Preparing for Renewable Energy Projects in CT

The 2018 Connecticut Land Conservation Conference

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Energy Sprawl Is the Largest Driver of Land Use Change in United States

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Abstract

Energy production in the United States for domestic use and export is predicted to rise 27% by 2040. We quantify projected energy sprawl (new land required for energy production) in the United States through 2040. Over 200,000 km^2 of additional land area will be directly impacted

What CT laws and policies have created this?

Commitment to renewable energy

Deficiency: DEEP's project-selection criteria value short-term price above all else

Solutions: 1. Require DEEP to give "meaningful weight" to non-price factors
2. Allow incentives for better sites

Deficiency: Siting Council must approve utility-scale solar facilities, with very little discretion

Solutions: 1. More thorough Siting Council review, &

Allow Siting Council to consider impacts to agricultural land (Now Public Act 17-218)

Summary of the solar siting processes and criteria:

In 2017, the Connecticut General Assembly passed Public Act 17-218, An Act Concerning the Installation of Certain Solar Facilities on Productive Farmlands, Incentives for the Use of Anaerobic Digesters by Agricultural Customer Hosts, Applications Concerning the Use of Kelp in Certain Biofuels and the Permitting of Waste Conversion Facilities. This Act primarily impacts the Siting Council process for solar photovoltaic facilities of greater than 2 megawatts that seek a "declaratory ruling" from the Connecticut Siting Council as opposed to a certificate. Pursuant to Public Act 17-218, such facilities must meet the following requirements:
The Siting Council must not find a "substantial adverse environmental effect" and
For facilities that are to be located on prime farmland or forestland (excluding facilities selected by DEEP prior to July 1, 2017), the Department of Agriculture must write to the Council that such projects "will not materially affect the status of such land as prime farmland" and/or the DEEP must write to the Council that such project will not materially affect the status of such land as core forest. Both DOA and DEEP may consult with USDA and soil and water conservation districts to conduct this evaluation.

Proposed facilities may elect to proceed through the certificate proceeding at Siting Council and avoid the requirement of a letter from DOA or DEEP. However the certificate proceeding requires more time and is more costly. The certificate process also requires that Siting Council conduct a more detailed review of the environmental impact of the facility that, since the passage of Public Act 17-218, must include every significant adverse effect on agriculture.

Well managed farm & forest land provides:

- Agricultural & forest products
- Part of sustainability
- Supports State & local economies
- Habitat and biodiversity
- Protects air & water quality
- Protects water quantity
- Flood storage and protection
- Scenic beauty
- Recreation
- Protects cultural resources
- Climate change mitigation and adaptation
- Quality of life
- Safe and secure food, fiber, plants

Issues of Large Scale Solar on Agricultural Land & Forest

Land use concerns related to the siting of large scale solar projects:

- Competing goals of encouraging least “expensive” renewable sources of energy and protecting valuable farmland
- Existing Farmland is typically considered the easier and cheaper location for large scale solar
- The loss of farmland is the potential loss in agricultural activity/$
- Loss/fragmentation of forest land and many ecosystem services
- Loss/fragmentation of habitat for wildlife
- Impacts to the visual landscape
- Property rights of land owners and farmers

Issues of Large Scale Solar on Agricultural Land & Forest

Land use concerns related to the siting of large scale solar projects

- Why are incentives being given to projects that are installed on farmland through one program, and preserved through another?
- Why isn't more focus on siting solar installation on lower quality/less productive farm soils, rooftops, landfills and brownfields?
- Siting considerations with regards to the CSC haven't considered the value of agriculture land, unfragmented forest
- What happens when the life of the solar arrays expire? No performance bonds required for restoration
- Lack of rigorous assessment of environmental impact
- Lack of input/weight of community
- Loss, disturbance of cultural and historic resources and landscapes

What Are the Other Options?

- State Lands
- Landfills
- Brownfields and Industrial Lands
- Rooftops
- Waterbodies
- Co-location with agricultural use
- Non P & I soils
- Right of Ways, Transportation Corridors
- Improve energy infrastructure to allow additional connections
- Increased efforts on energy conservation, mass transit, smart growth

ONE ACRE
OF PRIME FARMLAND
CAN PRODUCE:


27,000 LBS

or


8,400 LBS

or


6,000 LBS

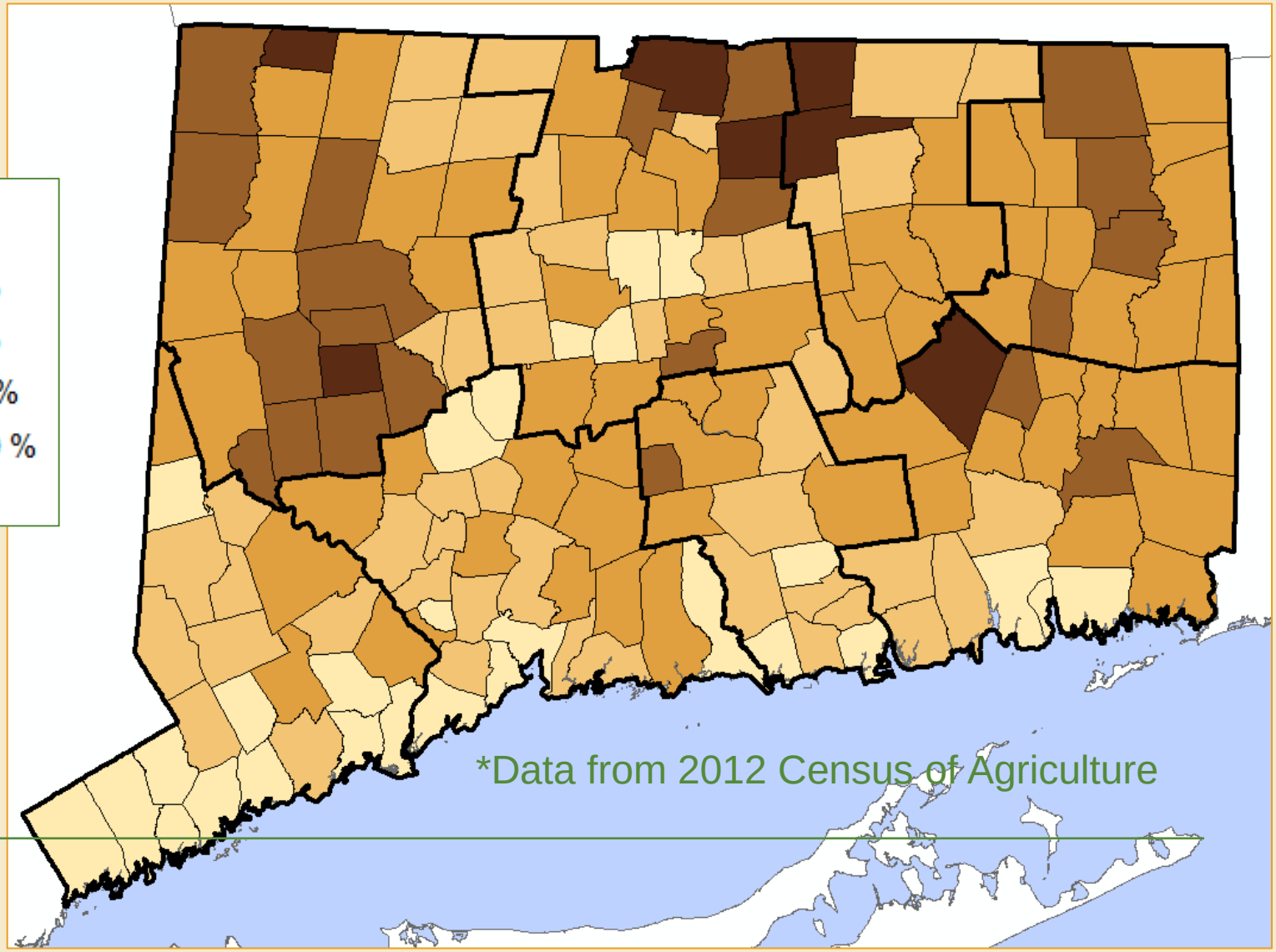
or


3,900 LBS

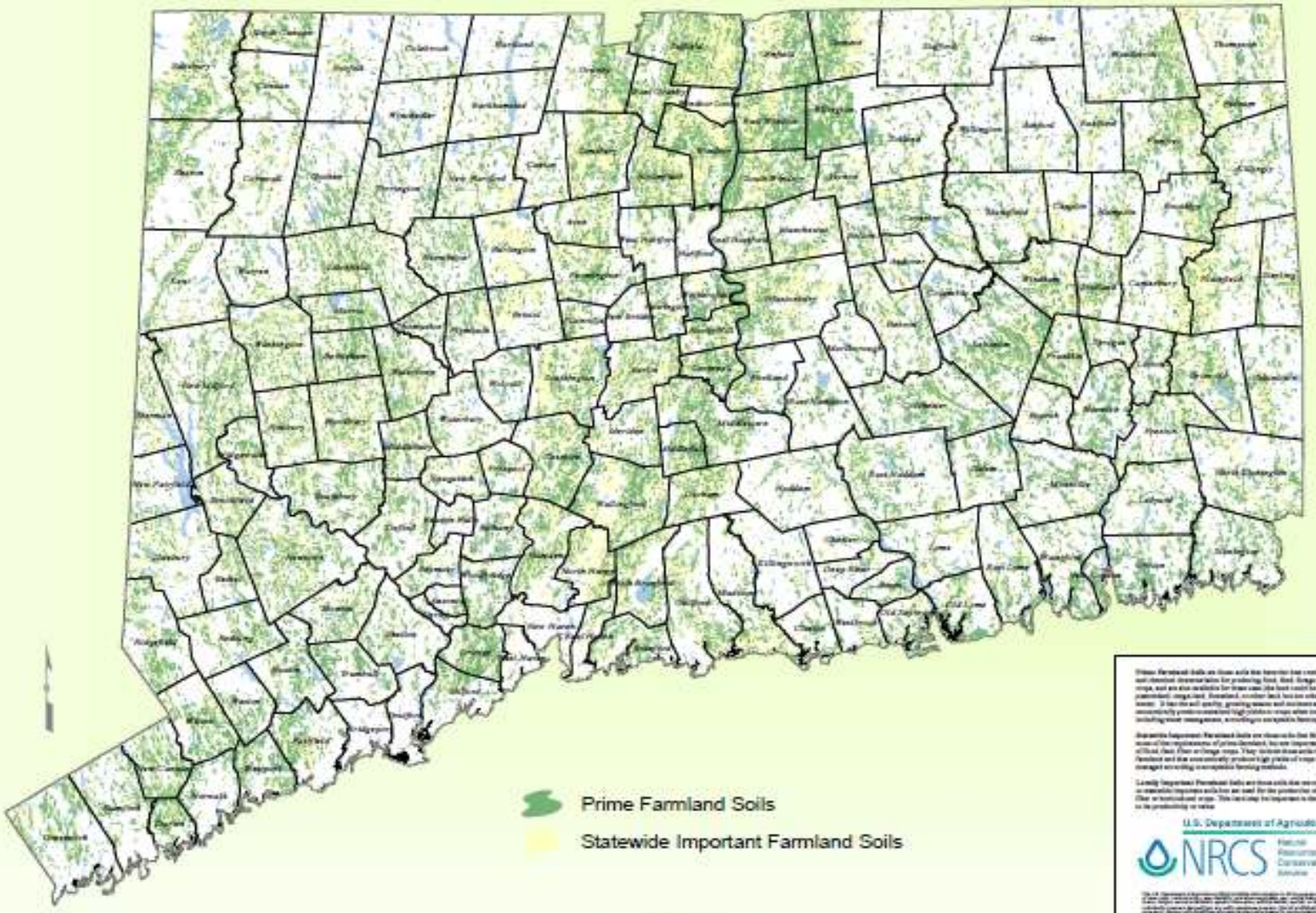
- One acre of solar array can provide power to 32 households
- Can supply 12 weeks of food in a CSA to 30+ families
- Helps support 80+ species of birds, hundreds of invertebrates, mammals, reptiles, and amphibians
- Provide feed and land for manure application for ½ cow

Where is our agricultural land?

Total Land in Farms: 436,539* 12.3%, 7% fields



Connecticut Prime and Important Farmland Soils



U.S. Department of Agriculture

NRCS Natural Resources Conservation Service

Environmental Quality in Connecticut

through the year 2016

E-mail

E-mail this link

April 19, 2017

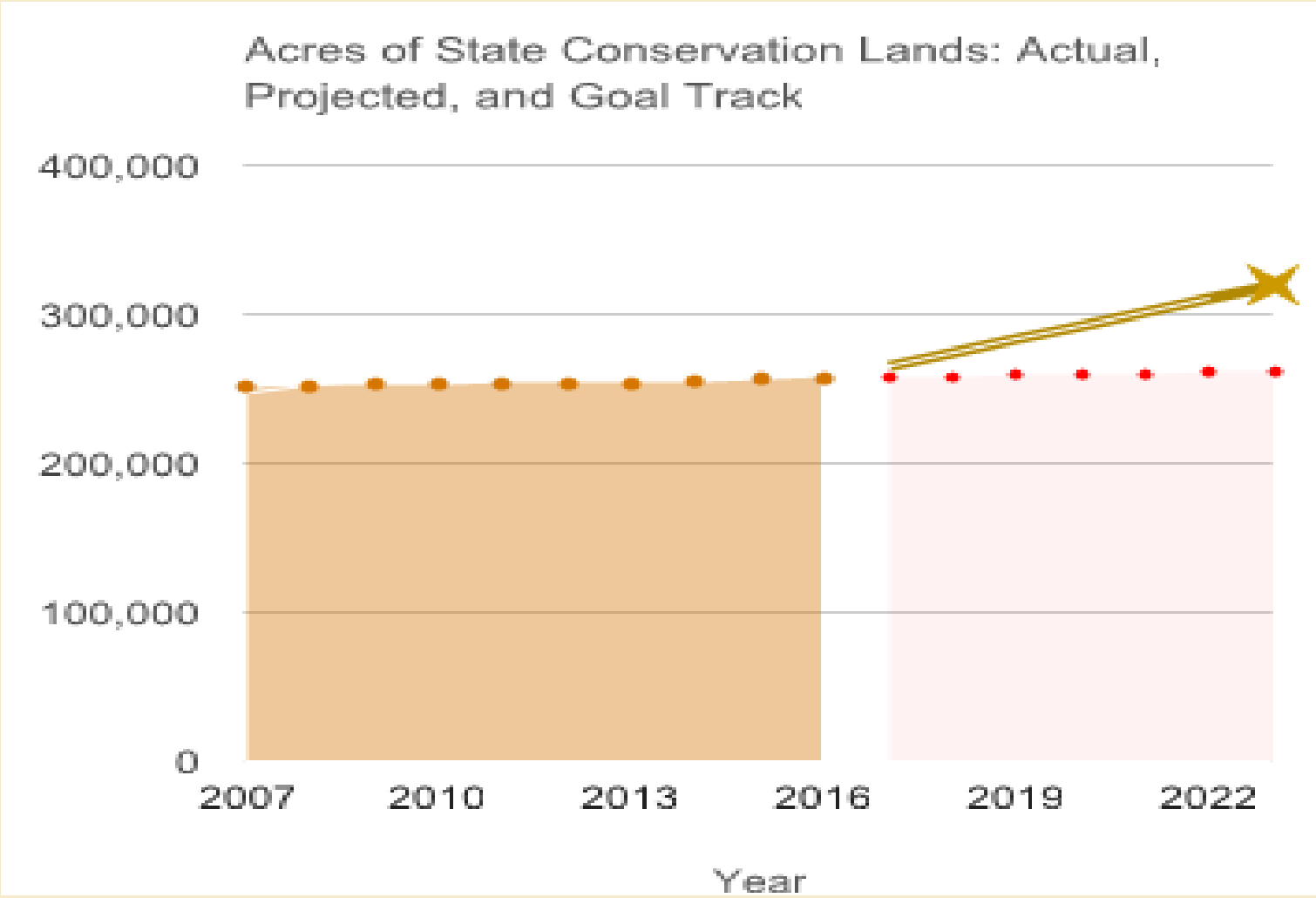
Updated June 21, 2017

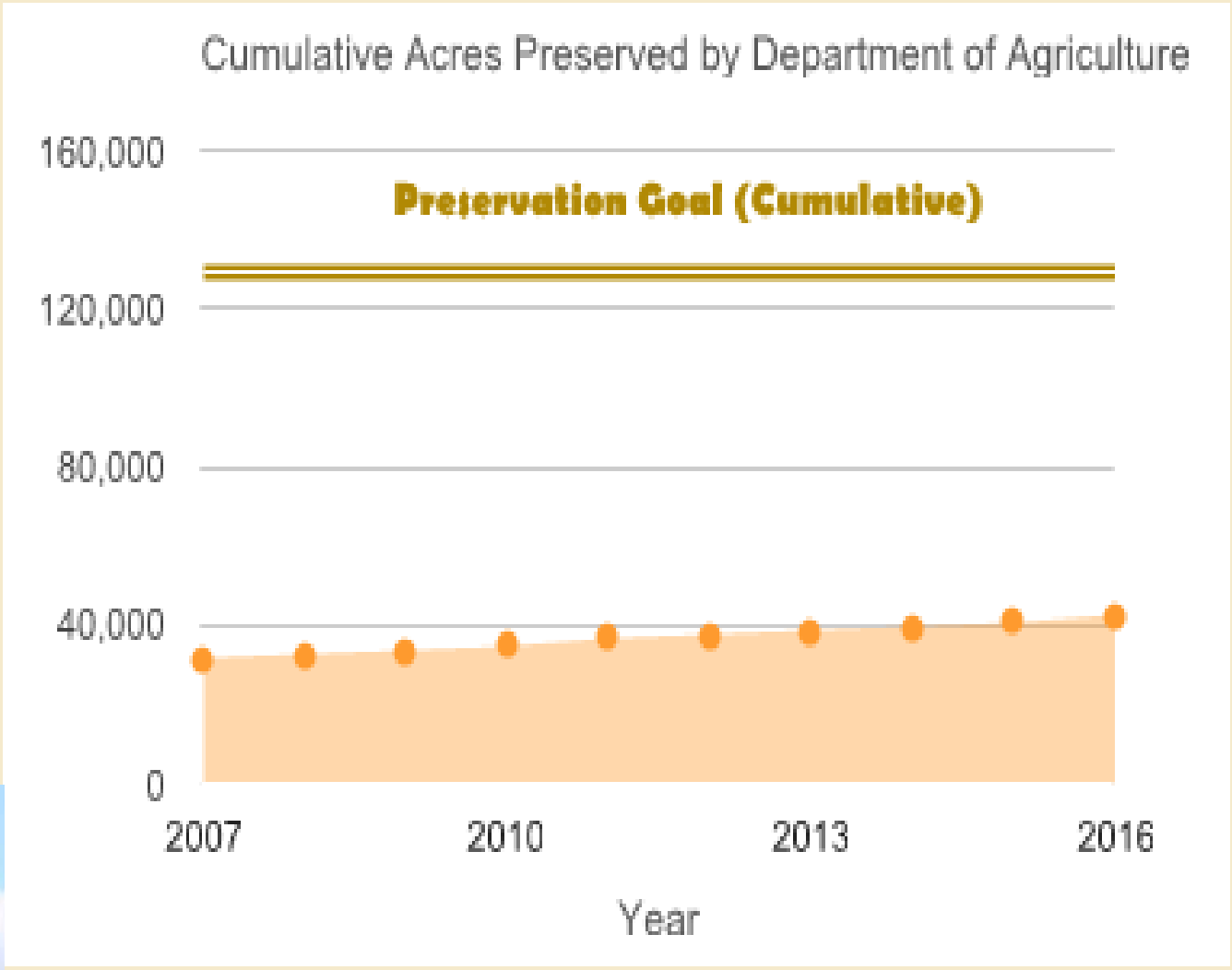
Welcome to *Environmental Quality in Connecticut*. This edition documents the condition of Connecticut's environment through 2016.

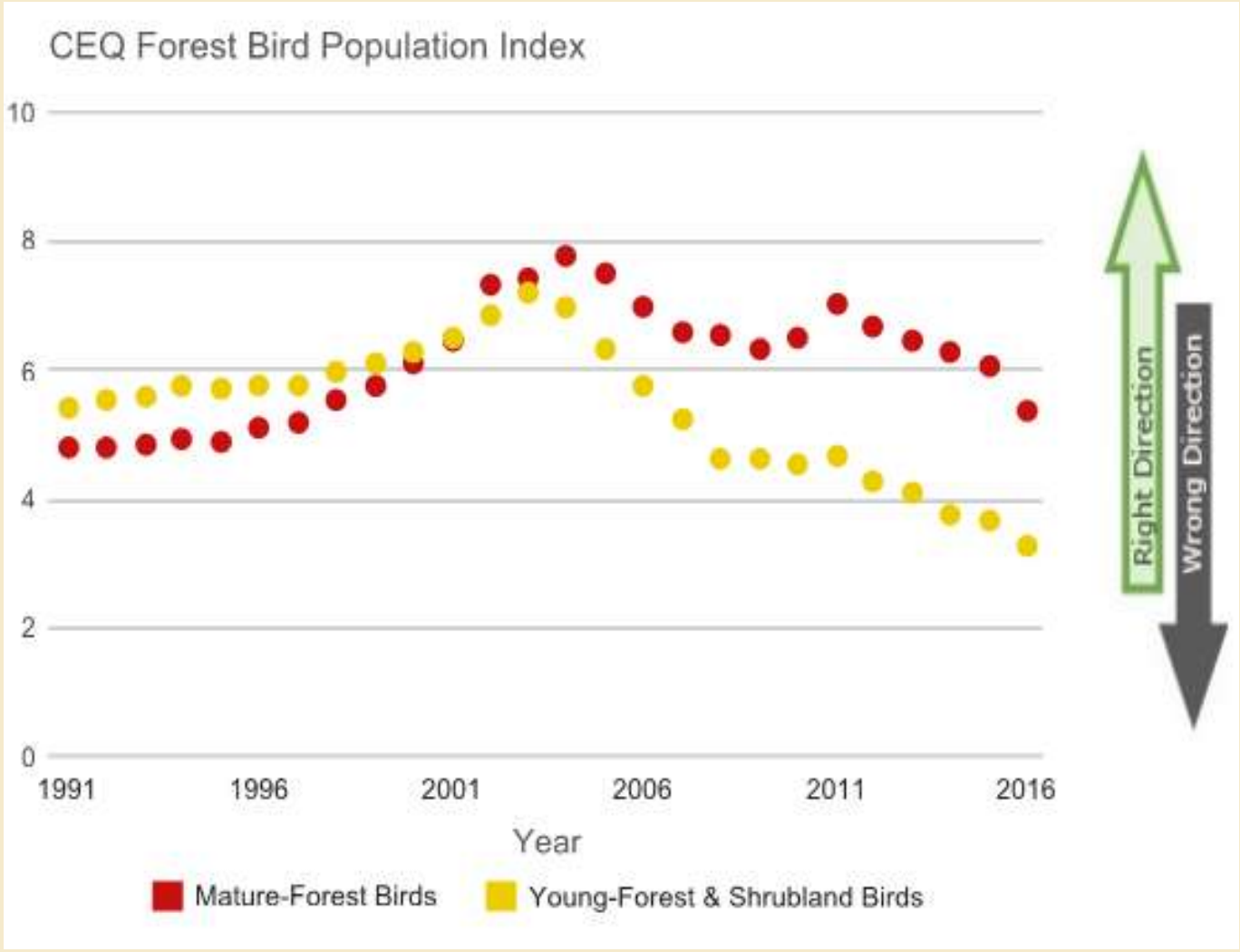
The four pages in the Summary section present an overview of recent trends and important conclusions. The 20 pages of environmental indicators, from air through "personal impact," display a comprehensive set of environmental data for the 10 years ending in 2016.

Data for four indicators were not available when this report was published in April. The Council updated this report on June 21, 2017. Sign up for e-alerts to receive a notice when updates are published.

The Council welcomes your comments and questions.


Acres of State Conservation Lands: Actual, Projected, and Goal Track
400,000
300,000
200,000
100,000
0
2007
2010
2013
2016
2019
2022
Year

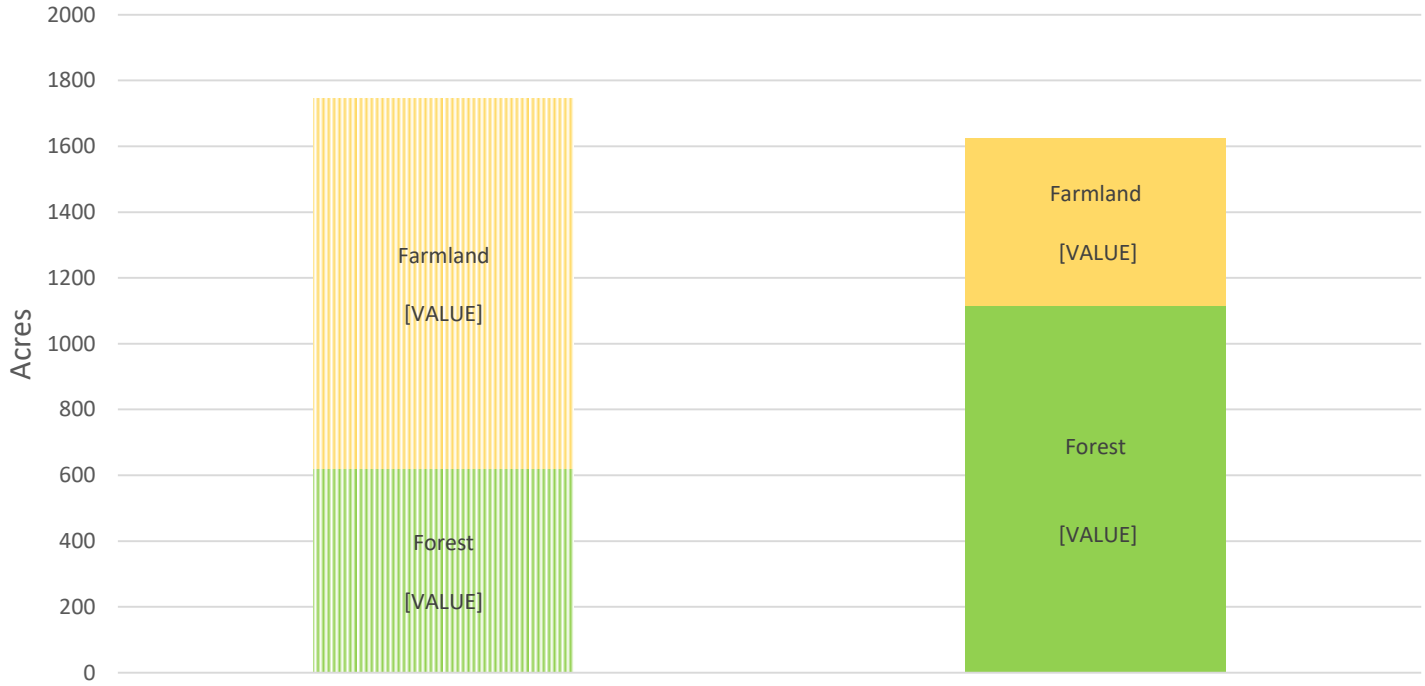

Cumulative Acres Preserved by Department of Agriculture
160,000
120,000
80,000
40,000
0
Preservation Goal (Cumulative)
2007
2010
2013
2016
Year


CEQ Forest Bird Population Index
10
8
6
4
2
0
1991
1996
2001
2006
2011
2016
Year
Mature-Forest Birds
Young-Forest & Shrubland Birds
Right Direction
Wrong Direction

Probable Reasons for Connecticut's Stable Forest and Farm Acreage

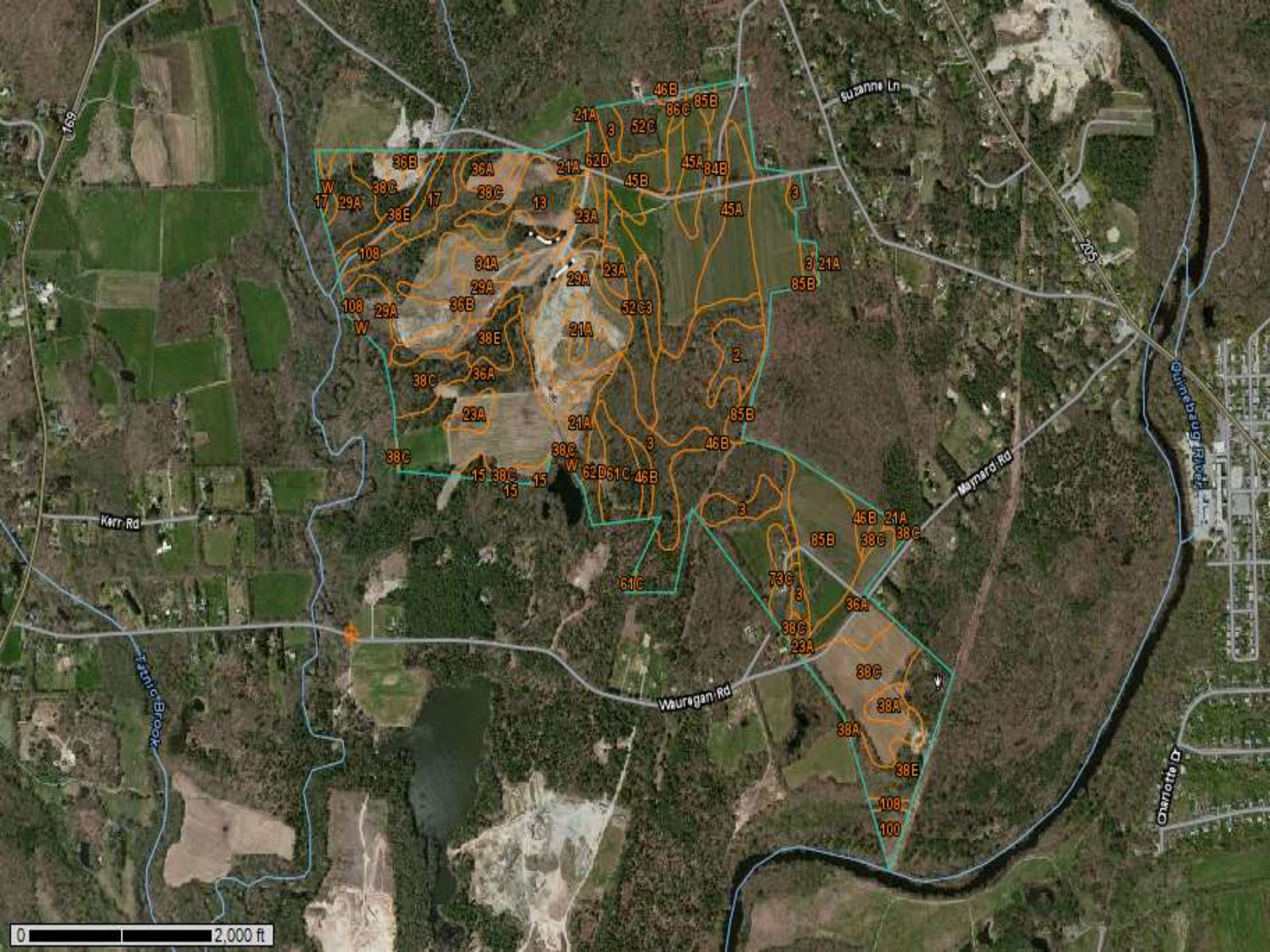
- 2007 Recession
- Stable Population
- State investment in private-land forest conservation and agricultural business

2016 Solar Development on Farm and Forest
vs.
Average Annual Land Conservation

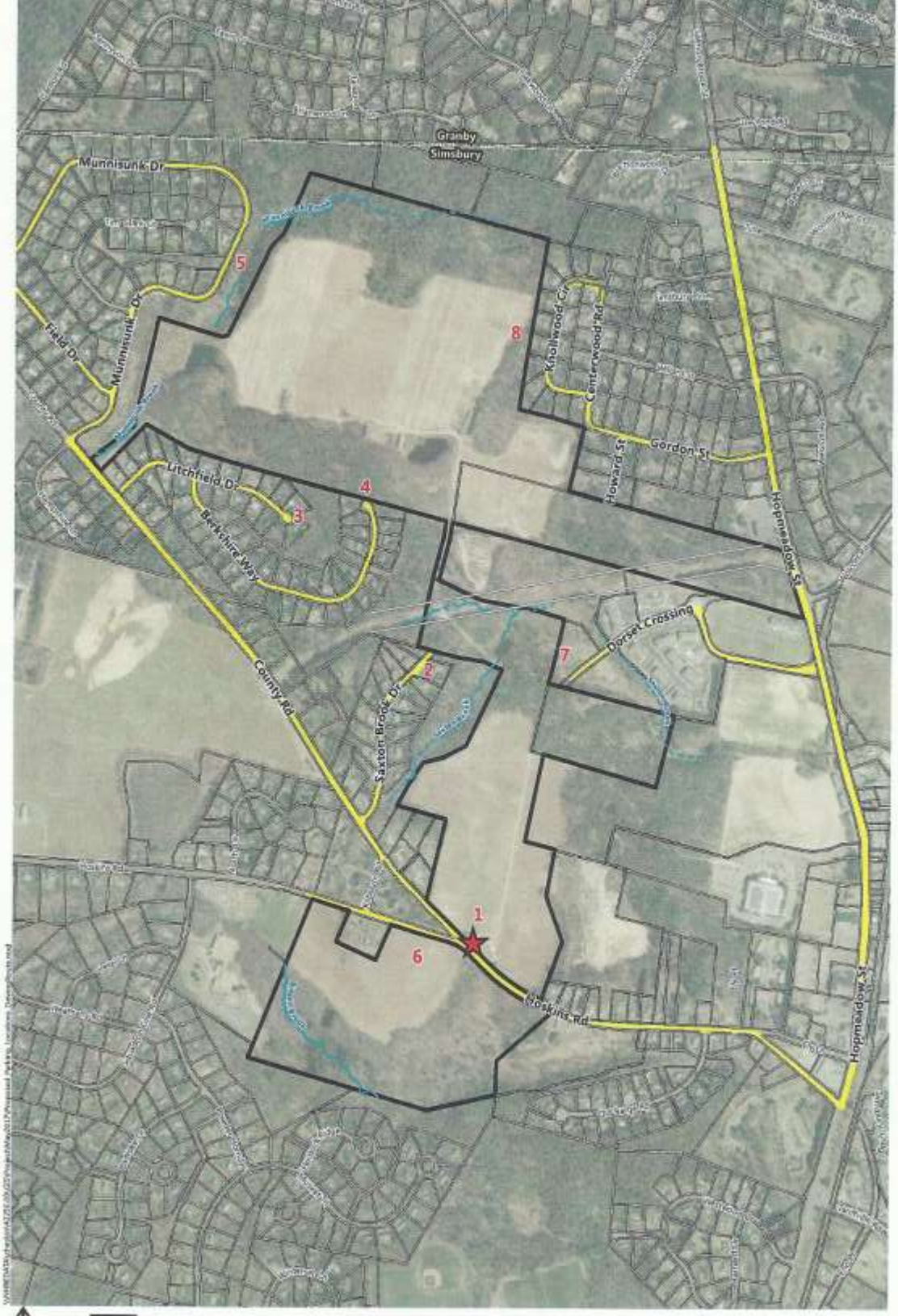


Acres of Farm and Forest Preserved Annually by DEEP & DOA (10-Year Average)

Acres of Farm and Forest Selected and/or Approved for Solar Projects in 2016



Suzanne Ln
169
205
Kerr Rd
Maynard Rd
Wauregan Rd
Quinebaug River
Tatnic Brook
Charlotte Dr
0
2,000 ft



0 375 750 1500 Feet

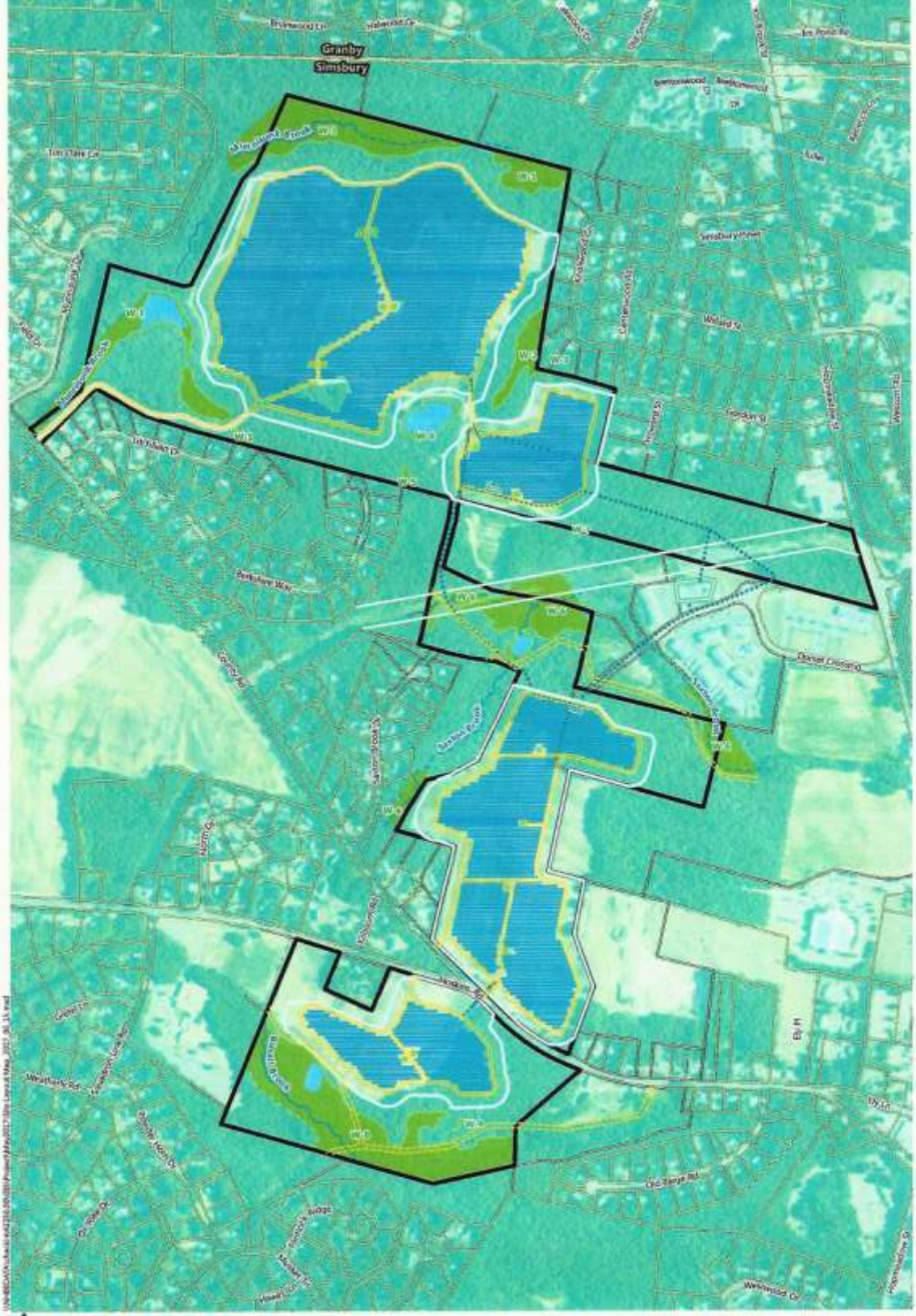
Property Boundary
Adjacent Parcels
Town Boundary
Existing Eversource ROW
Stream
Approximate Stream

Tobacco Valley Solar | Simsbury, Connecticut

Parking Location
Driving Route Stop
Potential Driving Route

CSC Field Walk Parking Location & Driving Routes

Source: VHB, CTDEEP, ESRI

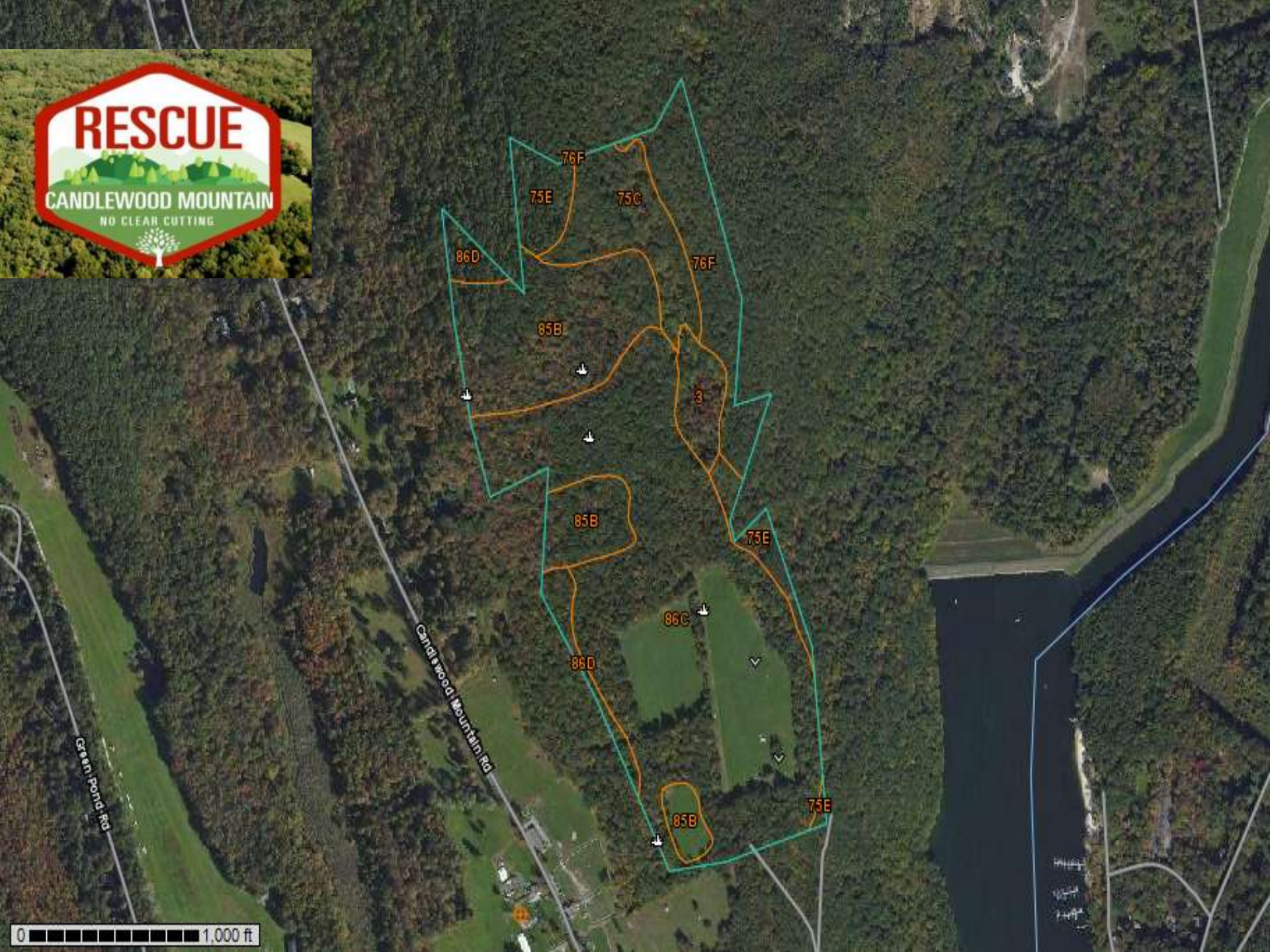


Tobacco Valley Solar

Simsbury, Connecticut

Project Layout Map

Source: VHB, CTDEEP, ESRI


RESCUE
CANDLEWOOD MOUNTAIN
NO CLEAR CUTTING
76F
75E
75C
86D
76F
85B
3
85B
75E
86C
86D
85B
75E
Candlewood Mountain Rd
Green Pond Rd
0
1,000 ft

Potential Impacts to Agricultural Viability

- Loss of Prime and Important Farmland soils
- Loss of soils most resilient to impacts of climate change
- Potential erosion/sedimentation during/after installation
- Soil compaction
- Soil profile & hydrologic disturbance by trenching, grading, infrastructure
- Increased soil temperature
- Increased runoff
- May increase use of more marginal soils
- Potential impacts of herbicide use
- Decrease in productivity if ever returned to production

Potential Impacts to Agricultural Viability

- Loss of access to land base for the business
- Creates competition for remaining land
- Creates barriers to Succession Planning
- Reduces opportunities for new & beginning farmers
- Fragmentation of fields/farms/habitat
- Creates uncertainty about land access
- Creates speculation by landowners, may elevate land values

Potential Impacts to Agricultural Viability

- Reduces potential for agritourism
- Reduces land base for proper manure/organics mngmt
- Reduces opportunity to create a better food system
- Reduces potential to store additional carbon
- Positive source of farm income and diversification
- Potential for co-location uses of ag & solar array

Potential Impacts to Ecosystem health

- Fragmentation/loss of habitat, species
- Loss of core forests
- Fencing disrupts movement of biota
- Potential erosion/sedimentation during/after installation
- Changes landscape hydrology, increased runoff
- Possible hazards to waterfowl
- Increased soil temperature
- Increased water temperature
- Potential for spread of invasives
- Loss of productive forest land for forest products
- Loss of carbon sequestration of forests
- Loss of migration corridors for plants and animals, biodiversity

Chestnut sided Warbler

Successful On-Farm Usage in CT

- Farms use a considerable amount of energy. Top two industries in the state in terms of economic value and energy consumption are the greenhouse/nursery and dairy industry.
- By reducing on-farm energy usage through EE and RE measures there is more supply for the grid and more dollars in the pockets of farmers.

246 kW roof mounted solar array at Oakridge Dairy in Ellington, CT.

Ground Mounted 129 kW solar array at Freund's Farm, E. Canaan, CT. First Farm in CT to Virtual Net Meter. Additionally the farm has installed a 223 kW roof mounted array on their new robotic milking barn.

Prides Corner Farm in Lebanon, CT installing 240 kW solar system on a newly constructed greenhouse structure.

"Sonnen-Energie-Feld" in der Nähe von Markranstädt

Foto: Knut LÖSCHKE, 6/2011

Challenges of vegetation management

		cost	risk	on-going labor
1	Sheep	low	low	low
2	Low Grow Grass	low	low	low
3	Decorative Plants	medium	low	medium
4	Low Light Crops	medium	low	high
5	Mowing	high	high	high
6	Chemicals	medium	medium	medium
7	Vegetation Barriers	high	medium	low

UMass Agronomy Lab – Demonstration Dual Use of Land

Solar in Vermont

- Property Taxes: Land with a solar generating facility is eligible for enrollment in the Current Use Program if the facility qualifies as a farm improvement. In order to qualify as a farm improvement it must be part of a farming operation. A facility is part of a farming operation in cases where 50% or more of the electricity generated is used by enrolled farm buildings.
- Policy Tensions: Statutory protection of soils versus property rights. Vermont regulators recently changed rules on siting solar projects to discourage the use of farmland and encourage solar projects to sites such as brownfields, landfills and other urban locations. Act 174
- In Vermont's new energy siting law, the consideration of NRCS prime agricultural soils has become an explicit consideration in the energy facility permitting process. Previously, the Agency of Agriculture had standing under the less-specific criterion of natural resources. Now, the petitioner has to provide certain information about soils, and, in projects above a certain size, the Agency has to make a finding.

Sheep using the solar array as a refuge from the heat on a hot day. Open View Farm. Photo: Alex DePillis

Solar in Vermont

- "Renewable energy installations whose production exceeds the energy needs of the conserved property will be reviewed on a case by case basis and may be conditioned or denied based on resource impacts, scale and scenic impacts to the conserved lands;" ***Vermont Housing and Conservation Board INTERIM GUIDELINES for RENEWABLE ENERGY PRODUCTION ON CONSERVED LAND***
- "Installation of solar panels on existing buildings in a complex should be considered first. When installation on existing structures is not feasible, the scale/aerial extent of the installation in relation to the size of the conserved property is an important consideration. VHCB uses a guideline of one percent (1%) of property acreage or one acre (whichever is greater) as the typical installation size suitable for conserved land. Installations larger than 1% of the land base may be possible, but this will depend…" ***Vermont Housing and Conservation Board INTERIM GUIDELINES for RENEWABLE ENERGY PRODUCTION ON CONSERVED LAND***
- Decommissioning: Plan for it. Their motto "PIBTWYFI" Put it back the way you found it. *Act 250 Procedure: Reclamation of Vermont Agricultural Soils*

Sheep using the solar array as a refuge from the heat on a hot day. Open View Farm.

MA -Land Use Categories

Category	Description	Incentive Level
Category 1	• All ground-mounted projects greater than 500 kW AC and less than or equal to five (5) MW AC that are zoned for commercial/industrial use or specifically for solar/power generation, but have been previously developed • All projects on brownfields, landfills, rooftops, canopies, and all other ground-mounted projects not sited on brownfields or landfills that are equal to or less than 500 kW AC, including: ➢ Low Income Projects ➢ Community Solar Projects ➢ Projects serving Municipal/Governmental Entities • Non-canopy projects on Land in Agricultural Use or on Prime Agricultural Farmland Soils sized to meet no greater than 200% of annual operation load	Base Incentive + Applicable Adder(s)
Category 2	• All ground-mounted projects greater than 500 kW AC and less than or equal to five (5) MW AC that are not sited on brownfields or landfills and are zoned for commercial/industrial use or specifically for solar/power generation, which have not been previously developed, including: ➢ Low Income Projects ➢ Community Solar Projects ➢ Projects serving Municipal/Governmental Entities	Base Incentive – Half Greenfield Subtractor + Applicable Adder(s)
Category 3	• Ground-mounted projects greater than 500 kW AC and less than or equal to five (5) MW AC that are not sited on brownfields or landfills and are not zoned for commercial/industrial use ➢ Low Income Projects ➢ Community Solar Projects ➢ Projects serving Municipal/Governmental Entities	Base Incentive – Full Greenfield Subtractor + Applicable Adder(s)
Category 4	• Ground-mounted projects not meeting the Category 1, 2, or 3 criteria • Projects on permanently protected open space that do not meet the criteria of category 4 • Projects sited on Wetland Resource Areas (not including Buffer Zones), as defined in the Massachusetts Wetland Protection Act, except as authorized by regulatory bodies • Historical/Archaeological Sites listed on the National/State Register of Historic Places, except as authorized by regulatory bodies	No Incentive

[1] Full Greenfield Subtractor = $0.001/kWh per acre of land impacted
[2] Half Greenfield Subtractor = $0.0005/kWh per acre of land impacted

MA-Land Use

- Original proposal on land use and siting criteria would have precluded significant portions of the state from receiving incentives for ground mounted projects
- Also relied heavily on GIS data layers
- Revised proposal provides exclusions from incentives for far fewer areas
- Under revised proposal, ground mounted projects that are larger than 500 kW, not sited on a brownfield or landfill, and are on land that has not been previously developed, will be subject to a $/kWh subtractor that changes based on the number of acres impacted
- All ground mounted projects will also be subject to a set of performance standards developed in consultation with the Department of Agricultural Resources

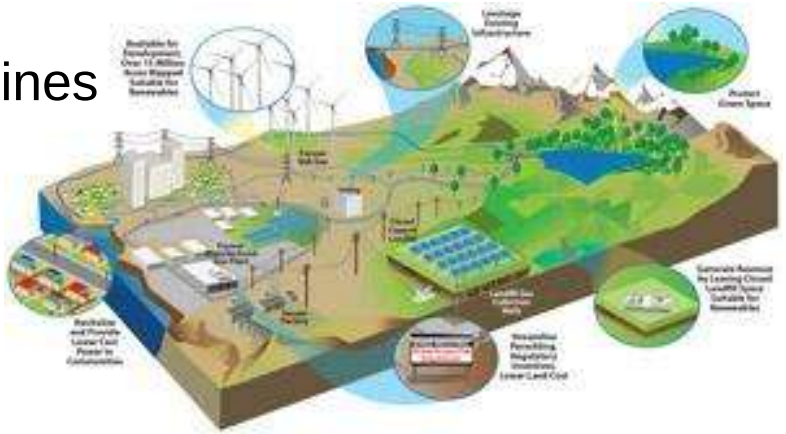
Project Type	Ground Mounted and not C&I Zoned	Ground Mounted, C&I Zoned, and NOT Previously Developed	Ground Mounted, C&I Zoned, and Previously Developed	Rooftop	Brownfields	Landfill	Parking Lot Canopy
Compensation Rate ($/kWh)	X - $0.001/acre	X - $0.0005/acre	X	X + $0.02	X + $0.03	X + $0.04	X + $0.06

MA-Land Use Performance Standards

- No stripping of soils
- For conventional ground mounted systems, ballasts or screw-type pilings that do not require footings or other permanent penetration of soils for mounting are required
- For agricultural integrated systems using canopies, any soil penetrations that may be required for providing system foundations necessary for structural loading shall do so with minimal soils disturbance, with any displaced soils to be temporary and recovered and returned after the penetration is completed.
- Absolute minimum soils/site disturbance; any soil penetrations that may be required for providing system trenching necessary for electrical routing shall be done with minimal soils disturbance, with any displaced soils to be temporary and recovered and returned after the penetration and trenching is completed
- No concrete or asphalt in the mounting area
- Address existing soil and water resource concerns that may be impacted
- Limited use of geotextile fabrics
- Where not practical to also use the area for agricultural production, maintain vegetative cover to prevent soil erosion, etc.

Guidance for the siting and approval of energy projects

- Develop ranking criteria and applicant guidelines that better reflect impacts on sustainability
- Focus on reuse of previously developed and disturbed land
- Use lands that have lower agricultural/forest quality (non prime farmland soils)
- Use mitigation where there are no alternatives
- Consider impacts to the broader agricultural, cultural, and ecological landscapes
- Collect more robust site data to assist with soil /landscape management and restoration
- Develop comprehensive restoration plans
- Utilize performance bonds to insure success
- Consider opportunities to incorporate agricultural production in the project
- Meet with developers upfront before they apply



Resources and Information

- new Solar Siting special collection of resources on the American Farmland Trust Farmland Information Center (FIC): http://www.farmlandinfo.org/special-collections/4718
- Energy Sprawl in Connecticut: Why Farmland and Forests are Being Developed for Electricity Production; Recommendations for Better Siting Special report from Council on Environmental Quality "Energy Sprawl in Connecticut—Why Farmland and Forests are Being Developed for Electricity Production; Recommendations for Better Siting" (2017)
- Core solar siting law: Connecticut Solar Siting Statute (2017) This law establishes siting standards and creates incentives for installing solar facilities in Connecticut. It incorporates recent amendments addressing whether projects require certificates demonstrating environmental compatibility and public need.