

**GUIDANCE REGARDING SOLAR ARRAYS
AND THE GENERAL PERMIT FOR THE
DISCHARGE OF STORMWATER AND DEWATERING WASTEWATERS FROM CONSTRUCTION
ACTIVITIES**

January 8, 2020

Solar development has expanded over the last several years as Connecticut and other states have invested in this important resource to further greenhouse gas emission reductions. The large amount of impervious surface inherent in the construction of a large-scale solar array is unlike most other construction activities regulated under the General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities (“general permit”) and entails challenges not encountered in traditional development projects. If not properly managed through appropriate design and mitigation measures, stormwater discharged during and after the construction of solar arrays can be a significant source of pollution resulting from increased runoff, erosion, and sedimentation, which can adversely impact wetlands or other natural resources. Solar installations must be properly designed to assure soil stabilization, minimize soil disturbance and soil compaction, and address ineffective controls to manage the total runoff volume and velocity that can lead to the loss of topsoil, erosion and sediment discharges from disturbed areas and stormwater outlets, and erosion along downstream channels and streambanks. The ability to address such significant environmental problems during construction and post-construction becomes more difficult as site imperviousness increases.

The environmental objectives of the general permit that solar facilities must meet have not changed. What has changed are the design assumptions and application of stormwater management techniques and engineering principles and practices to meet those requirements, as well as the Department’s knowledge and experience with respect to the ability of different techniques and engineering practices to meet the underlying environmental requirements. The Department is obligated to apply its best understanding of management techniques and engineering practices and principles. At the same time, the Department strives to provide more predictability and transparency around its approaches to permitting solar facilities in order to promote environmental compliance and competitive solar development in the state.

To that end, DEEP is publishing this Guidance, available at www.ct.gov/deep/stormwater to capture the Department’s current approach to reviewing construction activities for large-scale solar arrays to assist the professionals engaged in designing and constructing solar array projects, both large and small, and to provide a more transparent understanding of how the Department is considering emerging issues and the manner of addressing them. The Guidance describes the Department’s expectations around how such professionals must ensure that any such project is designed and constructed in a manner that takes into account site conditions such as: the amount, frequency, intensity and duration of precipitation; soil types, topography, surficial geology, hydrology and natural resources; and any changes to such conditions resulting from site activities during and after construction to minimize erosion and sedimentation and to control stormwater discharges, including peak flowrates and total stormwater runoff volume and velocity. This guidance should also help facilitate the preparation and efficient review of a Stormwater Pollution Control Plan (Plan) submitted in support of an application for coverage under the general permit.

This guidance should not be confused with, and is not intended to contain, enforceable requirements. A professional may propose to design and construct a solar array in another manner. A design professional may decide, based on the particular conditions for a project or a site, that the best technique or engineering practice is to deviate from this guidance. The Department is willing to consider alternative approaches. To be approved, however, any proposal must address the issues noted in this Guidance as well as demonstrate compliance with the requirements of the general permit. This guidance is provided for informational purposes only and is not meant to modify or replace any provision of the general permit or any applicable laws or regulation. In the event of a conflict between this guidance and the general permit or any applicable law or regulation, the permit or applicable law or regulation shall govern.

The Department notes that it has separately initiated a public comment process on the proposed Construction General Permit, which includes similar provisions described in this guidance. The adoption of any provisions in the proposed Construction General Permit would supersede this Guidance. Any questions about the applicability of this Guidance may be directed to Karen Allen at Karen.Allen@ct.gov.

Design and construction guidance

- (1) Roadways, gravel surfaces and transformer pads within the solar array are considered effective impervious cover for the purposes of calculating Water Quality Volume (WQV). In addition to these impervious surfaces, all solar panels in the array should also be considered effective impervious cover for the purposes of calculating the WQV if the proposed post-construction slopes at a site are equal to or greater than 15% or if the post-construction slopes at a site are less than 15% and the conditions in (a) – (e), inclusive, below have not been met:
 - (a) The vegetated area receiving runoff between rows of solar panels (see Figures 1 and 2, below) is equal to or greater than the average width of the row of solar panels draining to the vegetated area;
 - (b) Overall site conditions and solar panel configuration within the array are designed and constructed such that the runoff remains as sheet flow across the entire site;
 - (c) The following conditions are satisfied regarding the design of the post-construction slope of the site:
 - For slopes less than or equal to 5%, appropriate vegetation shall be established as indicated in Figure 1, below; and
 - for slopes greater than 5%, but less than 10%, practices including, but not limited to, the use of level spreaders, terraces or berms as described in Figure 2, below, shall be used to ensure long term sheet flow conditions; and
 - for sites with slopes greater than or equal to 8%, erosion control blankets or stump grindings or erosion control mix mulch or hydroseed with tackifier should be applied within 72 hours of final grading, or when a rainfall of 0.5 inches or greater is predicted within 24 hours, whichever time period is less; and
 - for slopes equal to or greater than 10% and less than 15%, the Plan includes specific engineered stormwater control measures with detailed specifications that are designed to provide permanent stabilization and non-erosive conveyance of runoff to the property line of the site or downgradient from the site.
 - (d) The solar panels should be designed and constructed in such a manner as to allow the growth of vegetation beneath and between the panels.
 - (e) A one-hundred (100) foot buffer should be maintained between any part of the solar array and any “watercourses” as that term is defined in Conn. Gen. Stat. § 22a-38. The buffer shall consist of undisturbed existing vegetation or native shrub plantings.
- (2) The lowest vertical clearance of the solar panels above the ground should not be greater than ten (10) feet. The panels should, however, be at an adequate height to support vegetative growth and maintenance beneath and between the panels. If the lowest vertical clearance of the solar panels above the ground is greater than ten (10) feet, non-vegetative control measures will be necessary to prevent/control erosion and scour along the drip line or otherwise provide energy dissipation from water running off the panels.
- (3) The Commissioner may require that a letter of credit be secured prior to undertaking construction activity in circumstances where site conditions, scale of project or previous compliance issues present elevated risks associated with potential non-compliance. For previously permitted projects, the amount of the letter of credit has been established at \$15,000.00 per acre of disturbance. The wording of such letter of credit shall be as prescribed by the Commissioner. The Permittee should maintain such letter of credit in effect until the Commissioner notifies the permittee that the Notice of Termination, filed in compliance with Section 6 of the general permit has been accepted by the Commissioner. The Commissioner may reduce the amount of the Letter of Credit upon showing of compliance with milestones set forth in the Plan or specified in this general permit. If requested by the Commissioner, the registrant must provide proof that the bank is regulated under state or federal

authority.

Design requirements for post-construction stormwater management measures.

- (1) Post-construction stormwater control measures should be designed and constructed to provide permanent stabilization and non-erosive conveyance of runoff to the property line of the site or downgradient from the site.
- (2) Orientation of panels should be considered with respect to drainage pattern, flow concentration, drainage area and velocity (i.e. rows perpendicular to the contours may result in higher runoff and flow concentration).
- (3) The permittee should conduct a hydrologic analysis that:
 - (a) Evaluates 2, 25, 50 and 100-year storm post-construction stormwater flows; and
 - (b) Is based on site specific soil mapping to confirm soil types; and
 - (c) Is able to determine and confirm the infiltrative capacity of any stormwater management measures and, in addition, reflects a reduction of the Hydrologic Soil Group present on-site by one (1) step (e.g. soils of HSG B shall be considered HSG C) to account for the compaction of soils that results from extensive machinery traffic over the course of the construction of the array; and
 - (d) Is based on slope gradient, surveyed soil type (adjusted per subparagraph (c), above), infiltration rate, length of slope, occurrence of bedrock, and change in drainage patterns (see also page 23 at https://www.ct.gov/deep/lib/deep/Permits_and_Licenses/Land_Use_Permits/Inland_Water_Permits/IWRD_inst.pdf); and
 - (e) For an engineered stormwater management system, demonstrates no net increase in peak flows, erosive velocities or volumes, or adverse impacts to downstream properties.

Figure 1
Solar Panel Installation with Slopes $\leq 5\%$

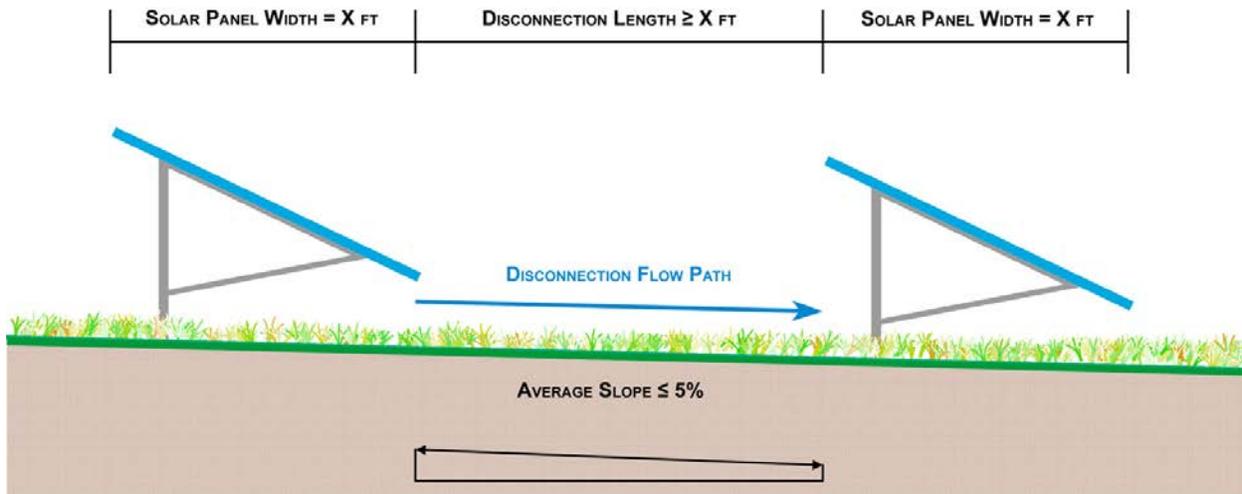
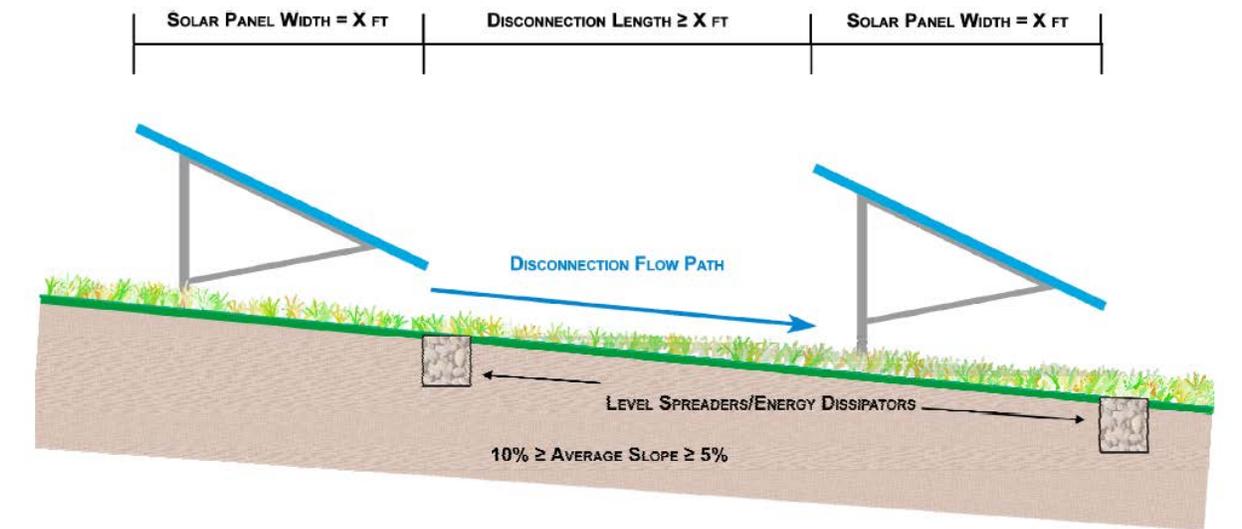


Figure 2
Solar Panel Installation with Slopes $> 5\%$ and $\leq 10\%$



Source: Maryland Department of the Environment: Stormwater Design Guidance – Solar Panel Installations