E-6. Solar Farms

Image SAS, Cary, NC

Design Objective

Solar farms consisting of large arrays of ground-mounted photovoltaic systems are becoming increasingly common in North Carolina. Responsible development of solar farms must balance the growth of this valuable industry with the need to protect our natural resources, including addressing issues related to stormwater runoff. Solar farms that use traditional elevated solar panels are unique because they contain an impervious surface (elevated solar panel) that often have a pervious surface (vegetation) underneath the panel. Stormwater management may be achieved in a cost-effective manner by disconnecting rows of solar panels and directing runoff over the vegetated areas between the rows.

Regulatory Requirements

Currently, the State allows solar panels associated with ground-mounted solar farms to be considered pervious if configured such that they promote sheet flow of stormwater from the panels and natural infiltration of stormwater into the ground beneath the panels. Other structures associated with the solar farm such as buildings, entrance roads, transformers, and footings would still be considered impervious.

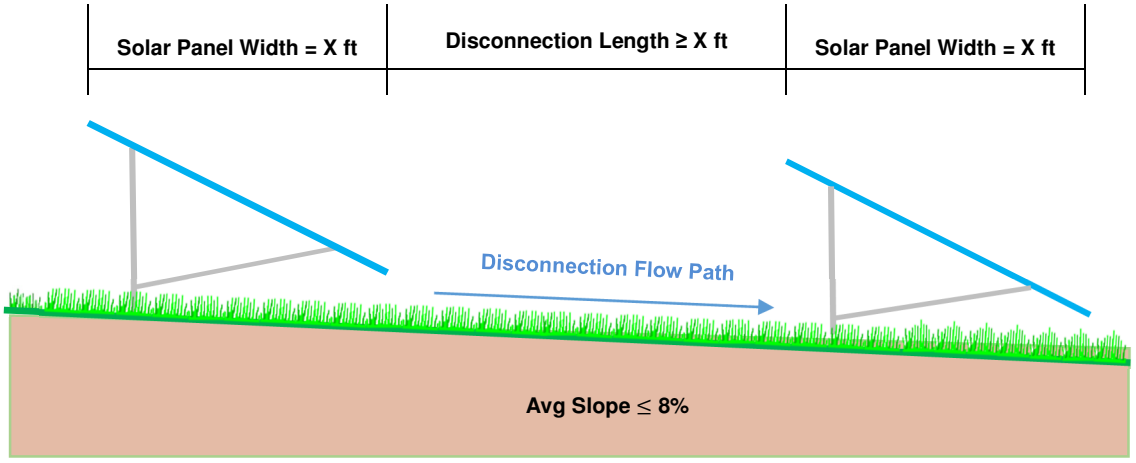
Important Links

N.C.G.S. 143-214.7(b2): “For purposes of implementing stormwater programs, ‘built-upon area’ means impervious surface and partially impervious surface to the extent that the partially impervious surface does not allow water to infiltrate through the surface and into the subsoil.”

RECOMMENDATION 1: AVOID COMPACTION OF SUBSOIL
Subsoil compaction should be minimized during and after installation of solar arrays to allow the maximum amount of natural infiltration. If compaction occurs during construction, subsoil should be tilled and amended to return the soil to its pre-compaction condition.

RECOMMENDATION 2: DISCONNECT RUNOFF FROM SOLAR PANEL ARRAYS
Solar arrays should be designed and installed to allow growth of vegetation under and between the solar arrays. Rows of panels should be installed with sufficient distance between rows to allow for capture of rainfall from at least 1.0 inch of rain (Figure 1). Where installed on slopes greater than 8%, consider options for maintaining sheet flow and dissipating energy at the drip edge of each row of panels.

Figure 1: Disconnection of flow path between solar panels when average slope is less than 8%.



RECOMMENDATION 3: AVOID CONCENTRATION OF STORMWATER
Panels should be positioned to allow stormwater to run off their surfaces; however, collection and concentration of stormwater flow is to be avoided. Arrays should be installed on a uniform plane such that stormwater will sheet flow off the panels and remain unconcentrated. When considering a potential build site, it's a good idea to consider the slope of the land in the areas of the site where the solar arrays are most likely to be installed. Areas with steep slopes may not be suitable or may require considerable grading.

RECOMMENDATION 4: MINIMIZE USE OF HERBICIDES AND FERTILIZERS
Weed control and vegetation management is particularly important for ground-mounted solar systems. Overuse of herbicides and fertilizers can contribute to degraded water quality. Limit

the use of fertilizers to that necessary to maintain vegetation. Use mowing for vegetation control instead of herbicides.

RECOMMENDATION 5: PLANT MIX OF WARM- & COOL-SEASON GRASSES
Large solar arrays can have the effect of creating microclimates under the panels. To help account for this, plant a mixture of warm-season and cool-season grasses to account for differences in temperature and shading created from the installation of large solar arrays. In addition, use low-growing, low-maintenance grass mixtures. Planting mixtures can also include low-growing wildflowers such as white clover and other types of vegetation that can be attractive to pollinators. A win-win for the grass and the bees!

RECOMMENDATION 6: LIMIT VERTICAL CLEARANCE TO ≤ 10 FEET
Stormwater runoff falling from solar panels can cause scouring and erosion at the driplines. Limiting the lowest vertical clearance to no greater than 10 feet will help prevent erosion and scouring along the dripline.