Ohio Environmental Protection Agency

Guidance on Post-Construction Storm Water Controls for Solar Panel Arrays

Background

Although the area under and between ground-mounted solar panel arrays may be covered in vegetation (normally considered pervious), the elevated panels alter the volume, velocity and discharge pattern of storm water runoff and associated pollutants and therefore do require post-construction storm water management under OHC00005 (Part III.G.2.e, pp. 19-27). Paved or gravel roads and support buildings associated with the solar panel array as well as any gravel surfaces under or around the panel arrays must also include post-construction storm water management.

Post-Construction Storm Water Management Options

There are several factors that determine the entire installation's effect on runoff and feasible storm water management options. In some cases, runoff from roads, buildings and the solar panels can be managed through the standard post-construction practices listed in tables 4a and 4b of the CGP. For many facilities, storm water runoff from the solar panels can be simply managed by disconnection to the vegetated ground surface under and between the elevated panels provided 1) an ungraded, uncompacted soil profile exists, 2) dense and healthy vegetation can be maintained over the entire surface, and 3) runoff from the panels can be managed as non-erosive, sheet flow. The disconnection length ($L_{Disconnection}$) provided depends upon the width of the row of solar panels (W_{Panel}) and the width of the open gap width between the panel rows ($W_{Row\ Gap}$) as shown in Figure 1 below.

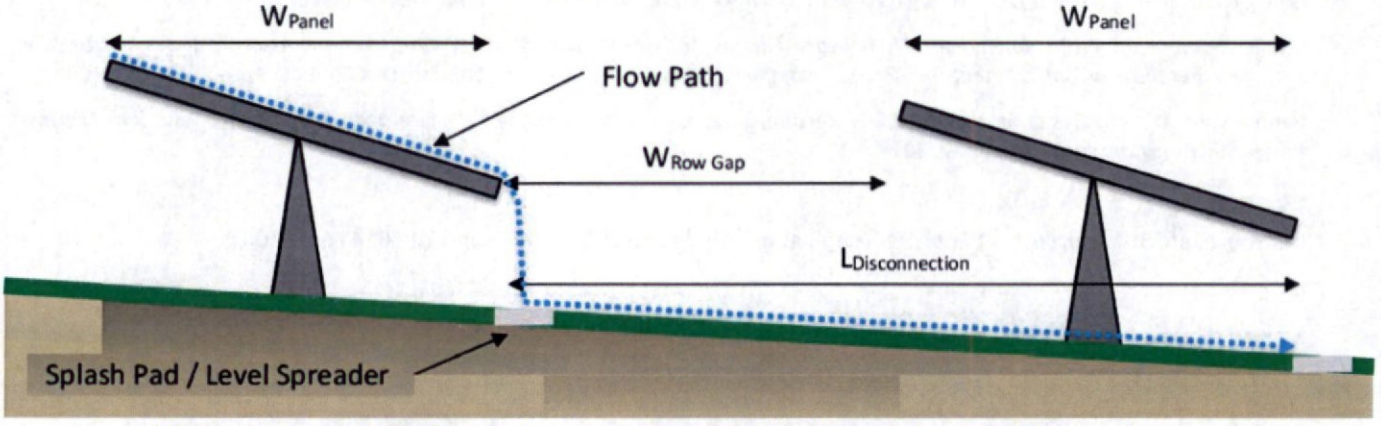

Figure 1: Schematic profile of solar panel array providing impervious area disconnection.

Runoff Reduction Spacing

The Runoff Reduction credit values for impervious area disconnection can be used to determine the $L_{Disconnection}$ needed based upon the W_{Panel}. Where the entire panel area is grass, this can be viewed as a needed ratio of W_{Panel} to $W_{Row\ Gap}$ for the entire length of the panel row.

For panel arrays on Hydrologic Soil Group (HSG) A or B soils and on soils that have been functionally restored, the disconnection length required is two times the solar panel width on a horizontal plane, which equates to a 1:1 spacing ratio. On HSG C or D soils without restoration, the disconnection length required is 3.5 times the solar panel width on a horizontal plane, or a 2.5:1 spacing ratio.

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Other Design Considerations

- Gravel or paved access roads and equipment pads as well as solar panels that drain onto to them may require traditional practices if impervious disconnection is not feasible.
- This guidance assumes the ground support structure and foundation are minimal (less than five percent of the area), will allow vegetation, and will not disrupt sheet flow. Otherwise, the area underneath the panels may not be included in the disconnection area.
- To limit erosion at the drip edge, it is recommended the panel drip edge be no more than 10 feet above the ground.
- If the panel position is fixed, a narrow stone drip pad may be used to protect the ground surface from erosion and promote sheet flow.
- If the panels track or rotate, the disconnection length shown in the previous diagram will vary and must be shown to be acceptable in all panel positions.
- The Storm Water Pollution Prevention Plan (SW3P) should include typical drawings and calculations for large panel arrays. Specific controls for access roads and other infrastructure must also be detailed.
- Utilize low- and slow-growing grass varieties to reduce compaction and damage from frequent mowing. Include cool-season, warm-season, shade-resistant, and legumes as necessary to develop a dense, year-round groundcover.

References

Maryland Department of the Environment. 2013. *Stormwater Design Guidance – Solar Panel Installation.*

North Carolina Department of Environmental Quality. 2018. *Stormwater Design Manual, E-6 Solar Farms.*

Ohio Department of Natural Resources. 2006 (with updates). *Rainwater and Land Development Manual.*

Ohio Environmental Protection Agency. 2018. *General Permit Authorization for Storm Water Discharges Associated with Construction Activity under the National Pollutant Discharge Elimination System.* Ohio EPA Permit Number OHC000005. April 23, 2018.

Pennsylvania Department of Environmental Protection, Bureau of Clean Water. 2019. *Chapter 102 Permitting for Solar Panel Farms, Frequently Asked Questions.* January 2, 2019.

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