Stormwater Management for Solar Farm Projects – Frequently Asked Questions

The Minnesota Pollution Control Agency (MPCA) regulates stormwater management in Minnesota under the Federal Nation Discharge Elimination System (NPDES) program. The MPCA issues permits every year covering every type of construction project including solar panel installations. Several solar Industry stakeholders and other agencies have requested guidance to clarify how stormwater regulations apply to these types of projects. This document was prepared in collaboration between these organizations and the MPCA.

***Are solar panel farms considered impervious for the National Pollutant Discharge Elimination System (NPDES) Permit?***

Yes. Solar panels, roads and gravel surfaces are impervious. The NPDES Permit states that a certain volume of stormwater, based on the amount of impervious, must be treated prior to runoff. However, the solar panels themselves are considered a *disconnected* impervious surfaces. The MPCA allows a volume credit for disconnected impervious surfaces to reduce the amount of stormwater that must be treated.

***What makes disconnected impervious different from connected impervious?***

A road is an example of a typical connected impervious surface. Runoff flows along the impervious surface of the road until it reaches an inlet. Although the surface of solar panels is considered to be impervious, the solar panel farm as a whole qualifies as disconnected impervious because *a)* there is pervious surface between each panel, and *b)* there is pervious surface beneath each panel. As rainfall drips off the solar panel’s surface, some of it will be infiltrated into the pervious surfaces before it reaches more panels or other impervious surfaces such as paths or roads. The MPCA solar panel calculator is an excel spreadsheet that quantifies the benefit of the solar panels acting as a disconnected impervious. More information on the methodology and the calculator can be found in the Minnesota Stormwater Manual: <http://stormwater.pca.state.mn.us/index.php/Main_Page>.

***How did the MPCA develop the solar farm excel spreadsheet calculator?***

Modeling analyses from a 35-year continuous simulation that varied the amount of pervious area and soil types was used to quantify the runoff reduction from impervious to pervious surfaces. The calculator uses the soil type, amount of impervious and pervious surface area, and the runoff depth from the solar panel to determine a Best Management Practice (BMP) volume credit. The BMP volume credit can then be subtracted from the required volume, resulting in a reduced total infiltration volume requirement

***Is there anything I can do in the design of my solar panel farm to help increase the BMP volume credit?***

Utilizing areas with soils that have high infiltration rates will achieve a larger BMP volume credit. Additionally, increasing the distance of pervious surface between each panel, or generally decreasing the ratio between impervious and pervious surfaces (I/P ratio), can also increase the BMP volume credit.

***Does it matter what type of pervious surface I have underneath my panels?***

Yes. Pervious surface must be vegetation such as pollinator friendly plant mix, mowed lawn, or a native plant mix. It is recommended that the vegetation cover is 90 percent or better uniform coverage. Gravel is considered impervious, so any pathways or roads within the solar panel farm cannot be included in the pervious area.

***What is a pollinator friendly plant? Is it required to be used in solar farms?***

Pollinator friendly plants include native plants that are highly attractive to pollinators such as native bees, honey bees, butterflies, moths, and hummingbirds, and are well-suited for plantings in urban and rural areas.  A pollinator friendly plant mix is an option for the pervious surface underneath and around solar panels, but it is not required. Pollinator plant mixes are easy to establish in most regions in Minnesota and are being endorsed by many agencies around the state for their numerous benefits.

***Can the BMP volume credit calculated in the MPCA’s excel spreadsheet calculator take care of the entire required infiltration volume?***

No. However, optimal site conditions such as a low I/P ratio paired with soils with a high infiltration rate can reduce the infiltration volume requirement by over 90%. The BMP volume credit is very dependent on specific site conditions and the design specifications of the solar panels.

***What are my options for traditional stormwater treatment in solar farms?***

To account for the rest of the required infiltration volume, there are many stormwater treatment options available, including but not limited to:

* Constructed shallow depressions for infiltration (with or without an underdrain)
* Natural depressions on the landscape that infiltrate
* Swales with check dams to create storage and promote infiltration
* Stormwater retention ponds, and
* Stormwater filtration

There is not one best option for stormwater treatment. It is best to consider variables such as maintenance and operation costs, available area within the solar panel farm, and the geographical and topographical setting of your solar panel farm when planning for stormwater management.