SECTION 9 UNUSUAL NATURAL AREAS

The Project Area was evaluated for the presence of unusual natural areas. According to the Preservation of Unusual Natural Areas standard of the No Adverse Environmental Effect Standard of the Site Law (06-096 CMR 375.12), an unusual natural area is defined as "any land or water area, usually only a few acres in size, which is undeveloped and which contains natural features of unusual geologic, botanical, zoological, ecological, hydrological, other scientific, educational, scenic, or recreational significance."

A. Agency Consultation

Tetra Tech contacted MNAP to request information regarding RTE plants or rare natural communities; MDACF to request information on Prime Farmland and Farmland of Statewide Significance; MDIFW for information about habitats for state-listed RTE wildlife species; and USFWS for information for federally listed RTE species or designated Critical Habitat documented on or in the vicinity of the Project.

MNAP consultation letters received on March 4, 2020, and March 8, 2021 (Exhibit 7-1) indicated that there are no rare botanical features or rare natural communities documented specifically within the Project Area. Red-stemmed Gentian (*Gentiana rubricaulis)* occurs on the powerline abutting the project site and may be included within the project boundary at this location. MNAP recommended that the Project Area be surveyed by a qualified field biologist for the presence of rare species.

An MDACF consultation letter received on February 24, 2021 (Exhibit 7-1) indicated that according to the information currently in the Farmland Soils Data layer, the project site includes areas with mapped farmland soils. Both Prime Farmland Soils and Soils of Statewide Importance are mapped within the project Area. MDACF recommends that the areas be evaluated in accordance with the MDACF guidance document entitled "Determining Prime Farmland Soils and Soils of Statewide Importance for Siting Solar Projects", dated May 2020 (Exhibit 9-1).

B. Field Surveys

Field surveys for potential RTE plants, natural communities, and invasive plants was completed in August 2021. No rare plant populations or rare natural communities were identified in or within 250 feet of the Project Area. Reed canary grass (*Phalaris arundinacea*) and coltsfoot (*Tussilago farfara*) were determined to be widespread throughout roadsides, log landings, and other disturbed areas and were not individually mapped. Management recommendations for these species will be to follow construction BMPs for working near invasive plants (e.g., avoidance where possible and cleaning equipment before moving between sites). The invasive plants that were mapped were those that were not widespread and have the potential to be successfully controlled. These species were Asiatic bittersweet (*Celastrus orbiculatis*), Canada thistle (*Cirsium arvense*), shrubby honeysuckles (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), and yam-leaved virgin's bower (*Clematis terniflora*). Populations of bull thistle (*Cirsium vulgare*) were also mapped; however, the species is considered "potential to be invasive - monitor." A complete report of the rare plant, natural community and invasive plant survey is provided in Exhibit 9-2 and a detailed VMP for the project is provided in Exhibit 10-1.

C. Prime Farmland and Farmland of Statewide Importance

In accordance with MDACF guidance the areas of mapped Prime Farmland Soils and Soils of Statewide Importance were reviewed by a licensed soil scientist to determine the extent that actual soil conditions mapped within the Project Area contain soils defined by the United States Department of Agriculture as Prime Farmland Soils and/or Soils of Statewide Importance. The review determined that there are areas of farmland soils within the Project Area, but they are significantly smaller than the areas depicted in the NRCS data layers (Exhibit 9-3). Farmland Soils (BaB, DxB & TpB) are located within approximately 44 acres or 4% of the Project Area which is less than the 10% siting

recommendation from MDACF. *[Note: All areas of mapped Farmland Soils are within a working forest and have not been in active agricultural use for decades.]*

Exhibits

- Exhibit 9-1 MDACF Prime Farmland Determination Guidelines
- Exhibit 9-2 Rare Plants, Rare Natural Communities, and Invasive Plants Survey Report
- Exhibit 9-3 Farmland Soils Affidavit

EXHIBIT 9-1 MDACF PRIME FARMLAND DETERMINATION GUIDELINES

DETERMINING PRIME FARMLAND SOILS

AND

SOILS OF STATEWIDE IMPORTANCE

FOR SITING SOLAR PROJECTS IN MAINE

May 2020

BACKGROUND:

In 2019, the Maine Legislature enacted "An Act To Promote Solar Energy Projects and Distributed Generation Resources in Maine." This act requires the Maine Public Utilities Commission (PUC) to solicit long-term contract proposals for targeted amounts of energy capacity and renewable energy credits from developers of renewable distributed energy facilities of less than 5 MW. The act provides financial incentives for outside parties to develop appropriately sized solar projects creating significant interest from the public sector.

The Maine PUC issued a Procurement Announcement for prospective developers which includes requirements to qualify for each of 5 rounds of bidding. The Procurement Announcement also includes an Appendix A, which lists both Pricing Attributes and Project Attributes.

Appendix A Number 9 of the Project Attributes states as follows: Project is sited such that no more than 10% of the project is located on land containing soils defined by the USDA Natural resources Conservation Services as "Prime Farmland" or "Farmland of Statewide Importance," as determined by a field-based survey conducted by a licensed soil scientist. How to demonstrate that this requirement is met is indicated as follows: "An affidavit from a Soil Scientist licensed by the Maine Department of Professional and Financial Regulation." The purpose of this document is to provide guidance and consistency to Maine licensed soil scientists in meeting this requirement.

TECHNICAL GUIDANCE:

Although Prime Farmland and Soils of Statewide Importance are listed by the USDA's Natural Resource Conservation Service (NRCS) which can be cross-referenced to widely available soil maps, these maps are not sufficient for calculation because their classification is based on soil map *units*, not soil series. All map units contain other soils besides the soil series for which a soil map unit is named. In addition, it will not be known where in the range of characteristics allowed for every soil series that the soil series on the property is until an on-site investigation is performed. Further, NRCS soil mapping concepts have changed over time and new soil series have been established since many of the soil maps were created. Also important is that significant alteration of the underlying soils may have occurred after the soil maps were made. As a result, the determination of whether a proposed solar project site has less than 10% of its soils meeting the definition of Prime Farmland or Farmland of Statewide Importance requires an on-site investigation using established technical criteria.

Prime Farmland

The National Soil Survey Handbook (NSSH) and 7 CFR 657 Prime and Unique Farmlands, defines Prime Farmlands as follows: "Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops, and is also available for these uses (the land could be in cropland, pastureland, rangeland, forest land,

or other land, but not urban built-up land or water). It has the soil quality, growing season and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods."

The NSSH lists "other considerations for prime farmland" which includes (iv) Water Table – "The soils either have no water table or have a water table that is maintained at a sufficient depth during the cropping season to allow cultivated crops common to the area to be grown." Most map units are drained but a few undrained areas are included. Note that only the drained areas meet the prime farmland criteria. The NSSH also requires that prime farmlands soils have a permeability of at least 0.06 inches per hour in the upper 20 inches.

Also, per the NSSH, (iii) Irrigation – "Some map units have areas with a developed irrigation water supply that is dependable and of adequate quality while other areas do not have such a supply. In those map units, only the irrigated areas meet the prime farm land criteria." 7 CFR 657 also states that prime farmlands have no or few surface rocks (would not interfere with farming) and that "less than 10% of the surface layer (upper 6") in these soils consists of rock fragments coarser than 3."

Slope alone is not a specific criteria but is tied to the erodibility of the soil and is determined by multiplying the K factor (erodibility) x percent slope. To qualify as a prime farmland, the product must be 2.0 or less. The pH of the soil must be between 4.5 and 8.4 in all horizons within 40" or within the root zone. Prime farmlands cannot flood frequently during the growing season (no more than once in 2 years).

How to Determine if a Soil is Prime Farmland:

1. You do not have to determine the soil moisture regime. All of Maine has a soil moisture regime that qualifies (aquic or Udic)
2. You do not have to determine the soil temperature regime (frigid and mesic qualify). Cryic does not qualify, however.
3. **You do have to determine the groundwater table depth**. The depth to groundwater table must be deep enough during the cropping season to allow cultivated crops common to the area to be grown (24" or deeper has been chosen to meet this criteria). The soil can also be drained and qualify if the ground water table is a at depth of less than 24".
4. You should not have to determine soil pH as the allowable range is 4.5 – 8.4.
5. **You do need to determine surface stoniness**. To qualify as prime farmland, there can't be enough stones to interfere with farming.
6. **You do need to determine the erodibility of the soil** by looking up the K factor and multiplying it by the slope. In order for the soil to be prime farmland, the product of that multiplication has to be less than 2.0.
7. **You do need to determine whether or not the soil floods less often than once in every 2 years**, required in order to be prime farmland.

8. **You do need to determine the permeability rate of the soil** which must be equal to or more than 0.06 inches per hour in the upper 20". Base this decision on the presence or absence of a "root restrictive layer" including hardpan or bedrock. Layers above a root restrictive layer will have a permeability of 0.06" per hour or more. Layers below a hardpan or bedrock will not have adequate permeability.
9. **You do need to determine the percent of the surface layer (upper 6") that is coarse fragments over 3".** It must be less than 10% in order to qualify as a prime farmland.
10. **You may need to determine an adequate and dependable water supply** from precipitation or irrigation. Soils that are somewhat excessively or excessively drained would not qualify as prime farmlands unless irrigated.

Soils of Statewide Importance

According to 7 CFR 657, Prime and Unique farmlands is defined as follows: "Criteria for defining and delineating this land are to be determined by the appropriate State agency or agencies. Generally, additional farmlands of statewide importance include those that are nearly prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods." (Emphasis added). There are no specific national criteria for classifying soils of statewide importance but the NRCS in Maine has recently developed those criteria. (See Attachment 1).

How to Determine if a Soil is of Statewide Importance:

1. Does not meet Prime Farmland criteria.
2. **Does not have a seasonal groundwater table within 16 inches** of the mineral soil surface during the growing season of most years (moderately well or well drained).
3. Are **less than 15% slope**.
4. Have **less than 3% cover of rocks or stones greater than 10 inches in diameter and less than 40 % cover of rocks less than 10 inches but more than 2" in diameter**.
5. Are **more than 20 inches to a root restrictive layer** (hardpan or bedrock)
6. Have **greater than 2 inches of available water holding capacity in the upper 20 inches** of soil (loamy fine sand or finer).
7. NRCS further requires areas designated as of statewide importance to be composed of at least 50% coverage of soils meeting the criteria. That means small areas of soils meeting the criteria scattered about a site do not have to be added up as they would not be realistically farmable (similar to pit and mound topography in wetland determinations where you use what predominates).

Additional Considerations

As previously mentioned, NRCS has compiled a list of Prime Farmland soils and Soils of Statewide Importance, by map unit. Many of those map units are named for the predominant soil series present in the map unit. Some of those soil series have a wide range of characteristics which go beyond the characteristics allowed for prime farmlands or soils of

statewide importance. An example would be the Peru and Woodbridge soil series. Both Peru and Woodbridge soils were mapped by NRCS when county soil survey maps were developed as both moderately well drained and somewhat poorly drained. In such cases, only the soils meeting the criteria allowed for Prime Farmlands or Soils of Statewide Importance would qualify. In the case of the Peru and Woodbridge soil series, only the moderately well drained component would be considered Prime Farmland or Soils of Statewide Significance.

The PUC Procurement Announcement, Appendix A, does not require a soil scientist to create a soil map. It asks for an Affidavit stating: "that the project is sites such that no more than 10% of the project is located on land containing soils defined by the USDA NRCS as Prime Farmland or Farmland of Statewide Importance, as determined by a field-based survey conducted by a licensed soil scientist." If you know the specific location of a proposed solar project and there are no Prime Farmland soils or Soils of Statewide Importance in the area, no soil map is needed. If, on the other hand, there are Prime Farmlands or Soils of Statewide Importance in the area, a soil map may be needed to properly site the project so that it is under the allowable threshold. The areas of Prime Farmland or Soils of Statewide Importance should be large enough to be farmable, not small spots here and there on the property (this is akin to the process for mapping wetlands in pit and mound topography).

Attachment 1

MAINE INSTRUCTION 430-380 – PRIME, STATEWIDE, UNIQUE AND LOCALLY IMPORTANT DESIGNATION

BACKGROUND

Published soil survey information has assigned important farmland designations for the purposes of the Farmland Protection Policy Act. Criterion for Prime Farmland Designation is defined in the United States Code of Federal Regulations Title 7 Subsection 657.5 *Identification of important farmlands*. For new attributions of Statewide, Unique, and Locally Important farmland, including for onsite attribution by soil scientists, state policy is required.

PURPOSE

This instruction establishes Maine's policy and procedures that are to be used for designating Prime, Statewide, and Locally Important farmlands by Maine Natural Resources Conservation Service (NRCS). It is subordinate to law and NRCS General Manual policy.

PRIME FARMLAND DESIGNATION

Criteria for Prime Farmland Designation is defined in the United States Code of Federal Regulations Title 7 Subsection 657.5 *Identification of important farmlands*. No supplementary Maine policy is to be utilized for Prime Farmland designation.

Statewide, Unique, and Locally Important Farmland are defined in the United States Code of Federal Regulations Title 7 Subsection 657.5.

Supplemental criteria and guidance for Maine is included below.

MAINE NRCS STATEWIDE IMPORTANT FARMLAND DESIGNATION

Note: Web Soil Survey components and soil map units will be designated as Statewide Important Farmland using the minimum criteria below only upon revision of soil survey information. These guidelines are set for use in future updates and soil survey projects, with the intended applicability being primarily for the Farmland Protection Policy Act.

Soils designated as statewide important farmland soils must meet all the following criteria:

1. Do not meet Prime Farmland criteria.
2. Do not have a seasonal high water table within 40cm of the mineral soil surface during the growing season of most years (e.g. must be moderately well drained or better).
3. Are less that 15 percent slope.
4. Have less than 3 percent cover of rock material greater than 25cm in size, less than 40 percent cover of rock material that is <25cm and >5cm in size.
5. Are more than 50cm deep to a root restrictive layer (e.g. moderately deep or deeper).
6. Have greater than 5cm of available water holding capacity in the upper 50cm of soil (Loamy find sand or finer fine earth texture).

Areas designated as statewide important farmland must be composed of at least 50 percent coverage of soils meeting the criteria above.

UNIQUE AND LOCALLY IMPORTANT FARMLAND CRITERIA

These soils and soil map units where they predominate must be proposed in writing by a Soil and Water Conservation District where they occur because of their importance for agricultural productivity. This proposal must be concurred upon by the NRCS State Conservationist in writing. Documentation of these approved map units shall be maintained in the NRCS FOTG, section II.

CONTACT: State Soil Scientist

EXHIBIT 9-2 RARE PLANTS, RARE NATURAL COMMUNITIES, AND INVASIVE PLANTS SURVEY REPORT

Rare Plants, Rare Natural Communities, and Invasive Plants Survey Report

Hartland Solar Project
Somerset County, Maine

Prepared For:

Hartland Solar Facility, LLC

500 Union Street Suite 625
Seattle, WA 98101

Prepared By:

Tetra Tech, Inc.
Complex World, Clear Solutions™
451 Presumpscot St., Portland, ME 04103 | tetratech.com

Final September 2023

EXECUTIVE SUMMARY

Hartland Solar Facility, LLC is working to develop the Hartland Solar Project (Project), a 1,130-acre commercial solar energy project within the Town of Hartland, Somerset County, Maine (Project Area). As part of Project planning and compliance with state natural resource regulations, a survey for rare plants, rare natural communities, and invasive plants was performed within the Project Area. No rare plant populations or rare natural communities were identified in or within 250 feet of the Project Area. Reed canary grass (*Phalaris arundinacea*) and coltsfoot (*Tussilago farfara*) were determined to be widespread throughout roadsides, log landings, and other disturbed areas and were not individually mapped. Management recommendations for these species will be to follow construction best management practices for working near invasive plants (e.g., avoidance where possible and cleaning equipment before moving between sites). The invasive plants that were mapped were those that were not widespread and have the potential to be successfully controlled. These species were Asiatic bittersweet (*Celastrus orbiculatis*), Canada thistle (*Cirsium arvense*), shrubby honeysuckles (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), and yam-leaved virgin's bower (*Clematis terniflora*). Populations of bull thistle (*Cirsium vulgare*) were also mapped; however, the species is considered "potential to be invasive - monitor."

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

Hartland Solar Facility, LLC is working to develop the Hartland Solar Project (Project), a 1,130-acre commercial solar energy project within the Town of Hartland, Somerset County, Maine (Project Area). The Project Area has additional buffers applied to meet different survey requirements. The Project is in the planning process and will require permits from the United States Army Corps of Engineers, the Maine Department of Environmental Protection, and the Town of Hartland.

As part of Project planning and compliance with state natural resource regulations, a survey for rare plants, rare natural communities, and invasive plants was performed within the Project Area. The rare plant survey was performed within the Project Area plus a 250-foot buffer for a total Study Area of approximately 1,940 acres (Appendix A). The invasive plant survey was performed within the Project Area.

This report describes the methods used to identify, characterize, and document occurrences of rare plants, rare natural communities, and invasive plants; and then presents and describes the results of the survey. Appendix A includes a map of the Project Area with survey results, Appendix B provides representative photos of invasive plants documented within the Project Area, Appendix C provides a copy of the consultation letter received from the Maine Natural Areas Program (MNAP) for this Project, and Appendix D includes fact sheets describing each invasive plant species and recommendations for control.

2.0 METHODS

The survey began with a desktop analysis, which included reviewing the MNAP consultation letter (Appendix C), examining Beginning with Habitat online maps (MDIFW 2023), reviewing MNAP natural community fact sheets (MNAP 2021), and examining photographs and plant lists from vernal pool, stream, and wetland surveys conducted in the Project Area. The field survey included incidental and reconnaissance-level observations made during the vernal pool, stream, and wetland surveys and a focused field effort performed August 9–11, 2021. The focused survey was conducted in August to coincide with the flowering window of the state threatened red-stemmed gentian (*Gentiana rubricaulis*) and several invasive plant species.

The field survey was conducted to verify information from the desktop analysis and to document plants and natural communities not identified during the desktop analysis. The field survey was conducted using meandering transects focused on areas identified during the desktop analysis and any other areas with high potential for rare plants, rare natural communities, and invasive plants. Data and photographs were collected electronically on iPads using the ArcGIS Field Maps application. GPS units tethered to the iPad provided sub-meter accuracy for data collection.

3.0 RESULTS

No rare plant populations or rare natural communities were identified in or within 250 feet of the Project Area. Known populations of red-stemmed gentian occur in the right-of-way (ROW) along the eastern boundary of the Project Area (Appendix A) but will not be disturbed by Project-related activities.

Seven invasive plant species, one invasive plant group, and one potential invasive plant species were documented within the Project Area (Table 1, Appendix A). Reed canary grass (*Phalaris arundinacea*) and coltsfoot (*Tussilago farfara*) were determined to be widespread throughout roadsides, log landings, and other disturbed areas and were not individually mapped. Management recommendations for these

species will be to follow construction best management practices (BMPs) for working near invasive plants (e.g., avoidance where possible and cleaning equipment before moving between sites).

The invasive plants that were mapped were those that were not widespread and have the potential to be successfully controlled. These species were Asiatic bittersweet (*Celastrus orbiculatis*), Canada thistle (*Cirsium arvense*), shrubby honeysuckles (*Lonicera* spp.), multiflora rose (*Rosa multiflora*), purple loosestrife (*Lythrum salicaria*), and yam-leaved virgin's bower (*Clematis terniflora*). Populations of bull thistle (*Cirsium vulgare*) were also mapped; however, the species is considered "potential to be invasive - monitor."

Table 1. Invasive Plants at the Hartland Solar Project; Somerset County, Maine, 2021

Common Name	Scientific Name	Ranking[1]	Habitats Threatened[1]	Status in Maine[1]
Asiatic bittersweet*	*Celastrus orbiculatis*	Severely invasive	Open Uplands Wooded Uplands Open Wetlands Wooded Wetlands	Widespread
Canada thistle	*Cirsium arvense*	Severely invasive	Open Uplands	Widespread
Shrubby honeysuckles*	*Lonicera spp.* (*L. morrowii*, *L. tatarica*, *L.* x *bella*)	Severely invasive	Open Uplands Wooded Uplands Open Wetlands Wooded Wetlands	Widespread (*L. morrowii*, *L. tatarica)* Localized (*L.* x *bella*)
Multiflora rose*	*Rosa multiflora*	Severely invasive	Open Uplands Wooded Uplands Open Wetlands Wooded Wetlands	Widespread
Reed canary grass**	*Phalaris arundinacea*	Severely invasive	Open Wetlands Wooded Wetlands	Widespread
Purple loosestrife*	*Lythrum salicaria*	Very invasive	Open Uplands Open Wetlands Wooded Wetlands	Widespread
Yam-leaved virgin's bower	*Clematis terniflora*	Very invasive	Open Uplands Wooded Uplands	N/A
Coltsfoot**	*Tussilago farfara*	Invasive, habitat-specific threats	Wooded Uplands Open Wetlands Wooded Wetlands	Widespread
Bull thistle	*Cirsium vulgare*	Potential to be invasive, monitor	Open uplands	Widespread

1 - MDACF 2019
*Plant regulated by the Do Not Sell list, Horticulture Program, Maine Department of Agriculture, Conservation and Forestry (MDACF 2023)
**Same as above, but effective January 1, 2024 (MDACF 2023)

4.0 CONCLUSION AND DISCUSSION

No rare plant populations or rare natural communities were identified in or within 250 feet of the Project Area. The MNAP consultation letter recommended a survey for red-stemmed gentian, which was confirmed in the ROW along the eastern boundary of the Project Area, but not within the Project Area. MNAP also provided a list of other rare and exemplary botanical features within 4 miles of the Project (Appendix C), but none of the species were detected.

Invasive plant species were present in much of the Project Area, with reed canary grass and coltsfoot being the most prevalent. The remaining species have the potential to be successfully controlled. Fact sheets describing each invasive plant species and their control recommendations are provided in Appendix D.

5.0 REFERENCES

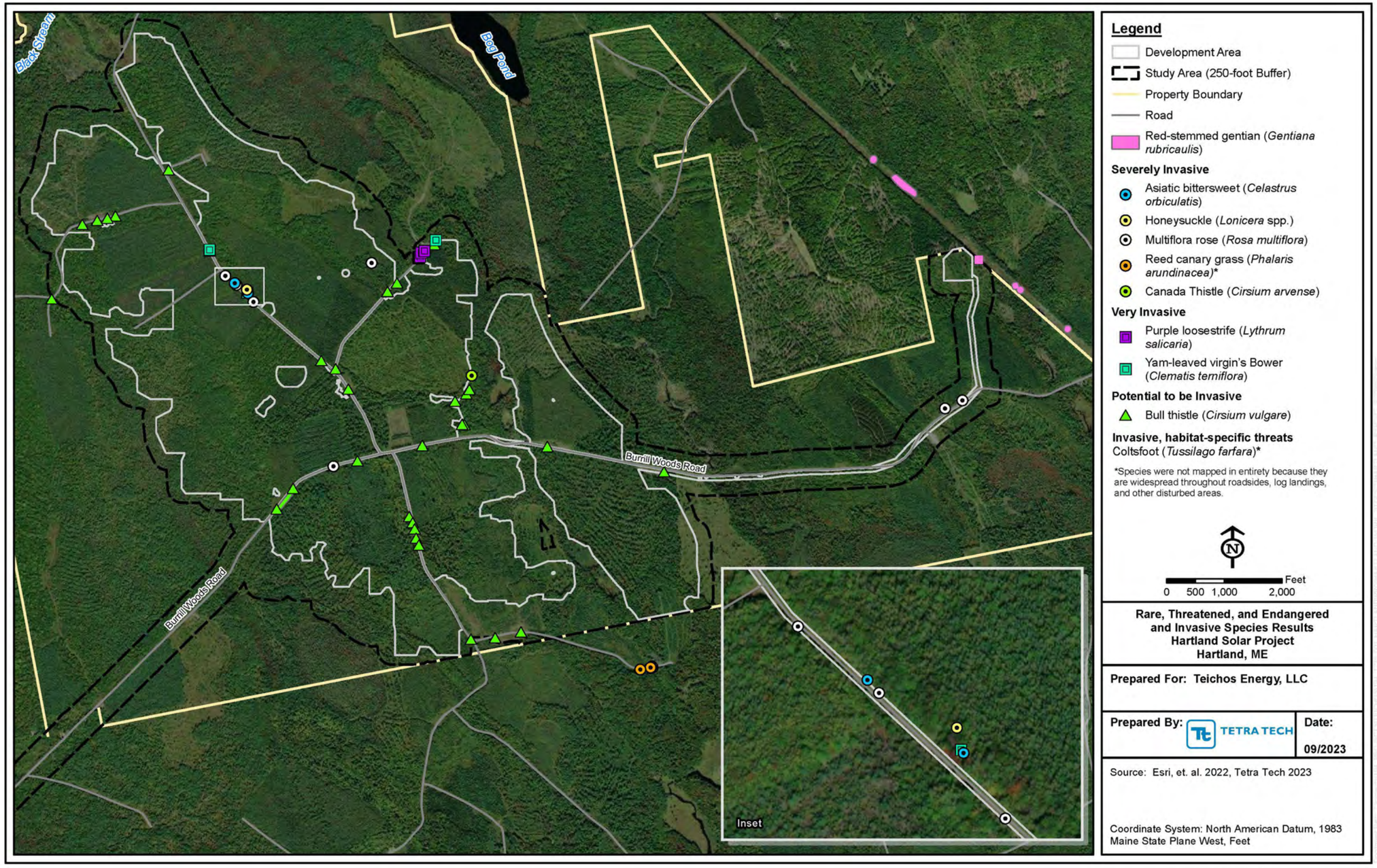
Maine Department of Agriculture, Conservation and Forestry (MDACF). 2023. Invasive Plants. Horticulture Program. Available at https://www.maine.gov/dacf/php/horticulture/invasiveplants.shtml. Accessed September 2023.

MDACF. 2019. Advisory List of Invasive Plants – 2019. Maine Natural Areas Program. Available at https://www.maine.gov/dacf/mnap/features/invasive_plants/invsheets.htm. Accessed September 2023.

Maine Department of Inland Fisheries and Wildlife (MDIFW). 2023. Beginning with Habitat Maps. Available at: https://www.maine.gov/ifw/fish-wildlife/wildlife/beginning-with-habitat/maps/index.html. Accessed September 2023.

Maine Natural Areas Program (MNAP). 2021. Natural Community Fact Sheets. Available at https://www.maine.gov/dacf/mnap/features/commsheets.htm. Accessed September 2023.

APPENDIX A. MAP



Not for Construction

APPENDIX B. REPRESENTATIVE INVASIVE PLANT PHOTOS

Photo No.: 1

Common Name:
Asiatic bittersweet

Scientific Name:
Celastrus orbiculatus

Maine Natural Areas Program Ranking:
Severely invasive

Photo No.: 2

Common Name:
Canada thistle

Scientific Name:
Cirsium arvense

Maine Natural Areas Program Ranking:
Severely invasive

Photo No.: 3

Common Name:
Shrubby honeysuckle

Scientific Name:
Lonicera spp.

Maine Natural Areas Program Ranking:
Severely invasive

Photo No.: 4

Common Name:
Multiflora rose

Scientific Name:
Rosa multiflora

Maine Natural Areas Program Ranking:
Severely invasive

Photo No.: 5

Common Name:
Reed canary grass

Scientific Name:
Phalaris arundinacea

Maine Natural Areas Program Ranking:
Severely invasive

Photo No.: 6

Common Name:
Purple loosestrife

Scientific Name:
Lythrum salicaria

Maine Natural Areas Program Ranking:
Very invasive

Photo No.: 7

Common Name:
Yam-leaved virgin's bower

Scientific Name:
Clematis sterniflora

Maine Natural Areas Program Ranking:
Very invasive

Photo No.: 8

Common Name:
Coltsfoot

Scientific Name:
Tussilago farfara

Maine Natural Areas Program Ranking:
Invasive, habitat-specific threats

Photo No.: 9

Common Name:
Bull thistle

Scientific Name:
Cirsium vulgare

Maine Natural Areas Program Ranking:
Potential to be invasive, monitor

APPENDIX C. CONSULTATION LETTER FROM MAINE NATURAL AREAS PROGRAM

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

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

March 8, 2021

Brad Agius
Tetra Tech
451 Presumpscot Street
Portland, ME 04103

Via email: brad.agius@tetratech.com

RE: Proposed Strobus Solar, LLC Athens Solar Project, Canaan and Hartland; Threatened, and Endangered Plants and Rare or Exemplary Natural Community Clearance Determination

Dear Mr. Agius:

I am writing in response to your request for a determination from the Maine Natural Areas Program (MNAP) on the potential for the above referenced project to result in adverse impacts to rare, threatened, or endangered plants or rare and exemplary natural communities, pursuant to the Maine Public Utilities Commission's Distributed Generation Siting Attribute criteria number 5.

There is no comprehensive statewide inventory that includes all rare, threatened, or endangered species occurrences and natural community types. Though many resources are included on data layers and resource maps, the completeness of these varies by species, habitat type, location, and previous survey efforts. Thus, such tools should be considered preliminary unless otherwise indicated by MNAP. It is the applicant's ultimate responsibility to ensure that their actions do not result in adverse impacts to rare, threatened, or endangered plants and rare or exemplary natural communities, regardless of whether species occurrences or natural communities have been previously identified and mapped.

MNAP's determination for this proposed project site is indicated in the selection below:

☐ **Based on review of the information provided, current documentation and available information indicate no known adverse impacts rare, threatened, or endangered plants or rare or exemplary natural communities on the proposed project site or in the vicinity.**

☐ **Based on review of the information provided, current documentation and available information indicate no known adverse impacts to rare, threatened, or endangered plants or rare or exemplary natural communities on the proposed project site. However, rare, threatened, or endangered plants or rare or exemplary natural communities have been documented in the vicinity of the proposed project site and MNAP recommends further investigations and surveys to enable a more definitive determination. Please contact MNAP for further guidance and survey protocols.**

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

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

☒ **Based on review of the information provided, current documentation and available information indicate the presence of rare, threatened, or endangered plants or rare or exemplary natural communities on the proposed project site. Red-stemmed Gentian occurs on the powerline abutting the project site, and may be included within the project boundary at this location. In addition, suitable habitat appears to be present on the project site, and MNAP recommends survey for this and other rare species. Please see MNAP's comments dated March 4, 2020.**

Please note that this determination relates only to known information on rare, threatened, or endangered plants or rare or exemplary natural communities in relation to the proposed project site. This determination does not constitute a full environmental review response for the proposed project. If you require additional information, please contact maine.nap@maine.gov.

Sincerely,

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

Cc: Sally Zeh, Christine Cook (MPUC)
Jim Beyer (MDEP)

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

JANET T. MILLS
GOVERNOR

AMANDA E. BEAL
COMMISSIONER

March 4, 2021

Brad Agius
Tetra Tech
451 Presumpscot Street
Portland, ME 04103

Via email: brad.agius@tetratech.com

Re: Rare and exemplary botanical features in proximity to: Strobus Solar, LLC Athens Solar Project, Canaan and Hartland, Maine

Dear Mr. Agius:

I have searched the Maine Natural Areas Program's Biological and Conservation Data System files in response to your request received February 11, 2021 for information on the presence of rare or unique botanical features documented from the vicinity of the project in Canaan and Hartland, 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. MNAP recommends that you have the site surveyed by a qualified field biologist to ensure that no undocumented rare features are inadvertently harmed. In particular, MNAP recommends that you survey project areas for Red-stemmed Gentian which occurs in the right-of-way along the eastern boundary of the project area, and it appears that suitable habitat may be present in the project area. In addition, if any work will be done to connect the project to the existing right-of-way, MNAP recommends avoiding any disturbance or clearing within 250 feet of documented populations. Please refer to the table below and attached map and factsheet.

Feature	State Status	State Rank	Global Rank	Notes
Red-stemmed Gentian *Gentiana rubricaulis*	Threatened	S1	G4?	Extant at ROW abutting site, Stafford Hill, Occurrence rank B, Good

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

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

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

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.

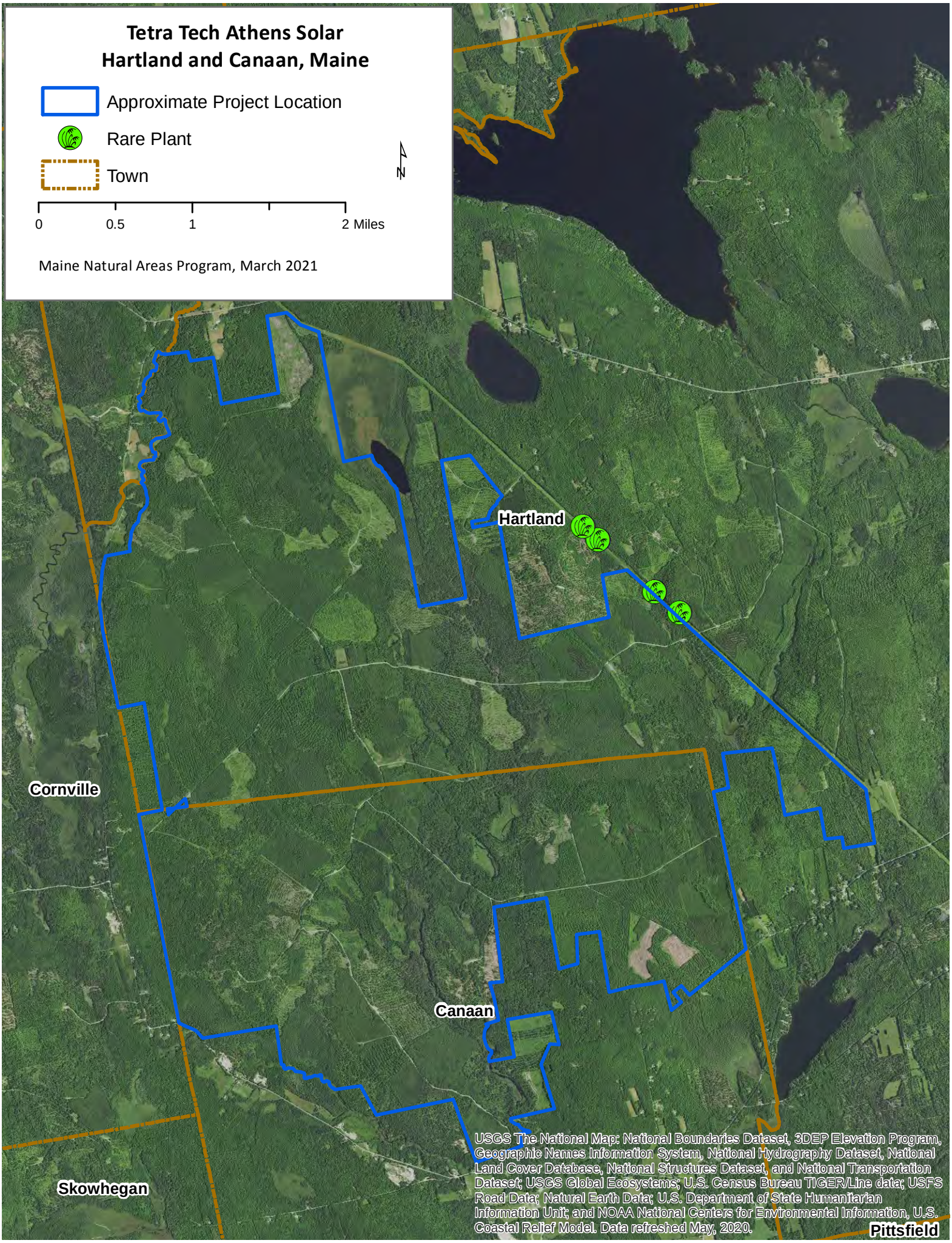
The Maine Natural Areas Program (MNAP) is continuously working to achieve a more comprehensive database of exemplary natural features in Maine. We would appreciate the contribution of any information obtained should you decide to do field work. MNAP welcomes coordination with individuals or organizations 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


Tetra Tech Athens Solar
Hartland and Canaan, Maine
Approximate Project Location
Rare Plant
Town
N
0
0.5
1
2 Miles
Maine Natural Areas Program, March 2021
Hartland
Cornville
Canaan
Skowhegan
Pittsfield
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS Global Ecosystems; U.S. Census Bureau TIGER/Line data; USFS Road Data; Natural Earth Data; U.S. Department of State Humanitarian Information Unit; and NOAA National Centers for Environmental Information, U.S. Coastal Relief Model. Data refreshed May, 2020.

Maine Natural Areas Program

Gentiana rubricaulis Schwein.

Red-stemmed Gentian

- State Rank: S1
- Global Rank: G4?
- State Status: Threatened

Habitat: Moist woods, wet meadows, and shores, especailly nongranitic substrates.

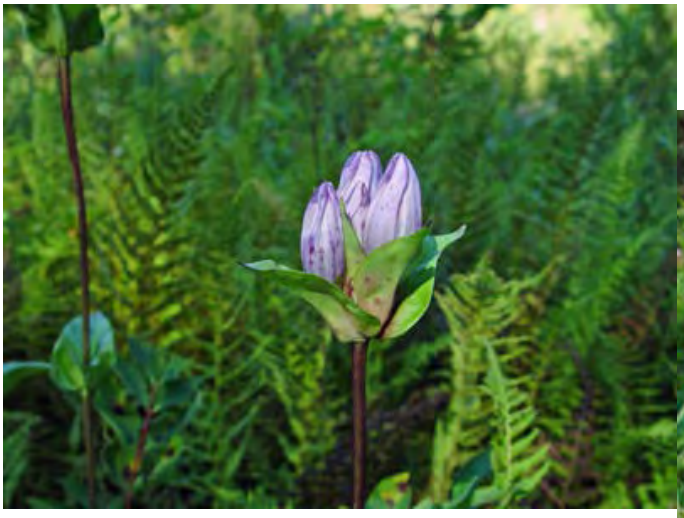
Family: Gentianaceae

Synonyms: *Dasystephana grayi* (Kusnez.) Britt; *Gentiana linearis* Froel. ssp. *rubricaulis* (Schwein.) J. Gillet; *Gentiana linearis* Froel. var. *lanceoata* Gray; *Gentiana linearis* Froel. var. *latifolia* Gray.

Range: Isolated stations in Maine and New Brunswick; otherwise Ontario to Saskatchewan, Minnesota, Wisconsin, Michigan, and Nebraska.

Phenology: Flowers Augusta to September.

Known Distribution in Maine: This rare plant has been documented from a total of 6 town(s) in the following county(ies): Kennebec, Somerset.



Contact

Department of Agriculture, Conservation and Forestry
22 State House Station
18 Elkins Lane
Augusta, ME 04333
More Locations

Phone: (207) 287-3200
Fax: (207) 287-2400
TTY Users Call Maine Relay 711
DACF@Maine.gov

Rare and Exemplary Botanical Features within 4 miles of
Project: Strobus Solar Athens Solar Project, Hartland and Canaan, Maine

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
American Chestnut						
	SC	S4	G3	2000-summer	5	Hardwood to mixed forest (forest, upland)
American Winter-cress						
	PE	SH	G5	1903-06-30	3	Non-tidal rivershore (non-forested, seasonally wet)
Blue-leaf Willow						
	T	S2	G4	1915-08-17	5	Non-tidal rivershore (non-forested, seasonally wet)
Goldie's Wood Fern						
	SC	S2	G4G5	1899-07-31	4	Hardwood to mixed forest (forest, upland)
	SC	S2	G4G5	1899	11	Hardwood to mixed forest (forest, upland)
Hairy Wood Brome-grass						
	SC	S2	G5	1899-08-03	4	Hardwood to mixed forest (forest, upland),Non-tidal rivershore (non-forested, seasonally wet)
Red-stemmed Gentian						
	T	S1	G4?	2007-10-01	5	Open wetland, not coastal nor rivershore (non-forested, wetland),Old field/roadside (non-forested, wetland or upland)
	T	S1	G4?	2007-09-29	3	Open wetland, not coastal nor rivershore (non-forested, wetland),Old field/roadside (non-forested, wetland or upland)
Shining Ladies'-tresses						
	T	S1	G4	1941	13	Non-tidal rivershore (non-forested, seasonally wet),Open wetland, not coastal nor rivershore (non-forested, wetland)
Showy Orchis						
	E	S1	G5	1941	14	Hardwood to mixed forest (forest, upland)
Silver Maple Floodplain Forest						
	<null>	S3	GNR	2003-09-29	14	Forested wetland
Spreading Sedge						
	E	S2	G5	1886-06-25	3	Hardwood to mixed forest (forest, upland)

Rare and Exemplary Botanical Features within 4 miles of
Project: Strobus Solar Athens Solar Project, Hartland and Canaan, Maine

Common Name	State Status	State Rank	Global Rank	Date Last Observed	Occurrence Number	Habitat
Wild Chervil						
	PE	SH	G5	1915-06	2	Hardwood to mixed forest (forest, upland)
Wild Ginger						
	T	S1S2	G5	1928-07-18	9	Hardwood to mixed forest (forest, upland)
	T	S1S2	G5	1938-05-22	8	Hardwood to mixed forest (forest, upland)

STATE RARITY RANKS

S1 Critically imperiled in Maine because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extirpation from the State of Maine.

S2 Imperiled in Maine because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.

S3 Rare in Maine (20-100 occurrences).

S4 Apparently secure in Maine.

S5 Demonstrably secure in Maine.

SU Under consideration for assigning rarity status; more information needed on threats or distribution.

SNR Not yet ranked.

SNA Rank not applicable.

S#? Current occurrence data suggests assigned rank, but lack of survey effort along with amount of potential habitat create uncertainty (e.g. S3?).

Note: **State Rarity Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines State Rarity Ranks for animals.

GLOBAL RARITY RANKS

G1 Critically imperiled globally because of extreme rarity (five or fewer occurrences or very few remaining individuals or acres) or because some aspect of its biology makes it especially vulnerable to extinction.

G2 Globally imperiled because of rarity (6-20 occurrences or few remaining individuals or acres) or because of other factors making it vulnerable to further decline.

G3 Globally rare (20-100 occurrences).

G4 Apparently secure globally.

G5 Demonstrably secure globally.

GNR Not yet ranked.

Note: **Global Ranks** are determined by NatureServe.

STATE LEGAL STATUS

Note: State legal status is according to 5 M.R.S.A. § 13076-13079, which mandates the Department of Conservation to produce and biennially update the official list of Maine's **Endangered** and **Threatened** plants. The list is derived by a technical advisory committee of botanists who use data in the Natural Areas Program's database to recommend status changes to the Department of Conservation.

E ENDANGERED; Rare and in danger of being lost from the state in the foreseeable future; or federally listed as Endangered.

T THREATENED; Rare and, with further decline, could become endangered; or federally listed as Threatened.

NON-LEGAL STATUS

SC SPECIAL CONCERN; Rare in Maine, based on available information, but not sufficiently rare to be considered Threatened or Endangered.

PE Potentially Extirpated; Species has not been documented in Maine in past 20 years or loss of last known occurrence has been documented.

ELEMENT OCCURRENCE RANKS - EO RANKS

Element Occurrence ranks are used to describe the quality of a rare plant population or natural community based on three factors:

- **Size**: Size of community or population relative to other known examples in Maine. Community or population's viability, capability to maintain itself.
- **Condition**: For communities, condition includes presence of representative species, maturity of species, and evidence of human-caused disturbance. For plants, factors include species vigor and evidence of human-caused disturbance.
- **Landscape context**: Land uses and/or condition of natural communities surrounding the observed area. Ability of the observed community or population to be protected from effects of adjacent land uses.

These three factors are combined into an overall ranking of the feature of **A**, **B**, **C**, or **D**, where **A** indicates an **excellent** example of the community or population and **D** indicates a **poor** example of the community or population. A rank of **E** indicates that the community or population is **extant** but there is not enough data to assign a quality rank. The Maine Natural Areas Program tracks all occurrences of rare (S1-S3) plants and natural communities as well as A and B ranked common (S4-S5) natural communities.

Note: **Element Occurrence Ranks** are determined by the Maine Natural Areas Program for rare plants and rare and exemplary natural communities and ecosystems. The Maine Department of Inland Fisheries and Wildlife determines Element Occurrence ranks for animals.

Visit our website for more information on rare, threatened, and endangered species!
http://www.maine.gov/dacf/mnap

APPENDIX D. INVASIVE PLANT FACT SHEETS

SEVERELY INVASIVE

ASIATIC BITTERSWEET

(Oriental bittersweet)

Celastrus orbiculatus

Status in Maine: widespread

Description: Perennial, deciduous, woody vine. Twines around mature trees and climbs high into the canopy, or sprawls over low-growing vegetation. **Leaves:** Simple, alternate, round to somewhat elliptical, 2-4" long, with wavy or weakly toothed edges, turning yellow in fall. Leaves abruptly pointed at tips or in sun more tapering toward pointed tip. **Flowers:** Green-yellow, 5-petaled, small, clustered in leaf axils, ~June. **Fruits:** Distinctive yellow aril covers orange-red seed. Fruits mature in fall and persist into winter. **Bark:** Light brown with raised tan lenticels. **Roots:** Bright orange.

Native range: Japan, China, Korea. **How arrived in U.S.:** As an ornamental.

Reproduction: By seed and vegetatively. Plants are usually dioecious; males do not produce fruit. Fruits are eaten and dispersed by birds and small mammals, or by careless disposal of bittersweet wreaths. Seeds are viable for about one year. New shoots may sprout from the root crown, and root fragments may also regenerate.

Habitat: Forests, forest edges, woodlands, old fields, beaches, and dunes. Moderately shade-tolerant; more productive in sun. Tolerates dry to moist soils.

Similar native species: American bittersweet (*C. scandens*), uncommon in Maine, is very similar but only has flowers and fruit at vine tips, and usually has leaves twice as long as wide. Grape (*Vitis* spp.) will also grow into tree canopies. Grape bark has a peeling, shredded appearance and leaves

ASIATIC BITTERSWEET

are larger and palmately lobed.

Similar non-native species: None in our area.

Control methods: Very small plants and seedlings may be pulled up by the roots when soil is moist; larger vines can be cut, but aggressive re-sprouting will occur. Cut larger vines at chest height and also at ankle height to prevent new vines climbing up old ones (you can also treat the rooted part of the vine with cut-stem herbicide if desired). Persistent cutting alone, multiple times during the growing season over several years, may kill the plant, but diligence is required (at least 6x/yr for 3 yrs is suggested). Vines can be left to die in the canopy; pulling the vines from the trees can cause additional damage. Mowing can prevent seedlings from establishing. Herbicides are effective as foliar applications (triclopyr solution, foliar glyphosate not as effective on this species), cut-stump applications (glyphosate or triclopyr solution applied immediately after cutting except during early spring), or basal bark application any time of year (for stems <6" diameter, triclopyr in bark oil). For dense thicket-type growth and very large infestations, cut or bush-hog all vines at mid-summer, then foliar spray triclopyr solution the following summer before flowering when plant height is lower and less herbicide is needed.

Leslie J. Mehrhoff, UCONN, Bugwood.org | 5487384

SEVERELY INVASIVE

CANADA THISTLE

Cirsium arvense

Status in Maine: widespread

Description: A creeping perennial herb, 2-5' tall, and member of the aster family. **Leaves:** Alternate, oblong, to 8", base sessile to stem clasping; margins variable, entire to deeply lobed, often wavy or crinkled looking, and very spiny. **Flowers:** Each "flower" is a compound head of ~50 flowers. Plant is mostly dioecious. Flower heads are ~½" diameter, ~1" long, and flask shaped. Several pale lilac to pinkish-purple flower heads per branching stem. Flower bracts are not spiny. **Fruit/seeds:** Each tiny, tan-colored achene has a long feathery pappus with branched hairs. **Stem:** Hollow, subtly ribbed, with few hairs. Freely branching toward top. **Root:** Has both a deep taproot (~3'), and spreading horizontal rhizomes.

Native range: Eurasia. **How arrived in U.S.:** Introduced to Canada in the 1600s as a contaminant in crop seeds.

Reproduction: Formidable capacity by both rhizomatous spread and seed production. With ~40 flower heads per plant, each plant can produce roughly 1,500 seeds. Its plumose pappus aids long distance seed dispersal. Seeds can remain viable for decades in the soil. Horizontal roots produce numerous shoots and can spread several meters in a season. Small fragments of stem or root can generate new plants.

Habitat: Disturbed sites, roadsides, agricultural areas, stream banks, floodplains, logging roads and landings. Shade intolerant.

Similar native species: Swamp thistle (*Cirsium discolor*) has larger flower heads. Leaves are more deeply lobed than Canada thistle, and not as spiny.

CANADA THISTLE

Similar non-native species: Bull thistle (*Cirsium vulgare*) is typically a larger, more robust plant, with spiny stem and a long spine on leaf midrib. Flower heads are ~2".

Control methods: Suppression can be achieved by repeated mowing (several times per season for several years), pulling, and/or cutting that exhausts the plant and eliminates seed production. Wear protective gear since the spines are sharp! Mechanical actions that result in fragmented shoots and roots are not recommended as these can create new plants if conditions are favorable. Sheep and goats are said to graze it when plants are young. Different ecotypes of Canada thistle have differing responses to herbicides, and the plants substantial below-ground biomass means that more than one application may be needed per growing season. One study found good control when the plant was cut in late July and then treated with glyphosate about a month later when in a rosette stage. Late summer or fall herbicide treatments seem to be the most effective. ***Consult a professional for large infestations.***

Mary Ellen (Mel) Harte, Bugwood.org | 1358352


Bonsak Hammeraas, NIBIO, Bugwood.org | 5417146

SEVERELY INVASIVE

SHRUBBY HONEYSUCKLES

Lonicera spp. *(L. morrowii, L. tatarica, L.* x *bella)*

Status in Maine: widespread

Description: Perennial, deciduous shrub, up to ~10' tall and wide, usually very branched. **Leaves:** Simple, opposite, oval to egg-shaped, with blunt to pointed tip, 1-2" long, edges entire, may be hairy underneath. Leaves emerge early and are held late. **Flowers:** ~1" wide, paired in leaf axils, fragrant, tubular, creamy white, yellow, or pink. Bilaterally symmetrical, ½" long petals like "arms" extend in several directions. Paired in leaf axils. Appear in May in Maine. **Fruit:** Red, globular, juicy berry, to ~⅓" wide. Ripen by late summer. **Stems:** Larger plants have shaggy bark on lower stem. Larger twigs have hollow pith (tube in twig center, cut with sharp blade to see).

Native range: Asia. **How arrived in U.S.:** As an ornamental and for windbreaks.

Reproduction: By seed. Birds and mammals consume fruits and disperse seed. Seed longevity is not known but likely modest.

Habitat: Reaches largest size in sun but highly shade-tolerant and capable of invading intact forest understory. Grows in forests, edges, old fields, and roadsides. Tolerant of dry to wet, nutrient-poor soils.

Similar native species: Fly-honeysuckle (*Lonicera canadensis*) and mountain honeysuckle (*Lonicera villosa*) both have similar oval, paired leaves, but have solid pith and tubular flowers with short triangular petals, and are much shorter in height. Bush-honeysuckle (*Diervilla lonicera*) has solid pith and leaves with fine teeth which are long-pointed at the tip. All native honeysuckles (*Lonicera* spp.) have solid pith.

SHRUBBY HONEYSUCKLES

Similar non-native species: The invasive shrubby honeysuckles can be distinguished as follows: *L. morrowii* (white or yellow flowers) is finely hairy on leaf bottoms, *L. tatarica* (pink flowers) mostly lacks leaf hairs, and their hybrid *L.* x *bella* (light pink to white flowers) is somewhat hairy. Common snowberry (*Symphoricarpos albus*), another opposite-leaved shrub, has clusters of small pink flowers and forms large white berries.

Control methods: Small plants and seedlings may be pulled up by the roots when soil is moist; larger plants can be cut, but re-sprouting will occur. Persistent cutting or burning the root crown multiple times during the growing season over several years may kill the plant, but diligence is required. Mowing can prevent seedlings from establishing. Goats and sheep will browse it but repeated, heavy damage over multiple years is required to kill established shrubs. Glyphosate is the most effective herbicide for honeysuckles. They will hold on to their leaves into the fall which makes them susceptible to a foliar glyphosate application after many native species have dropped their leaves. For cut-stump applications use glyphosate applied immediately after cutting except in early spring. Basal bark application is less effective on these species.

VERY INVASIVE

MULTIFLORA ROSE

(Rambler rose)

Rosa multiflora

Status in Maine: widespread

Description: Perennial, deciduous shrub, up to 20' tall, usually very branched, with arching canes that can grow up other plants and into low tree branches. Canes have stout recurved thorns. Thornless varieties exist, but they are uncommon. **Leaves:** Pinnately compound, 5-11 leaflets, each ~1" long, with teeth. Petiole is fringed at the base (stipule) where it attaches to twig; no other rose in Maine has this character. **Flowers:** 5-parted, white to pale pink, ~1" wide, clustered at twig tips, blooms in June in Maine. **Fruit:** ~¼" round to oblong, red, rose "hips" clustered at twig tips.

Native range: Japan and Asia. **How arrived in U.S.:** Rootstock for ornamental roses; also promoted for erosion control and living fences.

Reproduction: By seed and rooting from twig tips. Birds and mammals eat fruits and disperse seed. Seeds viable in soil for up to 20 years.

Habitat: Reaches largest size and fruiting capacity in full sun but is somewhat shade-tolerant. Found in forest edges, old fields, as well as disturbed sites. Can occur in forest interior after disturbance such as timber harvest. Tolerant of dry to moist soils.

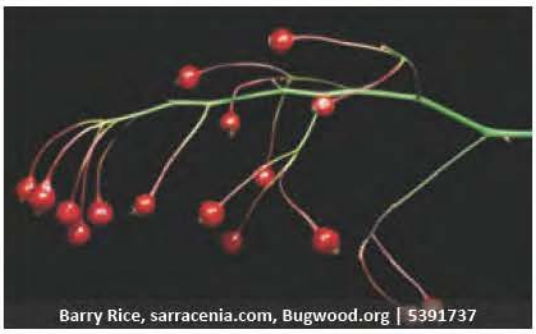
Similar native species: Native roses, but none of our native roses have a fringed base on the leaf petiole. Also, all native roses have pink flowers.

Similar non-native species: Rugosa rose has pink flowers to 2" wide and stems with straight prickles all around. Other horticultural roses escape infrequently and have fewer

MULTIFLORA ROSE

flowers, as well as other prickle arrangements.

Control methods: Small plants and seedlings may be pulled up by the roots when soil is moist (wear gloves!); larger plants can be cut, but re-sprouting will occur. Persistent cutting or mowing multiple times during the growing season over several years may kill the plant, but diligence is required. Mowing can prevent seedlings from establishing. Goats will browse it but repeated, heavy damage over multiple years is required to kill established shrubs. Herbicides are effective as foliar applications (glyphosate or triclopyr solution), cut-stump application (glyphosate or triclopyr solution applied immediately after cutting except in early spring), or basal bark application any time of year (glyphosate or triclopyr ester in bark oil).



SEVERELY INVASIVE

REED CANARY GRASS

Phalaris arundinacea

Status in Maine: widespread

Description: Robust, perennial grass, 2-6' tall, commonly to 4'. **Leaves:** Alternate, ⅓-¾" wide, and 4-8" long, gradually tapering to a point. Leaves are flat, with a rough texture, and come off the stem at a 45-degree angle. Transparent, ~¼" ligule occurs where the leaf sheath meets the stem. **Flowers/seeds:** 3-8" long inflorescences are formed high above the leaves. They begin as slender spikes in early summer, and become somewhat open-spreading when flowering. Color changes from green to purplish to tan as seeds mature. **Stem:** Hairless, sometimes hollow, ~⅓" diameter. **Root:** Sturdy, creeping rhizomes.

Native range: There are native ecotypes of this grass in North America, but the invasive strain is of Eurasian origin. **How arrived in U.S.:** Planted for forage and erosion control on wet pastures and fields. There are also ornamental varieties including one with white-stiped leaves which occasionally naturalizes.

Reproduction: Spreads by seed and vegetatively by rhizomes. Seeds are likely spread via movement of water.

Habitat: Stream and river banks, lakeshores, marshes, ditches, and roadsides. Found in wet soils but not usually in standing water. Only moderately shade tolerant; prefers full sun.

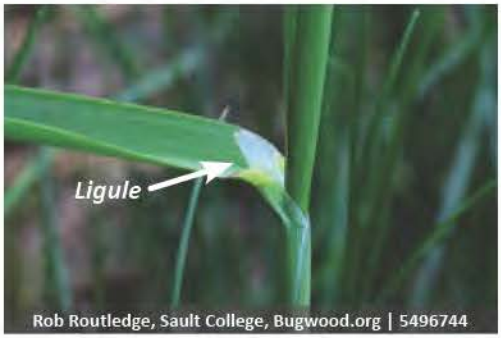
Similar native species: It is not possible to separate the native and non-native strains of reed canary grass without

REED CANARY GRASS

molecular techniques, however the invasive strain grows aggressively in areas with a history of human disturbance, forming large stands. Canada bluejoint (*Calamagrostis canadensis*) is similar and often grows in dense stands in wetland habitats. It has narrower inflorescences, leaves, and stems than reed canary grass.

Similar non-native species: Orchard grass (*Dactylis glomerata*) has narrower leaves (⅛-⅓" wide) and grows in tufts or small clusters as opposed to the spreading habit of reed canary grass.

Control methods: Hand pulling or digging is only practical for small patches. For larger infestations, mowing, if possible, can reduce or eliminate seed production and perhaps lower density over time. Prolonged flooding can kill reed canary grass, but may also kill desirable vegetation if present. Fire can be successfully used to remove the dense reed canary grass litter/thatch build-up. Litter build-up can prevent native species from establishing in areas previously dominated by reed canary grass, so even if treatments to kill the grass are successful, additional work may be needed to achieve a desired condition. Aquatic formulations of glyphosate are somewhat effective, but follow-up will be required, including repeat applications in many cases. ***Special rules apply to herbicide use in or near wetlands and waterbodies - see the section in the back of this guide titled "Use of Herbicides to Control Invasive Plants in or Near Wetlands and Waterbodies."***



Rob Routledge, Sault College, Bugwood.org | 5496744


L. Mehrhoff, Bugwood | 5451286


Leslie J. Mehrhoff, UCONN, Bugwood.org | 5451231

VERY INVASIVE

PURPLE LOOSESTRIFE

Lythrum salicaria

Status in Maine: widespread

Description: Robust, perennial herb 4-6', base of mature plant feels woody. **Leaves:** Simple, opposite or whorled, lanceolate to oblong, entire, sessile. **Flowers:** In long, crowded spikes, deep pink-purple, 5-7 petals, ½-¾" wide, mid to late summer in Maine. Asynchronous flowering - bottom of spikes open first. **Fruit:** Brown, dry capsules persist on stem. **Stem:** Four-angled.

Native range: Europe and Asia. **How arrived in U.S.:** As an ornamental, and as contaminant in ballast, livestock bedding, and possibly wool.

Reproduction: By seeds, which are viable for several years. Seeds are readily transported by water and can float for up to three days, or they may hitchhike on wildlife or in soil or fill.

Habitat: Wetlands, rivershores, lakeshores, and wet open areas such as roadsides, agricultural swales, and powerline corridors. Tolerates saturated conditions (organic/peat) and damp mineral soils. Most prolific in full sun, will survive in partial shade.

Similar native species: Fireweed (*Chamerion angustifolium*) also has spikes of pink-purple flowers, but the flowers are large (~1") and 4-petaled. Fireweed has alternate leaves and tends to grow in uplands. Blue vervain

PURPLE LOOSESTRIFE

(*Verbena hastata*) has spikes of blue-purple flowers and opposite leaves, but the leaves are toothed and the flowers are very small (<⅓") and consistently have 5 petals.

Similar non-native species: None in our area.

Control methods: Small plants or isolated individuals may be dug up by the roots when the soil is moist, but re-sprouting may occur. Persistent cutting or pulling multiple times during the growing season over several years (before flowering) may kill the plant, but diligence is required (at least 3x/year for 3 years is recommended). Herbicides are effective as foliar applications (aquatic glyphosate solution) or cut-drip applications (aquatic glyphosate applied immediately after cutting). Foliar applications of aquatic triclopyr can control loosestrife while avoiding harm to grasses and sedges. Cut-drip applications report less success than foliar applications and are extremely tedious and time-consuming. Regardless of the method chosen, cutting and bagging any flower heads is suggested since this is a prolific seed-producer. ***Special rules apply to herbicide use in or near wetlands and waterbodies - see the section in the back of this guide titled "Use of Herbicides to Control Invasive Plants in or Near Wetlands and Waterbodies."***

Opposite or whorled leaves on four-angled stem

SS AGR 309

UF UNIVERSITY of FLORIDA
IFAS Extension

Japanese clematis, *Clematis terniflora* (D.C.) Ranunculaceae[1]

Michael Meisenburg, Ken Langeland, and Kurt Vollmer[2]

Figure 1. A Japanese clematis has smothered a Southern magnolia in a natural, wooded area of Gainesville, FL.

Introduction

Japanese clematis (*Clematis terniflora*) is a vigorous woody vine that has been used for landscaping in the southeastern United States since 1877. The plant is recommended for landscape use in cold-hardy zones and is sometimes grown on trellises.

Some other frequently used common names for Japanese clematis include the following: sweet autumn virginsbower (http://www.plantatlas.usf.edu), autumn virginsbower (Wunderlin and Hansen 2003), sweet autumn clematis and autumn clematis.

Although native to Asia, Japanese clematis has naturalized and is considered invasive in many areas of the country, including in Florida. Japanese clematis is currently classified by the Florida Exotic Plant Pest Council as a Category II Invasive Species. This designation indicates the plant has increased in abundance and frequency in natural areas, but has not altered native plant communities to the extent caused by a Category I species.

In natural areas, Japanese clematis typically invades along roadsides and thickets, as well as along the edges of woods near creeks. It also grows well in the well shaded understory of forests.

Description

Dark green, glossy leaves are opposite in arrangement with 3 - 5 leaflets ranging from 2 - 3 inches long (Figure 2). The leaves of mature Japanese

1. This document is SS AGR 309, one of a series of the Agronomy Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date, September 2008. Reviewed April 2011. Visit the EDIS website at http://edis.ifas.ufl.edu.
2. Michael Meisenburg, biological scientist; Ken Langeland, professor; and Kurt Vollmer, graduate student assistant, Department of Agronomy, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, FL.

clematis are entirely smooth, without teeth. However, leaves of the small plants may have teeth, which are sometimes rounded (Figure 3). Leaves on small plants are often variegated (Figure 3).

Vines usually grow to about 1/2-inch in diameter (rarely to 4 inches). The vine can climb up to 30 feet with the aid leaf petioles twisting around supports (Figure 4). The bark is light brown with long splits and long shredding strips. Like other *Clematis* species, nodes persist on stems every 6 - 8 inches from where the leaves attach (Figure 5). Sporadic flowering takes place year-round, but occurs primarily in the late summer and early fall. Densely pubescent, star-shaped flowers are white with four sepals about 1 1/4 inch in length (Figure 6). Seeds are small and brown with a white, feathery plume (Figure 7). Mature seeds can germinate anywhere between one and nine months after maturity. Vines trailing along the surface of the ground rarely take root.

Two native species of similar-looking *Clematis* also occur throughout northern and central Florida: virginsbower (*C. virginiana*) and satincurls (*C. catesbyana*). Toothed leaves distinguish each of these native species from Japanese clematis (Figure 8).

Figure 2. Leaves of the invasive Japanese clematis usually have entire margins (smooth edges with no serrations).

Figure 3. Japanese clematis leaves can have some teeth along the margins and light green down the middle.

Figure 4. Leaf petioles wrap around vegetation to support climbing vines.

Figure 5. Clematis stems are distinctive with their swelled nodes every 6-8 inches.

Impacts

Populations of Japanese clematis have been occurring with increased frequency in northern Florida. This invasive plant is a prolific seed producer, and the short-winged appendages and fairly large seed mean most seeds are probably not dispersed far. While this method of dispersal may limit the speed at which the population expands, the

Figure 6. Flowers of Japanese clematis.

Figure 7. A cluster of Japanese clematis seeds. These seeds are not quite mature as evidenced by their light color.

Figure 8. The toothed leaves of native Clematis (such as these *C. catesbyana*) aid in distinguishing them from the invasive *C. terniflora*.

plant occurs at high densities within infested areas. In natural wooded areas, Japanese clematis commonly overgrows saplings and small trees, killing some. (See Figure 1.) As the Japanese clematis vine climbs, it has the potential to smother fully grown trees. In a review of Japanese clematis by UF/IFAS' Assessment of Non-native Plants in Florida's Natural Areas (http://plants.ifas.ufl.edu/assessment/), a lack of sufficient evidence for the invasiveness of the plant in northern and central Florida resulted in Japanese clematis being listed as “OK” for planting throughout Florida.

By contrast, Japanese clematis is considered invasive by exotic/invasive plant councils in Alabama, Georgia, Tennessee, South Carolina, and the Mid-Atlantic, as well as in Florida. Given the invasive designation these councils have assigned to Japanese clematis, and considering, as well, the plant's tendency to escape cultivation and invade intact natural areas, it would be prudent not to cultivate this plant in Florida

Management

Preventative. Japanese clematis is still at the stage where it can be effectively managed by preventing its introduction into new areas. Homeowners should not introduce this plant to their lawns or gardens, but instead plant the native *C. virginiana* or *catesbyana* if so desired. Identification of Japanese clematis is important to distinguish it from the native *Clematis.* Homeowners wishing to remove Japanese clematis vines from their property should properly dispose of cuttings and seeds, leaving them out of mulch and yard waste. Japanese clematis will probably continue to spread in natural areas throughout the Southeast. Natural-area managers should be proficient in identifying the species and be vigilant for its occurrence.

Mechanical. Seedlings may be hand-pulled or mowed. Mature plants can be cut by hand or mowed. Plants must be cut back enough and dug up to ensure complete removal.

Biological. To date no biological control exists for this species. However, leaf damange is occasionally observed (Figure 2) perhaps because Japanese clematis shares its range with several native *Clematis*.

Chemical. Current chemical-control methods include foliar applications of triclopyr amine (e.g. 2-3% Garlon 3A) and triclopyr ester (e.g. 15% Garlon 4 oil) for basal-bark applications. Either formulation, applied to cut stump, is effective in controlling the plant. Foliar application of glyphosate (e.g. 3% Roundup) provides good, but short-term control. For basal-bark applications, be sure to locate where the vine is rooted. Clematis vines will sometimes grow up one tree, trail back down to the ground, and climb up another tree. Applying

herbicide to a trailing vine will only kill the distal part; another treatment will later be required.

References and Useful Links

Clematis terniflora. Kemper Center for Home Gardening, Missouri Botanical Gardens. http://www.mobot.org/gardeninghelp/plantfinder/Plant.asp?cpde=A300

Clematis terniflora Fact Sheet. http://www.cnr.vt.edu/dendro/dendrology/syllabus2/factsheet.cfm?ID=494

Clematis terniflora: Sweet Autumn Clematis http://www.plantoftheweek.org/week273.shtml

Clematis terniflora. Global Invasive Species Database. http://www.invasivespecies.net/database/species/ecology.asp?si=1224&fr=1&sts

Floridata: http://www.floridata.com/ref/c/clem_ter.cfm

Invasive Plant List: Planting for a Livable Delaware. http://dda.delaware.gov/publications/plant_industries/DEInvasPlntBklt.pdf

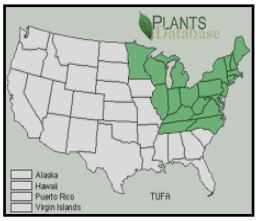
Coltsfoot *Tussilago farfara L.*

Common Names: coughwort, assfoot, horsefoot, foalfoot, bull's-foot, horsehoof, colt-herb, clayweed, cleats, dove-dock, dummyweed, ginger, gingerroot, hoofs, sowfoot, British tobacco, gowan

Native Origin: A native of Europe, this plant is believed to be brought to this country by early settlers for its medicinal properties.

Description: Coltsfoot is a perennial herb in the Aster family (Asteraceae). Solitary flowers are dandelion-like and bright yellow in color. There are several scaly white flower stalks per plant. Flowers emerge before the leaves in early spring through June growing 3 to 12 inches in height. Brown nutlets are attached to a pappus resembling the white fluffy seed heads of common dandelion. The heart-shaped (cordate) leaves appear after flowers have matured. Leaves are 3 to 7 inches wide, slightly toothed, upright and the underside is whitish. They arise directly from the root with no main stem present. Coltsfoot reproduces both vegetatively and sexually. The roots can remain dormant underground for long periods of time.

Habitat: Coltsfoot thrives in low-lying mesic areas including stream banks, moist field or pastures, roadsides, and disturbed areas. It can also be found in drier sites and in poor soils. It is intolerant of shade and is not commonly found in wooded areas, though it has been documented invading forests following fire.



Distribution: This species is reported from states shaded on Plants Database map. It is reported invasive in CT, ME, NC, NJ, and TN.

Ecological Impacts: Plant can be very competative and may have the capacity to invade natural communities along disturbance corridors, or to spread from stands in disturbed sites into undisturbed areas.

Control and Management:

- **Manual**- Initial infestations may be controlled by hand pulling to remove the entire plant.
- **Chemical**- It can be effectively controlled using any of several readily available general use herbicides such as glyphosate. Treat in summer when the leaves of coltsfoot are fully developed. Follow label and state requirements.

References: www.invasive.org, www.hort.purdue.edu, www.weedmapper.org/tufa.html www.forestryimages.org/search/action.cfm?q=coltsfoot

Produced by the USDA Forest Service, Forest Health Staff, Newtown Square, PA. WOW 01-18-06
Invasive Plants website: http://www.na.fs.fed.us/fhp/invasive_plants

Invasive Plants in Pennsylvania

Bull Thistle

Cirsium vulgare (Savi) *Ten.*

Photo: Western New Mexico University, Dept. of Nat. Sci. & Dale A. Zimmerman Herbarium

Background:

Thought to have been introduced to eastern North America during colonial times and western North America during late 1800s.

Range:

This plant is native to Europe, western Asia and northern Africa. It can now be found on every continent except Antarctica, and it is present in all 50 states in the U.S., although it is not as common in the southern states as it is in the north.

pennsylvania
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
www.dcnr.state.pa.us

Description:

Stems grow up to seven feet tall and have lance shaped, hairy leaves that are three to 12 inches long. There are lobes on each leaf, and they are tipped with stout spines. Flower heads are purple and one to two inches across. They appear from June to September.

Photo: Steve Dewey, Utah State U., www.invasive.org

Habitat:

This plant has the ability to become established in a wide variety of areas, especially ones that have been disturbed, like clearcuts, riparian areas and pastures.

Biology and Spread:

Bull thistle reproduces and spreads exclusively by seed. Plants produce 100 to 300 seeds per flower head, with up to 400 flower heads per plant. Seeds exhibit features that are suited for wind dispersal. Roughly 90 percent of seeds land within a distance of 1.5 times the height of the parent plant, however up to 10 percent of seeds produced do travel over 80 feet.

Ecological Threat:

Bull thistle has the potential to form dense thickets that displace and prevent native vegetation from establishing. The spiny features of the plant also make it unpalatable to wildlife and livestock, reducing forage land available.

Photo: Steve Dewey, Utah State U., www.invasive.org

How to Control this Species:

Prevention

Prevention should be the first goal in any control efforts for this plant. Equipment and gear need to be extensively cleaned after use in an infested area, to prevent seed transport. Use of weed-free seed should also be conducted.

Manual and Mechanical

Manual removal of plants via hand pulling, tilling and hoeing can be effective, but care should be taken to conduct these measures before flowering, in order to prevent seed production and spread. Slicing off the root crown has proven to be very effective at controlling this plant.

Chemical

Herbicides are most effective at controlling infestations when incorporated as part of a long-term, multifaceted control effort. Herbicide applications should be optimally timed in order to have the greatest effect.

Regardless of the control measures taken, reestablishing competitive, desirable vegetation to the site is critical.

Look-A-Likes:

Native species of thistle (*Cirsium* sp.), some of which are rare, could be confused with bull thistle. Before control is attempted, the thistle species in question should be accurately identified.

Chris Evans, River to River CWMA
www.forestryimages.org

References:

Zouhar, Kris. 2002. Cirsium vulgare. In: Fire Effects Information System. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory: http://www.fs.fed.us/database/feis

Center of Invasive Species and Ecosystem Health: www.invasive.org

For More Information:

DCNR Invasive Species Site: http://www.dcnr.state.pa.us/conservationscience/invasivespecies/index.htm

DCNR Invasive Exotic Plant Tutorial for Natural Lands Managers: http://www.dcnr.state.pa.us/forestry/invasivetutorial/canada_thistle.htm

Plant Invaders of Mid-Atlantic Natural Areas, National Park Service, http://www.nps.gov/plants/alien/pubs/midatlantic/midatlantic.pdf

Invasive Plants Field and Reference Guide, U.S. Forest Service: http://na.fs.fed.us/pubs/misc/ip/ip_field_guide.pdf

EXHIBIT 9-3 FARMLAND SOILS AFFIDAVIT

Broadwater Environmental, LLC
18 Grand St., South Portland, ME 04106

December 6, 2023

Mr. Jim Cassida, Project Manager
Tetra Tech
451 Presumpscot Street
Portland, ME 04103

Dear Jim,

Subject: Evaluation of Prime Farmland and Soil of Statewide Importance, Hartland Solar Project; Hartland, Maine

You have requested my assistance with determining whether Prime Farmland and/or Soil of Statewide Importance exists on Hartland Solar Project site. As you are aware, the Maine Legislature enacted "An Act To Promote Solar Energy Projects and Distributed Generation Resources in Maine" in 2019. The Act stipulates projects be sited where no more than 10 percent of the project area is comprised of Prime Farmland and Soil of Statewide Importance.

The purpose of this letter is to describe the evaluation process used to determine whether Prime Farmland Soil and/or Soil of Statewide Importance exists on the site. The results of the evaluation are also discussed.

Project Background

Tetra Tech has been retained by Hartland Solar Facility, LLC, formerly Strobus Solar, LLC, to assist in obtaining permits to construct and operate the proposed 400-Gigawatt solar energy farm on 1130 acres of land owned by Weyerhaeuser in Hartland, Maine. As part of the permitting process, Tetra Tech identified the need for a Class C soil map soil in the area planned to host the arrays and associated inverters, and Class B soil maps for two proposed associated electrical substations. The maps are contained in the report, 'Soil Map Report for Hartland Solar, Hartland, Maine" (BE, 2022).

Broadwater Environmental, LLC was retained by Tetra Tech to complete the soil mapping required. Ian Broadwater, Maine Certified Soil Scientist SS305, completed the fieldwork to support the mapping in 2021 and 2022. Soil series level interpretations were made by completing 80 hand auger observations and 152 test pits dug using a tracked CAT 305 excavator in 2021. To facilitate completion of the test pits, a timber harvester was used to cut access roads to the test pit locations, when needed.

In 2022, an additional 78 test pits and 4 logged boring were completed in locations that coincided with proposed stormwater control features. Due to the stoniness of the soil, particularly on the surface, more test pits were completed than was originally planned.

Soil observations were made to 48 inches below ground surface in the test pits, or as deep as bedrock would allow. The depth of auger borings was generally limited to less than 20 inches due to extremely dense subsoil and the presence of coarse fragments.

Evaluation Process

Soil data collected as part of the Class C and Class B soil map effort, was used to evaluate if portions of the project area contained Prime Farmland Soil or Soil of Statewide Importance. The criteria set forth in the document "Determining Prime Farmland Soil and Soil of Statewide Importance for Siting Solar Projects in Maine" published by the Maine Department of Agriculture Conservation and Forestry (DACF) (DACF, 2020) was used to complete the evaluation. This document lists several conditions that must be present to consider an area Prime Farmland Soil or Soil of Statewide Importance.

Results

The results of project-specific soil mapping showed a majority of soil on the site occur in a somewhat poorly drained condition. The Dixmont soil series, the most common on-site, can occur in a moderately well drained or somewhat poorly drained condition. The different drainage conditions of this series were parsed out on the project soil maps to provide a more accurate design of stormwater controls and depiction of expected conditions during construction.

One of the criteria discussed is the water table must be at least 24 inches below the surface to be considered an area of Prime Farmland. The content of coarse fragments must also be less than 10%. These two criteria are of particular importance for this project because one, or both of these criteria, were not met by a majority of the soils project area.

After completion of the Class C and B soil maps for the project, two important conditions were documented on the site:

- A majority of soil on the site are somewhat poorly drained or less well drained (i.e., poorly and very poorly drained).
- Rocks occur at the site in significant amounts. A very stoney surface was noted 20 times during the fieldwork. Some of the surface coarse fragments were the size of small cars. Many areas were noted to contain ten percent or more coarse fragments (i.e., particles larger than coarse sand) throughout the soil profile.

The presence of these conditions eliminated a large portion of the project area as Prime Farmland Soil or Soil or Statewide Significance.

Only one area on the site qualified as Prime Farmland Soil based on the latest guidance (DACF, 2020) and that was in the center of the site. This area was mapped by Broadwater Environmental as Dixmont silt loam, moderately well drained. However, only a portion of the map unit was found to have soil meeting the required depth to water table. This area is comprised of 40 acres as shown on the attached figure. There is also an area meeting the criteria of a Soil of Statewide Importance bordering the Prime Farmland Soil area on the north side. It is also within the Dixmont map unit and is approximately 4 acres. This area is also shown in the attached figure.

Based on the project size (1130 acres), only 3.5 percent of the project area is Prime Farmland Soil and 0.3 percent is Soil of Statewide Importance. Therefore, these soils

make up 3.8 percent of the total project area, well below the 10 percent threshold in the latest guidance (DACF, 2020).

I hope this letter provides the information you need for permitting. If you have any questions, please call me at 207-523-9029.

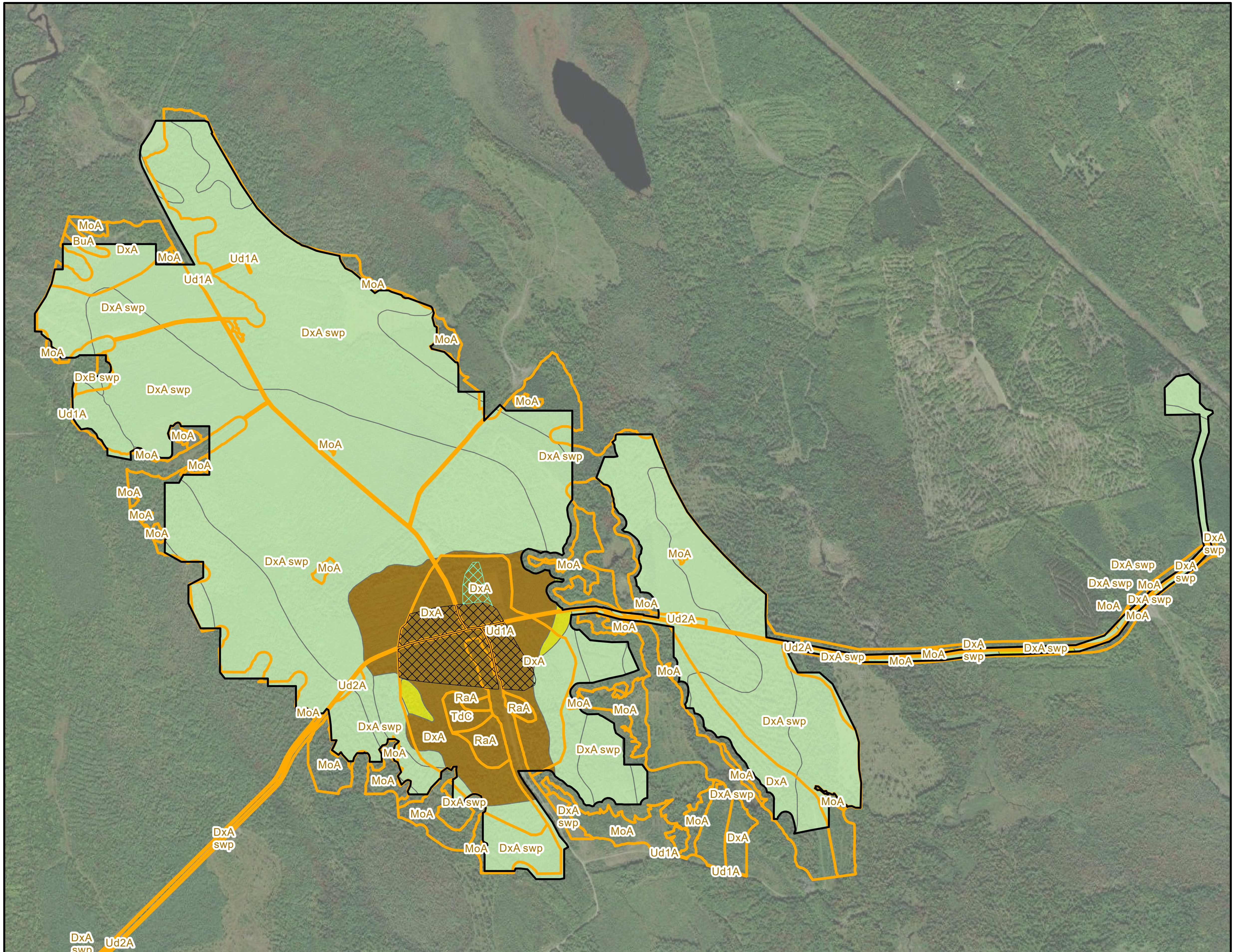
Sincerely,

Ian Broadwater
Owner; Broadwater Environmental, LLC
Certified Soil Scientist No. 305

References

BE, 2022. "Soil Map Report for Hartland Solar, Hartland, Maine". Broadwater Environmental, LLC, October 2022.

DACF, 2023. "Determining Prime Farmland and Soils of Statewide Importance for Siting Solar Projects In Maine." Maine Department of Agriculture Conservation and Forestry, May, 2020.



Legend

- Development Area
- Delineated Prime Farmland Soils (40 acres)
- Delineated Soil of Statewide Importance (4 acres)
- Delineated Soil Series

NRCS Farmland Soils

- Prime Farmland Soil
- Soil of Statewide Importance
- Not Prime Farmland

N

0 500 1,000 2,000 Feet

Farmland Soils
Hartland Solar Project

Prepared For: Hartland Solar Facility LLC

Prepared By: TETRA TECH

Date: **12/2023**

Source: Esri, et al. 2022, Broadwater 2023

Coordinate System: North American Datum, 1983
Maine State Plane East, Feet

Not for Construction