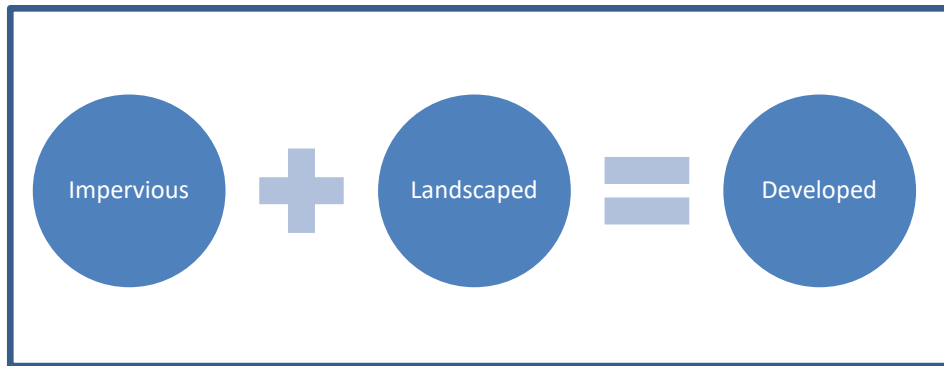




# Solar Array Projects: Stormwater Permitting & Compliance

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Bureau of Land Resources

# Chapter 500 Framework



Jurisdictional Threshold(s) Triggered



Quality Treatment Standards:

- General
- Phosphorus
- Urban Impaired Stream

Quantity Treatment:

- Flooding Standard (Peak Flow Control)

# Chapter 500 & Ground-mounted Solar Array Projects



## Solar Panel Consideration

Panel Area	Not Impervious
Post Area	Impervious

## Array Area Consideration

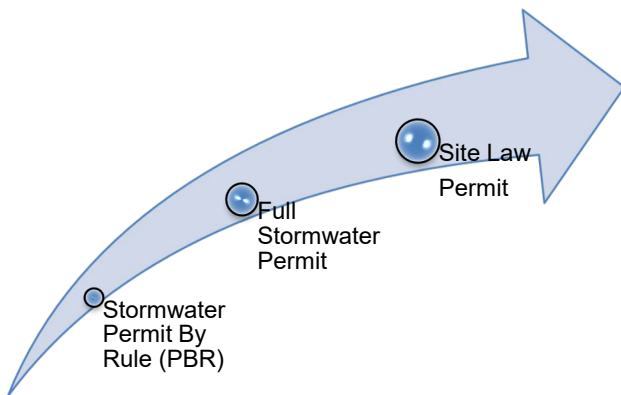
If grassed and mowed no more than twice a year, then	Not Developed
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- Minimal post-construction stormwater treatment for most solar projects.



## No DEP Permit Required if Soil Disturbance < One Acre!

Permit Type	Jurisdictional Threshold	DEP Review By	Applicable Standard(s)	Example
Stormwater PBR	< 20,000 sf impervious (LMAR, UIS) < One acre impervious (other watersheds)	BLR Field Services Staff	Only Basic (Mainly Construction ESC, No Post-construction Stormwater Standard)	A 19.9-acre solar array project meeting impervious area requirements
Full Stormwater	≥ 20,000 sf impervious (LMAR, UIS) ≥ One acre impervious (other watersheds)	BLR Stormwater Engineering Team (SET)	Basic, General (Phosphorus)	A 20.1-acre solar array project regardless its impervious area
Site Law	≥ Three acres impervious ≥ 20 acres <u>project area</u> *	BLR SET	Basic, General (Phosphorus, UIS), Flooding	A 20.1-acre solar array project regardless its impervious area



BLR: Bureau of Land Resources

LMAR: Lake most at risk from new development (Chapter 502)

UIS: Urban impaired stream (Chapter 502)



# Stormwater Impacts of the Solar Array Projects

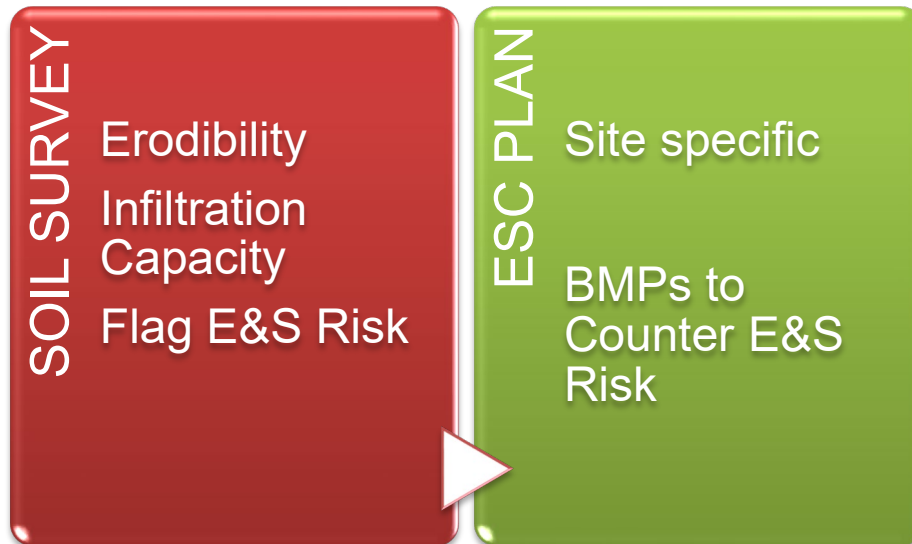
- Primary Focus:
  - Construction Phase Stormwater Management for Erosion and Sedimentation Control (ESC)

Factors Elevating Stormwater Impact	
Land Cover Change	Hayfield versus Forested: Logging and Grubbing ESC concerns
Grading	Common for Forested Sites Proposed for Pasture/Meadow Sites as well Compaction Concern
Downgradient Protected Natural Resources	Site Proximity to Wetlands, Streams, and Ponds: Hydraulic Connection via Drainageways
Soil Characteristics	Erodible, Low Infiltration Capacity Soils
Project Size	Operation & Logistics: ESC Inspection and Maintenance Requirements (e.g., mulch, dedicated and qualified crew)



# An Ounce of Prevention.....

Utilize Soil Data for Developing a Robust Erosion and Sedimentation Control (ESC) Plan



## Some of the Important ESC BMPs:

- **Qualified Personnel:**
  - Dedicated ESC Crew
  - Resident (Environmental) Inspector
  - Third-party Inspector
- **Temporary Sediment Containment:**
  - Design temporary sediment basins for large drainage areas (e.g., >10 acres)
- **Revegetation:**
  - Establish cover crop as fast as possible
  - Use soil testing to avoid costly trial-and-error method



## Case Study: Three Corners Solar Project

Developer: Longroad Energy

Project Location: Unity Township & Benton

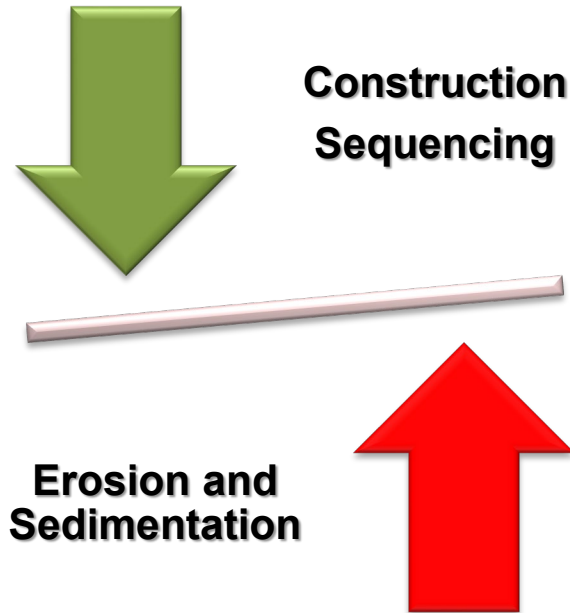
Permit Issued: 7/29/22

Construction Ongoing

Project Footprint: 926 acres

Developed Area: 22.8 acres

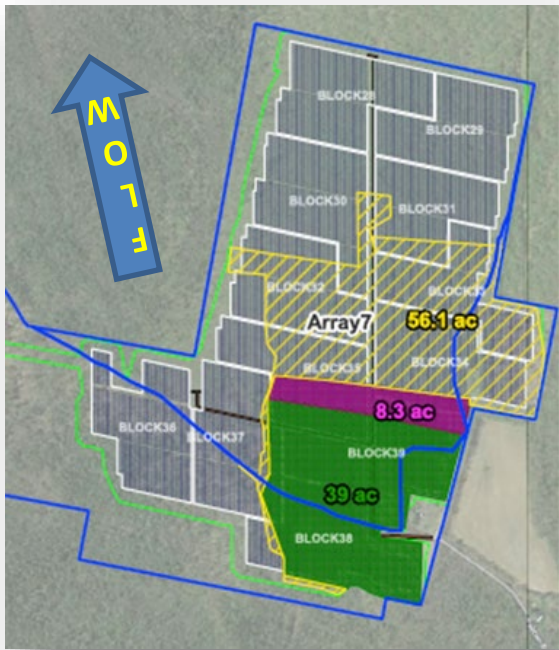
Impervious Area: 22.8 acres



### Relevant Permit Conditions:

- The applicant shall sequence construction of the project such that the active work area is limited to 10 acres of exposed soil at a time. A second work area may be opened up simultaneously, also with no more than 10 acres of exposed soil at a time, only if the two work areas are located in separate watersheds and are attended by separate work crews, each with a dedicated supply of erosion and sedimentation control materials sufficient for the respective work areas.
- The applicant shall submit an updated phasing plan showing the progress of construction to SET no less frequently than once per month, until civil construction on the project is complete.





End of September 2022

- Legend
- PV Array
  - Watershed Boundary
  - Limits of Clearing
  - Work Progress:
  - Temp. Stabilized
  - Disturbed
  - Cleared



Site Visit (11/17/22)



End of February 2023

- Legend
- PV Array
  - Watershed Boundary
  - Limits of Clearing
  - Work Progress:
  - Temp. Stabilized
  - Disturbed
  - Cleared



# Wrapping Up...

- The Department is closely following the developments in the solar sector: specifically, construction of the solar array projects permitted by the Department (Third-party inspector reports, field staff and SET site inspections),
- Post-construction stormwater management standards: jurisdictional differences exist. For example,
  - ME: Solar panels are not considered impervious area,
  - MN: Solar panels are considered disconnected impervious area.
- Impact of solar array projects on stormwater dynamics (pre- vs. post-development) needs more research. Recent noteworthy research by Great Plains Institute:
  - Photovoltaic Stormwater Management Research and Testing (PV-SMaRT) Best Practices published this January
  - New Stormwater Calculator by Dr. Mulla's Group (UMinn)
- Screening solar array projects for their erosion & sedimentation (E&S) risk is important. In general:
  - Project size, degree of soil disturbance (land cover change and grading), soil type, and downgradient protected natural resources must be considered in E&S risk assessment,
  - Robust ESC plans must be prepared for the projects having higher E&S risk: cooperation between soil scientists, engineers, and contractors.
- Work in Progress: SET has drafted a technical guidance for the construction phase stormwater management of the large-scale development projects including ground-mounted solar array projects.







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