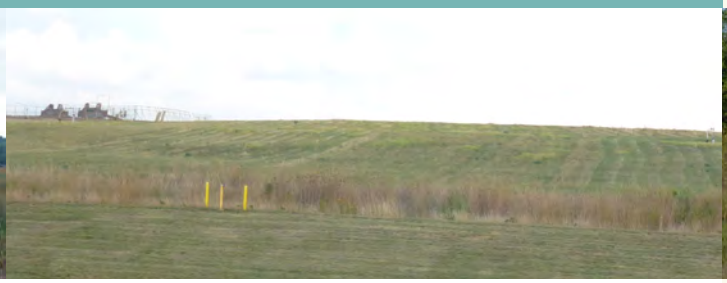
RENEWABLE ENERGY ASSESSMENT

Prairie View Landfill - Will County, IL

FINAL
DECEMBER 2013



OVERVIEW

The Prairie View Landfill is an active non-hazardous waste landfill located on a portion of the former Joliet Army Ammunitions Plant site (JOAAP) in Will County, Illinois. U.S. Army and EPA cleanup actions at the 36-square-mile JOAAP site have created multiple reuse benefits for the region, including an inter-modal logistics facility, the Midewin National Tallgrass Prairie and lands dedicated to Will County for economic development and the operation of a municipal landfill.

Today, Will County owns the Prairie View Landfill site and contracts with Waste Management to operate the landfill. Will County is considering portions of the Prairie View Landfill site for renewable energy technologies such as solar photovoltaic (PV) or wind.

EPA Region 5 sponsored a renewable energy assessment to support Will County, EPA and local stakeholders in evaluating renewable energy opportunities for the Prairie View Landfill site. This renewable energy assessment summarizes reuse considerations, renewable energy resource availability, site suitability and financial considerations for a set of pilot innovation projects to advance hybrid gas-to-energy and solar photovoltaic generation at the site.

REUSE CONSIDERATIONS

Landfill Phasing: The Prairie View Landfill site includes approximately 455 acres conveyed to Will County in 2002. The landfill will remain in operation until 2027 with a planned 223-acre footprint. Phased landfill construction is underway with active disposal on the western half of the landfill.

Long-Term Stewardship and Reuse: After the landfill's closure, the Forest Preserve District of Will County will become caretaker of the landfill. The Forest Preserve District and county stakeholders are evaluating a range of future use options for the landfill and non-landfill areas, including renewable energy, recreation, open space and education.

Renewable Energy: Waste Management operates a 4.8 megawatt (MW) gas-to-energy plant that generates electricity from landfill gasses at the site. Plans are in place to expand generation capacity to 12.8 MW. The gas-to-energy plant generates revenue for Will County through lease payments and the sale of electricity based on revenue-sharing agreements with Waste Management. Will County's Resource Recovery and Energy Division is interested in additional near-term renewable energy opportunities for areas located primarily outside of the landfill footprint.

Renewable Energy Assessment Funded by EPA Region 5

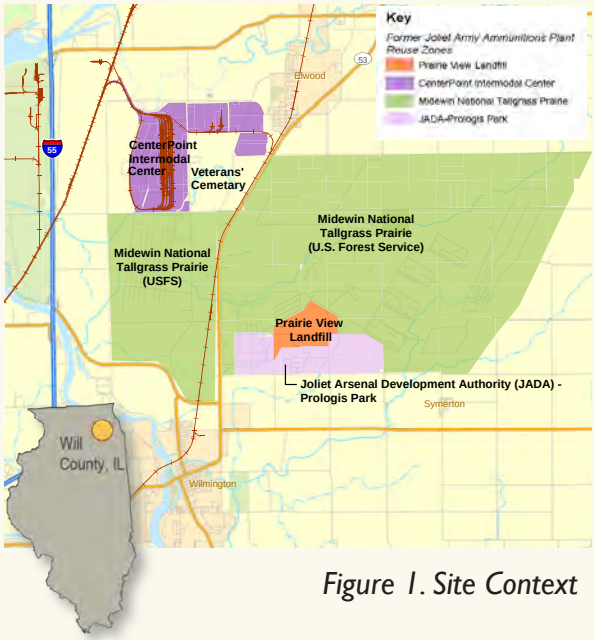


Figure 1. Site Context

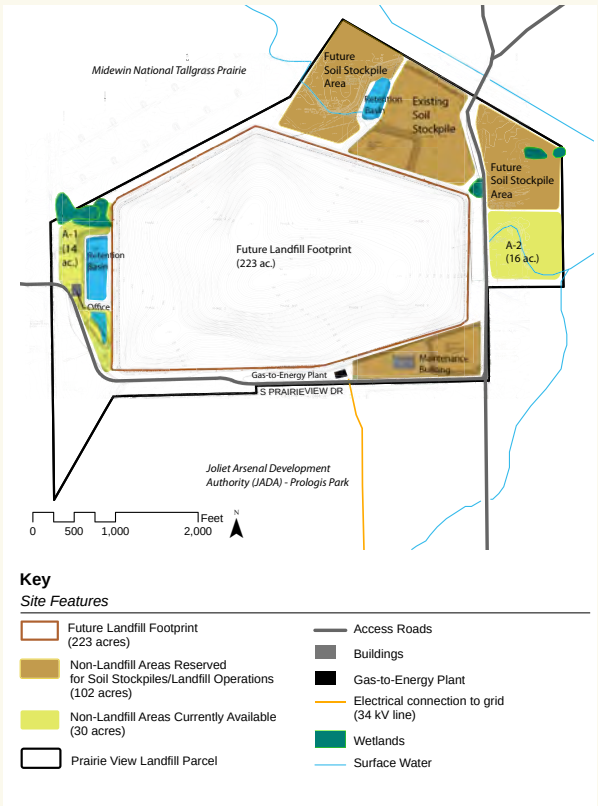


Figure 2. Site Features

Resource Availability Screening

The most important requirements for a renewable energy project are infrastructure availability, transmission access, renewable energy resource availability and site suitability. This section summarizes infrastructure access and solar and wind resource availability at the Prairie View Landfill site.

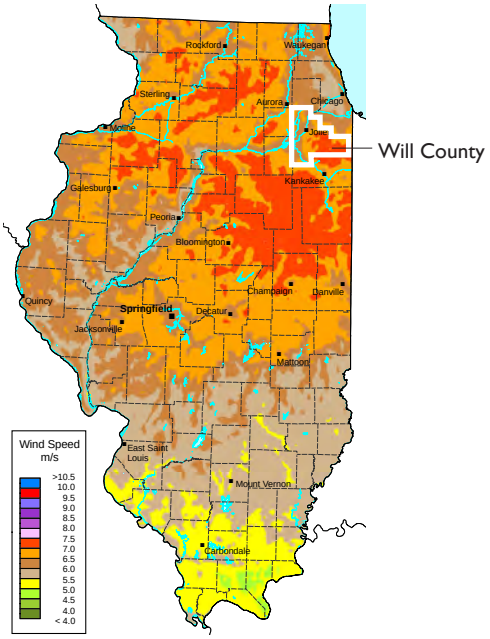


Figure 3. Illinois Wind Power Density at 80m
(National Renewable Energy Laboratory (NREL), 2010)

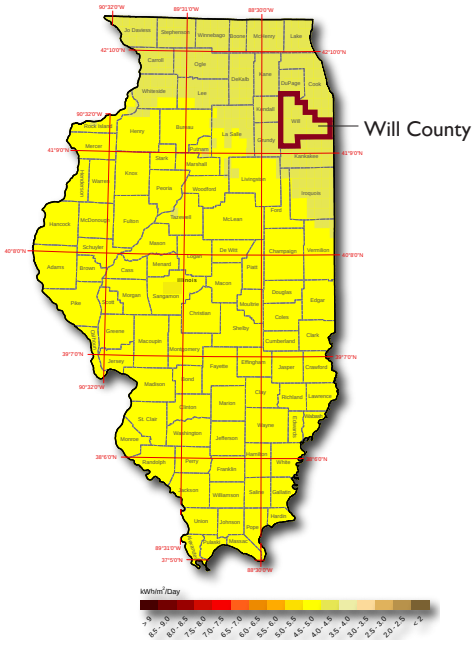


Figure 4. Illinois Solar Radiation Map
(NREL, 2007)

INFRASTRUCTURE

The Prairie View Landfill offers potential access to local utility Commonwealth Edison's transmission lines.

To accommodate the Prairie View Landfill gas-to-energy plant's anticipated 12.8 MW generation capacity, Waste Management has installed a 34-kilovolt (kV) electrical connection from the site to an existing Commonwealth Edison substation. Will County and Waste Management have initiated discussions regarding possibility of utilizing this interconnection to support additional, small-scale renewable energy facilities at the Prairie View Landfill site.

WIND

The Will County area's wind resource, as measured by wind speed at an elevation of 80 meters, is approximately 6.5 meters per second (m/s). This wind speed falls within the Class 2 to 3 category, which suggests a poor to fair wind resource relative to other areas of the state. Classes 3 to 7 are considered suitable for utility-scale wind power development.

Key factors to consider in siting wind turbines include: site suitability to accommodate excavation for wind tower footings, setback requirements from adjacent uses, visual impacts and aesthetic preferences for stakeholders, and potential impacts on avian species.

Will County, the Forest Preserve District and U.S. Forest Service (USFS) representatives at Midewin National Tallgrass Prairie have clarified that wind energy development is not a desirable technology option due to the site's location within a migratory bird pathway and the limited wind resource.

SOLAR

Northern Illinois and Will County have relatively good solar energy resources as measured by irradiance level (4.5 – 5 kilowatt hours per square-meter per day [kWh/m2/ day]). Irradiance levels of 6 kWh/m2/day and higher are considered excellent.

Will County, Waste Management and the Forest Preserve District have prioritized solar PV as the most desirable renewable energy technology for the Prairie View Landfill site.

The suitability analysis and financial assessment findings discussed on the following pages outline potential opportunities for Will County to host solar PV projects at the site.

REUSE ZONES

The reuse zones and suitability considerations provide a tool to assist Will County, Waste Management and stakeholders in evaluating potential locations for solar PV across the Prairie View Landfill site. The reuse suitability zones in Figure 5 and Table 1 identify suitable areas for solar PV, along with site suitability considerations, potential system size and technology options.

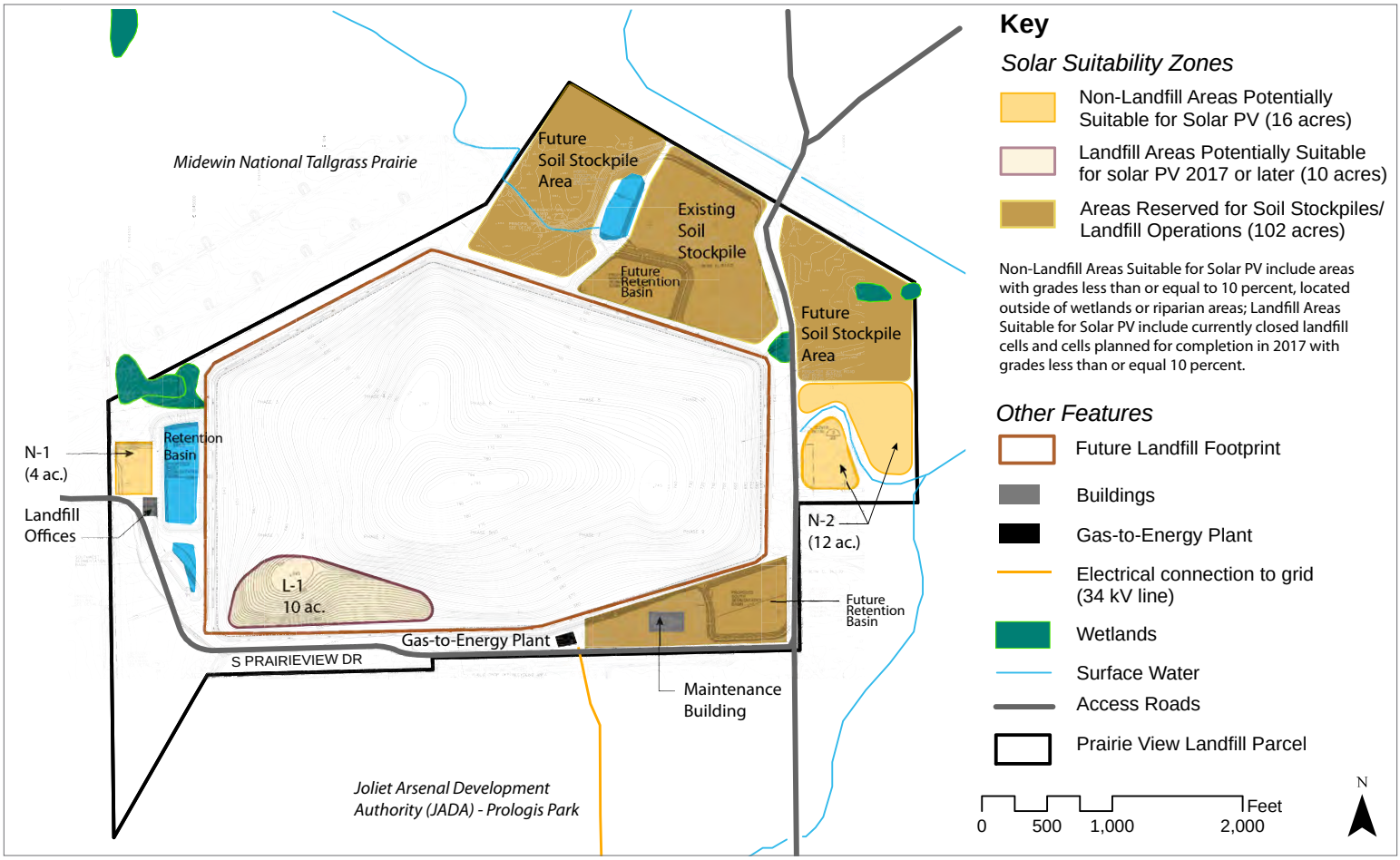


Figure 5. Reuse Suitability Zones

Table 1. Reuse Zones and Site Suitability Considerations

Reuse Zone	Site Suitability Considerations *
Non Landfill Areas Potentially Suitable for Solar PV (16 acres)	• Grades less than or equal to 10 percent. • Located outside wetlands, riparian areas and landfill operations. • Potential to support 2 MW solar PV system.
Landfill Areas Potentially Suitable for Pilot Solar PV (10 acres)	• South-facing slopes with grades less than or equal to 10 percent. • Landfill cells planned for completion in 2017 with final cap in place, landfill gas collection wells and subsurface collection lines. • Potential for small-scale solar PV system with flexibility to accommodate ongoing landfill operations and access to landfill gas collection system components.
Areas Reserved for Soil Stockpiles / Landfill Operations (102 acres)	• Current and future soil stockpile areas, landfill maintenance building and existing vacant buildings. • Potential for small-scale solar PV at maintenance building.

Note: The Prairie View Landfill site was identified as a "No Further Action" area in the 1998 Record of Decision for the Load-Assemble Package Area of the JOAAP site. Preliminary discussions with EPA confirmed that renewable energy generation facilities are likely compatible with the site's institutional controls for non-landfill areas; further coordination among Will County and U.S. Army Corps of Engineers may be needed to ensure consistency with property conveyance conditions at the Prairie View Landfill site.

FINANCIAL ASSESSMENT

Based on resource availability, site suitability and stakeholder reuse goals, the renewable energy assessment identified opportunities for solar PV generation at the site at two different scales. This assessment included a preliminary comparative financial analysis of estimated capital and periodic costs and financial payback for small- and large-scale solar PV systems. A brief summary of the financial assessment findings is included below.

Small-Scale Solar PV

Small-scale solar PV systems could potentially be located at Waste Management's maintenance building (roof-top solar array) or in areas surrounding the landfill office building. The financial assessment evaluated a hypothetical 40 kilowatt (kW) solar PV system owned and financed by Will County.

- A 40 kW system could help off-set Will County's electricity use with energy sold to Commonwealth Edison through a net-metering agreement.
- Commonwelath Edison's policies would allow for a 40 kW system to net meter at the retail rate. However, the current low price of electricity and high solar technology prices hinder the near term financial viability of a small solar system at the site. If electricity prices increase and the cost of solar technology decrease, a project could be financially viable.
- A solar project could be scaled based on available financial resources to develop an educational demonstration project or research project to test a hybrid gas-to-energy/solar PV system.

Large-Scale Solar PV

12 acres located outside of the landfill foot print (Figure 3, Zone N-2) could potentially accommodate a 2 MW solar PV system. The assessment evaluated the financial impact of a hypothetical 2 MW solar project under three different project ownership scenarios: 1) Direct Ownership, 2) Land Lease and 3) Third-Party Power Purchase Agreement (PPA).

- A land lease scenario would provide the least financial risk to Will County and could offer the most viable way to host a solar PV project at the site. The County could potentially negotiate a lease agreement with a third-party solar developer and capture revenue from annual rent payments. The value of the land lease will vary by developer, site and market considerations. Rental fees will be an important point of negotiation with a potential project developer.
- Currently, the low cost of electricity in Illinois, combined with low demand for utilities to purchase electricity from renewable energy projects until 2018 negatively impact the viability of either a Direct Ownership or Third-party PPA approach at the site. In the future, further evaluation of a Third-Party PPA approach may be warranted. A change in Illinois state incentives, speficially the Renewable Portfolio Standard, could create a stronger market for renewable energy projects in the future.

Renewable Energy Assessment Developed by Skeo Solutions

AKNOWLEDGEMENTS

The following organizations and entities contributed to the findings of the reuse assessment:

- Will County Land Use Division
- Will County Resource Recovery and Energy Division
- Waste Management
- Forest Preserve District of Will County
- Joliet Arsenal Development Authority
- U.S. Forest Service - Midewin National Tallgrass Prairie
- EPA Region 5

Waste Mangement's on-site maintenance building is a potential location for a roof-top mounted solar PV system.

Available land located in Reuse Zone N-2 could support a 2 MW solar PV project.

CONTACT INFORMATION

For additional information regarding the Prairie View Landfill Site Renewable Energy Assessment, contact:

Tom Bloom, Reuse Coordinator, EPA Region 5
312-886-1967 / bloom.thomas@epa.gov

Rosita Clarke, Brownfields Coordinator, EPA Region 5
312-886-7251 / clarke.rosita@epa.gov

Funded by EPA Region 5