

County Commission Public Hearing

ZTA19-03 – Solar Energy Facilities

Friday, September 25, 2020



Amendment to Stormwater Management Ordinance

- As summarized in a memorandum dated April 22, 2020 from the Jefferson County Chief Engineer and Director of the Department of Engineering, Planning, and Zoning,
- *“...the ASCE hydrologic study indicates that stormwater runoff from solar farms can be significant. However, the hydrologic study, and stormwater management practices adopted by the by [sic] other jurisdictions, indicate that solar farms can be exempt from providing traditional stormwater management facilities if the conditions proposed in the Jefferson County Stormwater Ordinance are satisfied. These proposed conditions require low-impact methods for reducing post-construction runoff volumes and velocities.”*

American Society of Civil Engineers Study

Conclusions

Solar farms are the energy generators of the future; thus, it is important to determine the environmental and hydrologic effects of these farms, both existing and proposed. A model was created to simulate storm-water runoff over a land surface without panels and then with solar panels added. Various sensitivity analyses were conducted including changing the storm duration and volume, soil type, ground slope, panel angle, and ground cover to determine the effect that each of these factors would have on the volumes and peak discharge rates of the runoff.

The addition of solar panels over a grassy field does not have much of an effect on the volume of runoff, the peak discharge, nor the time to peak. With each analysis, the runoff volume increased slightly but not enough to require storm-water management facilities. However, when the land-cover type was changed under the panels, the hydrologic response changed significantly. When gravel or pavement was placed under the panels, with the spacer section left as patchy grass or bare ground, the volume of the runoff increased significantly and the peak discharge increased by approximately 100%. This was also the result when the entire cell was assumed to be bare ground.

The potential for erosion of the soil at the base of the solar panels was also studied. It was determined that the kinetic energy of the water draining from the solar panel could be as much as 10 times greater than that of rainfall. Thus, because the energy of the water draining from the panels is much higher, it is very possible that soil below the base of the solar panel could erode owing to the concentrated flow of water off the panel, especially if there is bare ground in the spacer section of the cell. If necessary, erosion control methods should be used.

Bare ground beneath the panels and in the spacer section is a realistic possibility (see Figs. 1 and 5). Thus, a good, well-maintained grass cover beneath the panels and in the spacer section is highly recommended. If gravel, pavement, or bare ground is

deemed unavoidable below the panels or in the spacer section, it may necessary to add a buffer section to control the excess runoff volume and ensure adequate losses. If these simple measures are taken, solar farms will not have an adverse hydrologic impact from excess runoff or contribute eroded soil particles to receiving streams and waterways.

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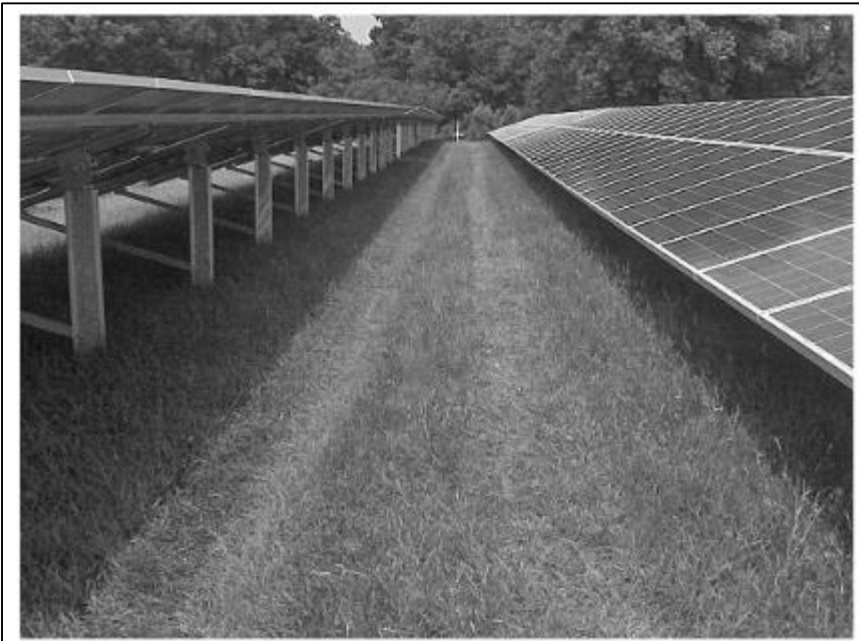


Fig. 1. Maintenance or “spacer” section between two rows of solar panels (photo by John E. Showler, reprinted with permission)

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SWM Ordinance Standards

- Earth disturbance and grading activities shall be minimized and natural vegetal cover shall be preserved and/or restored.
- Vegetal cover shall have 90% or better uniform coverage and shall not be subject to chemical fertilization and herbicides/pesticides. A meadow condition is preferable, particularly for slopes between 5 and 10%. Mowed areas should be kept to a minimum of 4”.
- Individual PV modules with an array shall be arranged to allow the passage of runoff underneath each module. The PV modules shall be arranged to allow the growth of vegetation beneath the PV modules and between the rows of PV arrays.
- If the width of the vegetative strip between rows of PV arrays is not a minimum of 12’, then stormwater BMPs such as infiltration trenches or berms shall be installed down gradient between each row.

SWM Ordinance Standards

- Ground mounted solar PV modules shall be supported with structures/foundations occupying a maximum of 5% of the total project area (the area within the boundary of the 100' setback/buffer surrounding the solar energy facility equipment). This area shall be delineated and dimensioned on the Concept Plan, along with a note of the total area and a calculation of the percent of impervious area occupied by the support structures/foundation.
- Solar PV modules shall be situated on mild slopes (10% max). If greater than 10% slopes are proposed, then stormwater BMPs such as infiltration trenches or berms shall be installed down gradient between each row of PV arrays, in addition to providing the minimum 12' spacing between the rows of PV arrays.
- The lowest vertical clearance of the solar PV array shall be at an elevation of 10' or less from the ground, but is also at an adequate height to promote vegetative growth below the PV array.
- No erosion or transport of sediments shall be allowed. An Erosion and Sediment Control Plan shall be submitted as part of the Stormwater Report. Permanent Erosion and Sediment Control shall be provided to address the potential for erosion at the drip edge of solar panels. In addition, the WVDEP temporary construction stormwater NPDES permit shall be submitted along with the Stormwater Report.

SWM Ordinance Standards

- The developer shall submit documentation in the form of a Stormwater Report, which demonstrates all of the above conditions are satisfied, to the Jefferson County Engineer for review and approval.
- The Stormwater Report shall be prepared, signed, and sealed by a professional engineer, registered in West Virginia.
- The Stormwater Report shall be approved prior to the issuance of the building permit.
- If the requirements established in the SWM Ordinance cannot be met, then stormwater quantity and quality control shall be provided.
- Engineering Staff shall have authority to visit the site within 72-hours notice, to determine if condition are being maintained.
- Failure to perpetually maintain and meet the conditions outlined in the SWM Ordinance shall be a violation.