MACC Annual Environmental Conference 2015
Workshop #17
Solar Arrays: Permitting Issues for Commissions to Consider

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Green Communities Act

- In 2008, Massachusetts enacted the Green Communities Act to encourages investment in renewable energy and boost energy efficiency.

- MassDEP supports the Green Communities Act by:
  - providing grants to municipalities
  - Working with the Clean Energy Center and others to site projects
  - Developing policy on emerging renewable energy issues
  - Encouraging solar projects to locate on closed landfills

Site Solar Arrays Outside of Wetlands

Intro to Ground Mounted Solar PV

- Solar photovoltaics (PV) convert sunlight into electrical energy through an array of solar panels that connect to the electrical grid.
- Solar cells are aggregated together to form a PV panel/module. A solar array includes several panels wired together to achieve the desired power producing capability.
- Solar PV panels produce direct current (DC) power, which must be converted to alternating current (AC) power which is supplied by electric utilities in the U.S.; accomplished by an inverter.
- Interconnection is the process of connecting a solar PV system to the electric grid.
- There are a number of financing incentives in place to encourage solar development projects in MA including but not limited to state and federal tax credits and renewable energy credits/solar renewable energy credits (SRECS).

Understanding the Construction Process

Site Preparation

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Site Stabilization

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Access Roads/Wetland Crossings

Foundation Work

Installing the Panel Supports on the Foundations

Panel Installation

Solar Arrays

Electrical Interconnection

Perimeter Fencing

Wetlands Protection Act Permitting Process

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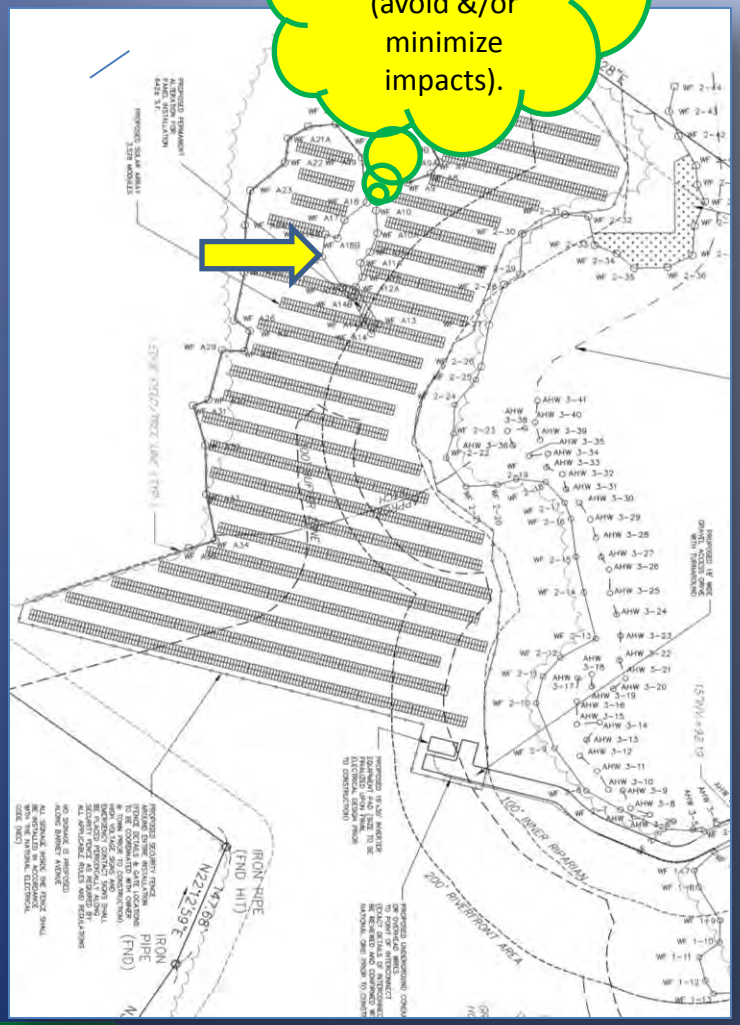
Solar Arrays Should Not be Sited in BVW (avoid &/or minimize impacts).



First Step is Avoidance!

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Second Step is Minimization!

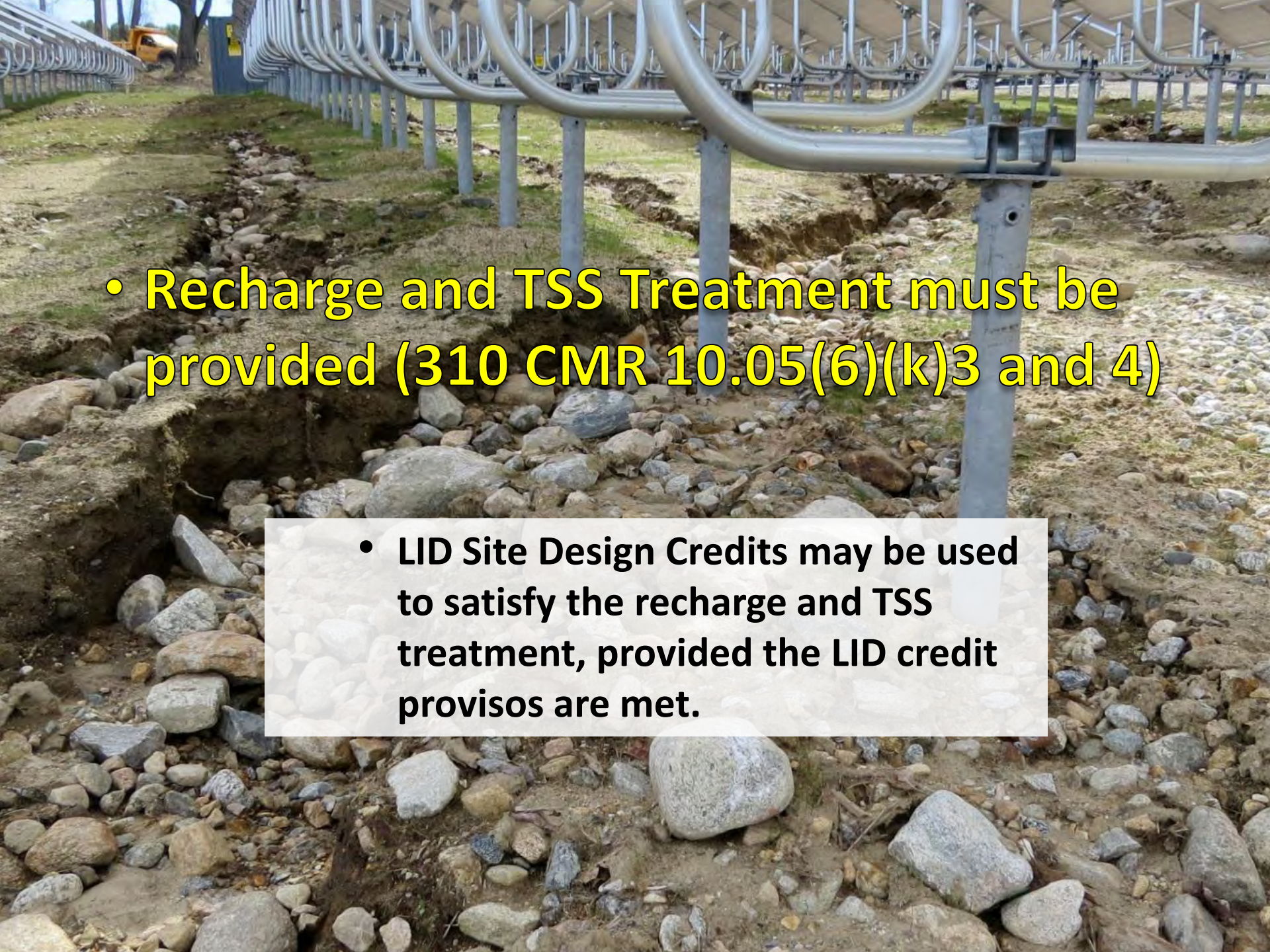
Stormwater Management

- Solar arrays subject to Stormwater Standards at 310 CMR 10.05(6)(k)-(q)

Solar Panels Are Impervious Surfaces

- Peak rate runoff control must be provided (310 CMR 10.05(6)(k)2)

- **CN 98 or higher must be used to model the solar panel area**
- **Solar Panels may be modeled as “unconnected” in the proposed condition, PROVIDED the runoff is directed to a pervious surface such as grass turf.**
- **TR55 classifies gravel surfaces as impervious. If gravel is proposed under solar panels, the runoff must be modeled as “connected.”**

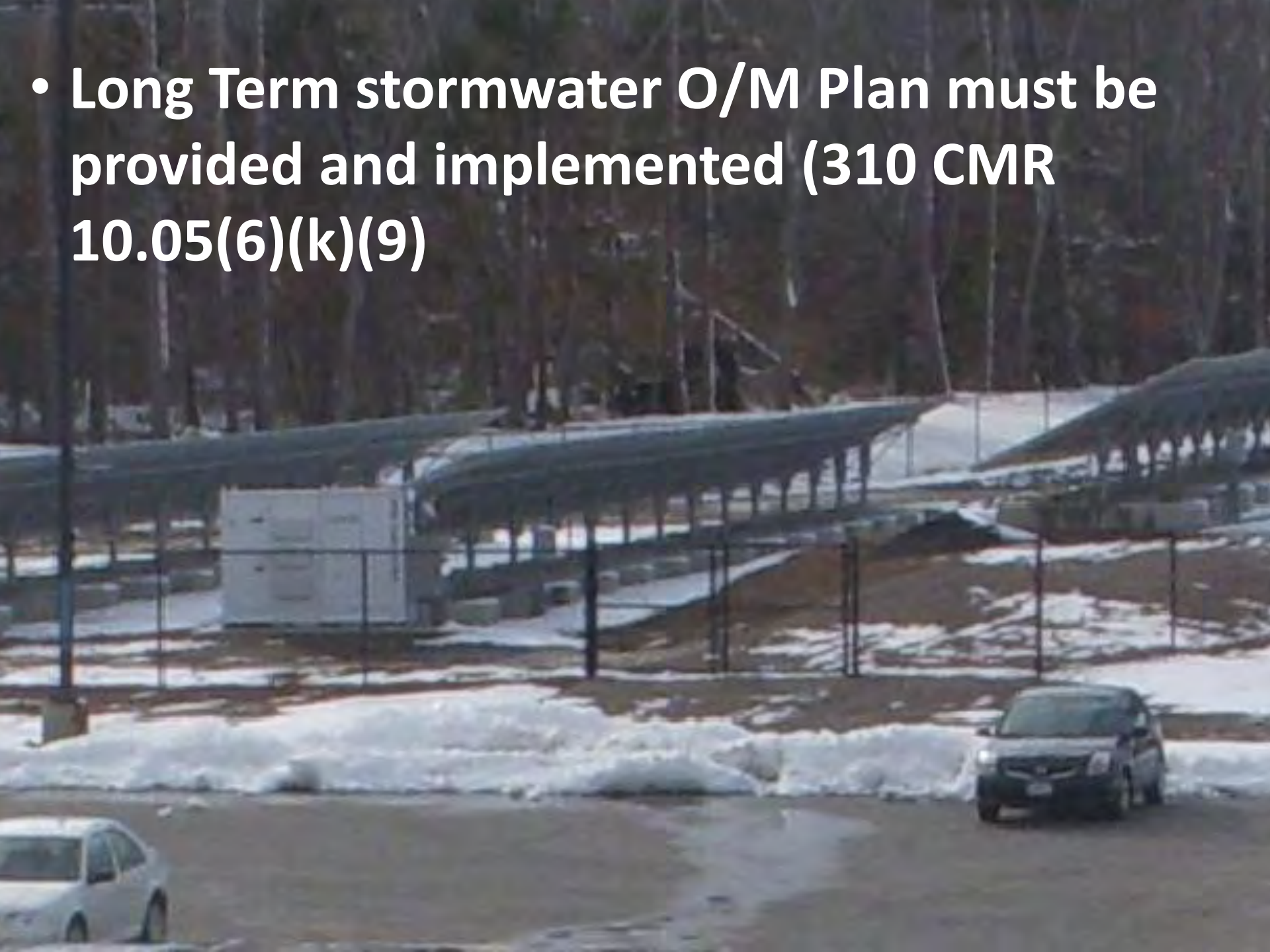


- Recharge and TSS Treatment must be provided (310 CMR 10.05(6)(k)3 and 4)

  - **LID Site Design Credits may be used to satisfy the recharge and TSS treatment, provided the LID credit provisos are met.**

- **Erosion Control Plan must be provided and implemented (310 CMR 10.05(6)(k)8)**

- **Long Term stormwater O/M Plan must be provided and implemented (310 CMR 10.05(6)(k)(9)**



Riverfront Area Alternatives Analysis

- Solar projects proposed in Riverfront Area that is not otherwise previously developed or degraded are required (in part) to make a demonstration to the Commission or MassDEP that there is:
  - "no practicable and substantially equivalent economic alternative to the proposed project with less adverse effects on the interests …".
- This is demonstrated through an alternatives analysis.

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Demonstrating Compliance with the General Performance Standards for BVW

- Solar projects are required to meet the general performance standards for work within wetland resource areas and should be sited outside of wetland resource areas whenever possible.
- The BVW general performance standards are found at 310 CMR 10.55(4)(a):
  - "…any proposed work in a Bordering Vegetated Wetland shall not destroy or otherwise impair any portion of said area."
  - "… the issuing authority may issue an Order of Conditions permitting work which results in the loss of up to 5,000 square feet of Bordering Vegetated Wetland when said area is replaced …".
  - "In the exercise of this discretion, the issuing authority shall consider the magnitude of the alteration and the significance of the project site to the interests … the extent to which adverse impacts can be avoided, the extent to which adverse impacts are minimized, and the extent to which mitigation measures, including replication or restoration, are provided …".
- There is no Limited Project provision associated with the siting of solar arrays in BVW. Other project elements may qualify as Limited Projects (electric interconnections, access roadway/driveway) if the proposed work cannot otherwise meet the general performance standards.

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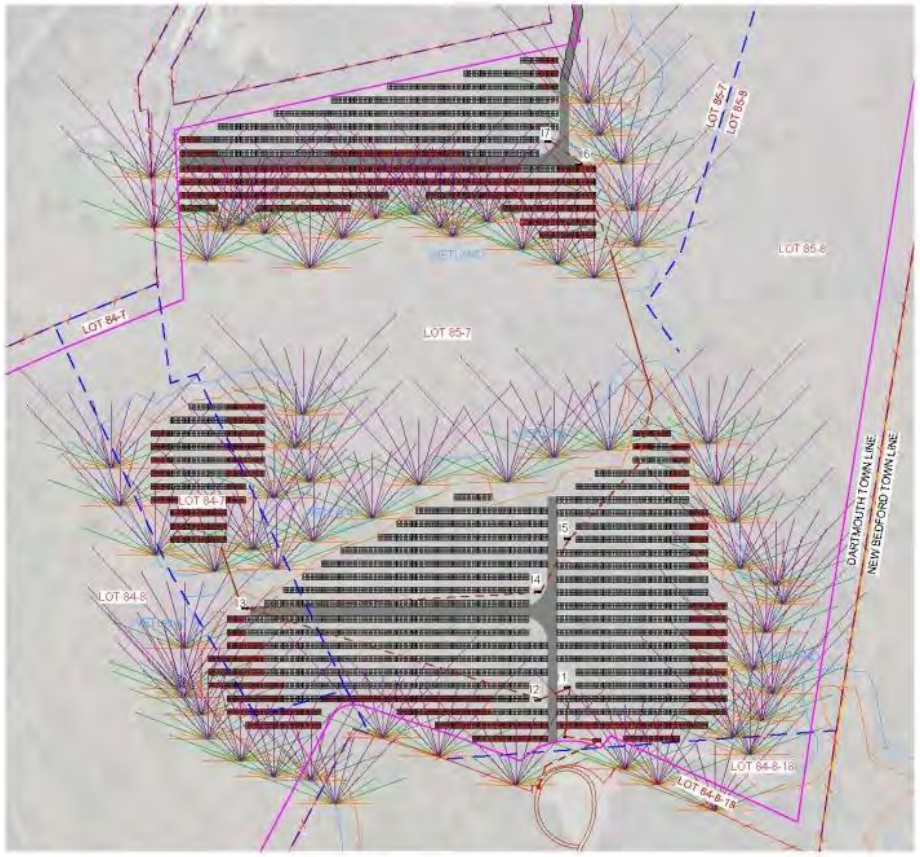
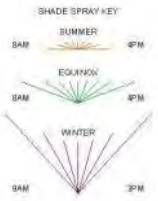
Clearing of Trees to Minimize the Effects from Shading on the Solar Panels



1 EFFECT OF SHADING FROM 60' TREES IN WINTER

0 50' 100' 200'



TREE HEIGHT	TOTAL MODULES	SHADED MODULES	PERCENTAGE AFFECTED
60'-0"	14,014	4,554	32.5%

NOTE: MODULES ARE SHADED (RED) IF THEY WILL BE AFFECTED BY TREE SHADOWS FOR MORE THAN ONE HOUR PER DAY, LIKELY IN THE MORNING OR EVENING, WHICH ARE OUTSIDE THE DAILY PEAK POWER PRODUCTION WINDOW.

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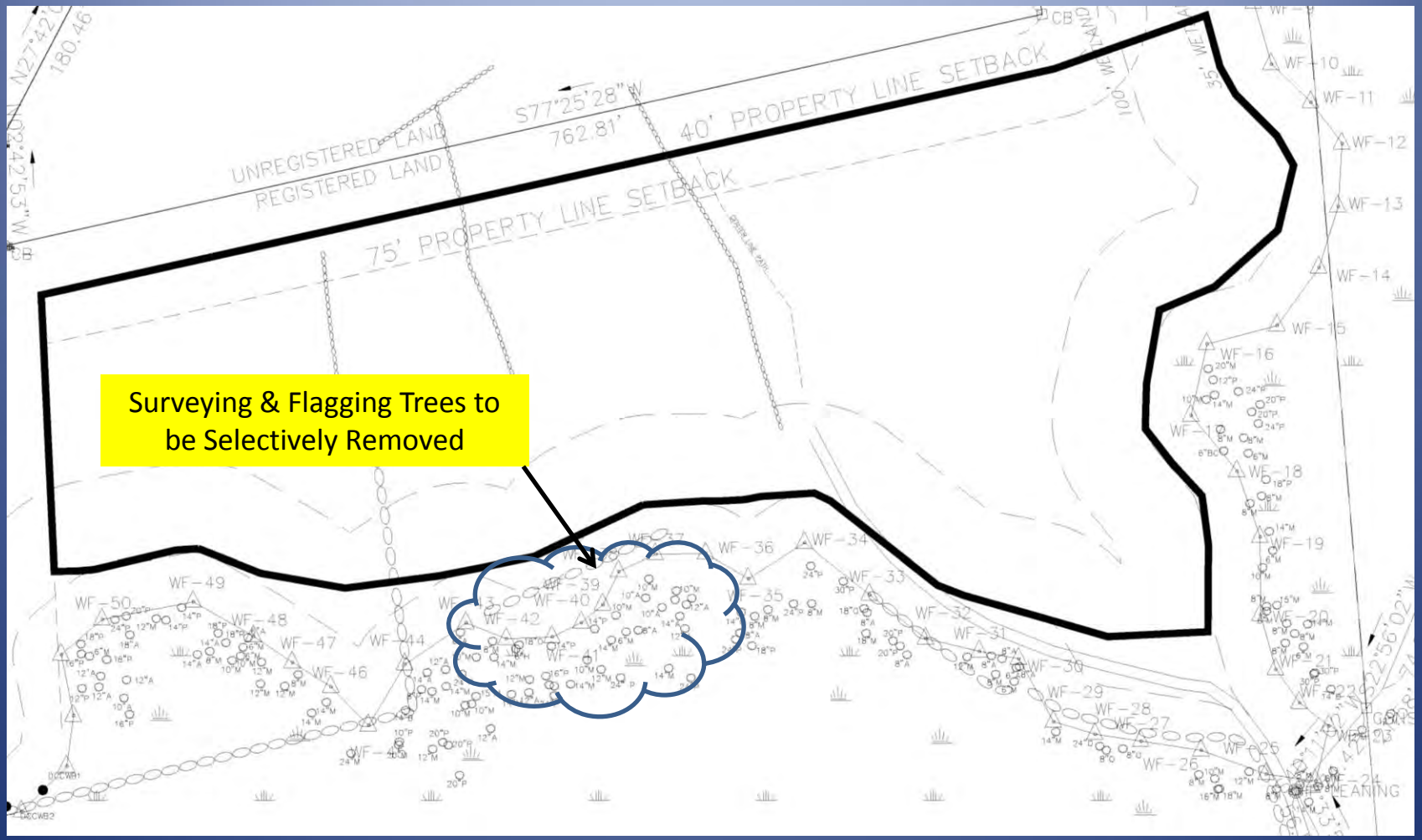
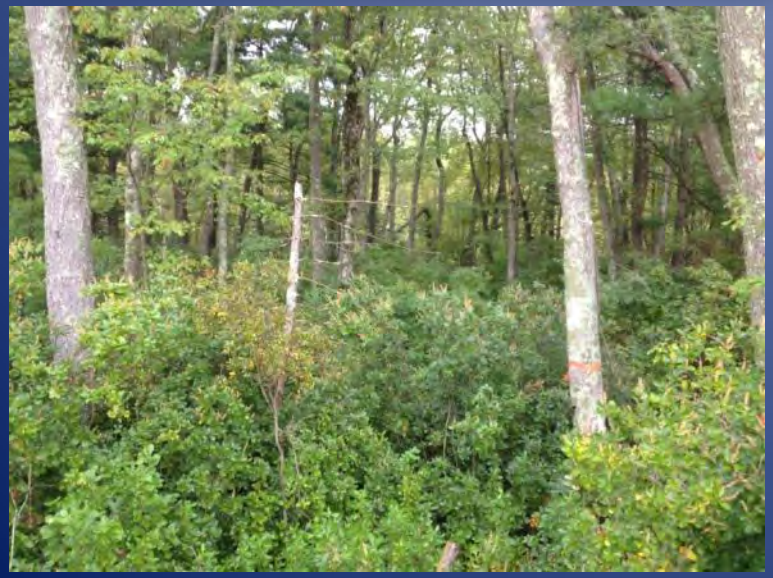
Identifying Trees to be Removed



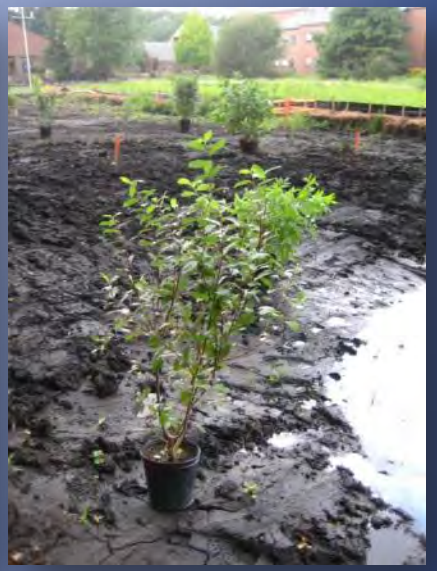
Quantifying Impacts

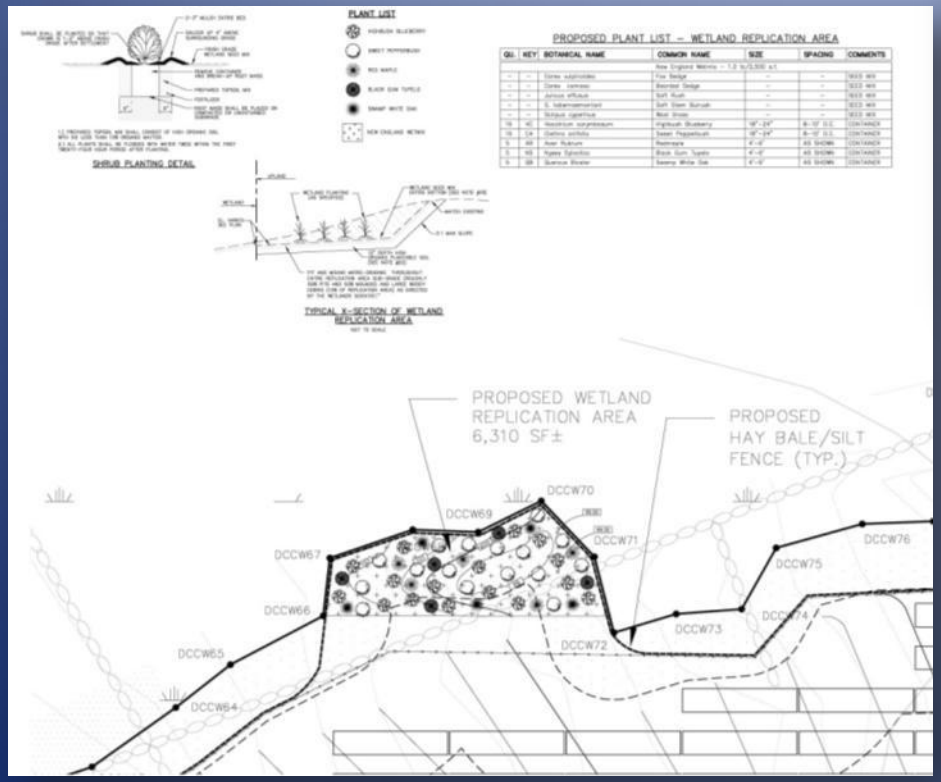


Diameter of Tree (Inches)	Type of Tree	Number of Trees	Estimated Basal Area Alteration (Square Feet)	Estimated Tree Canopy Alteration (Square Feet) (1)	Total Wetland Alteration (Square Feet) (2)
5	Ash	1	0.1	28.0	28.1
6	Ash	4	0.8	112.0	112.8
8	Ash	2	0.7	56.0	56.7
10	Ash	2	1.1	56.0	57.1
12	Ash	2	1.6	56.0	57.6
14	Ash	1	1.1	28.0	29.1
16	Ash	2	2.8	56.0	58.8
18	Ash	1	1.8	28.0	29.8
14	Hickory	1	1.1	28.0	29.1
5	Maple	6	0.8	168.0	168.8
6	Maple	14	2.7	392.0	394.7
8	Maple	17	5.9	476.0	481.9
10	Maple	3	1.6	84.0	85.6
12	Maple	9	7.1	252.0	259.1
14	Maple	12	12.8	336.0	348.8
16	Maple	3	4.2	84.0	88.2
20	Maple	2	4.4	56.0	60.4
6	Misc. Tree	2	0.4	56.0	56.4
10	Oak	4	2.2	112.0	114.2
12	Oak	3	2.4	84.0	86.4
14	Oak	1	1.1	28.0	29.1
16	Oak	2	2.8	56.0	58.8
20	Oak	3	6.5	84.0	90.5
6	Pine	9	1.8	252.0	253.8
7	Pine	5	1.3	140.0	141.3
8	Pine	4	1.4	112.0	113.4
12	Pine	2	1.6	56.0	57.6
14	Pine	4	4.3	112.0	116.3
16	Pine	5	7.0	140.0	147.0
20	Pine	2	4.4	56.0	60.4
24	Pine	1	3.1	28.0	31.1
Totals		128	90.6	3612.0	3703

Impact Minimization Techniques Specialized Tree Clearing Equipment

Potential Mitigation Measures for Unavoidable Alterations:
Wetland Replication & Supplemental Buffer Zone and Wetland Plantings





Potential Mitigation Measures
Wildlife Habitat Enhancements

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Wetlands, Solar Panels and Agriculture

- Shading of cranberry vines shown to cause impairment by reduction in fruiting and flowering
- Change of commodity permissible under “Land in Agricultural Use” harvesting cranberry vines rather than fruit; grazing of animals
- Disturbed soils - use of other credible evidence pursuant to 310 CMR 10.55(2)(c)2.

Wetland Delineation in Disturbed Conditions, 310 CMR 10.55(2)(c)3.

Where an area has been disturbed *the boundary is the line where*

- ***there are indicators of saturated or inundated conditions… or***
- ***credible evidence …that the area supported or would support under undisturbed conditions a predominance of wetland indicator plants.***

Summary

- Commonwealth has adopted programs to promote renewable resources to improve energy independence, reduce fossil fuel consumption that releases carbon, and promote resiliency to climate change
- MassDEP encourages solar installations at brownfields, landfills and other previously disturbed lands
- MassDEP discourages solar projects in wetland resource areas which may not meet performance standards
- Destruction or impairment of wetlands including BVW should be avoided, minimized, mitigated
- DEP monitoring solar projects and providing guidance to Commissions, consultants and applicants
- Solar proposals in agricultural land create complex analysis involving disturbed sites, possible exempt activities and changes of use or commodity

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Thank You!