



University of Colorado  
Boulder



## *Best Practices- Municipal Ordinances for Solar Development*

Katherine Ide  
Kennebec Land Trust Summer Intern 2021



*A dual-use solar farm in Deerfield, Massachusetts.*

## *Introduction*

As Maine strives to reach its statewide goal of 80% renewable energy by 2030 and 100% renewable energy by 2050, solar energy development projects are gaining traction. Solar farms can be sited in a variety of locations: fields, rooftops, parking lots, and other open locations. When communities include an assessment of the impacts of solar development on a given region's natural resources, some solar development settings are better options. For example, brownfields<sup>1</sup> are preferable to green fields<sup>2</sup>, because green fields could be used as agricultural land in the future.

Through Maine's "Home Rule" system, towns and cities have specific municipal ordinances regarding zoning and land use policies for all forms of development. Many municipalities in Maine do not yet have ordinances specific to siting solar energy projects, and among the municipalities that do have them, many of the ordinances are brief and vague and don't specifically address impacts to forestland, wetlands, valuable wildlife habitats, farmland, and other natural resources. To minimize these impacts, towns can consider including specific language in their ordinances to prioritize environmentally conscious siting practices.

To ensure that solar projects are sited in a responsible way, municipalities must enact solar energy ordinances, which are essential in regulating the protection of wildlife, habitats, forestlands, agricultural soils, and other factors that limit the impact of solar installations on the community and the environment. Including specific conditions within a solar ordinance is vital to this protection.

KLT serves an area of twenty-one communities, mainly within Kennebec County. The majority of municipalities in KLT's service area have *not* enacted solar ordinances. Municipalities that do have them include Manchester, Hallowell, Augusta, Monmouth, and Gardiner, but even these existing ordinances have potential gaps that allow for irresponsible siting practices and possible setbacks to environmental protection. Those municipalities that lack solar specific ordinances are Litchfield, Winthrop, Mt. Vernon, Readfield, Randolph,

---

<sup>1</sup> *"A tract of land that has been developed for industrial purposes, polluted, and then abandoned."* (Merriam-Webster)

<sup>2</sup> *"Land not previously developed or polluted."* (Merriam-Webster)

Vassalboro, Chelsea, Chesterville, Farmingdale, Fayette, Leeds, Pittston, Sidney, Vienna, Wayne, and West Gardiner.

My research focused on municipalities with existing solar energy ordinances, with the goal of summarizing the best strategies for creating ordinances that address ecological impacts and the conservation of natural resources.

### *Survey Data*

To gain a full picture of the process of writing and enforcing ordinances, I created a survey to examine the responses from three municipalities within KLT's service area. Manchester, Monmouth, and Hallowell have all enacted solar ordinances within the past few years. The survey was completed by a member of the municipal government from each municipality. The survey questions addressed the following topics: resources used to assist in writing the ordinance; factors and regulations that were considered and included within the ordinance; and how enforceable and effective those factors and regulations have been. Each municipality's ordinance is unique, and the survey responses reflected these differences.

Many organizations in Maine have provided resources to help municipal governments write comprehensive solar ordinances and will continue to make the results of new research available.<sup>3</sup> These organizations include the Maine Farmland Trust, Maine Audubon, and the Maine Department of Inland Fisheries and Wildlife, among others. Resources include guidelines for low-impact siting, model regulations, maps, and other materials that summarize ways in which solar developers can minimize environmental impacts. These resources are valuable in determining which factors and regulations are important to include within an ordinance. The survey results indicated that only two of the six best resources available in Maine were used by surveyed municipalities.

---

<sup>3</sup> Resources for municipalities are listed at the end of this paper.

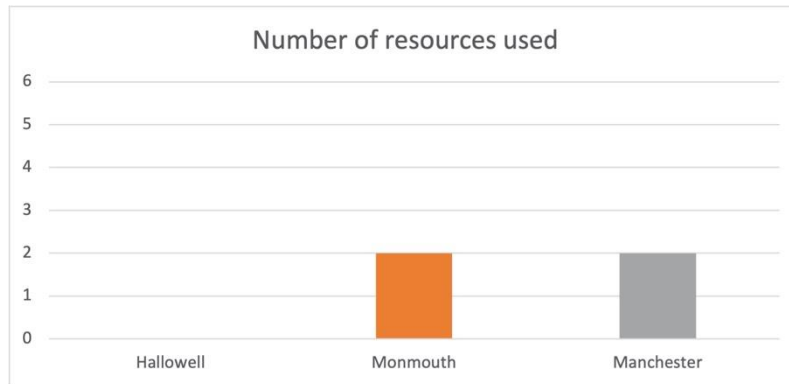


Figure 1. *Number of resources used by each municipality to write its solar ordinance out of the six major statewide planning resources available.*

The resource documents focus on protection of wildlife habitat and farmlands of statewide importance<sup>4</sup>; restrictions on forestland conversion; abandonment/decommissioning<sup>5</sup> of solar installations; visual impacts of solar installations; and restrictions on the size of solar farms. Communities that incorporate provisions relating to these concerns in their ordinances are better able to prioritize environmental issues during the siting, installation, maintenance, and removal of solar energy projects. Of the municipalities surveyed, all three included sections regarding abandonment/decommissioning of solar installations and the visual impacts of solar installations. One of the municipalities included regulations on the size of solar farms, and one included sections on the protection of wildlife habitat and agricultural land and soils.

	Protection of wildlife habitat	Protection of agricultural soils and farmland of statewide importance	Restrictions on forestland conversion	Abandonment and decommissioning of solar farms	Visual impacts of solar farms	Restrictions on the size of solar farms
<b>Hallowell</b>				<b>x</b>	<b>x</b>	
<b>Monmouth</b>	<b>x</b>	<b>x</b>		<b>x</b>	<b>x</b>	
<b>Manchester</b>				<b>x</b>	<b>x</b>	<b>x</b>

Figure 2. *Factors each municipality included in its solar ordinance.*

<sup>4</sup> “Land that meets specific criteria based on the physical and chemical properties of the soils, and the climatic environment of soil occurrence.” (USDA)

<sup>5</sup> “To remove from service.” (Merriam-Webster)

Ordinances are difficult to enforce if they do not include specific language and regulations. Municipalities can address environmental issues by including requirements for site plan reviews<sup>6</sup>, moratoriums<sup>7</sup> on solar development, the installation of visual screening for solar installations, granting conditional use permits<sup>8</sup>, making use of co-use or dual-use development<sup>9</sup> on agricultural lands, and utilizing livestock grazing<sup>10</sup> on agricultural lands in their ordinances. All three municipalities that were surveyed included regulations for granting conditional use permits and installing visual screening in their solar ordinances. Two municipalities included regulations for site plan review, and one included regulations for livestock grazing and dual-use development. Only two of the three municipalities have had applications for solar projects since enacting their ordinances. These two municipalities have found that regulations for site plan review, visual screening, conditional use permits, and dual-use development have been enforceable and effective. One municipality found that regulations for livestock grazing have been difficult to enforce and have not had the desired outcome.

---

<sup>6</sup> *“A locally developed system for reviewing new commercial, industrial, and other nonresidential development to assure that it meets public health, safety, and environmental concerns.”* (maine.gov)

<sup>7</sup> *“A waiting period set by an authority.”* (Merriam-Webster)

<sup>8</sup> *“A use that is permitted subject to compliance with a set of conditions or requirements set forth in the zoning ordinance.”* (Maine Municipal Association)

<sup>9</sup> *“Agricultural production and electricity production from solar photovoltaic (PV) panels occurring together on the same piece of land.”* (University of Massachusetts)

<sup>10</sup> *“The practice of grazing livestock on solar farms.”* (Merriam-Webster)



*Sheep grazing beneath solar panels on a solar farm in Oregon.*

	<b>Requirements for site plan review</b>	<b>Moratorium on solar development</b>	<b>Installation of visual screening for solar farms</b>	<b>Granting conditional use permits</b>	<b>Utilizing dual-use development on agricultural lands</b>	<b>Utilizing livestock grazing of solar farm sites</b>
<b>Hallowell</b>			<b>X</b>	<b>X</b>		
<b>Monmouth</b>	<b>X</b>		<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>
<b>Manchester</b>	<b>X</b>		<b>X</b>	<b>X</b>		

Figure 3. Regulations included in each municipality's solar ordinance.<sup>11</sup>

<sup>11</sup> Coincidentally, Augusta recently enacted a 180-day moratorium on solar development in order to make time to rewrite the local ordinance and include more regulations on visual impacts of solar farms. Read more here: <https://www.centralmaine.com/2021/08/06/augusta-bans-large-solar-project-development-for-180-days/>

## *Ordinance Analysis*

Each municipality's written solar ordinance addresses the important factors and regulations included within the survey. In section 6.8.9.3 of Monmouth's solar energy ordinance, section (e.) includes language that regulates the protection of wildlife habitat, farmlands of statewide importance, and restriction of forestland conversion. "Siting of projects should not occur on prime agricultural soils or soils of statewide importance.... Clearing of natural vegetation shall be limited.... Herbicide and pesticide use shall be minimized. No topsoil or prime agricultural soil shall be removed...." This section also includes language regarding dual-use development and livestock grazing: "...shall minimize mowing by utilizing livestock grazing...Efforts will be made to minimize the impact on existing agricultural uses by developing dual-use projects..." This section addresses environmental concerns with specific language, such as categorizing soil types and determining strategies like dual-use development and livestock grazing. The specifications ensure that these factors are considered during the installation, management, and removal of a solar energy system.

Comparing the language used in each ordinance's decommissioning section provides an example of the level of detail that it is necessary to include. Manchester's solar energy ordinance, section 7, part B, "*Abandonment and Removal*" states, "If a ground mounted solar energy system is removed, any earth disturbance as a result of the removal shall be landscaped in accordance with the Town of Manchester's Land Use Ordinance." Although there are some specifics outlined in Manchester's Land Use ordinance, Monmouth and Hallowell's solar ordinance decommissioning sections include more specific language. For example, Hallowell's ordinance says, "Stabilize or revegetate the site as necessary to minimize erosion. Native plants or seed mixtures shall be used to the maximum extent possible" (section 2, letter B, point #3). Using language to describe the goal of minimizing erosion and encouraging the use of native plants and seeds increases a municipality's ability to regulate and minimize the impacts that decommissioning solar projects may have. Including these specifics increases the effectiveness and enforceability of such regulations and prioritizes environmental conservation within the ordinance.



## *Conclusion*

Solar energy development will continue to grow in Maine regardless of whether municipalities are prepared for large-scale solar development or not. It is essential that municipalities act to create solar ordinances now, to minimize ecological impacts and prioritize the conservation of natural resources. By using the available statewide solar development planning resources and including specific environmental siting and management regulations, municipalities can significantly decrease the negative impacts that solar development could have on our forestlands, wetlands, valuable wildlife habitats, farmlands, and other natural resources. It is essential that ecological issues be considered a priority by solar developers, to maximize the positive environmental effects that increased solar energy production can have in reducing carbon emissions.

Special thanks to:

Linda Cohen, Stan Davis, Abby Farnham, Benjamin Godsoe, Ellen Griswold, Doug Ide, Theresa Kerchner, Jane Matrisciano, Yvette Meunier, Steve O'Donnell, Jim Perkins, Ethan Tremblay, Debora Southiere and the generous Kennebec Land Trust donors who make the Ronald Joseph Summer Internship possible.



207.377.2848  
[www.tkltr.org](http://www.tkltr.org)

PO Box 261 - 331 Main Street  
Winthrop, Maine 04364



## *Recommended Resources for Municipalities*

“Agricultural Solar Siting Resources” by Maine Department of Agriculture, Conservation, and Forestry

[www.maine.gov/dacf/ard/resources/solar.shtml](http://www.maine.gov/dacf/ard/resources/solar.shtml).

"BEST PRACTICES for Low Impact Solar Siting, Design, and Maintenance" by Maine Audubon and Maine Farmland Trust

[maineaudubon.org/wp-content/uploads/2020/09/Best-Practices-Nov-2019-singl-pgsLR.pdf](http://maineaudubon.org/wp-content/uploads/2020/09/Best-Practices-Nov-2019-singl-pgsLR.pdf).

"Model Site Plan Regulations and Conditional Use Permits to Support Solar Energy Systems in Maine Municipalities" by Maine Audubon

<https://growsmartmaine.org/wp-content/uploads/2020/06/ModelSolarOrdinance-Feb2020-FINAL.pdf>

"Solar Energy Project General Resource Guidance and Recommendations" by Maine Inland Fisheries and Wildlife

[www.maine.gov/dacf/ard/docs/ifw-solar-project-guidance-03052020.pdf](http://www.maine.gov/dacf/ard/docs/ifw-solar-project-guidance-03052020.pdf).

"Solar Siting Guidelines" by Maine Farmland Trust

[www.maineFarmlandtrust.org/solar-siting-guidelines/](http://www.maineFarmlandtrust.org/solar-siting-guidelines/).

"Solar Siting Mapping Tool” by Maine Audubon

[audubon.maps.arcgis.com/apps/webappviewer/index.html?id=fe964854735f446db6550ce618dd0b3b](http://audubon.maps.arcgis.com/apps/webappviewer/index.html?id=fe964854735f446db6550ce618dd0b3b).

"Renewable Energy and Wildlife in Maine" by Maine Audubon among others

[maineaudubon.org/wp-content/uploads/2019/11/MaineAudubonRenewables\\_Wildlife2019Summary.pdf](http://maineaudubon.org/wp-content/uploads/2019/11/MaineAudubonRenewables_Wildlife2019Summary.pdf).

## References

- Beyer, Jim. "State of Maine Land Use Laws and Regulations." *Maine.Gov*, [www11.maine.gov/dep/ftp/presentations/solar/BLR\\_Land\\_presentation\\_SolarOverview2019pptx.pdf](http://www11.maine.gov/dep/ftp/presentations/solar/BLR_Land_presentation_SolarOverview2019pptx.pdf).
- Branam, Chris. "Installing Solar Panels on Agricultural Lands Maximizes Their Efficiency, New Study Shows." *Life at OSU*, 20 Aug. 2019, [today.oregonstate.edu/news/installing-solar-panels-agricultural-lands-maximizes-their-efficiency-new-study-shows](http://today.oregonstate.edu/news/installing-solar-panels-agricultural-lands-maximizes-their-efficiency-new-study-shows).
- "Can Land Conservation and Dual-Use Solar on Farms Coexist?" *Civil Eats*, 29 June 2021, [civileats.com/2021/06/29/can-land-conservation-and-dual-use-solar-on-farms-coexist/](http://civileats.com/2021/06/29/can-land-conservation-and-dual-use-solar-on-farms-coexist/).
- "Dictionary by Merriam-Webster." *Merriam-Webster*, Merriam-Webster, [www.merriam-webster.com/](http://www.merriam-webster.com/).
- Donoghue, Eliza. "BEST PRACTICES for Low Impact Solar Siting, Design, and Maintenance." *Maine Audubon*, Nov. 2019, [maineaudubon.org/wp-content/uploads/2020/09/Best-Practices-Nov-2019-singl-pgsLR.pdf](http://maineaudubon.org/wp-content/uploads/2020/09/Best-Practices-Nov-2019-singl-pgsLR.pdf).
- Donoghue, Eliza. "Model Site Plan Regulations and Conditional Use Permits to Support Solar Energy Systems in Maine Municipalities." *Maine Audubon*, Feb. 2020, Model Site Plan Regulations and Conditional Use Permits to Support Solar Energy Systems in Maine Municipalities.
- Griswold, Ellen. "Policy Update: State Legislative Priorities." *MAINE FARMLAND TRUST*, 25 Jan. 2021, [www.maineFarmlandtrust.org/policy-update-state-legislation/](http://www.maineFarmlandtrust.org/policy-update-state-legislation/).
- Griswold, Ellen. "Solar Siting Guidelines." *MAINE FARMLAND TRUST*, 5 Dec. 2019, [www.maineFarmlandtrust.org/solar-siting-guidelines/](http://www.maineFarmlandtrust.org/solar-siting-guidelines/).
- Haggerty, Sarah. "Renewable Energy and Wildlife in Maine." *MaineAudubon.org*, Maine Audubon, Nov. 2019, [www.maineaudubon.org/wp-content/uploads/2019/11/MaineAudubonRenewables\\_Wildlife2019Report.pdf](http://www.maineaudubon.org/wp-content/uploads/2019/11/MaineAudubonRenewables_Wildlife2019Report.pdf).
- Klein, Sharon. *Is Community Solar Good for Communities?*. *Vimeo*, 15 Mar. 2021, [vimeo.com/524440577](https://vimeo.com/524440577).
- Maine Audubon. "Maine Solar Siting Viewer." *Arcgis Web Application*, [audubon.maps.arcgis.com/apps/webappviewer/index.html?id=fe964854735f446db6550ce618dd0b3b](http://audubon.maps.arcgis.com/apps/webappviewer/index.html?id=fe964854735f446db6550ce618dd0b3b).
- Maine Audubon. "Renewable Energy and Wildlife in Maine." *Maine Audubon*, Nov. 2019, [maineaudubon.org/wp-content/uploads/2019/11/MaineAudubonRenewables\\_Wildlife2019Summary.pdf](http://maineaudubon.org/wp-content/uploads/2019/11/MaineAudubonRenewables_Wildlife2019Summary.pdf).
- Martin, Todd. "Solar in Maine FAQ." *Maine Audubon*, 2020, [maineaudubon.org/wp-content/uploads/2020/09/Solar-in-Maine-FAQ.pdf](http://maineaudubon.org/wp-content/uploads/2020/09/Solar-in-Maine-FAQ.pdf).
- Matos, Manuel. "Natural Resources Conservation Service." *Prime & Other Important Farmlands Definitions*, [www.nrcs.usda.gov/wps/portal/nrcs/detailfull/pr/soils/?cid=nrcs141p2\\_037285](http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/pr/soils/?cid=nrcs141p2_037285).

Meunier, Yvette. "Agricultural Solar Siting Resources." *Agricultural Solar Siting Resources: Agricultural Resource Development Division: Maine DACF*, [www.maine.gov/dacf/ard/resources/solar.shtml](http://www.maine.gov/dacf/ard/resources/solar.shtml).

"Ordinances-Policies." *Manchester, Maine*, [manchester.govoffice2.com/index.asp?SEC=98AE5C55-DE23-40FA-9055-D1DC85C82E39&Type=B\\_BASIC](http://manchester.govoffice2.com/index.asp?SEC=98AE5C55-DE23-40FA-9055-D1DC85C82E39&Type=B_BASIC).

"Ordinances." *Hallowell, ME*, [hallowell.govoffice.com/index.asp?Type=B\\_BASIC&SEC=%7B41D0122C-AB11-4B9B-8646-0FAFFBD716B6%7D](http://hallowell.govoffice.com/index.asp?Type=B_BASIC&SEC=%7B41D0122C-AB11-4B9B-8646-0FAFFBD716B6%7D).

Stratton, Bob. "Solar Energy Project General Resource Guidance and Recommendations." *Maine Department of Inland Fisheries and Wildlife*, 5 Mar. 2020, [www.maine.gov/dacf/ard/docs/ifw-solar-project-guidance-03052020.pdf](http://www.maine.gov/dacf/ard/docs/ifw-solar-project-guidance-03052020.pdf).

Strong, River. "Dual-Use: Agriculture and Solar Photovoltaics." *Ag.umass.edu*, 1 May 2018, [ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/dual-use\\_050118\\_0.pdf](http://ag.umass.edu/sites/ag.umass.edu/files/fact-sheets/pdf/dual-use_050118_0.pdf).

"Town of Monmouth Ordinances." *Town of Monmouth, Maine*, [monmouthme.govoffice2.com/index.asp?SEC=8D406595-C7AF-4E90-9568-A5B2BC53914A&Type=B\\_BASIC](http://monmouthme.govoffice2.com/index.asp?SEC=8D406595-C7AF-4E90-9568-A5B2BC53914A&Type=B_BASIC).