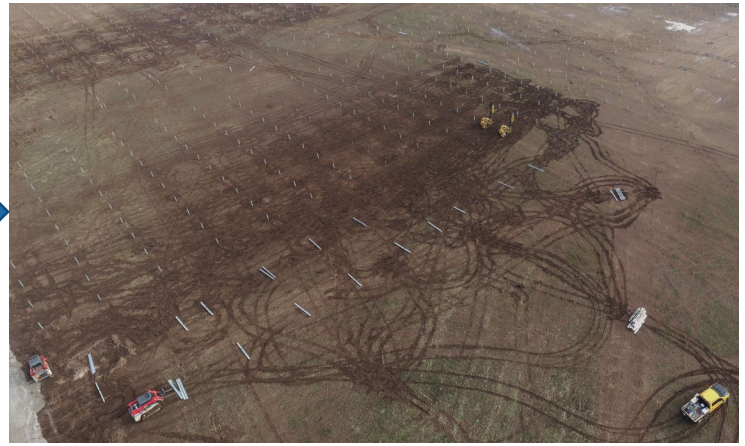
Project Planning and Implementation of Vegetation Management Practices during Development, Permitting, Construction, and Operations of Solar Projects

William Risse- Senior Permitting Specialist- National Grid Renewables

Planning

Implementation/ Construction



Operations

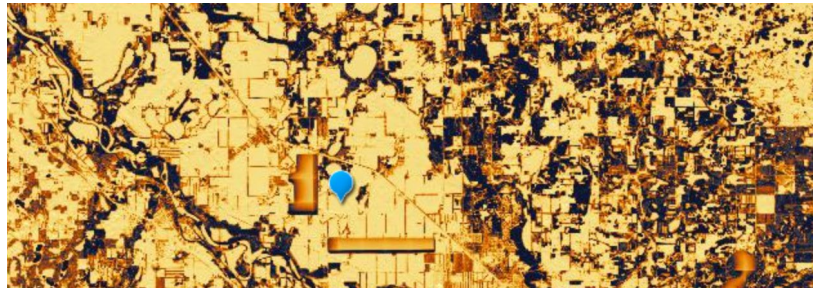
Planning and Development of Solar Projects

Integrating Vegetation Management Planning into the Development Process

Planning for Success

What makes a good solar site?

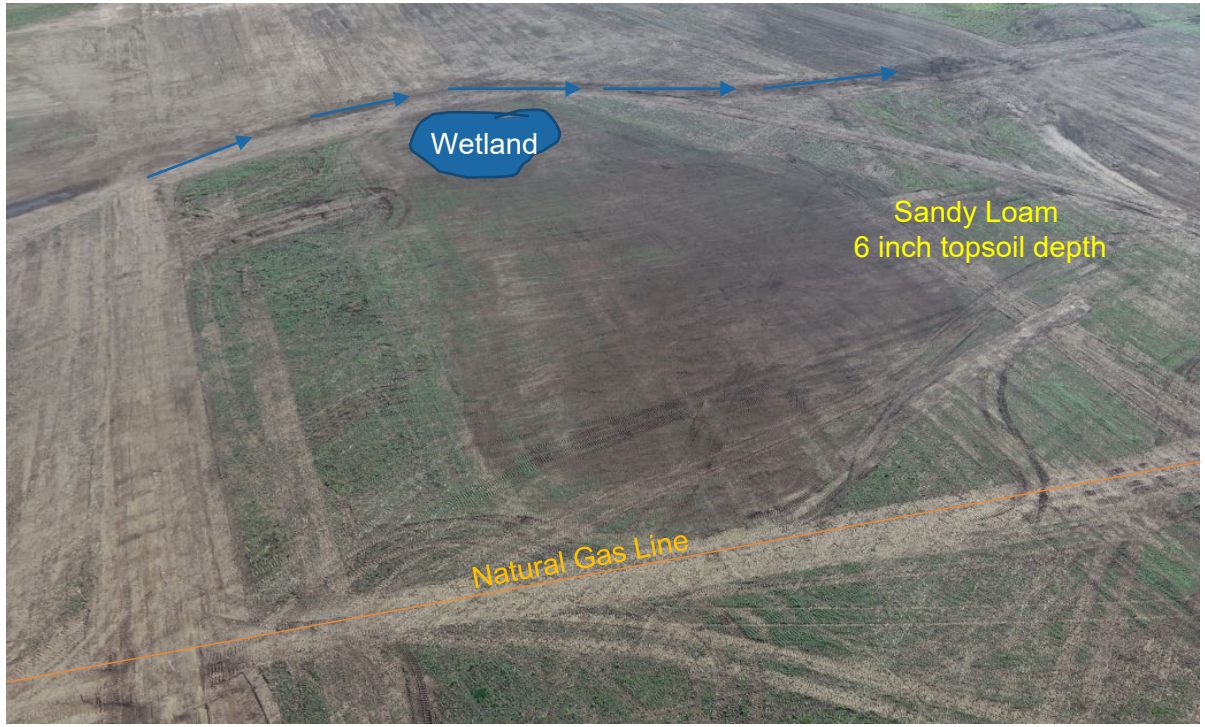
- Point of Interconnection and Upgrade Costs
- Quality Solar Resource
- Willing Landowners
- Generally Suitable Land (Ideally Flat, Ideally Minimal Environmental Constraints)



Planning and Development

What We Know for Permit Submittal

- **Site/Land Control**
- **Existing Conditions (Typically Ag Use)**
- **Soils**
- **Wetlands**
- **Hydrology**
- **Preliminary Design, Preliminary Transmission Route**
- **Anticipated Environmental Impacts**
- **Best Management Practices**
- **Suitable Seed Mixes for the Above**



What We Don’t Know

- **Will the Project be Approved as Proposed**
- **Final Civil Layout**
- **Contractor To Carry Plan Forward**
- **Operations Manager and Operations Contractor**

An Ideal VMP- Developers Perspective

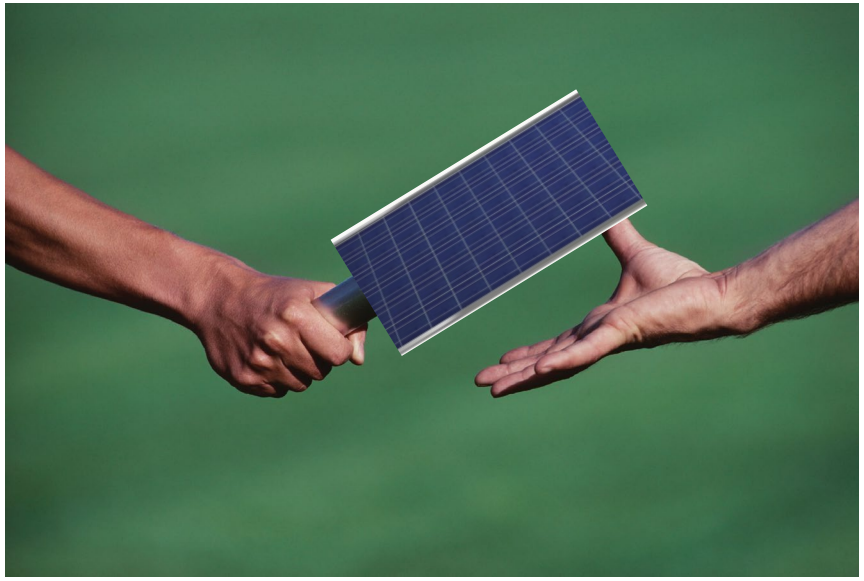
- **Goals**
- **Array Best Practices, Strategies, and Options for the Site**
- **Seed Mixes**
  - Implementation. Avoidance of highly specific techniques (ie plugs, detailed soil surveys)- looking for more general seed mixes suitable for an array of conditions, establish quickly to reduce erosion, improve long term management and viability and can still provide pollinator benefits.
  - Increasing focus on low growth option under array, challenges in diversity.
- **A Final Civil Layout Doesn't Have Large Impacts on Vegetation Management Practices**
  - The final layout will identify a more refined area for the practices to be carried out within.
- **Clear VMP Approval Process**
  - Who reviews, who approves, who aggregates and resolves conflicting comments/perspectives, and on what timeline?
- **Flexibility to Implement a New Plan in the Future**
  - For example, what if a grazing partner approaches a Project at year 5?

Late-Stage Development

Successfully Passing the Solar Baton to the Engineering Procurement and Construction Team

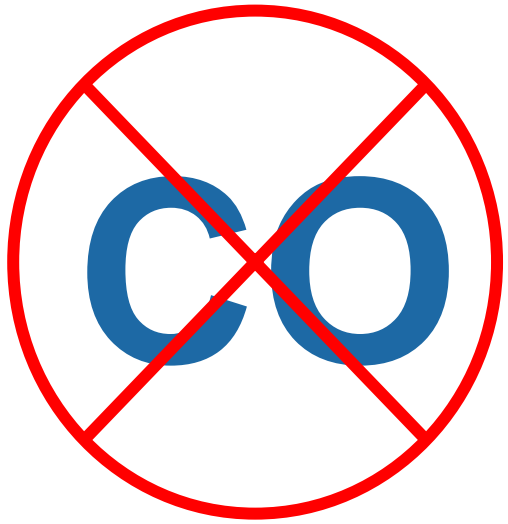
- Flexibility in Final Design- Value Added Engineering and Tech Improvements

- Final Approved Documents To Carry into Construction Contract
  - VMP
  - AIMP
  - Archaeological Concurrence
  - Wetland Concurrence



An Ideal VMP for an EPC Bid

- Contractors bidding into an RFP to Engineer, Procure, and Construct (EPC) a multi-thousand (community solar) or multi-million (utility scale) project are looking for a hard and fast set of rules that they can apply to provide an apples to apples (and competitive bid) for Utility Scale Project.
- Making a $500k assumption regarding vegetation management, fencing, other factors could tip the scales in favor of another company's bid.
- Developers are looking for as near a "final" approved VMP and other such plans prior to the conclusion of the site permit (state or local) process as possible to best inform potential EPC bidders of their commitments.
- Uncertainty following contract execution leads to change orders (CO) and budgeting headaches for contractor and owner.
- Financial modelling and Power Purchase Agreement obligations.



Say NO to the CO

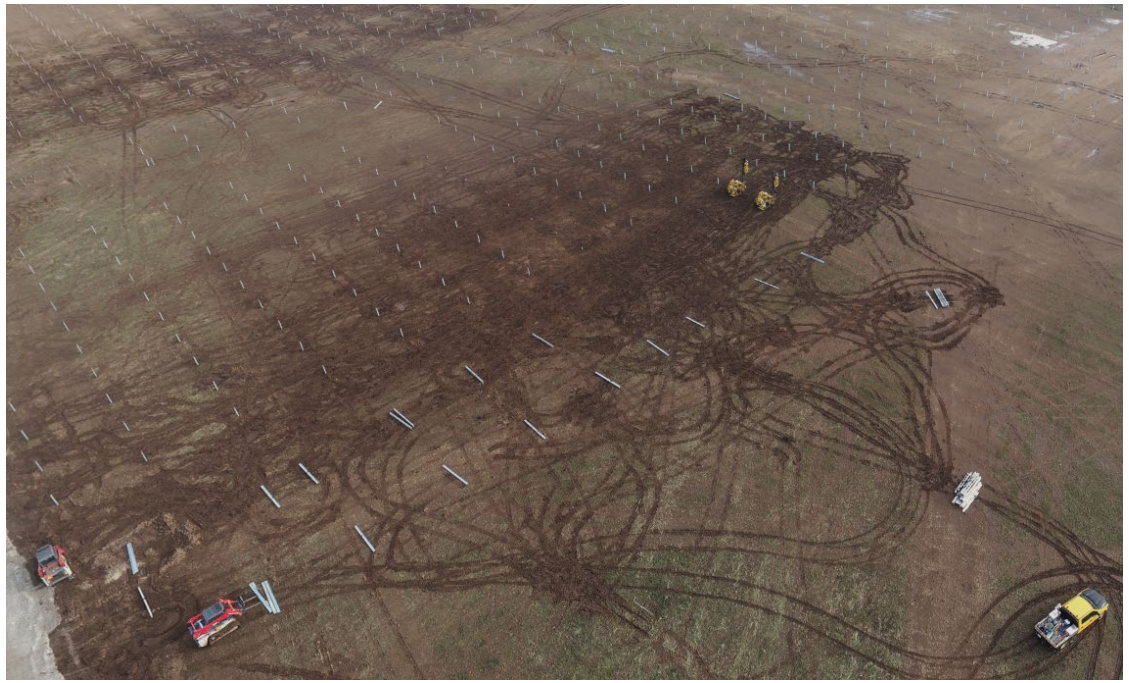
Construction of Solar Projects

Integrating Vegetation Management into the Construction Process

Solar Project Components and Construction

Typical Project Components

- Inverters
- Modules/Panels
- Racking
- Gravel Access Roads
- Electrical Components (e.g. cables, transformers, control systems and Point of Interconnection)
- Security Fencing and Screening
- Storm-water Retention Areas
- Operation and Maintenance Shed



Sunrise Community Solar

Best Management Practices

Site Preparation

Delphinus Community Solar

Yellowbud Solar Project

Access Roads

Pier Installation

DodgeSun Community Solar

Rosemount Community Solar

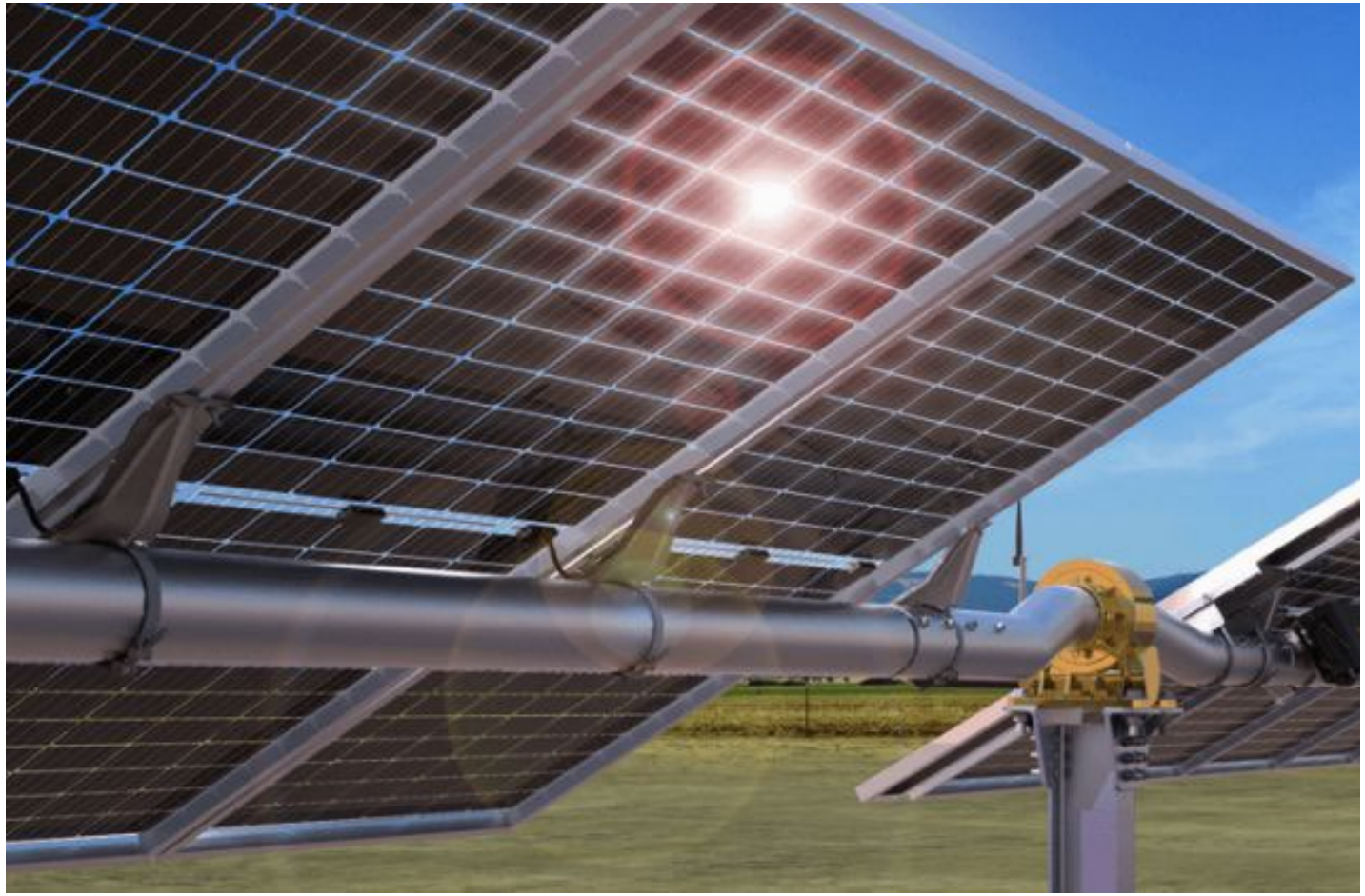
Soil Decompaction

Racking

Deneb Community Solar

Chisago Community Solar

Modules / Panels



Bifacial Panel

Thin Film

Polycrystalline

Inverters

Underground Collection

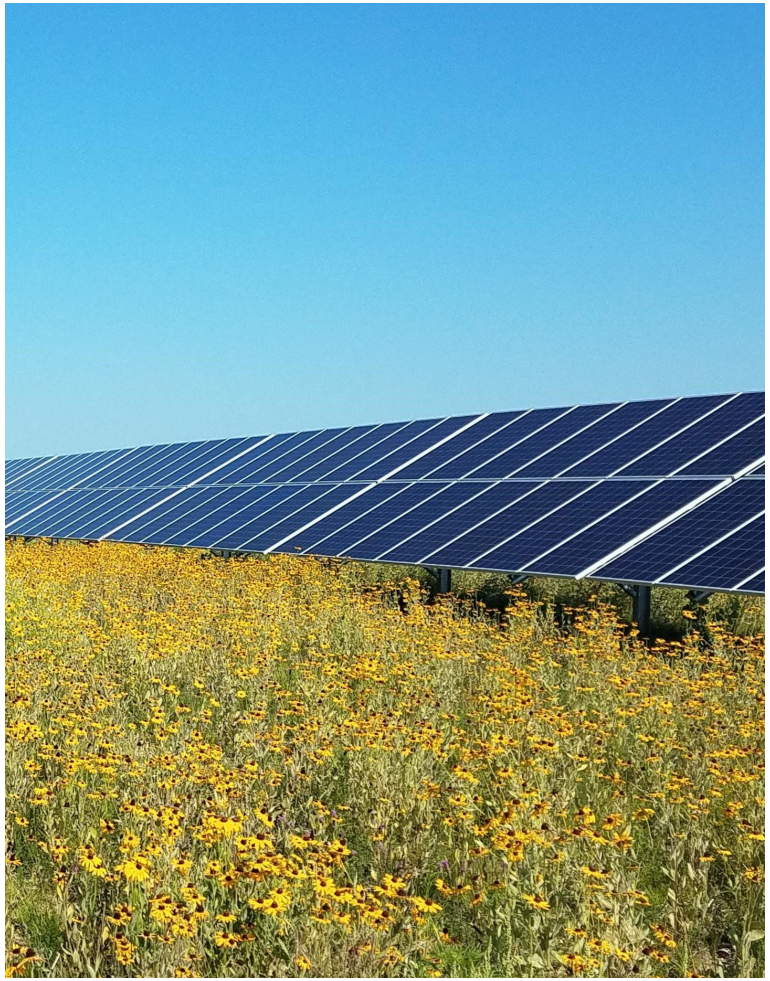
Point of Interconnection- Substations

Restoration and Re-Vegetation

Koppelman Community Solar

Solar Project Components – Restoration

St. John's Solar



Kramer Solar

Operations of Solar Projects

Ongoing Vegetation Management Strategies

Considerations in Management

- **Nimble and flexible VMPS and operational requirements allow for new creative approaches.**
  - Noxious Weed Management, Woody Vegetation Management.
  - Spot Seeding
  - Mowing Schedule
  - Expedient SWPPP Closeout A Challenge With Diverse Plantings and Their Establishment Timeframes
- **Monitoring and Reporting.**
- **Our current Minnesota strategy is primarily mowing, but we are exploring grazing opportunities.**
- **National Grid Renewables is not currently seriously considering haying in Minnesota due to state statute.**

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