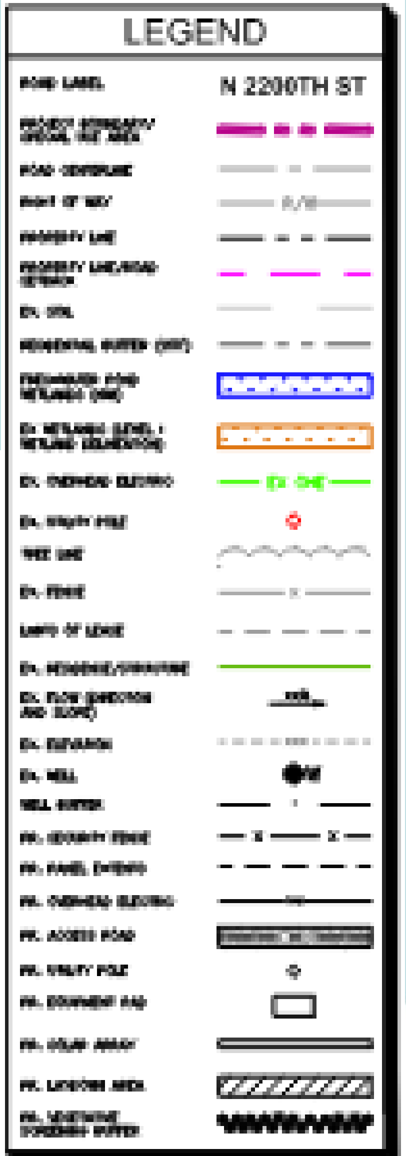
TurningPoint Energy
TPE IL KN309, LLC
Kane County

Presenter: Ryan Solum, P.E.

Date: May 2024

KN309 Site Plan

Kimley»Horn



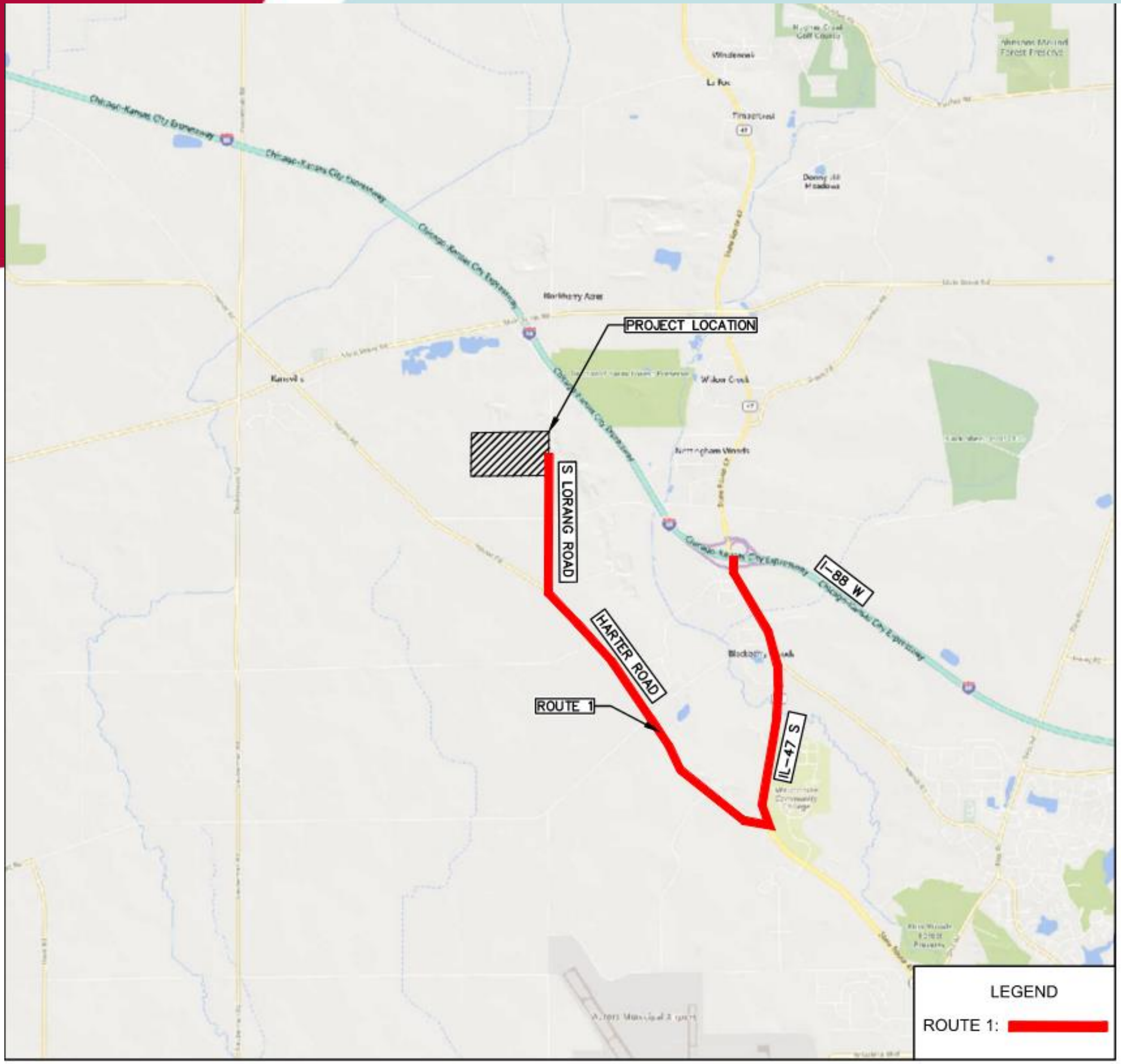
SITE DATA TABLE

PIN #	10-25-400-006
PROPERTY OWNER	VONDRA, MICHAEL P DEAN KELLY
SITE ADDRESS	S LORANG RD, ELBURN, IL 60119
LEGAL DESCRIPTION	PT SE ¼ SEC 25-39-6 AS DESC IN DOC 2006K134944
ZONING JURISDICTION	KANE COUNTY
ZONING	F- FARMLAND
CURRENT LAND USE	AGRICULTURE
PROPOSED USE	COMMERCIAL SOLAR ENERGY FACILITY
TOTAL PARCEL AREA	90.6 ± AC
PRELIMINARY PROJECT AREA	37.9 ± AC
PRELIMINARY SOLAR AREA	32.4 ± AC
RIGHT OF WAY SETBACK	50'
PROPERTY LINE SETBACK	50'
OCCUPIED DWELLING SETBACK	150'

*ZONING SITE PLAN IS BEING SUBMITTED FOR SPECIAL USE PERMIT TO CONSTRUCT/OPERATE A SOLAR FARM

KN309 Transportation & Access

Kimley»Horn



Stormwater/SWPPP/Ground Cover

- The American Society of Civil Engineers issued an Abstract titled Hydrologic Response of Solar Farms.
- The report analyzed the affects of solar panels over vegetated ground cover.
- The report concluded “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.”

Hydrologic Response of Solar Farms

Lauren M. Cook, S.M.ASCE[1]; and Richard H. McCuen, M.ASCE[2]

Abstract: Because of the benefits of solar energy, the number of solar farms is increasing; however, their hydrologic impacts have not been studied. The goal of this study was to determine the hydrologic effects of solar farms and examine whether or not storm-water management is needed to control runoff volumes and rates. A model of a solar farm was used to simulate runoff for two conditions: the pre- and postpaneled conditions. Using sensitivity analyses, modeling showed that the solar panels themselves did not have a significant effect on the runoff volumes, peaks, or times to peak. However, if the ground cover under the panels is gravel or bare ground, owing to design decisions or lack of maintenance, the peak discharge may increase significantly with storm-water management needed. In addition, the kinetic energy of the flow that drains from the panels was found to be greater than that of the rainfall, which could cause erosion at the base of the panels. Thus, it is recommended that the grass beneath the panels be well maintained or that a buffer strip be placed after the most downgradient row of panels. This study, along with design recommendations, can be used as a guide for the future design of solar farms. **DOI: 10.1061/(ASCE)HE.1943-5584.0000530.** *© 2013 American Society of Civil Engineers.*

CE Database subject headings: Hydrology; Land use; Solar power; Floods; Surface water; Runoff; Stormwater management.

Author keywords: Hydrology; Land use change; Solar energy; Flooding; Surface water runoff; Storm-water management.

Introduction

Storm-water management practices are generally implemented to reverse the effects of land-cover changes that cause increases in volumes and rates of runoff. This is a concern posed for new types of land-cover change such as the solar farm. Solar energy is a renewable energy source that is expected to increase in importance in the near future. Because solar farms require considerable land, it is necessary to understand the design of solar farms and their potential effect on erosion rates and storm runoff, especially the impact on offsite properties and receiving streams. These farms can vary in size from 8 ha (20 acres) in residential areas to 250 ha (600 acres) in areas where land is abundant.

The solar panels are impervious to rain water; however, they are mounted on metal rods and placed over pervious land. In some cases, the area below the panel is paved or covered with gravel. Service roads are generally located between rows of panels. Although some panels are stationary, others are designed to move so that the angle of the panel varies with the angle of the sun. The angle can range, depending on the latitude, from 22° during the summer months to 74° during the winter months. In addition, the angle and direction can also change throughout the day. The issue posed is whether or not these rows of impervious panels will change the runoff characteristics of the site, specifically increase runoff volumes or peak discharge rates. If the increases are hydrologically significant, storm-water management facilities may be needed. Additionally, it is possible that the velocity of water draining from the edge of the panels is sufficient to cause erosion of the soil below the panels, especially where the maintenance roadways are bare ground.

The outcome of this study provides guidance for assessing the hydrologic effects of solar farms, which is important to those who plan, design, and install arrays of solar panels. Those who design solar farms may need to provide for storm-water management. This study investigated the hydrologic effects of solar farms, assessed whether or not storm-water management might be needed, and if the velocity of the runoff from the panels could be sufficient to cause erosion of the soil below the panels.

Model Development

Solar farms are generally designed to maximize the amount of energy produced per unit of land area, while still allowing space for maintenance. The hydrologic response of solar farms is not usually considered in design. Typically, the panels will be arrayed in long rows with separations between the rows to allow for maintenance vehicles. To model a typical layout, a unit width of one panel was assumed, with the length of the downgradient strip depending on the size of the farm. For example, a solar farm with 30 rows of 200 panels each could be modeled as a strip of 30 panels with space between the panels for maintenance vehicles. Rainwater that drains from the upper panel onto the ground will flow over the land under the 29 panels on the downgradient strip. Depending on the land cover, infiltration losses would be expected as the runoff flows to the bottom of the slope.

To determine the effects that the solar panels have on runoff characteristics, a model of a solar farm was developed. Runoff in the form of sheet flow without the addition of the solar panels served as the prepaneled condition. The paneled condition assumed a downgradient series of cells with one solar panel per ground cell. Each cell was separated into three sections: wet, dry, and spacer.

The dry section is that portion directly underneath the solar panel, unexposed directly to the rainfall. As the angle of the panel from the horizontal increases, more of the rain will fall directly onto

[1]Research Assistant, Dept. of Civil and Environmental Engineering, Univ. of Maryland, College Park, MD 20742-3021.

[2]The Ben Dyer Professor, Dept. of Civil and Environmental Engineering, Univ. of Maryland, College Park, MD 20742-3021 (corresponding author). E-mail: rhmccuen@eng.umd.edu

Note. This manuscript was submitted on August 12, 2010; approved on October 20, 2011; published online on October 24, 2011. Discussion period open until October 1, 2013; separate discussions must be submitted for individual papers. This paper is part of the ***Journal of Hydrologic Engineering***, Vol. 18, No. 5, May 1, 2013. © ASCE, ISSN 1084-0699/2013/5-536-541/$25.00.

J. Hydrol. Eng. 2013.18:536-541.

Decommissioning Plan

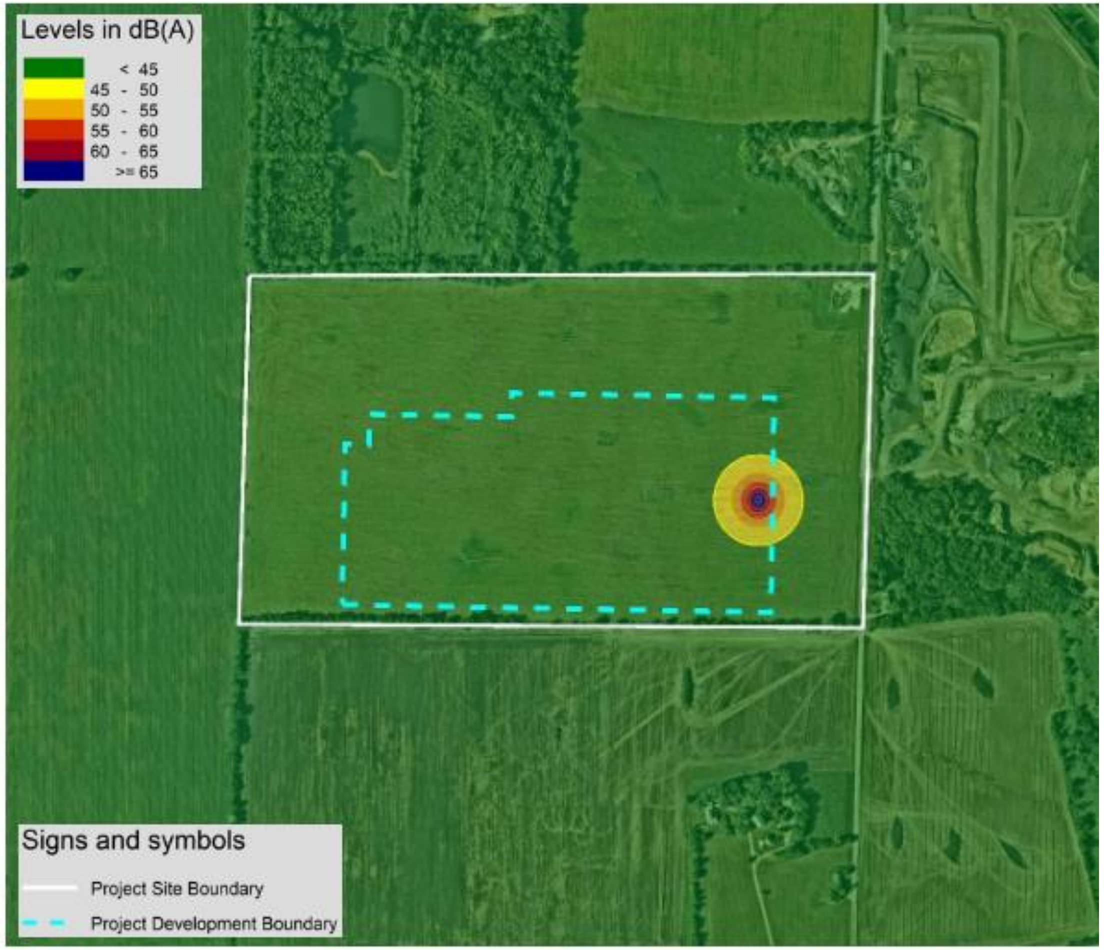
- **Project Components**
  - PV Equipment
  - Internal Power Collection System
  - Earthwork
  - Roads
  - Fence
- **Project Decommission and Recycles**
  - Permits
  - PV Equipment Removal and Recycling
  - Internal Power Collection System
  - Roads
  - Fencing
  - Landscaping
  - Site Restoration
- **Decommission Costs and Financial Assurance**
  - Fully executed AIMA

Environmental Overview

- TPE IL KN309 completed a detailed Environmental Constraints Study as part of the Project Siting and Design Process
- The Environmental Constraints Study included review of the following:
  - FEMA 100-Year Floodplain
  - Level 1 (Desktop) Wetland Investigation
  - Kane County Soils
  - Illinois Department of Natural Resources (IDNR) Public Waters Inventory
  - USGS Topographical data
  - Cultural Resources (State Historic Preservation Office)
  - U.S. Fish and Wildlife Services (USFWS) Threatened and Endangered Species
  - IL State-Listed Threatened, Endangered, and Species of Special Concern (IDNR)
- As part of the Environmental Constraints Study, TPE IL KN309 Solar completed consultation with the IDNR and formally submitted to SHPO for consultation.
- The IDNR Termination of Consultation and SHPO Response Letters are included in the application.

Sound

- The project will comply with Kane County's Zoning Code and Illinois Pollution Control Board sound limits



Kimley»Horn

KN309 Wildlife State Protected

Evaluate	• **The Applicant submitted an Ecological Compliance Assessment Tool (EcoCAT) request to the Illinois Department of Natural Resources (IDNR) to determine if the state had records of state protected species in the project area.**
Avoid and/or Minimize	• The IDNR natural resource review identified protected resources that may be in the vicinity of the proposed action. The Department evaluated this information and concluded that adverse effects are unlikely and consultation was terminated (No further correspondence required).

Kimley»Horn

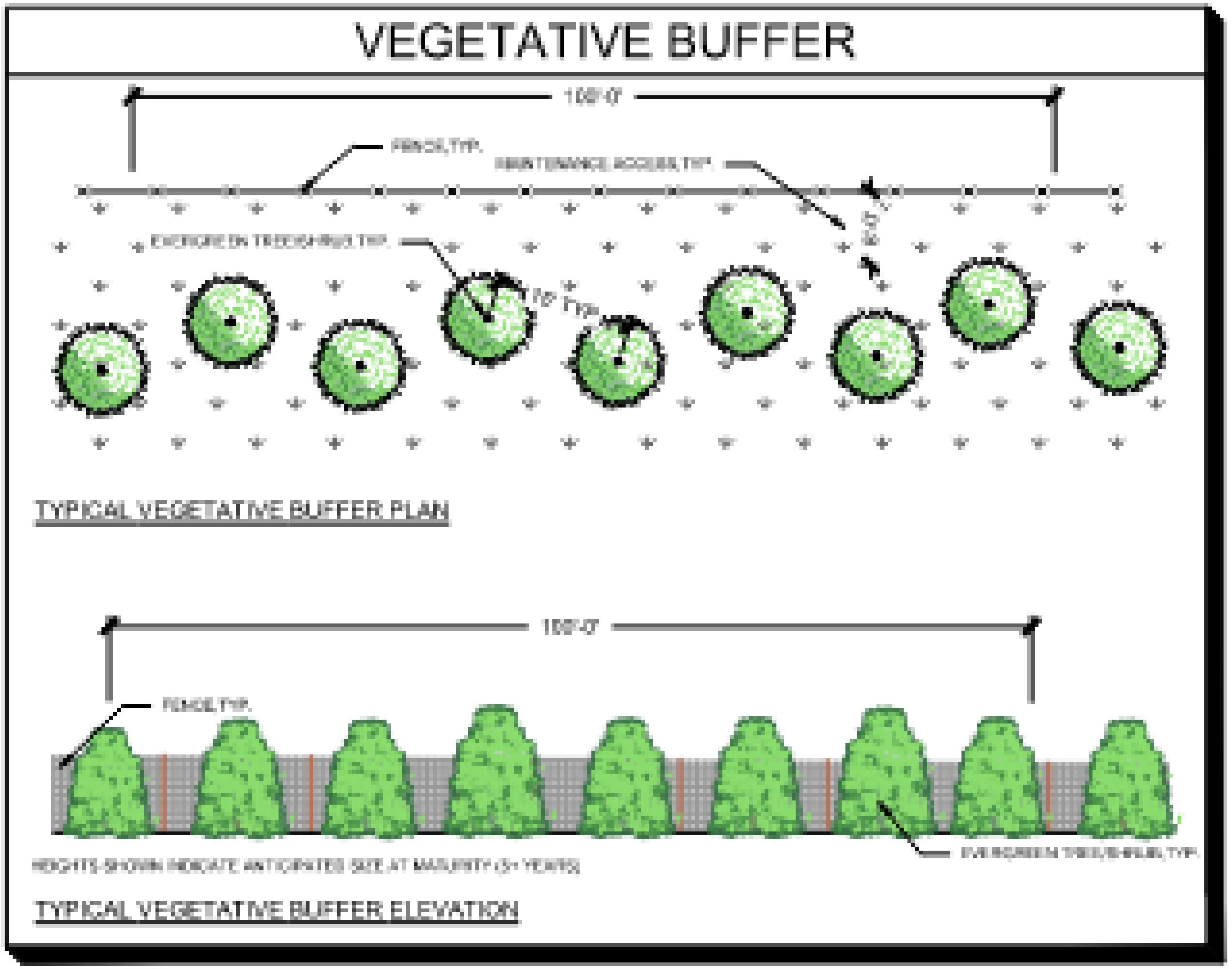
Cultural Resources

Identify	• The Project formally submitted for consultation to the Illinois State Historic Preservation Office (IL SHPO) in February, 2024.
Avoid and/or Minimize	• A response letter was received from SHPO, and a Phase I archaeological survey is required under state law.

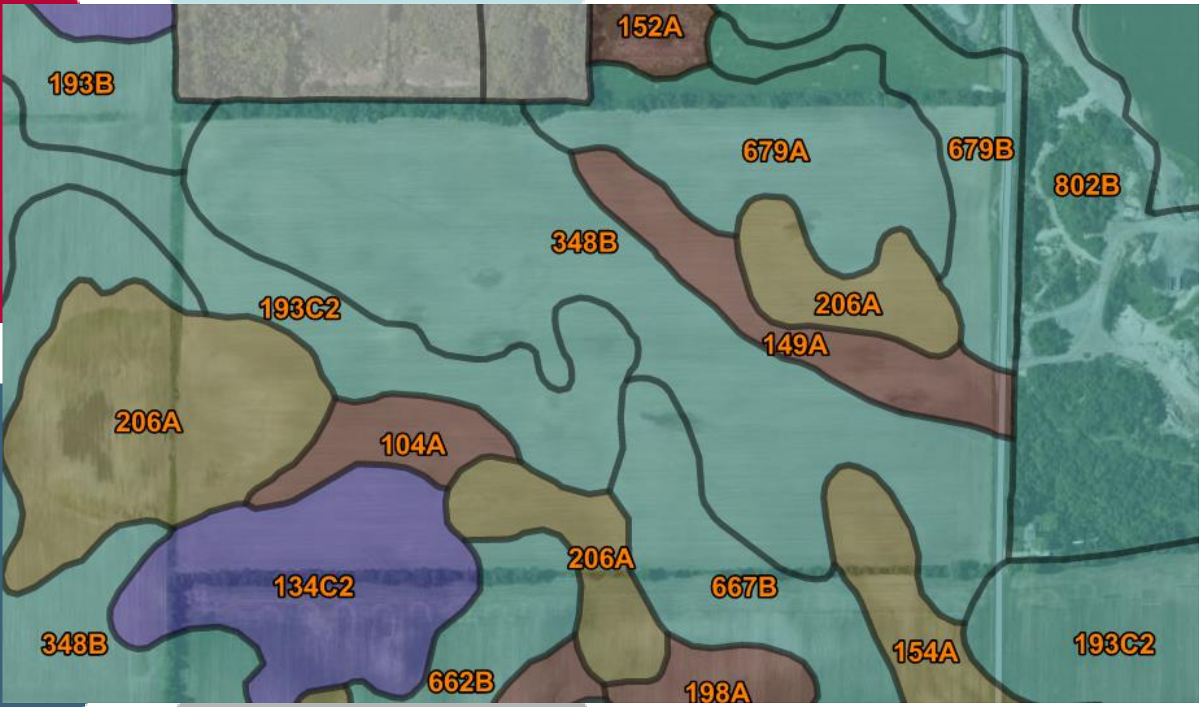
Kimley»Horn

Landscape & Maintenance

- Site-Specific design consideration
- Habitat and pollination
- Improve existing soil condition and ecology
- Provide maintenance during project life



Soils and Filtration



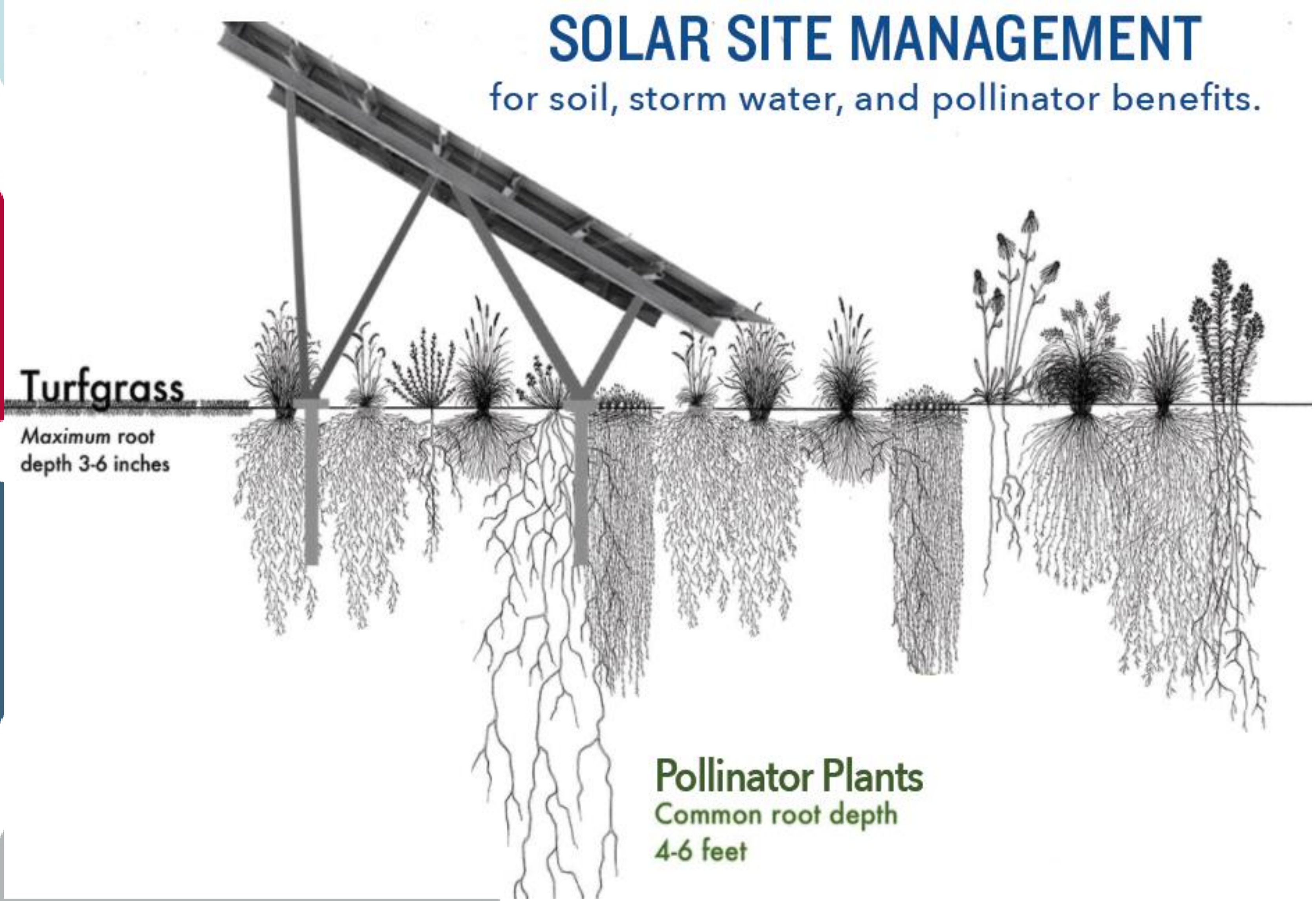
Existing Conditions (USDA NRCS Maps)

- Primarily 1 Soil: 348B
- Drainage Class: Moderate to Well Drained
- Ponding Frequency: Minimal Ponding

Proposed Improvements through Vegetation

- Increased water infiltration with deep rooted grasses
  - Soil Stabilization
- Improved water filtration:
  - Rhizosphere Bioremediation / Degradation
  - Nutrient Fixation

Kimley»Horn



- Improve Water Quality
- Reduce Soil Erosion
- Resist Climate Conditions
- Increase Organic Content
- Increase Topsoil Depth
- Provide Native Habitat
- Provide Weed Resistance
- Reduce Ambient Temperature
- Resist Invasive Species

Kimley»Horn

Native Vegetation Benefit


Turf Grass During Drought


Native Grasses During Drought

Kimley»Horn

Native Vegetation Benefit

Turf Grass In Wet Soils

Native Grasses In Wet Soils

Kimley»Horn