

7800 Solar Photovoltaic Installations

7801 Purpose

To facilitate and provide reasonable regulations for the placement, design, construction, operation, monitoring, modification, removal and recycling of Solar Photovoltaic Installations that address public health, safety and welfare in accordance with Massachusetts General Law Chapter 40A, Section 3, minimizes impacts on scenic, rural, natural and historic community resources, and provides adequate financial assurance for the eventual decommissioning of such installations.

7802 Applicability

This section shall apply to all Solar Photovoltaic Installations, including related buildings, structures, and equipment, and to physical modifications of such installations that materially alter their type, configuration, or size as determined by the Planning Board. For reference to Site Plan Review Application Policy and Procedures, applicants shall refer to the Site Plan Review Provision documents as follows:

- “Site Plan Review provisions for *large-scale ground-mounted solar energy systems*”
- “Site Plan Review provisions for *medium-scale ground-mounted solar energy systems*”
- “Site Plan Review provisions for *roof-mounted and small-scale ground-mounted solar energy systems*”

7803 Solar Photovoltaic Definitions

- 7803.1 Agrivoltaics or Dual Use shall mean the co-developing of the same area of land for both solar photovoltaic power as well as for agriculture. The coexistence of solar panels and crops implies a sharing of light between these two types of production.
- 7803.2 Ground-Mounted shall mean that installations are structurally mounted to the ground in any manner, including but not limited to ground anchored pole, rack, or rail installations, or non-ground penetrating ballasted installations; not roof-mounted installations or canopy installations above parking lots or driveways.
- 7803.3 Rated Nameplate Capacity shall mean the maximum rated output of electric power production of the photovoltaic system in watts of Direct Current (DC).
- 7803.4 Solar Collector shall mean a device, structure or a part of a device or structure for which the primary purpose is to transform solar radiant energy into thermal, mechanical, chemical, or electrical energy.
- 7803.5 Solar Energy shall mean radiant energy received from the sun that can be collected in the form of heat or light by a solar collector.
- 7803.6 Solar Energy System shall mean a device or structural design feature, a substantial purpose of which is to provide daylight for interior lighting or provide for the collection, storage and

- distribution of solar energy for space heating or cooling, electricity generation, or water heating.
- 7803.7 Solar Energy System, Active shall mean solar energy system whose primary purpose is to harvest energy by transforming solar energy into another form of energy or transferring heat from a collector to another medium using mechanical, electrical, or chemical means.
- 7803.8 Solar Energy System, Grid-Intertie shall mean a photovoltaic system that is connected to an electric circuit served by an electric utility.
- 7803.9 Solar Energy System, Ground-Mounted shall mean an Active Solar Energy System that is structurally mounted to the ground and is not roof-mounted; may be of any size (small-, medium- or large-scale).
- 7803.10 Solar Energy System, Large-Scale shall be considered an industrial facility use and mean an Active Solar Energy System that occupies more than 40,000 square feet of surface area (equivalent to a rated nameplate capacity of about 250kW DC or greater). Inclusive of access roads, utilities and appurtenant structures.
- 7803.11 Solar Energy System, Medium-Scale shall be considered an industrial facility use and mean an Active Solar Energy System that occupies more than 1,750 but less than 40,000 square feet of surface area (equivalent to a rated nameplate capacity of about 10 - 250 kW DC). Inclusive of access roads, utilities and appurtenant structures.
- 7803.12 Solar Energy System, Off-Grid shall mean photovoltaic solar energy system in which the circuits energized by the solar energy system are not electrically connected in any way to electric circuits that are served by an electric utility.
- 7803.13 Solar Energy System, Roof-Mounted or Building-Mounted shall mean an Active Solar Energy System that is structurally mounted to the roof of a building or structure; may be of any size (small-, medium- or large-scale).
- 7803.14 Solar Energy System, Small-Scale shall mean an Active Solar Energy System that occupies 1,750 square feet of surface area or less (equivalent to a rated nameplate capacity of about 10 kW DC or less). Inclusive of access roads, utilities and appurtenant structures.
- 7803.15 Solar Layout shall mean the total area of the vertical projection on the ground of all panels in the installation's most horizontal tilt position and shall include all spaces between the panels.
- 7803.16 Solar Photovoltaic System (also referred to as Solar Photovoltaic Installation) shall mean an active solar energy system that converts solar energy directly into electricity.
- 7803.17 Utility Provider shall mean connecting utility energy provider.

7804 Standards and Requirements

Except where specifically stated otherwise, the following provisions shall apply to all Medium and Large-Scale Ground-Mounted Solar Photovoltaic Installations in all applicable zoning districts.

(1) Setbacks

Medium and large-scale ground-mounted solar layouts of an installation along with all appurtenant structures, including but not limited to: buildings equipment shelters, storage facilities, transformers and substations shall adhere to a one hundred (100) foot front, side and rear yard setback requirement in all zoning districts. The Planning Board may reduce setbacks from lot lines for medium-scale ground-mounted solar layouts of 5,000 square feet or less if such an adjustment enhances the overall site design and still provides protection to adjacent properties. In such a case, additional screening may be required to minimize adverse impacts.

Small ground-mounted and roof or building mounted solar layouts of an installation along with appurtenant structures, including but not limited to: buildings, equipment shelters, storage facilities, transformers and substations shall comply with the building setbacks for front, side and rear yard requirements of the zoning district in which they are located, except for power feed and distribution lines and equipment where underground installation is not possible.

All ground-mounted solar energy systems in residential districts shall be installed either in the side yard or rear yard to the greatest extent practicable. Placement of solar energy systems in front yards is strongly discouraged, but permissible if an applicant can demonstrate that locating the solar energy system elsewhere on the property is not practicable, and shall require site plan approval.

(2) Landscaping, Screening, and Panel Orientation and Tilt

All appurtenant structures, including but not limited to: buildings, equipment shelters, storage facilities, transformers, and substations shall be architecturally compatible with each other. All structures shall be hidden from view whenever reasonable by vegetation or fencing and shall be in place prior to the issuance of a certificate to operate. Landscape plantings or solid fenced screening shall be provided to reduce the visual impact of installations and specifically to protect nearby receptors from danger, harm, or nuisance that may result from the reflective solar glare of photovoltaic panels. Photovoltaic panels shall have anti-reflective surfaces. Where necessary, panels shall be oriented or tilted in a manner to prevent such glare upon receptors.

Front, side and rear yard setback areas shall be designed to reduce the visual impact of the solar energy system upon adjacent property by use of fencing, trees and shrubs and/or naturally vegetated conditions. Suitable landscape

plantings for medium or large-scale ground-mounted solar energy systems shall consist of a substantially sight-impervious screen of evergreen foliage at 1.5 times the height of the highest solar panels. Suitable landscape plantings for small-scale ground-mounted solar energy systems shall consist of a substantially sight-impervious screen of evergreen foliage at least eight (8) feet in height. Screening is not required for roof or building-mounted solar energy systems. Suitable landscape plantings shall consist of native species identified by the UMass Clean Energy Extension Pollinator-Friendly Solar PV for Massachusetts initiative.¹

Alternatively, solid opaque fencing may be used. Fencing shall be no more than eight feet high, constructed of durable materials and supplemented with landscape plantings, sized as designated above. Berms or other methods to adequately screen the facility, depending on site specific conditions may be considered. All screening shall be maintained and replaced as necessary by the owner / operator of the solar energy system.

(3) Lighting

Lighting of ground-mounted solar energy systems and appurtenant structures shall be limited to that required for safety and operational purposes, and shall be fully shielded from abutting properties. Lighting of the solar energy system shall be directed downward and shall incorporate full cut-off fixtures to reduce light pollution. Security lighting shall be controlled by motion detectors or infrared sensors with an on-time of no more than ten (10) minutes per activation. No all-night lighting will be allowed.

(4) Utility Connections

All utility connections, conduits, cables, power lines, transformers and inverters shall be placed underground, except (a) where otherwise required by the Massachusetts State Building Code or the utility provider; (b) in adverse ground conditions such as appropriate soil conditions, shape and topography of the site, ledge or excess water; or (c) for connection to existing above ground utility lines. Wiring within the installation's solar layout shall follow industry standards and meet the requirements of the utility provider. Where an aboveground connection is already existing proximate to the site of the proposed facilities, it may be used, as determined by the Planning Board, if it meets the requirements of the utility provider, and electrical transformers for utility interconnections may be located above ground if required by the utility provider. In such a case, inverters shall be installed as far from abutting structures as feasible to mitigate potential noise impacts.

Where feasible all access roads and utilities shall minimize bisecting of the property and be installed along the perimeter of project. Access roads and associated tree clearing shall not exceed fourteen (14) feet in width.

¹ <https://ag.umass.edu/clean-energy/current-initiatives/pollinator-friendly-solar-pv-for-massachusetts>

(5) Signs

Signs shall comply with the requirements of Section 6300 of this Bylaw. However, in the Residential Districts not more than one (1) sign, with dimensions no larger than one (1) square foot in area per side shall be required to identify the owner and provide a 24-hour emergency contact phone number and may be installed with the trademarks of the installer, manufacturer, and operator of the installation. Solar energy systems shall not be used for displaying any advertising except for reasonable identification of the manufacturer, owner or operator of the solar energy system. Signs should not be visible to abutters nor to passersby on the street, if it can still be visible for emergency purposes.

(6) Stormwater Management and Conservation

Best management practices shall be used for controlling and managing stormwater run-off and drainage for the solar energy system in compliance with all applicable federal, state and local regulations. To the largest extent possible, the ground shall remain pervious to rain water. Where necessary, adequate provision shall be made for groundwater recharge and to prevent site run-off and erosion.

(7) Protection of Forest Land and Prime Farm Land, Land Clearing, Soil Erosion and Habitat Impacts

Not more than one (1) acre of land shall be deforested for any one Solar Photovoltaic Installation, and no such installation shall be placed on such land that was deforested within the prior 5 years. Clearing of natural vegetation shall be limited to what is necessary for the construction, operation and maintenance of solar energy system or otherwise prescribed by applicable laws, regulations, and bylaws/ordinances.

Solar Photovoltaic Installations are prohibited in locations of old growth forest, active farmland and prime farmland soils, wetlands, permanently protected open space, Priority Habitat Areas and BioMap 2 Critical Natural Landscape Core Habitat mapped by the Natural Heritage & Endangered Species Program (NHESP) and “Important Wildlife Habitat” mapped by the DEP.

The Planning Board will review siting of Solar Photovoltaic Installations with preference for the following locations:

- Roof-mounted
- Brownfield sites
- Parking lots

Proposed greenfield development is discouraged. Applicants who propose greenfield installations will be required to demonstrate why the proposed site

is preferable to a previously developed site. Such demonstration shall include a comparison of environmental impacts and a cost-benefit assessment.

(8) Decommissioning

Upon decommissioning of Solar Photovoltaic Installations all solar panel components shall be reused or recycled to the greatest extent possible using Silicon, Thin-Film based or next generation best practice solar panel recycling processes. The applicant may be required, as deemed appropriate by the Planning Board, to demonstrate a life-cycle analysis of the components to ensure that there is a net environmental benefit to the proposed installation.

(9) Solar for New Construction

New construction projects triggering Site Plan Review or Special Permit that can demonstrate one or more of the objectives as identified in the Sustainability Committee policy adopted by the Select Board on 5 October 2020 and in accordance with Section 1100, Purpose, are recommended.

New Industrial, Commercial or Residential Development:

Projects that create ten thousand (10,000) square feet or more of new impervious area or ten (10) or more residential units shall be strongly encouraged include a roof-mounted or building-mounted solar energy system equivalent to a minimum of 50% of the roof area of said project.

Parking Facilities:

New construction of roofed parking facilities with greater than twenty (20) parking spaces shall include a roof-mounted or building-mounted solar energy system equivalent to a minimum of 50% of the roof area of said project.

New construction of parking lots with greater than twenty (20) parking spaces shall include a roof-mounted parking canopy over the parking lot equivalent to a minimum of 50% of the parking area. Roof-mounted parking canopies in all districts shall meet setback requirements for Accessory Structures and shall be allowed where parking is permitted in accordance with requirements defined in Section 6000, Parking and Off-street Loading Requirements. All ground-mounted solar energy systems shall comply with the building setbacks for front, side and rear yard requirements of the zoning district in which they are located.

7805 Exemptions from Zoning Requirements

Solar energy systems shall not be included in calculations for lot coverage or impervious cover in so long as said installations should have planted surfaces beneath them such as dual-use solar or agrivoltaics installations. If the area beneath a solar energy system is to be paved or otherwise rendered impervious then this land area shall in fact count toward any coverage or impervious surface limit. Land required for access roads, utility

connections and appurtenant structures will be included in calculations for lot coverage or impervious cover of land.

4003(4): Business/ Industrial Uses – continued

	AR	R1	B	B1	OP	TC	IC
Roof or Building-Mounted Solar Photovoltaic Installation	Y	Y	Y	Y	Y	SP	Y
Small-Scale Ground-Mounted Solar Energy System (1,750 s.f. or less, 10 kW DC or less)	Y	Y	Y	Y	Y	N	Y
Medium-Scale Ground-Mounted Solar Energy System (greater than 1,750 but less than 40,000 s.f., 10 - 250 kW DC)	N	SP	Y	Y	Y	N	Y
Large-Scale Ground-Mounted Solar Energy System (40,000 s.f. or greater, 250kW DC or greater)	N	N	SP	SP	SP	N	SP

ARTICLE IV USE REGULATIONS

4XXX (Number TBD, Hundreds were all used) Special Permits for Medium or Large-Scale Ground Mounted Solar Energy Systems

The Planning Board shall be the Special Permit Granting Authority for the issuance of special permits in the case where an applicant requests to install a medium or large-scale ground mounted solar energy system. In addition to the standards set forth in Section 7800 of this Bylaw, the Special Permit Granting Authority shall also consider each of the following factors before the issuance of a special permit:

- (1) Suitability of the site for the proposed medium or large-scale ground mounted solar energy system;
- (2) Adequate landscaped and natural buffers are provided around the installation. Where applicable, physical buffers, such as berms, fences and/or walls are proposed between residential and installations of medium or large-scale ground mounted solar energy system;
- (3) The proposal, to the maximum extent possible, protects the existing tree canopy and stone walls on Massachusetts Avenue (Route 111) and along designated scenic roadways;

- (4) The proposal retains and/or preserves unique natural, historical or cultural resources located on the site, if any;

ARTICLE V DIMENSIONAL REQUIREMENTS
5000

FOOTNOTES – **continued**

¹⁹ Buildings of historical significance proposing roof or building-mounted solar energy systems shall be required to undergo reviews by both the Historical Commission and the Design Review Board. Solar energy systems on historically significant structures shall have limited or no visibility to the public on said structures and the Boards reserve the right to recommend specific solar energy systems to maintain historical character of structures.

²⁰ Existing zoning district height limitations apply for all ground-mounted solar energy systems. If the ground-mounted solar energy system is accessory to a principal building or structure on a lot, then the height restriction for accessory structures would apply as defined in Section 5008 of this Bylaw. If the ground-mounted solar energy system is the principal structure on a lot, then the height restriction shall be a maximum of twelve (12) feet from finished grade. An increase in height may be granted in commercial districts by special permit.