for their interconnection. Please see below requirements of insurance and provide an updated insurance certificate annually.

- For non-inverter-based Generating Facilities:

  - Generating Capacity greater than 5 MW: $3,000,000
  - Generating Capacity greater than 2 MW up to and including 5 MW: $2,000,000
  - Generating Capacity greater than 500 kW up to and including 2 MW: $1,000,000
  - Generating Capacity greater than 50 kW up to and including 500 kW: $500,000
  - Generating Capacity less than or equal to 50 kW: no insurance required

- For inverter-based Generating Facilities:

  - Generating Capacity greater than 5 MW: $2,000,000
  - Generating Capacity greater than 2 MW up to and including 5 MW: $1,000,000
  - Generating Capacity less than or equal to1 MW: no insurance required

Appendix D
Decommissioning Plan

Decommissioning Plan

for

Spring Mountain Solar

Proposed 996 kWac Ground-Mounted Solar Facility at Roosevelt Trail, Raymond, Maine

10 April 2024

By:
Spring Mountain Solar, LLC

1. Introduction

Spring Mountain Solar, LLC proposes to build a 996 kWac photovoltaic (PV) solar facility ("**Solar Facility**") under the State of Maine's Renewable Energy New Metering Program. The Solar Facility is planned to have a nameplate capacity of approximately 996 kilowatts (kW) alternating current (AC) and be built on approximately 6.8 acre parcel of private land.

This Decommissioning Plan ("**Plan**") provides an overview of activities that will occur during the decommissioning phase of the Solar Facility, including activities related to the restoration of land, the management of materials and waste, projected costs, and a decommissioning funding requirements overview.

The Solar Facility will have a maturity date of twenty (20) to thirty (30) years; however, the Solar Facility and many of its components including grid infrastructure has an estimated useful lifetime of over 30 years. This Plan assumes that the Solar Facility will be dismantled, and the Solar Facility site restored to a state similar to its pre-construction condition at the end of its useful life.

This decommissioning plan is based on current best management practices and procedures. This Plan may be subject to revision based on new standards and emergent best management practices at the time of decommissioning. Permits will be obtained as required and notification will be given to stakeholders prior to decommissioning as per Town requirements and regulations.

2. Decommissioning Process Description:

Decommissioning and restoration activities will adhere to the requirements of appropriate governing authorities, and will be in accordance with applicable federal, state, and local permits. The decommissioning and restoration process comprises removal of above-ground structures; grading, to the extent necessary; restoration of topsoil (if needed) and seeding. The process of removing structures involves evaluating

and categorizing all components and materials into categories of recondition and reuse, salvage, recycling and disposal. The Project consists of numerous materials that can be recycled, including steel, aluminum, glass, copper, and plastics. The components and material will be transported to the appropriate facilities for reconditioning, salvage, recycling, or disposal. Aboveground structures include the panels, racks, inverters, pads and any interconnection facilities located on the property.

2.1 Project Component Removal

Control cabinets, electronic components, and internal cables will be removed. The panels, racks and inverters will be lowered to the ground where they may be transported whole for reconditioning and reuse or disassembled/cut into more easily transportable sections for salvageable, recyclable, or disposable components.

2.2 PV Module Removal

Solar photovoltaic modules used in the project are manufactured within regulatory requirements for toxicity based on Toxicity Characteristic Leaching Procedure (TCLP). The solar panels are not considered hazardous waste. The panels used in the Project will contain silicon, glass, and aluminum which have value for recycling. Modules will be dismantled and packaged per manufacturer or approved recyclers specifications and shipped back to the manufacturer or to an approved off-site approved recycler.

2.3 Equipment Pad Removal

Only one small concrete pad of approximately 160 sq ft will be required for installing transformers and other electrical equipment. This concrete pad will be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable, and concrete to a depth of 24 inches below grade. The remaining excavation will be filled with clear subgrade material of quality comparable to the immediate surrounding area. The sub-grade material will be compacted to a density similar to surrounding subgrade material. All unexcavated areas compacted by equipment used in decommissioning shall be de-compacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area.

2.4 Electric Wire Removal

Electric wire made from copper or aluminum has value for recycling. DC wiring can be removed manually from the panels to the inverter. Underground wire to the interconnection pole will be pulled and removed from the ground. Overhead cabling for the interconnection will be removed from poles. All wire will be sent to an approved recycling facility.

2.5 Racking and Fencing removal

All racking and fencing material will be broken down into manageable units and removed from the facility and sent to an approved recycler. All racking posts driven into the ground will be pulled and removed.

2.6 Site Restoration Process Description

Following decommissioning activities, the sub-grade material and topsoil from affected areas will be de-compacted and restored to a density and depth consistent with the surrounding areas. The affected areas will be inspected, thoroughly cleaned, and all construction-related debris removed. Disturbed areas will be reseeded to promote re-vegetation of the area unless the area is to be immediately redeveloped. In all areas restoration shall include, as reasonably required, leveling, terracing, mulching, and other necessary steps to prevent soil erosion, to ensure establishment of suitable grasses and forbs, and to control noxious weeds and pests. The project access road which was existing prior to construction of the project will remain for use by the landowner.

3. Decommissioning Terms

The project shall be decommissioned within 180 days of the end of the project's operational life. Areas disturbed during the decommissioning phase will be seeded with a drought-tolerant grass seed mix appropriate for the area, unless such areas are being immediately redeveloped for other uses. The gravel access road will remain intact.

4. Costs of Decommissioning

Though it is hard to accurately determine the cost after 20 or 25 years, below is an educated attempt to estimate the costs involved based on guidance from NYSERDA and estimates from a more mature Massachusetts solar market.

Task	Costs
Remove panels	1,225
Remove rack wiring	1,230
Dismantle racks	6,175
Remove and load electrical equipment	925
Break up concrete pads	750
Remove Racks	3,900
Remove cables	3,250
Remove ground screws and power poles	6,925
Remove fence	2,475
Grading	2,000
Seed disturbed areas	1,040
Transportation to recycling centers	1,125
Current Total	**$31,020**

Given the cost of components today, and the salvage value associated with such components today (structural steel, transformer, copper cables, aluminum frames etc), the cost of decommissioning the solar arrays could be largely offset by the salvage value of the Solar Facility components. However, salvage value is excluded from the Decommissioning Cost estimate.

5. Decommissioning Fund Commitment

Prior to starting any construction work, Spring Mountain Solar, LLC commits to providing the Town with a performance bond or a bank Letter of Credit or any other financial security in a format acceptable to the Town in the amount of $32,000 towards the decommissioning activities of the Project.

Contact information for the project proponent is as follows:

Full Name of Company: Spring Mountain Solar, LLC

Contact: Lucy Fowler

Address: 143 Highland Shores Rd, Casco, ME 04015

Telephone: (207) 615-6850

Email: lucyfowler@nextphaseenergyservices.com

Appendix E
Equipment Specifications

powered by Q.ANTUM DUO Z

Q.PEAK DUO XL-G11.3
570-590

ENDURING HIGH PERFORMANCE

ntv GERMANY'S MOST POPULAR PROVIDER Life & Living Award 2021 1st Place Solar Technology Customer rating from 11 brands www.disq.de DEUTSCHES INSTITUT FÜR SERVICE-QUALITÄT GmbH & Co. KG

EUPD RESEARCH TOP BRAND PV MODULES EUROPE 2021

Q CELLS Yield Security

BREAKING THE 21% EFFICIENCY BARRIER
Q.ANTUM DUO Z Technology with zero gap cell layout boosts module efficiency up to 21.7%.

LOW ELECTRICITY GENERATION COSTS
Higher yield per surface area, lower BOS costs and up to 175 watts more module power than standard 144 half-cell modules.

ENDURING HIGH PERFORMANCE
Long-term yield security with Anti LID Technology, Anti PID Technology[1], Hot-Spot Protect and Traceable Quality Tra.Q™.

EXTREME WEATHER RATING
High-tech aluminium alloy frame, certified for high snow (5400 Pa) and wind loads (2400 Pa).

A RELIABLE INVESTMENT
Inclusive 12-year product warranty and 25-year linear performance warranty[2].

STATE OF THE ART MODULE TECHNOLOGY
Q.ANTUM DUO combines cutting edge cell separation and innovative 12-busbar design with Q.ANTUM Technology.

[1] APT test conditions according to IEC / TS 62804-1:2015, method A (–1500 V, 96 h)
[2] See data sheet on rear for further information.

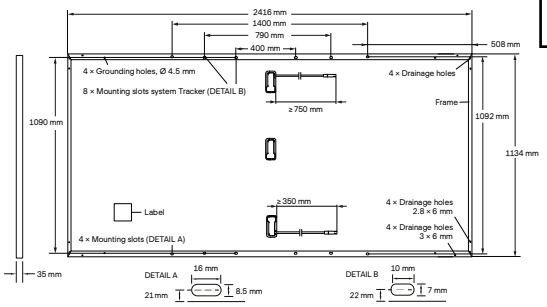
THE IDEAL SOLUTION FOR:
Ground-mounted solar power plants

Engineered in Germany

Q CELLS

MECHANICAL SPECIFICATION

Format	2416 mm × 1134 mm × 35 mm (including frame)
Weight	30.7 kg
Front Cover	3.2 mm thermally pre-stressed glass with anti-reflection technology
Back Cover	Composite film
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 mm² Solar cable; (+) ≥ 750 mm, (–) ≥ 350 mm
Connector	Stäubli MC4-Evo2, Hanwha Q CELLS HQC4; IP68



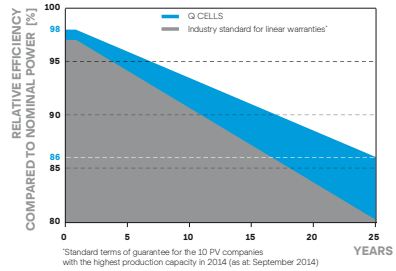
Drawing not to scale

ELECTRICAL CHARACTERISTICS

POWER CLASS				570	575	580	585	590
MINIMUM PERFORMANCE AT STANDARD TEST CONDITIONS, STC[1] (POWER TOLERANCE +5 W / –0 W)								
Minimum	Power at MPP[1]	P_{MPP}	[W]	570	575	580	585	590
	Short Circuit Current[1]	I_{SC}	[A]	13.49	13.51	13.54	13.57	13.59
	Open Circuit Voltage[1]	V_{OC}	[V]	53.59	53.62	53.64	53.67	53.70
	Current at MPP	I_{MPP}	[A]	12.82	12.87	12.92	12.97	13.01
	Voltage at MPP	V_{MPP}	[V]	44.46	44.68	44.90	45.12	45.33
	Efficiency[1]	η	[%]	≥20.8	≥21.0	≥21.2	≥21.4	≥21.5
MINIMUM PERFORMANCE AT NORMAL OPERATING CONDITIONS, NMOT[2]								
Minimum	Power at MPP	P_{MPP}	[W]	427.6	431.4	435.1	438.9	442.6
	Short Circuit Current	I_{SC}	[A]	10.87	10.89	10.91	10.93	10.95
	Open Circuit Voltage	V_{OC}	[V]	50.54	50.56	50.59	50.62	50.64
	Current at MPP	I_{MPP}	[A]	10.09	10.13	10.17	10.22	10.26
	Voltage at MPP	V_{MPP}	[V]	42.39	42.58	42.77	42.96	43.14

[1]Measurement tolerances P_{MPP} ±3%; I_{SC}; V_{OC} ±5% at STC: 1000 W/m², 25±2°C, AM 1.5 according to IEC 60904-3 • [2]800 W/m², NMOT, spectrum AM 1.5

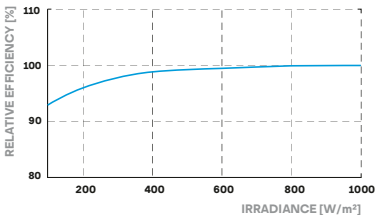
Q CELLS PERFORMANCE WARRANTY



At least 98% of nominal power during first year. Thereafter max. 0.5% degradation per year. At least 93.5% of nominal power up to 10 years. At least 86% of nominal power up to 25 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]	43±3

PROPERTIES FOR SYSTEM DESIGN

Maximum System Voltage	V_{SYS}	[V]	1500	PV module classification	Class II
Maximum Reverse Current	I_R	[A]	25	Fire Rating	C
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		

QUALIFICATIONS AND CERTIFICATES

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

TÜVRheinland CERTIFIED
www.tuv.com
ID 1111220277

CE

PACKAGING INFORMATION

Vertical packaging	2458 mm	1134 mm	1270 mm	1000 kg	20 pallets	16 pallets	31 modules

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

PRODUCT SAFETY DATA SHEET

HANWHA Q CELLS SOLAR PV MODULES ARE ARTICLES AS DEFINED BY THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION HAZARD COMMUNICATION STANDARD (HCS), 29 C.F.R. § 1910.1200 AND ARE EXEMPT FROM THE LABELING AND SAFETY DATA SHEETS (SDS) REQUIREMENTS OF THE STANDARD.

Hanwha Q CELLS provides this product safety data sheet only for convenience of interested parties in the United States of America who are used to the format of safety data sheets in order to assess the product safety. This product safety data sheet does not replace any other documents provided by Hanwha Q CELLS such as Safety Information, Installation and Operation Manual, Packaging and Transport Information, Product Data Sheet as well as Warranty Terms of the respective product.

SECTION 1: IDENTIFICATION

Solar PV modules convert light into electricity. Light-sensitive cells are electrically interconnected in series and sealed between glass and plastic foils for this purpose. This product safety data sheet is applicable to the following solar PV modules of the Q CELLS brand made by Hanwha Q CELLS:

- Q.PLUS-G4.X, Q.PLUS BFR-G4.X, Q.PLUS L-G4.X,
- Q.PEAK-G4.X, Q.PEAK BLK-G4.X, Q.PEAK L-G4.X,
- Q.PEAK DUO-G5, Q.PEAK DUO BLK-G5, Q.PEAK DUO L-G5
- Q.PEAK DUO-G5.X, Q.PEAK DUO BLK-G5.X, Q.PEAK DUO L-G5.X

Minor variations within the product families listed above can be identified by a versioning system which replaces character “X” with numerals of either “1”, “2” or “3” to form G4.1, G4.2, G4.3, G5.1, G5.2 and G5.3, respectively. All of these variants as well as the ones with additional suffix “/TAA” are covered by this product safety data sheet. This is also true for B-grade modules which have minor optical imperfections. Product names of these replace “Q.” with “B.LINE”. B-grade modules of Q.PEAK-G4.1 are named B.LINE PEAK-G4.1 for example.

Responsible Party as Importer:
Name: Hanwha Q CELLS America
Address: 300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618
Phone: 1-949-748-5996

SECTION 2: IDENTIFICATION OF SAFETY RISKS (HAZARDS IDENTIFICATION)

Hanwha Q CELLS solar PV modules do not pose any risk of hazardous chemicals. Hazard symbols and precautionary hazard statements for hazardous chemicals are not applicable. No symptoms or effects – neither acute nor delayed – have to be expected when Hanwha Q CELLS solar PV modules are handled as stipulated in the Installation and Operation Manual. Hanwha Q CELLS provides a Safety Information sheet with all modules shipments. This document contains detailed risk statements and recommendations for installation and operation. Before installing the module, read the Installation and Operation Manual for Q CELLS modules carefully. You can obtain the complete Installation and Operation Manual from your retailer.

Attention: Only qualified and authorized specialists may install modules and put them into operation. Keep children and unauthorized persons away from the modules.

Risks:
- Risk of death from electrocution! Solar modules generate electricity and are energized as soon as they are exposed to light.
- In rare cases, solar PV modules – as any other electrical device – can cause fire due to worn electrical contacts which result in electrical arching.
- Solar PV modules can reach high temperatures which can cause skin burns.
- Sharp edges, corners and broken glass can cause injuries.
- Solar PV modules can cause Injuries due to their weight.
  - Falling solar PV modules can cause injuries.
  - Lifting solar PV modules can cause injuries.

For precautionary statements, please refer to the Installation and Operations Manual of the respective product.

MISUSE OR INCORRECT USE OF SOLAR MODULES VOIDS THE LIMITED WARRANTY AND MAY CREATE A SAFETY HAZARD AND RISK PROPERTY DAMAGE. THIS INCLUDES IMPROPER INSTALLATION OR CONFIGURATION, IMPROPER MAINTENANCE, UNINTENDED USE, AND UNAUTHORIZED MODIFICATION.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

Safety data sheets are only required for hazardous chemicals covered by the Hazard Communication Standard (HCS). Solar PV modules made by Hanwha Q CELLS are not covered by HCS. The following table provides an overview of materials solar PV modules by Hanwha Q CELLS are made of. The values given for the share of weight are targets and can vary for the products covered by this Product Safety Data Sheet.

COMPONENT	MATERIAL	TOTAL SHARE	REMARK
FRAME	Aluminum	8 % – 16 %	not hazardous
	Silicone	< 1 %	not hazardous, see section 8
LAMINATE	Glass	60 % – 80 %	not hazardous
	Plastics (EVA, PET, PE, PPE, PC)	8 % – 16 %	no hazards known
	Silicon	2 % – 4 %	not hazardous
	Metals (Aluminum, Copper, Tin)	1 % – 3 %	not hazardous
	Lead	< 0,1 %	hazardous
	Silver	< 0,05 %	not hazardous

SECTION 4: FIRST-AID MEASURES

In case of electrocution:

- Always protect yourself by taking all necessary safety precautions before rescuing persons injured.
- Attention: Stay away from sources of high voltage and leave the rescue to qualified personnel with appropriate personal protection equipment!
- Call emergency rescue services.
- Do not touch live parts. Qualified personnel should shut down the PV system as far as possible – e.g. disconnect the modules at the inverter before uncovering any live electrical parts. Be sure to observe the specified time intervals after switching off the inverter. Highvoltage components need time to discharge. Follow OSHA requirements for control of hazardous energy at 29 C.F.R. § 1910.147.
- In the event a person is electrocuted or affected by electrical energy of the solar PV module, CALL 911. Before attempting rescue, SHUTDOWN THE POWER SOURCE.
- Remove the victim from the power source using only insulated tools ONLY IF CONTACT WITH LIVE ELECTRICAL COMPONENTS CAN B PREVENTED.
- Carefully move the injured from the zone of danger.
- After moving to a safe location, check heartbeat, respiration and consciousness of the injured person.
- Apply appropriate life-saving measures (CPR) accordingly before taking care of minor injuries.
- Consult a medical professional even if there are no visible injuries.
    - Flush thermal skin burns caused by touching hot surfaces of solar PV modules with cool water. Consult a medical professional.
    - Injuries due to sharp edges, corners and broken glass need to be appropriately treated. Consult a medical professional.
    - Other types of injuries need to be treated appropriately as well. Consult a medical professional.

SECTION 5: FIRE-FIGHTING MEASURES

- Hanwha Q CELLS solar PV modules are fire rated as Class C according to IEC and UL 1703 as well as Type 1 according to UL 1703.
- Hanwha Q CELLS solar PV modules are extensively tested at the factory to ensure electrical safety of the product before shipment.
- In rare cases, solar PV modules – as any other electrical device – can cause fire due to worn electrical contacts which result in electrical arching.
- In case solar PV modules which are not part of an array are on fire, USE FIRE EXTINGUISHERS RATED FOR ELECTRICAL EQUIPMENT, Class C.
- IN CASE A SOLAR PV MODULE ARRAY IS PRESENT, ANY FIRE SHOULD ONLY BE FOUGHT BY PROFESSIONAL FIREFIGHTERS. FIREFIGHTERS NEED TO TAKE PRECAUTIONS FOR ELECTRICAL VOLTAGES UP TO 1,500 VOLTS (DC).
- Some components of the modules can burn. Potential combustion products include oxides of carbon, nitrogen and silicon.
- In case of prolonged fire, solar PV modules may lose their structural integrity.

General recommendations from the below-mentioned reports:

- Fire service personnel should follow their normal tactics and strategies at structure fires involving solar power systems, but do so with awareness and understanding of exposure to energized electrical equipment. Emergency response personnel should operate normally, and approach this subject area with awareness, caution, and understanding to assure that conditions are maintained as safely as possible.
- Care must be exercised during all operations, both interior and exterior.
- Responding personnel must stay back from the roofline in the event modules or sections of an array may slide off the roof.
- Contacting a local professional PV installation company should be considered to mitigate potential hazards.
- Turning off an array is not as simple as opening a disconnect switch. As long as the array is illuminated, parts of the system will remain energized.
- When illuminated by artificial light sources such as fire department light trucks or an exposure fire, PV systems are capable of producing electrical power sufficient to cause inability to let go from electricity as a result of stimulation of muscle tissue, also known as lock-on hazard.
- Firefighting foam should not be relied upon to block light.
- The electric shock hazard due to application of water is dependent on voltage, water conductivity, distance and spray pattern.
- It is recommendable to fight fire with water instead of foam if a PV system is present. Salt water should not be used.
- Firefighter's gloves and boots afford limited protection against electrical shock provided the insulating surface is intact and dry. They should not be considered equivalent to electrical personal protection equipment.

Readers interested in more details may refer to the following reports:

- National Fire Protection Association, Fire Protection Research Foundation report "Fire Fighter Safety and Emergency Response for Solar Power Systems" issued May 2010, revised October 2013
- Important recommendations from a report called "Firefighter Safety and Photovoltaic Installations Research Project" issued by Underwriters Laboratories on November 29, 2011

SECTION 6: FIRE-FIGHTING MEASURES

This section is not applicable.

SECTION 7: HANDLING AND STORAGE

Before installing the module, read the Installation and Operation Manual for Q CELLS modules carefully. Noncompliance with the instructions may result in damage and physical injury or death. Only qualified and authorized specialists may install modules and put them into operation. You can obtain the complete installation manual from your retailer.

Details about transport and storage of palletized Hanwha Q CELLS solar PV modules can be found in the Packaging and Transport Information of the respective module type.

Storage, transport and unpacking:

- Store the module dry, well-ventilated and properly secured. The original packaging is not weatherproof.
- Always transport the module in its original packaging.
- Do not stack the modules. This prevents damage of the junction box.
- The module is made of glass. Take great care when unpacking, storing and transporting it.
- Do not subject the module glass to any mechanical stress (e.g. through torsion or deflection). Do not step on the module or place any objects onto the module.
- Protect both sides of the module against scratching and other damage.
- Carry the module by holding the edges with both hands, or use a glass suction lifter.
- Never lift or carry the module using the module junction box or wiring. Avoid pulling on the wiring at all costs.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

Before installing the module, read the Installation and Operation Manual carefully. Noncompliance with the instructions may result in damage and physical injury. Only qualified and authorized specialists may install modules and put them into operation. You can obtain the complete installation manual from your retailer.

- Please follow the valid national regulations and safety guidelines for the installation of electrical devices and systems.
- Please make sure to take all necessary safety precautions.
- Ensure that all personnel are aware of and adhere to accident-prevention and safety regulations.
- For handling of modules wear suitable protective gloves.
- Do not install damaged modules. Ensure that all electrical components are in a proper, dry, and safe condition.
- Do not modify the module (e.g. do not drill any additional holes). Never open the junction box.
- Ensure that modules and tools are not subject to moisture or rain at any time during installation. Only use dry, insulated tools for electrical work.
- Only connect cables with plugs. Ensure for a tight connection between the plugs. Plugs click together audibly.
- Cover the modules with an opaque material during installation. Cover the modules to be disconnected.

Silicones used in manufacturing release methanol during curing. Once cured, no additional methanol is released during use. Small amounts of these chemicals may be present in shipping cartons. Upon receipt, open container in a well ventilated location and allow to stand for 5 minutes before removing units from cartons. Exposures above recommended limits for methanol of 200 ppm eight-hour time-weighted-average (TWA) will not occur.

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

- Physical state: solid
- Voltage: refer to data sheet (below 50 volts for a single module)

Attention: Voltage of single modules add up when modules are electrically connected in series. Hanwha Q CELLS solar PV modules are designed and certified for voltages up to 1,000 volts or even up to 1,500 volts. Connection of modules in series is only permitted up to the maximum system voltage as listed in the applicable data sheet.

- Weight: refer to data sheet
- Solubility in water: insoluble in water

SECTION 10: STABILITY AND REACTIVITY

Under normal operating conditions as specified in the Product Data Sheet, Hanwha Q CELLS solar PV modules are chemically stable.

- Hanwha Q CELLS solar PV modules are tested for salt spray and ammonia resistance according to IEC 61701 and IEC 62716, respectively.
- Hanwha Q CELLS solar PV modules support ambient operating temperatures from –40 °C to +85 °C (–40 °F to +185 °F).
- Do not install modules above 13.120 ft (4000 m) altitude above sea level.
- Some components of the modules can burn. Potential combustion products include oxides of carbon, nitrogen and silicon.
- Do not scratch off dirt. Use a soft cellulose cloth or sponge to carefully wipe off stubborn dirt. Do not use micro fleece wool or cotton cloths.
- Rinse dirt off with lukewarm water (dust, leaves, etc.)
- Use an alcohol based glass cleaner. Do not use abrasive detergents or tensides.
- Isopropyl alcohol (IPA) can be used selectively to remove stubborn dirt and stains within one hour after it appeared.
- Follow the safety guidelines provided by the IPA manufacturer.
- Do not let IPA run down between the module and the frame or into the module edges.

SECTION 11: TOXICOLOGICAL INFORMATION

Small amounts of methanol may be present inside shipping cartons. Open cartons and allow to vent before removing units. No exposure to hazardous chemicals will occur when the units are in use.

SECTION 12: ECOLOGICAL INFORMATION

Hanwha Q CELLS solar PV modules are designed to withstand outdoor operating conditions for 25 years. Biodegradation is not expected due to high chemical stability of the components.

SECTION 13: DISPOSAL CONSIDERATIONS

Hanwha Q CELLS solar PV modules should be recycled rather than dumped in a landfill. Raw materials of the product can be recovered by recycling companies. Disposal must be in accordance with national and local laws and regulations for electric/electronic waste.

SECTION 14: TRANSPORT INFORMATION

Hanwha Q CELLS solar PV modules can be shipped via standardized container freight. Regulations for hazardous goods do not apply. For further details, please refer to the Packaging and Transport Information which can be provided as a separate document by Hanwha Q CELLS.

SECTION 15: REGULATORY INFORMATION

- Hanwha Q CELLS solar PV modules are tested according to international standards IEC 61215, IEC 61730 as well as US standards UL 1703.
- Please refer to the Installation and Operation Manual and Product Data Sheet of the respective Hanwha Q CELLS solar PV module.

SECTION 16: OTHER INFORMATION

- Date of initial creation of this product safety data sheet: July 1, 2016
- Date of last revision: July 11, 2018

Hanwha Q CELLS America Inc.
300 Spectrum Center Drive, Suite 1250, Irvine, CA 92618, USA I **TEL** +1 949 748 59 96 I **EMAIL** inquiry@us.q-cells.com I **WEB** www.q-cells.us

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
COMP: Glass & Panel 1	T180426-07	Glass/Panel	02/02/18 00:00	02/05/18 12:45
COMP: Glass & Panel 2	T180426-08	Glass/Panel	02/02/18 00:00	02/05/18 12:45
COMP: Glass & Panel 3	T180426-09	Glass/Panel	02/02/18 00:00	02/05/18 12:45

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fasheh

Rose Fasheh, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

DETECTIONS SUMMARY

Sample ID: COMP: Glass & Panel 1 **Laboratory ID:** T180426-07

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	0.14	0.10	mg/l	EPA 1311/6010/7000	
Lead	2.3	0.10	mg/l	EPA 1311/6010/7000	

Sample ID: COMP: Glass & Panel 2 **Laboratory ID:** T180426-08

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	0.14	0.10	mg/l	EPA 1311/6010/7000	
Lead	2.8	0.10	mg/l	EPA 1311/6010/7000	

Sample ID: COMP: Glass & Panel 3 **Laboratory ID:** T180426-09

Analyte	Result	Reporting Limit	Units	Method	Notes
Barium	0.12	0.10	mg/l	EPA 1311/6010/7000	
Lead	2.1	0.10	mg/l	EPA 1311/6010/7000	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fashch

Rose Fashch, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

COMP: Glass & Panel 1

T180426-07 (Glass/Panel)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
TCLP Metals by 6000/7000 Series Methods									
Mercury	ND	2.0	ug/l	1	8020538	02/05/18	02/09/18	EPA 1311/7470	
Arsenic	ND	0.10	mg/l	"	8020539	02/05/18	02/08/18	EPA 1311/6010/7000	
Barium	**0.14**	0.10	"	"	"	"	"	"	
Cadmium	ND	0.10	"	"	"	"	"	"	
Chromium	ND	0.10	"	"	"	"	"	"	
Lead	**2.3**	0.10	"	"	"	"	"	"	
Selenium	ND	0.10	"	"	"	"	"	"	
Silver	ND	0.10	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fashch

Rose Fashch, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

COMP: Glass & Panel 2

T180426-08 (Glass/Panel)

SunStar Laboratories, Inc.

TCLP Metals by 6000/7000 Series Methods

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
Mercury	ND	2.0	ug/l	1	8020538	02/05/18	02/09/18	EPA 1311/7470	
Arsenic	ND	0.10	mg/l	"	8020539	02/05/18	02/08/18	EPA 1311/6010/7000	
Barium	**0.14**	0.10	"	"	"	"	"	"	
Cadmium	ND	0.10	"	"	"	"	"	"	
Chromium	ND	0.10	"	"	"	"	"	"	
Lead	**2.8**	0.10	"	"	"	"	"	"	
Selenium	ND	0.10	"	"	"	"	"	"	
Silver	ND	0.10	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fashch

Rose Fashch, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

COMP: Glass & Panel 3

T180426-09 (Glass/Panel)

Analyte	Result	Reporting Limit	Units	Dilution	Batch	Prepared	Analyzed	Method	Notes
SunStar Laboratories, Inc.									
TCLP Metals by 6000/7000 Series Methods									
Mercury	ND	2.0	ug/l	1	8020538	02/05/18	02/09/18	EPA 1311/7470	
Arsenic	ND	0.10	mg/l	"	8020539	02/05/18	02/08/18	EPA 1311/6010/7000	
Barium	**0.12**	0.10	"	"	"	"	"	"	
Cadmium	ND	0.10	"	"	"	"	"	"	
Chromium	ND	0.10	"	"	"	"	"	"	
Lead	**2.1**	0.10	"	"	"	"	"	"	
Selenium	ND	0.10	"	"	"	"	"	"	
Silver	ND	0.10	"	"	"	"	"	"	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fasheh

Rose Fasheh, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

TCLP Metals by 6000/7000 Series Methods - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8020538 - TCLP Hg CV										
Blank (8020538-BLK1)				Prepared: 02/05/18 Analyzed: 02/09/18						
Mercury	ND	2.0	ug/l							
LCS (8020538-BS1)				Prepared: 02/05/18 Analyzed: 02/09/18						
Mercury	4.09	2.0	ug/l	5.00		81.7	75-125			
Matrix Spike (8020538-MS1)	Source: T180426-07			Prepared: 02/05/18 Analyzed: 02/09/18						
Mercury	3.84	2.0	ug/l	5.00	0.00423	76.6	75-125			
Matrix Spike Dup (8020538-MSD1)	Source: T180426-07			Prepared: 02/05/18 Analyzed: 02/09/18						
Mercury	3.91	2.0	ug/l	5.00	0.00423	78.0	75-125	1.83	30	
Batch 8020539 - TCLP Metals										
Blank (8020539-BLK1)				Prepared: 02/05/18 Analyzed: 02/08/18						
Arsenic	ND	0.10	mg/l							
Barium	ND	0.10	"							
Cadmium	ND	0.10	"							
Chromium	ND	0.10	"							
Lead	ND	0.10	"							
Selenium	ND	0.10	"							
Silver	ND	0.10	"							
LCS (8020539-BS1)				Prepared: 02/05/18 Analyzed: 02/08/18						
Arsenic	0.526	0.10	mg/l	0.500		105	75-125			
Barium	0.528	0.10	"	0.500		106	75-125			
Cadmium	0.497	0.10	"	0.500		99.3	75-125			
Chromium	0.501	0.10	"	0.500		100	75-125			
Lead	0.513	0.10	"	0.500		103	75-125			

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fashch

Rose Fashch, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	**Reported:**
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

TCLP Metals by 6000/7000 Series Methods - Quality Control

SunStar Laboratories, Inc.

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 8020539 - TCLP Metals										
Matrix Spike (8020539-MS1)	**Source: T180426-07**			Prepared: 02/05/18 Analyzed: 02/08/18						
Arsenic	0.527	0.10	mg/l	0.500	ND	105	75-125			
Barium	0.606	0.10	"	0.500	0.136	94.0	75-125			
Cadmium	0.486	0.10	"	0.500	0.000716	97.1	75-125			
Chromium	0.488	0.10	"	0.500	0.00187	97.2	75-125			
Lead	2.93	0.10	"	0.500	2.33	121	75-125			
Matrix Spike Dup (8020539-MSD1)	**Source: T180426-07**			Prepared: 02/05/18 Analyzed: 02/08/18						
Arsenic	0.509	0.10	mg/l	0.500	ND	102	75-125	3.38	30	
Barium	0.603	0.10	"	0.500	0.136	93.5	75-125	0.399	30	
Cadmium	0.486	0.10	"	0.500	0.000716	97.0	75-125	0.127	30	
Chromium	0.487	0.10	"	0.500	0.00187	97.0	75-125	0.234	30	
Lead	2.89	0.10	"	0.500	2.33	112	75-125	1.42	30	

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fasheh

Rose Fasheh, Project Manager

SunStar Laboratories, Inc.
Providing Quality Analytical Services Nationwide

25712 Commercentre Drive
Lake Forest, California 92630
949.297.5020 Phone
949.297.5027 Fax

Hanwha Q CELLS	Project: PV Module Samples	
300 Spectrum Center Dr., Ste 1250	Project Number: [none]	Reported:
Irvine CA, 92618	Project Manager: Dean Lee	02/12/18 13:15

Notes and Definitions

DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

SunStar Laboratories, Inc.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rose Fashch

Rose Fashch, Project Manager

TerraTrak

The first and only single axis tracker that allows you to turn unusable land into valuable assets. Built tough for reliable performance, TerraTrak will maximize energy output and returns conquering the most challenging sites. Employ PV where you never thought possible through durable mechanics and intelligent control technology.

Durable Mechanics

- Adaptable frame can accommodate frost susceptible soils, 20% N-S slopes, unlimited E-W eliminating 100% refusal risks
- Durable a-frame, torque tube, gear box, and self-locking hardware increase strength and ensure reliable performance in extreme weather
- Structurally optimized tracker rows and reduced part count simplify installation making it easy and affordable to employ PV anywhere
- Comprehensive wind tunnel analysis and patent pending self-locking hardware which increases stability during weather events
- Proprietary torque tube shape significantly reduces pounds per foot and loading in max capacity to yield in lower material cost and increased strength
- Field ready, lubricant-free with high durable plastics creates a simplistic, functional bushing housing to support the torque tube

Intelligent Controls

- Proprietary and advanced performance monitoring and controls engineered with bi-directional communications provides real-time performance monitoring data to boost visibility and maximize energy production
- Reduce downtime with predictive analytics and machine learning which tells us when a row isn't tracking on its normal path
- Onsite weather stations monitor wind and snow conditions and automatically stow the site when thresholds are crossed. TerraTrak is also integrated with a weather API which allows us to forecast bad weather and proactively stow your sites before bad weather approaches
- Zone controls allow you to perform routine maintenance like mowing and washing on a portion of the site while the rest of your site continues tracking for optimum power generation
- The persistent cellular connection allows us to troubleshoot each site remotely without rolling a truck
- Row box, weather station, and network controller have been tested to U.S. military standards to ensure reliable operation in the most relenting environmental conditions

Specifications

Module orientation	2 high in portrait
Tracking	120°
Range of motion	± 60°
Weather monitoring	Wind speed, snow depth, and flood height
Corrosion	ISO 9223 C2, C3
Max slope grade	20% N/S, Unlimited E/W
Modules per row	Up to 93 standard framed modules (-2m x 1m)
Drive system	Independent row design / 12 VDC motorized slew drive / Zero grid power consumption
Bushings	High impact polymer / Lubricant-free, Dry bushings
Bearing housings	Hard stop at each foundation / Integrated torque tube translation mitigation
Fasteners	Standard sizes / Self-locking / No special tools required
Material coating	HDG, Inline, Pre-galvanization, Powder coating

Adjustable foundations	Flexibility installation allows marketing leading adjustability
DC capacity per tow	33.49kW, assuming 385W x 87 mods/row
Grounding	Self-grounding racking
Electrical subsystem	Highly advanced BMS hardware & software
Typical dimensions	Horizontal (93 module row @ 60°) Height: 2.95m / 9.67ft Width: 3.96m / 13ft Length: 47.8m / 156.8ft
GCR	No minimum, typical 28% to 50%
Foundations	Ground screw, Driven piles
Max wind speed	Configurable up to 135mph
Flood clearance	66.6 inches (Grade = top of screw)
Leading edge	24.5 inches (Grade = top of screw)
Warranty	10 year structural, 5 year on drive and control system, 20 years on screw foundations, extended terms available
Certifications	UL3703, UL2703, & IEC 62817

Three-Phase
Transformers
CA202003EN

Effective July 2015
Supersedes 210-12 August 2013

COOPER POWER SERIES

Three-phase pad-mounted compartmental type transformer

General

At Eaton, we are constantly striving to introduce new innovations to the transformer industry, bringing you the highest quality, most reliable transformers. Eaton's Cooper Power series Transformer Products are ISO 9001 compliant, emphasizing process improvement in all phases of design, manufacture, and testing. In order to drive this innovation, we have invested both time and money in the Thomas A. Edison Technical Center, our premier research facility in Franksville, Wisconsin. Such revolutionary products as distribution-class UltraSIL™ Polymer-Housed Evolution™ surge arresters and Envirotemp™ FR3™ fluid have been developed at our Franksville lab.

With transformer sizes ranging from 45 kVA to 12 MVA and high voltages ranging from 2400 V to 46 kV, Eaton has you covered. From fabrication of the tanks and cabinets to winding of the cores and coils, to production of arresters, switches, tap changers, expulsion fuses, current limit fuses, bushings (live and dead) and molded rubber goods, Eaton does it all. Eaton's Cooper Power series transformers are available with electrical grade mineral oil or Envirotemp™ FR3™ fluid, a less-flammable and bio-degradable fluid. Electrical codes recognize the advantages of using Envirotemp™ FR3™ fluid both indoors and outdoors for fire sensitive applications. The bio-based fluid meets Occupational Safety and Health Administration (OSHA) and Section 450.23 NEC Requirements.

Powering Business Worldwide

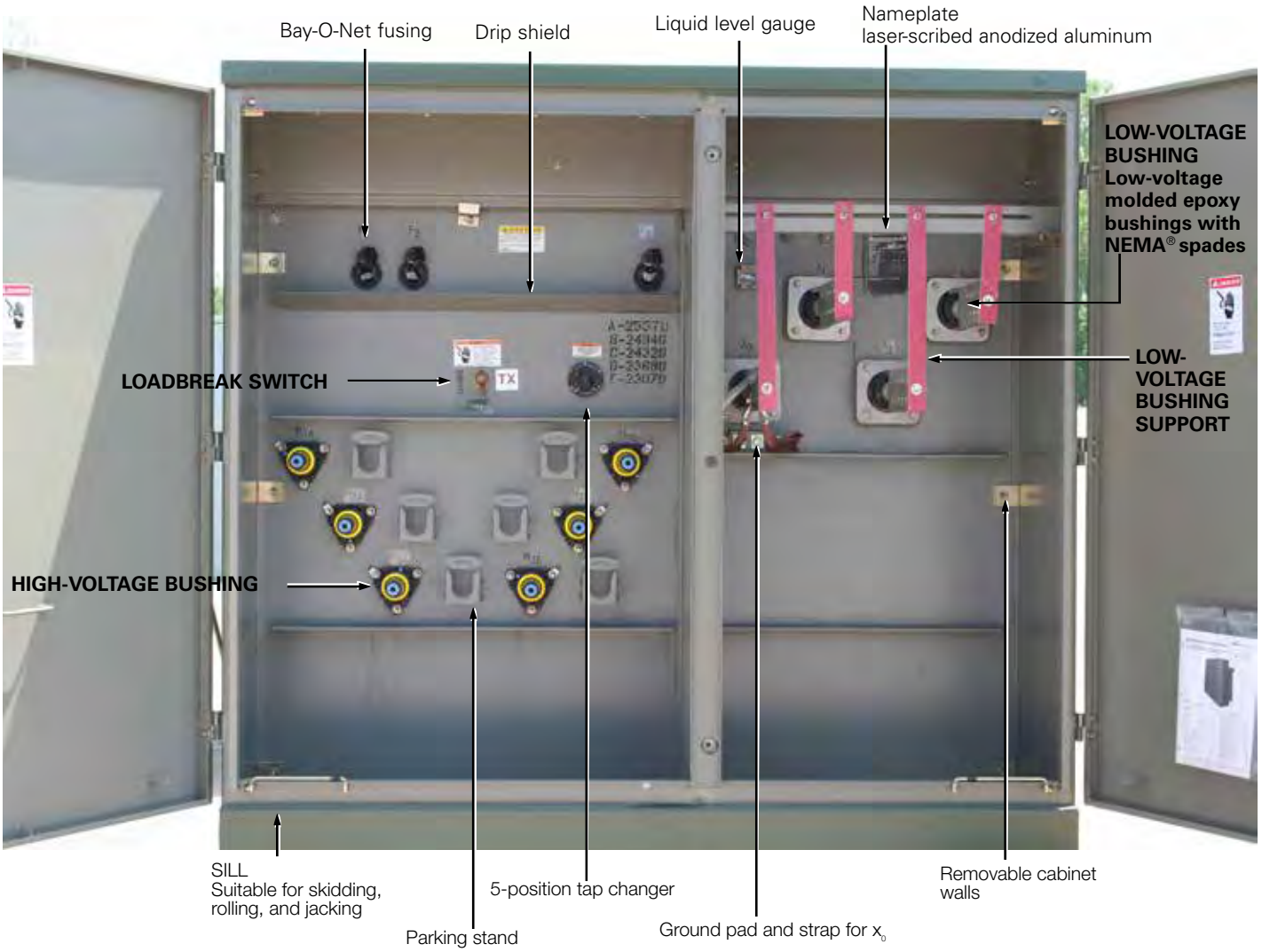


Figure 1. Three-phase pad-mounted compartmental type transformer.

Table 1. Product Scope

Type	Three Phase, 50 or 60 Hz, 65 °C Rise (55 °C, 55/65 °C), 65/75 °C, 75 °C
Fluid Type	Mineral oil or Envirotemp™ FR3™ fluid
Coil Configuration	2-winding or 4-winding or 3-winding (Low-High-Low), 3-winding (Low-Low-High)
Size	45 – 10,000 kVA
Primary Voltage	2,400 – 46,000 V
Secondary Voltage	208Y/120 V to 14,400 V
Specialty Designs	Inverter/Rectifier Bridge
	K-Factor (up to K-19)
	Vacuum Fault Interrupter (VFI)
	UL® Listed & Labeled and Classified
	Factory Mutual (FM) Approved®
	Solar/Wind Designs
	Differential Protection
	Seismic Applications (including OSHPD)
	Hardened Data Center

Table 2. Three-Phase Ratings

Three-Phase 50 or 60 Hz
kVA Available[1]: 45, 75, 112.5, 150, 225, 300, 500, 750, 1000, 1500, 2000, 2500, 3000, 3750, 5000, 7500, 10000

[1]Transformers are available in the standard ratings and configurations shown or can be customized to meet specific needs.

Table 3. Impedance Voltage

	Low-voltage rating		
Rating (kVA)	**≤ 600 V**	**2400 Δ through 4800 Δ**	**6900 Δ through 13800GY/7970 or 13800 Δ**
45-75	2.70-5.75	2.70-5.75	2.70-5.75
112.5-300	3.10-5.75	3.10-5.75	3.10-5.75
500	4.35-5.75	4.35-5.75	4.35-5.75
750-2500	5.75	5.75	5.75
3750	5.75	5.75	6.00
5000		6.00	6.50

Note: The standard tolerance is ± 7.5%

Table 4. Audible Sound Levels

	NEMA® TR-1 Average
Self-Cooled, Two Winding kVA Rating	**Decibels (dB)**
45-500	56
501-700	57
701-1000	58
1001-1500	60
1501-2000	61
2001-2500	62
2501-3000	63
3001-4000	64
4001-5000	65
5001-6000	66
6001-7500	67
7501-10000	68

Table 5. Insulation Test Levels

KV Class	Induced Test 180 or 400 Hz 7200 Cycle	kV BIL Distribution	Applied Test 60 Hz (kV)
1.2	Twice Rated Voltage	30	10
2.5		45	15
5		60	19
8.7		75	26
15		95	34
25		125	40
34.5		150	50

Table 6. Temperature Rise Ratings 0-3300 Feet (0-1000 meters)

	Standard	Optional
Unit Rating (Temperature Rise Winding)	65 ºC	55 °C, 55/65 ºC, 75 °C
Ambient Temperature Max	40 ºC	50 ºC
Ambient Temperature 24 Hour Average	30 ºC	40 ºC
Temperature Rise Hotspot	80 ºC	65 ºC

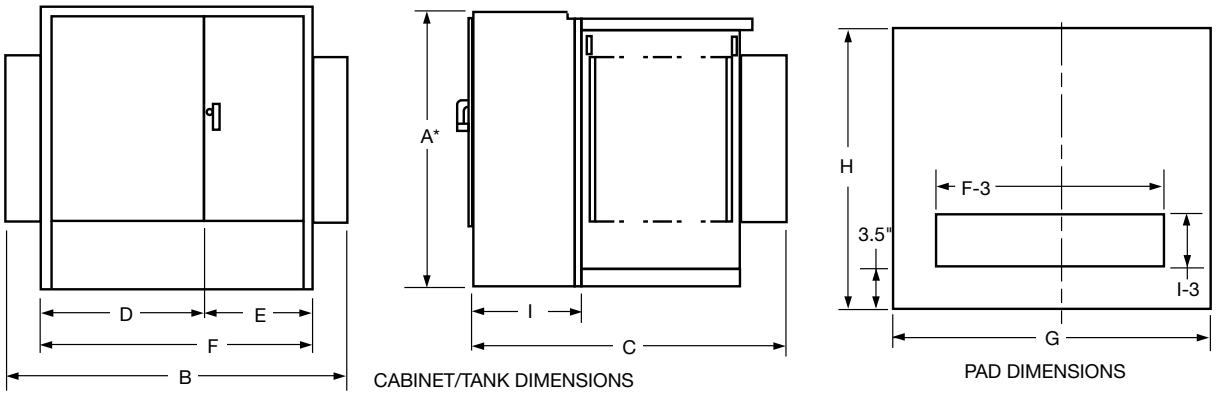


Figure 2. Transformer and pad dimensions.

* Add 9" for Bay-O-Net fusing.

Table 7. Fluid-filled—aluminum windings 55/65 °C Rise[1]

65° Rise	DEAD-FRONT—LOOP OR RADIAL FEED—BAY-O-NET FUSING OIL FILLED—ALUMINUM WINDINGS										
	OUTLINE DIMENSIONS (in.)									Gallons of	Approx. Total
kVA Rating	A*	B	C	D	E	F	G	H	I	Fluid	Weight (lbs.)
45	50	68	39	42	26	68	72	43	20	110	2,100
75	50	68	39	42	26	68	72	43	20	115	2,250
112.5	50	68	49	42	26	68	72	53	20	120	2,350
150	50	68	49	42	26	68	72	53	20	125	2,700
225	50	72	51	42	30	72	76	55	20	140	3,150
300	50	72	51	42	30	72	76	55	20	160	3,650
500	50	89	53	42	30	72	93	57	20	190	4,650
750	64	89	57	42	30	72	93	61	20	270	6,500
1000	64	89	59	42	30	72	93	63	20	350	8,200
1500	73	89	86	42	30	72	93	90	24	410	10,300
2000	73	72	87	42	30	72	76	91	24	490	12,500
2500	73	72	99	42	30	72	76	103	24	530	14,500
3000	73	84	99	46	37	84	88	103	24	620	16,700
3750	84	85	108	47	38	85	88	112	24	660	19,300
5000	84	96	108	48	48	96	100	112	24	930	25,000
7500	94	102	122	54	48	102	100	126	24	1,580	41,900

1 Weights, gallons of fluid, and dimensions are for reference only and not for construction. Please contact Eaton for exact dimensions.

* Add 9" for Bay-O-Net fusing.

Table 8. Fluid-Filled—Copper Windings 55/65 °C Rise[1]

65° Rise	DEAD-FRONT—LOOP OR RADIAL FEED—BAY-O-NET FUSING OIL FILLED—COPPER WINDINGS										
	OUTLINE DIMENSIONS (in.)									Gallons of	Approx. Total
kVA Rating	A*	B	C	D	E	F	G	H	I	Fluid	Weight (lbs.)
45	50	64	39	34	30	64	69	43	20	110	2,100
75	50	64	39	34	30	64	69	43	20	115	2,350
112.5	50	64	49	34	30	64	69	53	20	115	2,500
150	50	64	49	34	30	64	69	53	20	120	2,700
225	50	64	51	34	30	64	73	55	20	140	3,250
300	50	64	51	34	30	64	75	55	20	160	3,800
500	50	81	53	34	30	64	85	57	20	200	4,800
750	64	89	57	42	30	72	93	61	20	255	6,500
1000	64	89	59	42	30	72	93	63	20	300	7,800
1500	73	89	86	42	30	72	93	90	24	410	10,300
2000	73	72	87	42	30	72	76	91	24	420	11,600
2500	73	72	99	42	30	72	76	103	24	500	14,000
3000	73	84	99	46	37	84	88	103	24	720	18,700
3750	84	85	108	47	38	85	88	112	24	800	20,500
5000	84	96	108	48	48	96	100	112	24	850	25,000
7500	94	102	122	54	48	102	100	126	24	1,620	46,900

[1] Weights, gallons of fluid, and dimensions are for reference only and not for construction. Please contact Eaton for exact dimensions.

* Add 9" for Bay-O-Net fusing.

Standard features

Connections and neutral configurations

- Delta - Wye: Low voltage neutral shall be a fully insulated X0 bushing with removable ground strap.
- Grounded Wye-Wye: High voltage neutral shall be internally tied to the low voltage neutral and brought out as the H0X0 bushing in the secondary compartment with a removable ground strap.
- Delta-Delta: Transformer shall be provided without a neutral bushing.
- Wye-Wye: High voltage neutral shall be brought out as the H0 bushing in the primary compartment and the low voltage neutral shall be brought as the X0- bushing in the secondary compartment.
- Wye-Delta: High voltage neutral shall be brought out as the H0 bushing in the primary compartment. No ground strap shall be provided (line to line rated fusing is required).

High and low voltage bushings

- 200 A bushing wells (15, 25, and 35 kV)
- 200 A, 35 kV Large Interface
- 600 A (15, 25, and 35 kV) Integral bushings (dead-front)
- Electrical-grade wet-process porcelain bushings (live-front)

Tank/cabinet features

- Bolted cover for tank access (45-2500 kVA)
- Welded cover with hand hole (>2500 kVA)
- Three-point latching door for security
- Removable sill for easy installation
- Lifting lugs (4)
- Stainless steel cabinet hinges and mounting studs
- Steel divider between HV and LV compartment
- 20" Deep cabinet (45-1000 kVA)
- 24" Deep cabinet (1500-7500 kVA)
- 30" Deep cabinet (34.5/19.92 kV)
- Pentahead captive bolt
- Stainless steel 1-hole ground pads (45-500 kVA)
- Stainless steel 2-hole ground pads (750-10,000 kVA)
- Parking Stands (dead-front)

Valves/plugs

- One-inch upper filling plug
- One-inch drain plug (45-500 kVA)
- One-inch combination drain valve with sampling device in low voltage compartment (750-10,000 kVA)
- Automatic pressure relief valve

Nameplate

- Laser-scribed anodized aluminum nameplate

Figure 3. Drain valve with sampler.

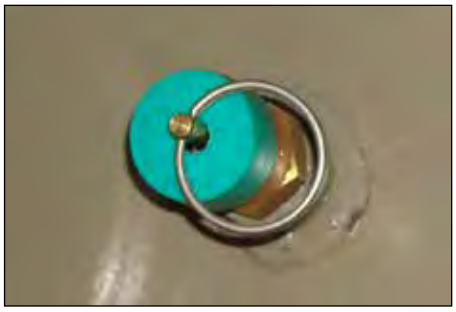


Figure 4. Automatic Pressure relief valve.

Figure 5. Liquid level gauge.

Figure 6. External Gauges.

Figure 7. External visible break with gauges.

Optional features

High and low voltage bushings

- 200 A (15, 25 kV) bushing inserts
- 200 A (15, 25 kV) feed thru inserts
- 200 A (15, 25 kV) (HTN) bushing wells with removable studs
- High-voltage 600 A (15, 25, 35 kV) deadbreak one-piece bushings
- Low voltage 6-, 8-holes spade
- Low voltage 12-, 16-, 20-holes spade (750-2500 kVA)
- Low voltage bushing supports

Tank/cabinet features

- Stainless steel tank base and cabinet
- Stainless steel tank base, cabinet sides and sill
- 100% stainless steel unit
- Service entrance (2 inch) in sill or cabinet side
- Touch-up paint (domestic)
- Copper ground bus bar
- Kirk-Key provisions
- Nitrogen blanket
- Bus duct cutout

Special designs

- Factory Mutual (FM)
- UL® Classified
- Triplex
- High altitude
- K-Factors
- Step-up
- Critical application
- Modulation transformers
- Seismic applications (including OSHPD)

Switches

- One, two, or three On/Off loadbreak switches
- 4-position loadbreak V-blade switch or T-blade switch
- Delta-wye switch
- 3-position V-Blade selector switch
- 100 A, 150 A, 300 A tap changers
- Dual voltage switch
- Visible break with VFI interrupter interlock
- External visible break (15, 25, and 35 kV, up to 3 MVA)
- External visible break with gauges (15, 25, and 35 kV, up to 3 MVA)

Gauges and devices

- Liquid level gauge (optional contacts)
- Pressure vacuum gauge (optional contacts and bleeder)
- Dial-type thermometer (optional alarm contacts)
- Cover mounted pressure relief device (optional alarm contacts)
- Ground connectors
- Hexhead captive bolt
- Molded case circuit breaker mounting provisions
- External gauges in padlockable box

Overcurrent protection

- Bay-O-Net fusing (Current sensing, dual sensing, dual element, high amperage overload)
- Bay-O-Net expulsion fuse in series with a partial range under-oil ELSP current limiting fuse (below 23 kV)
- Cartridge fusing in series with a partial range under-oil ELSP current limiting fuse (above 23 kV)
- MagneX™ interrupter with ELSP current-limiting fuse
- Vacuum Fault Interrupter (VFI)
- Visible break window
- Fuse/switch interlock

Valves/plugs

- Drain/sampling valve in high-voltage compartment
- Globe type upper fill valve

Overvoltage protection

- Distribution-, intermediate-, or station-class surge arresters
- Elbow arresters (for dead-front connections)

Metering/fan/control

- Full metering package
- Current Transformers (CTs)
- Metering Socket
- NEMA® 4 control box (optional stainless steel)
- NEMA® 7 control box (explosion proof)
- Fan Packages

Testing

- Customer test witness
- Customer final inspection
- Zero Sequence Impedance Test
- Heat Run Test
- ANSI® Impulse Test
- Audible Sound Level Test
- RIV (Corona) Test
- Dissolved Gas Analysis (DGA) Test
- 8- or 24-Hour Leak Test

Coatings (paint)

- ANSI® Bell Green
- ANSI® #61 Light Gray
- ANSI® #70 Sky Gray
- Special paint available per request

Nameplate

- Stainless steel nameplate

Decals and labels

- High voltage warning signs
- Mr. Ouch
- Bi-lingual warning
- DOE compliant
- Customer stock code
- Customer stenciling
- Shock and arc flash warning decal
- Non-PCB decal

Construction

Core

The three-legged, step-lap mitered core construction is manufactured using a high-quality cutting machine. For maximum efficiency, cores are precisely stacked, virtually eliminating gaps in the corner joints.

Five-legged wound core or shell-type triplex designs are used for wye-wye connected transformers, and other special transformer designs.

Cores are manufactured with precision cut, burr-free, grain-oriented silicon steel. Many grades of core steel are available for optimizing core loss efficiency.

Coils

Pad-mounted transformers feature a rectangular coil configuration with wire-wound, high-voltage primaries and sheet-wound secondaries. The design minimizes axial stress developed by short circuits and provides for magnetic balancing of tap connections.

Coils are wound using the highest quality winding machines providing exacting tension control and conductor placement for superior short-circuit strength and maximum efficiency.

Extra mechanical strength is provided by diamond pattern, epoxy-coated paper insulation, used throughout the coil, with additional epoxy at heavy stress points. The diamond pattern distribution of the epoxy and carefully arranged ducts, provide a network of passages through which cooling fluid can freely circulate.

Coil assemblies are heat-cured under calculated hydraulic pressure to ensure performance against short-circuit forces.

Core and coil assemblies

Pad-mounted transformer core and coil assemblies are braced with heavy steel ends to prevent the rectangular coil from distorting under short-circuit conditions. Plates are clamped in place using presses, and welded or bolted to form a solid core and coil assembly. Core and coil assemblies exceed ANSI® and IEEE® requirements for short-circuit performance. Due to the rigidity of the design, impedance shift after short-circuit is comparable to that of circular wound assemblies.

Tanks

Transformer tanks are designed for high strength and ease of handling, installation, and maintenance. Tanks are welded using precision-cut, hot rolled, pickled and oiled steel. They are sealed to protect the insulating fluid and other internal components.

Transformer tanks are pressure-tested to withstand 7 psig without permanent distortion and 15 psig without rupture.

Tank finish

An advanced multi-stage finishing process exceeds IEEE Std C57.12.28™-2014 standards. The eight-stage pre-treatment process assures coating adhesion and retards corrosion. It converts tank surfaces to a nonmetallic, water insoluble iron phosphate coating.

The paint method consists of two distinct layers of paint. The first is an epoxy primer (E-coat) layer which provides a barrier against moisture, salt and corrosives. The two-component urethane final coat seals and adds ultraviolet protection.

Vacuum processing

Transformers are dried and filled with filtered insulating fluid under vacuum, while secondary windings are energized. Coils are heated to drive out moisture, ensuring maximum penetration of fluid into the coil insulation system.

Insulating fluid

Eaton's Cooper Power series transformers are available with electrical-grade mineral insulating oil or Envirotemp™ FR3™ fluid. The highly refined fluids are tested and degassed to assure a chemically inert product with minimal acid ions. Special additives minimize oxygen absorption and inhibit oxidation. To ensure high dielectric strength, the fluid is re-tested for dryness and dielectric strength, refiltered, heated, dried, and stored under vacuum before being added to the completed transformer.

Eaton's Cooper Power series transformers filled with Envirotemp™ FR3™ fluid enjoy unique fire safety, environmental, electrical, and chemical advantages, including insulation life extending properties.

A bio-based, sustainable, natural ester dielectric coolant, Envirotemp™ FR3™ fluid quickly and thoroughly biodegrades in the environment and is non-toxic per acute aquatic and oral toxicity tests.

Building for Environmental and Economic Sustainability (BEES) total life cycle assessment software, utilized by the US Dept. of Commerce, reports its overall environmental performance impact score at 1/4th that reported for mineral oil. Envirotemp™ FR3™ fluid has also earned the EPA Environmental Technology Verification of transformer materials.

With a fire point of 360 °C, Envirotemp™ FR3™ fluid is FM Approved® and Underwriters Laboratories (UL®) Classified "Less-Flammable" per NEC® Article 450-23, fitting the definition of a Listed Product per NEC®.

Figure 8. VFI transformer with visible break.

Pad-mounted VFI transformer

Eaton's Cooper Power series VFI transformer combines a conventional distribution transformer with the proven Vacuum Fault Interrupter (VFI). This combination provides both voltage transformation and transformer over current protection in one space saving and money saving package. The pad-mounted VFI transformer protects the transformer and provides proper coordination with upstream protective devices. When a transformer fault or overload condition occurs, the VFI breaker trips and isolates the transformer.

The three-phase VFI breaker has independent single-phase initiation, but is three-phase mechanically gang-tripped. A trip signal on any phase will open all three phases. This feature eliminates single-phasing of three phase loads. It also enables the VFI breaker to be used as a three-phase load break switch.

Due to the resettable characteristics of the VFI breaker, restoring three-phase service is faster and easier.

The sealed visible break window and switch is an option that can be installed to provide visible break contact. This feature provides enhanced safety and allows an operator to see if the loadbreak switch contacts are in an open or closed position before performing maintenance.

Envirotran™ FM Approved special protection transformer

Eaton's Cooper Power series Envirotran™ transformer is FM Approved and suitable for indoor locations. Factory Mutual Research Corporation's (FMRC) approval of the Envirotran transformer line makes it easy to comply with and verify compliance with Section 450.23, 2008 NEC, Less-Flammable Liquid-Filled Transformer Requirements for both indoor and outdoor locations.

Envirotran FM Approved transformers offer the user the benefit of a transformer that can be easily specified to comply with NEC, and makes FM Safety Data Sheet compliance simpler, while also providing maximum safety and flexibility for both indoor and outdoor installations.

Because the "FM Approved" logo is readily visible on the transformer and its nameplate, NEC compliance is now easily verifiable by the inspector.

Envirotran FM Approved transformers are manufactured under strict compliance with FMRC Standard 3990 and are filled with FM Approved Envirotemp™ FR3™ fluid, a fire-resistant dielectric coolant.

FM
APPROVED

Special application transformers

Data Center transformer

With focus rapidly shifting from simply maximizing uptime and supporting demand to improving energy utilization, the data center industry is continually looking for methods to increase its energy efficiency and reliability. Utilizing cutting edge technology, Eaton's Cooper Power series Hardened Data Center (HDC) transformers are the solution. Designed with special attention given to surge protection, HDC liquid-filled transformers provide superior performance under the harshest electrical environments. Contrary to traditional dry-type units, HDC transformers provide unsurpassed reliability, overloadability, operational life, efficiency, thermal loading and installed footprint. These units have reliably served more than 100 MW of critical data center capacity for a total of more than 6,000,000 hours without any reported downtime caused by a thermal or short-circuit coil failure.

The top priority in data center operations is uninterrupted service. Envirotran HDC transformers from Eaton, having substantially higher levels of insulation, are less susceptible to voltage surges. Eaton has experienced zero failures due to switching transients. The ANSI® and IEEE® standard impulse withstand ratings are higher for liquid-filled transformers, making them less susceptible to insulation failure. The Envirotran HDC transformer provides ultimate protection by increasing the BIL rating one level higher than standard liquid-filled transformer ratings. The cooling system of liquid-filled transformers provides better protection from severe overloads—overloads that can lead to significant loss of life or failure.

Data center design typically includes multiple layers of redundancy, ensuring maximum uptime for the critical IT load. When best in class transformer manufacturing lead times are typically weeks, not days, an unexpected transformer failure will adversely affect the facility's reliability and profitability. Therefore, the ability to determine the electrical and mechanical health of a transformer can reduce the probability of costly, unplanned downtime. Routine diagnostic tests, including key fluid properties and dissolved gas analysis (DGA), can help determine the health of a liquid-filled transformer. Although sampling is not required for safe operation, it will provide the user with valuable information, leading to scheduled repair or replacement, and minimizing the duration and expense of an outage. With a dry-type transformer, there is no reliable way to measure the health or likelihood of an impending failure.

Solar transformer

As a result of the increasing number of states that are adopting aggressive Renewable & Alternative Energy Portfolio Standards, the solar energy market is growing—nearly doubling year over year. Eaton, a key innovator and supplier in this expanding market, is proud to offer its Cooper Power series Envirotran transformers specifically designed for Solar Photovoltaic medium-voltage applications. Eaton is working with top solar photovoltaic developers, integrators and inverter manufacturers to evolve the industry and change the way we distribute power.

In accordance with this progressive stance, every Envirotran Solar transformer is filled with non-toxic, biodegradable Envirotemp™ FR3™ dielectric fluid, made from renewable seed oils. On top of its biodegradability, Envirotemp™ FR3™ fluid substantially extends the life of the transformer insulation, saving valuable resources. What better way to distribute green power than to use a green transformer. In fact, delaying conversion to Envirotran transformers places the burden of today's environmental issues onto tomorrow's generations. Eaton can help you create a customized transformer, based on site specific characteristics including: temperature profile, site altitude, solar profile and required system life. Some of the benefits gained from this custom rating include:

- Reduction in core losses
- Improved payback on investment
- Reduction in footprint
- Improved fire safety
- Reduced environmental impact

For the solar photovoltaic industry, Eaton is offering standard step up transformers and dual secondary designs, including 4-winding, 3-winding (Low-High-Low) and 3-winding (Low-Low-High) designs.

Wind transformer

Eaton is offering custom designs for renewable energy power generation. Eaton manufactures its Cooper Power series Generator Step-Up (GSU) transformers for installation at the base of every wind turbine. Additionally, grounding transformers are available for wind power generation.

DOE efficiency

The United States Department of Energy (DOE) has mandated efficiency values for most liquid type, medium voltage transformers. As a result, all applicable Eaton's Cooper Power series transformers 2500 kVA and below conform to efficiency levels as specified in the DOE ruling "10 CFR Part 431 Energy Conservation Program".

Underwriters Laboratories® (UL®) Listed and Labeled/ Classified

The Envirotran transformer from Eaton can be specified as UL® Listed & Labeled, and/or UL® Classified. Underwriters Laboratories (UL®) listing is a verification of the design and construction of the transformer to the ANSI® and IEEE® standards. UL® listing generally is the most efficient, cost-effective solution for complying with relevant state and local electrical codes. UL® Combination Classification/Listing is another way in which to comply with Section 450.23, 2008 NEC® requirements. This combines the UL® listed transformer with a UL® Classified Less-Flammable Liquid and complies with the use restrictions found within the liquid Classification.

c UL US
LISTED

K-Factor transformer

With a drastic increase in the use of ferromagnetic devices, arcing devices, and electric power converters, higher frequency loads have increased significantly. This harmonic loading has the potential to generate higher heat levels within a transformer's windings and leads by as much as 300%. Harmonic loading has the potential to induce premature failure in standard-design distribution transformers.

In addition to standard UL® "K-Factor" ratings, transformers can be designed to customer-provided specifications detailing precise loading scenarios. Onsite measurements of magnitude and frequency, alongside harmonic analysis of the connected load can be performed by Eaton engineers or a third party consultant. These field measurements are used to determine exact customer needs and outline the transformer specifications.

Eaton will design harmonic-resistant transformers that will be subjected to the unique harmonic loads. These units are designed to maintain normal temperature rise under harmonic, full-load conditions. Standard UL® "K-Factor" designs can result in unnecessary costs when the "next-highest" K-Factor must be selected for a calculated design factor. To save the customer these unnecessary costs, Eaton can design the transformer to the specific harmonic spectrum used in the application. Eaton's Cooper Power series K-factor transformers are filled with mineral oil or Envirotemp™ FR3™ fluid and enjoy the added benefits of dielectric cooling such as higher efficiencies than dry-type transformers.

Modulation transformer

Bundled with an Outboard Modulation Unit (OMU) and a Control and Receiving Unit (CRU), a Modulation Transformer Unit (MTU) is designed to remotely achieve two way communication.

The use of an MTU reduces travel time and expense versus traditional meter reading performed by high voltage electricians. Additionally, with MTU it is possible to manage and evaluate energy consumption data, providing reduced metering costs and fewer tenant complaints.

An MTU utilizes existing utility infrastructure, therefore eliminating the need to engineer and construct a dedicated communication network.

Figure 9. Modular transformer.

Inverter/rectifier bridge

Eaton complements its range of applications for transformers by offering dual winding designs. These designs are intended for connection to 12-pulse rectifier bridges.

Product attributes

To set us apart from other transformer manufactures, Eaton includes the following guarantees with every three-phase pad-mounted transformer.

Engineered to order (ETO)

Providing the customer with a well developed, cost-effective solution is the number one priority at Eaton. Using customer specifications, Eaton will work with the customer from the beginning to the end to develop a solution to fit their needs. Whether it is application specific, site specific, or a uniquely specified unit, Eaton will provide transformers with the best in class value and performance, saving the customer time and money.

Made in the U.S.A.

Eaton's three-phase pad-mounted transformers are produced right here in the United States of America. Our manufacturing facilities are positioned strategically for rapid shipment of products. Furthermore, should the need arise, Eaton has a broad network of authorized service repair shops throughout the United States.

Superior paint performance

Protecting transformers from nature's elements worldwide, Eaton's E-coat system provides unrivaled transformer paint life, and exceeds IEEE Std C57.12.28™-2014 and IEEE Std C57.12.29™-2005 standards. In addition to the outside of the unit, each transformer receives a gray E-coat covering in the interior of the tank and cabinet, providing superior rust resistance and greater visibility during service.

If the wide range of standard paint selections does not suit the customer's needs, Eaton will customize the paint color to meet their requirements.

Rectangular coil design

Eaton utilizes a rectangular coil design. This winding technique results in a smaller overall unit footprint as well as reducing the transformer weight. The smaller unit size does not hinder the transformer performance in the least. Units have proven short circuit withstand capabilities up to 10 MVA.

Testing

Eaton performs routing testing on each transformer manufactured including the following tests:

- Insulation Power Factor: This test verifies that vacuum processing has thoroughly dried the insulation system to required limits.
- Ratio, Polarity, and Phase Relation: Assures correct winding ratios and tap voltages; checks insulation of HV and LV circuits. Checks entire insulation system to verify all live-to-ground clearances.
- Resistance: This test verifies the integrity of internal high-voltage and low-voltage connections; provides data for loss upgrade calculations.
- Routine Impulse Tests: The most severe test, simulating a lightning surge. Applies one reduced wave and one full wave to verify the BIL rating.
- Applied Potential: Applied to both high-voltage and low-voltage windings, this test stresses the entire insulation system to verify all live-to-ground clearances.
- Induced Potential: 3.46 times normal plus 1000 volts for reduced neutral designs.
- Loss Test: These design verification tests are conducted to assure that guaranteed loss values are met and that test values are

within design tolerances. Tests include no-load loss and excitation current along with impedance voltage and load loss.

- Leak Test: Pressurizing the tank to 7 psig assures a complete seal, with no weld or gasket leaks, to eliminate the possibility of moisture infiltration or fluid oxidation.

Design performance tests

The design performance tests include the following:

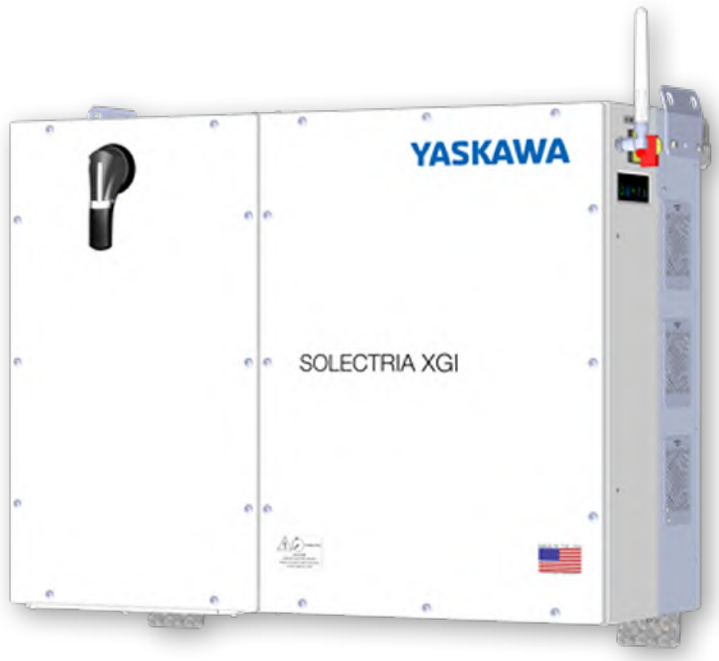
- Temperature Rise: Our automated heat run facility ensures that any design changes meet ANSI® and IEEE® temperature rise criteria.
- Audible Sound Level: Ensures compliance with NEMA® requirements.
- Lightning Impulse: To assure superior dielectric performance, this test consists of one reduced wave, two chopped waves and one full wave in sequence, precisely simulating the harshest conditions.

Thomas A Edison Research and Test Facility

We are constantly striving to introduce new innovations to the transformer industry, bringing you the highest quality transformer for the lowest cost. Eaton's Cooper Power series Transformer Products are ISO 9001 compliant, emphasizing process improvement in all phases of design, manufacture, and testing. We have invested millions of dollars in the Thomas A. Edison Technical Center, our premier research facility in Franksville, Wisconsin affirming our dedication to introducing new innovations and technologies to the transformer industry. This research facility is fully available for use by our customers to utilize our advanced electrical and chemical testing labs.

SOLECTRIA XGI™ 1500

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
- 99.0% peak efficiency
- Flexible solution for distributed and centralized system architecture
- Advanced grid-support functionality Rule 21/UL1741SA
- Robust, dependable and 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

Options

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

MADE IN THE USA

With U.S. and Global Components

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. The XGI 1500 inverters provide advanced grid-support functionality and meet the latest IEEE 1547 and UL 1741 standards for safety. The XGI 1500 inverters are the most powerful 1500VDC string inverters in the PV market and have been engineered for both distributed and centralized system architecture. Designed and engineered in Lawrence, MA, the new SOLECTRIA XGI inverters are assembled and tested at Yaskawa America's facilities in Buffalo Grove, IL. The XGI 1500 inverters are Made in the USA with global components and are compliant with the Buy American Act.

Specifications

	XGI 1500-125/125	XGI 1500-125/150	XGI 1500-150/166	XGI 1500-166/166
DC Input				
Absolute Maximum Input Voltage	1500 VDC	1500 VDC	1500 VDC	1500 VDC
Maximum 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
Maximum Operating Input Current	148.3 A	148.3 A	178.0 A	197.7 A
Maximum Operating PV Power	128 kW	128 kW	153 kW	170 kW
Maximum DC/AC Ratio | Max Rated PV Power	2.0 | 250 kW	2.0 | 250 kW	1.66 | 250 kW	1.5 | 250 kW
Max Rated PV Short-Circuit Current (∑Isc x 1.25)	320 A	320 A	320 A	320 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
Maximum 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)	+/- 0.85 Adjustable	+/- 0.85 Adjustable	+/- 0.85 Adjustable	+/- 0.85 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	<1 W	<1 W	<1 W	<1 W
Temperature				
Ambient Temperature 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	9,840 ft (3 km)		9,840 ft (3 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	UL 1741, IEEE 1547, UL 1998			
Advanced Grid Support Functionality	Rule 21, UL 1741SA			
Testing Agency	ETL			
FCC Compliance	FCC Part 15, Class A			
Warranty				
Standard and Options	5 Years Standard; Option for 10 Years			
Enclosure				
Acoustic Noise Rating	56 dBA @ 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			

Specifications subject to change.

SOLECTRIA SOLAR

Yaskawa Solectria Solar
360 Merrimack Street
Lawrence, MA 01843
solectria.com

1-978-683-9700
Email: inverters@solectria.com

Document FL.XGI1500.01
9/30/2019

YASKAWA

GEOPAK SERIES SIZE 1 LED

Architectural Wallpack

TRP1/RDI1/QSP1

NEW

Cat.#

Job

Type

HUBBELL Outdoor Lighting

Approvals

SPECIFICATIONS

APPLICATIONS

- Small sized architectural wallpacks in three stylish shapes with molded contours to accentuate building architecture. Provides excellent illumination in energy-saving LED systems.
- Back box accessory available for surface conduit application.

Construction:

- Housing is made from die-cast aluminum with a hinged back-plate for ease of installation and maintenance.
- The LED bezel and trim-plate are made of stainless steel.
- Five powder coat standard finishes, plus custom color options.
- Wet Location Listed to UL924 and UL1598 Standard.

LED:

- 12 high power LEDs delivering up to 3,000 lumens.
- Up to 118 lumens per watt
- Type II, III and IV distributions for a wide variety of applications.
- Zero uplight (U0), dark sky, neighbor friendly

Electrical:

- 120-277 operation, 50/60Hz
- 0-10V dimming driver standard
- 10kA surge protector
- Photocell and occupancy sensor options available for complete on/off and dimming control

Battery Backup:

- Intergral Battery Backup provides emergency lighting for the required 90 minute path of egress.
- Includes a long-life Lithium Iron Phosphate battery with optional battery heater for cold temperature application.
- Utilizes 4 LEDs in emergency mode with 657 lumens. Each of the 4 LEDs in emergency are designed to function independently in the unlikely event of a single LED malfunction
- Spectron® self-testing/self-diagnostic electronics are included standard.

Installation:

- Universal plate for mounting to standard 3 1/2" and 4" square electrical boxes. All connections are made from connections at the rear of the unit.
- Optional back-box accessory available for surface conduit application. See BB-Geo accessories.

Listings:

- UL 1598 listed for use in wet locations
- Drivers IP66 and RoHS compliant
- DesignLights Consortium® (DLC) qualified. Please refer to the DLC website for specific product qualifications at www.designlights.org

Warranty:

- For more information visit:

http://www.hubbelloutdoor.com/resources/warranty/

PRODUCT IMAGE(S)

GEOPAK™

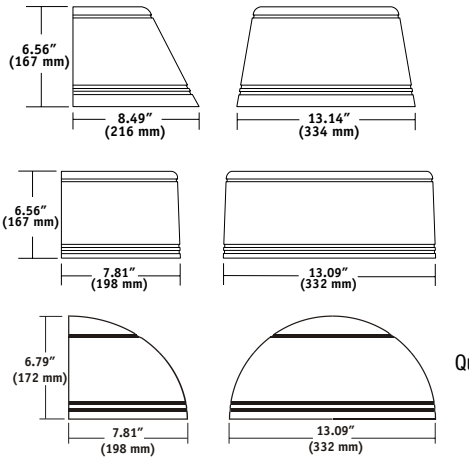
Trapezoid

Round

Quartersphere

Powered by DUALITE

DIMENSIONS



SHIPPING INFORMATION

Catalog Number	Weight (lbs)	Carton Dimensions		
		Length Inch (cm)	Width Inch (cm)	Height Inch (cm)
TRP1	11.5	17.0	9.9	10.0
RDI1	11.5	18.0	11.0	9.25
QSP1	10.5	17.0	9.6	10.5

CERTIFICATIONS/LISTINGS

C SA US

ida

*3000K and warmer CCTs only

DLC QPL LISTED

ORDERING INFORMATION

ORDERING EXAMPLE: TRP-12L-20-4K-3-1-BL-SCP-EH

HOUSING	VERSION	WATTAGE	CCT/CRI	DISTRIBUTION	VOLTAGE	FINISH	CONTROL OPTIONS	OPTIONS
TRP1 Trapezoid	**12L** 12 LEDS	**15** 15 watts	**3K7** 3000K, 70CRI	**2** Type II	**U** 120-277	**BL** Black	**PCU** Button Photocell	**F**[4] Fusing (only available with STD fixture configuration, 120-277V only)
RDI1 Radius		**20** 20 watts	**4K7** 4000K, 70CRI	**3** Type III	**1** 120	**DB** Bronze	**SCP**[2,3] Programmable Motion Sensor	**E**[1] Battery Pack (0˚C)
QSP1 Quartersphere		**30** 30 watts	**5K7** 5000K, 70CRI	**4** Type IV	**2** 208	**GR** Gray	**SPECIFY SCP HEIGHT**	**EH**[1] Battery Pack (-30˚C) with heater
					3 240	**PS** Platinum	**8F** Up to 8ft mount height	
					4 277	**WH** White	**20F** Up to 20ft mount height	
						CC Custom		

[1] Voltage specific (120 or 277V only)
[2] Must order minimum of one remote control to program dimming settings, 0-10V fully adjustable dimming with automatic daylight calibration and different time delay settings, 120-277V only
[3] PCU option not applicable, included in sensor
[4] Must specify input voltage (120, 208, 240 or 277)

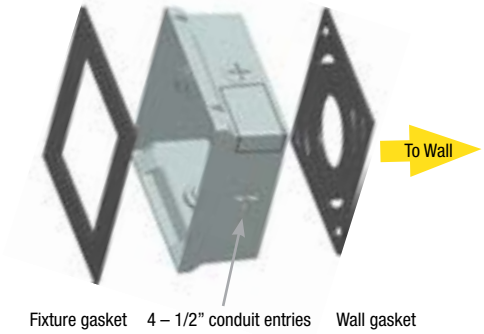
ACCESSORIES - Order separately

Catalog Number	Description
SCP-REMOTE[2]	Remote control for SCP option. Order at least one per project to program and control.
BB-GEO-XX	Back box with 4 - 1/2" threaded conduit holes, specify finish by replacing "XX" with finish selection, eg. Dark Bronze "DB"

[2] Must order minimum of one remote control to program dimming settings, 0-10V fully adjustable dimming with automatic daylight calibration and different time delay settings, 120V-277V only

BB-GEO-XX – Mounted to luminaire

BB-GEO-XX



PERFORMANCE DATA (AC/Standard Configurations)

				5K (5000K nominal, 70 CRI)					4K (4000K nominal, 70 CRI)					3K (3000K nominal, 70 CRI)				
# OF LEDS	DRIVE CURRENT	SYSTEM WATTS	DIST. TYPE	LUMENS	LPW[1]	B	U	G	LUMENS	LPW[1]	B	U	G	LUMENS	LPW[1]	B	U	G
12	350mA	13.9	2	1635	118	1	1	1	1577	113	1	1	1	1497	108	1	1	1
			3	1613	116	1	0	1	1556	112	1	0	1	1477	106	1	0	1
			4	1607	116	0	0	1	1550	111	0	0	1	1471	106	0	0	1
	500mA	19.9	2	2268	114	1	1	1	2176	109	1	1	1	2077	104	1	1	1
			3	2245	113	1	0	1	2140	108	1	0	1	2049	103	1	0	1
			4	2229	112	0	0	1	2150	108	0	0	1	2041	103	0	0	1
	700mA	28.2	2	2942	104	1	1	1	2885	102	1	1	2	2721	96	1	1	1
			3	2912	103	1	0	1	2836	101	1	0	1	2685	95	1	0	1
			4	2892	103	1	0	1	2789	99	1	0	1	2674	95	1	0	1

Electrical Data

Input Power Consumption

Drive Current (mA)	Input Voltage (V)	System Power (w)	Current (Amps)
350mA	120	13.9	0.12
	277		0.05
500mA	120	19.9	0.17
	277		0.07
700mA	120	28.2	0.24
	277		0.10

Battery backup units consume additional power during charging (maximum 32.2 watts for E, 50.7 watts for EH)

Projected Lumen Maintenance

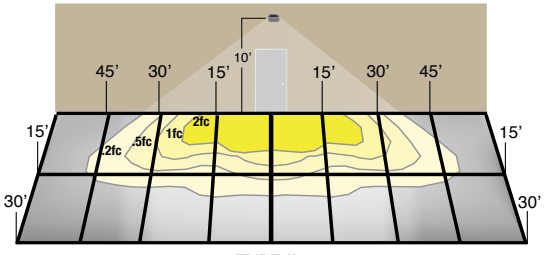
Ambient Temp.	Operating Hours 0	25,000	50,000	TM-21-11[1] 60,000	100,000	L70 (hours)
25°C/77°F	1.00	0.98	0.97	0.95	0.91	>345,000
40°C/104°F	1.00	0.96	0.95	0.92	0.87	>268,000

LUMINAIRE AMBIENT TEMPERATURE FACTOR (LATF)

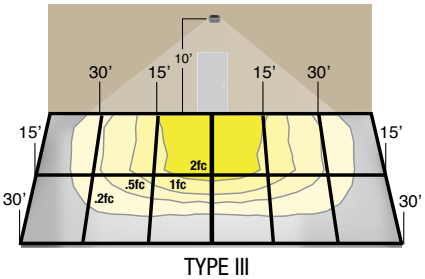
AMBIENT TEMPERATURE		LUMEN MULTIPLIER
0° C	32° F	1.02
10° C	50° F	1.01
20° C	68° F	1.00
25° C	77° F	1.00
30° C	86° F	1.00
40° C	104° F	0.99
50° C	122° F	0.98

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

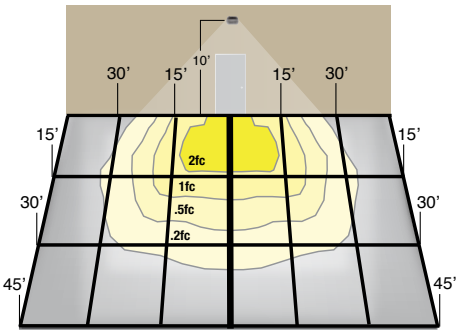
PHOTOMETRIC REPORTS



TYPE II



TYPE III



TYPE IV (Forward throw)

Appendix F
Noise Emission Calculations

ACHERON ENGINEERING SERVICES
Engineering, Environmental & Geologic Consultants
207-368-5700 Newport, Maine www.AcheronEngineering.com

Project No.:

Project: SPRING MTn. SOLAR

By: KJB Date: 4-14-24

Subject: NOISE EMISSION

Checked: Date:

DETERMINE MIN DISTANCE BETWEEN PARCEL BOUNDARY & EQUIPMENT:

CRITERIA:

55 dBa @ PROPERTY LINE (DAY)
45 dBa " " " (NIGHT)

* NO SUN → NO GENERATION
∴ NO NOISE DURING NIGHT TIME HOURS.

EQUIPMENT EMISSIONS:

TRANSFORMER: 60dBa @ 3m

INVERTER: 56dBa @ 3m

USE INVERSE SQUARE LAW:

$$L_{P_2} = L_{P_1} - 20 \log (R_2/R_1)$$

TRANSFORMER:

L_{P_2} = 55 dBa (MIN)
L_{P_1} = 60 dBa
R_1 = 3m
R_2 = 10 m

CALC SHEET DESIGNED BY JME

ACHERON ENGINEERING SERVICES
Engineering, Environmental & Geologic Consultants
207-368-5700 Newport, Maine www.AcheronEngineering.com

Page: 2 OF 2

Project No.:

Project: SPRING MTN SOLAR

By: KJB Date: 4-14-24

Subject: NOISE EMISSIONS

Checked: Date:

TRANSFORMER CONT'D

$L_{P_2} = 60\ dBa - 20 \log\left(\frac{10}{3}\right) = \underline{49.5\ dBa}$

10M = 32.8 FEET

EQUIPMENT SETBACK = 50'

∴ EMISSIONS FROM TRANSFORMER WILL BE LESS THAN 49.5 dBa

INVERTER:

BY INSPECTION EMISSIONS WILL BE LESS THAN TRANSFORMER

∴ EMISSIONS FROM INVERTER WILL BE LESS THAN 49.5 dBa

CALC SHEET DESIGNED BY JBL

Appendix G
Protected Natural Resources Report

Protected Natural Resources Report

Spring Mountain Solar Project
Roosevelt Trail
Casco, Maine

February 20, 2023

Prepared For:
Mainely Solar
Attention: Lucy Fowler, Project Coordinator
89 Main Street
Yarmouth, ME 04096

Prepared By:
Watershed Resource Consultants, LLC
1366 State Highway 102, #6
Bar Harbor, ME 04609

WRC #22205

TABLE OF CONTENTS

1.0 INTRODUCTION

This Report presents the findings of protected natural resource services conducted by Watershed Resource Consultants, LLC[1] (WRC) in support of a proposed commercial solar development within an approximately 52.5-acre property on Roosevelt Trail (Route 302) in Casco, Maine (i.e., the "site"). The purpose of the services was to identify and delineate Maine Department of Environmental Protection (MDEP) and U.S. Army Corps of Engineers (Corps) defined Protected Natural Resources on the site.

2.0 METHODOLOGY

2.1 Resource Identification and Delineation: WRC conducted Protected Natural Resources identification and delineation within the site as outlined in the Scope of Work provided by Mainely Solar. Field work for the assessment was conducted on October 19 and 21, 2021, April 4, 5, 12 and 13, 2022, and May 3, 2022.

Protected Natural Resources were identified as defined by the Maine Department of Environmental Protection[2] (MDEP) and U.S. Army Corps of Engineers[3] (Corps). Wetland delineation was conducted using the 1987 Corps Wetland Delineation Manual[4] and Northeast Regional Supplement[5]. Stream identification was conducted using the MDEP Natural Resources Protection Act Statute and the Corps General Permit. Vernal pool identification was conducted using MDEP Chapter 335[6], the 2014 Maine Association of Wetlands Scientists (MAWS) Vernal Pool Survey Protocol, and the Corps General Permit.

Wetland boundaries were flagged with pink flagging, stream centerlines/banks were flagged with blue flagging, and vernal pools were flagged with green flagging. Flagging was numbered according to the Resource ID.

Wetland and waterbody resources were characterized using the Cowardin Classification system[7].

2.2 Resource Location: Resource boundaries were located with a sub-meter GPS(s) and the GPS data, a survey plan by Plisga & Day Land Surveyors, and publicly available information (MeGIS) were used to make the Protected Natural Resources Plan attached in Appendix B.

---

[1] Watershed Resource Consultants, LLC (WRC) is the result of a consolidation of the natural resource service areas of Burman Land & Tree, LLC (Aleita Burman) and Atlantic Resource Co, LLC (Roger St.Amand). The official start of business date for WRC was April 17, 2022. The fieldwork and some of the reporting work for these services was conducted by Burman Land & Tree, LLC or Atlantic Resource Co, LLC prior to April 17, 2022. Reference to WRC in this report includes information gathered prior to April 17, 2022 by Burman Land & Tree, LLC or Atlantic Resource Co, LLC.

[2] State of Maine, Department of Environmental Protection, Natural Resources Protection Act Statute, 38 M.R.S.A. §480-A to 480-HH, DEPLW284-W2010, Revised August 12, 2011.

[3] United States Department of the Army, General Permit, State of Maine, Effective: October 14, 2020 to October 14, 2025.

[4] Environmental Laboratory. 1987. "Corps of Engineers Wetland Delineation Manual", Technical Report Y-87-1, U.S. Army Engineers Waterways Experiment Station, Vicksburg, Miss.

[5] U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, C. V. Noble, and J. F. Berkowitz.ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[6] State of Maine, Department of Environmental Protection, Chapter 335 Significant Wildlife Habitat, amended January 7, 2014.

[7] Cowardin, et al. 1979. United States, Fish and Wildlife Service, "Classification of Wetlands and Deepwater Habitats of the United States". Biological services program; FWS/OBS-79/31) FWS/OBS-79/31. QH76.U54a 79/31 [QH104] 574.5'0973s [574.5'2632] 79-607795

3.0 PROTECTED NATURAL RESOURCES ASSESSMENT

3.1 Site Overview: The approximately 52.5-acre property (Tax Map 3, Lot 40) is located on Roosevelt Trail in Casco, Maine. The property is mostly wooded with a network of logging trails. A residence is in the southern portion of the property.

3.2 Topography and Soils: The property is located on the western side slopes of a local hill dominated by glacial till sediments (NRCS mapping). Site slopes are generally 0-20%, with locally steeper areas.

The property extends from approximately 290 feet above sea level on the western side to approximately 470 feet above sea level on the eastern side, with gently to steeply sloping terrain. The western side of the property is predominantly a steep linear slope, while the eastern side is characterized by gently rolling hills with locally steeper terrain.

The USDA NRCS Soil Survey for Cumberland County maps Herman soil series within the site. Hermon are deep, somewhat excessively drained glacial till sediments.

3.3 Wetlands: Twenty wetlands were identified within the site. Of the wetlands identified, forested wetlands dominated by deciduous and evergreen vegetation in mineral soils were the most common. A summary table of the wetlands is attached in Appendix C. A typical forested wetland and typical scrub-shrub wetland are described below.

Wetland JL15 was a seasonally-saturated forested wetland with deciduous and evergreen tree and shrub species. This wetland was selectively cut, and drains to the southwest through Stream JL-1. Wetland JL15 is classified under the Cowardin Classification System as palustrine, forested, broad-leaved deciduous and needle-leaved evergreen (PFO1/4). Wetland hydrology indicators included High Water Table (A2), Saturation (A3), Water-Stained Leaves (B9), and Drainage Patterns (B10). Dominant hydrophytic vegetation included red maple (*Acer rubrum*), green ash (*Fraxinus pennsylvanica*), eastern hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), and sensitive fern (*Onoclea sensibilis*). Hydric soil indicators observed included Depleted Below Dark Surface (A11) and Redox Dark Surface (F6).

Wetland JL27 was a seasonally-saturated scrub-shrub wetland with deciduous and evergreen shrub species. Wetland JL27 is classified under the Cowardin Classification System as palustrine, scrub-shrub, broad-leaved deciduous and needle-leaved evergreen (PSS1/4). Wetland hydrology indicators included Surface Water (A1), High Water Table (A2), Saturation (A3), and Microtopographic Relief (D4). Dominant hydrophytic vegetation included gray birch (*Betula populifolia*), red maple, eastern hemlock, steeplebush (*Spiraea tomentosa*), and woolgrass (*Scirpus cyperinus*). Hydric soil indicators observed included Depleted Matrix (F3).

3.4 Streams: Two intermittent streams were identified within the surveyed area. Stream JL1 flowed westerly, beginning in Wetland JL17. Stream JL6 flowed northwesterly, beginning in Wetland JL16 and flowing into Stream JL1. Streams JL1 and JL6 had an average bank width of three feet, an average channel

width of one foot, and depths up to two inches, with sand and cobble substrates. A summary table of the streams is attached in Appendix C.

3.5 Vernal Pools: Three vernal pools (VP's) and two Maine vernal pool indicator species breeding areas (IBA's) were identified on the site. SVP-JL10 meets MDEP criteria to be classified as a Significant Vernal Pool. Vernal pools NSVP-MR1 and NSVP-MR2 do not meet the MDEP criteria to be classified as Significant Vernal Pools. IBA's MR6 and JL12 are man-made features that have evidence of breeding activity. A summary table of the vernal pools is attached in Appendix C. Maine State Vernal Pool Assessment Forms, which contain additional information on these vernal pools and IBA's, are included in Appendix F.

3.6 Resource Agency Mapped Resources: Watershed Resource Consultants, LLC (WRC) contacted and/or accessed the databases of natural resource agencies to identify if there are Threatened, Endangered, Significant or Essential species and/or habitats mapped on the site. Agencies contacted included the U.S. Fish and Wildlife Service (US FWS), Maine Department of Inland Fisheries and Wildlife (IF&W), and Maine Natural Areas Program (MNAP). Copies of response letters/database search are included in Appendix E.

According to the IF&W response letter and map, dated October 14, 2021, IF&W maps the site as within the habitat range of three species of bats that are protected under the Maine Endangered Species Act, and within the habitat range of five species of bats that are listed as species of Special Concern in Maine. According to the letter "*While a comprehensive statewide inventory for bats has not been completed, based on historical evidence it is likely that several of these species occur within the project area during the fall/spring migration, the summer breeding season, and/or for overwintering."* The letter recommends contacting US FWS for further guidance and requests that "*all areas of talus and rocky features of approximately 1,000 square feet or greater in size be documented*." The letter also states that "*If these features are not present in the project area, our Agency does not anticipate significant impacts to any of the bat species as a result of this project based on currently best available science*."

IF&W maps a Deer Wintering Area (DWA) (a Significant Wildlife Habitat) intersecting much of the site. IF&W recommends that "*development projects be designed to avoid losses or impacts to the continued availability of coniferous winter shelter. Any removal of vegetation should be conducted in such a way that improves the quality and vigor of the coniferous species providing this winter shelter*."

IF&W recommends that vernal pools be documented, and documentation sent to IF&W for review. Vernal pools were documented in the spring of 2022 and MSVPA Forms are included in Appendix F.

IF&W also recommends "*maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands*." IF&W recommends that stream crossings be designed for full fish passage and any in-stream work be conducted between July 15 and October 1. In the response letter, IF&W makes recommendations for stream crossing design.

Finally, to enhance the use of the project area by smaller animals, and in consideration of the need for site safety and security, IF&W recommends the use of wildlife-permeable fencing. Options for wildlife-permeable fencing includes the use of larger mesh fencing, similar to typical highway right-of-way fencing,

with large (12-in. x 12-in.) holes along the bottom of the fence, spaced evenly along the entire perimeter of the fence line every 20-25 feet. Alternatively, the fence can be installed so that there is at least 12 inches of clearance along the entire perimeter bottom.

The MNAP response letter dated October 14, 2021 states that "*According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area."* The MNAP database is not a site-specific field survey.

The US FWS database, accessed on February 15, 2023, indicates that two federally listed species should be considered as part of an effect analysis for the project: the Threatened northern long-eared bat and the Threatened small whorled pogonia. The database also lists the monarch butterfly as a Candidate Species. If the project will require a federal permit or will use federal funding, the federal action agency will determine if there are concerns regarding the project affecting this mapped habitat. Generally, bats are a concern if the site is near a known hibernacula or brooding tree, or if trees will be cut between about April 1 to October 31. Generally, small whorled pogonia is an issue if suitable second or third generation stands of hardwood with open understories will be disturbed. Generally, monarch butterflies are a concern if there is milkweed (obligate host plant) growing on a site. The US FWS database result, attached in Appendix D, is valid for 90-days. WRC can provide an updated USFWS database result upon request.

It is WRC's understanding that the northern long-eared bat's federal listing has been changed to Endangered. Because of this, bat studies may be required prior to cutting of vegetation if a Corps permit is required for the project. WRC's scientists did not observe the small whorled pogonia on the site during the out of season resource work, however, potentially suitable habitat may exist on the site. Because of this, a botanical survey for small whorled pogonia may be required if a Corps permit is required for the project.

WRC also reviewed available published mapping for the site including USGS topographic mapping, U.S. Fish and Wildlife National Wetland Inventory (NWI), U.S. Natural Resources Conservation Service (NRCS) soil mapping, and FEMA flood maps, as available, to provide an indication of potential areas of protected natural resources on the property and for wetland classification purposes. Copies of these maps are included in Appendix E.

3.7 Classification: WRC classified wetlands and streams based on the Cowardin Classification System, the wetlands based on MDEP rules which define "Wetlands of Special Significance" (WOSS) and "Wetlands Not of Special Significance" (WNSS), and vernal pools based on MDEP rules which define "Significant Vernal Pools" (SVP's). Wetland, stream, and vernal pool classifications are included in the Tables attached in Appendix C.

Based on MDEP Natural Resources Protection Act definitions, the wetlands, streams, and Significant Vernal Pool are Protected Natural Resources. Wetlands that are within 25 feet of streams meet MDEP criteria to be classified as WOSS. Wetland JL21, which contains SVP-JL10, is also classified as WOSS. The remainder of wetlands on the site meet MDEP classification as "Wetlands Not of Special Significance".

SVP-JL10 meets the MDEP criteria to be classified as a Significant Vernal Pool. A Significant Vernal Pool (SVP) and the area within a 250-foot radius of the SVP (the SVP's Critical Terrestrial Habitat) is regulated by MDEP as a Significant Wildlife Habitat. Vernal pools NSVP-MR1 and NSVP-MR2 do not meet the MDEP criteria for Significant Vernal Pools and are therefore not jurisdictional to the MDEP. IBA's MR6 and JL12 are man-made features that have evidence of breeding activity but are also not jurisdictional to the MDEP. All of the pools are jurisdictional to the Corps as vernal pools if a Corps permit is required for the project. Please note that when MSVPA Forms (Appendix F) are sent in to IF&W for review, classifications may be revised.

4.0 GENERAL PERMITTING INFORMATION

Alterations to jurisdictional wetlands, streams and/or vernal pools require a permit from the MDEP and the Corps, the type of permit dependent on the amount and type of alteration. General permitting information included pertains to resources observed on the site.

In general, wetland alterations of between 1 and 4,300 square feet of "Wetlands Not of Special Significance" require filing of a Corps Self-Verification Form to the Corps. Wetland alterations of between 4,300 and 15,000 square feet of "Wetlands Not of Special Significance" require filing of a MDEP Natural Resources Protection Act (NRPA) Tier 1 Permit Application to the MDEP and the Corps. Wetland alterations of greater than 15,000 square feet of "Wetlands Not of Special Significance", or of any alteration of "Wetlands of Special Significance" require filing of a MDEP NRPA Tier 2, Tier 3, or Individual Permit Application to the Corps and MDEP, depending on the amount and type of alteration. These higher threshold permits generally require further submissions such as wetland data forms and a functional assessment and generally include a wetland compensation component.

A MDEP NRPA Permit-By-Rule (PBR) Notification is required for a stream crossing or for soil/vegetation disturbance at between 25 feet and 75 feet of a stream. A MDEP NRPA Individual Permit is required for direct stream alterations, and for soil/vegetation disturbance within 25 feet of a stream. The Individual permit application generally requires further submissions such as a functional assessment and a wetland compensation plan. A Corps permit is required for direct alterations to a stream.

A MDEP NRPA Permit-By-Rule Notification is required for alterations of less than 25% of the forested habitat within 250-feet of a Significant Vernal Pool (not inclusive). A MDEP NRPA Individual Permit is required for direct Significant Vernal Pool alterations or alterations that do not meet Permit-By-Rule standards. The Individual permit application generally requires further submissions such as a functional assessment and a wetland compensation plan. A Corps permit is required for direct alterations to vernal pools.

A MDEP NRPA Permit-By-Rule (PBR) Notification is required for soil/vegetation disturbance at between 25 feet and 75 feet of a Significant Wildlife Habitat (the SVP and it's 250-foot Critical Terrestrial Habitat on this site) where it is within a wetland. A MDEP NRPA Individual Permit is required for soil/vegetation disturbance within 25 feet of a Significant Wildlife Habitat where it is within a wetland. The Individual

permit application generally requires further submissions such as a functional assessment and a wetland compensation plan.

If wetland alteration occurs for the project, the Corps licensing process includes review for impacts to wetlands, streams, vernal pools, northern long-eared bat habitat and small whorled pogonia habitat.

If the project will trigger MDEP Site Location of Development Act (SLODA) permitting, other setbacks may apply to wetlands, streams, and/or vernal pools; and further botanical and/or wildlife studies may be required. In general, IF&W requests a 100-foot buffer be maintained from streams for SLODA permitting.

5.0 SUMMARY AND RECOMMENDATIONS

Watershed Resource Consultants, LLC (WRC) conducted Protected Natural Resources identification and delineation services for a proposed solar development within an approximately 52.5-acre property on Roosevelt Trail in Casco, Maine.

Twenty freshwater wetland areas, two streams, three vernal pools, and two indicator breeding areas were delineated on the site. The wetlands were forested, scrub-shrub, and emergent marsh, the streams were intermittent, the vernal pools were natural, and the indicator breeding areas were man-made. One of the vernal pools meets classification as a Significant Vernal Pool. Wetlands that are within 25 feet of streams or that contain a Significant Wildlife Habitat (the SVP and it's 250-foot Critical Terrestrial Habitat) meet MDEP criteria to be classified as "Wetlands of Special Significance" (WOSS). The remainder of wetlands on the site meet MDEP classification as "Wetlands Not of Special Significance".

IF&W maps the site as within the habitat range of three species of bats that are protected under the Maine Endangered Species Act, and within the habitat range of five species of bats that are listed as species of Special Concern in Maine. IF&W recommends contacting US FWS for further guidance on bats and requests that "*all areas of talus and rocky features of approximately 1,000 square feet or greater in size be documented*." IF&W states that "*If these features are not present in the project area, our Agency does not anticipate significant impacts to any of the bat species as a result of this project based on currently best available science.*"

IF&W maps a Deer Wintering Area (DWA) (a Significant Wildlife Habitat) intersecting and covering much of the project site. IF&W recommends avoiding losses of coniferous winter shelter within this area.

IF&W recommends that vernal pools be documented, and documentation sent to IF&W for review. Vernal pools were documented in the spring of 2022.

IF&W also recommends "*maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands*." IF&W recommends that stream crossings be designed for full fish passage and any in-stream work be conducted between July 15 and October 1. In the response letter, IF&W makes recommendations for stream crossing design.

IF&W recommends the use of wildlife-permeable fencing and gives details in the response letter.

The US FWS database indicates that two federally listed species should be considered as part of an effect analysis for the project: the Threatened northern long-eared bat (now Endangered) and the Threatened small whorled pogonia. The database also lists the monarch butterfly as a Candidate Species. If the project requires a federal permit or will use federal funding, the federal action agency will determine if there are concerns regarding the project affecting this mapped habitat.

It is WRC's understanding that the northern long-eared bat's federal listing has been changed to Endangered. Because of this, bat studies may be required prior to cutting of vegetation if a Corps permit is required for the project. WRC's scientists did not observe the small whorled pogonia on the site during the out of season resource work, however, potentially suitable habitat may exist on the site. Because of this, a botanical survey for small whorled pogonia may be required if a Corps permit is required for the project.

WRC recommends that the MSVPA Forms attached in Appendix F be sent to IF&W for review and inclusion on state maps well prior to permitting efforts. WRC also recommends that alterations to Protected Natural Resources be avoided and minimized to the greatest extent practicable. If alterations to Protected Natural Resources are proposed, we recommend a pre-application meeting with the MDEP and Corps to discuss permitting requirements.

WRC did not review Town of Casco ordinances regarding alterations to natural resources. WRC recommends that the Town of Casco be contacted during the planning process for the project if natural resources are proposed to be altered.

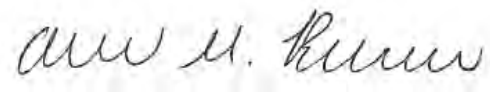
6.0 CLOSING

We appreciate the opportunity to assist you during this phase of the project. If you have any questions, please contact us.

Sincerely,

Watershed Resource Consultants, LLC

Jeanna Leclerc
Project Scientist | Watershed Resource Consultants, LLC
jleclerc@wrcmaine.com



Aleita M. Burman, CSS, CWS, LSE

Principal | Watershed Resource Consultants, LLC
lburman@wrcmaine.com

APPENDIX A
Limitations

Appendix A – Limitations

The scope of Watershed Resource Consultants, LLC services has been limited to Protected Natural Resources identification and delineation services on an approximately 52.5-acre property on Roosevelt Trail in Casco, Maine. This Report has been prepared for the exclusive use of Mainely Solar. No warranty, expressed or implied, is made. The conclusions made in this report are based on the data obtained from the areas explored at the time of services.

APPENDIX B

Site Location Map

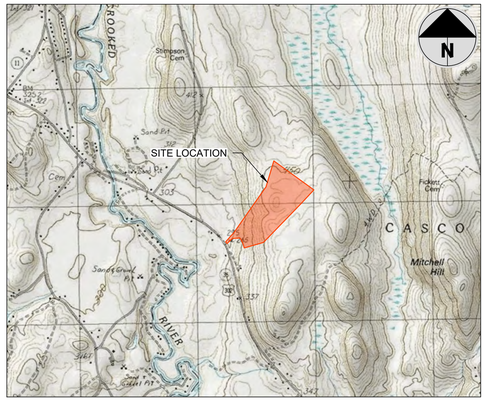
Protected Natural Resources Plan

NOTES

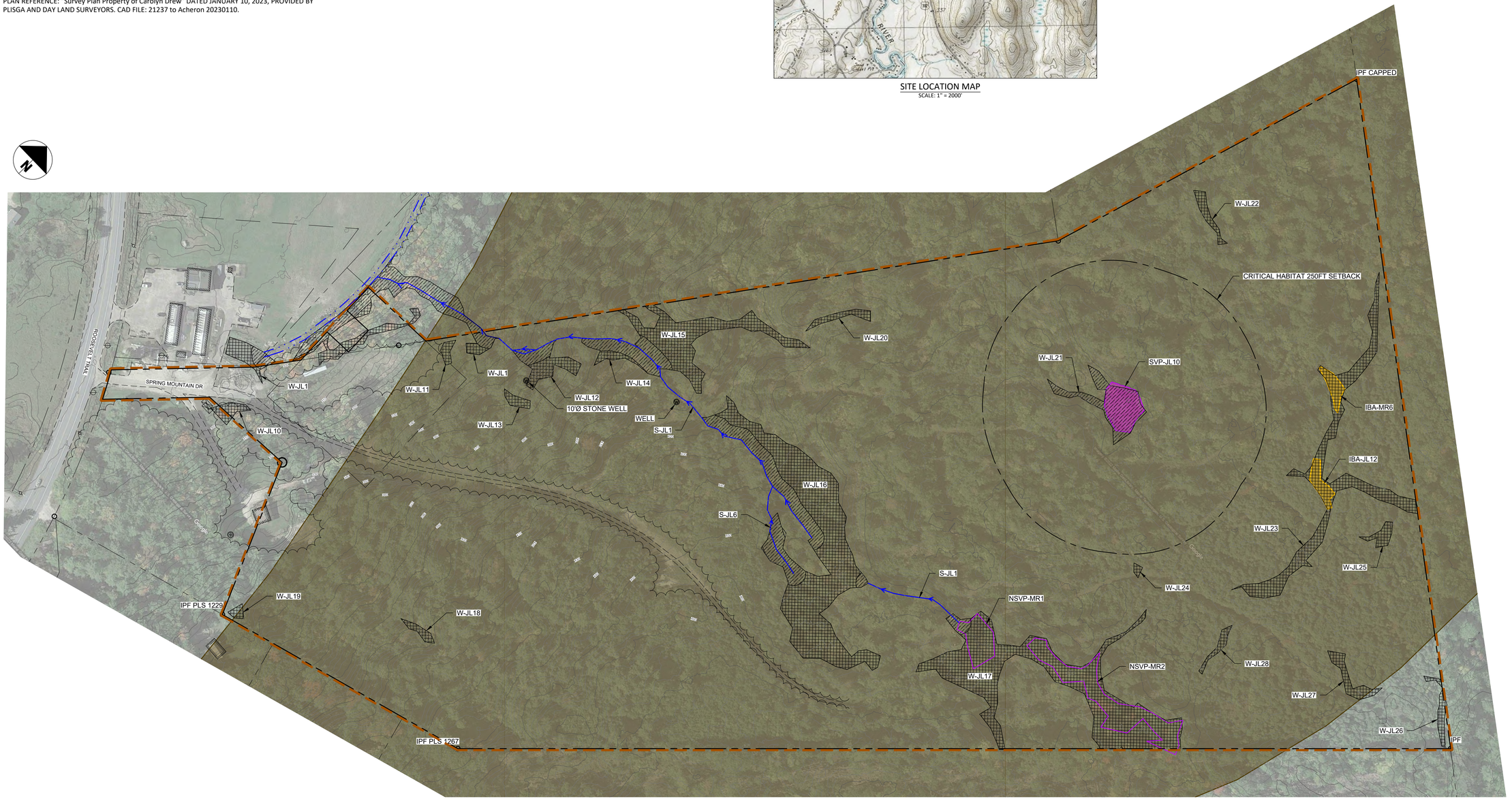
1. THIS PROTECTED NATURAL RESOURCES FIELD DELINEATION PLAN DETAILS THE FINDINGS OF PROTECTED NATURAL RESOURCES FIELD DELINEATION SERVICES CONDUCTED BY WATERSHED RESOURCE CONSULTANTS, LLC ON AN APPROXIMATELY 52-ACRE PROPERTY (TAX MAP 3, LOT 40) ON ROOSEVELT TRAIL, CASCO, MAINE. PROTECTED NATURAL RESOURCES FIELD DELINEATION SERVICES WERE CONDUCTED ON OCTOBER 19 & 21, 2021, APRIL 4, 5, 12 & 13, & MAY 3, 2022.
2. PROTECTED NATURAL RESOURCES WERE FIELD DELINEATED IN GENERAL ACCORDANCE WITH THE MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION NATURAL RESOURCES PROTECTION ACT DEFINITIONS; THE UNITED STATES DEPARTMENT OF THE ARMY STATE OF MAINE GENERAL PERMIT (OCTOBER 2020-2025), THE U.S. ARMY CORPS OF ENGINEERS WETLAND DELINEATION MANUAL (1987), THE U.S. ARMY CORPS OF ENGINEERS REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION (2012), AND THE MDEP CHAPTER 335: SIGNIFICANT WILDLIFE HABITAT RULES.
3. RESOURCE FEATURES WERE LOCATED BY WATERSHED RESOURCE CONSULTANTS, LLC USING A MAPPING GRADE GPS RECEIVER (SUBMETER ACCURACY AS PER MANUFACTURER). THE GPS DATA AND A TAX MAP (MEGIS) WERE USED TO MAKE THIS PLAN.
4. THIS PLAN IS FOR PLANNING AND RESOURCE ALTERATION PERMITTING PURPOSES ONLY, IT IS NOT A SURVEY. THIS PLAN IS TO BE USED IN CONJUNCTION WITH THE ACCOMPANYING PROTECTED NATURAL RESOURCES REPORT.
5. PLAN REFERENCE: "Survey Plan Property of Carolyn Drew" DATED JANUARY 10, 2023, PROVIDED BY PLISGA AND DAY LAND SURVEYORS. CAD FILE: 21237 to Acheron 20230110.

LEGEND

- PROJECT PARCEL
- LIMIT OF SERVICES
- MDEP CLASSIFIED "WETLANDS OF SPECIAL SIGNIFICANCE"
- MDEP CLASSIFIED "WETLANDS NOT OF SPECIAL SIGNIFICANCE"
- WATERLINE
- STREAMS
- SIGNIFICANT VERNAL POOL (SVP)
- NON-SIGNIFICANT VERNAL POOL (NSVP)
- MAINE VERNAL POOL INDICATOR SPECIES BREEDING AREA (IBA)
- MAINE DEER WINTERING AREA (MEGIS)



SITE LOCATION MAP
SCALE: 1" = 2000'



0 100 200 300

Do Not Use for Construction
For Regulatory Review Only

Watershed Resource Consultants, LLC.
1366 State Hwy 102, #6 Bar Harbor, ME 04609, (207) 944-7288, rstamand@wrcmaine.com
PO Box 145, Orrington, ME 825-4050, (207) 825-4050, lburman@wrcmaine.com

No.	Revision Description	Drwn.	Chk'd	Date
–	–	–	–	–
1	Update Pliga and Day Land Surveyors property line.	BG	AB	2/16/2023

Protected Natural Resources Plan

Mainely Solar - Spring Mountain Solar Project
Spring Mtn. Drive
Casco, Maine

Job No.: 22205	Scale: 1" = 100'
Date: 1/10/2023	Sheet: 1

APPENDIX C

Natural Resource Summary Tables

TABLE 1 - WETLANDS						
Resource ID	**Photograph Number**	**Cowardin Classification[1]**	**Dominant Vegetation**	**Hydric Soil Indicator[2]**	**Hydrology Indicators[2]**	**Preliminary MDEP Classification [3]**
W-JL1	Photo 1	PFO1/4	red maple (Acer rubrum), eastern white oak (Quercus alba), green ash (Fraxinus pennsylvanica), eastern hemlock (Tsuga canadensis), balsam fir (Abies balsamea)	A11 - Depleted Below Dark Surface; F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B9 - Water-Stained Leaves; D2 - Geomorphic Position	WOSS within 25' of Stream
W-JL10	Photo 2	PFO1	red maple (Acer rubrum), speckled alder (Alnus incana), steeplebush (Spiraea tomentosa), woolgrass (Scirpus cyperinus), sensitive fern (Onoclea sensibilis)	A11 - Depleted Below Dark Surface	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns; D2 - Geomorphic Position	WNSS
W-JL11	Photo 3	PSS1	red maple (Acer rubrum), Morrow's honeysuckle (Lonicera morrowii), Japanese barberry (Berberis thunbergii), common rush (Juncus effusus), woolgrass (Scirpus cyperinus)	A11 - Depleted Below Dark Surface; F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns	WNSS
W-JL12	Photo 4	PFO1/4	red maple (Acer rubrum), yellow birch (Betula alleghaniensis), American hornbeam (Carpinus caroliniana), eastern hemlock (Tsuga canadensis)	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns	WOSS within 25' of Stream
W-JL13	Photo 5	PSS1	red maple (Acer rubrum), green ash (Fraxinus pennsylvanica), interrupted fern (Osmunda claytoniana)	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns	WNSS
W-JL14	Photo 6	PFO1	green ash (Fraxinus pennsylvanica), black ash (Fraxinus nigra), eastern white oak (Quercus alba), red maple (Acer rubrum), sensitive fern (Onoclea sensibilis)	A1 - Histosol	A2 - High Water Table; A3 - Saturation; B9 - Water-Stained Leaves; D2 - Geomorphic Position	WOSS within 25' of stream
W-JL15	Photo 7	PFO1/4	red maple (Acer rubrum), eastern white oak (Quercus alba), green ash (Fraxinus pennsylvanica), eastern hemlock (Tsuga canadensis), balsam fir (Abies balsamea)	A11 - Depleted Below Dark Surface; F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B9 - Water-Stained Leaves; D2 - Geomorphic Position	WOSS within 25' of Stream
W-JL16	Photo 8	PFO1/4	red maple (Acer rubrum), eastern white oak (Quercus alba), green ash (Fraxinus pennsylvanica), eastern hemlock (Tsuga canadensis), balsam fir (Abies balsamea)	A11 - Depleted Below Dark Surface; F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B9 - Water-Stained Leaves; D2 - Geomorphic Position	WOSS within 25' of Stream
W-JL17	Photo 9	PFO1/4	eastern hemlock (Tsuga canadensis), red maple (Acer rubrum), eastern white oak (Quercus alba), balsam fir (Abies balsamea), interrupted fern (Osmunda claytoniana)	A1 - Histosol; A11 - Depleted Below Dark Surface	A2 - High Water Table; A3 - Saturation; D2 - Geomorphic Position	WOSS within 25' of Streams
W-JL18	Photo 10	PSS1	red maple (Acer rubrum), American witch-hazel (Hamemelis virginiana), Morrow's honeysuckle (Lonicera morrowii), sensitive fern (Onoclea sensibilis)	A11 - Depleted Below Dark Surface	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns; D4 - Microtopographic Relief	WNSS
W-JL19	Photo 11	PFO1	red maple (Acer rubrum), hop-hornbeam (Ostrya virginiana), green ash (Fraxinus pennsylvanica), interrupted fern (Osmunda claytoniana)	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns; D4 - Microtopographic Relief	WNSS

TABLE 1 - WETLANDS

Resource ID	Photograph Number	Cowardin Classification[1]	Dominant Vegetation	Hydric Soil Indicator[2]	Hydrology Indicators[2]	Preliminary MDEP Classification [3]
W-JL20	Photo 12	PSS1	red maple (Acer rubrum), green ash (Fraxinus pennsylvanica), eastern white oak (Quercus alba), American witch-hazel (Hamemelis virginiana), cinnamon fern (Osmundastrum cinnamomea)	S1 - Sandy Mucky Mineral	A2 - High Water Table; A3 - Saturation, B10 - Drainage Patterns	WNSS
W-JL21	Photo 13	PFO1	red maple (Acer rubrum), eastern hemlock (Tsuga canadensis), eastern white oak (Quercus alba), northern red oak (Quercus rubra), eastern white pine (Pinus strobus), cinnamon fern (Osmundastrum cinnamomea), sedges	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns; D4 - Microtopographic Relief	WOSS - contains SVP
W-JL22	Photo 14	PFO1/4	eastern hemlock (Tsuga canadensis), red maple (Acer rubrum), eastern white oak (Quercus alba), balsam fir (Abies balsamea), interrupted fern (Osmunda claytoniana)	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns; D4 - Microtopographic Relief	WNSS
W-JL23	Photo 15	PFO1/4	eastern hemlock (Tsuga canadensis), red maple (Acer rubrum), sensitive fern (Onoclea sensibilis), sedges	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; B10 - Drainage Patterns; D4 - Microtopographic Relief	WNSS
W-JL24	Photo 16	PSS1	red maple (Acer rubrum),gray birch (Betula populifolia), dwarf raspberry (Rubus pubescens)	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; D4 - Microtopographic Relief	WNSS
W-JL25	Photo 17	PSS1	red maple (Acer rubrum), yellow birch (Betula alleghaniensis), steeplebush (Spiraea tomentosa), dwarf raspberry (Rubus pubescens), interrupted fern (Osmunda claytoniana), woolgrass (Scirpus cyperinus)	F3 - Depleted Matrix	A1 - Surface Water; A2 - High Water Table; A3 - Saturation	WNSS
W-JL26	Photo 18	PFO1/4	red maple (Acer rubrum), eastern hemlock (Tsuga canadensis), eastern white pine (Pinus strobus), interrupted fern (Osmunda claytoniana)	F3 - Depleted Matrix	A2 - High Water Table; A3 - Saturation; D2 - Geomorphic Position	WNSS
W-JL27	Photo 19	PSS1/4	gray birch (Betula populifolia), red maple (Acer rubrum), eastern hemlock (Tsuga canadensis), steeplebush (Spiraea tomentosa), woolgrass (Scirpus cyperinus)	F3 - Depleted Matrix	A1 - Surface Water; A2 - High Water Table; A3 - Saturation	WNSS
W-JL28	Photo 20	PEM1	steeplebush (Spiraea tomentosa), woolgrass (Scirpus cyperinus), interrupted fern (Osmunda claytoniana)	F3 - Depleted Matrix	A1 - Surface Water; A2 - High Water Table; A3 - Saturation	WNSS

1 - Cowardin, et al. 1979. United States, Fish and Wildlife Service, evaluated during winter conditions. PFO1/4 = Palustrine, Forested, Broad-Leaved Deciduous and Needle-Leaved Evergreen; PFO1 = Palustrine, Forested, Broad-Leaved Deciduous; PSS1/4 = Palustine, Scrub-Shrub, Broad-Leaved Deciduous and Needle-Leaved Evergreen; PSS1 = Palustine, Scrub-Shrub, Broad-Leaved Deciduous; PEM1 = Palustrine, Emergent, Persistent

2 - U.S. Army Corps of Engineers. 2011. Regional Supplement to the Corps of Engineers Wetland Delineation Manual:Northcentral and Northeast Region (Version 2.0)

3 - State of Maine, Department of Environmental Protection, Natural Resources Protection Act Statute; WOSS = Wetlands of Special Significance; WNSS = Wetlands Not of Special Significance

Table 2 - Streams								
Resource ID	**Photograph No. (Figure)**	**Cowardin Classification[1]**	**Hydroperiod**	**Approximate Bank Width**	**Approximate Bank Height**	**Approximate Channel Width**	**Depth at Visit**	**Bottom Type**
Stream JL1	Figure 21	R4SB3/4	Intermittent	36"	8"	12"	2"	Cobble, Gravel, and Sand
Stream JL-6	Figure 22	R4SB3/4	Intermittent	36"	6"	12"	1"	Cobble, Gravel, and Sand

1 - Cowardin, et al. 1979. United States, Fish and Wildlife Service

Table 3 - Vernal Pools

Resource ID	Pool Origin	Wood Frog Egg Masses		Spotted Salamander Egg Masses		Blue Spotted Salamander Egg Masses		Fairy Shrimp		Vegetation Classification	Pool Hydroperiod (Estimated)	Soils	Corps Jurisdictional	MDEP Jurisdictional **
		V #1	V #2	V #1	V #2	V #1	V #2	V #1	V #2					
SVP-JL10	Natural-Modified	4	0	20	26	0	0	0	0	PFO	Semi-Permanent	Shallow Organic	Yes	Yes - SVP
NSVP-MR1	Natural	0	0	1	5	0	0	0	0	PFO	Ephemeral	Shallow Organic	Yes	No
NSVP-MR2	Natural	4	0	7	7	0	0	0	0	PFO	Ephemeral	Deep Organic	Yes	No
IBA-JL12	Man-Made	0	0	4	17	0	0	0	0	Ppem	Ephemeral	Deep Organic	Yes	No
IBA-MR6	Man-Made	0	0	8	9	0	0	0	0	PFO	Ephemeral	Shallow Organic	Yes	No

V#1 Visit Dates: April 13, 2022

V#2 Visit Dates: May 3, 2022

**** Pending IF&W review of MSVPA Forms**

APPENDIX D

Color Photographs of Wetlands and Streams

Photo 1: Wetland JL1, looking northwest. Photograph taken April 4th, 2022.

Photo 2: Wetland JL10, looking southwest. Photograph taken April 4th, 2022.

Photo 3: Wetland JL11, looking north. Photograph taken April 4th, 2022.

Photo 4: Wetland JL12, looking east. Photograph taken April 4th, 2022.

Photo 5: Wetland JL13, looking east. Photograph taken April 4th, 2022.

Photo 6: Wetland JL14, looking northeast. Photograph taken April 4th, 2022.

Photo 7: Wetland JL15, looking north. Photograph taken April 4th, 2022.

Photo 8: Wetland JL16, looking northeast. Photograph taken April 4th, 2022.

Photo 9: Wetland JL17, looking southeast. Photograph taken April 4th, 2022.

Photo 10: Wetland JL18, looking northeast. Photograph taken April 4th, 2022.

Photo 11: Wetland JL19, looking south. Photograph taken April 4th, 2022.

Photo 12: Wetland JL20, looking west. Photograph taken April 5th, 2022.

Photo 13: Wetland JL21, looking southwest. Photograph taken April 5th, 2022.

Photo 14: Wetland JL22, looking southeast. Photograph taken April 5th, 2022.

Photo 15: Wetland JL23, looking northwest. Photograph taken April 5th, 2022.

Photo 16: Wetland JL24, looking west. Photograph taken April 5th, 2022.

Photo 17: Wetland JL25, looking southwest. Photograph taken April 5th, 2022.

Photo 18: Wetland JL26, looking north. Photograph taken April 5th, 2022.

Photo 19: Wetland JL27, looking north. Photograph taken April 5th, 2022.

Photo 20: Wetland JL28, photo looking south. Photograph taken April 5th, 2022.

Photo 21: Stream JL1, photo looking east. Photograph taken April 4th, 2022.

Photo 22: Stream JL6, photo looking southeast. Photograph taken April 4th, 2022.

APPENDIX E

Agency Letters and Published Mapping

JANET T. MILLS
GOVERNOR

STATE OF MAINE
DEPARTMENT OF
INLAND FISHERIES & WILDLIFE
353 WATER STREET
41 STATE HOUSE STATION
AUGUSTA ME 04333-0041

JUDITH CAMUSO
COMMISSIONER

October 14, 2021

Roger St. Amand
Atlantic Resource Consultants
Bass Harbor, ME 04653

RE: Information Request – Solar Development Project, Casco

Dear Roger:

Per your request received on October 13, 2021, we have reviewed current Maine Department of Inland Fisheries and Wildlife (MDIFW) information for known locations of Endangered, Threatened, and Special Concern species; designated Essential and Significant Wildlife Habitats; and inland fisheries habitat concerns within the vicinity of the *Solar Development* project in Casco. Note that as project details are lacking, our comments are non-specific and should be considered preliminary.

Our Department has not mapped any Essential Habitats that would be directly affected by your project.

Endangered, Threatened, and Special Concern Species

Bats - Of the eight species of bats that occur in Maine, the three *Myotis* species are afforded special protection under Maine's Endangered Species Act (MESA, 12 M.R.S §12801 et. seq.): little brown bat (State Endangered), northern long-eared bat (State Endangered), and eastern small-footed bat (State Threatened). The five remaining bat species are designated as Species of Special Concern: big brown bat, red bat, hoary bat, silver-haired bat, and tri-colored bat. While a comprehensive statewide inventory for bats has not been completed, based on historical evidence, it is likely that several of these species occur within the project area during the fall/spring migration, the summer breeding season, and/or for overwintering. If the proposed project has a Federal nexus, either via funding or permitting, or if the project is not consistent with the USFWS "4(d) Rule", we recommend that you contact the U.S. Fish and Wildlife Service--Maine Fish and Wildlife Complex (Wende Mahaney, Wende_Mahaney@fws.gov, 207-902-1569) for further guidance on their perspective, as the northern long-eared bat is also listed as a Threatened Species under the Federal Endangered Species Act. The USFWS "4(d) Rule" provides guidance for protection of bat winter hibernacula and maternity roost trees for northern long-eared bats (see https://www.fws.gov/midwest/endangered/mammals/nleb/4drule.html). MDIFW Endangered Species Rules for bats (Chapter 8.06; see link at http://www.maine.gov/sos/cec/rules/09/137/137c008.docx) provide equivalent seasonal protection of maternity roost trees for any of the three state-listed bats, seasonally prohibits entry into subsurface winter hibernacula, and has additional protections for tree removal within ¼ mile of subsurface winter hibernacula. At present, no maternity roost trees have been designated for protection.

In addition to traditional hibernacula like caves and old mines, recent findings indicate that *Myotis* and big brown bats may also overwinter in exposed rocky features. To date, Maine talus and rocky outcrop studies have focused on relatively exposed slopes with minimal canopy cover, although ongoing research has shown that bats use rocky areas under the forest canopy. Occupied talus slopes in Maine have consisted of variable rock sizes, ranging in size from softball-sized to car-sized boulders. Rock piles, rock

ledges, and small vertical cracks in rocks (>1/2-inch-wide) create crevices that allow bats to access deeper cavities that provide protection for predators and suitable temperature and humidity conditions. Some species of bat, like the eastern small-footed bat, use rocky features year-round. A desktop GIS analysis does not indicate the presence of these features in your project area; however, not all talus and rocky features have been mapped statewide. Therefore, we advise that all areas of talus and rocky features of approximately 1,000 square feet or greater in size be documented on and within 250 feet of your project area, including smaller areas of rock piles and tailings (i.e., quarry spoils). See attached photographs for representative features—these photographs are not all-inclusive and should be used for guidance purposes only. Detailed photographs and coordinates should be submitted to MDIFW for review, and acoustic monitoring may be recommended to document occupancy. Alternatively, these features should be appropriately buffered commensurate with the size and layout of the project. If these features are not present in the project area, our Agency does not anticipate significant impacts to any of the bat species as a result of this project based on currently best available science.

Significant Wildlife Habitat

Deer Wintering Areas (DWAs) – The project search area intersects with a DWA. DWAs contain habitat cover components that provide conditions where deer find protection from deep snow and cold wind, which is important for overwinter survival. MDIFW recommends that development projects be designed to avoid losses or impacts to the continued availability of coniferous winter shelter. Any removal of vegetation should be conducted in such a way that improves the quality and vigor of the coniferous species providing this winter shelter.

Significant Vernal Pools - At this time, MDIFW Significant Wildlife Habitat maps indicate no known presence of Significant Vernal Pools in the project search area; however, a comprehensive statewide inventory for Significant Vernal Pools has not been completed. Therefore, we recommend that surveys for vernal pools be conducted within the project boundary by qualified wetland scientists prior to final project design to determine whether there are Significant Vernal Pools present in the area. These surveys should extend up to 250 feet beyond the anticipated project footprint because of potential performance standard requirements for off-site Significant Vernal Pools, assuming such pools are located on land owned or controlled by the applicant. Once surveys are completed, survey forms should be submitted to our Agency for review well before to the submission of any necessary permits. Our Department will need to review and verify any vernal pool data prior to final determination of significance.

Fisheries Habitat

We generally recommend maintaining 100-foot undisturbed vegetated buffers from the upland edge of all intermittent and perennial streams and any contiguous wetlands. Maintaining and enhancing buffers along these resources is critical to the protection of water temperatures, water quality, natural inputs of coarse woody debris, and various forms of aquatic life necessary to support fish and other aquatic species. Riparian buffers also provide critical habitat and important travel corridors for a variety of wildlife species. Stream crossings should be avoided, but if a stream crossing is necessary, or an existing crossing needs to be modified, it should be designed to provide for full aquatic passage. Small streams, including intermittent streams, can provide crucial rearing habitat, cold water for thermal refugia, and abundant food for juvenile salmonids on a seasonal basis. Undersized crossings may inhibit these functions and become a frequent maintenance problem that causes reoccurring damage to the resource. Generally, MDIFW recommends that all new, modified, and replacement stream crossings be sized to span at least 1.2 times the bankfull width of the stream. In addition, we generally recommend that stream crossings be

open bottomed (i.e. natural bottom), although embedded structures which are backfilled with representative streambed material have been shown to be effective in providing habitat connectivity for fish and other aquatic organisms. Construction Best Management Practices should be closely followed to avoid erosion, sedimentation, alteration of stream flow, and other impacts as eroding soils can travel significant distances as well as transport other pollutants resulting in direct impacts to fish, other aquatic life, and their habitats. In addition, we recommend that any necessary instream work occur between July 15 and October 1.

Wildlife Permeable Fencing

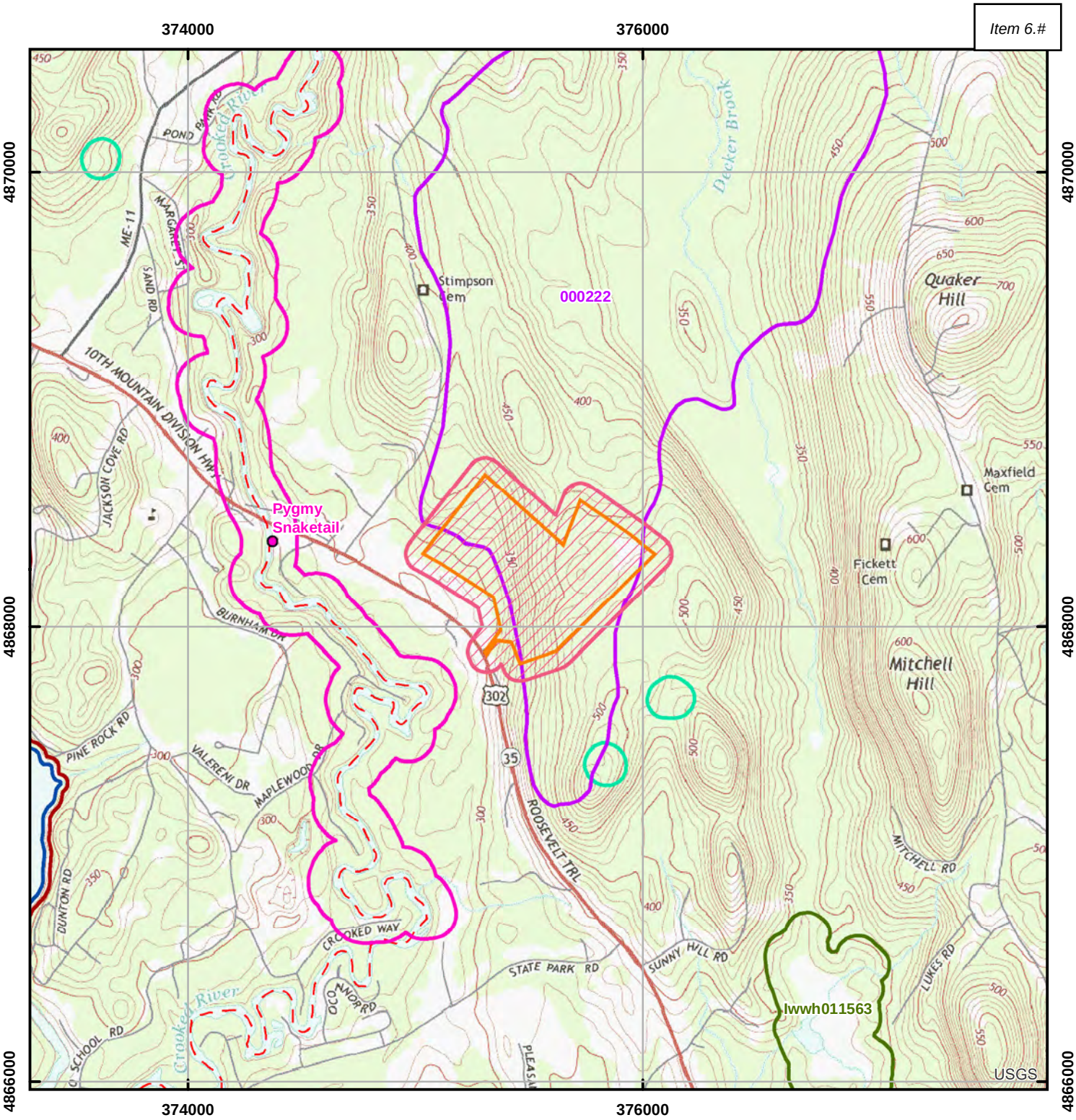
To enhance the use of the project area by smaller animals, and in consideration of the need for site safety and security, we recommend the use of wildlife-permeable fencing. Options for wildlife-permeable fencing includes the use of larger mesh fencing, similar to typical highway right-of-way fencing, with large (12-in. x 12-in.) holes along the bottom of the fence, spaced evenly along the entire perimeter of the fence line every 20-25 feet. Alternatively, the fence can be installed so that there is at least 12 inches of clearance along the entire perimeter bottom.

This consultation review has been conducted specifically for known MDIFW jurisdictional features and should not be interpreted as a comprehensive review for the presence of other regulated features that may occur in this area. Prior to the start of any future site disturbance we recommend additional consultation with the municipality, and other state resource agencies including the Maine Natural Areas Program, Maine Department of Marine Resources, and Maine Department of Environmental Protection in order to avoid unintended protected resource disturbance.

Please feel free to contact my office if you have any questions regarding this information, or if I can be of any further assistance.

Best regards,

Becca Settele
Wildlife Biologist



Environmental Review of Fish and Wildlife Observations and Priority Habitats

Project Name: Solar Dev, Casco (Version 1)

0 0.125 0.25 0.5 0.75 1 Miles

Projection: UTM, NAD83, Zone 19N

Date: 10/14/2021

Maine Department of Inland Fisheries and Wildlife

- ProjectSearchAreas - All Versions
- Maine Cliff and Talus Areas
- Deer Winter Area
- LUPC p-fw
- Cooperative DWAs
- Seabird Nesting Islands
- Shorebird Areas
- Inland Waterfowl and Wading Bird
- 2008 Iwwh - Shoreland Zoning
- Tidal Waterfowl and Wading Bird
- Significant Vernal Pools
- Environmental Review Polygons
- Roseate Tern
- Piping Plover and Least Tern
- Aquatic ETSc - 2.5 mi review
- Rare Mussels - 5 mi review
- Maine Heritage Fish Waters
- Arctic Charr Habitat
- Redfin Pickerel and Swamp Darter Habitats - buffer100ft
- Special Concern occupied habitats - 100ft buffer
- Wild Lake Trout Habitats

STATE OF MAINE
DEPARTMENT OF AGRICULTURE, CONSERVATION & FORESTRY
177 STATE HOUSE STATION
AUGUSTA, MAINE 04333

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

October 14, 2021

Roger St. Amand
Atlantic Resource Co, LLC
PO Box 76
Bass Harbor, ME 04653

Via email: roger@arc-env.com

Re: Rare and exemplary botanical features in proximity to: #21114, Solar Development, Roosevelt Trail, Casco, Maine

Dear Mr. St. Amand:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received October 12, 2021 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Casco, Maine. Rare and unique botanical features include the habitat of rare, threatened, or endangered plant species and unique or exemplary natural communities. Our review involves examining maps, manual and computerized records, other sources of information such as scientific articles or published references, and the personal knowledge of staff or cooperating experts.

Our official response covers only botanical features. For authoritative information and official response for zoological features you must make a similar request to the Maine Department of Inland Fisheries and Wildlife, 284 State Street, Augusta, Maine 04333.

According to the information currently in our Biological and Conservation Data System files, there are no rare botanical features documented specifically within the project area. This lack of data may indicate minimal survey efforts rather than confirm the absence of rare botanical features. You may want to have the site inventoried by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed.

If a field survey of the project area is conducted, please refer to the enclosed supplemental information regarding rare and exemplary botanical features documented to occur in the vicinity of the project site. The list may include information on features that have been known to occur historically in the area as well as recently field-verified information. While historic records have not been documented in several years, they may persist in the area if suitable habitat exists. The enclosed list identifies features with potential to occur in the area, and it should be considered if you choose to conduct field surveys.

This finding is available and appropriate for preparation and review of environmental assessments, but it is not a substitute for on-site surveys. Comprehensive field surveys do not exist for all natural areas in Maine, and in the absence of a specific field investigation, the Maine Natural Areas Program cannot provide a definitive statement on the presence or absence of unusual natural features at this site.

MOLLY DOCHERTY, DIRECTOR
MAINE NATURAL AREAS PROGRAM
BLOSSOM LANE, DEERING BUILDING

DEPARTMENT OF Agriculture Conservation & Forestry

PHONE: (207) 287-804490
WWW.MAINE.GOV/DACF/MNAP

The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations proposing environmental alteration or conducting environmental assessments. If, however, data provided by MNAP are to be published in any form, the Program should be informed at the outset and credited as the source.

The Maine Natural Areas Program has instituted a fee structure of $75.00 an hour to recover the actual cost of processing your request for information. You will receive an invoice for $150.00 for two hours of our services.

Thank you for using MNAP in the environmental review process. Please do not hesitate to contact me if you have further questions about the Natural Areas Program or about rare or unique botanical features on this site.

Sincerely,

Kristen Puryear | Ecologist | Maine Natural Areas Program
207-287-8043 | kristen.puryear@maine.gov

Rare and Exemplary Botanical Features within 4 miles of
Project: #21114, Solar Development, Roosevelt Trail, Casco, Maine

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Dry Land Sedge						
	SC	S2	G5	2001-06-08	8	Old field/roadside (non-forested, wetland or upland)
Enriched Northern Hardwoods Forest						
	<null>	S3	GNR	2001-06-08	33	Hardwood to mixed forest (forest, upland)
Fern-leaved False Foxglove						
	SC	S3	G5	2001-06-08	25	Dry barrens (partly forested, upland),Hardwood to mixed forest (forest, upland)
Oak - Northern Hardwoods Forest						
	<null>	S5	GNR	1996-08-27	2	Hardwood to mixed forest (forest, upland)
Oak - Pine Forest						
	<null>	S5	G5	1996-08-27	1	Hardwood to mixed forest (forest, upland)
Oak - Pine Woodland						
	<null>	S4	G3G5	2001-06-08	10	Dry barrens (partly forested, upland),Rocky summits and outcrops (non-forested, upland)
Pitch Pine - Heath Barren						
	<null>	S1	G3G5	2004-04-08	3	Dry barrens (partly forested, upland)
Purple Clematis						
	SC	S3	G5T5	2001-06-08	26	Non-tidal rivershore (non-forested, seasonally wet),Hardwood to mixed forest (forest, upland)
Smooth Winterberry Holly						
	SC	S3	G5	1849-07	7	Forested wetland
Summer Grape						
	T	S2	G5T5	2001-06-08	8	Hardwood to mixed forest (forest, upland),Rocky summits and outcrops (non-forested, upland)
White Oak - Red Oak Forest						
	<null>	S3	GNR	1978	5	Hardwood to mixed forest (forest, upland)

Rare and Exemplary Botanical Features within 4 miles of
Project: #21114, Solar Development, Roosevelt Trail, Casco, Maine

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Wild Coffee						
	E	S1	G5	1933-08-17	4	Non-tidal rivershore (non-forested, seasonally wet),Hardwood to mixed forest (forest, upland)

Conservation Status Ranks

State and Global Ranks: This ranking system facilitates a quick assessment of a species' or habitat type's rarity and is the primary tool used to develop conservation, protection, and restoration priorities for individual species and natural habitat types. Each species or habitat is assigned both a state (S) and global (G) rank on a scale of 1 to 5. Factors such as range extent, the number of occurrences, intensity of threats, etc., contribute to the assignment of state and global ranks. The definitions for state and global ranks are comparable but applied at different geographic scales; something that is state imperiled may be globally secure.

The information supporting these ranks is developed and maintained by the Maine Natural Areas Program (state ranks) and NatureServe (global ranks).

Rank	Definition
S1 **G1**	**Critically Imperiled** – At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
S2 **G2**	**Imperiled** – At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
S3 **G3**	**Vulnerable** – At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
S4 **G4**	**Apparently Secure** – At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
S5 **G5**	**Secure** – At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
SX **GX**	**Presumed Extinct** – Not located despite intensive searches and virtually no likelihood of rediscovery.
SH **GH**	**Possibly Extinct** – Known from only historical occurrences but still some hope of rediscovery.
S#S# **G#G#**	**Range Rank** – A numeric range rank (e.g., S2S3 or S1S3) is used to indicate any range of uncertainty about the status of the species or ecosystem.
SU **GU**	**Unrankable** – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.
GNR **SNR**	**Unranked** – Global or subnational conservation status not yet assessed.
SNA **GNA**	**Not Applicable** – A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities (e.g., non-native species or ecosystems.
Qualifier	**Definition**
S#? **G#?**	**Inexact Numeric Rank** – Denotes inexact numeric rank.
Q	**Questionable taxonomy that may reduce conservation priority** – Distinctiveness of this entity as a taxon or ecosystem type at the current level is questionable. The "Q" modifier is only used at a global level.
T#	**Infraspecific Taxon (trinomial)** – The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank.

State Status: Endangered and Threatened are legal status designations authorized by statute. Please refer to MRSA Title 12, §544 and §544-B.

Status	Definition
E	**Endangered** – Any native plant species in danger of extinction throughout all or a significant portion of its range within the State or Federally listed as Endangered.
T	**Threatened** – Any native plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range in the State or Federally listed as Threatened.
SC	**Special Concern** – A native plant species that is rare in the State, but not rare enough to be considered Threatened or Endangered.
PE	**Potentially Extirpated** – A native plant species that has not been documented in the State in over 20 years, or loss of the last known occurrence.

Element Occurrence (EO) Ranks: Quality assessments that designate viability of a population or integrity of habitat. These ranks are based on size, condition, and landscape context. Range ranks (e.g., AB, BC) and uncertainty ranks (e.g., B?) are allowed. The Maine Natural Areas Program tracks all occurrences of rare plants and natural communities/ecosystems (S1-S3) as well as exemplary common natural community types (S4-S5 with EO ranks A/B).

Rank	Definition
A	**Excellent** – Excellent estimated viability/ecological integrity.
B	**Good** – Good estimated viability/ecological integrity.
C	**Fair** – Fair estimated viability/ecological integrity.
D	**Poor** – Poor estimated viability/ecological integrity.
E	**Extant** – Verified extant, but viability/ecological integrity not assessed.
H	**Historical** – Lack of field information within past 20 years verifying continued existence of the occurrence, but not enough to document extirpation.
X	**Extirpated** – Documented loss of population/destruction of habitat.
U	**Unrankable** – Occurrence unable to be ranked due to lack of sufficient information (e.g., possible mistaken identification).
NR	**Not Ranked** – An occurrence rank has not been assigned.

Visit the Maine Natural Areas Program website for more information
http://www.maine.gov/dacf/mnap

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
Phone: (207) 469-7300 Fax: (207) 902-1588

In Reply Refer To:
Project Code: 2023-0045901
Project Name: Solar Development

February 15, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Maine Ecological Services Field Office
P. O. Box A
East Orland, ME 04431
(207) 469-7300

Project Summary

Project Code: 2023-0045901
Project Name: Solar Development
Project Type: Power Gen - Solar
Project Description: The project is a solar development on Roosevelt Trail in Casco, Maine. Details are unknown, design phase.
Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@43.95547545,-70.54522885265766,14z

Counties: Cumberland County, Maine

Endangered Species Act Species

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Threatened

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Small Whorled Pogonia *Isotria medeoloides* Population: No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/1890	Threatened

Critical habitats

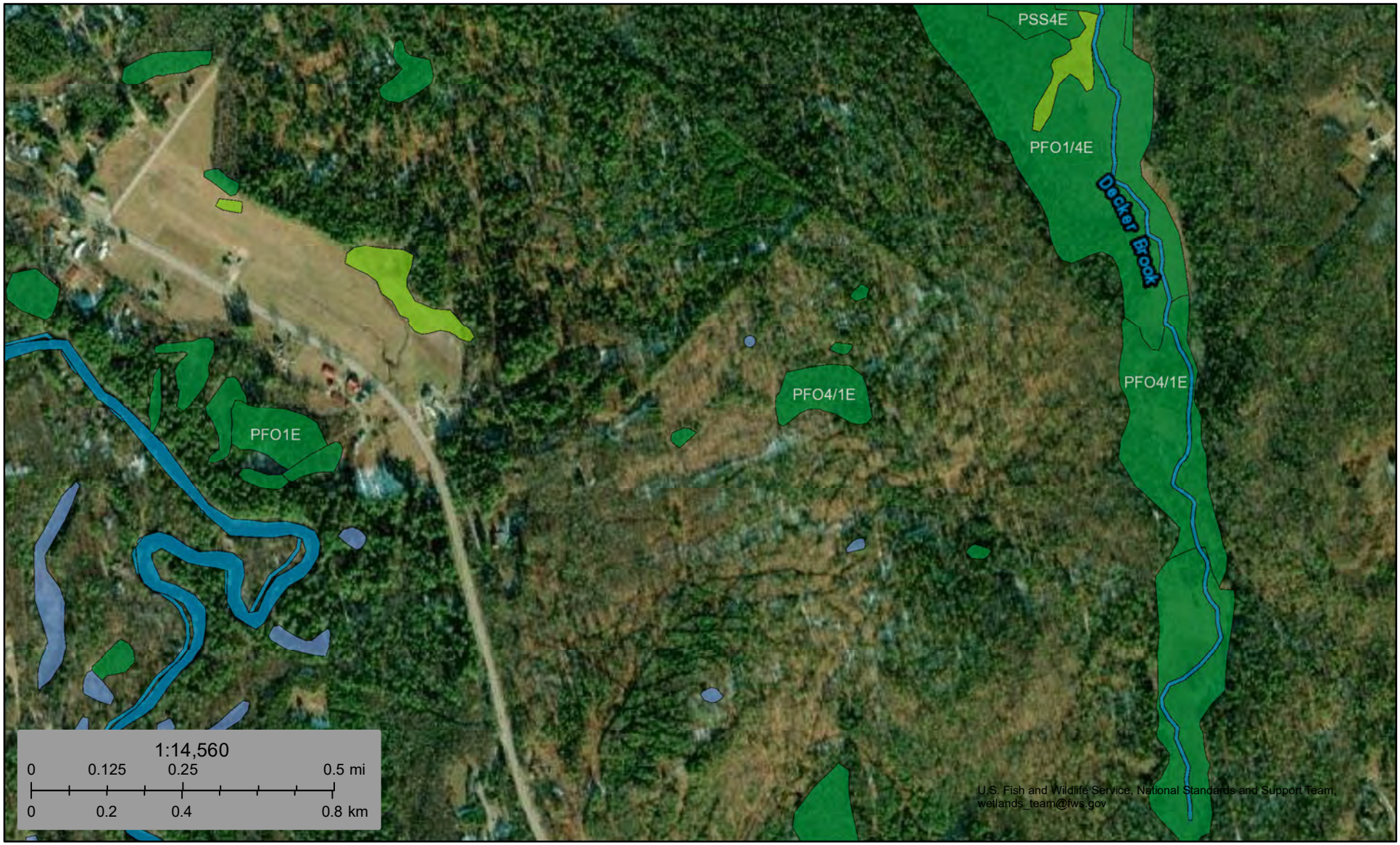
THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency: Watershed Resource Consultants, LLC
Name: Aleita Burman
Address: P.O. Box 145
City: Orrington
State: ME
Zip: 04474
Email blburman@gmail.com
Phone: 2073856056

U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetlands



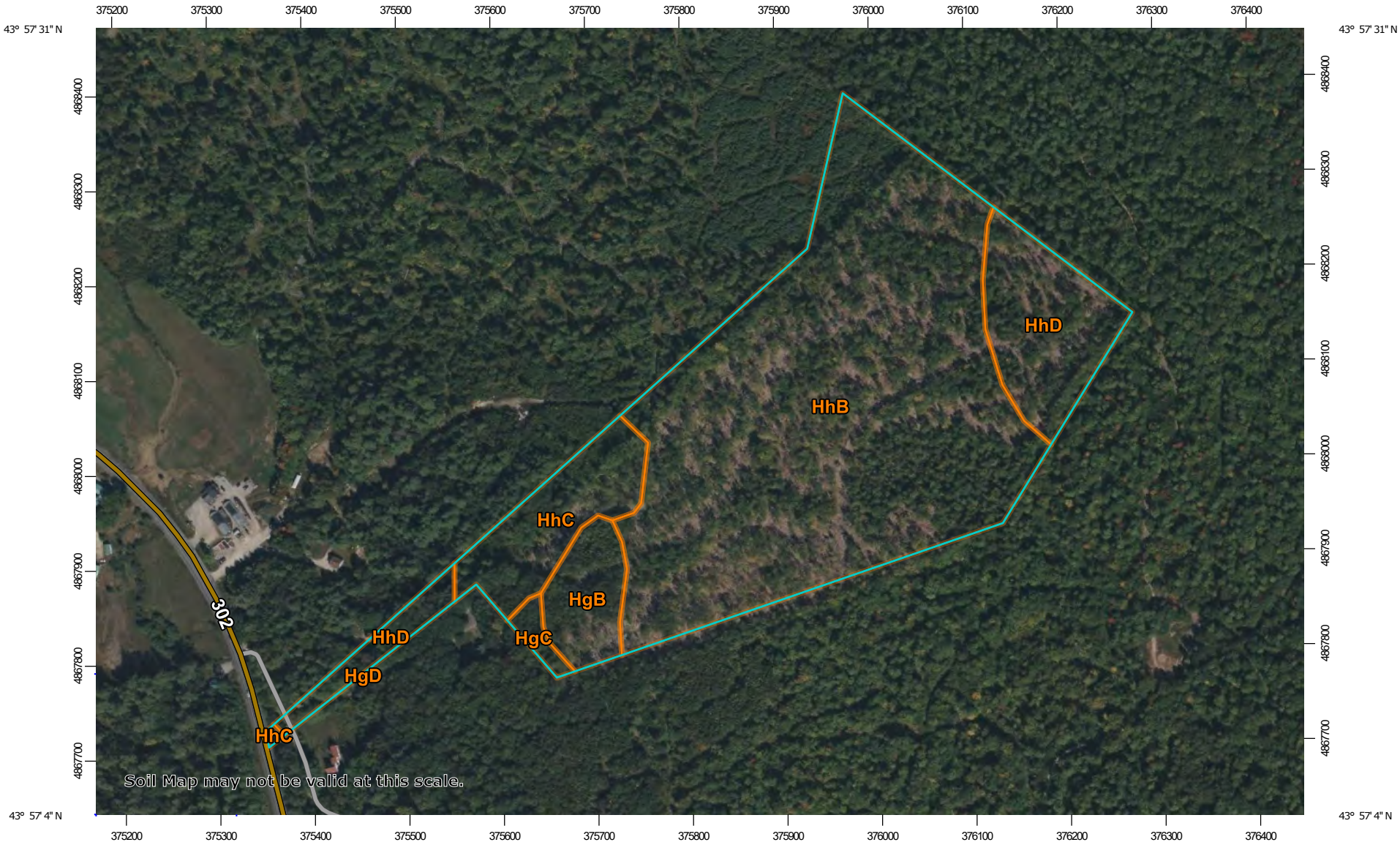
February 15, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

Soil Map—Cumberland County and Part of Oxford County, Maine



Map Scale: 1:5,840 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 250 500 1000 1500

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

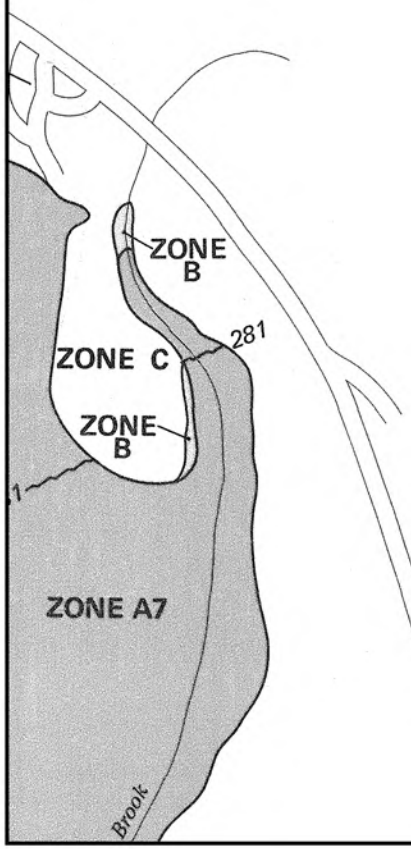
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Cumberland County and Part of Oxford County, Maine
Survey Area Data: Version 19, Aug 30, 2022

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

Date(s) aerial images were photographed: Jun 19, 2020—Sep 20, 2020

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



SITE

ZONE C

contact your insurance agent, or call the National Flood Insu
Program at (800) 638-6620, or (800) 424-8872.

APPROXIMATE SCALE

400 0 400 FEET

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

TOWN OF
CASCO,
MAINE
CUMBERLAND COUNTY

PANEL 14 OF 30
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
230044 0014 B

EFFECTIVE DATE:
MAY 5, 1981

federal emergency management agency
federal insurance administration

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
HgB	Hermon sandy loam, 3 to 8 percent slopes	2.6	5.2%
HgC	Hermon sandy loam, 8 to 15 percent slopes	0.5	1.1%
HgD	Hermon sandy loam, 15 to 25 percent slopes	0.0	0.0%
HhB	Hermon sandy loam, 0 to 8 percent slopes, very stony	36.2	71.6%
HhC	Hermon sandy loam, 8 to 15 percent slopes, very stony	4.4	8.7%
HhD	Hermon sandy loam, 15 to 35 percent slopes, very stony	6.8	13.4%
Totals for Area of Interest		**50.6**	**100.0%**

APPENDIX F

Maine State Vernal Pool Assessment Forms and Color Photographs

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: VP-JL10 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Jeanna Leclerc, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other Roger St.Amand, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Mainely Solar, Spring Mtn, Casco, Maine

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Carolyn Drew Phone: (207) 329-9056 E-mail: carolyndrew61@gmail.com

Street Address: 791 Roosevelt Trail City: Casco State: ME Zip: 04015

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Casco

Brief site directions to the pool (using mapped landmarks):

From North Windham, travel north on US-302 for 11.1 miles. Site will be on your right at 791 Roosevelt Trail, Casco. See plan and GPS locations for exact location of pool. SVP JL10 is ~900' NW of end of main logging road.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 70.548543 Latitude/Northing: 43.957649

Coordinate system: WGS 84

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

Edges of pool have several skidder ruts, but no breeding activity observed in them and they do not alter the hydrology or vegetation of the pool

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ◉ Semi-permanent (drying partially in all years and completely in drought years)
- ○ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pool is very deep, but contained terrestrial vegetation in the deepest portions. Likely dries out in most years.

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ○ 12-36" (1-3 ft.) ◉ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 72 ○ m ◉ ft Length: 110 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☐ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☑ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☑ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☑ Other: green frogs in pool

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 4/13/2022, 5/3/2022

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ◉ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	4	0		3			A								
Spotted Salamander	20	26		3	3		F	M							
Blue-spotted Salamander	0	0													
Fairy Shrimp[3]	0	0													

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☑ SVP ☐ Potential SVP ☐ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Large, natural pool with cold, deep water.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: NSVP-MR1 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Jeanna Leclerc, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ○ same as observer ◉ other Roger St.Amand, WRC, LL

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Mainely Solar, Spring Mountain , Casco

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Carolyn Drew Phone: (207) 329-9056 E-mail: carolyndrew61@gmail.com

Street Address: 791 Roosevelt Trail City: Casco State: ME Zip: 04015

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Casco

Brief site directions to the pool (using mapped landmarks):

From North Windham, travel north on US-302 for 11.1 miles. Site will be on your right at 791 Roosevelt Trail, Casco. See plan and GPS locations for exact location of pool. NSVP MR1 is ~200' N of end of main logging road.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 70.548131 Latitude/Northing: 43.956186

Coordinate system: WGS 84

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ○ Natural ◉ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

Pool may be artificially high due to downslope alterations from logging road crossing. Edges have skidder ruts.

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pool likely remains saturated all year, but standing water drains from pool through outlet into intermittent stream

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 75 ○ m ◉ ft Length: 110 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ○ Organic matter (peat/muck) shallow or restricted to deepest portion
- ◉ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☐ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☑ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☑ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☑ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ○ No inlet or outlet
- ◉ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 4/13/2022, 5/3/2022

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ◉ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0													
Spotted Salamander	1	5		3	3		F	F/M							
Blue-spotted Salamander	0	0													
Fairy Shrimp[3]	0	0													

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Pool contains outlet into an intermittent stream. Deep organic substrate with slow flow during spring survey.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: NSVP-MR2 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Jeanna Leclerc, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other Roger St. Amand, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Mainely Solar, Spring Mtn, Casco, Maine

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Carolyn Drew Phone: (207) 329-9056 E-mail: carolyndrew61@gmail.com

Street Address: 791 Roosevelt Trail City: Casco State: ME Zip: 04015

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Casco

Brief site directions to the pool (using mapped landmarks):

From North Windham, travel north on US-302 for 11.1 miles. Site will be on your right at 791 Roosevelt Trail, Casco. See plan and GPS locations for exact location of pool. NSVP MR2 is ~100' NE of NSVP MR1

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 70.547117 Latitude/Northing: 43.956467

Coordinate system: WGS 84

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☐ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☐ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ◉ Natural ○ Natural-Modified ○ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Pool flows slowly downslope into VP-MR1, likely dries out in the summer months

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 60 ○ m ◉ ft Length: 360 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ○ Organic matter (peat/muck) shallow or restricted to deepest portion
- ◉ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☐ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☑ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☑ Sphagnum moss (anchored or suspended)
- ☑ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☑ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☑ Other: Peepers calling, mallards feeding

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ○ No inlet or outlet
- ◉ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 4/13/2022, 5/3/2022

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ◉ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	4	0		3			F								
Spotted Salamander	7	7		3	3		F	F/M							
Blue-spotted Salamander	0	0													
Fairy Shrimp[3]	0	0													

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☑ Non Significant VP ☐ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Slow flow through natural pool, drains to VP-MR1 (within same wetland complex)

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: IBA-JL12 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Jeanna Leclerc, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other Roger St.Amand, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

c. Project Name: Mainely Solar, Spring Mtn, Casco, Maine

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Carolyn Drew Phone: (207) 329-9056 E-mail: carolyndrew61@gmail.com

Street Address: 791 Roosevelt Trail City: Casco State: ME Zip: 04015

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Casco

Brief site directions to the pool (using mapped landmarks):

From North Windham, travel north on US-302 for 11.1 miles. Site will be on your right at 791 Roosevelt Trail, Casco. See plan and GPS locations for exact location of pool. IBA JL12 is ~1000' north of end of main logging road.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 70.546907 Latitude/Northing: 43.958162

Coordinate system: WGS 84

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☐ Forested swamp
- ☐ Shrub swamp
- ☐ Peatland (fen or bog)
- ☑ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☑ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ○ Natural ○ Natural-Modified ◉ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

Deep skid ruts/disturbed area in forested wetland.

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

Water level drop between 1st and 2nd visit, terrestrial vegetation growing in pool

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 25 ○ m ◉ ft Length: 103 ○ m ◉ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☐ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☐ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☐ Sphagnum moss (anchored or suspended)
- ☑ Wet site ferns (e.g. royal fern, marsh fern)
- ☐ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☑ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ○ No inlet or outlet
- ◉ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 4/13/2022, 5/3/2022

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ◉ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0													
Spotted Salamander	4	17		3	3		F	M							
Blue-spotted Salamander	0	0													
Fairy Shrimp[3]	0	0													

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☐ Non Significant VP ☑ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

Modified area in forested wetland. Rest of wetland has no pooled surface water, only area with obvious ruts and disturbance.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Maine State Vernal Pool Assessment Form

INSTRUCTIONS:

- **Complete all 3 pages of form thoroughly. Most fields are required for pool registration.**
- **Clear photographs of a) the pool AND b) the indicators (one example of each species egg mass) are required for all observers.**

Observer's Pool ID: IBA-MR6 **MDIFW Pool ID:** _____

1. PRIMARY OBSERVER INFORMATION

a. Observer name: Jeanna Leclerc, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ◉ Yes

2. PROJECT CONTACT INFORMATION

a. Contact name: ◉ same as observer ○ other Roger St.Amand, WRC, LLC

b. Contact and credentials previously provided? ○ No (submit Addendum 1) ○ Yes

c. Project Name: Mainely Solar, Spring Mtn, Casco, Maine

3. LANDOWNER CONTACT INFORMATION

a. Are you the landowner? ○ Yes ◉ No If no, was landowner permission obtained for survey? ◉ Yes ○ No

b. Landowner's contact information (required)

Name: Carolyn Drew Phone: (207) 329-9056 E-mail: carolyndrew61@gmail.com

Street Address: 791 Roosevelt Trail City: Casco State: ME Zip: 04015

c. ☐ Large Projects: check if separate project landowner data file submitted

The Maine Department of Environmental Protection will e-mail official status letters to the project contact and landowner. Please check these data for completeness and accuracy to prevent delay in mailings. E-mail is the preferred method of notification; please provide e-mail addresses for the project contact and the landowner when available.

4. VERNAL POOL LOCATION INFORMATION

a. Location Township: Casco

Brief site directions to the pool (using mapped landmarks):

From North Windham, travel north on US-302 for 11.1 miles. Site will be on your right at 791 Roosevelt Trail, Casco. See plan and GPS locations for exact location of pool. IBA MR6 is ~1200' north of end of main logging road.

b. Mapping Requirements

i. USGS topographic map OR aerial photograph with pool clearly marked.

ii. GPS location of vernal pool (use Datum NAD83 / WGS84)

Longitude/Easting: 70.547567 Latitude/Northing: 43.958614

Coordinate system: WGS 84

Check one:

◉ GIS shapefile
- send to VernalPool.MDIFW@maine.gov; observer has reviewed shape accuracy

○ (Best) The pool perimeter is delineated by multiple GPS points. (Excellent)
- Include map or spreadsheet with coordinates.

○ The above GPS point is at the center of the pool. (Good)

5. VERNAL POOL HABITAT INFORMATION

a. Habitat survey date (only if different from indicator survey dates on page 3): _____

b. Wetland habitat characterization

■ Choose the best descriptor for the landscape setting:

- ○ Isolated depression
- ○ Floodplain depression
- ◉ Pool associated with larger wetland complex
- ○ Other: _____

■ Check all wetland types that best apply to this pool:

- ☑ Forested swamp
- ☑ Shrub swamp
- ☐ Peatland (fen or bog)
- ☑ Emergent marsh
- ☐ Wet meadow
- ☐ Lake or pond cove
- ☐ Abandoned beaver flowage
- ☐ Active beaver flowage
- ☐ Slow stream
- ☐ Floodplain
- ☐ Mostly unvegetated pool
- ☑ ATV or skidder rut
- ☐ Dug pond or borrow pit
- ☐ Roadside ditch
- ☐ Other: _____

c. Vernal pool status under the Natural Resources Protection Act (NRPA)

i. Pool Origin: ○ Natural ○ Natural-Modified ◉ Unnatural ○ Unknown

If modified, unnatural or unknown, describe any modern or historic human impacts to the pool (**required**):

skid ruts through forested wetland

ii. Pool Hydrology

■ Select the pool's estimated hydroperiod AND provide rationale in box (**required**):

- ○ Permanent
- ○ Semi-permanent (drying partially in all years and completely in drought years)
- ◉ Ephemeral (drying out completely in most years)
- ○ Unknown

Explain:

drop in water levels between 1st and 2nd visits, vegetation growing in pool

■ Maximum depth at survey: ○ 0-12" (0-1 ft.) ◉ 12-36" (1-3 ft.) ○ 36-60" (3-5 ft.) ○ >60" (>5 ft.)

■ Approximate size of pool (at spring highwater): Width: 28 ○ m ◉ ft Length: 97 ○ m ○ ft

■ Predominate substrate in order of increasing hydroperiod:

- ○ Mineral soil (bare, leaf-litter bottom, or upland mosses present)
- ○ Mineral soil (sphagnum moss present)
- ◉ Organic matter (peat/muck) shallow or restricted to deepest portion
- ○ Organic matter (peat/muck) deep and widespread

■ Pool vegetation indicators in order of increasing hydroperiod (check all that apply):

- ☐ Terrestrial nonvascular spp. (e.g. haircap moss, lycopodium spp.)
- ☐ Dry site ferns (e.g. spinulose wood fern, lady fern, bracken fern)
- ☑ Moist site ferns (e.g. sensitive fern, cinnamon fern, interrupted fern, New York fern)
- ☑ Moist site vasculars (e.g. skunk cabbage, jewelweed, blue flag iris, swamp candle)
- ☐ Sphagnum moss (anchored or suspended)
- ☐ Wet site ferns (e.g. royal fern, marsh fern)
- ☑ Wet site shrubs (e.g. highbush blueberry, maleberry, winterberry, mountain holly)
- ☑ Wet site graminoids (e.g. blue-joint grass, tussock sedge, cattail, bulrushes)
- ☐ Aquatic vascular spp. (e.g. pickerelweed, arrowhead)
- ☐ Floating or submerged aquatics (e.g. water lily, water shield, pond weed, bladderwort)
- ☐ No vegetation in pool

■ Faunal indicators (check all that apply):

- ☐ Fish
- ☐ Bullfrog or Green Frog tadpoles
- ☐ Other: _____

iii. Inlet/Outlet Flow Permanency

Type of inlet or outlet (a seasonal or permanent channel providing water flowing into or out of the pool):

- ◉ No inlet or outlet
- ○ Intermittent inlet or outlet
- ○ Permanent inlet or outlet (channel with well-defined banks and permanent flow)
- ○ Other or Unknown (explain): _____

6. VERNAL POOL INDICATOR INFORMATION

a. Indicator survey dates: 4/13/2022, 5/3/2022

b. Indicator abundance criteria and pool survey effort

- Is pool depression bisected by 2 ownerships (straddler pool)? ○ Yes ◉ No
- Was the entire pool surveyed for egg masses? ◉ Yes ○ No; what % of entire pool surveyed? _____
- For each indicator species, indicate the exact number of egg masses, confidence level for species determination, and egg mass maturity. Separate cells are provided for separate survey dates.

INDICATOR SPECIES	Egg Masses (or adult Fairy Shrimp)									Tadpoles/Larvae[4]					
	Visit #1	Visit #2	Visit #3	Confidence Level[1]			Egg Mass Maturity[2]			Observed			Confidence Level[1]		
Wood Frog	0	0													
Spotted Salamander	8	9		3	3		F	M							
Blue-spotted Salamander	0	0													
Fairy Shrimp[3]	0	0													

1-Confidence level: 1 = <60%, 2 = 60-95%, 3 = >95%

2-Egg mass maturity: F= Fresh (<24 hrs), M= Mature (round embryos), A= Advanced (loose matrix, curved embryos), H= Hatched or Hatching

3-Fairy shrimp: X = present

4-Tadpoles/larvae: X = present

c. Rarity criteria

- Note any rare species associated with vernal pools. Observations should be accompanied by photographs.

SPECIES	Method of Verification*			CL**	SPECIES	Method of Verification*			CL**
	P	H	S			P	H	S	
Blanding's Turtle	☐	☐	☐		Wood Turtle	☐	☐	☐	
Spotted Turtle	☐	☐	☐		Ribbon Snake	☐	☐	☐	
Ringed Boghaunter	☐	☐	☐		Other:	☐	☐	☐	

*Method of verification: P = Photographed, H = Handled, S = Seen

**CL - Confidence level in species determination: 1= <60%, 2= 60-95%, 3= >95%

d. Optional observer recommendation:

☐ SVP ☐ Potential SVP ☐ Non Significant VP ☑ Indicator Breeding Area

e. General vernal pool comments and/or observations of other wildlife:

skid ruts/disturbance in forested wetland. Pooled water only exists in disturbed area.

Send completed form and supporting documentation to: VernalPool.MDIFW@maine.gov

NOTE: Digital submissions are preferred but if not possible, please mail to: Maine Department of Inland Fisheries and Wildlife
Attn: Vernal Pools
106 Hogan Road, Suite 1
Bangor, ME 04401

For MDIFW use only Reviewed by MDIFW Date: _____ Initials: _____

This pool is: ☐ **Significant** ☐ **Potentially Significant** but lacking critical data ☐ **Not Significant** due to: ○ does not meet biological criteria. ○ does not meet MDEP vernal pool criteria.

Comments:

Photo 1: Vernal Pool SVP JL10, looking east. Photograph taken May 3rd, 2022.

Photo 2: Spotted salamander egg mass in SVP JL10. Photograph taken May 3rd, 2022.

Photo 3: Wood frog egg mass in SVP JL10. Photograph taken April 13th, 2022.

Photo 4: Vernal Pool NSVP MR1, looking east. Photograph taken May 3rd, 2022.

Photo 5: Spotted salamander egg mass in NSVP MR1. Photograph taken May 3rd, 2022.

Photo 6: Vernal Pool NSVP MR2, looking west. Photograph taken May 3rd, 2022.

Photo 7: Spotted salamander egg mass in NSVP MR2. Photograph taken May 3rd, 2022.

Photo 8: Wood frog egg mass in NSVP MR2. Photograph taken April 13th, 2022.

Photo 9: Indicator Breeding Area (IBA) MR6, looking east. Photograph taken May 3rd, 2022.

Photo 10: Spotted salamander egg mass in IBA MR6. Photograph taken May 3rd, 2022.

Photo 11: IBA JL12, looking southeast. Photograph taken May 3rd, 2022.

Photo 12: Spotted salamander egg mass in IBA JL12. Photograph taken May 3rd, 2022.

Appendix H
Erosion & Sedimentation Control Plan

EROSION AND SEDIMENTATION CONTROL
INSPECTION AND MAINTENANCE PLAN

SPRING MOUNTAIN SOLAR
ROOSEVELT TRAIL, CASCO, MAINE

Prepared by:

Acheron Engineering, LLC
153 Main Street
Newport, Maine 04953
207- 341-2590

DATE:

APRIL, 2024

1.0 Introduction

The purpose of this plan is to establish an inspection and maintenance process to employ during construction of the project and is intended to meet the requirements set forth in Chapter 500, Section 4(B) of the Stormwater Management Rules. The following section includes:

- A description of the project.
- Responsible parties for implementing the plan.
- Inspection and maintenance procedures during construction.
- Inspection and maintenance procedures after construction

This plan was prepared by or under the supervision of, Kirk Ball, P.E., Acheron Engineering, 320 Gogan Road Benton, Maine 04901.

2.0 Project Description

Spring Mountain Solar Power, LLC is proposing a 0.996 MWac utility scale solar power generation facility, located within a parcel owned by Carolyn Drew. Spring Mountain Solar and Carolyn Drew have established a Memorandum of Solar Option and Lease, granting Spring Mountain Solar, LLC exclusive option to lease the land associated with the project area for solar development.

The project includes 17,925 square feet of impervious area, will occupy 9.9 acres of the 53.37 acre parcel identified by the Town of Casco as Map 3 Lot 40 and within the direct watershed of Sebago Lake. Sebago Lake is identified by the Maine Department of Environment Protection (MDEP) as a waterbody most at risk of development. As proposed the project is required to obtain an individual stormwater permit from the MDEP. However, the project includes soil disturbance over 20,000 square feet and is required to file a stormwater PBR with the MDEP prior to construction.

Currently, the project area is utilized for timber harvesting and includes a gravel timber harvesting road. The project includes the installation a single access tilt tracking system, solar panels, transformer, inverters, upgrading the access drive and installation of a barrier fence that will surround the project area. Please refer to the design plans attached for specific details.

Sebago Solar's project plans include:

- Clearing and grubbing approximately 9.9 acres.
- Upgrading the existing access drive to include; increasing the travel width to 16 feet with 2 foot gravel shoulders, construction of road side ditches, installation of three cross culverts, and construction of eleven ditch turnouts with level spreaders.
- Installation of utility line below grade.
- Installation of two utility poles to support connection to Central Maine Power's local grid.
- Install ground mounted solar array system and equipment.
- Revegetate all disturbed areas with pollinator friendly vegetation.

Erosion and Sedimentation Control BMPs include:

- Construction Entrance,
- Construction of rip rap lined ditches and turnouts,
- Stone level spreaders,
- Sediment barriers (silt fence or erosion control mix berms),
- and stone check dams.

3.0 Responsible Parties

During construction General Contractor retained by Spring Mountain Solar will be responsible to ensure that the inspections are performed as described in the following sections. Following Construction, Spring Mountain Solar will be responsible for overseeing or conducting the inspections and record keeping as described in Section 5. Recertification requirement, within three months of the expiration of each five-year interval from the date of issuance of the permit, the permittee shall certify the following to the Department:

1. All areas of the project site have been inspected for areas of erosion, and appropriate steps have been taken to permanently stabilize these areas.
2. All aspects of the stormwater control system are operating as approved, have been inspected for damage, wear, and malfunction, and appropriate steps have been taken to repair or replace the system, or portions of the system, as necessary.
3. The stormwater maintenance plan for the site is being implemented as approved by the Department, and the maintenance log is being maintained.

Owner Contact Information:

David Fowler
Spring Mountain Solar Power, LLC
143 Highland Shores Road
Casco, Maine
Tel. 207-461-0666

General Contractor:
TBD

4.0 Inspection and Maintenance During Construction

This plan applies to all temporary and permanent erosion control features/structures. During construction all erosion control structures that remain in place and stormwater features shall be inspected weekly, or after each rainstorm producing 1” or greater rainfall, whichever is more frequent. All inspections shall be conducted performed by an individual with knowledge of erosion and stormwater control practices and the conditions of the stormwater management permit issued by the Maine Department of Environmental

Protection. All erosion and sedimentation controls structures shall be inspected and maintained for but not limited to the following:

A. Sediment Barriers

1. Inspect weekly, before and after a storm.
2. Verify that barriers are installed prior to any soil disturbance.
3. Verify if silt fence is keyed properly and tight.
4. Repair and/or replace barriers as needed.
5. Verify barriers are removed when the site is stabilized. Silt fence should be cut at the ground surface.
6. Water that is flowing under the silt-fence without treatment requires resetting the silt fence so the bottom of the fabric is buried into or covered with soil or stone.
7. Sediments that have built up behind silt fence should be removed and the section of the silt fence reset (with new fabric and posts if signs of damage are evident).
8. Rips or holes in fabric require replacement of the section of silt fence with new fabric from post to post. Examine area for cause of problem and remove the threat.
9. Water that is flowing under the silt-fence without treatment requires resetting the silt fence so the bottom of the fabric is buried into or covered with soil or stone.
10. Sediments that have built up behind silt fence should be removed and the section of the silt fence reset (with new fabric and posts if signs of damage are evident).
11. Rips or holes in fabric require replacement of the section of silt fence with new fabric from post to post. Examine area for cause of problem and remove the threat.

B. Temporary Stabilization

1. Inspect disturbed areas weekly, before and after a storm.
2. Verify that areas that are idle for more than 14 days has been stabilized.
3. Verify that disturbed areas within 100 feet of a natural resource is stabilized each day.

C. Mulch

1. Inspect disturbed areas weekly, before and after a storm.
2. Verify that areas are seeded and mulched within 7 days of obtaining final grade.
3. Verify that erosion control mix is 4-6 inches thick.
4. Verify that erosion control blankets or hay mulch are anchored.

D. Stormwater Channels

1. Inspect disturbed areas weekly, before and after a storm.
2. Verify that ditches and swales are clear of obstruction, accumulated sediments or debris.
3. Verify that ditch lining/bottoms are free of erosion.

E. Buffers

1. Inspect before and after a storm.
2. Verify that areas that buffers are free of erosion and concentrated flows.
3. Verify that area downgradient of level spreaders is stable.
4. Inspect and remove any sediment accumulation within the level spreaders.

F. Winter Construction (Nov 1st to April 15th)

1. Inspect erosion control measure daily.
    i. Ensure final graded areas are mulched twice the normal rate with and anchored.
    ii. Ensure that newly constructed ditches are lined with riprap.
    iii.

If any corrective correction actions based on inspections, shall be started by the end of the following work day and completed within seven days or prior to the next rain event. Document the corrective actions and maintain with inspection forms. Inspection forms and corrective action document shall be maintained for three years after permanent stabilization is achieved.

(See Appendix A for Inspection and Maintenance Log)

5.0 Housekeeping

A. Spill Prevention & Response

Controls must be used to prevent pollutants from construction and waste materials stored on site to enter stormwater, which includes storage practices to minimize exposure of the materials to stormwater. The site contractor or operator must develop, and implement as necessary, appropriate spill prevention, containment, and response planning measures.

NOTE: Any spill or release of toxic or hazardous substances must be reported to the Maine Department of Environmental Protection. For oil spills, call 1-800-482-0777 which is available 24 hours a day. For spills of toxic or hazardous material, call 1-800-452-4664 which is available 24 hours a day. For more information, visit the Department's website at: http://www.maine.gov/dep/spills/emergspillresp/

Clean-up assistance:

Clean Harbors Environmental: 207-772-2201

B. Groundwater protection

During construction, liquid petroleum products and other hazardous materials with the potential to contaminate groundwater may not be stored or handled in areas of the site draining to an infiltration area. An "infiltration area" is any area of the site that by design or as a result of soils, topography and other relevant factors accumulates runoff that infiltrates into the soil. Dikes, berms, sumps, and other forms of secondary containment that prevent discharge to groundwater may be used to isolate portions of the site for the purposes of storage and handling of these materials. Any project proposing infiltration of stormwater must provide adequate pre-treatment of stormwater prior to discharge of stormwater to the infiltration area, or provide for treatment within the infiltration area, in order to prevent the accumulation of fines, reduction in infiltration rate, and consequent flooding and destabilization. During dry months all access roads should be wet down weekly or as needed.

C. Fugitive Sediment and Dust

Actions must be taken to ensure that activities do not result in noticeable erosion of soils or fugitive dust emissions during or after construction. Oil may not be used for dust control, but other water additives may be considered as needed. A stabilized construction entrance (SCE) should be included to minimize tracking of mud and sediment. If off-site tracking occurs, public roads should be swept immediately and no less than once a week and prior to significant storm events. Operations during dry months, that experience fugitive dust problems, should wet down unpaved access roads once a week or more frequently as needed with a water additive to suppress fugitive sediment and dust.

D. Debris and Other Materials

Minimize the exposure of construction debris, building and landscaping materials, trash, fertilizers, pesticides, herbicides, detergents, sanitary waste and other materials to precipitation and stormwater runoff. These materials must be prevented from becoming a pollutant source.

E. Excavation Dewatering

Excavation de-watering is the removal of water from trenches, foundations, coffer dams, ponds, and other areas within the construction area that retain water after excavation. In most cases the collected water is heavily silted and hinders correct and safe construction practices. The collected water removed from the ponded area, either through gravity or pumping, must be spread through natural wooded buffers or removed to areas that are specifically designed to collect the maximum amount of sediment possible, like a cofferdam sedimentation basin. Avoid allowing the water to flow over disturbed areas of the site. Equivalent measures may be taken if approved by the Department of Environmental Protection.

F. Authorized Non-stormwater Discharges

Identify and prevent contamination by non-stormwater discharges. Where allowed non-stormwater discharges exist, they must be identified and steps should be taken to ensure the implementation of appropriate pollution prevention measures for the non-stormwater component(s) of the discharge. Authorized non-stormwater discharges are:

1. Discharges from firefighting activity;
2. Fire hydrant flushings;
3. Vehicle wash water if detergents are not used and washing is limited to the exterior of vehicles (engine, undercarriage and transmission washing is prohibited);
4. Dust control runoff in accordance with permit conditions;
5. Routine external building wash down, not including surface paint removal, that does not involve detergents;
6. Pavement wash water (where spills/leaks of toxic or hazardous materials have not occurred, unless all spilled material had been removed) if detergents are not used;
7. Uncontaminated air conditioning or compressor condensate;
8. Uncontaminated groundwater or spring water;
9. Foundation or footer drain-water where flows are not contaminated;
10. Uncontaminated excavation dewatering;
11. Potable water sources including waterline flushings; and
12. Landscape irrigation

G. **Unauthorized Non-stormwater Discharges**

The Department of Environmental Protections' approval does not authorize a discharge that is mixed with a source of non stormwater, other than those discharges in compliance with Department regulations. Specifically, the Department's approval does not authorize discharges of the following:

1. Wastewater from the washout or cleanout of concrete, stucco, paint, form release oils, curing compounds or other construction materials;
2. Fuels, oils or other pollutants used in vehicle and equipment operation and maintenance;
3. Soaps, solvents, or detergents used in vehicle and equipment washing; and
4. Toxic or hazardous substances from a spill or other release.

APPENDIX A

INSPECTION LOGS

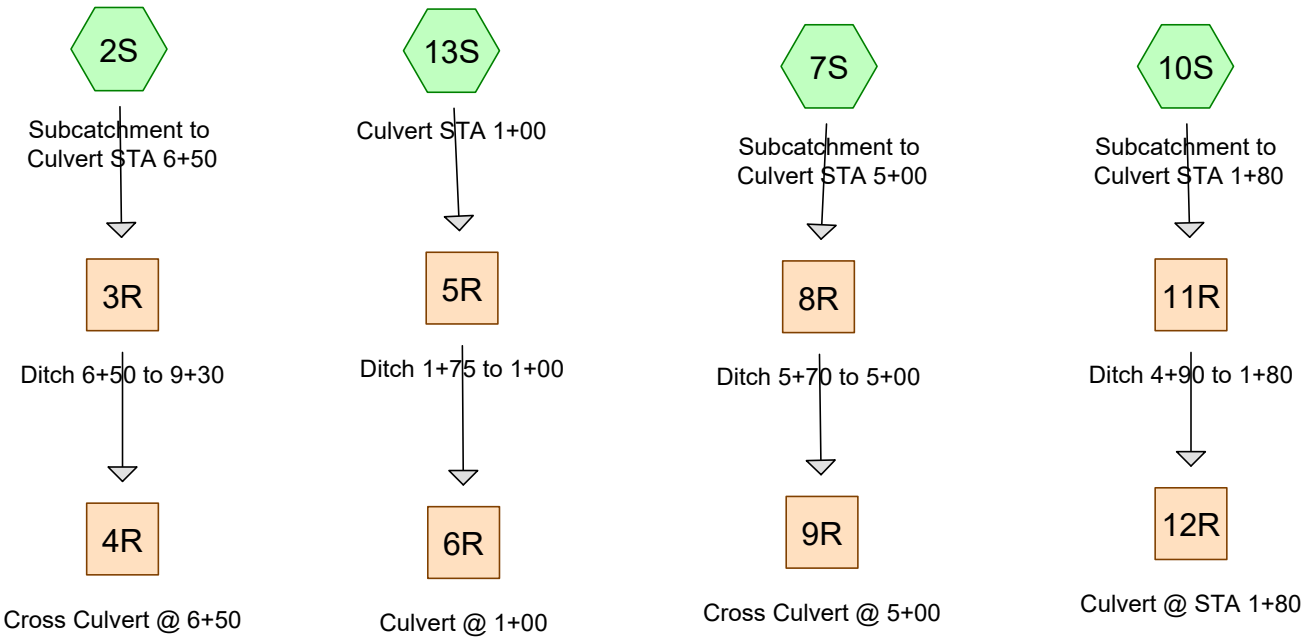
EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before and After a Storm	After Construction
SEDIMENT BARRIERS			
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized–channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X

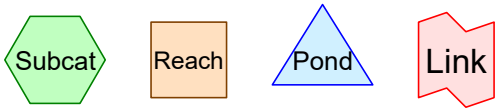
CATCH BASIN SYSTEMS			
Catch basins are built properly	X		
Accumulated sediments and debris are removed from sump, grate and collection area		X	X
Floating debris and floating oils are removed from trap			X
ROADWAYS AND PARKING SURFACES			
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are crowned		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
STORMWATER BASINS AND TRAPS			
Embankments are free of settlement, slope erosion, internal piping, and downstream swamping		X	X
All flow control structure or orifices are operational and clear of debris or sediments		X	X
Any pre-treatment structure that collects sediment or hydrocarbons is clean or maintained		X	X
Vegetated filters and infiltration basins have adequate grass growth			X
Any impoundment or forebay is free of sediment		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

EROSION AND SEDIMENT CONTROL MEASURES AND ACTIVITY	INSPECTION FREQUENCY		
	Weekly	Before and After a Storm	After Construction
SEDIMENT BARRIERS			
Sediment barriers are installed prior to soil disturbances	X	X	
Silt fences are keyed in and tight	X	X	
Barriers are repaired and replaced as necessary	X	X	
Barriers are removed when the site is stabilized - Silt fence should be cut at the ground surface			X
TEMPORARY STABILIZATION			
Areas are stabilized if idle for 14 days or more	X	X	
Daily stabilization within 100 ft of a natural resource	X	X	
MULCH			
Seed and mulch within 7 days of final grading. Ground is not visible	X	X	
Erosion control mix is 4-6 inch thick	X	X	
Erosion control blankets or hay mulch are anchored	X	X	
VEGETATION			
Vegetation provides 90% soil cover	X		X
Loam or soil amendment were provided	X		X
New seeded areas are mulched and protected from vehicle, foot traffic and runoff	X	X	X
Areas that will remain unworked for more than 1 year are vegetated with grass	X		
SLOPES AND EMBANKMENTS			
Final graded slopes and embankments are stabilized	X	X	X
Diversions are provided for areas with rill erosion	X	X	X
Areas steeper than 2:1 are riprapped	X		
Stones are angular, durable and various in size	X		
Riprap is underlain with a gravel layer or filter fabric	X		
STORMWATER CHANNELS AND CULVERTS			
Ditches and swales are permanently stabilized–channels that will be riprapped have been over-excavated	X	X	X
Ditches are clear of obstructions, accumulated sediments or debris	X	X	X
Ditch lining/bottoms are free of erosion	X	X	X
Check dams are spaced correctly to slow flow velocity	X		
Underlying filter fabric or gravel is not visible	X	X	X
Culvert aprons and plunge pools are sized for expected flows volume and velocity	X		
Stones are angular, durable and various in size	X		
Culverts are sized to avoid upgradient flooding	X	X	
Culvert protection extends to the maximum flow elevation within the ditch	X	X	X
Culvert is embedded, not hanging	X	X	X

CATCH BASIN SYSTEMS			
Catch basins are built properly	X		
Accumulated sediments and debris are removed from sump, grate and collection area		X	X
Floating debris and floating oils are removed from trap			X
ROADWAYS AND PARKING SURFACES			
The gravel pad at the construction entrance is clear from sediments	X	X	
Roads are crowned		X	X
Cross drainage (culvert) is provided	X		
False ditches (from winter sand) are graded		X	X
BUFFERS			
Buffers are free of erosion or concentrated flows		X	X
The downgradient of spreaders and turnouts is stable		X	X
Level spreaders are on the contour			X
The number of spreaders and ditch turnouts is adequate for flow distribution		X	X
Any sediment accumulation is removed from within spreader or turnouts		X	X
STORMWATER BASINS AND TRAPS			
Embankments are free of settlement, slope erosion, internal piping, and downstream swamping		X	X
All flow control structure or orifices are operational and clear of debris or sediments		X	X
Any pre-treatment structure that collects sediment or hydrocarbons is clean or maintained		X	X
Vegetated filters and infiltration basins have adequate grass growth			X
Any impoundment or forebay is free of sediment		X	X
WINTER CONSTRUCTION (November 1st-April15th)			
Final graded areas are mulched daily at twice the normal rate with hay, and anchor (not on snow)	Daily		
A double row of sediment barrier is provided for all areas within 100 ft of a sensitive resource (use erosion control mix on frozen ground)	Daily		
Newly constructed ditches are riprapped	Daily		
Slopes greater than 8% are covered with an erosion control blanket or a 4-inch layer of erosion control mix	Daily		
HOUSEKEEPING PUNCH LIST			
All disturbed areas are permanently stabilized, and plantings are established (grass seeds have germinated with 90% vegetative cover)			X
All trash, sediments, debris or any solid waste have been removed from stormwater channels, catch basins, detention structures, discharge points, etc.			X
All ESC devices have been removed: (silt fence and posts, diversions and sediment structures, etc.)			X
All deliverables (certifications, survey information, as-built plans, reports, notice of termination (NOT), etc.) in accordance with all permit requirements have been submitted to town, Maine DEP, association, owner, etc.			X

Appendix I
Stormwater Model Results





Routing Diagram for 02-06-23 Spring Mt Culverts VII
Prepared by {enter your company name here}, Printed 4/14/2024
HydroCAD® 10.00-22 s/n 00774 © 2018 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.086	69	50-75% Grass cover, Fair, HSG B (13S)
2.613	61	>75% Grass cover, Good, HSG B (2S, 7S, 10S)
0.014	98	Paved parking, HSG A (13S)
0.151	98	Paved parking, HSG B (2S)
0.086	98	Water Surface, HSG A (7S, 10S)
10.613	60	Woods, Fair, HSG B (13S)

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	4R	404.00	403.00	50.0	0.0200	0.020	18.0	0.0	0.0
2	6R	308.00	307.00	50.0	0.0200	0.020	24.0	0.0	0.0
3	9R	376.00	375.00	50.0	0.0200	0.020	18.0	0.0	0.0
4	12R	320.00	319.00	50.0	0.0200	0.020	18.0	0.0	0.0

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 2S: Subcatchment to Runoff Area=28,161 sf 23.29% Impervious Runoff Depth>2.45"
Flow Length=146' Tc=2.4 min CN=70 Runoff=2.19 cfs 0.132 af

Subcatchment 7S: Subcatchment to Culvert Runoff Area=50,899 sf 2.38% Impervious Runoff Depth>1.79"
Flow Length=351' Tc=4.0 min CN=62 Runoff=2.68 cfs 0.174 af

Subcatchment 10S: Subcatchment to Runoff Area=45,062 sf 5.62% Impervious Runoff Depth>1.83"
Flow Length=186' Tc=45.1 min CN=63 Runoff=1.09 cfs 0.158 af

Subcatchment 13S: Culvert STA 1+00 Runoff Area=684,454 sf 0.09% Impervious Runoff Depth>1.82"
Flow Length=1,718' Tc=56.6 min CN=63 Runoff=14.58 cfs 2.387 af

Reach 3R: Ditch 6+50 to 9+30 Avg. Flow Depth=0.18' Max Vel=4.86 fps Inflow=2.19 cfs 0.132 af
n=0.035 L=274.0' S=0.1752 '/' Capacity=793.30 cfs Outflow=2.03 cfs 0.132 af

Reach 4R: Cross Culvert @ 6+50 Avg. Flow Depth=0.47' Max Vel=4.28 fps Inflow=2.03 cfs 0.132 af
18.0" Round Pipe n=0.020 L=50.0' S=0.0200 '/' Capacity=9.66 cfs Outflow=2.00 cfs 0.132 af

Reach 5R: Ditch 1+75 to 1+00 Avg. Flow Depth=0.51' Max Vel=8.14 fps Inflow=14.58 cfs 2.387 af
n=0.035 L=36.0' S=0.1528 '/' Capacity=740.83 cfs Outflow=14.58 cfs 2.387 af

Reach 6R: Culvert @ 1+00 Avg. Flow Depth=1.23' Max Vel=7.16 fps Inflow=14.58 cfs 2.387 af
24.0" Round Pipe n=0.020 L=50.0' S=0.0200 '/' Capacity=20.80 cfs Outflow=14.58 cfs 2.386 af

Reach 8R: Ditch 5+70 to 5+00 Avg. Flow Depth=0.20' Max Vel=5.18 fps Inflow=2.68 cfs 0.174 af
n=0.035 L=88.0' S=0.1790 '/' Capacity=801.84 cfs Outflow=2.60 cfs 0.174 af

Reach 9R: Cross Culvert @ 5+00 Avg. Flow Depth=0.53' Max Vel=4.62 fps Inflow=2.60 cfs 0.174 af
18.0" Round Pipe n=0.020 L=50.0' S=0.0200 '/' Capacity=9.66 cfs Outflow=2.59 cfs 0.174 af

Reach 11R: Ditch 4+90 to 1+80 Avg. Flow Depth=0.12' Max Vel=3.85 fps Inflow=1.09 cfs 0.158 af
n=0.035 L=313.0' S=0.1717 '/' Capacity=785.43 cfs Outflow=1.09 cfs 0.158 af

Reach 12R: Culvert @ STA 1+80 Avg. Flow Depth=0.34' Max Vel=3.62 fps Inflow=1.09 cfs 0.158 af
18.0" Round Pipe n=0.020 L=50.0' S=0.0200 '/' Capacity=9.66 cfs Outflow=1.09 cfs 0.158 af

Summary for Subcatchment 2S: Subcatchment to Culvert STA 6+50

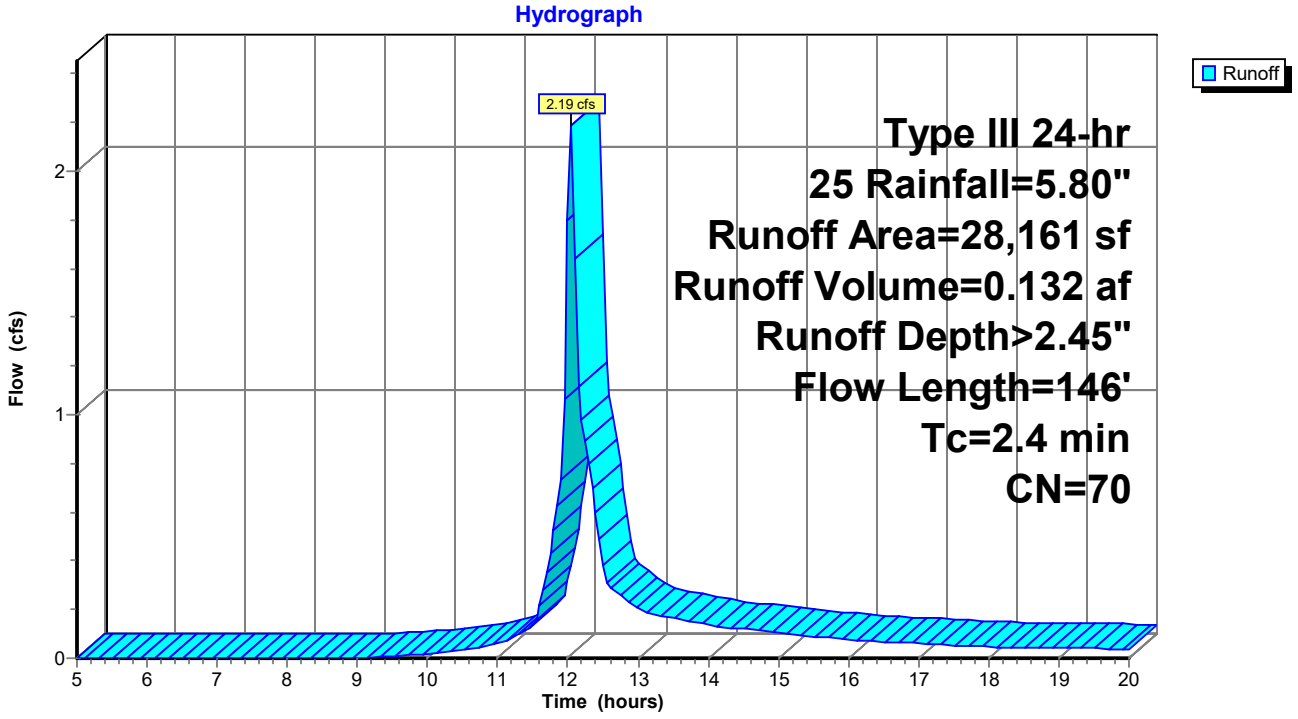
Runoff = 2.19 cfs @ 12.05 hrs, Volume= 0.132 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Rainfall=5.80"

Area (sf)	CN	Description
21,603	61	>75% Grass cover, Good, HSG B
6,558	98	Paved parking, HSG B
28,161	70	Weighted Average
21,603		76.71% Pervious Area
6,558		23.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.1	20	0.1000	0.16		**Sheet Flow, Sheet top of Hill** Grass: Dense n= 0.240 P2= 3.10"
0.2	49	0.0820	4.30		**Shallow Concentrated Flow, SCF Top of Hill** Grassed Waterway Kv= 15.0 fps
0.1	77	0.0260	11.05	618.93	**Channel Flow, Low slope Ditch** Area= 56.0 sf Perim= 27.3' r= 2.05' n= 0.035 Earth, dense weeds
2.4	146	Total			

Subcatchment 2S: Subcatchment to Culvert STA 6+50



Summary for Subcatchment 7S: Subcatchment to Culvert STA 5+00

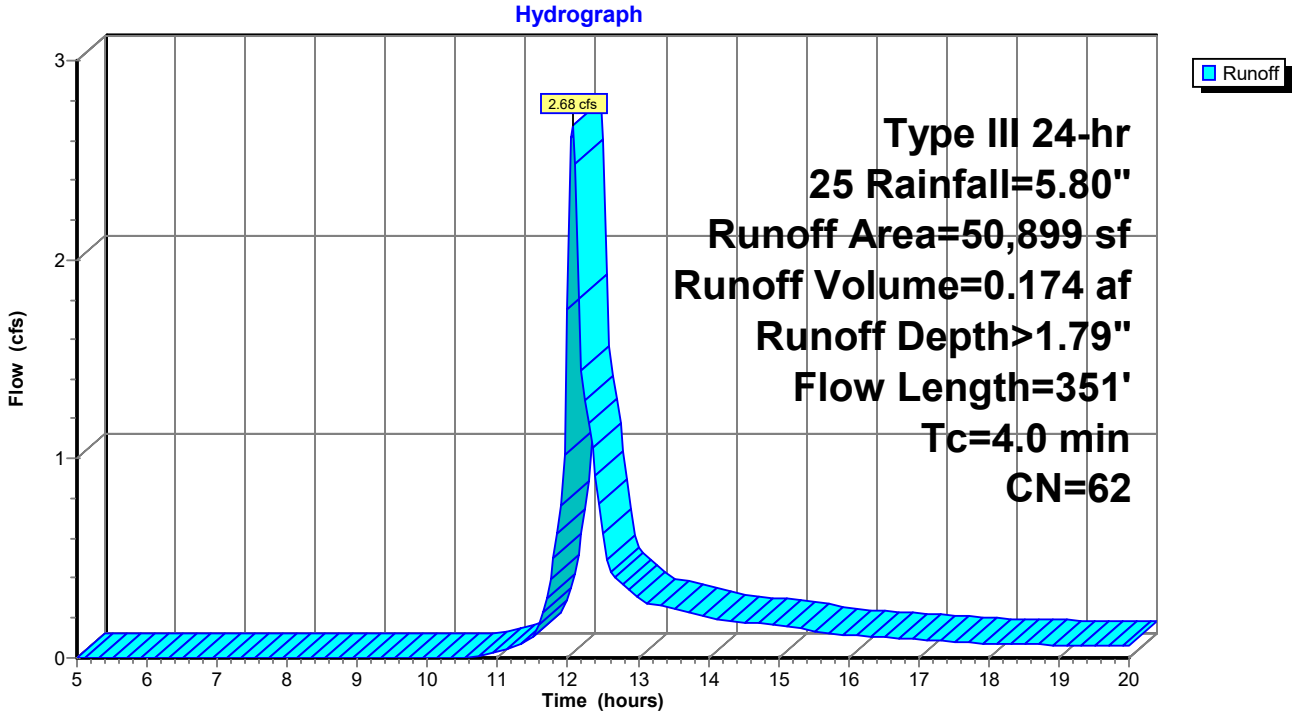
Runoff = 2.68 cfs @ 12.07 hrs, Volume= 0.174 af, Depth> 1.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Rainfall=5.80"

Area (sf)	CN	Description
49,687	61	>75% Grass cover, Good, HSG B
1,212	98	Water Surface, HSG A
50,899	62	Weighted Average
49,687		97.62% Pervious Area
1,212		2.38% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.1	30	0.0833	0.16		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.10"
0.8	289	0.1730	6.24		**Shallow Concentrated Flow, Shallow Conc** Grassed Waterway Kv= 15.0 fps
0.1	32	0.3333	8.66		**Shallow Concentrated Flow, Ditch Slope** Grassed Waterway Kv= 15.0 fps
4.0	351	Total			

Subcatchment 7S: Subcatchment to Culvert STA 5+00



Summary for Subcatchment 10S: Subcatchment to Culvert STA 1+80

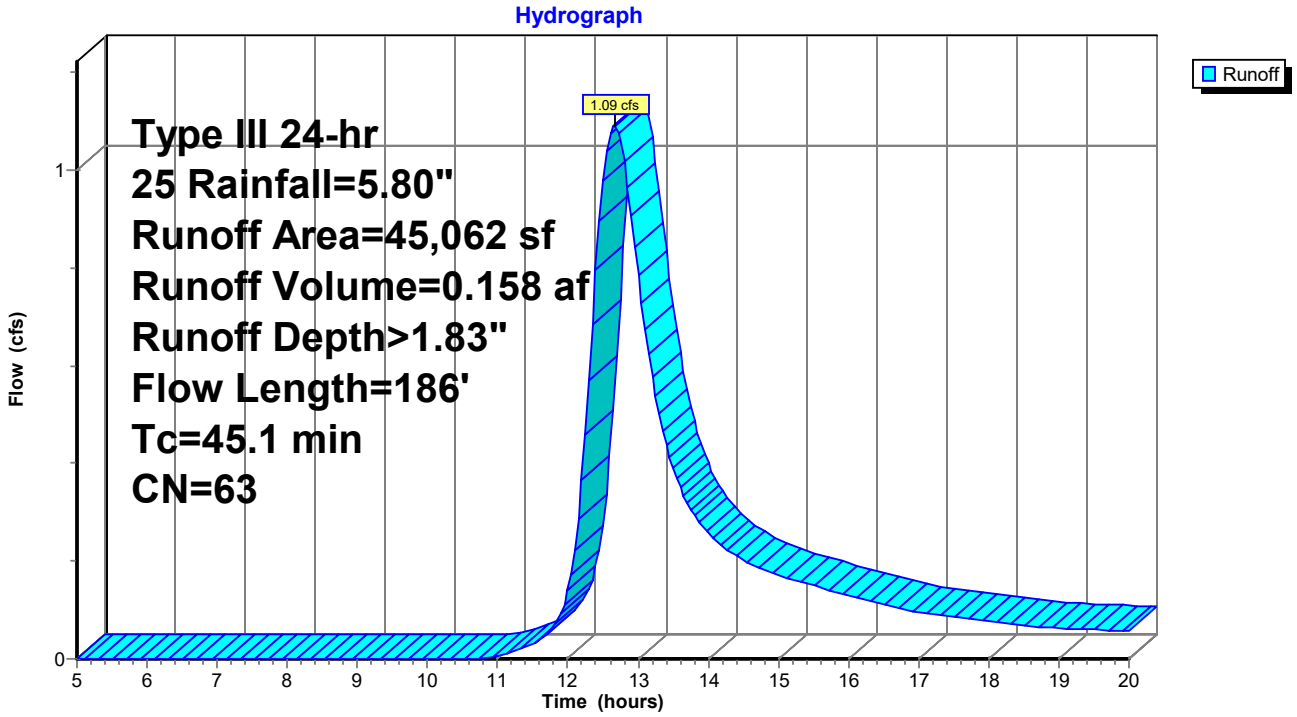
Runoff = 1.09 cfs @ 12.66 hrs, Volume= 0.158 af, Depth> 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Rainfall=5.80"

Area (sf)	CN	Description
42,530	61	>75% Grass cover, Good, HSG B
2,532	98	Water Surface, HSG A
45,062	63	Weighted Average
42,530		94.38% Pervious Area
2,532		5.62% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
44.8	29	0.0001	0.01		**Sheet Flow, Sheet** Grass: Dense n= 0.240 P2= 3.10"
0.3	157	0.2564	7.60		**Shallow Concentrated Flow, Shallow Concentrated** Grassed Waterway Kv= 15.0 fps
45.1	186	Total			

Subcatchment 10S: Subcatchment to Culvert STA 1+80



Summary for Subcatchment 13S: Culvert STA 1+00

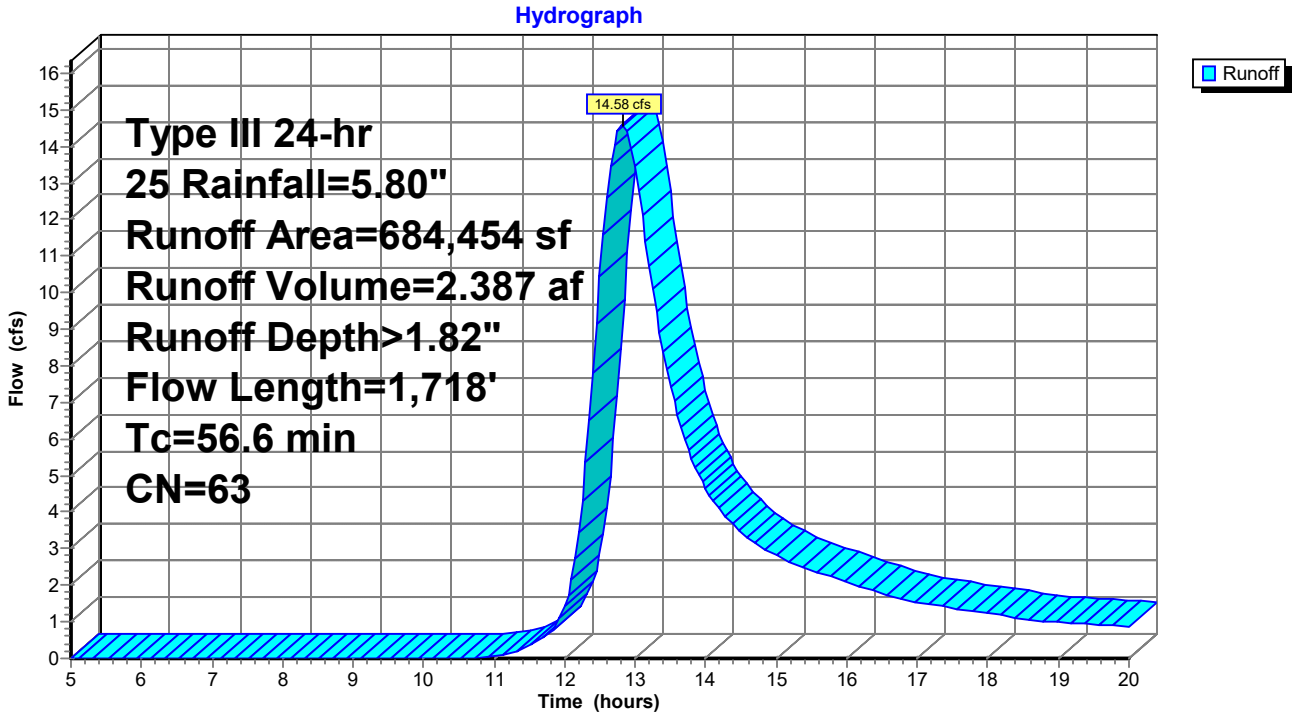
Runoff = 14.58 cfs @ 12.81 hrs, Volume= 2.387 af, Depth> 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Rainfall=5.80"

Area (sf)	CN	Description
442,102	60	Woods, Fair, HSG B
221,531	69	50-75% Grass cover, Fair, HSG B
20,199	60	Woods, Fair, HSG B
622	98	Paved parking, HSG A
684,454	63	Weighted Average
683,832		99.91% Pervious Area
622		0.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
38.0	100	0.0050	0.04		**Sheet Flow, top of hill off site** Woods: Light underbrush n= 0.400 P2= 3.10"
11.0	390	0.0140	0.59		**Shallow Concentrated Flow, Concentrated** Woodland Kv= 5.0 fps
3.5	131	0.0153	0.62		**Shallow Concentrated Flow, Shallow Conc** Woodland Kv= 5.0 fps
0.6	258	0.0850	7.54	918.95	**Channel Flow, Woods Channelized** Area= 121.8 sf Perim= 53.0' r= 2.30' n= 0.100 Heavy timber, flow below branches
1.6	557	0.1580	5.96		**Shallow Concentrated Flow, Solar field** Grassed Waterway Kv= 15.0 fps
1.8	214	0.1590	1.99		**Shallow Concentrated Flow, wooded south** Woodland Kv= 5.0 fps
0.1	32	0.3333	8.66		**Shallow Concentrated Flow, Ditch slope** Grassed Waterway Kv= 15.0 fps
0.0	36	0.1530	18.77	1,050.99	**Channel Flow, Ditch** Area= 56.0 sf Perim= 27.3' r= 2.05' n= 0.050 Scattered brush, heavy weeds
56.6	1,718	Total			

Subcatchment 13S: Culvert STA 1+00



Summary for Reach 3R: Ditch 6+50 to 9+30

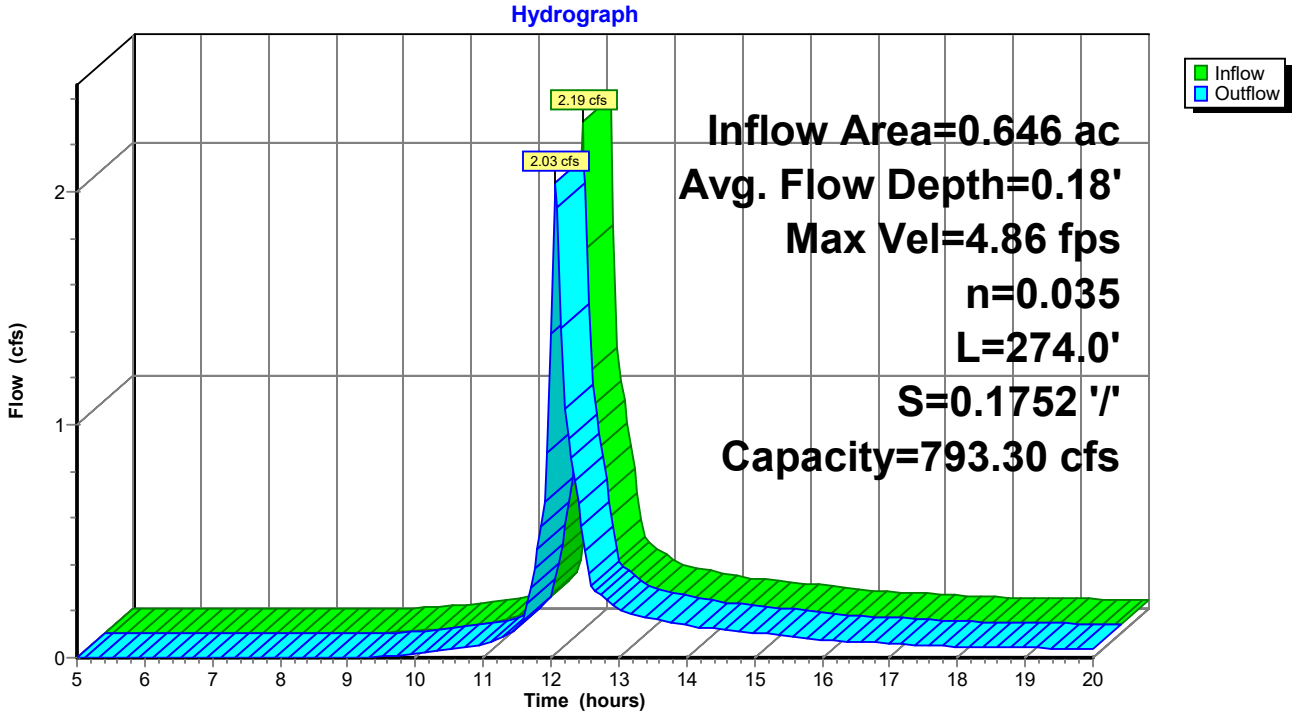
Inflow Area = 0.646 ac, 23.29% Impervious, Inflow Depth > 2.45" for 25 event
Inflow = 2.19 cfs @ 12.05 hrs, Volume= 0.132 af
Outflow = 2.03 cfs @ 12.07 hrs, Volume= 0.132 af, Atten= 7%, Lag= 1.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.86 fps, Min. Travel Time= 0.9 min
Avg. Velocity = 1.90 fps, Avg. Travel Time= 2.4 min

Peak Storage= 122 cf @ 12.06 hrs
Average Depth at Peak Storage= 0.18'
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 793.30 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 274.0' Slope= 0.1752 '/'
Inlet Invert= 452.00', Outlet Invert= 404.00'

Reach 3R: Ditch 6+50 to 9+30



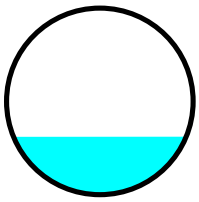
Summary for Reach 4R: Cross Culvert @ 6+50

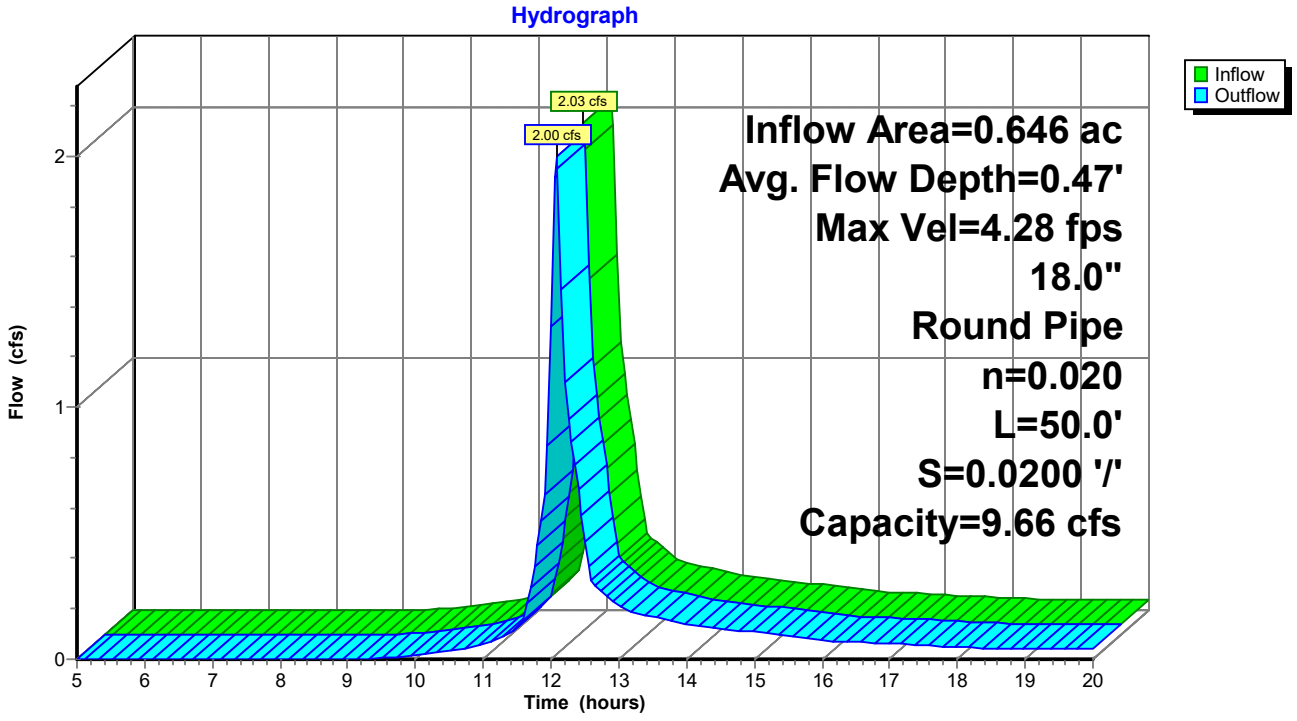
Inflow Area = 0.646 ac, 23.29% Impervious, Inflow Depth > 2.45" for 25 event
Inflow = 2.03 cfs @ 12.07 hrs, Volume= 0.132 af
Outflow = 2.00 cfs @ 12.08 hrs, Volume= 0.132 af, Atten= 2%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.28 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.71 fps, Avg. Travel Time= 0.5 min

Peak Storage= 23 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.47'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.66 cfs

18.0" Round Pipe
n= 0.020 Corrugated PE, corrugated interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 404.00', Outlet Invert= 403.00'





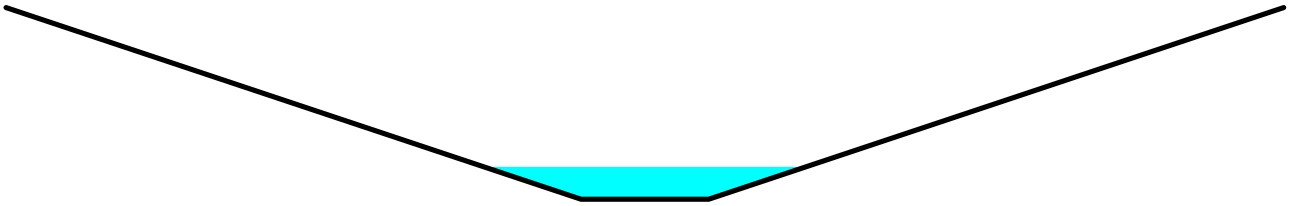
Summary for Reach 5R: Ditch 1+75 to 1+00

Inflow Area = 15.713 ac, 0.09% Impervious, Inflow Depth > 1.82" for 25 event
Inflow = 14.58 cfs @ 12.81 hrs, Volume= 2.387 af
Outflow = 14.58 cfs @ 12.81 hrs, Volume= 2.387 af, Atten= 0%, Lag= 0.1 min

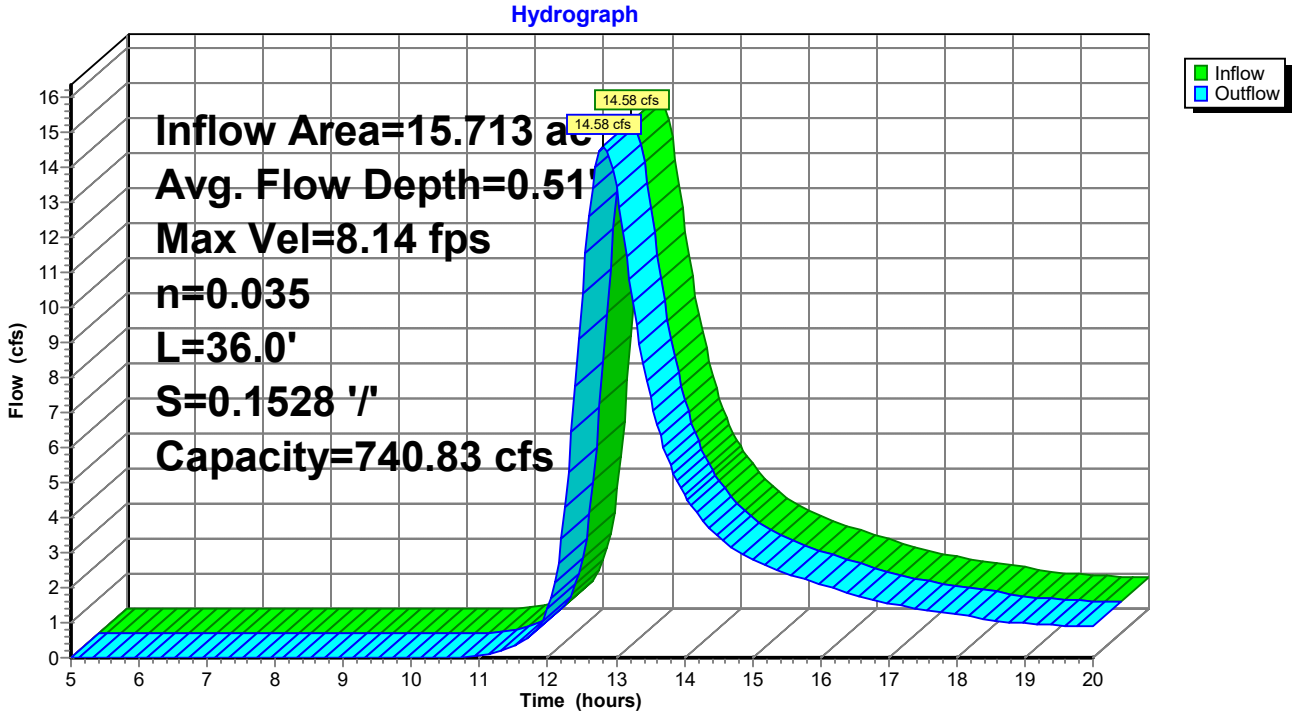
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.14 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.48 fps, Avg. Travel Time= 0.1 min

Peak Storage= 64 cf @ 12.81 hrs
Average Depth at Peak Storage= 0.51'
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 740.83 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 36.0' Slope= 0.1528 '/'
Inlet Invert= 313.50', Outlet Invert= 308.00'



Reach 5R: Ditch 1+75 to 1+00



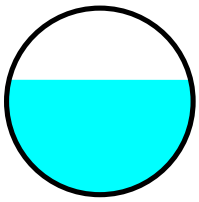
Summary for Reach 6R: Culvert @ 1+00

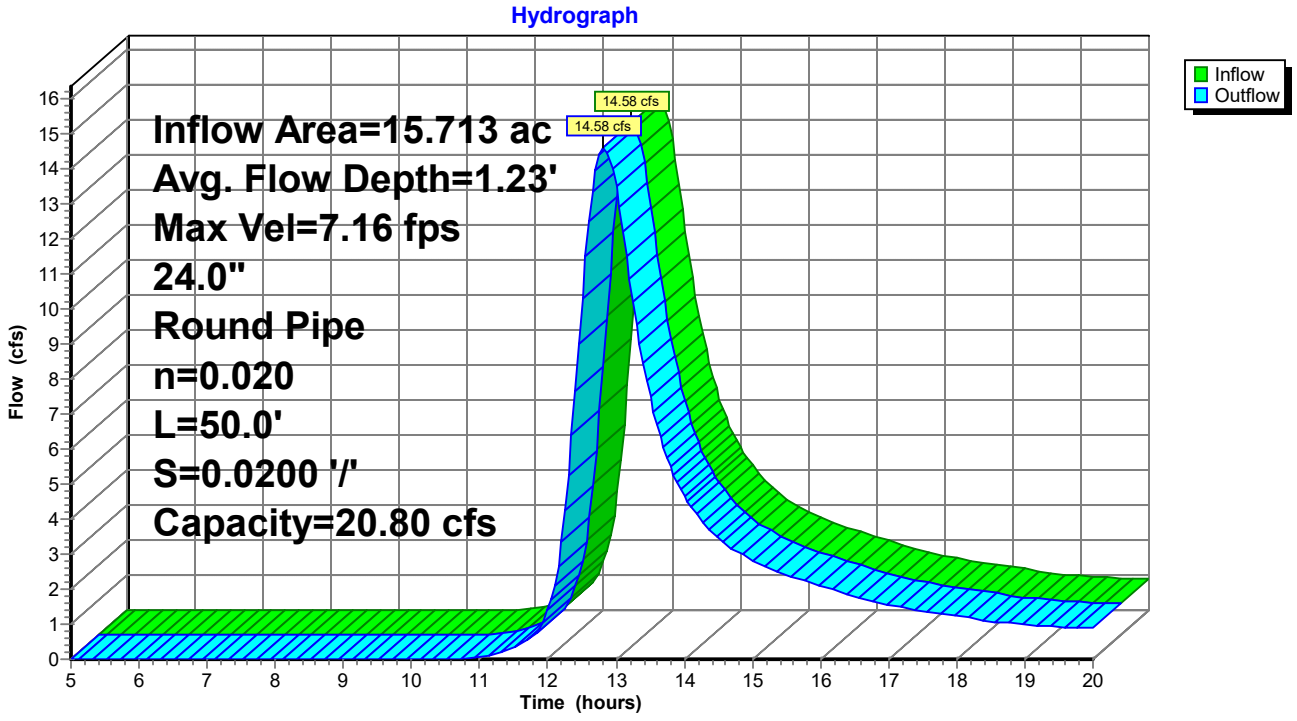
Inflow Area = 15.713 ac, 0.09% Impervious, Inflow Depth > 1.82" for 25 event
Inflow = 14.58 cfs @ 12.81 hrs, Volume= 2.387 af
Outflow = 14.58 cfs @ 12.82 hrs, Volume= 2.386 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.16 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.09 fps, Avg. Travel Time= 0.2 min

Peak Storage= 102 cf @ 12.82 hrs
Average Depth at Peak Storage= 1.23'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 20.80 cfs

24.0" Round Pipe
n= 0.020 Corrugated PE, corrugated interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 308.00', Outlet Invert= 307.00'





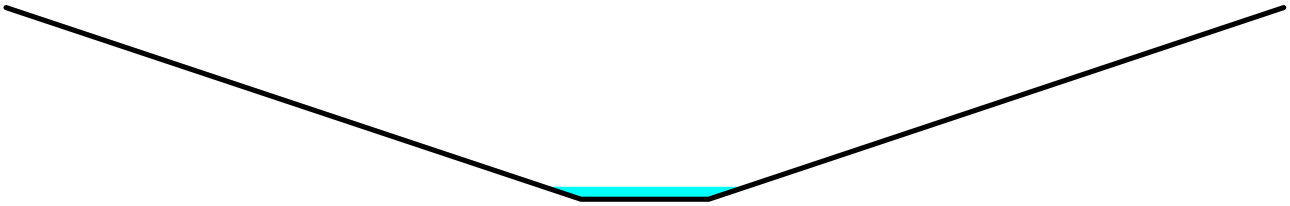
Summary for Reach 8R: Ditch 5+70 to 5+00

Inflow Area = 1.168 ac, 2.38% Impervious, Inflow Depth > 1.79" for 25 event
Inflow = 2.68 cfs @ 12.07 hrs, Volume= 0.174 af
Outflow = 2.60 cfs @ 12.08 hrs, Volume= 0.174 af, Atten= 3%, Lag= 0.6 min

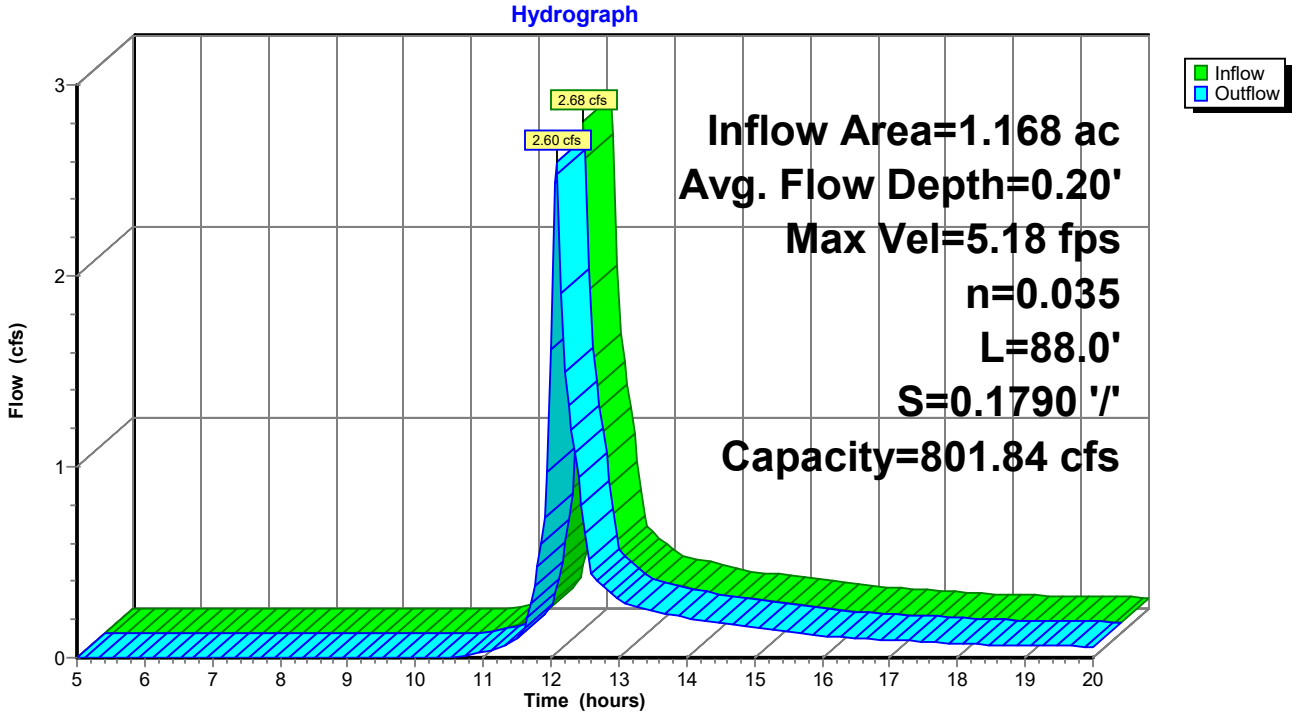
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.18 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.07 fps, Avg. Travel Time= 0.7 min

Peak Storage= 45 cf @ 12.07 hrs
Average Depth at Peak Storage= 0.20'
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 801.84 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 88.0' Slope= 0.1790 '/'
Inlet Invert= 391.75', Outlet Invert= 376.00'



Reach 8R: Ditch 5+70 to 5+00



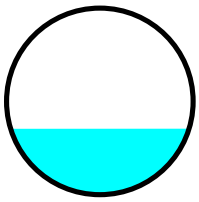
Summary for Reach 9R: Cross Culvert @ 5+00

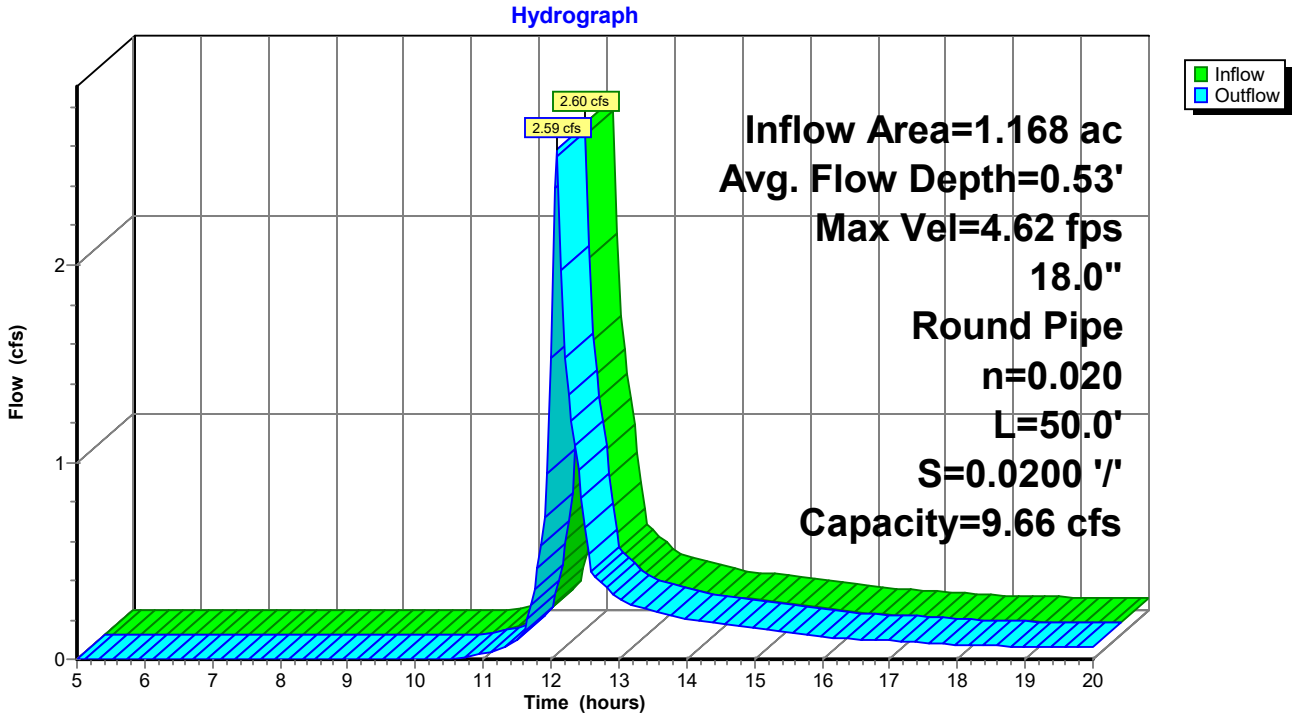
Inflow Area = 1.168 ac, 2.38% Impervious, Inflow Depth > 1.79" for 25 event
Inflow = 2.60 cfs @ 12.08 hrs, Volume= 0.174 af
Outflow = 2.59 cfs @ 12.09 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.62 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.98 fps, Avg. Travel Time= 0.4 min

Peak Storage= 28 cf @ 12.08 hrs
Average Depth at Peak Storage= 0.53'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.66 cfs

18.0" Round Pipe
n= 0.020 Corrugated PE, corrugated interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 376.00', Outlet Invert= 375.00'





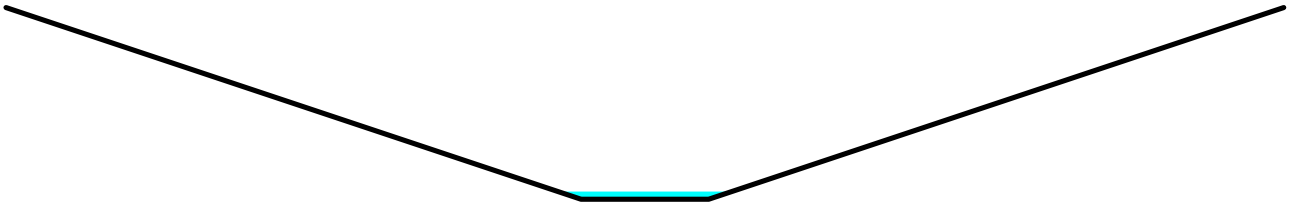
Summary for Reach 11R: Ditch 4+90 to 1+80

Inflow Area = 1.034 ac, 5.62% Impervious, Inflow Depth > 1.83" for 25 event
Inflow = 1.09 cfs @ 12.66 hrs, Volume= 0.158 af
Outflow = 1.09 cfs @ 12.70 hrs, Volume= 0.158 af, Atten= 0%, Lag= 2.3 min

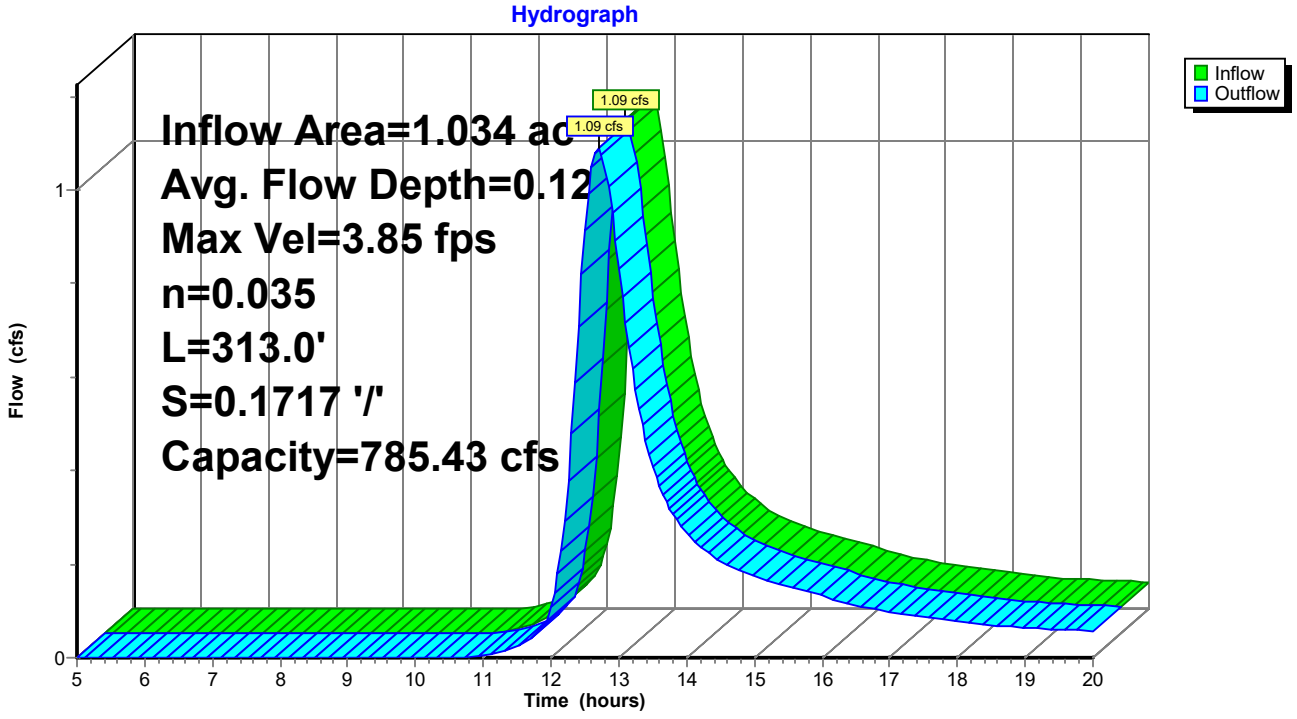
Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.85 fps, Min. Travel Time= 1.4 min
Avg. Velocity = 2.04 fps, Avg. Travel Time= 2.6 min

Peak Storage= 89 cf @ 12.68 hrs
Average Depth at Peak Storage= 0.12'
Bank-Full Depth= 3.00' Flow Area= 33.0 sf, Capacity= 785.43 cfs

2.00' x 3.00' deep channel, n= 0.035 Earth, dense weeds
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 313.0' Slope= 0.1717 '/'
Inlet Invert= 373.75', Outlet Invert= 320.00'



Reach 11R: Ditch 4+90 to 1+80



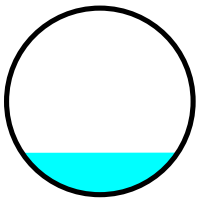
Summary for Reach 12R: Culvert @ STA 1+80

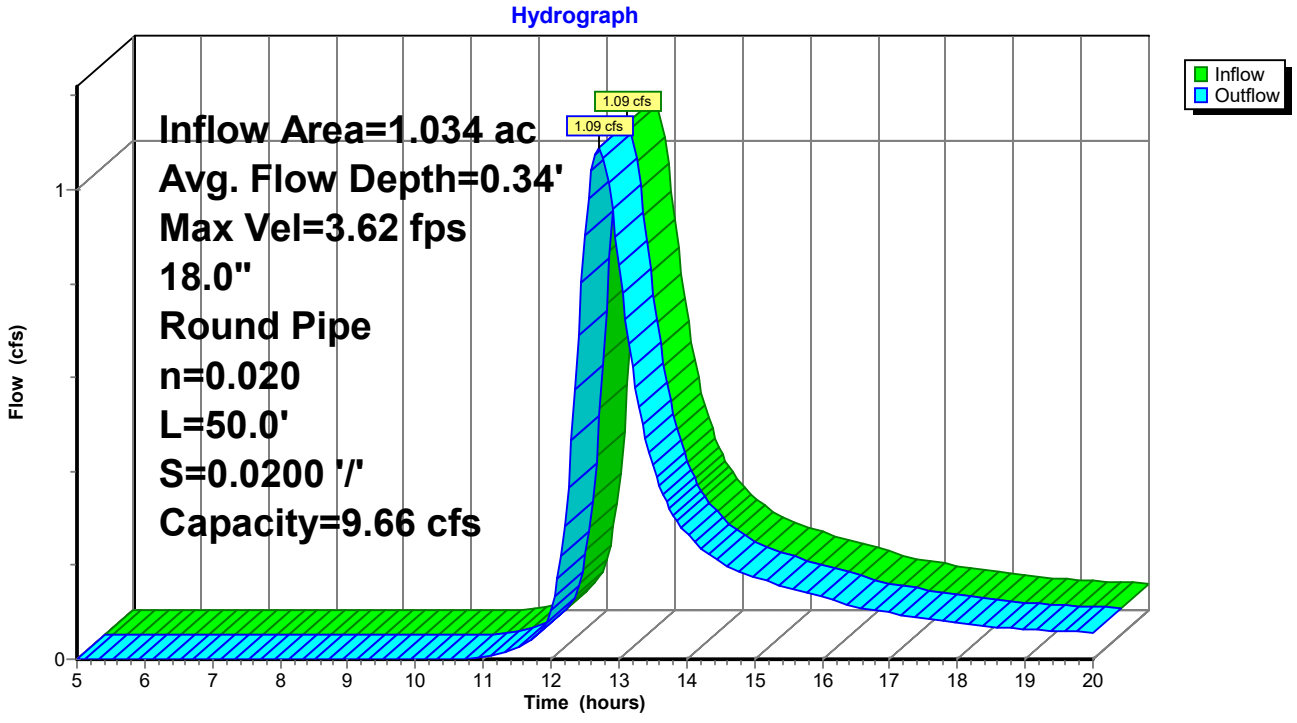
Inflow Area = 1.034 ac, 5.62% Impervious, Inflow Depth > 1.83" for 25 event
Inflow = 1.09 cfs @ 12.70 hrs, Volume= 0.158 af
Outflow = 1.09 cfs @ 12.71 hrs, Volume= 0.158 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.62 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 1.93 fps, Avg. Travel Time= 0.4 min

Peak Storage= 15 cf @ 12.70 hrs
Average Depth at Peak Storage= 0.34'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.66 cfs

18.0" Round Pipe
n= 0.020 Corrugated PE, corrugated interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 320.00', Outlet Invert= 319.00'

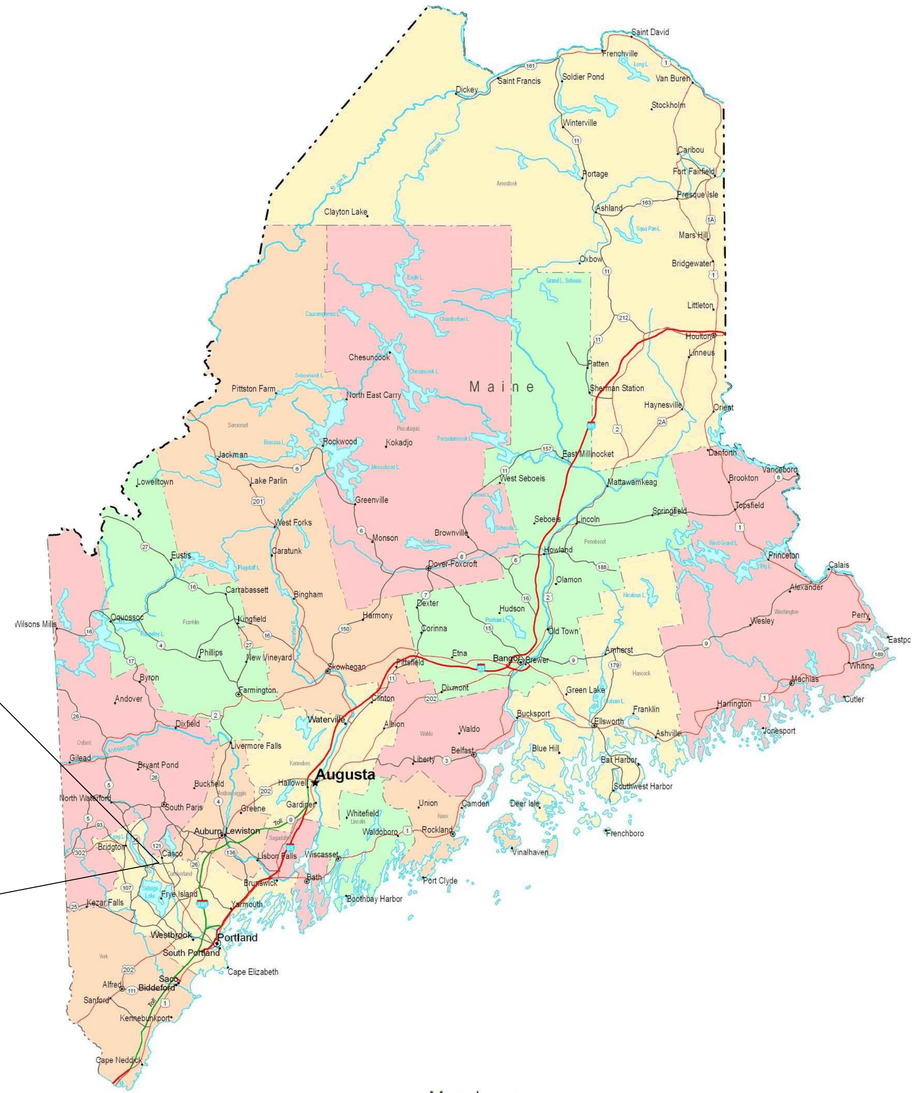




Appendix J
Design Plans

Spring Mountain Solar, LLC.
Roosevelt Trail
Casco, Maine

SITE LOCATION MAP



Maine

ACHERON ENGINEERING, LLC
Engineering &Environmental Consultants

www.AcheronEngineering.com

153 Main St.
Newport, ME. 04953
(207)-368-5700

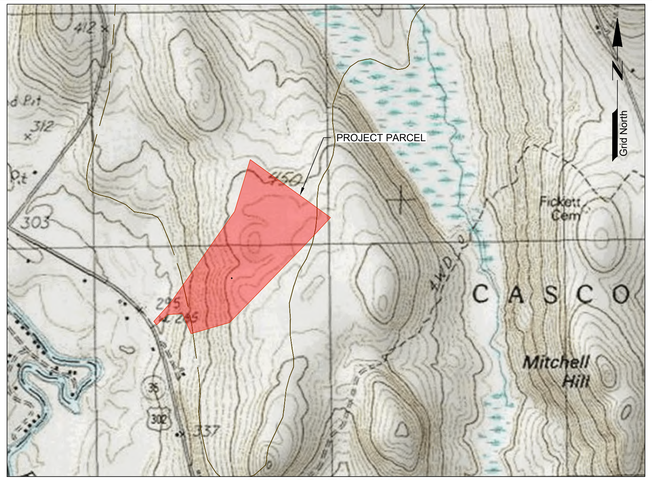
113 Winter East
Williamsburg, VA 23188
(207)341-2590

NOTES:

1. Project is referenced horizontally to the Maine State Coordinate System, West Zone NAD83(2011).
2. Documents referenced on this plan are recorded in the Cumberland County Registry of Deeds unless otherwise noted.
3. Project boundary survey and abutters completed by Plisga & Day Land Surveyors on November 17, 2022.
4. Contours for the project area were obtained from the State of Maine Office of GIS.
5. The Protected Natural Resources field delineation services were conducted were conducted by Watershed Resource Consultants, LLC. on April 13 & May 3, 2022, and April 4, 5, 13 & May 3, 2023.
6. Soils boundary lines and labels were downloaded from the USDA Natural Resource Conservation Service (NRCS) using the Web Soil Survey (WSS).

SOILS LEGEND

DeA - Deerfield Loamy Fine Sand, 0-3 percent slopes, HSG A
DeB - Deerfield Loamy Fine Sand, 1-8 percent slopes, HSG A
HhB - Hermon Sandy Loam, 0-8 percent slopes, HSG A
HhC - Hermon Sandy Loam, 8-15 percent slopes, HSG A
HhD - Hermon Sandy Loam, 15-35 percent slopes, HSG A
HgB - Hermon Sandy Loam, 3-8 percent slopes, HSG A
HgC - Hermon Sandy Loam, 8-15 percent slopes, HSG A
HgD - Hermon Sandy Loam, 15-25 percent slopes, HSG A



SITE LOCATION MAP
SCALE: 1" = 1000'

LEGEND

EXISTING
- PROPERTY LINE
- #5 REBAR FOUND
- SETBACK LINE
- ZONE DISTRICT LINE
- NRCS SOILS BOUNDARY LINE
- MDEP CLASSIFIED WETLANDS
- STREAMS
- 75FT STREAM BUFFER
- FLOW ARROWS
- INDEX CONTOURS
- CONTOURS
- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- UTILITY POLES
- STRUCTURES
- DEER WINTERING AREA
- SIGNIFICANT VERNAL POOL

PROPOSED
- 2FT CONTOURS
- GRAVEL ACCESS ROAD
- AREAS OF RIP-RAP
- UTILITY POLE
- SILT FENCE
- DOUBLE ROW SILT FENCE
- FLOW ARROWS
- TEMPORARY LAY DOWN AND STAGING AREA
- UNDERGROUND UTILITY

Grid North

ROOSEVELT TRAIL
AQUIFER PROTECTION OVERLAY DISTRICT
RESIDENTIAL DISTRICT
COMMERCIAL DISTRICT
SPRING MTN. DRIVE
UP #339
UP #171
Carolyn Drew
Tax Map 3 - Lot 40
Carolyn & Gary Drew
Volume 39816, Page 193
Lands n/f of
Jacob Webb
Tax Map 3 - Lot 41
Lands n/f of
Hunter Ridge, LLC
Tax Map 3 - Lot 38
Lands n/f of
Henry P. Watkins, Jr.
Tax Map 5 - Lot 1-1
N 34°55'39" E 1312'±
N 15°30'32" E 696.04'
50' SETBACK
EXISTING TREELINE
N 24°37'17" W 183.1'
Lands n/f of
Elaine J. Heuiser
Tax Map 3 - Lot 14-3
S 73°39'28" W 855.33'
Lands n/f of
Russell G. Morton
Tax Map 3 - Lot 14-2
Carolyn Drew
Tax Map 3 - Lot 40
S 54°05'55" E 1387.12'
Lands n/f of
Casco Timber
Company, Inc.
Tax Map 3 - Lot 15-1
S 43°56'22" W 2036.22'
Lands n/f of
Waldamar Waugh
Tax Map 3 - Lot 14
DeA
DeB
HhB
HhC
HhD
HgB
HgC
HgD

KIRK J. BALL
STATE OF MAINE
No. 11681
LICENSED PROFESSIONAL ENGINEER

Do Not Use for Construction
For Regulatory Review Only

0 100 200 300
SCALE: 1" = 100'

No.	Revision Description	Drwn	Chk'd	Date
X	XXXXXX	X	X	X

Drwn By: BPG
Desg By: KJB & BPG
Chkd By: KJB
Aprvd By: KJB
Date: 04/10/24

ACHERON ENGINEERING, LLC
Engineering & Environmental Consultants
www.AcheronEngineering.com
320 Gogan Rd.
Benton, ME 04901
(207)341-2590
153 Main St.
Newport, ME 04953
(207)-341-2590

Spring Mtn. Solar
Existing Conditions Site Plan

Mainley Solar
Spring Mt
Casco, Maine

Job Number:
MSM003

Drawing No:
C-1

Sheet 2 of 6

NOTES:

1. Project is referenced horizontally to the Maine State Coordinate System, West Zone NAD83(2011).
2. Documents referenced on this plan are recorded in the Cumberland County Registry of Deeds unless otherwise noted.
3. Project boundary survey and abutters completed by Plisga & Day Land Surveyors on November 17, 2022.
4. Contours for the project area were obtained from the State of Maine Office of GIS.
5. The Protected Natural Resources field delineation services were conducted were conducted by Watershed Resource Consultants, LLC. on April 13 & May 3, 2022, and April 4, 5, 13 & May 3, 2023.
6. Soils boundary lines and labels were downloaded from the USDA Natural Resource Conservation Service (NRCS) using the Web Soil Survey (WSS).
7. Zoning district: Residential (R)
8. All solar-relayed equipment shall be set back at least 50 feet from all lot lines.
9. The maximum height of the solar energy system, as measured from existing, predevelopment grade shall be 15 feet.
10. A sign per § 215-5.28 of the Casco land use ordinance shall be install at every point of ingress and egress from the project and at least 100 feet around the project perimeter.
11. Utility Connections. All connections between the solar energy system and the electrical grid shall be undr ground, to the greatest extent practical.
12. All Transformers and Inverters shall maintain a minimum separation of 50 feet from the property line.
13. Forested wetland clearing: 1,010 sf
14. All disturbed areas to be seeded with native pollinator friendly seed mix.
15. Project Area Information:
    Project Area: 9.9 Acres
    Impervious Area: 17,925.0 Sf
16. All Utilities shall be installed below grade from New Pole #22-200 to transformer.
17. Submit an operations and maintenance plan, including site control and projected operating life of the solar energy system at the time of applying for a building permit.
18. When applying for a building permit submit an emergency management plan for anticipated hazards for review by the Casco Fire Chief.

Planning Board Approval

This is to certify that after reviewing the Solar Field shown by this plan and considering each of the criteria set forth in Town of Casc Ordinances, as amended, the undersigned having made findings of fact establishing that the proposed Solar Field meets all of the criteria set forth therin, and therefore the Solar Field is approved.

Dated: _____

The Town of Casco Planning Board

LEGEND

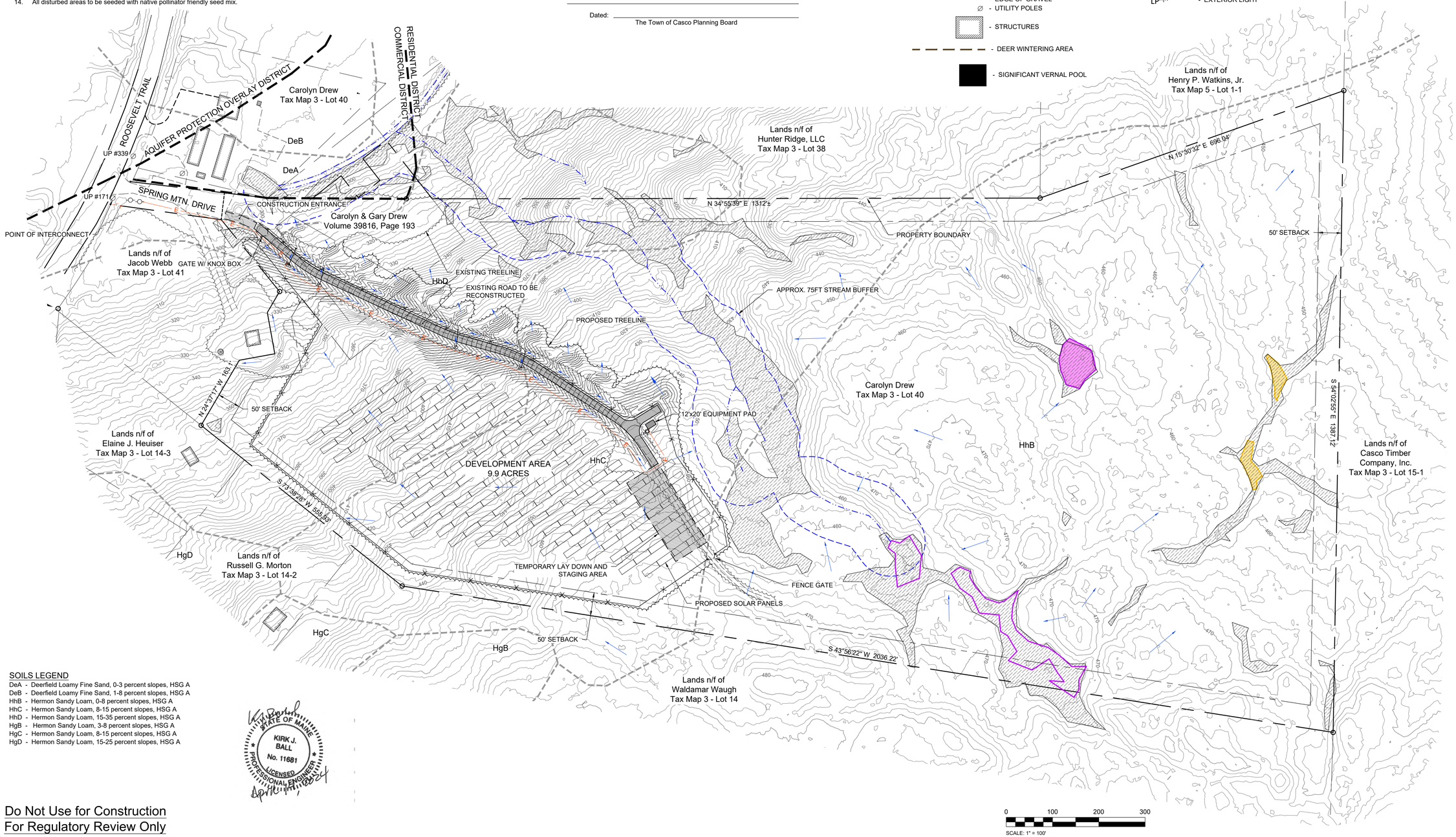
EXISTING

- PROPERTY LINE
- #5 REBAR FOUND
- SETBACK LINE
- ZONE DISTRICT LINE
- NRCS SOILS BOUNDARY LINE
- NRCS SOILS BOUNDARY LINE
- MDEP CLASSIFIED WETLANDS
- STREAMS
- 75FT STREAM BUFFER
- FLOW ARROWS
- INDEX CONTOURS
- CONTOURS
- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- UTILITY POLES
- STRUCTURES
- DEER WINTERING AREA
- SIGNIFICANT VERNAL POOL

PROPOSED

- 2FT CONTOURS
- GRAVEL ACCESS ROAD
- AREAS OF RIP-RAP
- UTILITY POLE
- SILT FENCE
- DOUBLE ROW SILT FENCE
- FLOW ARROWS
- TEMPORARY LAY DOWN AND STAGING AREA
- UNDERGROUND UTILITY
- EXTERIOR LIGHT

Grid North



SOILS LEGEND

DeA - Deerfield Loamy Fine Sand, 0-3 percent slopes, HSG A
DeB - Deerfield Loamy Fine Sand, 1-8 percent slopes, HSG A
HhB - Hermon Sandy Loam, 0-8 percent slopes, HSG A
HhC - Hermon Sandy Loam, 8-15 percent slopes, HSG A
HhD - Hermon Sandy Loam, 15-35 percent slopes, HSG A
HgB - Hermon Sandy Loam, 3-8 percent slopes, HSG A
HgC - Hermon Sandy Loam, 8-15 percent slopes, HSG A
HgD - Hermon Sandy Loam, 15-25 percent slopes, HSG A

Do Not Use for Construction
For Regulatory Review Only

0 100 200 300
SCALE: 1" = 100'

No.	Revision Description	Drwn	Chk'd	Date
X	XXXXXX	X	X	X

Drwn By: BPG
Desg By: KJB & BPG
Chkd By: KJB
Aprvd By: KJB
Date: 04/10/24

ACHERON ENGINEERING, LLC
Engineering &Environmental Consultants
www.AcheronEngineering.com
320 Gogan Rd.
Benton, Maine 04901
(207)341-2590
153 Main St.
Newport, ME. 04953
(207)-368-5700

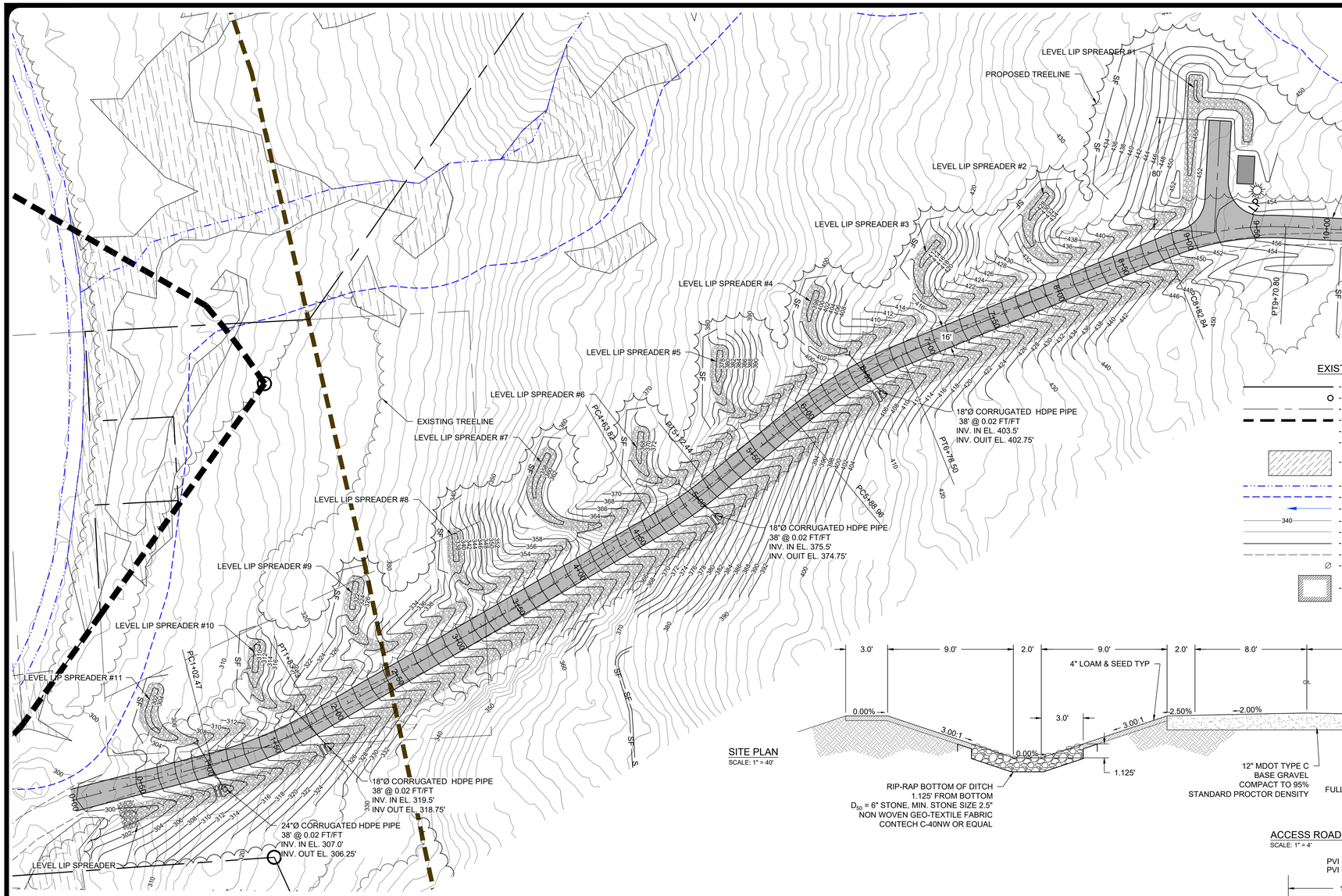
Spring Mtn. Solar
Proposed Conditions Site Plan

Mainley Solar
Spring Mt
Casco, Maine

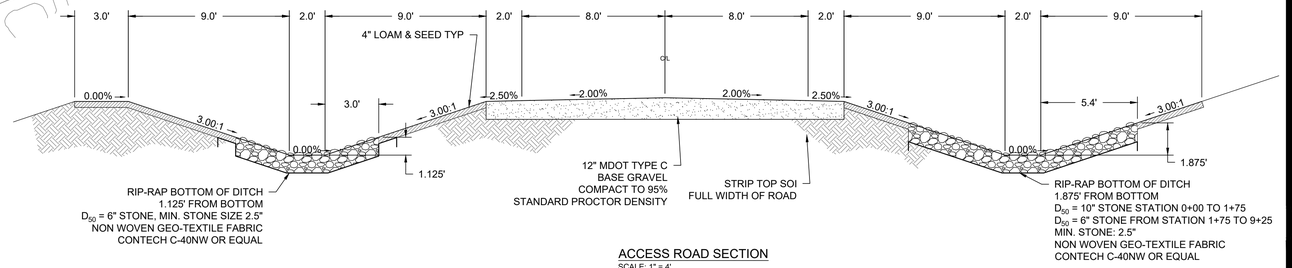
Job Number:
MSM003

Drawing No:
C-2

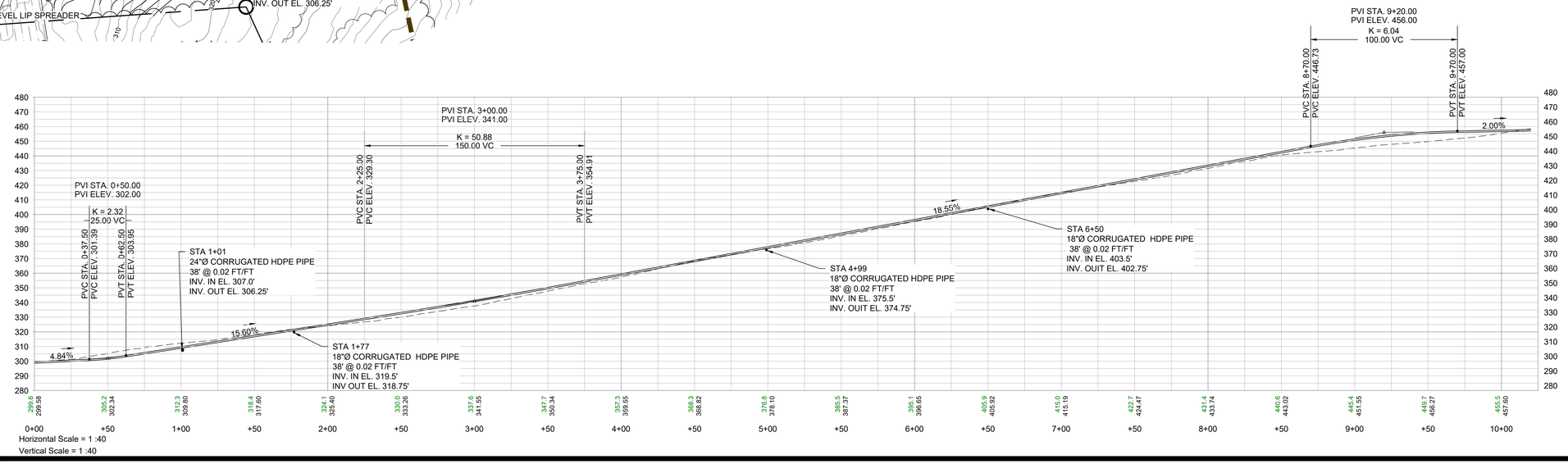
Sheet 3 of 6



SITE PLAN
SCALE: 1" = 40'



ACCESS ROAD SECTION
SCALE: 1" = 4'



LEGEND

EXISTING

- PROPERTY LINE
- #5 REBAR FOUND
- SETBACK LINE
- ZONE DISTRICT LINE
- NRCS SOILS BOUNDARY LINE
- NRCS SOILS BOUNDARY LINE
- MDEP CLASSIFIED WETLANDS
- STREAMS
- 75FT STREAM BUFFER
- FLOW ARROWS
- 340 - INDEX CONTOURS
- CONTOURS
- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- UTILITY POLES
- STRUCTURES

PROPOSED

- 342 - 2FT CONTOURS
- GRAVEL ACCESS ROAD
- AREAS OF RIP-RAP
- UTILITY POLE
- SF SF - SILT FENCE
- SF SF - DOUBLE ROW SILT FENCE
- FLOW ARROWS
- TEMPORARY LAY DOWN AND STAGING AREA
- E - UNDERGROUND UTILITY

Grid North

No.	Revision Description	Date
X	XXXXXX	XX/XX/XX
X		
X		
X		

Drwn By: BPG
Desg By: KJB & BPG
Chkd By: KJB
Aprvd By: KJB
Date: 04/10/24

ACHERON ENGINEERING, LLC
Engineering &Environmental Consultants
www.AcheronEngineering.com
320 gogan Rd.
Benton, ME 04901
(207)341-2590
153 Main St. 04953
Newport, ME. 04953
(207)-341-2590

Spring Mtn. Solar
Proposed Roadway Plan & Profile

Mainley Solar
Spring Mt
Casco, Maine

STATE OF MAINE
KIRK J. BALL
No. 11681
LICENSED PROFESSIONAL ENGINEER
04/10/24

0 40 80 120
SCALE: 1" = 40'

Job Number:
MSM003

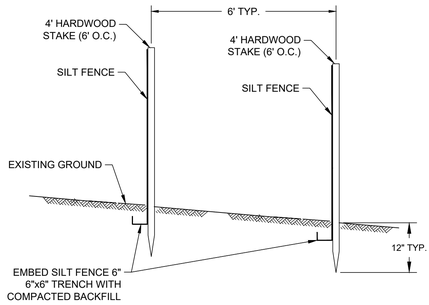
Drawing No:
C-3

Sheet 4 of 6

Do Not Use for Construction
For Regulatory Review Only

SPECIFICATIONS

SILT FENCE: SILT STOP BY AMOCO OR APPROVED EQUAL

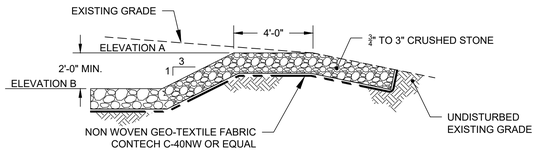


DOUBLE SILT FENCE DETAIL

NOT TO SCALE

LEVEL LIP SPREADER ELEVATION TABLE

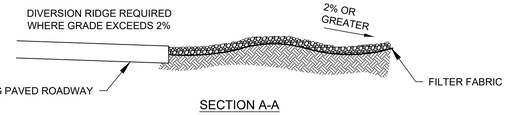
LEVEL LIP SPREADER	ELEVATION A	ELEVATION B
#1	448.0'	450.0'
#2	428.0'	430.0'
#3	412.0'	414.0'
#4	398.0'	400.0'
#5	378.0'	380.0'
#6	368.0'	370.0'
#7	358.0'	360.0'
#8	338.0'	340.0'
#9	322.0'	324.0'
#10	310.0'	312.0'
#11	302.0'	304.0'



LEVEL LIP SPREADER DETAIL

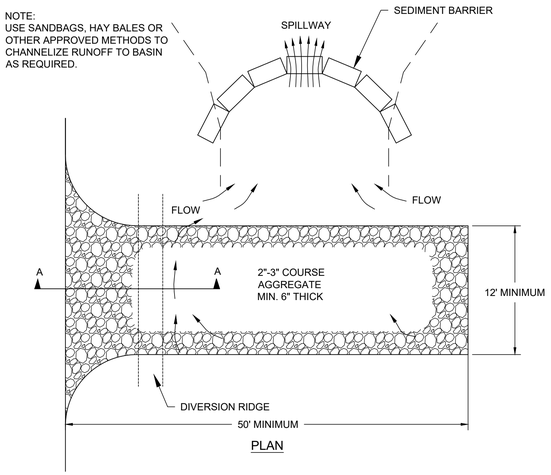
NOT TO SCALE

NOTE:
INSPECTIONS BY A PROFESSIONAL ENGINEER SHALL CONSIST OF WEEKLY VISITS TO THE SITE TO INSPECT EACH LEVEL SPREADERS CONSTRUCTION, STONE BERM MATERIAL AND PLACEMENT, SETTLING BASIN FROM INITIAL GROUND DISTURBANCE TO FINAL STABILIZATION OF THE LEVEL SPREADER.



SECTION A-A

NOTE:
USE SANDBAGS, HAY BALES OR OTHER APPROVED METHODS TO CHANNELIZE RUNOFF TO BASIN AS REQUIRED.

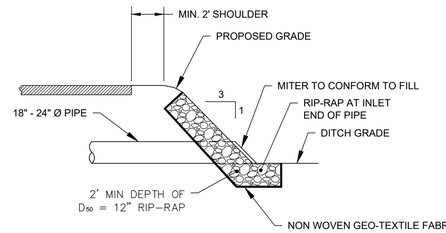


PLAN

TEMPORARY GRAVEL CONSTRUCTION ENTRANCE

NOT TO SCALE

NOTE:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABLIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

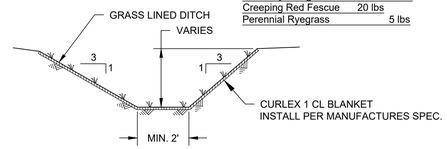


CULVERT INLET DETAIL

NOT TO SCALE

NOTE:
THE SEED MIXTURE SHALL CONSIST OF SEEDS PROPORTIONED BY WEIGHT AS FOLLOWS:

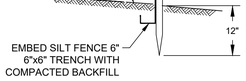
	Pounds / Acre
Kentucky Bluegrass	20 lbs
Creeping Red Fescue	20 lbs
Perennial Ryegrass	5 lbs



GRASS LINED COLLECTION DITCH DETAIL

SPECIFICATIONS

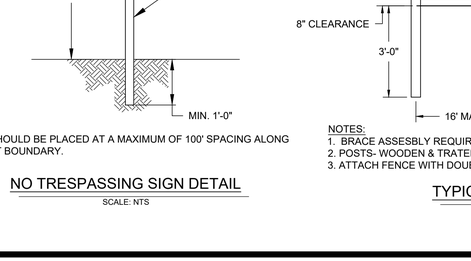
SILT FENCE: SILT STOP BY AMOCO OR APPROVED EQUAL



SILT FENCE DETAIL

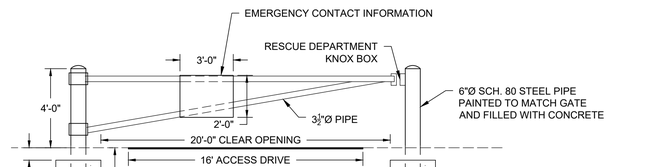
NOT TO SCALE

NOTES:
1. STORMWATER PIPE TRENCH WITH MULTIPLE PIPES MUST HAVE A MIN OF 18" SAND BEDDING BETWEEN THEM.
2. TRENCH BOTTOMS CONTAINING BEDROCK, SOFT MUCK OR REFUSE, OR OTHER MATERIAL UNABLE TO PROVIDE LONG-TERM UNIFORM PIPE SUPPORT ARE UNACCEPTABLE.
3. WHERE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE A MIN OF 1'-0" AND REPLACE WITH SAND BEDDING.
4. IF NATIVE SOIL CAN MIGRATE INTO BACKFILL, USE NON WOVEN GEO-TEXTILE FABRIC CONTECH C-40NW OR EQUAL TO SEPARATE NATIVE SOIL FROM SAND BEDDING.



TYPICAL TRENCH DETAIL

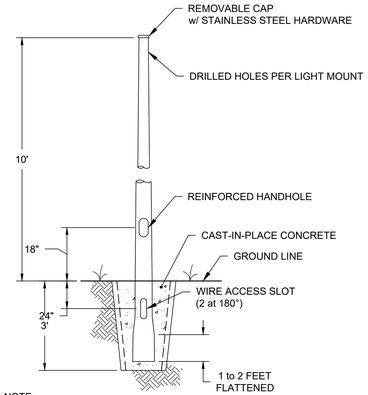
NOT TO SCALE



NOTE:
ALL ENTRANCE & EXIT GATES SHALL HAVE A MINIMUM OPEN CLEARANCE OF 20 FEET. ALL GATES SHALL HAVE A CASCO FIRE AND RESCUE DEPARTMENT KNOX BOX THAT INCLUDE ALL KEYS OR KEY CARDS, AND CURRENT SITE EMERGENCY CONTACT INFORMATION.

ENTRANCE GATE DETAIL

SCALE: NTS

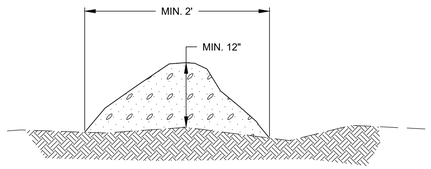


NOTE:
ROUND TAPERED DIRECT BURIAL 6063 ALUMINUM LIGHT POLE, 10 FEET ABOVE GRADE, 5 INCH DIAMETER, 0.125 INCH WALL THICKNESS OR APPROVED EQUAL.
HUBBELL OUTDOOR LIGHTING GEOPACK SERIES SIZE 1 LED LIGHT TRP1, TYPE III, ZERO UPLIGHT (UO) DARK SKY, NEIGHBOR FRIENDLY OR APPROVED EQUAL.

OUTDOOR LIGHT POLE DETAIL

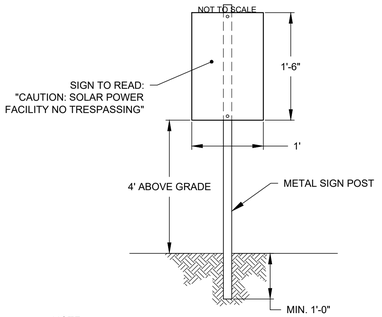
SCALE: NTS

NOTE:
IN LIEU OF SILT FENCE EROSION CONTROL MIX CAN BE USED IF CONDITIONS BELOW ARE MET: FOLLOW MAINE EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES 2016.
EROSION CONTROL MIX BERM:
THE ECM BERM SHOULD BE A MINIMUM OF 12" HIGH AND A MINIMUM OF TWO FEET WIDE. ON LONGER OR STEEPER SLOPES, THE BERM WILL NEED TO BE WIDER AND HIGHER. BERMS COMPOSED OF ECM CAN BE RESHAPED WHEN NECESSARY.
EROSION CONTROL MIX:
THE MIX MUST BE WELL-GRADED WITH AN ORGANIC COMPONENT THAT IS BETWEEN 50 AND 100% OF DRY WEIGHT, AND THAT IS COMPOSED OF FIBROUS AND ELONGATED FRAGMENTS. THE MINERAL PORTION OF THE MIX SHOULD BE NATURALLY INCLUDED IN THE PRODUCT WITH NO LARGER ROCKS (>4") OR LARGE AMOUNTS OF FINES (SILTS AND CLAYS). IN STUMP GRINDING, THE MINERAL SOIL ORIGINATES FROM THE ROOT BALL AND SHOULD NOT BE REMOVED BEFORE GRINDING. THE MIX SHOULD BE FREE OF REFUSE, MATERIAL TOXIC TO PLANT GROWTH OR UNSUITABLE MATERIAL (BARK CHIPS, GROUND CONSTRUCTION DEBRIS OR REPROCESSED WOOD PRODUCTS).



EROSION CONTROL MIX BERM DETAIL

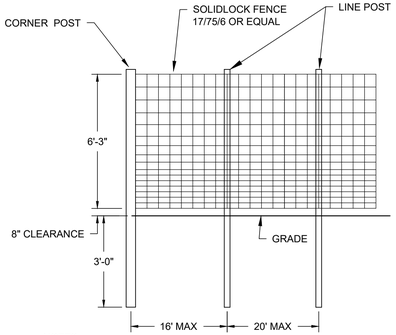
SCALE: NTS



NOTE:
SIGNS SHOULD BE PLACED AT A MAXIMUM OF 100' SPACING ALONG PROJECT BOUNDARY.

NO TRESPASSING SIGN DETAIL

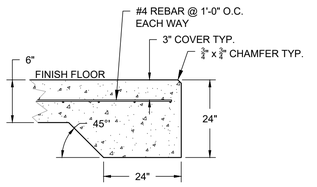
SCALE: NTS



NOTES:
1. BRACE ASSESBLY REQUIRED AT ALL CORNERS AND ANY CHANGE IN DIRECTION.
2. POSTS- WOODEN & TRATED.
3. ATTACH FENCE WITH DOUBLE BARBED GALVANIZED STAPLES.

TYPICAL FENCE DETAIL

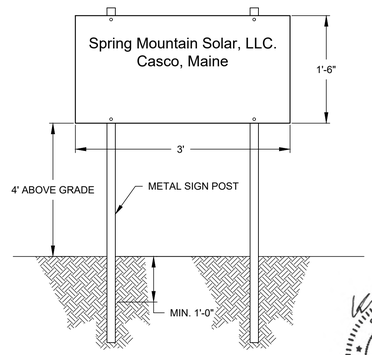
SCALE: NTS



NOTES:
EQUIPMENT PAD SUB-BASE SHALL BE 6" OF ¾" CRUSHED STONE ON 1'-0" OF MDOT TYPE A GRAVEL THAT IS COMPACTED 95% STANDARD PROCTOR DENSITY.
EQUIPMENT PAD 1 FINISH FLOOR ELEVATION: 298.5'
EQUIPMENT PAD 2 FINISH FLOOR ELEVATION: 313.5'

EQUIPMENT PAD DETAIL

SCALE: NTS



PROJECT SIGN DETAIL

SCALE: NTS

Do Not Use for Construction
For Regulatory Review Only

No.	Revision Description	Date
X	XXXXXX	XX/XX/XX

Drwn By: BPG
Desg By: KJB & BPG
Chkd By: KJB
Aprvd By: KJB
Date: 04/10/24

ACHERON ENGINEERING, LLC
Engineering & Environmental Consultants
www.AcheronEngineering.com
320 Gogan Rd.
Benton, ME 04901
(207)341-2590
153 Main St.
Newport, ME. 04953
(207)-341-2590

Spring Mtn. Solar
Details
Mainley Solar
Spring Mt
Casco, Maine

Job Number:
MSM003

Drawing No:
D-1
Sheet 5 of 6

N
Grid North

75' STREAM BUFFER

REACH 1R
274 FT @ 0.175 FT/FT
INV IN EL. 452'
INV OUT EL. 403.5'

12'x20' CONCRETE PAD

CHANNELIZED FLOW
69 FT @ 0.057 FT/FT

SCF - 50 FT @ 0.123 FT/FT
SHEET FLOW
20FT @ 0.10 FT/FT

18"Ø CULVERT
38 FT @ 0.02 FT/FT
INV IN EL. 403.5'
INV OUT EL. 402.75'

TEMPORARY LAY DOWN AND
STAGING AREA 16,000SF (80'x200')

2S

18"Ø CULVERT
38 FT @ 0.02 FT/FT
INV IN EL. 375.5'
INV OUT EL. 374.75'

SILT FENCE

EXISTING TREELINE

SHEET FLOW
30FT @ 0.083 FT/FT

SCF - 289 FT @ 0.173 FT/FT

SCF - 32 FT @ 0.375 FT/FT

7S

REACH 2R
138 FT @ 0.191 FT/FT
INV IN EL. 402'
INV OUT EL. 375.5'

SCF - 390 FT @ 0.014 FT/FT

Shallow conc. Flow 260 ft @ 0.030 Ft/Ft

18"Ø CULVERT
38 FT @ 0.02 FT/FT
INV IN 319.5'
INV OUT 318.75'

PROPOSED TREELINE

REACH 4R
73.7 FT @ 0.1493 FT/FT
INV IN 318'
INV OUT 307'
DENSE WEEDS

SCF 157 FT @ 0.256 FT/FT

SHEET FLOW 29 FT @ 0.001 FT/FT

10S

REACH 3R
313 FT @ 0.172 FT/FT
INV IN EL. 373.75'
INV OUT EL. 319.5'

SCF - 131 FT @ 0.015 FT/FT

PEAK RUN OFF= 10.40 CFS
VELOCITY 7.33 FPS

SHALLOW CONCENTRATED FLOW (SCF)
32 FT @ 0.333 FT/FT

24"Ø CULVERT
38 FT @ 0.02 FT/FT
INV IN EL. 307'
INV OUT EL. 306.25'

13S

CHANNELIZED FLOW
258 FT @ 0.085 FT/FT

SCF - 214 FT @ 0.159 FT/FT

SCF - 557 FT @ 0.158 FT/FT

PROPOSED SOLAR PANELS

DOUBLE SILT FENCE (SEE DETAIL)

LEGEND

EXISTING

- PROPERTY LINE
- #5 REBAR FOUND
- SETBACK LINE
- ZONE DISTRICT LINE
- NRCS SOILS BOUNDARY LINE
- NRCS SOILS BOUNDARY LINE
- MDEP CLASSIFIED WETLANDS
- STREAMS
- 75FT STREAM BUFFER
- FLOW ARROWS
- INDEX CONTOURS
- CONTOURS
- EDGE OF PAVEMENT
- EDGE OF GRAVEL
- UTILITY POLES
- STRUCTURES

PROPOSED

- 342 - 2FT CONTOURS
- GRAVEL ACCESS ROAD
- AREAS OF RIP-RAP
- UTILITY POLE
- SF SF - SILT FENCE
- SF SF - DOUBLE ROW SILT FENCE
- STORMWATER FLOW PATH
- TEMPORARY LAY DOWN AND STAGING AREA
- E - UNDERGROUND UTILITY
- 13S - STORMWATER SUBCATCHMENT
- SUBCATCHMENT BOUNDARY

0 50 100 150
SCALE: 1" = 50'

Do Not Use for Construction
For Regulatory Review Only

No.	Revision Description	Drwn	Chk'd	Date
X	XXXXXX	X	X	X

Drwn By: BPG
Desg By: KJB & BPG
Chkd By: KJB
Aprvd By: KJB
Date: 04/10/24

ACHERON ENGINEERING, LLC
Engineering &Environmental Consultants
www.AcheronEngineering.com
153 Main St. 113 Winter East
Newport, ME. 04953 Williamsburg, VA 23188
(207)-368-5700 (207)341-2590

Spring Mtn. Solar
Site Plan Stormwater Management

Mainley Solar
Spring Mt
Casco, Maine

KIRK J. BALL
No. 11681
LICENSED PROFESSIONAL ENGINEER
STATE OF MAINE
4/10/24

Job Number:
MSM003

Drawing No:
SW-1

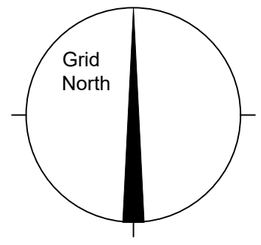
Sheet 6 of 6

Notes:

(1) Documents referenced on this plan are recorded in the Cumberland County Registry of Deeds unless otherwise noted.

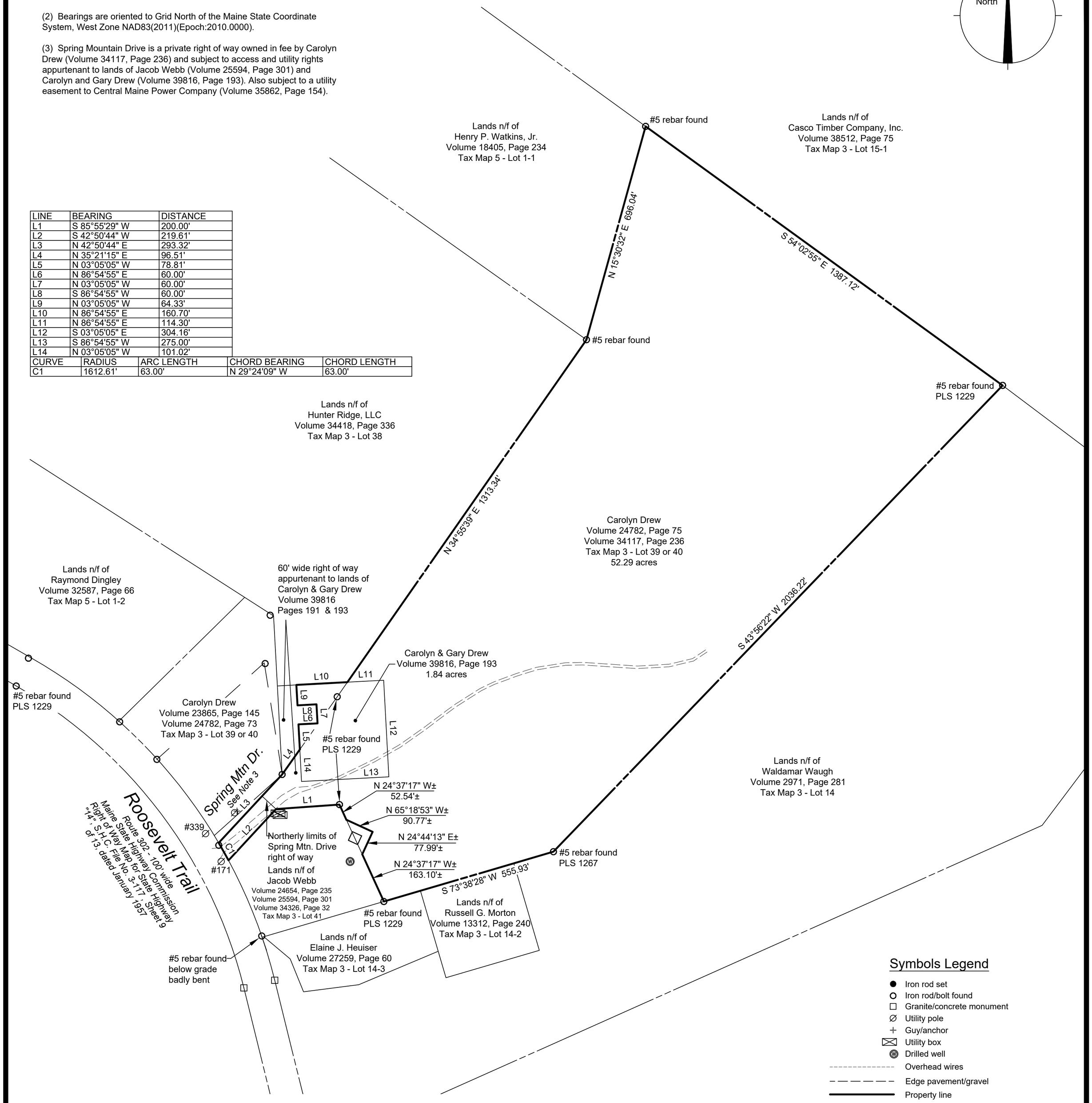
(2) Bearings are oriented to Grid North of the Maine State Coordinate System, West Zone NAD83(2011)(Epoch:2010.0000).

(3) Spring Mountain Drive is a private right of way owned in fee by Carolyn Drew (Volume 34117, Page 236) and subject to access and utility rights appurtenant to lands of Jacob Webb (Volume 25594, Page 301) and Carolyn and Gary Drew (Volume 39816, Page 193). Also subject to a utility easement to Central Maine Power Company (Volume 35862, Page 154).



LINE	BEARING	DISTANCE
L1	S 85°55'29" W	200.00'
L2	S 42°50'44" W	219.61'
L3	N 42°50'44" E	293.32'
L4	N 35°21'15" E	96.51'
L5	N 03°05'05" W	78.81'
L6	N 86°54'55" E	60.00'
L7	N 03°05'05" W	60.00'
L8	S 86°54'55" W	60.00'
L9	N 03°05'05" W	64.33'
L10	N 86°54'55" E	160.70'
L11	N 86°54'55" E	114.30'
L12	S 03°05'05" E	304.16'
L13	S 86°54'55" W	275.00'
L14	N 03°05'05" W	101.02'

CURVE	RADIUS	ARC LENGTH	CHORD BEARING	CHORD LENGTH
C1	1612.61'	63.00'	N 29°24'09" W	63.00'



Symbols Legend

- Iron rod set
- Iron rod/bolt found
- Granite/concrete monument
- Utility pole
- Guy/anchor
- Utility box
- Drilled well
- Overhead wires
- Edge pavement/gravel
- Property line

SCALE: 1"= 200'

200' 0 200' 400' 600' 800'

PLISGA & DAY
LAND SURVEYORS
72 MAIN STREET
BANGOR, MAINE
DATE: March 12, 2024
PROJ. NO. 21237
Email: info@WeMapIt.com
Phone: (207) 947-0019
Toll-Free: 1-800-734-0019
DRAWING FILE: 21237.dwg
www.WeMapIt.com

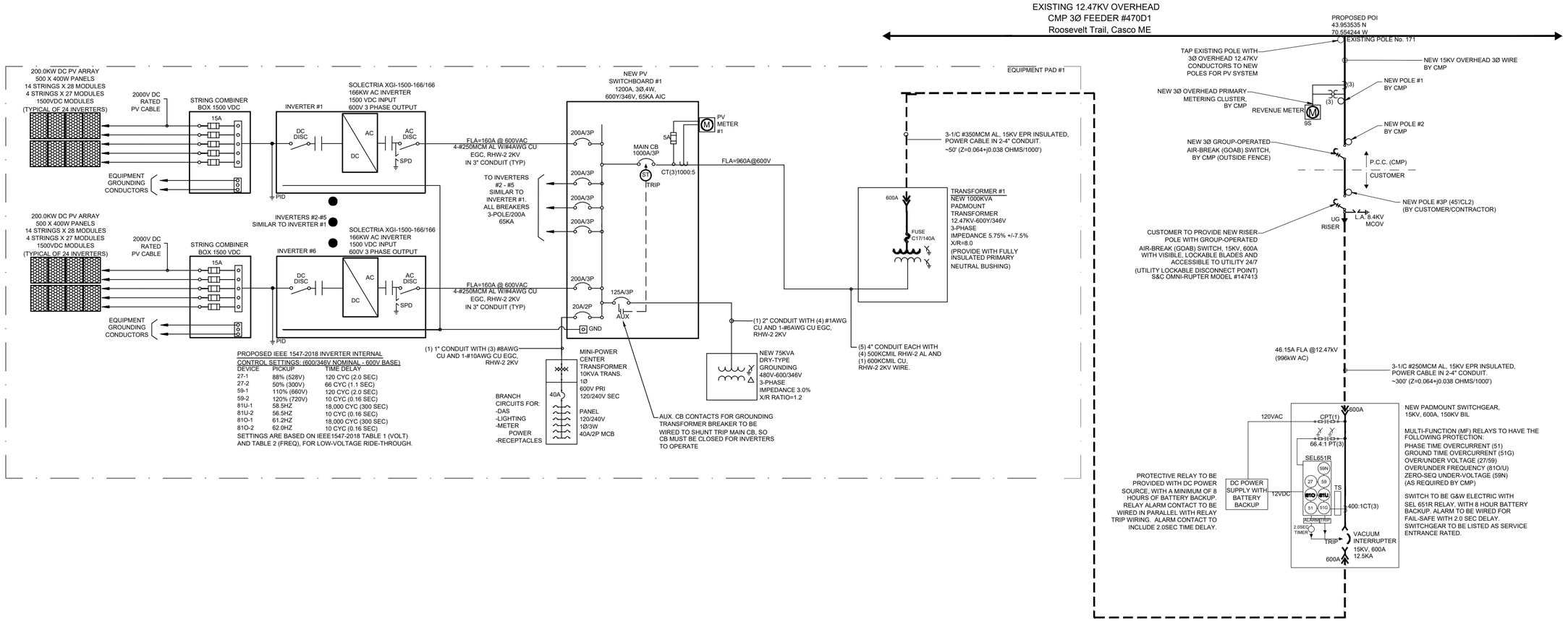
Survey Standard:

This plan was prepared from information obtained by a survey conforming substantially to the requirements of Technical Standards contained in Chapter 90, Part 2, of the Rules of the Board of Licensure for Professional Land Surveyors, effective April 1, 2001. Monuments not set.

Adam N. Robinson, Maine Licensed
Professional Land Surveyor No. 2361

STATE OF MAINE
ADAM N. ROBINSON
NO. 2361
PROFESSIONAL LAND SURVEYOR

Survey Plan
property of
Carolyn Drew
Cumberland County Registry of Deeds
Volume 24782, Page 75
Volume 34117, Page 236
Volume 39816, Page 193
Roosevelt Trail - Casco, Maine
for
Spring Mt. Solar, LLC



PROPOSED IEEE 1547-2018 INVERTER INTERNAL
CONTROL SETTINGS: (600/346V NOMINAL - 600V BASE)

DEVICE	PICKUP	TIME DELAY
27-1	88% (528V)	120 CYC (2.0 SEC)
27-2	50% (300V)	66 CYC (1.1 SEC)
59-1	110% (660V)	120 CYC (2.0 SEC)
59-2	120% (720V)	10 CYC (0.16 SEC)
81U-1	58.5HZ	18,000 CYC (300 SEC)
81U-2	58.5HZ	10 CYC (0.16 SEC)
81O-1	61.2HZ	18,000 CYC (300 SEC)
81O-2	62.0HZ	10 CYC (0.16 SEC)

SETTINGS ARE BASED ON IEEE1547-2018 TABLE 1 (VOLT) AND TABLE 2 (FREQ), FOR LOW-VOLTAGE RIDE-THROUGH.

ONE LINE POWER DIAGRAM

LOAD-BREAK SWITCH
FUSE, SIZE AS INDICATED
TRANSFORMER, SIZE AS INDICATED (DELTA GND TYPICAL)
CIRCUIT BREAKER
DRAWN-OUT CIRCUIT BREAKER
K1 KIRK-KEY INTERLOCK
CURRENT TRANSFORMER
POTENTIAL TRANSFORMER
SOLID STATE TRIP UNIT
GROUND
A AMMETER
AS AMMETER SWITCH
V VOLTMETER
VS VOLTMETER SWITCH
T2 REFER TO DRY TYPE TRANSFORMER SCHEDULE
L.A. LIGHTNING ARRESTED
CABLE TERMINATION / LOAD ELBOW
FUSED CUTOUT
GROUP AIR (GOAB) SWITCH
M REVENUE METER (BY UTILITY)
200A 200A LOAD BREAK ELBOWS

LEGEND:
OVERHEAD
UNDERGROUND
PRIMARY
SECONDARY

UTILITY INTERCONNECTION NOTES:

1. TRANSFORMER TO BE WYE GROUND PRIMARY AND SECONDARY FOR PV.
2. PROTECTIVE RELAYS TO HAVE DC BATTERY BACKUP WITH AC POWERED BATTERY CHARGER FOR BACKUP.
4. PROTECTIVE RELAY ALARM CIRCUIT TO BE WIRED OR PROGRAMMED TO TRIP SWITCH FOR REDUNDANCY PER CMP REQUIREMENTS. FOR SEL RECLOSER THE HALARM WORD BIT IS USED TO TRIP (AND BLOCK CLOSE) ON LOSS OF DC POWER. BTFAIL IS USED FOR BATTERY FAILURE. LOSS OF 120VAC POWER TO THE RELAY WILL TRIP AND BLOCK/CLOSE. TRIP WILL BE IN LESS THAN 2.0 SECONDS.
5. TRANSFORMER FUSES TO BE COOPER BAY - O - NET STYLE, CAT#4000353C17 FOR 140A.
6. TRANSFORMER PRIMARY NEUTRAL BUSHING TO BE FULLY INSULATED
7. PV SYSTEM WILL HAVE A 5-MINUTE HEALTHY GRID RECONNECT FEATURE PROGRAMMED INTO THE RECLOSER. THIS WILL BE PROGRAMMED INTO THE RECLOSER TO DEFEAT THE CLOSE BUTTON AND BLOCK CLOSE UNTIL THE 5 MINUTE TIMER HAS COMPLETED. SETTINGS WILL BE PER IEEE 1547 SECTION 4.2.6 FOR 5 MINUTES. VOLTAGES WILL BE WITHIN ANSI C84.1 TABLE 1, RANGE B, 95-105% (6.84-7.56KV ON 7.2KV BASE) AND FREQUENCY WILL BE WITHIN 59.5-60.5HZ. THE 5 MINUTE TIME INTERVAL WILL RESTART IF VOLTAGE OR FREQUENCY FALLS OUT OF THIS WINDOW.
8. CUSTOMER ELECTRICAL EQUIPMENT WILL BE SERVICE-ENTRANCE RATED AS IS REQUIRED BY THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE (NEC).

PV TOTAL SYSTEM SUMMARY
3,000 PV MODULES TOTAL
400W PV MODULES
1,200.0 KW DC TOTAL
996.0 KW PV AC TOTAL
27-28 MODULES PER STRING (TYP).
111 STRINGS TOTAL
18 STRINGS PER INVERTER
27-28 MODULES PER STRING
6 X 166KW INVERTERS
1 X 1000KVA TRANSFORMER

DEVICE NO.	DESCRIPTION
51	PHASE TIME OVERCURRENT RELAY
51G	GROUND TIME OVERCURRENT RELAY
51C	VOLTAGE-CONTROLLED PHASE O.C. RELAY
51GC	VOLTAGE-CONTROLLED GROUND O.C. RELAY
51N	NEUTRAL OVERCURRENT RELAY
27	UNDER-VOLTAGE RELAY
59	OVER-VOLTAGE RELAY
81U	UNDER-FREQUENCY RELAY
81O	OVER-FREQUENCY RELAY
59N	ZERO-SEQUENCE OVER-VOLTAGE RELAY
59Q	NEGATIVE SEQUENCE OVER-VOLTAGE RELAY
32R	REVERSE POWER RELAY
25	SYNC-CHECK RELAY

PROPOSED 651R RELAY SETTINGS:

DEVICE	PICKUP	DELAY SETTING	TOTAL CLEAR
27-2	50% (60.0V)	63 CYC	66 CYC (1.1 SEC)
27-1	88% (105.6V)	117 CYC	120 CYC (2.0 SEC)
59-1	110 / (132.0V)	117 CYC	120 CYC (2.0 SEC)
59-2	120 / (144.0V)	6.5 CYC	9.5 CYC (0.16 SEC)
81U-2	56.5HZ	6.5 CYC	9.5 CYC (0.16 SEC)
81U-1	58.5HZ	17997 CYC	18000 CYC (300 SEC)
81O-1	61.2HZ	17997 CYC	18000 CYC (300 SEC)
81O-2	62.0HZ	6.5 CYC	9.5 CYC (0.16 SEC)
59N	100V	80.0 CYC	83 CYC
51	350A	2.0TD U5	
51G	120A	3.0TD U4	

- SETTINGS INCLUDED 3 CYCLE ESTIMATE CONTACTOR OPENING TIME VOLTAGE SETTINGS ARE BASED ON A 120V SECONDARY PT BASE. RELAY LOGIC TO PROVIDE FOR "FAIL-SAFE" OPERATION TO TRIP ON LOSS OF DC OR RELAY HARDWARE ALARM. ACCURACY CLASSES AS NOTED. NO CORRECTION FACTORS ARE PROPOSED.

GENERAL NOTES

STATE OF MAINE
SACHIN PATEL
No. 16471
LICENSED PROFESSIONAL ENGINEER

PROJECT ADDRESS

996 kW$_{ac}$ SOLAR PROJECT
791 Roosevelt Trail
Casco, ME 04015

PROJECT OWNER

SPRING MOUNTAIN SOLAR, LLC.
143 HIGHLAND SHORES Rd.
CASCO, ME 04015

DRAWING : 001	SHEET
DATE : 8/2/2022	
SCALE : NTS	