Natural Resource Information Report

Compiled By

The DeKalb County Soil and Water Conservation District

DeKalb County Soil and Water Conservation District
1350 West Prairie Drive, Sycamore IL, 60178
Phone: (815) 756-3234 x3
dekalbswcd@gmail.com
# Project Information

<table>
<thead>
<tr>
<th>Natural Resource Information File Number</th>
<th>#727</th>
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<tbody>
<tr>
<td>Date the SWCD Board Reviews Report</td>
<td>March 15, 2023</td>
</tr>
<tr>
<td>Name of Petitioner</td>
<td>Shenandoah Solar, LLC</td>
</tr>
<tr>
<td>Size of Area of Review</td>
<td>96 acres</td>
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<tr>
<td>Current Zoning</td>
<td>A1 (Agricultural)</td>
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<td>Proposed Zoning</td>
<td>A-1, Special Use</td>
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<tr>
<td>Parcel Numbers</td>
<td>15-34-300-0005 and 15-33-400-004</td>
</tr>
<tr>
<td>Contact Person</td>
<td>Michael Keith</td>
</tr>
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<th>Copies of this report and notification of the proposed land use changes were provided to:</th>
<th>Yes</th>
<th>No</th>
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<td>The Petitioner</td>
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</tr>
<tr>
<td>The Petitioner's Legal Representation</td>
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<td>X</td>
</tr>
<tr>
<td>DeKalb County Community Development</td>
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<tr>
<td>DeKalb County SWCD District Files</td>
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</table>

*Report Prepared By: Jeff Woodyatt  Position: Resource Conservationist*
Purpose and Intent of This Report

The purpose of this report is to inform officials of the local governing body and other decision-makers with natural resource information. This information may be useful when undertaking land use decisions concerning variations, amendments or relief of local zoning ordinances, proposed subdivision of vacant or agricultural lands and the subsequent development of these lands. This report is a requirement under Section 22.02a of the Illinois Soil and Water Conservation Districts Act.

The intent of this report is to present the most current natural resource information available in a readily understandable manner. It contains a description of the present site conditions, the present resources, and the potential impacts that the proposed change may have on the site and its resources. The natural resource information was gathered from standardized data, on-site investigations and information furnished by the petitioner. This report must be read in its entirety so that the relationship between the natural resource factors and the proposed land use change can be fully understood.

Due to the limitations of scale encountered with the various resource maps, the property boundaries depicted in the various exhibits in this report provide a generalized representation of the property location and may not precisely reflect the legal description of the PIQ (Parcel in Question).

This report, when used properly, will provide the basis for proper land use change decisions and development while protecting the natural resource base of the county. It should not be used in place of detailed environmental and/or engineering studies that are warranted under most circumstances, but in conjunction with those studies.

The conclusions of this report in no way indicate that a certain land use is not possible, but it should alert the reader to possible problems that may occur if the capabilities of the land are ignored. Any questions on the technical data supplied in this report or if anyone feels that they would like to see more additional specific information to make the report more effective, please contact:

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E-mail: Jeffery.Woodyatt@il.nacdnet.net
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**Supplement Material**

Supplemental A. - Custom Soils Resource Report

Supplemental B. - NRCS Conservation Practice Standard 560 (Access Road)
# Executive Summary

<table>
<thead>
<tr>
<th>Natural Resource Information File Number:</th>
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<td>Petitioners Name:</td>
<td>Shenandoah Solar, LLC</td>
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<tr>
<td>Contact Person:</td>
<td>Michael Keith</td>
</tr>
<tr>
<td>Unit of Government Responsible for Land Use Change:</td>
<td>DeKalb County Community Development</td>
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<tr>
<td>Location of parcel:</td>
<td><em>Part of the Southwest Quarter in Section 34 and Southeast Quarter in Section of 33 Township 38 North, Range 5, East of the third principal meridian (Squaw Grove Township).</em></td>
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<td>Property Address, PIN Number</td>
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<td>Surrounding Land Use:</td>
<td>A1, Ag. Row Crops</td>
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<td>Proposed Land Use:</td>
<td>Solar Energy Farm</td>
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<td>Proposed Water Supply:</td>
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<td>Proposed Wastewater Treatment:</td>
<td>N/A</td>
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<tr>
<td>DeKalb County Unified Future Land Use Plan</td>
<td>A-1 (Agricultural)</td>
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Highlights of the Natural Resource Concerns

**Land Evaluation and Site Assessment (LESA):** Land Evaluation score is **98.1** out of 100. The Site Assessment for the proposed project was not calculated for this report; the assessment factors used for the Site Assessment are grouped into five major areas of consideration:

1. Agricultural/Land Use
2. Zoning
3. Compatibility and Impact of Uses
4. Land Use Feasibility
5. Compatibility with Comprehensive Development Plans

The proposed project is to be located in an A-1 zoned district with a Special Use condition. This project will have little impact to the factors listed above; therefore, the Site Assessment would not be feasible in this situation as there would be little deviation from the current zoning for this site.

**Prime Farmland:** Prime farmland soils are an important resource for DeKalb County. Each soil type is assigned a rating, which is then used to determine the LESA score for the site. Sites with a LESA score of 80 or greater are considered to be prime farmland. This site has a score of **98.1** on the LESA soil evaluation system, which places it within the definition of Prime Farmland. A complete description of the farmland classification for this site is located in the Custom Soils Resource Report (Supplemental A) for this project starting on page 37.

**Stormwater:** The District encourages the use of on-site detention for stormwater runoff if required by the County. The DeKalb County Stormwater Ordinance should be used to determine detention requirements. There should be no changes to the natural surface flow of water on the site. All roadways associated with the project should follow the natural contours of the land. Culverts should be used to a minimum or not at all. The Natural Resource Conservation Service (NRCS) Conservation Practice Standard for Access Roads (Supplemental B) is included with this report as a resource document.

**NPDES Permits:** An NPDES (National Pollution Discharge Elimination System) permit from the Illinois EPA is required for all construction and demolition sites that disturb 1 acre or more.

**Sediment and Erosion Control:** Development on this site should include a sedimentation and erosion control plan which is required by the ILR10 permit (SWPPP) with the Illinois EPA. The DeKalb County Soil and Water Conservation District recommends the use of the Illinois Urban Manual in selecting the proper Best Management Practices for development sites.

**Hydrologic Soil Group:** Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.
The specific soil types and Hydrologic soil groups associated with this site are:

A complete description of the Hydrologic soil groups associated for this site is located in the Custom Soils Resource Report for this project starting on page 48.

**NWII Wetlands:** A review of U.S. Fish & Wildlife Service National Wetland Inventory (NWII) maps identified an area within the project site that is identified as a potential “Riverine habitat classified as a RSUBH”. Please refer to page 30 of the Natural Resource Information Report.

The District has received a “Wetland Determination/Delineation” conducted by Atwell, LLC. This report concluded that there are two areas on the southeast boundary of the project site that are likely to meet Section 404 criteria to be considered jurisdictional wetlands (See report by Atwell, LLC.). The district recommends that the developer contact the US Army Corp of Engineers for information regarding the jurisdiction status and boundary of any potential wetland area.

**NRCS Wetlands:** A review of NRCS (Natural Resources Conservation Service) Wetlands Inventory maps identified no potential wetland areas on this site. Please refer to the NRCS Wetland map on page 31 of the Natural Resource Information Report.

**Floodplain:** There are no floodplain areas identified on this site according to the National Flood Hazard Layer produced by FEMA. Please refer to pages 27 of the Natural Resource Information Report.

**Aquifer Sensitivity:** According to Illinois State Geological Survey, there is no aquifer material identified within 50 feet of the surface and the potential for aquifer contamination is limited.

**Ponding Frequency:** Drummer silty clay loam (152A) and Elpaso silty clay loam (356A), which makes up 67.7% or 65 acres of the site, is classified as poorly drained soils that frequently will pond. The rating of “frequent” means that ponding occurs, on the average, more than once in 2 years (blue areas below). The chance of ponding is more than 50% in any year. Planners should take this into consideration as
they develop this site. Please refer to page 56 of the Custom Soil Resource Report for specific information.

**Solar Farm Ground Cover**: The District would like to remind the developer of the requirement of installing and maintaining a low-profile native prairie species for ground cover, per the DeKalb County’s Ordinance 2022-21. The developer will be required to submit a detailed Landscape Plan to the DeKalb County SWCD for approval prior to issuance of building permits. This plan should detail all the items set forth in the ordinance. In addition, the developer is required to develop a Landscape Monitoring and Maintenance Plan that will be approved by the DeKalb County SWCD. It is important for the long-term success of the ground cover that these plans are developed by an experienced individual that takes into consideration the required components of the county’s ordinance; and as well as thoughtful examination of the qualitative characteristics of the project site, mainly soil and hydrologic factors that affect plant growth and establishment across the site.

Benefits of native shrubs and groundcovers, such as grasses and wildflowers, include improved erosion control, pesticide avoidance, stormwater infiltration, wildlife habitat, and reduced overall maintenance. In addition, native fruiting and flowering plants provide a food source and habitat for wild native bees. Native bees make a considerable contribution to agricultural crops through pollination.

Promoting habitat for native bees and other pollinators can have a positive ecological impact on disturbed sites, as well as a positive economic impact on neighboring insect-pollinated crops. Planting
native grasses and wildflowers in low maintenance areas of solar farms also reduces long-term maintenance costs and emissions. These naturalized meadows, once established, are more drought tolerant, require little to no fertilization, and only need to be mowed once or twice a year.

Sustainable landscaping strategies serve as an educational tool to the community about positive agricultural and environmental practices, and act as a visual demonstration of commitment to land stewardship.

**Ecological Considerations:** The District recognizes two potential sources of water pollution from solar farms. Each of these concerns have best management practices that can be used to mitigate risks. The potential pollution sources and best management practices include:

- **Cracked panels** - Leaching of toxic materials could be an issue if a large number of broken panels were exposed to precipitation over a long period of time. To prevent leaching from becoming an issue, solar farm operators should regularly inspect for cracked panels. Any cracked panels must be immediately stored under protective cover to prevent exposure to precipitation. No broken panels, or any parts of broken panels, shall remain exposed to the elements while stored on-site. To reduce risks over time and prevent an excessive number of panels from being stored onsite, cracked panels should be periodically transported offsite for recycling or proper offsite storage.

- **Oil leaks or spills from transformers** - Electrical transformers are used to step up output voltage from the solar farms to the electrical grid. Electrical transformers contain oil, even those used in renewable energy systems. Oil leaks or spills resulting in environmental damage can occur. The size and voltage of the solar farm affects the size of the electrical transformers and the volume of oil being used. To mitigate risks of oil pollution from transformers, the following best management practices are recommended.
  - Use only biodegradable oil in the transformers. Larger transformers typically use mineral based oil unless biodegradable oil is specifically requested. While leaks and spills of biodegradable oil must still be prevented, risks for groundwater contamination would be reduced and clean-up efforts simplified in the event of a release.
  - Provide secondary containment systems such as trays, membranes, or vaults to collect and contain all oil in the event of a leak or spill. The containment systems must be designed to manage stormwater so adequate containment volume is maintained. If the containment area were to fill up with stormwater, there would not be sufficient storage volume to capture and contain the oil. A variety of secondary containment options are available. Solar farm developers would be responsible for selecting the secondary containment system and demonstrating its effectiveness.
DeKalb County SWCD
Land Use Opinion

The DeKalb County Soil and Water Conservation District (hereafter SWCD) has reviewed the natural resource information for a Solar Energy System proposed by Shenandoah Solar, LLC. This site is located in part of the Southwest Quarter in Section 34 and Southeast Quarter in Section of 33 Township 38 North, Range 5, East of the third principal meridian (Squaw Grove Township). The area of review includes 2 parcels totaling approximately 96 acres. The parcels in question are currently zoned A-1 with the intent to have both parcels be zoned to A-1 with Special Use for a commercial solar facility.

Based on the DeKalb County Soil Survey, this site is principally comprised of Prime Farmland soils. These types of soils are recognized for their highly productive qualities for growing agriculturally important grain and fiber crops. Preserving soil resources, especially those that are designated Prime Farmland, is an important consideration as we look forward towards the food and fiber needs in our communities. The SWCD Board of Directors is irresolute on their consideration of changing land use that has such a significant impact on agriculture production.

However, the DeKalb County SWCD acknowledges that land taken out of agriculture production and used for the purpose of a solar farm can have beneficial effects on soil health and surface water quality leaving the site. The District would like to remind the developer of the requirement of installing and maintaining a low-profile native prairie species for ground cover, per the DeKalb County’s SES Ordinance 2022-21. The developer will be required to submit a detailed Landscape Plan and Landscape Monitoring and Maintenance Plan that will be approved by the DeKalb County SWCD.

The DeKalb County SWCD strongly recommends the use of diverse native ground cover, specifically plant varieties beneficial to pollinator species, be used to vegetate the site. Recent field studies have indicated the benefits of native plant use in solar arrays not only to soil health and habitat creation, but also the resiliency of such ground cover to drought and prolonged wet conditions, as well as reduced maintenance needs after successful establishment. Native vegetation will help improve surface water quality within the project site along with the adjacent streams. It will be the responsibility of the Developer to protect the natural resources on and surrounding this site from potential contaminants that can occur from a project such as this.

The DeKalb County SWCD would like to remind the developer that a sub-surface drainage tile investigation is required prior to development of the site. At this time our office has not received this information. Damage of existing sub-surface drainage will lead to offsite drainage impacts. Based on testimonial information provided to the district, the existing sub-surface drainage tile that bisects the site drains approximately 2,500 surface acres of ag land to the north and northwest, which includes some properties that are within the Squaw Grove #12 Drainage District. Current site plans provided by the petitioner note a buffer area around this assumed path. If site plans or panel layout is altered from this proposed plan, the developer should be cognizant of activities above and around this underground drainage infrastructure.
Furthermore, studies regarding Solar Farms have been completed to evaluate hydrologic effects and examine whether water management is needed to control runoff. These studies show that it is important to have vegetative cover during construction and after to protect the soil from erosion. In some cases, it may be necessary to have detention; the County Engineer will determine any specific detention requirements that may be applicable for this site.

If development occurs, a soil erosion and sediment control plan will need to be in place. If the area has land disturbance of one acre or more the developer will need to comply with the IEPA ILR-10 permit which includes a Storm Water Pollution Prevention Plan. Sediment leaving the area can damage streams, ponds, and wetlands. Best Management Practices will need to be in place to protect the site and surrounding areas from erosion and sedimentation.

As a SWCD, we have established that it is our mission to "responsibly protect our healthy soils and clean water for all generations." The proposed project will provide vegetative cover of the soil for the length of its project life. Established vegetation will provide protection from erosion and improve soil health. This report contains information regarding potential issues with recommendations to address them accordingly.

The DeKalb County Soil and Water Conservation District hereby approves the Petitioners request provided that the aforementioned items stated above are addressed, as well as the information gathered here is considered during the planning stages of any future development of this site.

The information that is included in this Natural Resource Information Report is to assure the land Developers take into full consideration the limitations of that land that they wish to develop. Guidelines and recommendations are also a part of this report and should be considered in the planning process. The Natural Resource Information Report is required by the Illinois Soil and Water Conservation District Act (Ill Compiled Statutes, Ch. 70 Par 405/22.02a).

[Signature]
SWCD Chairman

3-15-2023
Date
Legal Description of Property: Part of the Southwest Quarter in Section 34 and Southeast Quarter in Section of 33 Township 38 North, Range 5, East of the third principal meridian (Squaw Grove Township).
The parcel in question is located approximately 3 miles south of the Village of Hinckley (Google Earth).
The parcel in question is located southwest of the intersection of Shabbona Grove Road and Somonauk Road (Google Earth 9/2015).
Aerial photo of parcel in question showing area of concentrated surface water flow (Google Earth 4/2001).
Soils Information

Map Unit Legend

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<th>Map Unit Symbol</th>
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<th>Acres in AOI</th>
<th>Percent of AOI</th>
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<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
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<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
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<td>67.6%</td>
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<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
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<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
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<td>El Paso silty clay loam, 0 to 2 percent slopes</td>
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<tr>
<td>512B</td>
<td>Danbrook silt loam, 2 to 5 percent slopes</td>
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<td><strong>Totals for Area of Interest</strong></td>
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<td><strong>100.0%</strong></td>
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Archaeologic / Cultural Resources

Simply stated, cultural resources are all the past activities and accomplishments of people. They include the following: buildings; objects made or used by people; locations; and less tangible resources, such as stories, dance forms, and holiday traditions. The Soil and Water Conservation District most often encounters cultural resources as historical properties. These may be prehistoric or historical sites, buildings, structures, features, or objects. The most common type of historical property that the Soil and Water Conservation District may encounter is non-structural archaeological sites. These sites often extend below the soil surface and must be protected against disruption by development or other earth moving activity if possible. Cultural resources are non-renewable because there is no way to “grow” a site to replace a disrupted site.

Landowners with historical properties on their land have ownership of that historical property. However, the State of Illinois owns all the following: human remains, grave markers, burial mounds, and artifacts associated with graves and human remains. Non-grave artifacts from archaeological sites and historical buildings are the property of the landowner. The landowner may choose to disturb a historical property but may not receive federal or state assistance to do so. If an earth moving activity disturbs human remains, the landowner must contact the county coroner within 48 hours.

Office maps indicate no historical property located within the project area. However, there is a historic farmstead that is present today adjacent to the site. The Illinois Historic Preservation Agency has not been notified of the proposed land use change by the DeKalb County SWCD. The applicant may need to contact the IHPA according to current Illinois Law (1939 photo).
Ecologically Sensitive Areas

What is Biological Diversity and why should it be conserved?

Biological diversity, or biodiversity, is the range of life on our planet. A more thorough definition is presented by botanist Peter H. Raven: “At the simplest level, biodiversity is the sum total of all the plants, animals, fungi and microorganisms in the world, or in a particular area; all of their individual variation; and all of the interactions between them. It is the set of living organisms that make up the fabric of the planet Earth and allow it to function as it does, by capturing energy from the sun and using it to drive all of life’s processes; by forming communities of organisms that have, through the several billion years of life’s history on Earth, altered the nature of the atmosphere, the soil and the water of our Planet; and by making possible the sustainability of our planet through their life activities now” (Raven 1994).

It is not known how many species occur on our planet. Presently, about 1.4 million species have been named. It has been estimated that there are perhaps 9 million more that have not been identified. What is known is that they are vanishing at an unprecedented rate. Reliable estimates show extinction occurring at a rate several orders of magnitude above “background” in some ecological systems (Wilson 1992, Hoose 1981).

The reasons for protecting biological diversity are complex, but they fall into four major categories. First, loss of diversity generally weakens entire natural systems. Healthy ecosystems tend to have many natural checks and balances. Every species plays a role in maintaining this system. When simplified by the loss of diversity, the system becomes more susceptible to natural and artificial perturbations. The chances of a system-wide collapse increase. In parts of the midwestern United States, for example, it was only the remnant areas of natural prairies that kept soil intact during the dust bowl years of the 1930s (Roush 1982).

Simplified ecosystems are almost always expensive to maintain. For example, when synthetic chemicals are relied upon to control pests, the target species are not the only ones affected. Their predators are almost always killed or driven away, exasperating the pest problem. In the meantime, people are unintentionally breeding pesticide-resistant pests. A process has begun where people become perpetual guardians of the affected area, which requires the expenditure of financial resources and human ingenuity to keep the system going.

A second reason for protecting biological diversity is that it represents one of our greatest untapped resources. Great benefits can be reaped from a single species. About 20 species provide 90% of the world’s food. Of these 20, just three, wheat, maize, and rice-supply over one half of that food. American wheat farmers need new varieties every five to 15 years to compete with pests and diseases. Wild strains of wheat are critical genetic reservoirs for these new varieties.

Further, every species is a potential source of human medicine. In 1980, a published report identified the market value of prescription drugs from higher plants at over $3 billion. Organic alkaloids, a class of
chemical compounds used in medicines, are found in an estimated 20% of plant species. Yet only 2% of plant species have been screened for these compounds (Hoose 1981).

The third reason for protecting diversity is that humans benefit from natural areas and depend on healthy ecosystems. The natural world supplies our air, our water, our food and supports human economic activity. Further, humans are creatures that evolved in a diverse natural environment between forest and grasslands. People need to be reassured that such places remain. When people speak of “going to the country,” they generally mean more than getting out of town. For reasons of their own sanity and well-being, they need a holistic, organic experience. Prolonged exposure to urban monotony produces neuroses, for which cultural and natural diversity cure.

Historically, the lack of attention to biological diversity, and the ecological processes it supports, has resulted in economic hardships for segments of the basin’s human population.

The final reason for protecting biological diversity is that species and natural systems are intrinsically valuable. The above reasons have focused on the benefits of the natural world to humans. All things possess intrinsic value simply because they exist.

**Biological Resources Concerning the Subject Parcel**

As part of the Natural Resources Information Report, staff checks office maps to determine if any nature preserves are in the general vicinity of the parcel in question. If there is a nature preserve in the area, then that resource will be identified as part of the report. The SWCD recommends that every effort be made to protect that resource. Such efforts should include, but are not limited to erosion control, sediment control, stormwater management, and groundwater monitoring.

An office review indicated that there were **no ecologically sensitive areas in the vicinity of the parcel in question.**
Geologic/Aquifer Information

Geology and the Proposed Land Use

Local geology plays an important role in determining the pollution potential. Groundwater pollution potential is an important factor when determining a specific area's suitability for a given land use. The local geology is an important element of the natural resource base. This information, when compared to soils information, gives a clearer picture of conditions on this parcel.
Aquifer Information

Due to the underlying materials present, the potential for aquifer contamination for the parcel in question has few limitations. The majority of the site is made up of uniform, relatively impermeable silty or clayey till at least 50 feet thick with no evidence of iterbedded sand and gravel.

Based on Illinois State Water Survey maps this area does not have aquifer material identified within 50 feet of the surface and the potential for aquifer contamination is limited.
Potential for Contamination of Shallow Aquifers in Illinois

Illinois State Geological Survey

Approximate location of parcel in question.

Uniform, relatively impermeable silty or clayey till at least 50 ft thick; no evidence of interbedded sand and gravel.

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<th>Primarily bedrock limitation</th>
<th>Primarily glacial drift limitation</th>
<th>Materials generally having few limitations</th>
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<tr>
<td>Groundwater contamination potential</td>
<td>Trench construction problems and/or contamination</td>
<td>Groundwater contamination potential</td>
</tr>
<tr>
<td>A1</td>
<td>(A1)*</td>
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</tr>
<tr>
<td>A3</td>
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Figure 11: Summary: geologic limitations for land burial of municipal wastes. (*Note units in parentheses indicate secondary or local limitations.)
Watershed Information

Watershed and Subwatershed Information

A watershed is the area of land that drains into a specific point including a stream, lake, or other body of water. High points on the Earth’s surface, such as hills and ridges define watersheds. When rain falls in the watershed, it flows across the ground towards a stream or lake. Rainwater carries any pollutants it comes in contact with such as oils, pesticides, and soil.

Everyone lives in a watershed. Their actions can impact natural resources and people living downstream. Residents can minimize this impact by being aware of their environment and implications of their activities, implementing practices recommended in watershed plans and educating others about their watershed. The parcel in question is located within the Town of Little Rock-Little Rock Creek subwatershed (HUC 12).

More information can be found about completed Watershed Improvement Plans and Best Management Practices at [www.dekalbcountrywatersheds-il.org](http://www.dekalbcountrywatersheds-il.org)
The parcel in question is located within the Town of Little Rock-Little Rock Creek subwatershed.
The elevation of this parcel ranges from 726 feet to 708 feet above sea level. The site largely drains to the east with approximately 18 feet of fall.
Importance of Flood Information

A floodplain is defined as land adjoining a watercourse (riverine) or an inland depression (non-riverine) that is subject to periodic inundation by high water. Floodplains are important areas demanding protection since they have water storage and conveyance functions which affect upstream and downstream flows, water quality and quantity, and suitability of the land for human activity. Since floodplains play distinct and vital roles in the hydrologic cycle, development that interferes with their hydrologic and biologic functions should be carefully considered.

Flooding is both dangerous to people and destructive to their properties. The following maps, when combined with wetland and topographic information, can help developers and future homeowners to “sidestep” potential flooding or ponding problems.

FIRM is the acronym for the Flood Insurance Rate Map, produced by the Federal Emergency Management Agency. These maps define flood elevation adjacent to tributaries and major bodies of water and superimpose that onto a simplified USGS topographic map. The scale of the FIRM maps is generally dependent on the size and density of parcels in that area. (This is to correctly determine the parcel location and flood plain location.) The FIRM map has three (3) zones. A is the zone of 100-year flood, zone B is the 100 to 500 year flood, and zone C is outside the flood plain.

The Hydrologic Atlas (H.A.) Series of the Flood of Record Map is also used for the topographic information. This map is different from the FIRM map mainly because it will show isolated or pocketed flooded areas. DeKalb County uses both these maps in conjunction with each other for flooded area determinations. The Flood of Record maps, show the areas of flood for various years. Both of these maps stress that the recurrence of flooding is merely statistical. That is to say a 100-year flood may occur twice in one year, or twice in one week, for that matter.

It should be noted that greater floods than those shown on the two maps are possible. The flood boundaries indicated provide a historic record only until the map publication date. Additionally, these flood boundaries are a function of the watershed conditions existing when the maps were produced. Cumulative changes in runoff characteristics caused by urbanization can result in an increase in flood height of future flood episodes.

Floodplains play a vital role in reducing the flood damage potential associated with an urbanizing area and, when left in an undisturbed state, also provide valuable wildlife habitat benefits. If it is the petitioner's intent to conduct floodplain filling or modification activities, the petitioner, and the Unit of Government responsible need to consider the potentially adverse effects this type of action could have on adjacent properties. The change or loss of natural floodplain storage often increases the frequency and severity of flooding on adjacent property.

If the available maps indicate the presence of a floodplain on the PIQ, the petitioner should contact the IDOT-DWR and FEMA to delineate a floodplain elevation for the parcel. If a portion of the property is indeed floodplain, applicable state, county, and local regulations will need to be reflected in the site plans.
Another indication of flooding potential can be found in the soil's information. Hydric soils indicate the presence of drainageways, areas subject to ponding, or a naturally occurring high water table. These need to be considered along with the floodplain information when developing the site plan and the stormwater management plan. If the site does include these hydric soils and development occurs, thus raising the concerns of the loss of water storage in these soils and the potential for increased flooding in the area.

FEMA Maps indicate that there are no floodplain areas located within the parcel in question (Zone X).
Soil Erosion and Sediment Control

Erosion is the wearing away of the soil by water, wind, and other forces. Soil erosion threatens the Nation's soil productivity and contributes the most pollutants in our waterways. Water causes about two thirds of erosion on agricultural land. Four properties, mainly, determine a soil's erodibility:

1. Texture  
2. Slope  
3. Structure  
4. Organic matter content

**Slope** has the most influence on soil erosion potential when the site is under construction. Erosivity and runoff increase as slope grade increases. The runoff then exerts more force on the particles, breaking their bonds more readily and carrying them farther before deposition. The longer water flows along a slope before reaching a major waterway, the greater the potential for erosion.

Soil erosion during and after this proposed construction can be a primary non-point source of water pollution. Eroded soil during the construction phase can create unsafe conditions on roadways, decrease the storage capacity of lakes, clog streams and drainage channels, cause deterioration of aquatic habitats, and increase water treatment costs. Soil erosion also increases the risk of flooding by choking culverts, ditches, and storm sewers, and by reducing the capacity of natural and man-made detention facilities.

The general principles of erosion and sedimentation control measures include:
- reducing or diverting flow from exposed areas, storing flows, or limiting runoff from exposed areas,
- staging construction to keep disturbed areas to a minimum,
- establishing or maintaining or temporary or permanent groundcover,
- retaining sediment on site and
- professionally installing, inspecting, and maintaining control measures.

Erosion control practices are useful controls only if they are properly located, installed, inspected, and maintained.

The SWCD recommends an erosion control plan for all sites, especially if near a wetland or stream.

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Eroded Soils</strong></td>
<td></td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>
Wetland Information

Importance of Wetland Information

Wetlands function in many ways to provide numerous benefits to society. They control flooding by offering a slow release of excess water downstream or through the soil. They cleanse water by filtering out sediment and some pollutants and can function as rechargers of our valuable groundwater. They also are essential breeding, rearing, and feeding grounds for many species of wildlife.

These benefits are particularly valuable in urbanizing areas as development activity typically adversely affects water quality, increases the volume of stormwater runoff, and increases the demand for groundwater. In an area where many individual homes rely on shallow groundwater wells for domestic water supplies, activities that threaten potential groundwater recharge areas are contrary to the public good. The conversion of wetlands, with their sediment trapping and nutrient absorbing vegetation, to biologically barren stormwater detention ponds can cause additional degradation of water quality in downstream or adjacent areas.

It has been estimated that over 95% of the wetlands that were historically present in Illinois have been destroyed while only recently has the true environmental significance of wetlands been fully recognized. America is losing 100,000 acres of wetlands a year and has saved 5 million acres total (since 1934). One acre of wetland can filter 7.3 million gallons of water a year. These are reasons why our wetlands are high quality and important.

This section contains the NRCS (Natural Resources Conservation Service) Wetlands Inventory, which is the most comprehensive inventory to date. The NRCS Wetlands Inventory is reproduced from an aerial photo at a scale of 1” equals 660 feet. The NRCS developed these maps in cooperation with U.S. EPA (Environmental Protection Agency,) and the U.S. Fish and Wildlife Service, using the National Food Security Act Manual, 3rd Edition. The main purpose of these maps is to determine wetland areas on agricultural fields and areas that may be wetlands but are in a non-agriculture setting.

The NRCS Wetlands Inventory in no way gives an exact delineation of the wetlands, but merely an outline, or the determination that there is a wetland within the outline. For the final, most accurate wetland determination of a specific wetland, a wetland delineation must be certified by NRCS staff using the National Food Security Act Manual (on agricultural land.) On urban land, a certified wetland delineator must perform the delineation using the ACOE 1987 Manual. See the glossary section for the definitions of “delineation” and “determination.”
There is an area within the project site that is identified as a potential “Riverine habitat classified as a R5UBH” based on U.S. Fish and Wildlife Service National Wetland Inventory (NWI) maps.

In addition, a wetland determination conducted by Atwell, LLC concluded that there are two areas on the southeast boundary of the project site that likely meet Section 404 criteria to be considered jurisdictional wetlands (See report by Atwell, LLC).
A review of USDA-NRCS Wetland layers identify no potential wetland areas within the project site.
PLEASE READ THE FOLLOWING IF YOU ARE PLANNING TO DO ANY WORK NEAR A STREAM (THIS INCLUDES SMALL UNNAMED STREAMS), LAKE, WETLAND OR FLOODWAY.

The laws of the United States and the State of Illinois assign certain agencies specific and different regulatory roles to protect the waters within the State's boundaries. These roles, when considered together, include protection of navigation channels and harbors, protection against floodway encroachments, maintenance and enhancement of water quality, protection of fish and wildlife habitat and recreational resources, and, in general, the protection of total public interest. Unregulated use of the waters within the State of Illinois could permanently destroy or alter the character of these valuable resources and adversely impact the public. Therefore, please contact the proper regulatory authorities when planning any work associated with Illinois waters so that proper consideration and approval can be obtained.

WHO MUST APPLY

Anyone proposing to dredge, fill, rip rap, or otherwise alter the banks or beds of, or construct, operate, or maintain any dock, pier, wharf, sluice, dam, piling, wall, fence, utility, flood plain or floodway subject to State of Federal regulatory jurisdiction should apply for agency approvals.

REGULATORY AGENCIES:

◆ **Wetlands or U.S. Waters**: U.S. Army Corps of Engineers, Rock Island District, Clock Tower Building, P.O. Box 2004, Rock Island, IL 61204-2004. Phone: (309) 794-5379.
◆ **Flood plains**: Illinois Department of Natural Resources \ Office of Water Resources, Natural Resources Way, Springfield, IL 62702-1270.
◆ **Water Quality \ Erosion Control**: Illinois Environmental Protection Agency, Division of Water Pollution Control, Permit Section, Watershed Unit, 2200 Churchill Road, Springfield, IL 62706, phone (217)- 782-0610.

COORDINATION

We recommend early coordination with the regulatory agencies **BEFORE** finalizing work plans. This allows the agencies to recommend measures to mitigate or compensate for adverse impacts. Also, the agency can make possible environmental enhancement provisions early in the project planning stages. This could reduce time required to process necessary approvals.

CAUTION: Contact with the United States Army Corps of Engineers is strongly advised before commencement of any work in or near a water of the United States. This could save considerable time and expense. Persons responsible for willful and direct violation of Section 10 of the River and Harbor Act of 1899 or Section 404 of the Federal Water Pollution Control Act are subject to fines ranging up to $27,500 per day of violation and imprisonment for up to one year or both.
Land Evaluation Site Assessment

(LESA) Background Information

The DeKalb County Land Evaluation and Site Assessment System (LESA) is designed to evaluate the viability of a site for agricultural uses. Although the framework of the system was developed by the Natural Resources Conservation Service of the U.S. Department of Agriculture, the contents of the County’s LESA System were prepared locally to utilize soil survey information and interpretations and to incorporate local values and objectives regarding the protection of agricultural land use and the coordination of growth, affecting land development.

Decision makers use the LESA system to determine the suitability of a land use change and/or a zoning request as it relates to agricultural land. The LESA system is a two-step procedure that includes:

* Land Evaluation (LE), soils value
* Site Assessment (SA), land use

The systems two parts are evaluated based on the assignment of points, with a maximum of 300 total. The Land Evaluation has a maximum of 100 points and is used to rate farmland for its agricultural productivity and its prime farmland category. Generally, the Land Evaluation arranges the County’s soils by their relative values, represented by a score of 0 to 100, with 0 being the worst for agriculture and 100 the best. The data for formulating the land evaluation is derived from the soil survey of DeKalb County.

Moreover, Land Evaluation encompasses information regarding soils found on the site and their suitability for agricultural purposes. DeKalb County soils consist of thirty-one different soil series ranging from very poorly drained Houghton Muck to well drained Harvard. DeKalb County is known for its highly productive agricultural soils such as Drummer, Flanagan and Muscatine. For the purposes of the Land Evaluation portion of the LESA system, each soil is rated higher on the overall LESA score. DeKalb County SWCD provides a weighted average of the soils using a simple, mechanical, unbiased method of determining agricultural suitability of soils on site.

The Site Assessment considers important factors other than soils relative to a specific parcel, which determine viability for agricultural use. The maximum number of points for the Site Assessment is 200. The Site Assessment identifies and weighs 15 criteria. The determination to include the specific site assessment factors directly resulted from the following:

* DeKalb County Zoning Ordinance
* Land Use Plan
* Health Department Criteria for Septic
* Other adopted county policies.

If a parcel were to receive a total of 215 points or more for the completed evaluation, that would indicate that the site has a high rating for agriculture. In utilizing the LESA System, the higher the point value, the greater the productivity and the more viable the site for agricultural use.
The DeKalb County LESA System is a valuable tool to guide land use decisions for the County. It does not take away the power of local officials to make land use decisions; rather, it assists them in making rational, consistent, and supportable land use decisions. Applications of the LESA System will generally fall under two types of requests involving conversion of land from agricultural use to non-agricultural use. The most frequent application of LESA will be when a request is made to rezone a tract of land from the County’s agricultural districts to another zoning district or for special use. The LESA System can also be used to review state and federal projects for compliance with the Illinois Farmland Preservation Act and the Federal Farmland Protection Policy Act and their impact on important farmland.

In summary, the LESA evaluation addresses all factors, including soils information, together to provide a rational, consistent, unbiased determination of the impact to agriculture from the proposed land use and zoning changes.

<table>
<thead>
<tr>
<th>Soil</th>
<th>Value Group</th>
<th>Percentage</th>
<th>Acreage Value</th>
<th>Value Factor</th>
<th>Adjusted Farm Unit Size</th>
<th>Adjusted Ag. Point Value</th>
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<tr>
<td>59A</td>
<td>1</td>
<td>2.40%</td>
<td>2.3</td>
<td>98</td>
<td>2.3</td>
<td>2.4</td>
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<tr>
<td>152A</td>
<td>1</td>
<td>67.60%</td>
<td>64.9</td>
<td>100</td>
<td>64.9</td>
<td>67.6</td>
</tr>
<tr>
<td>154A</td>
<td>1</td>
<td>19.00%</td>
<td>18.3</td>
<td>100</td>
<td>18.3</td>
<td>19.0</td>
</tr>
<tr>
<td>348B</td>
<td>4</td>
<td>10.80%</td>
<td>10.3</td>
<td>83</td>
<td>8.5</td>
<td>9.0</td>
</tr>
<tr>
<td>356A</td>
<td>1</td>
<td>0.10%</td>
<td>0.1</td>
<td>100</td>
<td>0.1</td>
<td>0.1</td>
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<td>0.10%</td>
<td>0.1</td>
<td>95</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>100%</td>
<td>96</td>
<td>94.2</td>
<td></td>
<td>98.1</td>
</tr>
</tbody>
</table>

**** The LE score is the Total Value Number (shaded on the table)***

*Note: the soil types and percentages may differ from the limitations table for this calculation because of buildings, driveways, and other manmade impediments to agriculture. See figure 9 for the approximate "footprint" of the features (if any.)

Explanation of the LE Worksheet

Soil Number: is the soil type of the polygon on the soils map.
Percentage and Acreage: the percentages of the parcel, and the area that the soil polygon represents.
Value: the numeric value from 0-100 that is assigned that soil units.
Adjusted Farm Unit Size: the acreage multiplied by the value of that soil unit.
Adjusted Ag. Point Value: the percentage multiplied by the value factor of that soil unit.

******** The LE score is the Total Value Number (shaded on the table)***
This parcel in question is located within an area identified for A-1 (Agriculture) zoning in the 2011 DeKalb County Unified Future Land Use Plan Map.
AGRICULTURAL PROTECTION AREAS (AG AREAS) - Allowed by P.A. 81-1173. An AG AREA consists of a minimum of 350 acres of farmland, as contiguous and compact as possible. Petitioned by landowners, AG AREAS protect for a period of ten years initially, then reviewed every eight years thereafter. AG AREA establishment exempts landowners from local nuisance ordinances directed at farming operations, and designated land cannot receive special tax assessments on public improvements that do not benefit the land, e.g., water and sewer lines.

AGRICULTURE - The growing, harvesting and storing of crops including legumes, hay, grain, fruit and truck or vegetable including dairying, poultry, swine, sheep, beef cattle, pony and horse production, fur farms, and fish and wildlife farms; farm buildings used for growing, harvesting and preparing crop products for market, or for use on the farm; roadside stands, farm buildings for storing and protecting farm machinery and equipment from the elements, for housing livestock or poultry and for preparing livestock or poultry products for market; farm dwellings occupied by farm owners, operators, tenants or seasonal or year around hired farm workers.

B.G. - Below Grade. Under the surface of the Earth.

BEDROCK - Indicates depth at which bedrock occurs. Also lists hardness as rippable or hard.

FLOODING - Indicates frequency, duration, and period during year when floods are likely to occur.

HIGH LEVEL MANAGEMENT - The application of effective practices adapted to different crops, soils, and climatic conditions. Such practices include providing for adequate soil drainage, protection from flooding, erosion and runoff control, near optimum tillage, and planting the correct kind and amount of high-quality seed. Weeds, diseases, and harmful insects are controlled. Favorable soil reaction and near optimum levels of available nitrogen, phosphorus, and potassium for individual crops are maintained. Efficient use is made of available crop residues, barnyard manure, and/or green manure crops. All operations, when combined efficiently and timely, can create favorable growing conditions and reduce harvesting losses -- within limits imposed by weather.

HIGH WATER TABLE - A seasonal high-water table is a zone of saturation at the highest average depth during the wettest part of the year. May be apparent, perched, or artesian kinds of water tables.

Water Table, Apparent - A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water Table, Artesian - A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.
**Water Table, Perched** - A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

**DELINEATION** - For Wetlands: A series of orange flags placed on the ground by a certified professional that outlines the wetland boundary on a parcel.

**DETERMINATION** - A polygon drawn on a map using map information that gives an outline of a wetland.

**HYDRIC SOIL** - This type of soil is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (USDA Natural Resources Conservation Service 1987)

**INTENSIVE SOIL MAPPING** - Mapping done on a smaller more intensive scale than a modern soil survey to determine soil properties of a specific site, e.g. mapping for septic suitability.

**LAND EVALUATION AND SITE ASSESSMENT (L.E.S.A.)** - LESA is a systematic approach for evaluating a parcel of land and to determine a numerical value for the parcel for farmland preservation purposes.

**MODERN SOIL SURVEY** - A soil survey is a field investigation of the soils of a specific area, supported by information from other sources. The kinds of soil in the survey area are identified and their extent shown on a map, and an accompanying report describes, defines, classifies, and interprets the soils. Interpretations predict the behavior of the soils under different used and the soils' response to management. Predictions are made for areas of soil at specific places. Soils information collected in a soil survey is useful in developing land-use plans and alternatives involving soil management systems and in evaluating and predicting the effects of land use.

**PALUSTRINE** - Name given to inland freshwater wetlands.

**PERMEABILITY** - Values listed estimate the range (in rate and time) it takes for downward movement of water in the major soil layers when saturated but allowed to drain freely. The estimates are based on soil texture, soil structure, available data on permeability and infiltration tests, and observation of water movement through soils or other geologic materials.

**PIQ** - Parcel in question

**POTENTIAL FROST ACTION** - Damage that may occur to structures and roads due to ice lens formation causing upward and lateral soil movement. Based primarily on soil texture and wetness.

**PRIME FARMLAND** - Prime farmland soils are lands that are best suited to food, feed, forage, fiber, and oilseed crops. It may be cropland, pasture, woodland, or other land, but it is not urban and built-up land or water areas. It either is used for food or fiber or is available for those uses. The soil qualities, growing season, and moisture supply are those needed for a well-managed soil economically to produce a sustained high yield of crops. Prime farmland produces in highest yields with minimum inputs of energy and economic resources and farming the land results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is
acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 5 percent. (Source USDA Natural Resources Conservation Service)

**PRODUCTIVITY INDEXES** - Productivity indexes for grain crops express the estimated yields of the major grain crops grown in Illinois as a single percentage of the average yields obtained under basic management from several of the more productive soils in the state. This group of soils is composed of the Muscatine, Ipava, Sable, Lisbon, Drummer, Flanagan, Littleton, Elburn, and Joy soils. Each of the 425 soils found in Illinois are found in Circular 1156 from the Illinois Cooperative Extension Service.

**SEASONAL** - When used in reference to wetlands indicates that the area is flooded only during a portion of the year.

**SHRINK-SWELL POTENTIAL** - Indicates volume changes to be expected for the specific soil material with changes in moisture content.

**SOIL MAPPING UNIT** - A map unit is a collection of soil areas of miscellaneous areas delineated in mapping. A map unit is generally an aggregate of the delineations of many different bodies of a kind of soil or miscellaneous area but may consist of only one delineated body. Taxonomic class names and accompanying phase terms are used to name soil map units. They are described in terms of ranges of soil properties within the limits defined for taxa and in terms of ranges of tax adjuncts and inclusions.

**SOIL SERIES** - A group of soils, formed from a particular type of parent material, having horizons that, except for texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

**SUBSIDENCE** - Applies mainly to organic soils after drainage. Soil material subsides due to shrinkage and oxidation.

**TERRAIN** - The area or surface over which a particular rock or group of rocks is prevalent.

**TOPSOIL** - That portion of the soil profile where higher concentrations of organic material, fertility, bacterial activity, and plant growth take place. Depths of topsoil vary between soil types.

**WATERSHED** - An area of land that drains to an associated water resource such as a wetland, river, or lake. Depending on the size and topography, watersheds can contain numerous tributaries, such as streams and ditches, and ponding areas such as detention structures, natural ponds, and wetlands.

**WETLAND** - An area that has a predominance of hydric soils and that is inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances does support, a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions.
References


Geologic Road Map of Illinois Department of Natural Resources, Illinois State Geological Survey, Natural Resources Building, 615 East Peabody, Champaign, IL 61820-6964.


Hydrologic Unit Map for DeKalb County. Natural Resources Conservation Service, United States Department of Agriculture.


Land Evaluation and Site Assessment System. The DeKalb County Department of Planning and Zoning and the DeKalb County Soil and Water Conservation District. In cooperation with USDA, Natural Resources Conservation Service.

Natural Resources Conservation Service Wetland Inventory Map. United States Department of Agriculture.

Potential for Agriculture Chemical Contamination of Shallow Aquifers in DeKalb County. Illinois State Geological Survey.


Soil Survey of DeKalb County. Natural Resources Conservation Service, United States Department of Agriculture.


Wetlands - The Corps of Engineers' Administration of the Section 404.
Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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<td>512B—Danabrook silt loam, 2 to 5 percent slopes</td>
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil
scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.
Custom Soil Resource Report
Soil Map (NRI 727)

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 16N WGS84

Map Scale: 1:5,590 if printed on A landscape (11" x 8.5") sheet.

Soil Map may not be valid at this scale.
The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: DeKalb County, Illinois
Survey Area Data: Version 17, Aug 31, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 3, 2019—Aug 24, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
Map Unit Legend (NRI 727)

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
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<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
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</table>

Totals for Area of Interest | 96.0 | 100.0%

Map Unit Descriptions (NRI 727)

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it
was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.
DeKalb County, Illinois

59A—Lisbon silt loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2ytd7
Elevation: 690 to 850 feet
Mean annual precipitation: 35 to 42 inches
Mean annual air temperature: 48 to 54 degrees F
Frost-free period: 165 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Lisbon and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lisbon

Setting
Landform: End moraines, ground moraines
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile
Ap - 0 to 11 inches: silt loam
Bt - 11 to 36 inches: silty clay loam
2Bt - 36 to 39 inches: clay loam
2C - 39 to 60 inches: loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C/D
Ecological site: F095XB005WI - Moist Loamy or Clayey Lowland
Hydric soil rating: No
Minor Components

Drummer, drained
Percent of map unit: 3 percent
Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Elpaso, drained
Percent of map unit: 3 percent
Landform: Ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

Sable, drained
Percent of map unit: 2 percent
Landform: Ground moraines, swales
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes

152A—Drummer silty clay loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2ssrz
Elevation: 490 to 1,020 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 160 to 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Drummer, drained, and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.
Description of Drummer, Drained

Setting

*Landform:* Swales on till plains, swales on outwash plains, stream terraces on till plains, stream terraces on outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Base slope, talf
*Down-slope shape:* Linear
*Across-slope shape:* Concave, linear
*Parent material:* Loess over stratified loamy outwash

Typical profile

*Ap - 0 to 14 inches:* silty clay loam
*Btg - 14 to 41 inches:* silty clay loam
*2Btg - 41 to 47 inches:* loam
*2Cg - 47 to 60 inches:* stratified sandy loam to clay loam

Properties and qualities

*Slope:* 0 to 2 percent
*Depth to restrictive feature:* More than 80 inches
*Drainage class:* Poorly drained
*Runoff class:* Negligible
*Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.60 to 2.00 in/hr)
*Depth to water table:* About 0 to 12 inches
*Frequency of flooding:* None
*Frequency of ponding:* Frequent
*Calcium carbonate, maximum content:* 30 percent
*Maximum salinity:* Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
*Available water supply, 0 to 60 inches:* High (about 9.6 inches)

Interpretive groups

*Land capability classification (irrigated):* None specified
*Land capability classification (nonirrigated):* 2w
*Hydrologic Soil Group:* B/D
*Ecological site:* R110XY024IL - Ponded Depressional Sedge Meadow, R111XD020IN - Wet Outwash Mollisol, R108XA013IL - Wet Outwash Prairie
*Hydric soil rating:* Yes

Minor Components

Peotone, drained

*Percent of map unit:* 3 percent
*Landform:* Depressions on outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
*Down-slope shape:* Concave
*Across-slope shape:* Concave
*Ecological site:* R110XY024IL - Ponded Depressional Sedge Meadow
*Hydric soil rating:* Yes

Harpster, drained

*Percent of map unit:* 3 percent
*Landform:* Depressions on outwash plains
*Landform position (two-dimensional):* Toeslope
*Landform position (three-dimensional):* Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY025IL - Ponded Calcareous Sedge Meadow
Hydric soil rating: Yes

154A—Flanagan silt loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2ssry
Elevation: 570 to 990 feet
Mean annual precipitation: 34 to 42 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 160 to 190 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Flanagan and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Flanagan
Setting
Landform: Ground moraines, till plains
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over loamy till

Typical profile
Ap - 0 to 8 inches: silt loam
A - 8 to 18 inches: silty clay loam
Bt1 - 18 to 32 inches: silty clay loam
Bt2 - 32 to 45 inches: silty clay loam
2Bt3 - 45 to 49 inches: silt loam
2C - 49 to 60 inches: loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 6.0
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: C/D
Ecological site: R108XA006IL - Loess Upland Prairie
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: No

Minor Components
El paso, drained
Percent of map unit: 4 percent
Landform: Till plains, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow,
                    R108XA008IL - Ponded Loess Sedge Meadow, R108XA007IL - Wet Loess
                    Upland Prairie
Other vegetative classification: Grass/Prairie (Herbaceous Vegetation)
Hydric soil rating: Yes

Urban land
Percent of map unit: 1 percent
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

348B—Wingate silt loam, cool mesic, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: 2sn03
Elevation: 660 to 960 feet
Mean annual precipitation: 33 to 40 inches
Mean annual air temperature: 46 to 51 degrees F
Frost-free period: 145 to 185 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Wingate and similar soils: 97 percent
Minor components: 3 percent
Estimates are based on observations, descriptions, and transects of the map unit.

Description of Wingate
Setting
Landform: End moraines, ground moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over loamy till

Typical profile
Ap - 0 to 8 inches: silt loam
BE - 8 to 12 inches: silt loam
Bt1 - 12 to 34 inches: silty clay loam
2Bt2 - 34 to 47 inches: clay loam
2C - 47 to 60 inches: loam

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R108XA010IL - Loess Upland Savanna
Hydric soil rating: No

Minor Components
Elpaso, drained
Percent of map unit: 3 percent
Landform: Swales on ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R108XA008IL - Ponded Loess Sedge Meadow, R108XA007IL - Wet Loess Upland Prairie
Hydric soil rating: Yes

356A—Elpaso silty clay loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2t6zs
Elevation: 580 to 1,020 feet
Mean annual precipitation: 34 to 42 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 155 to 190 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Elpaso, drained, and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Elpaso, Drained

Setting
Landform: Ground moraines, till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Loess over till

Typical profile
Ap - 0 to 21 inches: silty clay loam
Btg1 - 21 to 44 inches: silty clay loam
2Btg2 - 44 to 69 inches: silty clay loam
2C - 69 to 79 inches: silty clay loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 30 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.5 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow,
               R108XA008IL - Ponded Loess Sedge Meadow, R108XA007IL - Wet Loess
               Upland Prairie
Hydric soil rating: Yes

Minor Components
Harpster, drained
Percent of map unit: 4 percent
Landform: Depressions on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY025IL - Ponded Calcareous Sedge Meadow
Hydric soil rating: Yes

Peotone, drained
Percent of map unit: 2 percent
Landform: Depressions on till plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R110XY024IL - Ponded Depressional Sedge Meadow
Hydric soil rating: Yes

512B—Danabrook silt loam, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: 2ytdf
Elevation: 800 to 930 feet
Mean annual precipitation: 30 to 40 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 140 to 180 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Danabrook and similar soils: 92 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Danabrook
Setting
Landform: End moraines, ground moraines
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess over till

Typical profile
Ap - 0 to 13 inches: silt loam
Bt - 13 to 33 inches: silty clay loam
2Bt - 33 to 42 inches: clay loam
2C - 42 to 60 inches: loam

Properties and qualities
Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 40 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F095XB007WI - Loamy Upland with Carbonates
Hydric soil rating: No

Minor Components
Drummer, drained
Percent of map unit: 8 percent
Landform: Ground moraines, stream terraces on outwash plains, swales on outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Ecological site: F095XB004WI - Wet Loamy or Clayey Lowland
Hydric soil rating: Yes
Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Building Site Development

Building site development interpretations are designed to be used as tools for evaluating soil suitability and identifying soil limitations for various construction purposes. As part of the interpretation process, the rating applies to each soil in its described condition and does not consider present land use. Example interpretations can include corrosion of concrete and steel, shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Ground-based Solar Arrays, Soil-penetrating Anchor Systems (NRI 727)

Ground-based Solar Arrays, Soil-penetrating Anchor Systems

Ground-based solar arrays are sets of photovoltaic panels that are not situated on a building or pole. These installations consist of a racking system that holds the panel in the desired orientation and the foundation structures that hold the racking system to the ground. Two basic methods are used to hold the systems to the ground, based on site conditions and cost. One method employs driven piles, screw augers, or concrete piers that penetrate into the soil to provide a stable foundation. The ease of installation and general site suitability of soil-penetrating anchoring systems depends on soil characteristics such as rock fragment content, soil depth, soil strength, soil corrosivity, shrink-swell tendencies, and drainage. The other basic anchoring system utilizes precast ballasted footings or ballasted trays on the soil surface to make the arrays too heavy to move. The site considerations that impact both basic systems are slope, slope aspect, wind speed, land surface shape, flooding, and ponding. Other factors that will contribute to the function of a solar power array include daily hours of sunlight and shading from hills, trees or buildings.
Soil-penetrating anchoring systems can be used where the soil conditions are not limited. Installation of these systems requires some power equipment for hauling components and either driving piles, turning helices, or boring holes to install the anchoring apparatus.

Soils can be a non-member, partial member or complete members of the set of soils that are limited for "Ground-based Solar Panel Arrays". If a soil's property within 150 cm (60 inches) of the soil surface has a membership indices greater than zero, then that soil property is limiting and the soil restrictive feature is identified. The overall interpretive rating assigned is the maximum membership indices of each soil interpretive property that comprise the "Ground-based Solar Panel Array" interpretive rule. Minor restrictive soil features are identified but not considered as part of the overall rating process. These restrictive features could be important factors where the major restrictive features are overcome through design application.

Soils are placed into interpretive rating classes per their rating indices. These are not limited (rating index = 0), somewhat limited (rating index greater than 0 and less than 1.0), or very limited (rating index! = 1.0).

Numerical ratings indicate the degree of limitation. The ratings are shown in decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil has the least similarity to a good site (1.00) and the point at which the soil feature is very much like known good sites (0).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

References:


Custom Soil Resource Report
Map—Ground-based Solar Arrays, Soil-penetrating Anchor Systems (NRI 727)

Soil Map may not be valid at this scale.
### MAP LEGEND

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<th>Area of Interest (AOI)</th>
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**Soils**

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**Soil Map Units**

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- **Somewhat limited**
- **Not limited**
- **Not rated or not available**

**Water Features**

- Streams and Canals

**Transportation**

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

**Source of Map:** Natural Resources Conservation Service  
Web Soil Survey URL: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

**Soil Survey Area:** DeKalb County, Illinois  
**Survey Area Data:** Version 17, Aug 31, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

**Date(s) aerial images were photographed:** Aug 3, 2019—Aug 24, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Tables—Ground-based Solar Arrays, Soil-penetrating Anchor Systems (NRI 727)

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<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
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<td></td>
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<td></td>
<td>Steel corrosion (0.75)</td>
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</table>

**Totals for Area of Interest**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very limited</td>
<td>96.0</td>
<td>100.0%</td>
</tr>
<tr>
<td>Totals for Area of Interest</td>
<td>96.0</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

#### Rating Options—Ground-based Solar Arrays, Soil-penetrating Anchor Systems (NRI 727)

**Aggregation Method: Dominant Condition**

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole. A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.
For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Unpaved Local Roads and Streets (NRI 727)

Unpaved local roads and streets are those roads and streets that carry traffic year round but have a graded surface of local soil material or aggregate.

Description:

Unpaved local roads and streets are those roads and streets that carry traffic year round but have a graded surface of local soil material or aggregate.

The roads and streets consist of

(1) the underlying local soil material, either cut or fill, which is called "the sub-grade";

(2) the surface, which may be the same as the subgrade or may have aggregate such as crushed limestone added.

They are graded to shed water, and conventional drainage measures are provided. These roads and streets are built mainly from the soil at the site. Soil interpretations for local roads and streets are used as a tool in evaluating soil suitability and identifying soil limitations for the practice. The rating is for soils in their present condition and does not consider present land use. Soil properties and qualities that
affect local roads and streets are those that influence the ease of excavation and grading and the traffic-supporting capacity. The properties and qualities that affect the ease of excavation and grading are hardness of bedrock or a cemented pan, depth to bedrock or a cemented pan, depth to a water table, flooding, the amount of large stones, and slope. The properties that affect traffic-supporting capacity are soil strength as inferred from the AASHTO group index and the Unified classification, subsidence, shrink-swell behavior, potential frost action, and depth to the seasonal high water table. The dust generating tendency of the soil is also considered.
**MAP LEGEND**

<table>
<thead>
<tr>
<th>Area of Interest (AOI)</th>
<th>Background</th>
<th>Aerial Photography</th>
</tr>
</thead>
</table>

Soils

Soil Rating Polygons

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Lines

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Points

- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

**MAP INFORMATION**

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: [Web Soil Survey](https://websoilsurvey.sc.egov.usda.gov/App/home.do)
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: DeKalb County, Illinois
Survey Area Data: Version 17, Aug 31, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 3, 2019—Aug 24, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Tables—Unpaved Local Roads and Streets (NRI 727)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>Very limited</td>
<td>Lisbon (92%)</td>
<td>Frost action (1.00)</td>
<td>2.3</td>
<td>2.4%</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Low strength (0.99)</td>
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<td>Dusty (0.05)</td>
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<td></td>
<td>Drummer, drained (3%)</td>
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<td>Ponding (1.00)</td>
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<td>Shrink-swell (0.25)</td>
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<td></td>
<td>Elpaso, drained (3%)</td>
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<td>Ponding (1.00)</td>
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<td>Low strength (1.00)</td>
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<td></td>
<td>Shrink-swell (0.59)</td>
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<td>Sable, drained (2%)</td>
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<td>Ponding (1.00)</td>
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<td>Shrink-swell (0.64)</td>
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<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>Very limited</td>
<td>Drummer, drained (94%)</td>
<td>Ponding (1.00)</td>
<td>64.9</td>
<td>67.6%</td>
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<td>Depth to saturated zone (1.00)</td>
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Custom Soil Resource Report

34
<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peotone, drained (3%)</td>
<td>Frost action (1.00)</td>
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<td>Low strength (1.00)</td>
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<td>Shrink-swell (0.37)</td>
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<td>Harpster, drained (3%)</td>
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<td>Low strength (1.00)</td>
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<td>Shrink-swell (1.00)</td>
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<td>Shrink-swell (0.29)</td>
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<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2</td>
<td>Very limited</td>
<td>Flanagan (95%)</td>
<td>Low strength (1.00)</td>
<td>18.3</td>
<td>19.0%</td>
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<td></td>
<td>percent slopes</td>
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<td>Shrink-swell (0.89)</td>
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<td>Frost action (0.50)</td>
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<td>Dusty (0.06)</td>
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<td>Elpaso, drained (4%)</td>
<td>Frost action (1.00)</td>
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<td>Depth to saturated zone (1.00)</td>
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<td>Low strength (1.00)</td>
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<td></td>
<td>Shrink-swell (0.24)</td>
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<tr>
<td>348B</td>
<td>Wingate silt loam, cool</td>
<td>Very limited</td>
<td>Wingate (97%)</td>
<td>Frost action (1.00)</td>
<td>10.3</td>
<td>10.8%</td>
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<td>Map unit symbol</td>
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<td>Rating</td>
<td>Component name (percent)</td>
<td>Rating reasons (numeric values)</td>
<td>Acres in AOI</td>
<td>Percent of AOI</td>
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<tr>
<td>mesic, 2 to 5 percent slopes</td>
<td>El Paso, drained (3%)</td>
<td></td>
<td>Low strength (0.98) &lt;br&gt; Shrink-swell (0.15) &lt;br&gt; Depth to saturated zone (0.08) &lt;br&gt; Dusty (0.04)</td>
<td>Ponding (1.00)</td>
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<tr>
<td>356A</td>
<td>El Paso silty clay loam, 0 to 2 percent slopes</td>
<td>Very limited</td>
<td>El Paso, drained (94%)</td>
<td>Ponding (1.00)</td>
<td>0.1</td>
<td>0.1%</td>
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<tr>
<td>Harpster, drained (4%)</td>
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<td>Depth to saturated zone (1.00) &lt;br&gt; Frost action (1.00) &lt;br&gt; Low strength (1.00) &lt;br&gt; Shrink-swell (0.19)</td>
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<tr>
<td>Peotone, drained (2%)</td>
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<td>Ponding (1.00)</td>
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</table>
### Map Unit Information

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<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>Very limited</td>
<td>Danabrook (92%)</td>
<td>Frost action (1.00)</td>
<td>0.1</td>
<td>0.1%</td>
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<td>Low strength (0.93)</td>
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<td>Shrink-swell (0.21)</td>
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<td>Dusty (0.04)</td>
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<td>Drummer, drained (8%)</td>
<td>Ponding (1.00)</td>
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<td>Depth to saturated zone (1.00)</td>
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<td>Frost action (1.00)</td>
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<td></td>
<td></td>
<td>Shrink-swell (0.65)</td>
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</tr>
</tbody>
</table>

**Totals for Area of Interest**

- Rating: 96.0
- Percent of AOI: 100.0%

### Rating Options—Unpaved Local Roads and Streets (NRI 727)

*Aggregation Method:* Dominant Condition  
*Component Percent Cutoff:* None Specified  
*Tie-break Rule:* Higher

### Land Classifications

Land Classifications are specified land use and management groupings that are assigned to soil areas because combinations of soil have similar behavior for specified practices. Most are based on soil properties and other factors that directly influence the specific use of the soil. Example classifications include ecological site classification, farmland classification, irrigated and nonirrigated land capability classification, and hydric rating.

### Farmland Classification (NRI 727)

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies
the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.
<table>
<thead>
<tr>
<th>Soil Rating Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not rated or not available</td>
<td>Not prime farmland</td>
</tr>
<tr>
<td>All areas are prime farmland</td>
<td>Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60</td>
</tr>
<tr>
<td>Prime farmland if drained</td>
<td>Prime farmland if irrigated and reclaimed of excess salts and sodium</td>
</tr>
<tr>
<td>Prime farmland if either protected from flooding or not frequently flooded during the growing season</td>
<td>Farmland of statewide importance</td>
</tr>
<tr>
<td>Prime farmland if irrigated and drained</td>
<td>Farmland of state-wide importance, if irrigated</td>
</tr>
<tr>
<td>Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season</td>
<td>Farmland of unique importance</td>
</tr>
<tr>
<td>Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season</td>
<td>Farmland of local importance, if irrigated</td>
</tr>
</tbody>
</table>

### Soil Rating Points

- **Not Prime Farmland**
- **All Areas are Prime Farmland**
- **Prime Farmland if Drained**
- **Prime Farmland if Irrigated and Reclaimed of Excess Salts and Sodium**
- **Prime Farmland if Either Protected from Flooding or Not Frequently Flooded During the Growing Season**
- **Farmland of Statewide Importance**
- **Prime Farmland if Irrigated and Drained**
- **Prime Farmland if Either Protected from Flooding or Not Frequently Flooded During the Growing Season**
- **Farmland of Local Importance, if Irrigated**
- **Farmland of Unique Importance**
- **Farmland of Statewide Importance**
- **Farmland of Local Importance**
- **Farmland of Statewide Importance, if Irrigated**
- **Farmland of Statewide Importance, if Drained**
- **Farmland of Statewide Importance, if Protected from Flooding or Not Frequently Flooded During the Growing Season**
- **Farmland of Statewide Importance, if Thawed**
- **Farmland of Local Importance**
- **Farmland of Statewide Importance, if Irrigated and Drained**
- **Farmland of Statewide Importance, if Subsoiled, Completely Removing the Root Inhibiting Soil Layer**
- **Farmland of Statewide Importance, if Irrigated and the Product of I (Soil Erodibility) x C (Climate Factor) Does Not Exceed 60**
- **Farmland of Statewide Importance, if Protected from Flooding or Not Frequently Flooded During the Growing Season**
- **Farmland of Statewide Importance, if Watershed**
- **Farmland of Statewide Importance, if Irrigated**
- **Farmland of Statewide Importance, if Drained**
- **Farmland of Statewide Importance, ifProtected from Flooding or Not Frequently Flooded During the Growing Season**
- **Farmland of Statewide Importance, if Irrigated and Reclaimed of Excess Salts and Sodium**
- **Farmland of Statewide Importance, if Subsoiled, Completely Removing the Root Inhibiting Soil Layer**
- **Farmland of Statewide Importance, if Irrigated and the Product of I (Soil Erodibility) x C (Climate Factor) Does Not Exceed 60**
The soil surveys that comprise your AOI were mapped at 1:12,000.

Farmland of statewide importance, if drained and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if irrigated and drained
Farmland of statewide importance, if irrigated and either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if subsoiled, completely removing the root inhibiting soil layer
Farmland of statewide importance, if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
Farmland of statewide importance, if irrigated and reclaimed of excess salts and sodium
Farmland of unique importance
Farmland of statewide importance, if irrigated and drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough, and either drained or either protected from flooding or not frequently flooded during the growing season
Farmland of statewide importance, if warm enough
Farmland of statewide importance, if thawed
Farmland of local importance
Farmland of local importance, if irrigated
Farmland of unique importance
Not rated or not available

Water Features
Streams and Canals

Transportation
Rails
Interstate Highways
US Routes
Major Roads
Local Roads

Background
Aerial Photography

Warning: Soil Map may not be valid at this scale.
Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Web Mercator (EPSG:3857)
Coordinate System: Web Mercator (EPSG:3857)
Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.
This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: DeKalb County, Illinois
Survey Area Data: Version 17, Aug 31, 2022
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.
Date(s) aerial images were photographed: Aug 3, 2019—Aug 24, 2019
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
Table—Farmland Classification (NRI 727)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>All areas are prime farmland</td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>Prime farmland if drained</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>All areas are prime farmland</td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>All areas are prime farmland</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>Prime farmland if drained</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>All areas are prime farmland</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td></td>
<td><strong>96.0</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Rating Options—Farmland Classification (NRI 727)

*Aggregation Method:* No Aggregation Necessary

*Tie-break Rule:* Lower

Water Management

Water Management interpretations are tools for evaluating the potential of the soil in the application of various water management practices. Example interpretations include pond reservoir area, embankments, dikes, levees, and excavated ponds.

Surface Water Management, System (NRI 727)

The ratings for Surface Water Management, System are based on the soil properties that affect the capacity of the soil to convey surface water across the landscape. Factors affecting the system installation and performance are considered. Water conveyances include graded ditches, grassed waterways, terraces, and diversions. The ratings are for soils in their natural condition and do not consider present land use. The properties that affect the surface system performance include depth to bedrock, saturated hydraulic conductivity, depth to cemented pan, slope, flooding, ponding, large stone content, sodicity, surface water erosion, and gypsum content.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected.
“Somewhat limited” indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as that listed for the map unit. The percent composition of each component in a particular map unit is given so that the user will realize the percentage of each map unit that has the specified rating.

A map unit may have other components with different ratings. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.
Custom Soil Resource Report
Map—Surface Water Management, System (NRI 727)

Soil Map may not be valid at this scale.

Map Scale: 1:5,590 if printed on a landscape (11" x 8.5") sheet.

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 16N WGS84

Soil Map may not be valid at this scale.
Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Lines
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Soil Rating Points
- Very limited
- Somewhat limited
- Not limited
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map:  Natural Resources Conservation Service
Web Soil Survey URL:  Web Mercator (EPSG:3857)

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Survey Area Data:  Version 17, Aug 31, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed:  Aug 3, 2019—Aug 24, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Tables—Surface Water Management, System (NRI 727)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Component name (percent)</th>
<th>Rating reasons (numeric values)</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>Not limited</td>
<td>Lisbon (92%)</td>
<td></td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>Somewhat limited</td>
<td>Drummer, drained (94%)</td>
<td>Ponding (0.50)</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peotone, drained (3%)</td>
<td>Ponding (0.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Harpster, drained (3%)</td>
<td>Ponding (0.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>Not limited</td>
<td>Flanagan (95%)</td>
<td></td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>Somewhat limited</td>
<td>Wingate (97%)</td>
<td>Slope (0.22) Water Erosion (0.12)</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Elpaso, drained (3%)</td>
<td>Ponding (0.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>Somewhat limited</td>
<td>Elpaso, drained (94%)</td>
<td>Ponding (0.50)</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Harpster, drained (4%)</td>
<td>Ponding (0.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peotone, drained (2%)</td>
<td>Ponding (0.50)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>Somewhat limited</td>
<td>Danabrook (92%)</td>
<td>Slope (0.06) Water Erosion (0.01)</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Drummer, drained (8%)</td>
<td>Ponding (0.50)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Totals for Area of Interest**  
96.0 100.0%

<table>
<thead>
<tr>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somewhat limited</td>
<td>75.4</td>
<td>78.5%</td>
</tr>
<tr>
<td>Not limited</td>
<td>20.6</td>
<td>21.5%</td>
</tr>
</tbody>
</table>

**Totals for Area of Interest**  
96.0 100.0%

**Rating Options—Surface Water Management, System (NRI 727)**

*Aggregation Method: Dominant Condition*

*Component Percent Cutoff: None Specified*

*Tie-break Rule: Higher*
Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (NRI 727)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at
or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.
The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Web Mercator (EPSG:3857)

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Table—Hydrologic Soil Group (NRI 727)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>C/D</td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>B/D</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>C/D</td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>C</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>B/D</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>C</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td></td>
<td><strong>96.0</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

Rating Options—Hydrologic Soil Group (NRI 727)

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher

Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Flooding Frequency Class (NRI 727)

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

*"None"* means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.
"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.
The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Web Mercator (EPSG:3857)

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Table—Flooding Frequency Class (NRI 727)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>None</td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>None</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>None</td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>None</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>None</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>None</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>Totals for Area of Interest</td>
<td></td>
<td></td>
<td>96.0</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Rating Options—Flooding Frequency Class (NRI 727)

Aggregation Method: Dominant Condition
Component Percent Cutoff: None Specified
Tie-break Rule: More Frequent
Beginning Month: January
Ending Month: December

Ponding Frequency Class (NRI 727)

Ponding is standing water in a closed depression. The water is removed only by deep percolation, transpiration, or evaporation or by a combination of these processes. Ponding frequency classes are based on the number of times that ponding occurs over a given period. Frequency is expressed as none, rare, occasional, and frequent.

“None” means that ponding is not probable. The chance of ponding is nearly 0 percent in any year.

“Rare” means that ponding is unlikely but possible under unusual weather conditions. The chance of ponding is nearly 0 percent to 5 percent in any year.

“Occasional” means that ponding occurs, on the average, once or less in 2 years. The chance of ponding is 5 to 50 percent in any year.
"Frequent" means that ponding occurs, on the average, more than once in 2 years. The chance of ponding is more than 50 percent in any year.
The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: Web Mercator (EPSG-3857)

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### Table—Ponding Frequency Class (NRI 727)

<table>
<thead>
<tr>
<th>Map unit symbol</th>
<th>Map unit name</th>
<th>Rating</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A</td>
<td>Lisbon silt loam, 0 to 2 percent slopes</td>
<td>None</td>
<td>2.3</td>
<td>2.4%</td>
</tr>
<tr>
<td>152A</td>
<td>Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>Frequent</td>
<td>64.9</td>
<td>67.6%</td>
</tr>
<tr>
<td>154A</td>
<td>Flanagan silt loam, 0 to 2 percent slopes</td>
<td>None</td>
<td>18.3</td>
<td>19.0%</td>
</tr>
<tr>
<td>348B</td>
<td>Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>None</td>
<td>10.3</td>
<td>10.8%</td>
</tr>
<tr>
<td>356A</td>
<td>Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>Frequent</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td>512B</td>
<td>Danabrook silt loam, 2 to 5 percent slopes</td>
<td>None</td>
<td>0.1</td>
<td>0.1%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td></td>
<td><strong>96.0</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

### Rating Options—Ponding Frequency Class (NRI 727)

**Aggregation Method:** Dominant Condition  
**Component Percent Cutoff:** None Specified  
**Tie-break Rule:** More Frequent  
**Beginning Month:** January  
**Ending Month:** December
Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Erosion

This folder contains a collection of tabular reports that present soil erosion factors and groupings. The reports (tables) include all selected map units and components for each map unit. Soil erosion factors are soil properties and interpretations used in evaluating the soil for potential erosion. Example soil erosion factors can include K factor for the whole soil or on a rock free basis, T factor, wind erodibility group and wind erodibility index.

RUSLE2 Related Attributes (NRI 727)

This report summarizes those soil attributes used by the Revised Universal Soil Loss Equation Version 2 (RUSLE2) for the map units in the selected area. The report includes the map unit symbol, the component name, and the percent of the component in the map unit. Soil property data for each map unit component include the hydrologic soil group, erosion factor Kf for the surface horizon, erosion factor T, and the representative percentage of sand, silt, and clay in the mineral surface horizon. Missing surface data may indicate the presence of an organic layer.

Report—RUSLE2 Related Attributes (NRI 727)

Soil properties and interpretations for erosion runoff calculations. The surface mineral horizon properties are displayed or the first mineral horizon below an organic surface horizon. Organic horizons are not displayed.

<table>
<thead>
<tr>
<th>Map symbol and soil name</th>
<th>Pct. of map unit</th>
<th>Slope length (ft)</th>
<th>Hydrologic group</th>
<th>Kf</th>
<th>T factor</th>
<th>Representative value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>% Sand   % Silt  % Clay</td>
</tr>
<tr>
<td>59A—Lisbon silt loam, 0 to 2 percent slopes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.5  69.0  23.5</td>
</tr>
<tr>
<td>Lisbon</td>
<td>92</td>
<td>298</td>
<td>C/D</td>
<td>.28</td>
<td>5</td>
<td>7.5  69.0  23.5</td>
</tr>
<tr>
<td>152A—Drummer silty clay loam, 0 to 2 percent slopes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.0  61.0  31.0</td>
</tr>
<tr>
<td>Drummer, drained</td>
<td>94</td>
<td>298</td>
<td>B/D</td>
<td>.24</td>
<td>5</td>
<td>8.0  61.0  31.0</td>
</tr>
</tbody>
</table>
RUSLE2 Related Attributes–DeKalb County, Illinois

<table>
<thead>
<tr>
<th>Map symbol and soil name</th>
<th>Pct. of map unit</th>
<th>Slope length (ft)</th>
<th>Hydrologic group</th>
<th>Kf</th>
<th>T factor</th>
<th>Representative value</th>
</tr>
</thead>
<tbody>
<tr>
<td>154A—Flanagan silt loam, 0 to 2 percent slopes</td>
<td>95</td>
<td>298</td>
<td>C/D</td>
<td>.32</td>
<td>5</td>
<td>5.0 71.0 24.0</td>
</tr>
<tr>
<td>348B—Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>97</td>
<td>200</td>
<td>C</td>
<td>.37</td>
<td>5</td>
<td>8.0 73.0 19.0</td>
</tr>
<tr>
<td>356A—Elpaso silty clay loam, 0 to 2 percent slopes</td>
<td>94</td>
<td>249</td>
<td>B/D</td>
<td>.24</td>
<td>5</td>
<td>6.0 63.0 31.0</td>
</tr>
<tr>
<td>512B—Danabrook silt loam, 2 to 5 percent slopes</td>
<td>92</td>
<td>298</td>
<td>C</td>
<td>.32</td>
<td>5</td>
<td>7.0 71.0 22.0</td>
</tr>
</tbody>
</table>

**Water Features**

This folder contains tabular reports that present soil hydrology information. The reports (tables) include all selected map units and components for each map unit. Water Features include ponding frequency, flooding frequency, and depth to water table.

**Hydrologic Soil Group and Surface Runoff (NRI 727)**

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

### Report—Hydrologic Soil Group and Surface Runoff (NRI 727)

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

<table>
<thead>
<tr>
<th>Map symbol and soil name</th>
<th>Pct. of map unit</th>
<th>Surface Runoff</th>
<th>Hydrologic Soil Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>59A—Lisbon silt loam, 0 to 2 percent slopes</td>
<td>Lisbon</td>
<td>92</td>
<td>Low</td>
</tr>
<tr>
<td>152A—Drummer silty clay loam, 0 to 2 percent slopes</td>
<td>Drummer, drained</td>
<td>94</td>
<td>Negligible</td>
</tr>
<tr>
<td>154A—Flanagan silt loam, 0 to 2 percent slopes</td>
<td>Flanagan</td>
<td>95</td>
<td>Low</td>
</tr>
<tr>
<td>348B—Wingate silt loam, cool mesic, 2 to 5 percent slopes</td>
<td>Wingate</td>
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<td>512B—Danabrook silt loam, 2 to 5 percent slopes</td>
<td>Danabrook</td>
<td>92</td>
<td>Low</td>
</tr>
</tbody>
</table>
References


Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

ACCESS ROAD

CODE 560

(ft)

DEFINITION

An access road is an established route for equipment and vehicles.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- To provide a fixed route for vehicular travel for resource activities involving the management of conservation forestry operations, livestock, agriculture, wildlife habitat, and other conservation enterprises.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies where access is needed from a private or public road or highway to a land use enterprise or conservation measure, or where access is needed in a planned land use area.

Access roads range from single-purpose, seasonal-use roads, designed for low speed and rough driving conditions, to all-purpose, all-weather roads. Single-purpose roads provide access to areas such as forest fire lines, forest management activities, remote recreation areas, or for maintenance of facilities.

This practice does not apply to temporary or infrequently used trails used for logging. Use NRCS Conservation Practice Standard (CPS) Forest Trails and Landings (Code 655) to meet this need. Trails and walkways used for animals, pedestrians, or off-road vehicles are addressed in NRCS CPS Trails and Walkways (Code 575).

CRITERIA

General Criteria Applicable to All Purposes

Design the access road to serve the enterprise or planned use with the expected vehicular or equipment traffic. Factors in the design include the type of vehicle or equipment and the speed, loads, soils, climate, turning radius, and other conditions under which vehicles and equipment are expected to operate.

Location

Locate the access road to serve the purpose intended, to facilitate the control and disposal of surface and subsurface water, to control or reduce erosion, and to make the best use of topographic features. Design the layout of the road to follow natural contours and slopes to minimize disturbance of drainage patterns. Locate the access road where it can be maintained and where water management problems are not created. To reduce potential pollution, position the road as far as possible from water bodies and watercourses. To the extent possible, do not impede overland flow.
Alignment
Adapt the gradient and horizontal alignment to the intensity of use, the mode of travel, the type of equipment and load weights, and the level of development.

Grades normally should not exceed 10 percent except for short lengths. A maximum grade of 15 percent should only be exceeded if necessary for special uses such as field access roads or fire protection roads.

Width
The minimum width of the roadbed for an all-purpose road is 14 feet for one-way traffic and 20 feet for two-way traffic. The roadbed width includes a tread-width of 10 feet for one-way traffic or 16 feet for two-way traffic and 2 feet of shoulder width on each side. Increase the two-way traffic width by a minimum of 4 feet for trailer traffic. Single-purpose roads will have a minimum width of 10 feet with greater widths at curves and turnouts. Use vegetation or other measures to protect the shoulders from erosion.

Use turnouts on single lane roads where vehicles travel in both directions on a limited basis. Design the turnout to accommodate the anticipated vehicle use.

Provide a turnaround at the end of dead end roads. Size the turnaround for the anticipated vehicle type that will be using the road.

Provide parking space as needed to keep vehicles from parking on the shoulder or other undesirable locations.

Side slopes
Design all cuts and fills to have stable slopes that are a minimum of 2 horizontal to 1 vertical. For short lengths, rock areas, or very steep hillsides, steeper slopes may be permitted if soil conditions warrant and special stabilization measures are installed. Where possible, design slopes to a minimum of 4 horizontal to 1 vertical to improve establishment and maintenance of turf.

Where possible, avoid areas with geological conditions and soils that are subject to slides. When the area cannot be avoided, treat the area to prevent slides.

Drainage
The type of drainage structures used will depend on the intended use and runoff conditions. Provide a culvert, bridge, ford, or surface cross drain for water management at every natural drainageway. The capacity and design of the drainage feature must be consistent with sound engineering principles and must be adequate for the class of vehicle, road type, land use in the watershed, and intensity of use.

When a culvert or bridge is installed in a drainageway, it must have a minimum capacity that is sufficient to convey the design storm runoff without causing erosion or road overtopping. Table 1 lists minimum design storm frequencies for various road types.

Table 1: Minimum design storm frequencies

<table>
<thead>
<tr>
<th>Road Intensity and Usage</th>
<th>Storm Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermittent; single-purpose or farm use</td>
<td>2 year - 24 Hour</td>
</tr>
<tr>
<td>Frequent; farm headquarters, livestock access,</td>
<td>10 year - 24 Hour</td>
</tr>
<tr>
<td>isolated recreation areas</td>
<td></td>
</tr>
<tr>
<td>High intensity; residential or public access</td>
<td>25 year - 24 Hour</td>
</tr>
</tbody>
</table>

For public access roads, design storm frequencies must also meet local standards.

Use NRCS CPSs Stream Crossing (Code 578), or Aquatic Organism Passage (Code 396) when aquatic species are present, to design stream crossings.

An erosion-resistant low point or overflow area may be constructed across the access road to supplement the culvert capacity on nonpublic-use roads.
Surface cross drains, such as broad-based or rolling dips, may be used to control and direct water flow off the road surface on low-intensity-use forest, ranch, or similar roads. Protect the outlets of drainage measures to limit erosion. On steep grades where water could run down the road, use a broad-based dip or other similar feature to divert runoff. The surface cross drain must be constructed of materials that are compatible with the use and maintenance of the road surface. The discharge area for a surface cross drain must be well-vegetated or have other erosion resistant materials (see fig. 1). Reduce separation distances as needed to account for local hydrologic conditions.

Design a minimum cross slope to direct precipitation off of the roadway. Cross slopes range from 1.5 to 2 percent for paved surfaces and 2 to 6 percent for unpaved surfaces.

Provide ditches, as needed, to move water away from the road. Maintain unobstructed flow into the ditches to prevent flows from causing roadside erosion. The capacity of a roadside ditch must be adequate to carry the drainage from the road surface. Design ditch channels to have stable grades and side slopes. Provide a stable outlet for the ditch. Protection may include riprap or other similar materials. Use NRCS CPS Structure for Water Control (Code 587), Lined Waterway or Outlet (Code 468), or Grade Stabilization Structure (Code 410), if needed.

**Figure 1. Recommended spacing of surface cross drains based on soil types**

SURFACING

Install a wearing course or surface treatment on the access road if required by traffic needs, soil, climate, erosion control, particulate matter emission control, or other site condition. If none of these factors apply, no special treatment of the surface is required.

When a treatment is used, the type of treatment will depend on local conditions, available materials, and the existing road base. On roads made of soils with weak bearing capacity, such as silts, organics, and clays, or where it is necessary to separate the surfacing material from the foundation material, place a geotextile material specifically designed for road stabilization applications under the surface treatment. Use the criteria in NRCS CPS Heavy Use Area Protection (Code 561) to design the surface treatment. Do not use toxic and acid-forming materials to build the road.
Safety
Provide passing lanes, turnouts, guardrails, signs, and other facilities as needed for safe traffic flow. Design an intersection to a public highway to meet applicable Federal, State, and local criteria.

Erosion control
Use the criteria in NRCS CPS Critical Area Planting (Code 342) or the NRCS State-approved seeding specification to vegetate road banks and disturbed areas as soon as soil and climatic conditions are favorable. If permanent vegetation cannot be established in a timely manner, use appropriate temporary measures to control erosion. If the use of vegetation is precluded and protection against erosion is needed, use the criteria in NRCS CPS Mulching (Code 484) to provide surface protection.

During and after construction, use erosion and sediment control measures to minimize offsite damages.

CONSIDERATIONS
Consider visual resources and environmental values during planning and design of the road system.

Consider locating roads outside of the active floodplain to reduce bank erosion potential and the effects on stream hydrology.

Limiting the number of vehicles and vehicle speed will reduce the potential for generation of particulate matter and decrease safety and air quality concerns.

Consider using additional conservation practices such as NRCS CPS Windbreak/Shelterbelt Establishment (Code 380), to reduce the potential for generation and transport of particulate matter emissions.

During adverse weather, some roads may become unsafe or may be damaged by use. Consider restricting access to the road at that time.

When revegetation is needed, consider revegetating using species or diverse mixes that are native or adapted to the site and have multiple benefits. In addition, where appropriate, consider a diverse mixture of forbs and wildflowers to support pollinator and other wildlife habitat.

Consideration should be given to—

- Effects on downstream flows, wetlands, or aquifers that would affect other water uses or users.
- Effects on wildlife habitats that would be associated with the practice.
- Utilizing buffers where possible to protect surface water.
- Short-term and construction-related effects of this practice.

PLANS AND SPECIFICATIONS
Provide plans and specifications that describe the requirements for applying the practice to achieve its intended purpose. As a minimum, include—

- A plan view of the proposed road that shows water features, known utilities, and other features that affect the design.
- Road width and length with profile and typical cross section(s) including turnouts, parking, and turnarounds.
- Design road grades or maximum grades when applicable.
- Soils investigation. Include location of soil borings and plot of the soil/geologic boring showing the Unified Soil Classification System, as needed.
- Type and thickness of surface treatment including any subbase preparation.
- Grading plan.
• Cut and fill slopes where applicable.
• Planned drainage features.
• Location, size, type, length, and invert elevations of all required water control structures.
• Vegetative requirements that include vegetation materials to be used, establishment rates, and season of planting.
• Erosion and sediment control measures, as needed.
• Safety features.
• Construction and material specifications.

OPERATION AND MAINTENANCE
Prepare a written operation and maintenance plan for the access road. As a minimum, include the following activities:

• Inspect culverts, roadside ditches, water bars, and outlets after each major runoff event and restore flow capacity as needed. Ensure proper cross section is available and outlets are stable.
• Maintain vegetated areas in adequate cover to meet the intended purpose(s).
• Fill low areas in travel treads and regrade, as needed, to maintain road cross section. Repair or replace surfacing materials as needed.
• Selection of chemical treatment(s) for surface treatment or snow/ice removal, as needed. Select the chemicals used for surface treatment or snow and ice removal to minimize adverse effects on stabilizing vegetation.
• Selection of dust control measures, as needed.

REFERENCES


STANDARD AGRICULTURAL IMPACT MITIGATION AGREEMENT

between

Shenandoah Solar, LLC

and the

ILLINOIS DEPARTMENT OF AGRICULTURE

Pertaining to the Construction of a Commercial Solar Energy Facility

in

DeKalb County, Illinois

Pursuant to the Renewable Energy Facilities Agricultural Impact Mitigation Act (505 ILCS 147), the following standards and policies are required by the Illinois Department of Agriculture (IDOA) to help preserve the integrity of any Agricultural Land that is impacted by the Construction and Deconstruction of a Commercial Solar Energy Facility. They were developed with the cooperation of agricultural agencies, organizations, Landowners, Tenants, drainage contractors, and solar energy companies to comprise this Agricultural Impact Mitigation Agreement (AIMA).

Shenandoah Solar, LLC, hereafter referred to as Commercial Solar Energy Facility Owner, or simply as Facility Owner, plans to develop and/or operate a 5MW Commercial Solar Energy Facility in DeKalb County [GPS Coordinates: 41.724207, -88.65474], which will consist of up to 88 acres that will be covered by solar facility related components, such as solar panel arrays, racking systems, access roads, an onsite underground collection system, inverters and transformers and any affiliated electric transmission lines. This AIMA is made and entered between the Facility Owner and the IDOA.

If Construction does not commence within four years after this AIMA has been fully executed, this AIMA shall be revised, with the Facility Owner’s input, to reflect the IDOA’s most current Solar Farm Construction and Deconstruction Standards and Policies. This AIMA, and any updated AIMA, shall be filed with the County Board by the Facility Owner prior to the commencement of Construction.

The below prescribed standards and policies are applicable to Construction and Deconstruction activities occurring partially or wholly on privately owned agricultural land.

**Conditions of the AIMA**

The mitigative actions specified in this AIMA shall be subject to the following conditions:

A. All Construction or Deconstruction activities may be subject to County or other local requirements. However, the specifications outlined in this AIMA shall be the minimum standards applied to all Construction or Deconstruction activities. IDOA may utilize any legal means to enforce this AIMA.

B. Except for Section 17. B. through F., all actions set forth in this AIMA are subject to modification through negotiation by Landowners and the Facility Owner, provided such changes are negotiated in advance of the respective Construction or Deconstruction activities.

C. The Facility Owner may negotiate with Landowners to carry out the actions that Landowners wish to perform themselves. In such instances, the Facility Owner shall offer Landowners the area commercial rate for their machinery and labor costs.

*Standard Solar AIMA V.8.19.19*
D. All provisions of this AIMA shall apply to associated future Construction, maintenance, repairs, and Deconstruction of the Facility referenced by this AIMA.

E. The Facility Owner shall keep the Landowners and Tenants informed of the Facility’s Construction and Deconstruction status, and other factors that may have an impact upon their farming operations.

F. The Facility Owner shall include a statement of its adherence to this AIMA in any environmental assessment and/or environmental impact statement.

G. Execution of this AIMA shall be made a condition of any Conditional/Special Use Permit. Not less than 30 days prior to the commencement of Construction, a copy of this AIMA shall be provided by the Facility Owner to each Landowner that is party to an Underlying Agreement. In addition, this AIMA shall be incorporated into each Underlying Agreement.

H. The Facility Owner shall implement all actions to the extent that they do not conflict with the requirements of any applicable federal, state and local rules and regulations and other permits and approvals that are obtained by the Facility Owner for the Facility.

I. No later than 45 days prior to the Construction and/or Deconstruction of a Facility, the Facility Owner shall provide the Landowner(s) with a telephone number the Landowner can call to alert the Facility Owner should the Landowner(s) have questions or concerns with the work which is being done or has been carried out on his/her property.

J. If there is a change in ownership of the Facility, the Facility Owner assuming ownership of the Facility shall provide written notice within 90 days of ownership transfer, to the Department, the County, and to Landowners of such change. The Financial Assurance requirements and the other terms of this AIMA shall apply to the new Facility Owner.

K. The Facility Owner shall comply with all local, state and federal laws and regulations, specifically including the worker protection standards to protect workers from pesticide exposure.

L. Within 30 days of execution of this AIMA, the Facility Owner shall use Best Efforts to provide the IDOA with a list of all Landowners that are party to an Underlying Agreement and known Tenants of said Landowner who may be affected by the Facility. As the list of Landowners and Tenants is updated, the Facility Owner shall notify the IDOA of any additions or deletions.

M. If any provision of this AIMA is held to be unenforceable, no other provision shall be affected by that holding, and the remainder of the AIMA shall be interpreted as if it did not contain the unenforceable provision.

Definitions

Abandonment When Deconstruction has not been completed within 12 months after the Commercial Solar Energy Facility reaches the end of its useful life. For purposes of this definition, a Commercial Solar Energy Facility shall be presumed to have reached the end of its useful life if the Commercial Solar Energy Facility Owner fails, for a period of 6 consecutive months, to pay the Landowner amounts owed in accordance with an Underlying Agreement.
Aboveground Cable
Electrical power lines installed above ground surface to be utilized for conveyance of power from the solar panels to the solar facility inverter and/or point of interconnection to utility grid or customer electric meter.

Agricultural Impact Mitigation Agreement (AIMA)
The Agreement between the Facility Owner and the Illinois Department of Agriculture (IDOA) described herein.

Agricultural Land
Land used for Cropland, hayland, pastureland, managed woodlands, truck gardens, farmsteads, commercial ag-related facilities, feedlots, livestock confinement systems, land on which farm buildings are located, and land in government conservation programs used for purposes as set forth above.

Best Efforts
Diligent, good faith, and commercially reasonable efforts to achieve a given objective or obligation.

Commercial Operation Date
The calendar date of which the Facility Owner notifies the Landowner, County, and IDOA in writing that commercial operation of the facility has commenced. If the Facility Owner fails to provide such notifications, the Commercial Operation Date shall be the execution date of this AIMA plus 6 months.

Commercial Solar Energy Facility (Facility)
A solar energy conversion facility equal to or greater than 500 kilowatts in total nameplate capacity, including a solar energy conversion facility seeking an extension of a permit to construct granted by a county or municipality before June 29, 2018. “Commercial solar energy facility” does not include a solar energy conversion facility: (1) for which a permit to construct has been issued before June 29, 2018; (2) that is located on land owned by the commercial solar energy facility owner; (3) that was constructed before June 29, 2018; or (4) that is located on the customer side of the customer’s electric meter and is primarily used to offset that customer’s electricity load and is limited in nameplate capacity to less than or equal to 2,000 kilowatts.

Commercial Solar Energy Facility Owner deemed (Facility Owner)
A person or entity that owns a commercial solar energy facility. A Commercial Solar Energy Facility Owner is not nor shall it be to be a public utility as defined in the Public Utilities Act.

County
The County or Counties where the Commercial Solar Energy Facility is located.

Construction
The installation, preparation for installation and/or repair of a Facility.

Cropland
Land used for growing row crops, small grains or hay; includes land which was formerly used as cropland, but is currently enrolled in a government conservation program; also includes pastureland that is classified as Prime Farmland.
Deconstruction
The removal of a Facility from the property of a Landowner and the restoration of that property as provided in the AIMA.

Deconstruction Plan
A plan prepared by a Professional Engineer, at the Facility’s expense, that includes:

(1) the estimated Deconstruction cost, in current dollars at the time of filing, for the Facility, considering among other things:

i. the number of solar panels, racking, and related facilities involved;
ii. the original Construction costs of the Facility;
iii. the size and capacity, in megawatts of the Facility;
iv. the salvage value of the facilities (if all interests in salvage value are subordinate to that of the Financial Assurance holder if abandonment occurs);
v. the Construction method and techniques for the Facility and for other similar facilities; and

(2) a comprehensive detailed description of how the Facility Owner plans to pay for the Deconstruction of the Facility.

Department
The Illinois Department of Agriculture (IDOA).

Financial Assurance
A reclamation or surety bond or other commercially available financial assurance that is acceptable to the County, with the County or Landowner as beneficiary.

Landowner
Any person with an ownership interest in property that is used for agricultural purposes and that is party to an Underlying Agreement.

Prime Farmland
Agricultural Land comprised of soils that are defined by the USDA Natural Resources Conservation Service (NRCS) as "Prime Farmland" (generally considered to be the most productive soils with the least input of nutrients and management).

Professional Engineer
An engineer licensed to practice engineering in the State of Illinois.

Soil and Water Conservation District (SWCD)
A unit of local government that provides technical and financial assistance to eligible Landowners for the conservation of soil and water resources.

Tenant
Any person, apart from the Facility Owner, lawfully residing or leasing/renting land that is subject to an Underlying Agreement.

Topsoil
The uppermost layer of the soil that has the darkest color or the highest content of organic matter; more specifically, it is defined as the "A" horizon.

Underlying Agreement
The written agreement between the Facility Owner and the Landowner(s) including, but not limited to, an easement, option, lease, or license under the terms of which another person has constructed, constructs, or intends to construct a Facility on the property of the Landowner.
Underground Cable  
Electrical power lines installed below the ground surface to be utilized for conveyance of power within a Facility or from a Commercial Solar Energy Facility to the electric grid.

USDA Natural Resources Conservation Service (NRCS)  
An agency of the United States Department of Agriculture that provides America's farmers with financial and technical assistance to aid with natural resources conservation.

Construction and Deconstruction Standards and Policies

1. Support Structures
   A. Only single pole support structures shall be used for the Construction and operation of the Facility on Agricultural Land. Other types of support structures, such as lattice towers or H-frames, may be used on nonagricultural land.
   
   B. Where a Facility’s Aboveground Cable will be adjacent and parallel to highway and/or railroad right-of-way, but on privately owned property, the support structures shall be placed as close as reasonably practicable and allowable by the applicable County Engineer or other applicable authorities to the highway or railroad right-of-way. The only exceptions may be at jogs or weaves on the highway alignment or along highways or railroads where transmission and distribution lines are already present.
   
   C. When it is not possible to locate Aboveground Cable next to highway or railroad right-of-way, Best Efforts shall be expended to place all support poles in such a manner to minimize their placement on Cropland (i.e., longer than normal above ground spans shall be utilized when traversing Cropland).

2. Aboveground Facilities
   Locations for facilities shall be selected in a manner that is as unobtrusive as reasonably possible to ongoing agricultural activities occurring on the land that contains or is adjacent to the Facility.

3. Guy Wires and Anchors
   Best Efforts shall be made to place guy wires and their anchors, if used, out of Cropland, pastureland and hayland, placing them instead along existing utilization lines and on land other than Cropland. Where this is not feasible, Best Efforts shall be made to minimize guy wire impact on Cropland. All guy wires shall be shielded with highly visible guards.

4. Underground Cabling Depth
   A. Underground electrical cables located outside the perimeter of the (fence) of the solar panels shall be buried with:
      1. a minimum of 5 feet of top cover where they cross Cropland.
      2. a minimum of 5 feet of top cover where they cross pastureland or other non-Cropland classified as Prime Farmland.
      3. a minimum of 3 feet of top cover where they cross pastureland and other Agricultural Land not classified as Prime Farmland.
4. a minimum of 3 feet of top cover where they cross wooded/brushy land.

B. Provided that the Facility Owner removes the cables during Deconstruction, underground electric cables may be installed to a minimum depth of 18 inches:
   1. Within the fenced perimeter of the Facility; or
   2. When buried under an access road associated with the Facility provided that the location and depth of cabling is clearly marked at the surface.

C. If Underground Cables within the fenced perimeter of the solar panels are installed to a minimum depth of 5 feet, they may remain in place after Deconstruction.

5. Topsoil Removal and Replacement

A. Any excavation shall be performed in a manner to preserve topsoil. Best Efforts shall be made to store the topsoil near the excavation site in such a manner that it will not become intermixed with subsoil materials.

B. Best Efforts shall be made to store all disturbed subsoil material near the excavation site and separate from the topsoil.

C. When backfilling an excavation site, Best Efforts shall be used to ensure the stockpiled subsoil material will be placed back into the excavation site before replacing the topsoil.

D. Refer to Section 7 for procedures pertaining to rock removal from the subsoil and topsoil.

E. Refer to Section 8 for procedures pertaining to the repair of compaction and rutting of the topsoil.

F. Best Efforts shall be performed to place the topsoil in a manner so that after settling occurs, the topsoil’s original depth and contour will be restored as close as reasonably practicable. The same shall apply where excavations are made for road, stream, drainage ditch, or other crossings. In no instance shall the topsoil materials be used for any other purpose unless agreed to explicitly and in writing by the Landowner.

G. Based on the mutual agreement of the landowner and Facility Owner, excess soil material resulting from solar facility excavation shall either be removed or stored on the Landowner’s property and reseeded per the applicable National Pollution Discharge Elimination System (NPDES) permit/Stormwater Pollution Prevention Plan (SWPPP). After the Facility reaches the end of its Useful Life, the excess subsoil material shall be returned to an excavation site or removed from the Landowner’s property, unless otherwise agreed to by Landowner.

6. Rerouting and Permanent Repair of Agricultural Drainage Tiles

The following standards and policies shall apply to underground drainage tile line(s) directly or indirectly affected by Construction and/or Deconstruction:

A. Prior to Construction, the Facility Owner shall work with the Landowner to identify drainage tile lines traversing the property subject to the Underlying Agreement to the extent reasonably practicable. All drainage tile lines identified in this manner shall be shown on the Construction and Deconstruction Plans.
B. The location of all drainage tile lines located adjacent to or within the footprint of the Facility shall be recorded using Global Positioning Systems (GPS) technology. Within 60 days after Construction is complete, the Facility Owner shall provide the Landowner, the IDOA, and the respective County Soil and Water Conservation District (SWCD) with “as built” drawings (strip maps) showing the location of all drainage tile lines by survey station encountered in the Construction of the Facility, including any tile line repair location(s), and any underground cable installed as part of the Facility.

C. **Maintaining Surrounding Area Subsurface Drainage**

If drainage tile lines are damaged by the Facility, the Facility Owner shall repair the lines or install new drainage tile line(s) of comparable quality and cost to the original(s), and of sufficient size and appropriate slope in locations that limit direct impact from the Facility. If the damaged tile lines cause an unreasonable disruption to the drainage system, as determined by the Landowner, then such repairs shall be made promptly to ensure appropriate drainage. Any new line(s) may be located outside of, but adjacent to the perimeter of the Facility. Disrupted adjacent drainage tile lines shall be attached thereto to provide an adequate outlet for the disrupted adjacent tile lines.

D. **Re-establishing Subsurface Drainage Within Facility Footprint**

Following Deconstruction and using Best Efforts, if underground drainage tile lines were present within the footprint of the facility and were severed or otherwise damaged during original Construction, facility operation, and/or facility Deconstruction, the Facility Owner shall repair existing drainage tiles or install new drainage tile lines of comparable quality and cost to the original, within the footprint of the Facility with sufficient capacity to restore the underground drainage capacity that existed within the footprint of the Facility prior to Construction. Such installation shall be completed within 12 months after the end of the useful life of the Facility and shall be compliant with Figures 1 and 2 to this Agreement or based on prudent industry standards if agreed to by Landowner.

E. If there is any dispute between the Landowner and the Facility Owner on the method of permanent drainage tile line repair, the appropriate County SWCD’s opinion shall be considered by the Facility Owner and the Landowner.

F. During Deconstruction, all additional permanent drainage tile line repairs beyond those included above in Section 6.D. must be made within 30 days of identification or notification of the damage, weather and soil conditions permitting. At other times, such repairs must be made at a time mutually agreed upon by the Facility Owner and the Landowner. If the Facility Owner and Landowner cannot agree upon a reasonable method to complete this restoration, the Facility Owner may implement the recommendations of the appropriate County SWCD and such implementation constitutes compliance with this provision.

G. Following completion of the work required pursuant to this Section, the Facility Owner shall be responsible for correcting all drainage tile line repairs that fail due to Construction and/or Deconstruction for one year following the completion of Construction or Deconstruction, provided those repairs were made by the Facility Owner. The Facility Owner shall not be responsible for drainage tile repairs that the Facility Owner pays the Landowner to perform.
7. Rock Removal

With any excavations, the following rock removal procedures pertain only to rocks found in the uppermost 42 inches of soil, the common freeze zone in Illinois, which emerged or were brought to the site as a result of Construction and/or Deconstruction.

A. Before replacing any topsoil, Best Efforts shall be taken to remove all rocks greater than 3 inches in any dimension from the surface of exposed subsoil which emerged or were brought to the site as a result of Construction and/or Deconstruction.

B. If trenching, blasting, or boring operations are required through rocky terrain, precautions shall be taken to minimize the potential for oversized rocks to become interspersed in adjacent soil material.

C. Rocks and soil containing rocks removed from the subsoil areas, topsoil, or from any excavations, shall be removed from the Landowner’s premises or disposed of on the Landowner’s premises at a location that is mutually acceptable to the Landowner and the Facility Owner.

8. Repair of Compaction and Rutting

A. Unless the Landowner opts to do the restoration work on compaction and rutting, after the topsoil has been replaced post-Deconstruction, all areas within the boundaries of the Facility that were traversed by vehicles and Construction and/or Deconstruction equipment that exhibit compaction and rutting shall be restored by the Facility Owner. All prior Cropland shall be ripped at least 18 inches deep or to the extent practicable, and all pasture and woodland shall be ripped at least 12 inches deep or to the extent practicable. The existence of drainage tile lines or underground utilities may necessitate less ripping depth. The disturbed area shall then be disked.

B. All ripping and disking shall be done at a time when the soil is dry enough for normal tillage operations to occur on Cropland adjacent to the Facility.

C. The Facility Owner shall restore all rutted land to a condition as close as possible to its original condition upon Deconstruction, unless necessary earlier as determined by the Landowner.

D. If there is any dispute between the Landowner and the Facility Owner as to what areas need to be ripped/disked or the depth at which compacted areas should be ripped/disked, the appropriate County SWCD’s opinion shall be considered by the Facility Owner and the Landowner.

9. Construction During Wet Weather

Except as provided below, construction activities are not allowed on agricultural land during times when normal farming operations, such as plowing, disk ing, planting or harvesting, cannot take place due to excessively wet soils. With input from the landowner, wet weather conditions may be determined on a field by field basis.

A. Construction activities on prepared surfaces, surfaces where topsoil and subsoil have been removed, heavily compacted in preparation, or otherwise stabilized (e.g. through cement mixing) may occur at the discretion of the Facility Owner in wet weather conditions.
B. Construction activities on unprepared surfaces will be done only when work will not result in rutting which may mix subsoil and topsoil. Determination as to the potential of subsoil and topsoil mixing will be made in consultation with the underlying Landowner, or, if approved by the Landowner, his/her designated tenant or designee.

10. Prevention of Soil Erosion

A. The Facility Owner shall work with Landowners and create and follow a SWPPP to prevent excessive erosion on land that has been disturbed by Construction or Deconstruction of a Facility.

B. If the Landowner and Facility Owner cannot agree upon a reasonable method to control erosion on the Landowner’s property, the Facility Owner shall consider the recommendations of the appropriate County SWCD to resolve the disagreement.

C. The Facility Owner may, per the requirements of the project SWPPP and in consultation with the Landowner, seed appropriate vegetation around all panels and other facility components to prevent erosion. The Facility Owner must utilize Best Efforts to ensure that all seed mixes will be as free of any noxious weed seeds as possible. The Facility Owner shall consult with the Landowner regarding appropriate varieties to seed.

11. Repair of Damaged Soil Conservation Practices

Consultation with the appropriate County SWCD by the Facility Owner shall be carried out to determine if there are soil conservation practices (such as terraces, grassed waterways, etc.) that will be damaged by the Construction and/or Deconstruction of the Facility. Those conservation practices shall be restored to their preconstruction condition as close as reasonably practicable following Deconstruction in accordance with USDA NRCS technical standards. All repair costs shall be the responsibility of the Facility Owner.

12. Compensation for Damages to Private Property

The Facility Owner shall reasonably compensate Landowners for damages caused by the Facility Owner. Damage to Agricultural Land shall be reimbursed to the Landowner as prescribed in the applicable Underlying Agreement.

13. Clearing of Trees and Brush

A. If trees are to be removed for the Construction or Deconstruction of a Facility, the Facility Owner shall consult with the Landowner to determine if there are trees of commercial or other value to the Landowner.

B. If there are trees of commercial or other value to the Landowner, the Facility Owner shall allow the Landowner the right to retain ownership of the trees to be removed and the disposition of the removed trees shall be negotiated prior to the commencement of land clearing.

14. Access Roads

A. To the extent practicable, access roads shall be designed to not impede surface drainage and shall be built to minimize soil erosion on or near the access roads.
B. Access roads may be left intact during Construction, operation or Deconstruction through mutual agreement of the Landowner and the Facility Owner unless otherwise restricted by federal, state, or local regulations.

C. If the access roads are removed, Best Efforts shall be expended to assure that the land shall be restored to equivalent condition(s) as existed prior to their construction, or as otherwise agreed to by the Facility Owner and the Landowner. All access roads that are removed shall be ripped to a depth of 18 inches. All ripping shall be performed consistent with Section 8.

15. Weed/Vegetation Control
   A. The Facility Owner shall provide for weed control in a manner that prevents the spread of weeds. Chemical control, if used, shall be done by an appropriately licensed pesticide applicator.

   B. The Facility Owner shall be responsible for the reimbursement of all reasonable costs incurred by owners of agricultural land where it has been determined by the appropriate state or county entity that weeds have spread from the Facility to their property. Reimbursement is contingent upon written notice to the Facility Owner. Facility Owner shall reimburse the property owner within 45 days after notice is received.

   C. The Facility Owner shall ensure that all vegetation growing within the perimeter of the Facility is properly and appropriately maintained. Maintenance may include, but not be limited to, mowing, trimming, chemical control, or the use of livestock as agreed to by the Landowner.

   D. The Deconstruction plans must include provisions for the removal of all weed control equipment used in the Facility, including weed-control fabrics or other ground covers.

16. Indemnification of Landowners
    The Facility Owner shall indemnify all Landowners, their heirs, successors, legal representatives, and assigns from and against all claims, injuries, suits, damages, costs, losses, and reasonable expenses resulting from or arising out of the Commercial Solar Energy Facility, including Construction and Deconstruction thereof, and also including damage to such Facility or any of its appurtenances, except where claims, injuries, suits, damages, costs, losses, and expenses are caused by the negligence or intentional acts, or willful omissions of such Landowners, and/or the Landowners heirs, successors, legal representatives, and assigns.

    A. Deconstruction of a Facility shall include the removal/disposition of all solar related equipment/facilities, including the following utilized for operation of the Facility and located on Landowner property:
       1. Solar panels, cells and modules;
       2. Solar panel mounts and racking, including any helical piles, ground screws, ballasts, or other anchoring systems;
       3. Solar panel foundations, if used (to depth of 5 feet);
4. Transformers, inverters, energy storage facilities, or substations, including all components and foundations; however, Underground Cables at a depth of 5 feet or greater may be left in place;

5. Overhead collection system components;

6. Operations/maintenance buildings, spare parts buildings and substation/switching gear buildings unless otherwise agreed to by the Landowner;

7. Access Road(s) unless Landowner requests in writing that the access road is to remain;

8. Operation/maintenance yard/staging area unless otherwise agreed to by the Landowner; and

9. Debris and litter generated by Deconstruction and Deconstruction crews.

B. The Facility Owner shall, at its expense, complete Deconstruction of a Facility within twelve (12) months after the end of the useful life of the Facility.

C. During the County permit process, or if none, then prior to the commencement of construction, the Facility Owner shall file with the County a Deconstruction Plan. The Facility Owner shall file an updated Deconstruction Plan with the County on or before the end of the tenth year of commercial operation.

D. The Facility Owner shall provide the County with Financial Assurance to cover the estimated costs of Deconstruction of the Facility. Provision of this Financial Assurance shall be phased in over the first 11 years of the Project’s operation as follows:

1. On or before the first anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover ten (10) percent of the estimated costs of Deconstruction of the Facility as determined in the Deconstruction Plan.

2. On or before the sixth anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover fifty (50) percent of the estimated costs of Deconstruction of the Facility as determined in the Deconstruction Plan.

3. On or before the eleventh anniversary of the Commercial Operation Date, the Facility Owner shall provide the County with Financial Assurance to cover one hundred (100) percent of the estimated costs of Deconstruction of the Facility as determined in the updated Deconstruction Plan provided during the tenth year of commercial operation.

The Financial Assurance shall not release the surety from liability until the Financial Assurance is replaced. The salvage value of the Facility may only be used to reduce the estimated costs of Deconstruction if the County agrees that all interests in the salvage value are subordinate or have been subordinated to that of the County if Abandonment occurs.
E. The County may, but is not required to, reevaluate the estimated costs of Deconstruction of any Facility after the tenth anniversary, and every five years thereafter, of the Commercial Operation Date. Based on any reevaluation, the County may require changes in the level of Financial Assurance used to calculate the phased Financial Assurance levels described in Section 17.D. required from the Facility Owner. If the County is unable to its satisfaction to perform the investigations necessary to approve the Deconstruction Plan filed by the Facility Owner, then the County and Facility may mutually agree on the selection of a Professional Engineer independent of the Facility Owner to conduct any necessary investigations. The Facility Owner shall be responsible for the cost of any such investigations.

F. Upon Abandonment, the County may take all appropriate actions for Deconstruction including drawing upon the Financial Assurance.

Concurrence of the Parties to this AIMA

The Illinois Department of Agriculture and Shenandoah Solar, LLC concur that this AIMA is the complete AIMA governing the mitigation of agricultural impacts that may result from the Construction and Deconstruction of the solar farm project in DeKalb County within the State of Illinois.

The effective date of this AIMA commences on the date of execution.

STATE OF ILLINOIS
DEPARTMENT OF AGRICULTURE

By Jerry Costello II, Director 6

By General Counsel

801 E. Sangamon Avenue, 62702
State Fairgrounds, POB 19281 Springfield, IL 62794-9281

George T. Hovis, Jr.

By George T. Hovis

128 Demanade Blvd. Ste 200 70503

Address

March 25, 2023

March 6th, 2023
**FIGURE 1.**

**CROSS SECTION**

*Channel* - open or slotted corrugated galvanized, PVC or aluminum cradle to support drain tile.

**NOTE:**

1. *Immediately repair tile if water is flowing through tile at time of trenching.* If no water is flowing and temporary repair is delayed, or not made by the end of the work day, a screen or appropriate "night cap" shall be placed on open ends of tile to prevent entrapment of animals etc.

2. *Channel or pipe (open or slotted) made of corrugated galvanized pipe, PVC or aluminum will be used for support of drain tile spans.*

3. *Industry standards shall be followed to ensure proper seal of repaired drain tiles.*

**TEMPORARY DRAIN TILE REPAIR**
PLAN VIEW

END VIEWS

MINIMUM SUPPORT TABLE

<table>
<thead>
<tr>
<th>TILE SIZE</th>
<th>CHANNEL SIZE</th>
<th>PIPE SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3&quot;</td>
<td>6&quot; @ 0.4</td>
<td>4&quot; STD. W.T.</td>
</tr>
<tr>
<td>4-1/2&quot;</td>
<td>5&quot; @ 0.7</td>
<td>4&quot; STD. W.T.</td>
</tr>
<tr>
<td>5-1/2&quot;</td>
<td>7&quot; @ 0.8</td>
<td>9-10&quot; STD. W.T.</td>
</tr>
<tr>
<td>10&quot;</td>
<td>10&quot; @ 1.5</td>
<td>12&quot; STD. W.T.</td>
</tr>
</tbody>
</table>

NOTE:

1. TILE REPAIR AND REPLACEMENT SHALL MAINTAIN ORIGINAL ALIGNMENT GRADIENT AND WATER FLOW TO THE GREATEST EXTENT POSSIBLE. IF THE TILE NEEDS TO BE RELOCATED, THE INSTALLATION ANGLE MAY VARY DUE TO SITE SPECIFIC CONDITIONS AND LANDOWNER RECOMMENDATIONS.

2. 1"-6" MINIMUM LENGTH OF CHANNEL OR RIGID PIPE (OPEN OR SLOTTED CORRUGATED GALVANIZED, PVC OR ALUMINUM CRADLE) SHALL BE SUPPORTED BY UNDISTURBED SOIL, OR IF CROSSING IS NOT AT RIGHT ANGLES TO PIPELINE, EQUIVALENT LENGTH PERPENDICULAR TO TRENCH, 5% WITH SAND BAGS TO UNDISTURBED SOIL FOR SUPPORT AND DRAINAGE GRADE MAINTENANCE (TYPICAL BOTH SIDES).

3. DRAIN TILES WILL BE PERMANENTLY CONNECTED TO EXISTING DRAIN TILES A MINIMUM OF THREE FEET OUTSIDE OF EXCAVATED TRENCH LINES USING INDUSTRY STANDARDS TO ENSURE PROPER SEAL OF REPAIRED DRAIN TILES INCLUDING SLIP COUPLINGS.

4. DIAMETER OF RIGID PIPE SHALL BE OF ADEQUATE SIZE TO ALLOW FOR THE INSTALLATION OF THE TILE FOR THE FULL LENGTH OF THE RIGID PIPE.

5. OTHER METHODS OF SUPPORTING DRAIN TILES MAY BE USED IF ALTERNATE PROPOSED IS EQUIVALENT IN STRENGTH TO THE CHANNEL/PIPE SECTIONS SHOWN AND IF APPROVED BY COMPANY REPRESENTATIVES AND LANDOWNER IN ADVANCE. SITE SPECIFIC ALTERNATE SUPPORT SYSTEM TO BE DEVELOPED BY COMPANY REPRESENTATIVES AND FURNISHED TO CONTRACTOR FOR SPANS IN EXCESS OF 20', TILE GREATER THAN 10" DIAMETER, AND FOR "HEADER" SYSTEMS.

6. ALL MATERIAL TO BE FURNISHED BY CONTRACTOR.

7. PRIOR TO REPAIRING TILE, CONTRACTOR SHALL PROBE LATERALLY INTO THE EXISTING TILE TO FULL WIDTH OF THE RIGHTS OF WAY TO DETERMINE IF ADDITIONAL DAMAGE HAS OCCURRED. ALL DAMAGED/DISTURBED TILE SHALL BE REPAIRED AS NEAR AS PRACTICABLE TO ITS ORIGINAL OR BETTER CONDITION.

PERMANENT DRAIN TILE REPAIR