



**DETERMINING PRIME FARMLAND SOILS  
AND  
SOILS OF STATEWIDE IMPORTANCE  
FOR SITING SOLAR PROJECTS IN MAINE**

**May 2020**

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**I. KEY DEFINITIONS:**

Term	Definition
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>High-Value Agricultural Land (HVAL)</b> (DACF Chapter 575 Rules)</p>	<p>Land that has physical properties that indicate high suitability for agriculture.</p> <ol style="list-style-type: none"> <li>1. HVAL includes land that amounts to one (1) or more contiguous acres &amp; meets the definition of:               <ol style="list-style-type: none"> <li>A. “Prime farmland,” “farmland of statewide importance,” or a combination of the two, as verified by a “field-based survey” conducted by a “licensed soil scientist” in accordance with the most recently updated version of the DACF guidance document “<i>Determining Prime Farmland Soils and Soils of Statewide Importance for Siting Solar Projects in Maine;</i>” [This document]</li> <li>B. “Blueberry barren;” or</li> <li>C. “PFAS-impacted HVAL.”</li> </ol> </li> <li>2. To be considered HVAL, a “field-based survey” is required to confirm that the land:               <ol style="list-style-type: none"> <li>A. Is not occupied by residential, commercial, or industrial uses that substantially reduce agricultural potential; and</li> <li>B. Has no structures except for i) farm-related infrastructure or ii) energy generation and transmission structures that accommodate co-located agricultural activities.</li> </ol> </li> <li>3. The definition of HVAL does not include the following:               <ol style="list-style-type: none"> <li>A. Land that meets the definition of “contaminated land” or “forestland.”</li> <li>B. Land with existing conditions such as impervious surfaces, gravel roads, asphalt roads, land that has been stripped of the topsoil, land that has soil exposure due to surface mining activities, and/or other alterations that make it unfit for agricultural purposes. For the purposes of this subsection, “existing” means at the time of permit application submittal to DACF and prior to the “start of construction.”</li> </ol> </li> </ol>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Field-Based Survey</b> (DACF Chapter 575 Rules)</p>	<p>An on-site survey of the solar energy development “land area” that includes the following components:</p> <ol style="list-style-type: none"> <li>1. A high-level assessment of current or past site uses, such as residential, commercial, industrial, agricultural, or undeveloped.</li> <li>2. A high-level inventory of on-site structures and impervious surfaces. This may include, but is not limited to, farm-related infrastructure, energy generation structures, and transmission structures.</li> <li>3. An inventory conducted by a licensed soil scientist of soil resources that is based on a systematic field examination, description, and classification of soils in accordance with the most recently updated version of the DACF guidance documents “<i>Identifying High-Value Agricultural Land</i>” and “<i>Determining Prime Farmland Soils and Soils of Statewide Importance for Siting Solar Projects in Maine.</i>”</li> </ol> <p>Only subsection (3) above must be conducted by a “licensed soil scientist.” Subsections (1) and (2) above may be conducted by an environmental scientist, engineer, consultant, site evaluator, or an individual who is qualified to fulfill the requirements of these subsections.</p> <p>If any one of subsections (1) through (3) above disqualifies the land area from being considered HVAL, then the survey components of the other two subsections are not required to be completed (e.g., if a “licensed soil scientist” finds that the “land area” surveyed does not meet the qualifications to be categorized as HVAL, then an additional survey of site uses and an inventory of on-site structures is not required).</p>

Term	Definition
<b>Prime Farmland<sup>1</sup></b> (7 C.F.R. § 657.5(a)(1))	<p>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 cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water).</p> <p>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. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air.</p> <p>Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding.</p> <p>Examples of soils that qualify as prime farmland are Paxton fine sandy loam, 3 - 8 percent slopes; Bangor silt loam, 0 – 8 percent slopes; and Caribou gravelly loam, 0 – 8 percent slopes.</p>
<b>Farmland of Statewide Importance<sup>2</sup></b> (7 C.F.R. § 657.5(c))	<p>This is land, in addition to prime and unique farmlands, that is of statewide importance for the production of food, feed, fiber, forage, and oil seed crops. Criteria for defining and delineating this land are to be determined by the appropriate State agency or agencies.</p> <p>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. Some may produce as high a yield as prime farmlands if conditions are favorable. In some states, additional farmlands of statewide importance may include tracts of land that have been designated for agriculture by state law.</p>

## II. INTRODUCTION

This guidance document explains how to identify prime farmland soils (“prime soils” or “PF”) and soils of statewide importance (“state soils” or “SOSI”) as part of the process for identifying high-value agricultural land (HVAL) under the Department of Agriculture, Conservation, and Forestry (DACF) Chapter 575 rules, [Permitting Solar Energy Developments on High-Value Agricultural Land](#) (“Chapter 575 rules”).

If you are only trying to identify prime and state soils, unrelated to HVAL or solar development, then please disregard the following sections: I. Key Definitions for “High-Value Agricultural Land (HVAL)” and “Field-Based Survey,” III. High-Value Agricultural Land (HVAL), and VI. Report.

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<sup>1</sup> Note: The terms “prime farmland” and “prime soils” are used interchangeably in this guidance document.

**\*\*An important distinction to make between the federal definition of prime farmland and the state definition of HVAL is that forestland is not considered HVAL, even if the soil beneath it consists of prime and/or state soils.\*\***

<sup>2</sup> Note: The terms “farmland of statewide importance,” “soils of statewide importance,” and “state soils” are used interchangeably in this guidance document.

### III. HIGH-VALUE AGRICULTURAL LAND (HVAL)

#### BACKGROUND

The Chapter 575 rules implement [2023 legislation](#) directing DACF to define HVAL and establish a compensation fee program for solar energy developments constructed on HVAL. The term HVAL was created by the 2023 legislation (38 M.R.S.A. §§ 484-C, 3201 & 3202) and has no prior statutory or regulatory history (see Section I for the definition).

When evaluating soil to determine if HVAL is present at a site, this guidance document should be used in conjunction with the latest version of the *High-Value Agricultural Land (HVAL) Identification Protocol* (“HVAL ID Protocol”), found on the [DACF HVAL landing page](#). That webpage is the best source for up-to-date resources related to HVAL identification. Together, this guidance document and the HVAL ID Protocol describe the role of a licensed soil scientist (LSS) in determining whether land meets the definition of HVAL.

An LSS is responsible for conducting the soil resources inventory component of a field-based survey when such an inventory is required. The definition of “field-based survey” (see Section I) identifies when the services of an LSS are necessary. In some circumstances, an LSS is not required, such as when factors unrelated to pedology exclude the land from meeting the definition of HVAL. Exclusions, exceptions, and other disqualifying characteristics are described in the HVAL definition and the HVAL ID Protocol.

A field-based survey is required to confirm the presence of HVAL. Users should consult the HVAL ID Protocol to understand the steps in the HVAL identification process that may occur *before* soil resources are inventoried. The guidance in this document applies once the HVAL identification process has reached the soil resources inventory stage.

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**The Point:** Legislation from 2023 and the rules that resulted from that statute created new protections for high-value agricultural land (HVAL). *This document provides guidance on how to conduct an inventory of soil resources and identify prime farmland soils and soils of statewide importance, which are important components in identifying HVAL.*

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#### HVAL SCALE

From a soils standpoint, the land in question must be at least one contiguous acre of either prime soils, state soils, or some combination thereof to be considered HVAL. Therefore, prime and state soil determinations should be conducted at a 1-acre scale, akin to a Class B Soil Survey. The survey area may have multiple pockets of HVAL interspersed throughout.

For example, a 20-acre site may have a 5-acre patch of prime soil in one area and a 1-acre patch of state soil in another. These areas need to be mapped in enough detail so that a client may calculate the acreage of HVAL impacted by the solar development, for the purpose of determining the mitigation fee. The standards for map unit sizes with limiting inclusions should meet the Class B Soil Survey standards. However, this does not mean a Class B narrative report is required.

## SOIL SURVEY VS. NRCS MAPS

Prime farmland and soils of statewide importance (also sometimes referred to as farmland of statewide importance) are defined by the USDA's Natural Resource Conservation Service (NRCS) and can be cross-referenced to widely available soil maps.

### Why is a soil survey required when NRCS soil maps already exist?

- **Map Units vs. Soil Series.** NRCS soil maps are insufficient for calculating HVAL compensation fees because their classification is based on soil map *units*, rather than soil *series*. While many map units are named for the dominant soil series they contain, map units typically contain other soil series as well. **See Example 1.**
- **Map Scale.** The scale at which NRCS mapping is conducted is not designed to identify a soil series to map units that are one acre in size.
- **Maps Change with Time.** NRCS soil mapping concepts have evolved, new soil series have been introduced, and the soils at a site may have been significantly altered since the maps were created.
- **Soil Series Variations.** Some soil series exhibit a range of characteristics, not all of which meet the criteria for prime farmland or farmland of statewide importance. *Only the portions of a soil series that meet these specific criteria would qualify as such.* **See Example 2.**

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**The Point:** An on-site soil survey using established technical criteria is required to confirm whether prime or state soils are present when evaluating a proposed solar site for the presence of HVAL.

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### EXAMPLE 1

The Marlow–Brayton–Peru Complex is a soil map unit that can be found in York County, Maine. This map unit contains three main soil series, each with a distinct drainage class:

**Marlow** = well-drained

**Brayton** = somewhat poorly drained to poorly drained

**Peru** = moderately well-drained.

In this case, **only the moderately well-drained and well-drained components would be considered prime farmland or soils of statewide importance.** The somewhat poorly drained component would only qualify as SOSI if drained.

### EXAMPLE 2

While the Marlow series is generally well drained, it is mapped in multiple phases that differ in slope and surface characteristics:

**Marlow loam, 0–3% slopes** = qualifies as PF or SOSI

**Marlow loam, 3–8% slopes** = qualifies as PF or SOSI

**Marlow loam, 8–15% slopes** = does not qualify as PF or SOSI due to erosion limitations

**Marlow loam, very stony phases** = do not qualify as PF or SOSI due to cultivation limitations

In this case, although all mapped areas belong to the same soil series, **only those portions of the Marlow soil series that meet applicable slope and surface-condition criteria qualify as prime farmland or soils of statewide importance.**

#### IV. PRIME FARMLAND CRITERIA

The Code of Federal Regulations (C.F.R.) lists specific criteria that land must meet to be considered prime farmland. Additionally, the National Soil Survey Handbook (NSSH) identifies additional considerations when identifying prime farmland. These criteria include:

- **Moisture Regime** – *“The soils have:*
  - *“Aquic, udic, ustic, or xeric moisture regimes and sufficient available water capacity within a depth of 40 inches, or in the root zone..., to produce the commonly grown cultivated crops ... adapted to the region in 7 or more years out of 10; or” (7 C.F.R. § 657.5(a)(2)(i)(A)).*
  - *“Xeric or ustic moisture regimes in which the available water capacity is limited, but the area has a developed irrigation water supply that is dependable (a dependable water supply is one in which enough water is available for irrigation in 8 out of 10 years for the crops commonly grown) and of adequate quality; or” (7 C.F.R. § 657.5(a)(2)(i)(B)).*
  - *“Aridic or torric moisture regimes and the area has a developed irrigation water supply that is dependable and of adequate quality” (7 C.F.R. § 657.5(a)(2)(i)(C)).*
- **Temperature Regime** – *“The soils have a temperature regime that is frigid, mesic, thermic, or hyperthermic (pergelic and cryic regimes are excluded)...” (7 C.F.R. § 657.5(a)(2)(ii)).*
- **pH** – *“The soils have a pH between 4.5 and 8.4 in all horizons within a depth of 40 inches in the root zone if the root zone is less than 40 inches deep” (7 C.F.R. § 657.5(a)(2)(iii)).*
- **Conductivity** – *“The soils can be managed so that, in all horizons within a depth of 40 inches or in the root zone if the root zone is less than 40 inches deep, during part of each year the conductivity of the saturation extract is less than 4 mmhos/cm and the exchangeable sodium percentage is less than 15” (7 C.F.R. § 657.5(a)(2)(v)).*
- **Surface Stoniness** – *“Less than 10% of the surface layer (upper 6 inches) in these soils consists of rock fragments coarser than 3 inches” (7 C.F.R. § 657.5(a)(2)(ix)).*
- **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” (7 C.F.R. § 657.5(a)(2)(iv)).*
- **Erodibility** – *“The product of K (erodibility factor) × percent slope is less than 2.0, and the product of I (soils erodibility) × C (climatic factor) does not exceed 60” (7 C.F.R. § 657.5(a)(2)(vii)).*
- **Permeability Rate** – *“The soils have a permeability rate of at least 0.06 inch per hour in the upper 20 inches and the mean annual soil temperature at a depth of 20 inches is less than 59°F; the permeability rate is not a limiting factor if the mean annual soil temperature is 59°F or higher” (7 C.F.R. § 657.5(a)(2)(viii)).*
- **Flooding** – *“The soils are not flooded frequently during the growing season (less often than once in 2 years)” (7 C.F.R. § 657.5(a)(2)(vi)).*
- **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 farmland criteria” (NRCS NSSH pt. 622.3(a)(1)(iii)).*

## V. PRIME FARMLAND DETERMINATION

Below is a suggested order of operations for determining whether a soil is prime farmland. The order of tasks listed below is designed to maximize efficiency and minimize cost, with the least intensive soil properties assessed first and the more in-depth soil properties assessed later.

### NEXT STEPS IF PRIME FARMLAND IS NOT DETECTED

- If an investigation of a certain soil property disqualifies it from prime status, then you may immediately advance your investigation to determine whether the soil meets the criteria for soils of statewide importance.
- **Example:** If you determine that the upper 6 inches is made up of approximately 15% of coarse fragments, then you may skip steps 6 through 11 below and investigate whether the soil in question meets the state soils criteria, as described in the next section.

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**Note:** Remember to state the reason for ending the soils investigation early and identify which soil property disqualifies it from prime status in the narrative provided to your client.

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### TO DETERMINE IF A SOIL IS PRIME FARMLAND, YOU SHOULD NOT NEED TO EVALUATE

1. The soil moisture regime. All of Maine has a soil moisture regime that qualifies (aquic or udic).
2. The soil temperature regime. Frigid and mesic qualify, but cryic does not.
3. The soil pH. The allowable range is 4.5 to 8.4.
4. The soil conductivity.



**TO DETERMINE IF A SOIL IS PRIME FARMLAND, YOU SHOULD EVALUATE:**

1. The surface stoniness

- There cannot be too many stones to interfere with farming. **To be considered prime farmland, the soil must meet the criteria for surface stoniness Class 3 or lower (<15% of surface).**



Figure 3-11 from NRCS Soil Survey Manual of Class 3 surface stoniness.<sup>3</sup>

Classes of Surface Stones & Boulders in Terms of Cover & Spacing					
Class	% of surface covered	Distance in meters between stones or boulders if the diameter is:			Descriptive term
		0.25 m*	0.6 m	1.2 m	
1	0.01 to < 0.1	≥ 8	≥ 20	≥ 37	Stony or bouldery
2	0.1 to < 3.0	1 – 8	3 – 20	6 – 37	Very stony or very bouldery
3	3.0 to < 15	0.5 – 1	1 – 3	2 – 6	Extremely stony or extremely bouldery
4	15 to < 50	0.3 – 0.5	0.5 – 1	1 – 2	Rubbly
5	≥ 50	< 0.3	< 0.5	< 1	Very rubbly

\* 0.38 m if the fragment is flat.

Table 3-4 from NRCS Soil Survey Manual of surface stoniness classes.<sup>4</sup>

<sup>3</sup> U.S. Department of Agriculture. 2017. *Soil Survey Manual*. USDA Handbook No. 18. Washington, DC: U.S. Government Publishing Office. Fig. 3-11, p. 144.

<sup>4</sup> U.S. Department of Agriculture. 2017. *Soil Survey Manual*. USDA Handbook No. 18. Washington, DC: U.S. Government Publishing Office. Table 3-4, p. 142.

- Determine the percent of the surface layer (upper 6 inches) that contains coarse fragments over 3 inches. **To be considered prime farmland, the surface layer must contain less than 10% of coarse fragments over 3 inches.**
2. The seasonal groundwater table depth.
    - The depth to the seasonal groundwater table must be deep enough during the cropping season to allow cultivated crops common to the area to be grown.
    - **To be considered prime farmland, the depth to the seasonal groundwater table must be 16 inches or deeper.** If the groundwater table is at a depth of less than 16 inches, the soil can also be drained to qualify as prime farmland.
    - Most map units in Maine are drained, but a few undrained areas are included. Note that only the drained areas meet the prime farmland criteria.
  3. The erodibility of the soil.
    - Slope alone is not a criterion for evaluating prime farmland but is tied to the erodibility of the soil. Look up the K factor and multiply it by the slope. This is typically accomplished by assigning the soil exploration to a soil series, and then finding the K factor for that series on Web Soil Survey, preferably in the same county.
    - **To be considered prime farmland, the product of the K factor and slope must be < 2.0.**
  4. The permeability rate of the soil.
    - 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 inches per hour or more. Layers below a hardpan or bedrock will not have adequate permeability. This is typically accomplished by assigning the soil exploration to a soil series and then finding the permeability rate for that series on Web Soil Survey, preferably in the same county.
    - **To be considered prime farmland, there cannot be a root restrictive layer in the upper 20 inches, and the permeability rate of the soil must be  $\geq 0.06$  inches per hour in the upper 20 inches.**
  5. How often the soil floods.
    - You will rarely find a soil being evaluated for HVAL with a flooding frequency greater than once every two years, more so because site selection for a solar development would tend to avoid these areas. Use your judgment when evaluating this criterion and/or consider an interview with the site owner.
    - **To be considered prime farmland, the soil must not flood more often than once every 2 years.**

6. If there is an adequate and dependable water supply.
  - Soils that are somewhat excessively or excessively drained would not qualify as prime farmland unless irrigated or receiving regular precipitation.
  - ***To be considered prime farmland, the soil must have a dependable water supply, whether from the water table, irrigation, pond, well, or other on-site water source.***
  
7. What percentage of the soils meet the criteria for prime farmland.
  - ***To be considered prime farmland, 50% or more of the soil must meet the criteria for prime farmland.*** Small areas of soil meeting the criteria scattered about a site do not have to be added up, as they would not be realistically farmable.
  - **Example:** In wetland delineations, an area with pit and mound topography may act as a wetland (the pits) or an upland (the mounds). The assessment focuses on the predominant soil, vegetation, and hydrologic characteristics of the overall landscape unit to determine if it acts more as a wetland or an upland. Similarly, when determining prime farmland, only 50% of the area would have to meet the criteria.

## **VI. SOILS OF STATEWIDE IMPORTANCE CRITERIA & DETERMINATION**

According to 7 C.F.R. § 657.5(c), “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.”

There is no national instruction for the identification of state soils; however, instructions for identifying soils of statewide importance are determined by state NRCS offices. Instructions for state soils were released by Maine NRCS via *Maine Instruction 430-380 – Prime, Statewide, Unique and Locally Important Designation* in May 2020. The list of soils of statewide importance criteria below is in line with the most up-to-date information from NRCS.

### **SOILS OF STATEWIDE IMPORTANCE CRITERIA**

1. Soils do not meet prime farmland criteria.
2. Soils do not have a seasonal groundwater table within 12 inches of the mineral soil surface during the growing season of most years (moderately well or well drained).
3. Soils are less than 15% slope.
4. Soils have less than 3% cover of rocks or stones greater than 10 inches in diameter.
5. Soils have less than 40% cover of rocks or stones less than 10 inches but more than 2 inches in diameter.
6. Soils have more than 20 inches to a root restrictive layer (hardpan or bedrock).
7. Soils have greater than 2 inches of available water holding capacity in the upper 20 inches of soil (loamy fine sand or finer).
8. To be considered soils of statewide importance, the evaluation area must be composed of at least 50% coverage of soils meeting the criteria for a) soils of statewide importance or b) a combination of prime farmland and soils of statewide importance, where less than 50% of the components are prime farmland.

### **NEXT STEPS IF STATE SOILS ARE NOT DETECTED**

- If at any point in the assessment, it is determined that the soil does not meet statewide importance standards, conclude the investigation.
- In the narrative provided to the client, remember to state the reason for ending the state soils investigation early and identify which soil property disqualifies it from state soil status.

## VII. REPORT

### REPORTING GOALS

- Provide the client with enough information to know if at least one acre of contiguous prime soil, state soil, or a combination thereof, is present on-site, and if so;
- Be able to depict the location with enough specificity to calculate the acreage of impact.

### REPORTING REQUIREMENTS

Reporting requirements will depend on the presence or absence of prime and/or state soils. Please be sure to review the *High-Value Agricultural Land (HVAL) Identification Protocol* for any additional reporting requirements beyond those described below.

#### **If there are no prime/state soils:**

1. A template is available on the DACF HVAL landing page. The template asks the LSS to attest to the fact that no prime/state soils were present at the site. The signature of an LSS is required on this form.
2. The form asks the LSS to provide a short narrative detailing how this determination was made. Key information may include how many test pits were dug and the reasons soils were disqualified from prime or state status. The LSS may add any other information you deem important to your assessment. If prime/state soils are observed on site, but they did not constitute one contiguous acre, the LSS should report this in the narrative.
3. **The LSS DOES NOT need to provide a map or test pit data** for the permitting process. However, the client may request that you provide that data to them. So, discuss deliverables with your client ahead of time.

#### **If there are prime/state soils:**

1. **Provide a report** that, at a minimum:
  - a. Contains a brief description of the process used to evaluate the soils;
  - b. Identifies the type of soils (prime and/or state) found;
  - c. Maps where prime and/or state soils are located on the site; and
  - d. Provides the acreage of each soil type found.
2. **Provide a digital map** identifying where the prime and/or state soils are located and where representative test pits were dug. The map should be drawn according to MAPSS Class B HISS standards.
3. **Provide representative test pit data** for prime, state, and non-prime/state areas. For example, if you have a 20-acre site, dug 20 test pits, found 5 acres of prime soils, and 15 acres of non-prime/state soils, you only need to submit data for two test pit datasheets: one for the prime soils and one for the non-prime/state soils.

In your report, state the acreage that the test pit data represents (e.g., “Test pit data at site A is representative of all 5 acres of prime soils and test pit data at site B is representative of all 15 acres of non-prime/state soils.”). You may submit test pit data according to your normal reporting standards, or you may simplify the test pit data as you deem necessary for prime/state determinations.