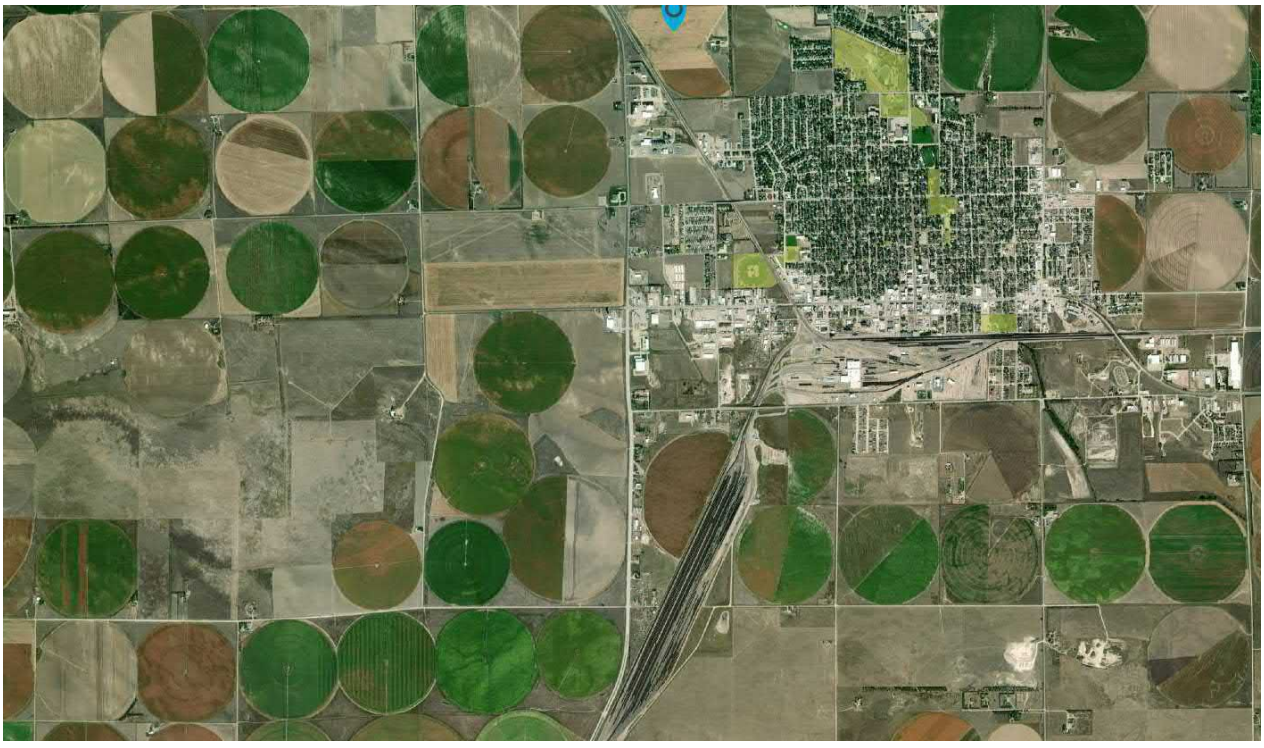
APPENDIX A

RESOURCE DOCUMENTATION

Protected Areas Database of the United States Viewer



Legends

Fee Managers

Protected Areas Database of the United States (PAD-US) v3.0

- Department of Defense (DOD)
- American Indian Areas (Census Bureau)
- Bureau of Land Management (BLM)
- National Park Service (NPS)
- Forest Service (USFS)
- Army Corps of Engineers (USACE)
- Bureau of Reclamation (USBR)
- U.S. Fish and Wildlife Service (FWS)
- Natural Resources Conservation Service (N
- Other Federal (TVA, ARS, BPA, DOE, etc
- Non-Governmental Organization
- State Trust Land
- Other State (NHP, DOT, HS, etc.)
- State Fish and Wildlife
- State Park and Recreation
- County / Regional Agency Land
- City Land
- Private Conservation; Private Corporation
- Joint, Other, Unknown

Dataset Details

Fee Managers

Data Description

An ArcGIS WebService representing fine level manager or administrative agency name standardized for the Nation (USFS, BLM, State Fish and Wildlife, State Parks and Rec, City, NGO, etc). Where available this layer includes fee simple parcels from the PAD-US 3.0 Fee feature Class plus DOD and Tribal from the Proclamation feature class. Use for categorization by manager name, with detailed federal managers and generic state/local/other managers. DOD and Tribal areas shown with 50% transparency. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

An ArcGIS WebService representing fine level manager or administrative agency name standardized for the Nation (USFS, BLM, State Fish and Wildlife, State Parks and Rec, City, NGO, etc). Where available this layer includes fee simple parcels from the PAD-US 3.0 Fee feature Class plus DOD and Tribal from the Proclamation feature class. Use for categorization by manager name, with detailed federal managers and generic state/local/other managers. DOD and Tribal areas shown with 50% transparency. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Copyright Text

Esri ArcGIS MapServer URL

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https://gis.usgs.gov/padus/rest/services/padus3/Fee_Managers/MapServer
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Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Fee_Managers/MapServer

Manager Type

Data Description

An ArcGIS WebService representing coarse level land manager description from "Agency Type" Domain, "Manager Type" Field (for example, Federal, Tribal, State, Local Gov, Private). Use for broad categorization of manager levels, for general depictions of who manages what areas. Tribal areas shown with 50% transparency. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

Service representing coarse level land manager description from "Agency Type" Domain, "Manager Type" Field (for example, Federal, Tribal, State, Local Gov, Private). Use for broad categorization of manager levels, for general depictions of who manages what areas. Tribal areas shown with 50% transparency. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

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https://gis.usgs.gov/padus/rest/services/padus3/Manager_Type/MapServer
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Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Manager_Type/MapServer

Protection Mechanism Category

Data Description

An ArcGIS WebService representing the protection mechanism category including fee simple, internal management designations, easements, leases and agreements, and Marine Areas. Proclamation category shown as gray outline. Use to show categories of land tenure for all protected areas, including marine areas. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

Service representing the protection mechanism category including fee simple, internal management designations, easements, leases and agreements, and Marine Areas. Proclamation category shown as gray outline. Use to show categories of land tenure for all protected areas, including marine areas.

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U.S. Geological Survey (USGS) Gap Analysis Project (GAP), 2022, Protected Areas Database of the United States (PAD-US) 3.0: U.S. Geological Survey (USGS), https://doi.org/10.5066/P9Q9LQ4B .

Esri ArcGIS MapServer URL

`https://gis.usgs.gov/padus/rest/services/padus3/Protection_Mechanism_Category/MapServer`

Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Protection_Mechanism_Category/MapServer

Protection Status by GAP Status Code

Data Description

Service representing a measure of management intent to permanently protect biodiversity. GAP 1&2 areas are primarily managed for biodiversity, GAP 3 are managed for multiple uses including conservation and extraction, GAP 4 no known mandate for biodiversity protection. GAP Status Codes 1-3 are displayed, GAP 4 areas included but not displayed. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

Service representing a measure of management intent to permanently protect biodiversity. GAP 1&2 areas are primarily managed for biodiversity, GAP 3 are managed for multiple uses including conservation and extraction, GAP 4 no known mandate for biodiversity protection. GAP Status Codes 1-3 are displayed, GAP 4 areas included but not displayed. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

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U.S. Geological Survey (USGS) Gap Analysis Project (GAP), 2020, Protected Areas Database of the United States (PAD-US) 2.1: U.S. Geological Survey data release, https://doi.org/10.5066/P9Q9LQ4B .

Esri ArcGIS MapServer URL

`https://gis.usgs.gov/padus/rest/services/padus3/Protection_Status_by_GAP_Status_Code/MapServer`

Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Protection_Status_by_GAP_Status_Code/MapServer

Public Access

Data Description

An ArcGIS WebService representing the general level of public access permitted in the area - Open, Restricted (permit, seasonal), Closed. Public Access Unknown areas not included. Use to show general categories of public access (however, not all areas have been locally

reviewed). For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

Service representing general level of public access permitted in the area - Open, Restricted (permit, seasonal), Closed. Public Access Unknown areas not displayed. Use to show general categories of public access (however, not all areas have been locally reviewed).

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Esri ArcGIS MapServer URL

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https://gis.usgs.gov/padus/rest/services/padus3/Public_Access/MapServer
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Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Public_Access/MapServer

Federal Fee Managers (Authoritative Data)

Data Description

An ArcGIS WebService describing authoritative fee data for federal managers or administrative agencies by name. U.S. Department of Defense and Tribal areas shown with 50% transparency from the Proclamation feature class. Use to depict authoritative fee data for individual federal management agencies (no state, local or private lands). This service does not include designations that often overlap state, private or other inholdings. U.S. Department of Defense internal land ownership is not represented but is implied Federal. See the Federal Management Agencies service for a combined view of fee ownership, designations, and easements. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

An ArcGIS WebService describing authoritative fee data for federal managers or administrative agencies by name. U.S. Department of Defense and Tribal areas shown with 50% transparency from the Proclamation feature class. Use to depict authoritative fee data for individual federal management agencies (no state, local or private lands). This service does not include designations that often overlap state, private or other inholdings. U.S. Department of Defense internal land ownership is not represented but is implied Federal. See the Federal Management Agencies service for a combined view of fee ownership, designations, and easements. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

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Esri ArcGIS MapServer URL

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Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Federal_Fee_Managers_Authoritative/MapServer

Federal Management Agencies

Data Description

An ArcGIS WebService describing federal managers or administrative agencies by name. DOD and Tribal areas shown with 50% transparency. Use to depict individual federal management agencies (no state, local or private lands). This map is based on the PAD-US 3.0 Combined Proclamation, Marine, Fee, Designation, Easement feature class. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

An ArcGIS WebService describing federal managers or administrative agencies by name. DOD and Tribal areas shown with 50% transparency. Use to depict individual federal management agencies (no state, local or private lands). This map is based on the PAD-US 3.0 Combined Proclamation, Marine, Fee, Designation, Easement feature class. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

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Esri ArcGIS MapServer URL

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https://gis.usgs.gov/padus/rest/services/padus3/Federal_Management_Agencies/MapServer
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Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Federal_Management_Agencies/MapServer

Proclamation and Other Planning Boundaries

Data Description

An ArcGIS WebService representing boundaries that provide additional context. Administrative agency name standardized for the nation (DOD, FWS, NPS, USFS, Tribal). Boundaries shown with outline only, as proclamation data do not depict actual ownership or management. Use to show outline of agency proclamation, approved acquisition or other planning boundaries where internal ownership is not depicted. For more information about PAD-US: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

Service representing boundaries that provide additional context. Administrative agency name standardized for the nation (DOD, FWS, NPS, USFS, Tribal). Boundaries shown with outline only, as proclamation data do not depict actual ownership or management. Use to show outline of agency proclamation, approved acquisition or other planning boundaries where internal ownership is not depicted.

Copyright Text

Esri ArcGIS MapServer URL

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https://gis.usgs.gov/padus/rest/services/padus3/Proclamation_and_Other_Planning_Boundaries/MapServer
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Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/Proclamation_and_Other_Planning_Boundaries/MapServer

Fee Topology Fed/State Grtr than 5 Ac

Data Description

This layer identifies large overlaps (greater than 5 acres in size) between federal and state managed records (minimum distance between feature coordinates to evaluate overlap relationship = 0.05 meter) within the PAD-US 3.0 Fee Feature Class plus State managed designations from the Designation feature class. As an aggregated data inventory, PAD-US contains thousands of data sources which are all integrated into one combined database. The policy of USGS is to accept agency data “as is” and translate them into the PAD-US format. Boundaries created by a specific agency or data steward may not fully align with those of another, creating GIS topology errors (mostly minor boundary discrepancies) associated with fee parcel ownership. In addition, more than one agency may submit an area for PAD-US without complete attributes that differentiate the fee owner and land manager. The FGDC Federal Lands Working Group (FLWG, https://communities.geoplatform.gov/ngda-govunits/federal-lands-workgroup/) and the PAD-US Team made great progress with version 3.0 in reducing boundary discrepancies among federal agencies and between federal and state lands. PAD-US has a number of feature classes that overlay one another - for example, some easements overlay fee lands or other easements; many designation or proclamation boundaries overlay fee and/or easement lands, as well as other designations/proclamations. These are not errors - they are an accurate reflection of the world of protected areas data. But they can create challenges for spatial data users. In PAD-US version 3.0, designations and proclamations are in separate feature classes which has helped address this issue, but overlapping boundaries still remain in the fee parcel ownership layer desired for many applications. Users are encouraged to generally review these overlaps, contained in this record or the full topology assessment available here: https://doi.org/10.5066/P9Q9LQ4B .

Service Description

As an aggregated data inventory, PAD-US contains thousands of data sources which are all integrated into one combined database. The policy of USGS is to accept agency data “as is” and translate them into the PAD-US format. Boundaries created by a specific agency or data steward may not fully align with those of another, creating GIS topology errors (mostly minor boundary discrepancies) associated with fee parcel ownership. In addition, more than one agency may submit an area for PAD-US without complete attributes that differentiate the fee owner and land manager. The FGDC Federal Lands Working Group (FLWG, https://communities.geoplatform.gov/ngda-govunits/federal-lands-workgroup/) and the PAD-US Team made great progress with version 3.0 in reducing boundary discrepancies among federal agencies and between federal and state lands. PAD-US has a number of feature classes that overlay one another - for example, some easements overlay fee lands or other easements; many designation or proclamation boundaries overlay fee and/or easement lands, as well as other designations/proclamations. These are not errors - they are an accurate reflection of the world of protected areas data. But they can create challenges for spatial data users. In PAD-US version 3.0, designations and proclamations are in separate feature classes which has helped address this issue, but overlapping boundaries still remain in the fee parcel ownership layer desired for many applications. Users are encouraged to generally review these overlaps, contained in this record or the full topology assessment available here: https://doi.org/10.5066/P9Q9LQ4B . The assessment identifies all overlaps (minimum distance between feature coordinates to evaluate overlap relationship = 0.05 meter), large (greater than 5 acres), and small (less than 5 acres) overlaps between federal agency lands and between federal and state agency lands in the Fee feature class.

Copyright Text

Esri ArcGIS MapServer URL

`https://gis.usgs.gov/padus/rest/services/padus3/PAD_US_Fee_Topology/MapServer/2`

Layer name: 2

Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/PAD_US_Fee_Topology/MapServer/2

Fee Topology Fed/Fed Grtr than 5 Ac

Data Description

This layer identifies large overlaps (greater than 5 acres in size) between federally managed records (minimum distance between feature coordinates to evaluate overlap relationship = 0.05 meter) within the PAD-US 3.0 Fee Feature Class plus State managed designations from the Designation feature class. As an aggregated data inventory, PAD-US contains thousands of data sources which are all integrated into one combined database. The policy of USGS is to accept agency data “as is” and translate them into the PAD-US format. Boundaries created by a specific agency or data steward may not fully align with those of another, creating GIS topology errors (mostly minor boundary discrepancies) associated with fee parcel ownership. In addition, more than one agency may submit an area for PAD-US without complete attributes that differentiate the fee owner and land manager. The FGDC Federal Lands Working Group (FLWG, https://communities.geoplatform.gov/ngda-govunits/federal-lands-workgroup/) and the PAD-US Team made great progress with version 3.0 in reducing boundary discrepancies among federal agencies and between federal and state lands. PAD-US has a number of feature classes that overlay one another - for example, some easements overlay fee lands or other easements; many designation or proclamation boundaries

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Esri ArcGIS MapServer URL

`https://gis.usgs.gov/padus/rest/services/padus3/PAD_US_Fee_Topology/MapServer/1`

Layer name: 1

Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/PAD_US_Fee_Topology/MapServer/1

Fee Topology - All Errors

Data Description

This layer identifies all overlaps between records (minimum distance between feature coordinates to evaluate overlap relationship = 0.05 meter) within the PAD-US 3.0 Fee Feature Class plus State managed designations from the Designation feature class. As an aggregated data inventory, PAD-US contains thousands of data sources which are all integrated into one combined database. The policy of USGS is to accept agency data “as is” and translate them into the PAD-US format. Boundaries created by a specific agency or data steward may not fully align with those of another, creating GIS topology errors (mostly minor boundary discrepancies) associated with fee parcel ownership. In addition, more than one agency may submit an area for PAD-US without complete attributes that differentiate the fee owner and land manager. The FGDC Federal Lands Working Group (FLWG, https://communities.geoplatform.gov/ngda-govunits/federal-lands-workgroup/) and the PAD-US Team made great progress with version 3.0 in reducing boundary discrepancies among federal agencies and between federal and state lands. PAD-US has a number of feature classes that overlay one another - for example, some easements overlay fee lands or other easements; many designation or proclamation boundaries overlay fee and/or easement lands, as well as other designations/proclamations. These are not errors - they are an accurate reflection of the world of protected areas data. But they can create challenges for spatial data users. In PAD-US version 3.0, designations and proclamations are in separate feature classes which has helped address this issue, but overlapping boundaries still remain in the fee parcel ownership layer desired for many applications. Users are encouraged to generally review these overlaps, contained in this record or the full topology assessment available here: https://doi.org/10.5066/P9Q9LQ4B . The assessment identifies all overlaps (minimum distance between feature coordinates to evaluate overlap relationship = 0.05 meter), large (greater than 5 acres), and small (less than 5 acres) overlaps between federal agency lands and between federal and state agency lands in the Fee feature class.

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Esri ArcGIS MapServer URL

`https://gis.usgs.gov/padus/rest/services/padus3/PAD_US_Fee_Topology/MapServer/0`

Layer name: 0

Metadata URL

https://gis.usgs.gov/padus/rest/services/padus3/PAD_US_Fee_Topology/MapServer/0

Map Credits

- [object HTMLDivElement]
- U.S. Geological Survey (USGS) Gap Analysis Project (GAP), 2022, Protected Areas Database of the United States (PAD-US) 3.0: U.S. Geological Survey (USGS), https://doi.org/10.5066/P9Q9LQ4B .
- Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

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Printed from https://maps.usgs.gov/padus/ on Fri Sep 16 2022 15:10:58 GMT-0500 (Central Daylight Time)

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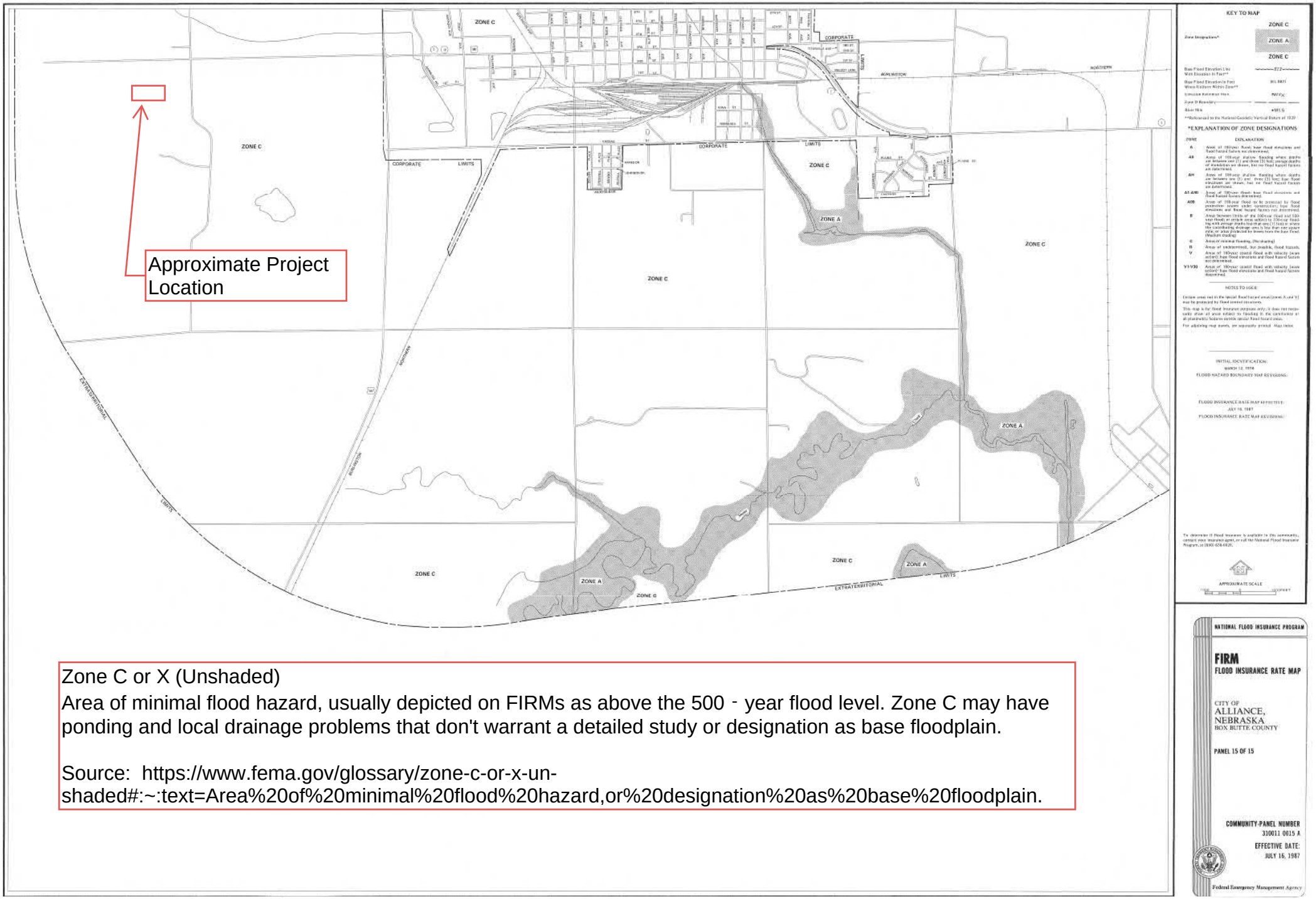
FEMA FIRM Map



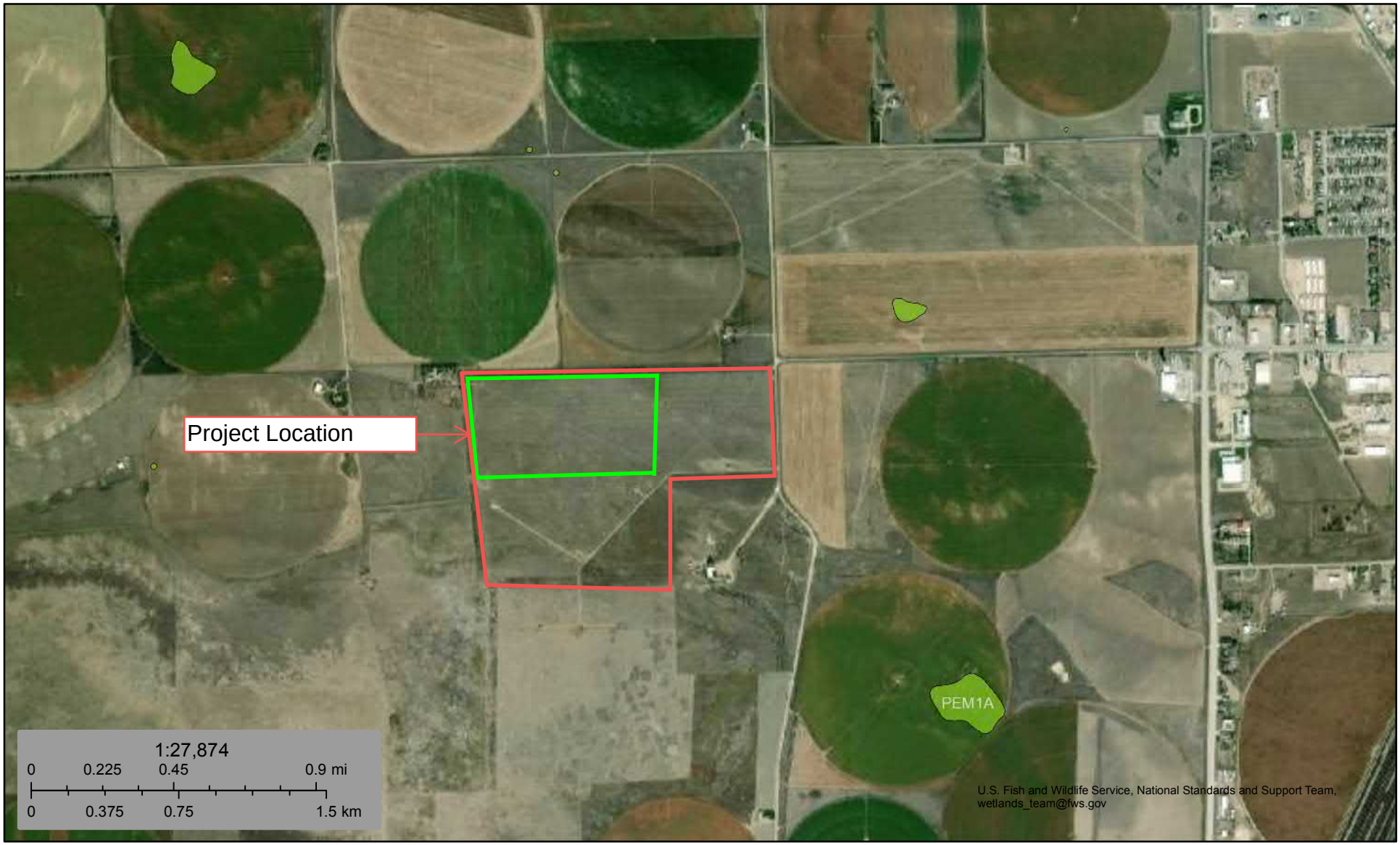
Zone C or X (Unshaded)

Area of minimal flood hazard, usually depicted on FIRMs as above the 500 - year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain.

Source: https://www.fema.gov/glossary/zone-c-or-x-un-shaded#:~:text=Area%20of%20minimal%20flood%20hazard,or%20designation%20as%20base%20floodplain.

U.S. Fish and Wildlife Service
National Wetlands Inventory

Alliance Solar Site



July 7, 2022

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NWI mapper

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Box Butte County, Nebraska

February 21, 2023

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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Contents

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

Map Scale: 1:4,460 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

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 1:20,000.

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:
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: Box Butte County, Nebraska
Survey Area Data: Version 23, Sep 6, 2022

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

Date(s) aerial images were photographed: Jun 8, 2022—Aug 29, 2022

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1548	Dailey loamy sand, 3 to 9 percent slopes	0.9	1.2%
1617	Keith loam, 0 to 1 percent slopes	41.9	54.2%
1760	Richfield loam, 0 to 1 percent slopes	2.3	3.0%
1809	Satanta fine sandy loam, 1 to 3 percent slopes	23.2	30.0%
1812	Satanta fine sandy loam, 3 to 6 percent slopes	2.9	3.8%
1894	Valent loamy fine sand, 9 to 20 percent slopes	5.7	7.4%
5143	Busher-Tassel loamy very fine sands, 6 to 30 percent slopes	0.3	0.4%
Totals for Area of Interest		**77.2**	**100.0%**

Map Unit Descriptions

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.

Box Butte County, Nebraska

1548—Dailey loamy sand, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2zj4x
Elevation: 1,970 to 5,000 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 120 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Dailey and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dailey

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Sandy eolian deposits derived from sandstone

Typical profile

Ap - 0 to 7 inches: loamy sand
A - 7 to 15 inches: loamy sand
C - 15 to 79 inches: loamy sand

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R064XY011NE - Sandy 14-17" PZ
Forage suitability group: Not suited (G064XY000NE)
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Minor Components

Vetal

Percent of map unit: 8 percent
Landform: Plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Busher

Percent of map unit: 7 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

1617—Keith loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tv60
Elevation: 3,730 to 4,600 feet
Mean annual precipitation: 15 to 23 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Keith and similar soils: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Keith

Setting

Landform: Plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 6 inches: loam
A - 6 to 9 inches: loam
Bt1 - 9 to 13 inches: silty clay loam
Bt2 - 13 to 28 inches: silt loam
Bk - 28 to 36 inches: silt loam
C - 36 to 79 inches: very fine sandy loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 2c
Hydrologic Soil Group: C
Ecological site: R064XY015NE - Loamy 14-17" PZ
Hydric soil rating: No

Minor Components

Duroc

Percent of map unit: 4 percent
Landform: Draws
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: R064XY015NE - Loamy 14-17" PZ
Hydric soil rating: No

Lodgepole

Percent of map unit: 1 percent
Landform: Playas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R072XA011KS - Closed Upland Depression (North) Draft (April 2010) (PE 16-20)
Hydric soil rating: Yes

1760—Richfield loam, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: d0bj
Elevation: 3,000 to 5,000 feet
Mean annual precipitation: 16 to 18 inches
Mean annual air temperature: 45 to 48 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Richfield and similar soils: 99 percent
Minor components: 1 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Richfield

Setting

Landform: Plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess

Typical profile

Ap - 0 to 8 inches: loam
B - 8 to 26 inches: silty clay loam
C - 26 to 60 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): 1
Land capability classification (nonirrigated): 2c
Hydrologic Soil Group: C
Ecological site: R064XY015NE - Loamy 14-17" PZ
Forage suitability group: Not suited (G064XY000NE)
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Minor Components

Lodgepole, frequently ponded

Percent of map unit: 1 percent
Landform: Playas
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R064XY027NE - Clayey Overflow
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: Yes

1809—Satanta fine sandy loam, 1 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2wgfb
Elevation: 1,970 to 3,940 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Satanta and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Satanta

Setting

Landform: Sand sheets
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy eolian deposits

Typical profile

Ap - 0 to 13 inches: fine sandy loam
Bt - 13 to 46 inches: loam
C - 46 to 79 inches: very fine sandy loam

Properties and qualities

Slope: 1 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 15 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): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R064XY011NE - Sandy 14-17" PZ
Forage suitability group: Not suited (G064XY000NE)
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Minor Components

Busher

Percent of map unit: 10 percent
Landform: Plains
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Droughty Loam (G064XY120NE)
Hydric soil rating: No

Jayem

Percent of map unit: 8 percent
Landform: Plains
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Droughty Loam (G064XY120NE)
Hydric soil rating: No

Lodgepole, frequently ponded

Percent of map unit: 2 percent
Landform: Playas
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R064XY027NE - Clayey Overflow
Other vegetative classification: Wet (G064XY900NE)
Hydric soil rating: Yes

1812—Satanta fine sandy loam, 3 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2wgfm
Elevation: 1,970 to 3,940 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 120 to 150 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Satanta and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Satanta

Setting

Landform: Sand sheets
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy eolian deposits

Typical profile

Ap - 0 to 13 inches: fine sandy loam
Bt - 13 to 46 inches: loam
C - 46 to 79 inches: very fine sandy loam

Properties and qualities

Slope: 3 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 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): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R064XY011NE - Sandy 14-17" PZ
Forage suitability group: Not suited (G064XY000NE)
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Minor Components

Busher

Percent of map unit: 10 percent
Landform: Plains
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Droughty Loam (G064XY120NE)
Hydric soil rating: No

Jayem

Percent of map unit: 8 percent
Landform: Plains
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Droughty Loam (G064XY120NE)
Hydric soil rating: No

Lodgepole, frequently ponded

Percent of map unit: 2 percent
Landform: Playas
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R064XY027NE - Clayey Overflow
Other vegetative classification: Wet (G064XY900NE)
Hydric soil rating: Yes

1894—Valent loamy fine sand, 9 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2tzzt
Elevation: 3,200 to 5,000 feet
Mean annual precipitation: 15 to 17 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Valent and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Valent

Setting

Landform: Dunes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Nose slope, head slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Parent material: Eolian sands

Typical profile

A - 0 to 7 inches: loamy fine sand
C - 7 to 79 inches: fine sand

Properties and qualities

Slope: 9 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R064XY012NE - Sands
Forage suitability group: Sand (G064XY300NE)
Other vegetative classification: Sand (G064XY300NE)
Hydric soil rating: No

Minor Components

Dailey

Percent of map unit: 5 percent
Landform: Dunes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex, linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Sand (G064XY300NE)
Hydric soil rating: No

Jayem

Percent of map unit: 3 percent
Landform: Interdunes
Landform position (two-dimensional): Footslope, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, linear

Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Droughty Loam (G064XY120NE)
Hydric soil rating: No

Ipage

Percent of map unit: 2 percent
Landform: Interdunes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: R064XY029NE - Sandy Lowland
Other vegetative classification: Sand (G065XY300NE)
Hydric soil rating: No

5143—Busher-Tassel loamy very fine sands, 6 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2tvt6
Elevation: 3,200 to 5,000 feet
Mean annual precipitation: 15 to 17 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 130 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Busher and similar soils: 50 percent
Tassel and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Busher

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Down-slope shape: Concave, convex
Across-slope shape: Linear
Parent material: Residuum weathered from sandstone

Typical profile

A - 0 to 10 inches: loamy very fine sand
Bw - 10 to 29 inches: loamy very fine sand
C - 29 to 44 inches: loamy very fine sand
Cr - 44 to 79 inches: bedrock

Properties and qualities

Slope: 6 to 30 percent
Depth to restrictive feature: 39 to 59 inches to paralithic bedrock
Drainage class: Well drained

Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R064XY011NE - Sandy 14-17" PZ
Forage suitability group: Droughty Loam (G064XY120NE)
Other vegetative classification: Droughty Loam (G064XY120NE)
Hydric soil rating: No

Description of Tassel

Setting

Landform: Ridges, hillslopes
Landform position (two-dimensional): Shoulder, summit
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Residuum weathered from calcareous sandstone

Typical profile

A - 0 to 5 inches: loamy very fine sand
C - 5 to 18 inches: loamy very fine sand
Cr - 18 to 79 inches: bedrock

Properties and qualities

Slope: 6 to 30 percent
Depth to restrictive feature: 10 to 20 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R064XY040NE - Shallow
Forage suitability group: Not suited (G064XY000NE)
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Minor Components

Vetal

Percent of map unit: 5 percent
Landform: Swales, hillslopes
Landform position (two-dimensional): Footslope, backslope
Down-slope shape: Linear, concave, convex
Across-slope shape: Concave, linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Loam (G064XY100NE)
Hydric soil rating: No

Valent

Percent of map unit: 4 percent
Landform: Dunes, hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Nose slope, head slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Ecological site: R064XY012NE - Sands
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Rock outcrop, sandstone

Percent of map unit: 4 percent
Landform: Ridges, escarpments
Landform position (two-dimensional): Shoulder, summit, backslope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Ecological site: R064XY999NE - Non-site
Other vegetative classification: Not suited (G064XY000NE)
Hydric soil rating: No

Jayem

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope, backslope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R064XY011NE - Sandy 14-17" PZ
Other vegetative classification: Sand (G064XY300NE)
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Hydric Rating by Map Unit—Box Butte County, Nebraska

Map Scale: 1:4,460 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Lines
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- Not rated or not available

Soil Rating Points
- Hydric (100%)
- Hydric (66 to 99%)
- Hydric (33 to 65%)
- Hydric (1 to 32%)
- Not Hydric (0%)
- 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 1:20,000.

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:
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: Box Butte County, Nebraska
Survey Area Data: Version 23, Sep 6, 2022

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

Date(s) aerial images were photographed: Jun 8, 2022—Aug 29, 2022

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.

Hydric Rating by Map Unit

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1548	Dailey loamy sand, 3 to 9 percent slopes	0	0.9	1.2%
1617	Keith loam, 0 to 1 percent slopes	1	41.9	54.2%
1760	Richfield loam, 0 to 1 percent slopes	1	2.3	3.0%
1809	Satanta fine sandy loam, 1 to 3 percent slopes	2	23.2	30.0%
1812	Satanta fine sandy loam, 3 to 6 percent slopes	2	2.9	3.8%
1894	Valent loamy fine sand, 9 to 20 percent slopes	0	5.7	7.4%
5143	Busher-Tassel loamy very fine sands, 6 to 30 percent slopes	0	0.3	0.4%
Totals for Area of Interest			**77.2**	**100.0%**

Description

This rating indicates the percentage of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is rated based on its respective components and the percentage of each component within the map unit.

The thematic map is color coded based on the composition of hydric components. The five color classes are separated as 100 percent hydric components, 66 to 99 percent hydric components, 33 to 65 percent hydric components, 1 to 32 percent hydric components, and less than one percent hydric components.

In Web Soil Survey, the Summary by Map Unit table that is displayed below the map pane contains a column named 'Rating'. In this column the percentage of each map unit that is classified as hydric is displayed.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Percent Present

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Geotechnical Engineering Report

MEAN Community Solar – Alliance Site
Alliance, Nebraska
September 1, 2022
Terracon Project No. 2422P064D

Prepared for:
Sandhills Energy LLC
Omaha, Nebraska

Prepared by:
Terracon Consultants, Inc.
Cheyenne, Wyoming

September 1, 2022

Sandhills Energy LLC
1209 Harney Street, Suite 400
Omaha, Nebraska 68102

Attn: Mr. Michael Knapp
P: (402) 389-1668
E: michael@sandhillsenergyco.com

Re: Geotechnical Engineering Report
MEAN Community Solar – Alliance Site
Country Club Road and County Road 62
Alliance, Nebraska
Terracon Project No. 2422P064D

Dear Mr. Knapp:

We have completed the Geotechnical Engineering services for the project referenced above. This study was performed in general accordance with Terracon Proposal No. P05215252A. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and access roads for the proposed MEAN Community Solar – Alliance Site project.

We appreciate the opportunity to work with you on this project. Please contact us with any questions concerning this report or if we may be of further service.

Sincerely,
Terracon Consultants, Inc.

LJ Salyers, P.G.
Project Geologist

Andrew J. Miller, P.E.
Department Manager

APR Review by Eric D. Bernhardt, P.E.

SME Review by Adam S. Maher, E.I.

Distribution: Addressee (pdf)

REPORT TOPICS

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the ***GeoReport*** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

Note: Refer to each individual Attachment for a listing of contents.

Geotechnical Engineering Report
MEAN Community Solar – Alliance Site
Country Club Road and County Road 62
Alliance, Nebraska

Terracon Project No. 2422P064D
September 1, 2022

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed MEAN Community Solar project to be located on the southwest side Country Club Road and County Road 62 near Alliance, Nebraska.

The field exploration included 5 soil borings to a depth of approximately 20½ feet below existing grades. Maps showing the site, boring and field electrical resistivity locations are shown on **Site Location** and **Exploration Plan**, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring logs and as separate graphs in **Exploration Results**.

The purposes of this exploration and report are to provide information and geotechnical engineering recommendations relative to:

- Soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Corrosivity test results
- Excavation considerations
- Foundation design and construction
- Frost considerations
- Unpaved access road construction

SITE CONDITIONS

Item	Description
Parcel Information	The approximate 28-acre project site is located on the southwest side of Country Club Road and County Road 62 near Alliance, Nebraska. Latitude/Longitude: 42.0942° N, 102.9273°W (approx. center of site) See **Site Location**.
Existing Improvements	The project site is an undeveloped parcel.
Current Ground Cover	The current ground cover consists mostly of agricultural fields.
Existing Topography	Based on review of aerial imagery, the site slopes slightly down to the east with an elevation change of about 8 feet from Boring Nos. B-2 and B-4.

PROJECT DESCRIPTION

Our understanding of the project is as follows:

Item	Description
Proposed Structure	The project consists of a solar PV array field, aggregate-surfaced access roads, and new underground utilities. We anticipate the PV array panels will be constructed on a solar tracker rack supported on driven steel piles. We anticipate other ancillary equipment and structures will be supported on reinforced concrete (turned down edge) mat foundations or driven steel piles.
Maximum Loads	Structural loads were not provided. We have estimated the following structural loads for the array field based on our understanding of the project and our experience with similar projects: ■ Downward: 1 to 7 kips ■ Lateral: 1 to 2 kips ■ Uplift: 0.5 to 3 kips ■ Moment: 0.1 to 30 kip-ft For equipment pads, we assume sustained contact pressures of less than 250 psf. For lightly-loaded ancillary structures, we assume wall loads of less than 2 klf.
Grading/Slopes	We anticipate the arrays will generally follow the existing site topography and minimal site grading (less than one foot of cut or fill) will be required.
Access Road	We anticipate low-volume, aggregate-surface and native subgrade soil access roads will have a maximum vehicle load of 30,000 lbs. and travel over access roads will be approximately once per week. We anticipate access road cross sections used for construction of the project will be the responsibility of the engineering, procurement and construction (EPC) contractor, and only post-construction traffic with an allowable rut depth of 3 inches is what we are to design for this project.

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical recommendations. Conditions encountered at each exploration point are indicated on the individual logs. The individual logs and GeoModel can be found in **Exploration Results**.

Stratification boundaries on the GeoModel and boring logs represent the approximate location of changes in soil types; in situ, the transition between materials may be gradual. As noted in **General Comments**, the characterizations are based on widely spaced exploration points across the site, and variations are likely. Previous grading and construction may have created additional variations.

As part of our review, we identified the following model layers within the subsurface profile. Refer to the GeoModel for more information.

Model Layer	Layer Name	General Description
1	**Topsoil**	Medium stiff to stiff, clay with varying amounts of fine to medium grained sand and organics. About 2 to 4 inches of root penetration Dark brown to brown.
2	**Clay**	Medium stiff to stiff, clay with varying amounts of fine to medium grained sand. Trace small roots and calcium carbonate stringers. Dark brown to brown, light brown.
3	**Sand**	Loose to dense, fine to coarse grained sand with varying amounts of silt and fine to coarse grained gravel. Trace calcium carbonate stringers. Weakly to moderately cemented nodules. Tan to dark brown.

Groundwater Conditions

The boreholes were observed while drilling and shortly after completion for the presence and level of groundwater. Groundwater was not observed in the borings while drilling, or for the short duration the borings were allowed to remain open.

Groundwater levels can and should be expected to fluctuate in response to site development and with varying seasonal and weather conditions and other factors not evident at the time the borings were performed. While not likely, it is possible groundwater may be present during construction or at other times in the life of the solar facility.

GEOTECHNICAL OVERVIEW

The proposed solar panel structures could be installed on ground-mounted systems supported on driven piles. Relatively high N-values were observed in the borings below depths of about 9 feet likely associated with larger sized gravel particles and/or observed cemented nodules, and could be encountered at shallower depths across the site. Recommendations for pile foundations are contained in the **Solar Panel Foundations** section.

Support of footing foundations above onsite clays is discussed in this report. These conditions may become unstable after excavation and repeated traffic. Recommendations to improve working conditions in foundation excavations are also contained in the **Shallow Foundations** section.

The subgrade soils present in the borings appear to generally be suitable for support of new unpaved (i.e. aggregate surfaced) access roads. The **Unpaved Access Road** section addresses the subgrade recommendations for the project.

Based on the resistivity test results, the selected lab sample tested on this project would be considered mildly to moderately corrosive to ferrous materials. A certified corrosion engineer should be consulted to determine the need for corrosion protection and to design appropriate protective measures. Further discussion is provided in **Corrosivity**.

The **General Comments** section provides an understanding of the report limitations.

ADFREEZE AND FROST CONSIDERATIONS

Based on the provided information, the solar arrays for this project are anticipated to be supported by driven piles. Driven piles should be designed to resist design loads including compression, uplift, frost heave action and lateral forces.

The near surface soils at this site are considered frost susceptible. Frost heave effects on pile foundations can be significant. If the anchorage of the foundations and the deadweight of the structure are not sufficient to resist these forces, it can cause uplift to structures. Frost heaving is caused by formation of lenses of frost within soils. Three conditions are required for formation of frost lenses:

- Freezing temperatures
- Source of water
- Frost susceptible soils (often considered to be materials with more than 3% finer than the No. 200 Sieve)

Removal of any of the above conditions will reduce or potentially eliminate risks associated with frost heaving. Terracon performed five (5) borings extending to depths of approximately 20 feet

bgs. Groundwater was not observed in any of the borings. Additionally, in review of publicly available soil maps, shallow groundwater is not expected across the site. Therefore, it is our opinion that adfreeze does not apply at this site due to lack of a water source from beneath the frost zone.

Thawing soils typically have significantly less strength than frozen or fully-thawed soils. Relatively lower strength parameters than determined by conventional testing in non-climate effected seasons should be used to determine the design skin friction and lateral soil resistance of near-surface soils to account for the reduced capacity of the thawing soils at the top of the frost zone. The values provided in the **Solar Panel Foundations** design table have already considered the reduction due to thawing soil conditions.

The typical frost protection depth for design of shallow spread footing and mat foundations for unheated structures is 42 inches. If frost action needs to be eliminated in critical grade supported slab or mat foundation areas, we recommend the use of non-frost susceptible (NFS) granular fill (with drain tile) or structural slabs (for instance, structural stoops in front of building doors).

Placement of NFS material in large areas may not be feasible; however, the following recommendations are provided to help reduce potential frost heave for grade supported structures:

- Provide surface drainage away from the structures and slabs, and toward the site storm drainage system.
- Install drains around the perimeter of the structures, stoops, below exterior slabs and access roadways, and connect them to the storm drainage system.
- Grade clayey subgrades, so groundwater potentially perched in overlying more permeable subgrades, such as sand or aggregate base, slope toward a site drainage system.
- Place NFS fill as backfill beneath slabs and access roadways critical to the project.
- Place a 3 horizontal to 1 vertical (3H:1V) transition zone between NFS fill and other soils.
- Place NFS materials in critical sidewalk areas

SOLAR PANEL FOUNDATIONS

Pile Foundation Design Recommendations

In our opinion, the proposed solar panel structures could be installed on ground-mounted systems supported on driven piles. Relatively high N-values were observed in the borings below depths of about 9 feet likely associated with larger sized gravel particles and/or observed cemented nodules, and could be encountered at shallower depths across the site. If piles are required to extend to these depths or greater, predrilling of undersized holes may be required to accommodate pile installation.

Driven piles used for foundation support transmit structural loads to a stratum of adequate bearing capacity. The design capacity of a single-driven pile is a function of several factors including the size and type of the pile, and the engineering properties of the subsurface soils. The geotechnical parameters in the following table can be used for evaluation of driven pile foundations.

Approx. Depth Range (Feet)	LPILE Soil Model	Est. Total Unit Weight (pcf)	Est. Friction Angle / Cohesion (degrees / psf)	Ultimate Skin Friction (psf)	Ultimate End Bearing (psf)	Strain ε_{50}	Static Lateral Subgrade Modulus[1] (pci)
0 to 1	Stiff Clay w/o Free Water	100	NA	NA[2]	NA[2]	P-multiplier = 0.7	
1 to 5		105	0 / 1,200	NA[2]	NA[2,3]	P-multiplier = 1.0	
5 to 8	Sand (Reese)	115	32° / 0	200	NA[2,4]	P-multiplier = 1.0	
8 to 12		115	33° / 0	350	10,000		
12 to 20		120	34° / 0	500	15,000		

1. Perform the LPILE analyses using cyclic loading. Allow LPILE to use Default values based on the strength parameters of the soil layer.
2. NA = Not applicable.
3. Value applies for piles embedded to depths of 5 feet or deeper.
4. Loose/weak sand soils encountered between depths of 5 and 8 feet or deeper throughout site.

The estimated cohesion and friction angle are nominal (unfactored) values without factors of safety. The side friction and end bearing resistances are ultimate parameters. We suggest considering factors of safety of 2 and 3 for side friction and end bearing, respectively. The values given in the above table are based on our borings and past experience with similar soil types. The upper 1 foot of soil should be neglected when calculating side friction due to surface disturbance effects.

Performing a pile test program prior to construction could help reduce uncertainty in pile installation costs, and could help refine the overall pile design. Terracon can provide a proposal for pile load testing, including test pile installation, upon request.

Pre- and post-construction evaluation of lateral deflections of piles should be performed using an appropriate analysis method and will depend upon the pile's and/or shaft's shape, length, configuration, stiffness and "fixed head" or "free head" condition. We can provide additional analyses and estimates of lateral deflections if structural loads and proposed pile types are provided. If lateral pile load testing is performed, Terracon could provide updated LPILE parameters derived from the load test for use for final design of the pile foundations.

Corrosion protection should be considered for the steel piles. Refer to **Corrosivity** and **Field Electrical Resistivity Testing** for a summary of testing performed and more discussion.

Driven Pile Construction Considerations

The steel piles should be driven vertically. Driving should be monitored to determine if obstructions are encountered. If practical refusal is experienced above the planned depths, then the pile may be on an obstruction and a replacement pile should be driven. If this occurs, the situation should be evaluated by Terracon during the pile driving operations.

The pile installation equipment should be operated at the manufacturer's recommended energy when measuring penetration resistance. A Terracon representative should observe pile driving operations during test pile and initial production pile driving operations. During production pile driving, the penetration resistance established from the test pile program and accepted energy correlations, in units of seconds of continuous driving per foot, considered as an acceptance criterion, and should be tracked at each location for uniformity and repeatability.

EARTHWORK

Site Preparation

To prepare for new structural fill or foundation placement, we recommend stripping of existing topsoil, and any soft/loose or disturbed soils from below proposed at-grade structures and their overexcavation areas. A typical stripping depth of about 4 to 6 inches should be anticipated to remove topsoil and root-laden soils, prior to additional minor site grading. Please note that actual stripping depths will vary and will differ across the site and away from the boring locations.

Excavations to remove unsuitable materials for new structures should be evaluated for foundation support by a geotechnical engineer prior to new fill or foundation placement.

After stripping of unstable soils and prior to placing fill or aggregate, we recommend cohesionless subgrades be proofrolled with a smooth drum roller and cohesive subgrades with a 25-ton loaded tandem-axle dump truck observed by a geotechnical engineer. This will assist in identifying any soft/loose or weak areas that will require additional soil correction work. Areas that yield or rut more than 1 inch due to wheel traffic should be corrected. Failed areas should be further evaluated to determine appropriate stabilization methods. In general, scarification, moisture conditioning, and recompaction of the upper 1 foot of on-site soils should provide a suitable subgrade for access road construction. Additional stabilization areas in some areas may be required. We anticipate the use of crushed stone, crushed concrete, and/or gravel to replace lower-strength, soft/loose soils could improve subgrade stability. To limit depths of undercuts, the use of a geosynthetic could be considered. The manufacturer’s specifications for each reinforcement product should be verified prior to material purchase/delivery and placement at the site.

The on-site, near surface soils consisted of low plasticity clays or sands which would be suitable as structural fill material for uses presented in the table below. Reuse of the low-plasticity soils

appear feasible provided they can be moisture adjusted and compacted as recommended below in **Fill Material Types**.

Fill Material Types

Fill required to achieve design grade should be classified dependent upon its placement location and proximity to adjacent site elements. Materials considered for use as engineered fill should meet the following material property recommendations:

Fill Type [1]	USCS Classification	Acceptable Location for Placement
Low-plasticity, cohesive soil	CL (LL ≤ 45 and 5≤ PI ≤ 20) [2]	All locations and elevations.
"Bridge Lift" aggregate [3]	GW, GP	■ Unstable subgrades, where necessary ■ Below foundations
Aggregate pavement[4]	GW, GP	Unpaved roadways
On-site soil [5]	CL, SC, SM, SP	Generally appears suitable for use as low-plasticity structural fill.

1. Structural fill should consist of approved materials that are free of organic matter or debris. Frozen material should not be used, and fill should not be placed on a frozen subgrade. Each proposed fill material should be sampled and evaluated by the geotechnical engineer prior to its delivery and/or use.
2. LL = Liquid Limit, PI = Plasticity Index.
3. Well-graded crushed stone or crushed concrete with a maximum particle size of about 2 inches and less than about 10 percent fines.
4. Well-graded crushed stone similar to NDOT Crushed Rock for Surfacing.
5. Sorting of topsoil and on-site soils containing debris, organics, etc., will be necessary. Delineation of unsuitable on-site soils should be performed in the field by a Terracon representative. Moisture conditioning of the on-site soils will be necessary to facilitate compaction.

Terracon should be retained to evaluate proposed fill materials, including sampling and performing laboratory tests on proposed fill to evaluate compliance with the project specifications. We can also review data for proposed materials which are generated by the contractor or suppliers.

Fill Compaction

Structural fill should meet the following compaction recommendations:

Item	Structural Fill
Maximum Lift Thickness	8 inches or less in loose thickness
Minimum Compaction Requirements [1]	■ 95% of maximum density below foundations, slabs, oversize areas and unpaved roads ■ 90% of maximum density below landscape surfaces
Water Content Range	Cohesive: -1% to +3% of optimum Cohesionless: 2% to +2% of optimum [2]

1. Maximum density and optimum water content as determined by the standard Proctor test (ASTM D 698).
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled or containing excess water (ponding).

Earthwork Construction Considerations

Shallow excavations for the proposed structures and utilities are anticipated to be accomplished with conventional construction equipment.

As a minimum, temporary excavations should be sloped or braced as required by Occupational Safety and Health Administration (OSHA) regulations to provide stability and safe working conditions. Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Excavations should comply with applicable local, state, and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts including site grading and fill placement should be observed and tested by Terracon. Observations should include documentation of adequate removal of unsuitable soils, evaluation of exposed subgrades, and testing the placement of new fill lifts for compaction and moisture content.

SHALLOW FOUNDATIONS

Discussion

It is our opinion that conventional and "turned-down" edge, reinforced concrete mat foundations can be utilized to support equipment, and shallow spread footings can be utilized for lightly-loaded ancillary structures such as operations / maintenance buildings. If the site has been prepared in accordance with the recommendations provided in **Earthwork** and **Foundation Construction Considerations**, the following design parameters are applicable for shallow foundations.

Design Parameters – Compressive Loads for Shallow Spread Footings

Item	Description
Maximum Net Allowable Bearing Pressure [1, 2]	2,000 psf
Minimum Embedment below Finished Grade [3]	42 inches
Estimated Total Settlement from Structural Loads [2]	About 1 inch
Estimated Differential Settlement [2, 4]	About 2/3 of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. These bearing pressures can be increased by 1/3 for transient loads unless those loads have been factored to account for transient conditions. Values assume that exterior grades are no steeper than 20% within 10 feet of structure. Values also assume the recommendations in **Foundation Construction Considerations** are implemented.
2. The foundation settlement will depend upon the variations within the soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted fill, and the quality of the earthwork operations, especially when implementing recommendations presented in the **Foundation Construction Considerations**. The above settlement estimates assume the maximum footing size is 1.5 feet for continuous footings and relatively uniform loading.
3. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
4. Differential settlements are as measured over a span of 30 feet.

Design Parameters – Compressive Loads for Mat Foundations

General dimensions and associated maximum sustained contact pressures across the top of mat foundations with similar total and differential settlements indicated in the table above are provided below:

- 10'x10': about 850 psf
- 15'x15': about 600 psf
- 20'x20': about 450 psf

Foundation Construction Considerations

As noted in **Earthwork**, the footing excavations should be observed and testing during construction to confirm the bearing soils are free of water and loose soil, and suitable for new fill or foundation placement. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed and reconditioned or replaced before foundation concrete is placed.

To provide a more stable working surface in mat and shallow spread footings foundation excavation, consideration could be made for placement of a thin (e.g. 3 to 4 inches) lean concrete mud mat at the base of the foundation excavation. A Terracon representative should observe and test the footing excavations prior to placement of the aggregate or mud mat.

UNPAVED ACCESS ROAD

General Comments

We understand the access road will consist of an aggregate section with no asphalt or concrete surface. Recommendations are presented below assume the aggregate section is placed over stable, proofrolled native subgrade or engineered fill materials.

The access road area subgrades should slope to direct water from beneath the drive area aggregate section toward the edge and/or down gradient. To maintain surface drainage, the subgrade should have a minimum ¼-inch per foot slope and the final grade adjacent to the road should slope down from road edges at a minimum 2 percent. Collected water should be channeled away from the access road. Adequate sloping of the gravel surface will reduce the potential for ponding of water on or within proximity to the drive area. Long-term saturation of the subgrade will shorten the life of the unpaved roadways, and corrections of poorly drained areas should be provided as part of regular maintenance.

The aggregate section presented in this report is considered a minimum section based upon the expected traffic and the composite subgrade conditions and is expected to function with periodic maintenance if adequate drainage is provided and maintained.

Aggregate Section Over Stable Subgrade

Based on the relative strength characteristics of the subgrade soils and expected traffic loading, compacted native soils supporting overlying crushed aggregate and a geosynthetic could be considered for use in unpaved access areas. The access road subgrades should contain the material and be prepared in accordance with the recommendations provided in the **Earthwork**

section, including proof-rolling and removal/replacement of soft/unstable areas identified by the proof-rolling. These subgrades should be prepared immediately prior to the time of aggregate placement to reduce the risk of disturbance due to weather or construction vehicle traffic. If this cannot be done, the subgrades should be reevaluated by a Terracon representative for disturbance or softening immediately prior to aggregate placement.

We recommend a minimum unpaved roadway aggregate thickness of 9 inches. The aggregate should comprise the material and be placed in accordance with **Earthwork**. The stone should be installed over a biaxial/triaxial geogrid (or similar geosynthetic), with a minimum 12" overlap between parallel rows, to reduce the potential for long term aggregate movement into the subgrade and increase structural support, especially during spring thaws and wet periods of the year.

Haul Road Maintenance

Regardless of the design, unsurfaced roadways will display varying levels of wear and deterioration. We recommend implementation of a site inspection program at a frequency of at least once per year to observe the adequacy of the roadways. Preventative measures should be applied as needed for erosion control and regrading. An initial site inspection should be completed approximately three months following construction. For planning purposes, we recommend assuming that over time the placement of additional aggregate material will likely be required to level depressions and long-term rutting. These areas should be filled with additional aggregate rather than scalping of material from adjacent areas.

Shoulder build-up on both sides of proposed roadways should match the road surface elevation and slope outwards at a minimum grade of 10 percent for 5 feet. Surface drainage should be provided away from the edge of roadways to reduce lateral moisture transmission into the subgrade.

When potholes, ruts, depressions, or yielding subgrades develop, they must be repaired prior to applying additional traffic loads. Typical repairs could consist of placing additional crushed stone in ruts or depressed areas and, in some cases, complete removal of crushed stone surfacing, repair of unstable subgrade, and replacement of the geogrid and crushed stone surfacing. Potholes and depressions should not be filled by blading adjacent ridges or high areas into the depressed areas. New material should be added to the depressed areas as they develop. Failure to make timely repairs will result in more rapid deterioration of the roadways, making more extensive repairs necessary.

CORROSIVITY

The table below lists the results of laboratory soluble sulfate, soluble chloride, electrical resistivity, pH testing, sulfides, total salts, and red-ox potential tests. The values may be used to estimate

potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Corrosivity Test Results Summary									
Boring	Sample Depth (feet)	Soil Description	Soluble Sulfate (mg/kg)	Soluble Chloride (mg/kg)	Electrical Resistivity (Ω-cm)	pH	Sulfides (mg/kg)	Total Salts (mg/kg)	Red-OX
B-4	1 to 6	Silty Sand (SM)	32	75	4,853	8.7	Nil	549	+425

As discussed in Section 10.7.5 of the AASHTO LRFD Bridge Manual, 8th Edition, 2017, the following soil or site conditions should be considered as indicative of potential deterioration or corrosion situation for steel piles:

- Soil electrical resistivity less than 2,000 ohm-cm
- pH less than 5.5
- pH between 5.5 and 8.5 with high organic content
- Sulfate concentration greater than 1,000 ppm (mg/kg)

Publications indicate soils with resistivity values less than 2,000 ohm-cm can be highly corrosive to ferrous materials, and soil resistivity values between 2,000 and 5,000 ohm-cm can be mildly to moderately corrosive to ferrous materials. Resistivity values above 5,000 ohm-cm are considered to be mildly to non-corrosive. Based on the resistivity test results, the sample tested on this project would be considered mildly to moderately corrosive to ferrous materials.

The Portland Cement Association states that sulfate attack from soils containing less than 1,000 ppm water soluble sulfate is negligible.

The pH, sulfates, sulfides, total dissolved salts, oxidation-reduction potential, and chlorides can affect the aggressiveness of corrosion to buried metal structures. These test results are provided to assist in determining the type and degree of corrosion protection that may be required. We recommend that a certified corrosion engineer be employed to determine the need for corrosion protection and to design appropriate protective measures.

FIELD ELECTRICAL RESISTIVITY TESTING

Field electrical resistivity testing was performed at one orthogonal cross near FER-1 location using the Wenner Four Electrode Method. Results of the electrical resistivity testing are provided in **Exploration Results**.

The resistivity values are directly dependent upon surface grade and the material's moisture content, void ratio, particle size, and temperature.

GENERAL COMMENTS

Our analysis and opinions are based on our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon should be retained to provide observation and testing services during grading, excavation, foundation construction, and other earth-related construction phases of the project. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third party beneficiaries intended. Any third party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance on the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including, excavation support and dewatering requirements/design, are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Layout: Terracon personnel provided the layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ±10 feet) and approximate ground surface elevations were obtained from interpolation of aerial imagery (Google Earth Pro).

Subsurface Exploration Procedures: The borings were advanced with a truck-mounted drilling rig utilizing continuous-flight hollow-stem augers. Four samples were obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. Soil sampling were performed using modified California barrel and/or standard split-barrel sampling procedures. For the standard split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. For the modified California barrel sampling procedure, a 2½-inch outer diameter split-barrel sampling spoon is used for sampling. Modified California barrel sampling procedures are similar to standard split-barrel sampling procedures; however, blow counts are typically recorded for 6-inch intervals for a total of 12 inches of penetration. Additionally, a bulk sample was obtained at B-4 from 1 to 6 feet below ground surface for laboratory corrosion testing. The samples were placed in appropriate containers, taken to our soil laboratory for testing, and classified by a geotechnical engineer.

In addition, we checked for groundwater levels during drilling observations. The borings were backfilled with auger cuttings after completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

Laboratory testing for this project generally consisted of the following:

- moisture content tests to determine water content
- density tests to determine in-situ unit weights
- Atterberg limit tests to evaluate plasticity and aid in classification
- sieve testing to determine fines content
- chemical testing to evaluate corrosion potential

Laboratory test results are indicated on the boring logs and are presented in depth in the **Exploration Results** section. The test results are used for the geotechnical engineering analyses and the development of foundations, pavements, and earthwork recommendations. Laboratory tests are performed in general accordance with applicable local standards or other accepted standards. Procedural standards are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Descriptive classifications of the soils indicated on the boring logs are in accordance with the enclosed General Notes and the Unified Soil Classification System. Also shown are estimated Unified Soil Classification Symbols. A brief description of this classification system as well as the General Notes can be found in the **Supporting Information** section. Classification was by visual-manual procedures. Selected samples were further classified using the results of Atterberg limit and percent fines testing. The Atterberg limit test results are also provided in the **Exploration Results** section

Soil Electrical Resistivity Testing: Soil electrical resistivity data was obtained in general accordance with ASTM G57 Standard Test Method for Field Measurement of Soil Resistivity Using the Wenner Four-Electrode Method. For testing, we performed two mutually perpendicular lines with electrode “a” spacing of :

- 1, 2, 4, 8, 15, 25, 50, 75, 100, 150 and 200 feet at FER-1 location.

SITE LOCATION AND EXPLORATION PLANS

Contents:

SITE LOCATION

MEAN Community Solar – Alliance Site ■ Alliance, Nebraska
September 1, 2022 ■ Terracon Project No. 2422P064D

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

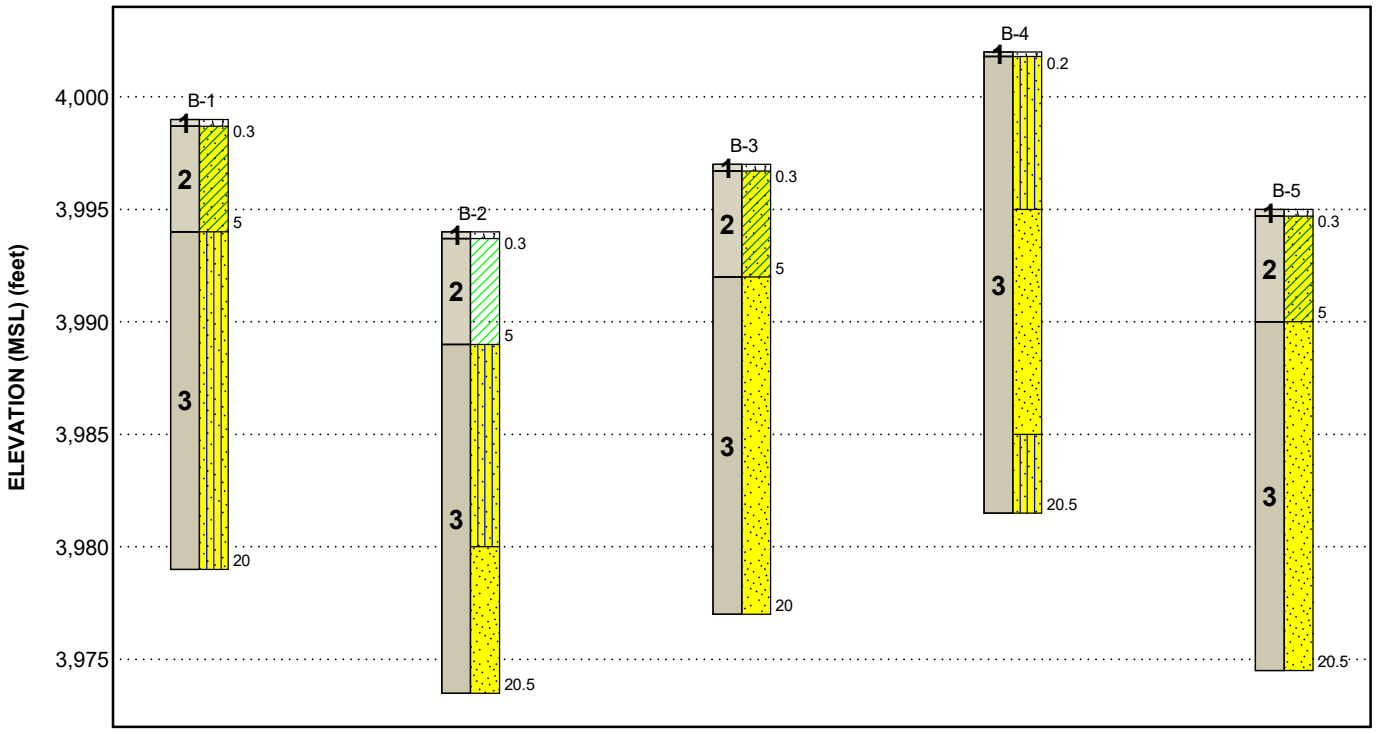
MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION RESULTS

Contents:

GEOMODEL

MEAN Solar Sites Portfolio - Alliance, NE ■ Alliance, NE
Terracon Project No. 2422P064D



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Topsoil	Medium stiff to stiff, clay with fine to medium grained sand and organics. About 2 to 4 inches of root penetration. Dark brown to brown.
2	Clay	Medium stiff to stiff, clay with varying amounts of fine to medium grained sand. Trace small roots and calcium carbonate stringers. Dark brown to brown, light brown.
3	Sand	Loose to dense, fine to coarse grained sand with varying amounts of silt and fine to coarse grained gravel. Trace calcium carbonate stringers. Weakly to moderately cemented nodules. Tan to dark brown.

LEGEND

- Topsoil
- Lean Clay
- Sandy Lean Clay
- Poorly-graded Sand
- Silty Sand

NOTES:
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

BORING LOG NO. B-1

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

CLIENT: Sandhills Energy LLC
Omaha, NE

SITE: Country Club Road and County Road 62
Alliance, NE

LOCATION See Exploration Plan

Latitude: 42.0952° Longitude: -102.9306°

Approximate Surface Elev.: 3,999 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
1	0.3	3998.5+/-	**SANDY LEAN CLAY (CL)**, with organics, fine to medium grained sand, dark brown to brown, medium stiff, about 3 inches of root penetration
2	5.0	3994+/-	**SANDY LEAN CLAY (CL)**, fine to medium grained sand, dark brown to brown, medium stiff, trace small roots
3	20.0	3979+/-	**SILTY SAND (SM)**, trace fine grained gravel, fine to coarse grained, tan, loose to medium dense Trace calcium carbonate stringers at about 9 feet CLAY WITH SAND lens at about 14 to 15 feet
			Boring Terminated at 20 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		1-2-5 N=7	8.6			
		7/12"	7.8	90		
5		11/12"	5.5	106		
		2-3-7 N=10	2.4			
10						
		3-10-14 N=24	38.1			
15						
		19/12"	2.4			
20						

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4¼ inch inner-diameter, hollow-stem auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from Google Earth Pro.

Notes:

WATER LEVEL OBSERVATIONS

None encountered after completion of drilling

Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

Boring Started: 07-12-2022 | Boring Completed: 07-12-2022

Drill Rig: CME 75 | Driller: Henderson Drilling, Inc.

Project No.: 2422P064D

BORING LOG NO. B-2

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

CLIENT: Sandhills Energy LLC
Omaha, NE

SITE: Country Club Road and County Road 62
Alliance, NE

LOCATION See Exploration Plan

Latitude: 42.0952° Longitude: -102.9251°

Approximate Surface Elev.: 3,994 (Ft.) +/-

MODEL LAYER	DEPTH	ELEVATION (Ft.)	
1	0.3	3993.5+/-	**SANDY LEAN CLAY (CL)**, with organics, fine to medium grained sand, dark brown to brown, stiff, about 4 inches of root penetration
2			**LEAN CLAY (CL)**, trace fine grained sand, fine to medium grained sand, dark brown to brown, stiff, trace small roots
			Color changes to light brown to tan at about 3 feet
	5.0	3989+/-	
3			**SILTY SAND (SM)**, trace fine grained gravel, fine to coarse grained, tan to light brown, loose to medium dense, weakly cemented nodules
			CLAY WITH SAND lens at about 12 to 13 feet
	14.0	3980+/-	
			POORLY GRADED SAND (SP), fine to medium grained, tan, loose to medium dense
	20.5	3973.5+/-	
			Boring Terminated at 20.5 Feet

DEPTH (Ft.)	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
		2-3-6 N=9	11.3			
		3-4-5 N=9	7.9		29-19-10	86
5						
		14/12"	10.3	96		
10		3-9-11 N=20	4.7			
		13/12"	1.2			
15						
20		3-8-12 N=20	0.9			

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4¼ inch inner-diameter, hollow-stem auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from Google Earth Pro.

Notes:

WATER LEVEL OBSERVATIONS

None encountered after completion of drilling

Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

Boring Started: 07-12-2022 | Boring Completed: 07-12-2022

Drill Rig: CME 75 | Driller: Henderson Drilling, Inc.

Project No.: 2422P064D

BORING LOG NO. B-3

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

CLIENT: Sandhills Energy LLC
Omaha, NE

SITE: Country Club Road and County Road 62
Alliance, NE

LOCATION See Exploration Plan

Latitude: 42.0941° Longitude: -102.9274°

Approximate Surface Elev.: 3,997 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DESCRIPTION
1		0.3	3996.5+/-	**SANDY LEAN CLAY (CL)**, with organics, fine to medium grained sand, dark brown to brown, stiff, about 4 inches of root penetration
2				**SANDY LEAN CLAY (CL)**, fine to medium grained sand, dark brown to brown, stiff, trace small roots Color change to light brown to brown and trace calcium carbonate stringers at about 3 feet
		5.0	3992+/-	
3				**POORLY GRADED SAND (SP)**, fine to medium grained, tan, medium dense to dense, weakly to moderately cemented nodules Varies to POORLY GRADED GRAVEL WITH SAND (GP) at about 6 to 8 feet
		20.0	3977+/-	
				Boring Terminated at 20 Feet

DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
			1-2-8 N=10	9.8			
			14/12"	9.4	94		
5			5-7-5 N=12	1.7		NP	3
10			4-12-13-16 N=25	14.7			
15			9-19-24 N=43	12.4			
20			20/12"	1.9	104		

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4¼ inch inner-diameter, hollow-stem auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from Google Earth Pro.

Notes:

WATER LEVEL OBSERVATIONS

None encountered after completion of drilling

Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

Boring Started: 07-12-2022 | Boring Completed: 07-12-2022

Drill Rig: CME 75 | Driller: Henderson Drilling, Inc.

Project No.: 2422P064D

BORING LOG NO. B-4

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

CLIENT: Sandhills Energy LLC
Omaha, NE

SITE: Country Club Road and County Road 62
Alliance, NE

LOCATION See Exploration Plan

Latitude: 42.0932° Longitude: -102.9305°

Approximate Surface Elev.: 4,002 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.2	4002+/-								
			SANDY LEAN CLAY (CL), with organics, fine to medium grained sand, dark brown to brown, medium stiff, about 2 inches of root penetration				1-3-2 N=5	8.7			
			SILTY SAND (SM), fine to medium grained, dark brown to brown, loose, trace small roots to about 5 feet				4-5-4 N=9	3.8			
		7.0	3995+/-	5			10/12"	2.8	108		
3			**POORLY GRADED SAND (SP)**, fine to medium grained, tan, loose to medium dense				2-5-6 N=11	1.7		NP	2
		17.0	3985+/-	10			13/12"	2.0	102		
			SILTY SAND (SM), fine to medium grained, tan, medium dense	15							
			CLAY WITH SAND lens at about 19.5 to 20 feet				5-9-12 N=21	17.7			
		20.5	3981.5+/-	20							
			Boring Terminated at 20.5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4¼ inch inner-diameter, hollow-stem auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from Google Earth Pro.

Notes:

WATER LEVEL OBSERVATIONS

None encountered after completion of drilling

Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

Boring Started: 07-12-2022 | Boring Completed: 07-12-2022

Drill Rig: CME 75 | Driller: Henderson Drilling, Inc.

Project No.: 2422P064D

BORING LOG NO. B-5

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

CLIENT: Sandhills Energy LLC
Omaha, NE

SITE: Country Club Road and County Road 62
Alliance, NE

LOCATION See Exploration Plan

Latitude: 42.0931° Longitude: -102.925°

Approximate Surface Elev.: 3,995 (Ft.) +/-

MODEL LAYER	GRAPHIC LOG	DEPTH	ELEVATION (Ft.)	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	DRY UNIT WEIGHT (pcf)	ATTERBERG LIMITS LL-PL-PI	PERCENT FINES
1		0.3	3994.5+/-								
2			**SANDY LEAN CLAY (CL)**, with organics, fine to medium grained sand, dark brown to brown, stiff, about 4 inches of root penetration				2-3-5 N=8	11.8			
			SANDY LEAN CLAY (CL), fine to medium grained sand, dark brown to brown, stiff, trace small roots								
			Trace calcium carbonate stringers at about 3 feet				10/12"	10.1	94		
		5.0	3990+/-	5							
3			**POORLY GRADED SAND (SP)**, fine to medium grained, tan, medium dense				6-10-12 N=22	1.9			
				10			30/12"	0.5			
			CLAY WITH SAND lens at about 14.5 to 15 feet	15			3-9-11 N=20	0.7			
				20			3-8-11 N=19	1.2			
		20.5	3974.5+/-								
			Boring Terminated at 20.5 Feet								

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:
4¼ inch inner-diameter, hollow-stem auger

Abandonment Method:
Boring backfilled with auger cuttings upon completion.

See Supporting Information for explanation of symbols and abbreviations.

Elevations were interpolated from Google Earth Pro.

Notes:

WATER LEVEL OBSERVATIONS

None encountered after completion of drilling

Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

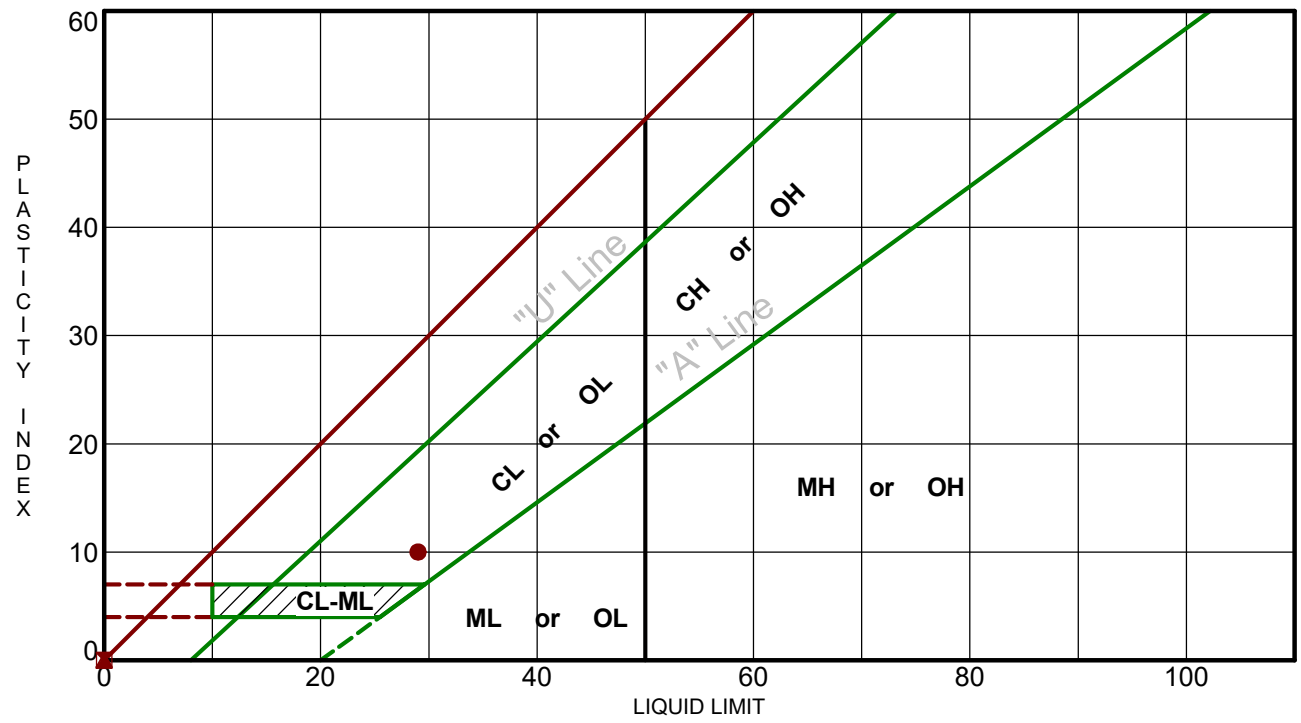
Boring Started: 07-12-2022 | Boring Completed: 07-12-2022

Drill Rig: CME 75 | Driller: Henderson Drilling, Inc.

Project No.: 2422P064D

ATTERBERG LIMITS RESULTS

ASTM D4318



Boring ID		Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	B-2	3 - 4.5	29	19	10	85.8	CL	LEAN CLAY
⊠	B-3	6 - 7.5	NP	NP	NP	2.8	GP	POORLY GRADED GRAVEL with SAND
▲	B-4	9 - 10.5	NP	NP	NP	2.3	SP	POORLY GRADED SAND

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

SITE: Country Club Road and County Road 62 Alliance, NE

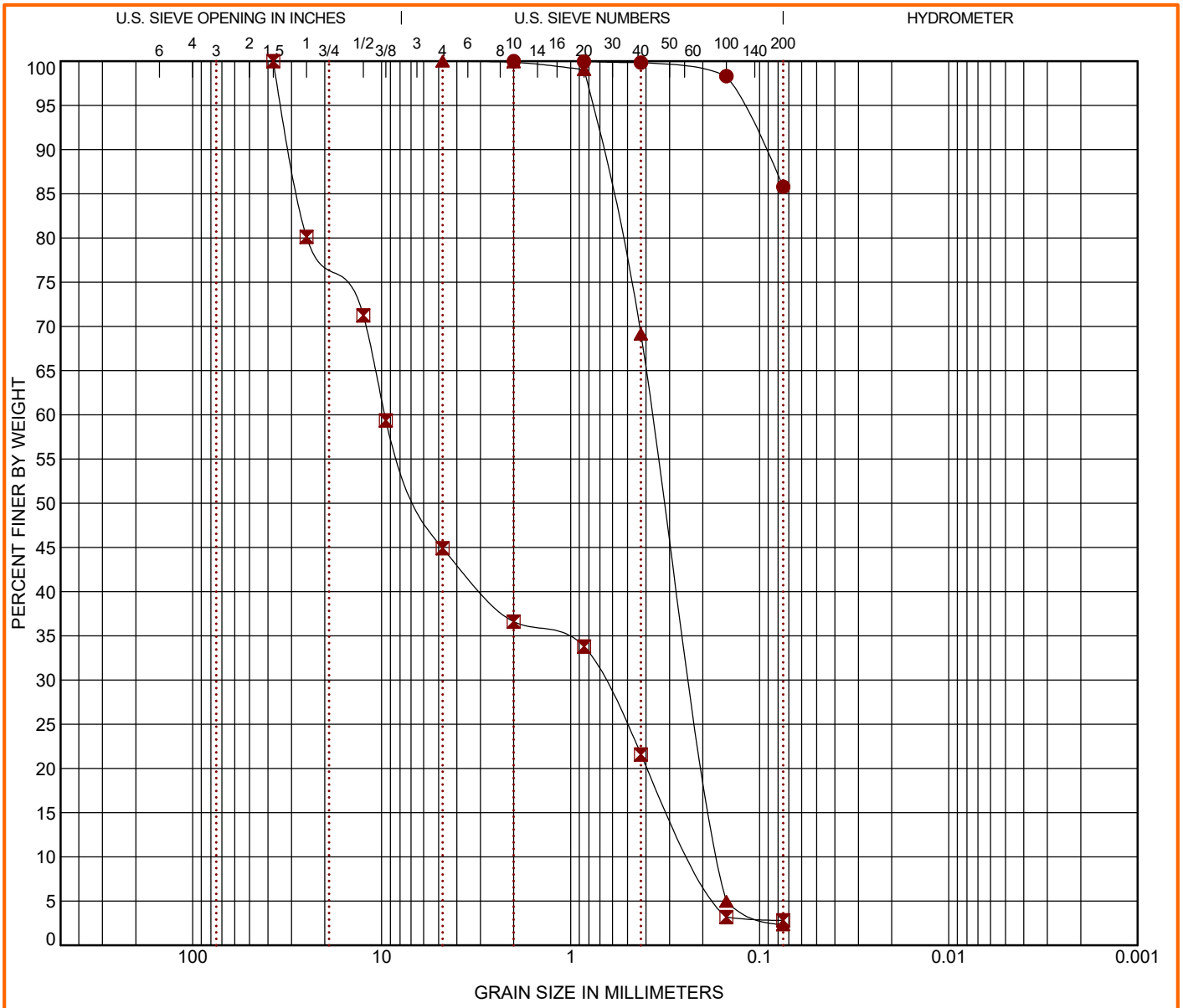
Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

PROJECT NUMBER: 2422P064D

CLIENT: Sandhills Energy LLC Omaha, NE

GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Boring ID		Depth (Ft)	USCS Classification	WC (%)	LL	PL	PI	Cc	Cu
●	B-2	3 - 4.5	LEAN CLAY (CL)	7.9	29	19	10		
⊠	B-3	6 - 7.5	POORLY GRADED GRAVEL with SAND (GP)	1.7	NP	NP	NP	0.22	43.71
▲	B-4	9 - 10.5	POORLY GRADED SAND (SP)	1.7	NP	NP	NP	0.85	2.25

Boring ID		Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Silt	%Fines	%Clay
●	B-2	3 - 4.5	2				0.0	0.0	14.2		85.8	
⊠	B-3	6 - 7.5	37.5	9.641	0.685	0.221	0.0	55.1	42.1		2.8	
▲	B-4	9 - 10.5	4.75	0.366	0.225	0.163	0.0	0.0	97.7		2.3	

PROJECT: MEAN Solar Sites Portfolio - Alliance, NE

SITE: Country Club Road and County Road 62 Alliance, NE

Terracon
1505 Old Happy Jack Rd
Cheyenne, WY

PROJECT NUMBER: 2422P064D

CLIENT: Sandhills Energy LLC
Omaha, NE

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 2422P064D MEAN SOLAR SITES .GPJ TERRACON_DATATEMPLATE.GDT 7/21/22

CHEMICAL LABORATORY TEST REPORT

Project Number: 2422P064D
Service Date: 07/19/22
Report Date: 07/21/22

Terracon
10400 State Highway 191
Midland, Texas 79707
432-684-9600

Client

Sandhills Energy LLC
1209 Harney Street, #400
Omaha, NE 68102

Project

MEAN Solar Sites Portfolio - Alliance, NE
Country Club Road and County Road 62
Alliance, NE

Sample Location	B-4
Sample Depth (ft.)	1-6
pH Analysis, ASTM - G51-18	8.7
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	32
Sulfides, ASTM - D4658-15, (mg/kg)	nil
Chlorides, ASTM D 512 , (mg/kg)	75
RedOx, ASTM D-1498, (mV)	+425
Total Salts, ASTM D1125-14, (mg/kg)	549
Resistivity, ASTM G187, (ohm-cm)	4,853

Analyzed By: Zach Robertson

Zach Robertson
Engineering Technician III

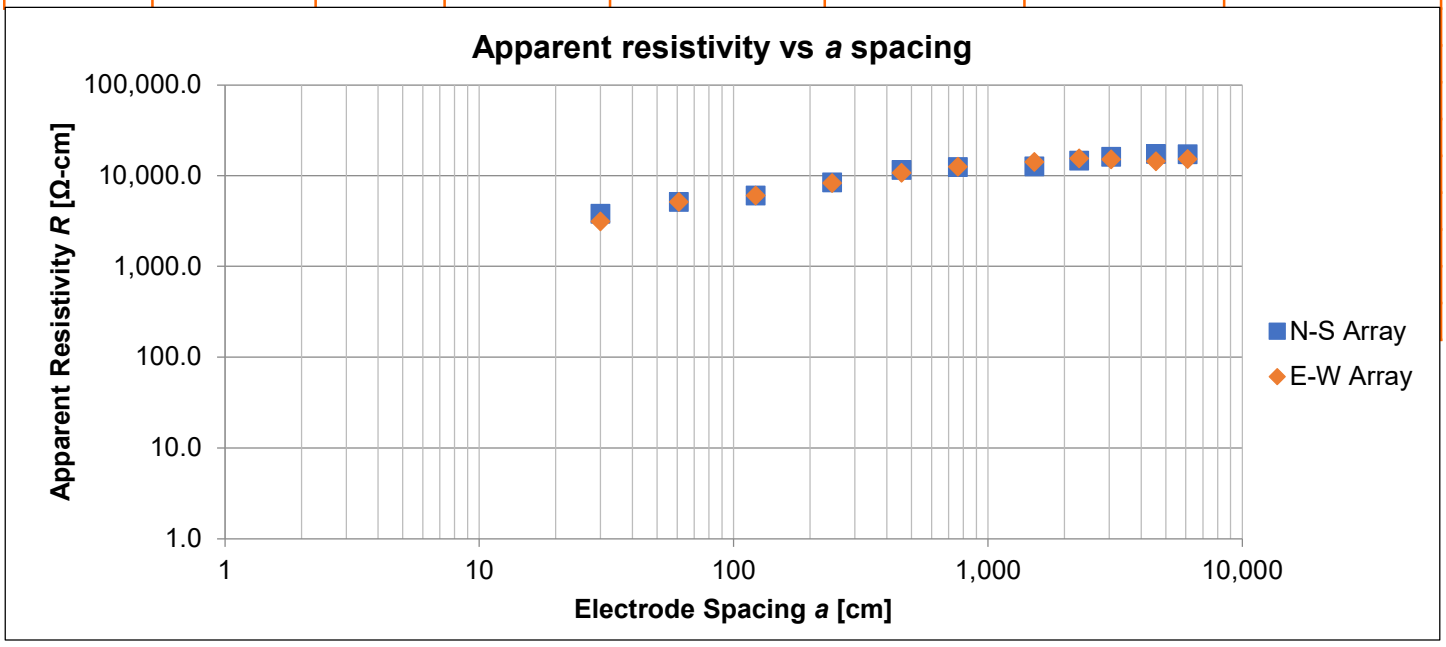
FIELD ELECTRICAL RESISTIVITY TEST DATA

MEAN Solar Sites Portfolio - Alliance, NE ■ Alliance, Nebraska
July 22 2022 ■ Terracon Project No. 2422P064D

Array Loc.	FER 1		
Instrument	Ultra MiniRes	**Weather**	Sunny/ Clear
Serial #	SN-312	**Ground Cond.**	Native grasses and weeds
Cal. Check	100%	**Tested By**	Graham Gaspard
Test Date	July 12, 2022	**Method**	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	GPS Coordinates (center test location): 41.09425°N, 102.92752°W		

Apparent resistivity ρ is calculated as : $$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2+4b^2}} - \frac{a}{\sqrt{a^2+b^2}}}$$

Electrode Spacing *a*		Electrode Depth *b*		N-S Test		E-W Test	
[feet]	[centimeters]	[inches]	[centimeters]	Measured Resistance *R*	Apparent Resistivity ρ	Measured Resistance *R*	Apparent Resistivity ρ
				Ω	[Ω-cm]	Ω	[Ω-cm]
1	30	3	8	18.0580	3,790	14.8770	3,120
2	61	6	15	12.1460	5,110	12.1570	5,110
4	122	6	15	7.6460	6,010	7.6390	6,010
8	244	12	30	5.3490	8,410	5.2440	8,250
15	457	12	30	3.9810	11,520	3.7190	10,760
25	762	12	30	2.5780	12,380	2.6160	12,560
50	1,524	12	30	1.3141	12,590	1.4716	14,100
75	2,286	12	30	1.0149	14,580	1.0800	15,520
100	3,048	12	30	0.8439	16,160	0.7854	15,040
150	4,572	12	30	0.6051	17,380	0.4997	14,360
200	6,096	12	30	0.4482	17,170	0.3976	15,230



SUPPORTING INFORMATION

Contents:

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS
MEAN Solar Sites Portfolio - Alliance, NE ■ Alliance, NE
Terracon Project No. 2422P064D

Terracon GeoReport

SAMPLING	WATER LEVEL	FIELD TESTS
Auger Cuttings Modified California Ring Sampler Standard Penetration Test	**Water Initially Encountered** **Water Level After a Specified Period of Time** **Water Level After a Specified Period of Time** **Cave In Encountered** Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	**N** Standard Penetration Test Resistance (Blows/Ft.) **(HP)** Hand Penetrometer **(T)** Torvane **(DCP)** Dynamic Cone Penetrometer **UC** Unconfined Compressive Strength **(PID)** Photo-Ionization Detector **(OVA)** Organic Vapor Analyzer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance			
Descriptive Term (Density)	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**	**Descriptive Term (Consistency)**	**Unconfined Compressive Strength Qu, (psf)**	**Standard Penetration or N-Value Blows/Ft.**	**Ring Sampler Blows/Ft.**
Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1	< 3
Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4	3 - 4
Medium Dense	10 - 29	19 - 58	Medium Stiff	1,000 to 2,000	4 - 8	5 - 9
Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15	10 - 18
Very Dense	> 50	> 99	Very Stiff	4,000 to 8,000	15 - 30	19 - 42
			Hard	> 8,000	> 30	> 42

RELEVANCE OF SOIL BORING LOG

The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

Terracon GeoReport

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3 [E]		GW	Well-graded gravel [F]
			Cu < 4 and/or 1 > Cc > 3 [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3 [E]		SW	Well-graded sand [I]
			Cu < 6 and/or 1 > Cc > 3 [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A"		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

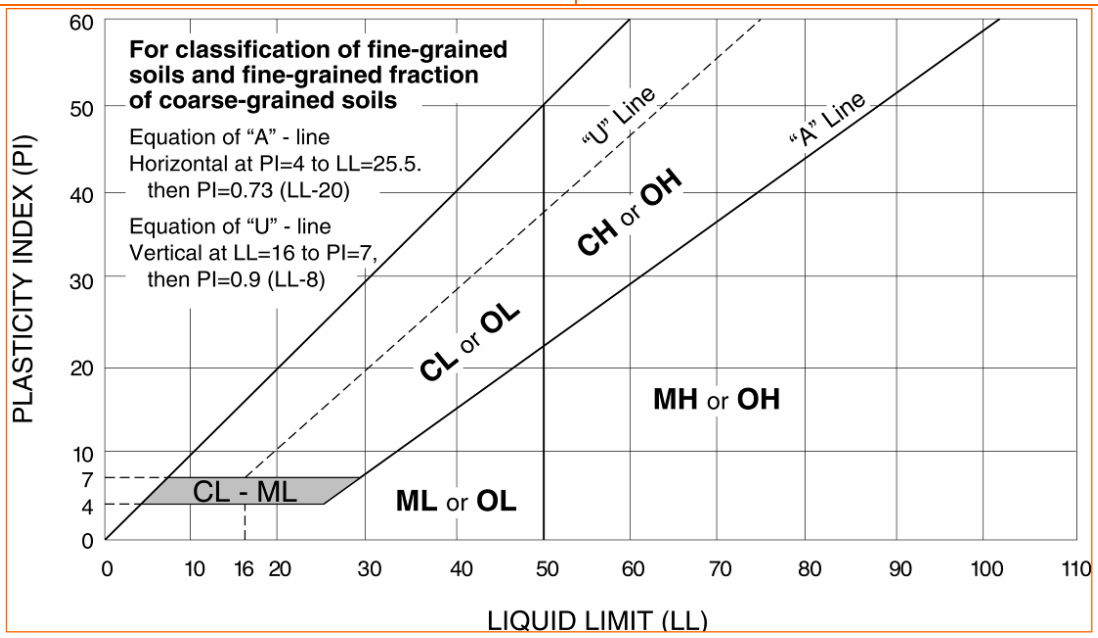
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Sole Source Aquifers - Western Nebraska

10/3/2022, 1:24:37 PM

1:2,311,162

0 15 30 60 mi

0 20 40 80 km

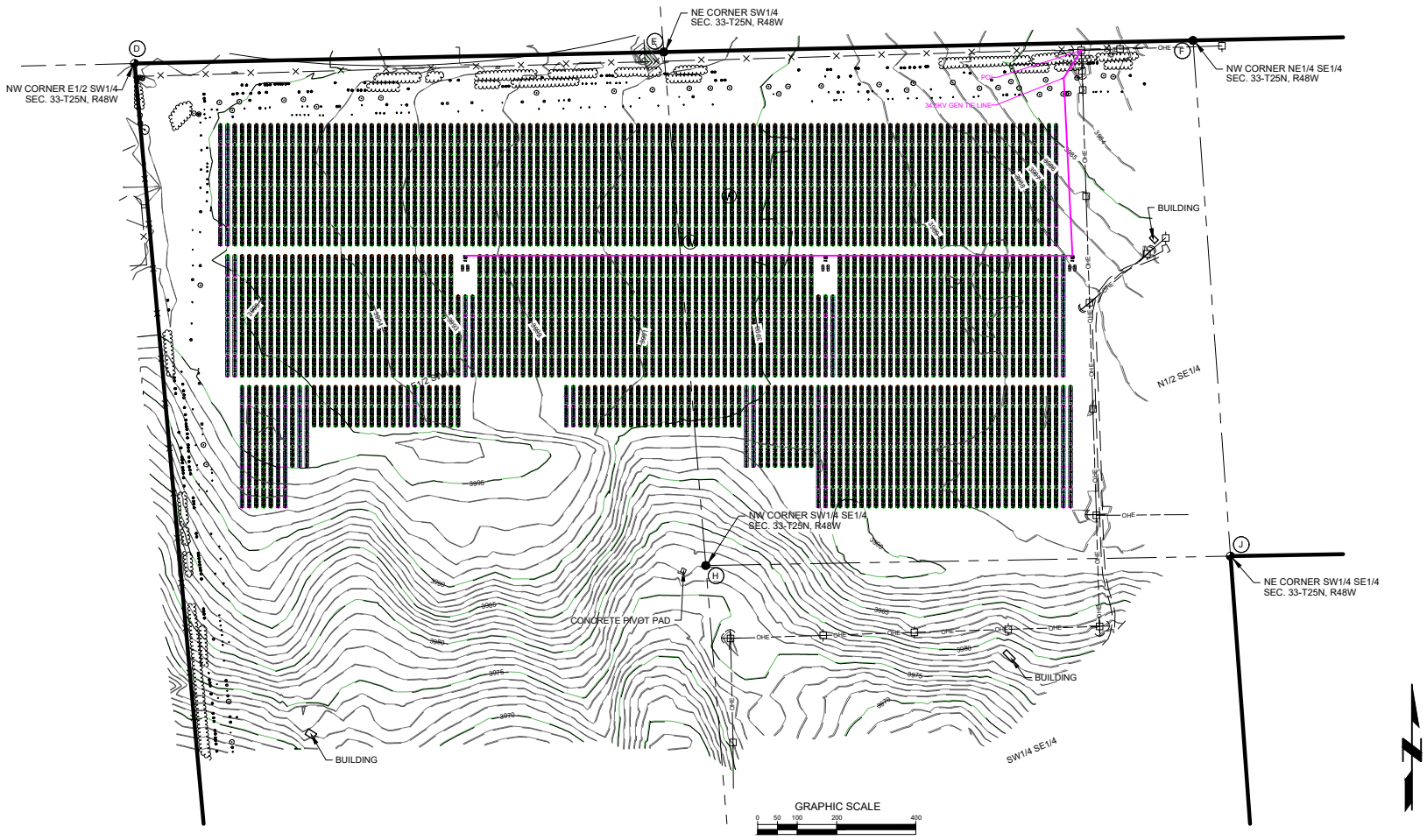
Esri, HERE, Garmin, NGA, USGS, NPS

U.S. Environmental Protection Agency

APPENDIX B

SITE PLANS

TOPO GRAPHIC DETAIL



APPENDIX C

SITE PHOTOS

Project Name: SE Municipal Solar - Alliance
Terracon Project No. 0522P061
Date Photos Taken: June 1, 2022

Photo #1 View of a well house (#1) on the northeast corner of the site.

Photo #2 View of three pole-mounted transformers just west of the northeast well house.

Photo #3 View of well filtration system off the southern gravel road on site.

Photo #4 View of red above-ground storage tank next to well house (#2) on site.

Photo #5 View of three pole-mounted transformers next to well house.

Photo #6 View of signage on door of well hosue.

Project Name: SE Municipal Solar - Alliance
Terracon Project No. 0522P061
Date Photos Taken: June 1, 2022

Photo #7 View of three-pole mounted transformers next to well house.

Photo #8 View of adjoining property to the south of the site..

Photo #9 View of wellhouse (#3) with pad mounted transformer, looking west.

Photo #10 View of pad mounted transformer next to well house looking east.

Photo #11 View of well head behind well house (#3).

Photo #12 View of northern portion of site from the middle of the site.

Project Name: SE Municipal Solar - Alliance
Terracon Project No. 0522P061
Date Photos Taken: June 1, 2022

Photo #13 View of western portion of the site from the middle of the site.

Photo #14 View of the southern portion of the site, from the middle of site..

Photo #15 View of eastern portion of the site, from the middle of site.

Photo #16 View of farmstead on the adjoining property to the west.

Photo #17 View of adjoining agricultural field east of site.

Photo #18 View of cable on the northeast portion of the site.

Project Name: SE Municipal Solar - Alliance
Terracon Project No. 0522P061
Date Photos Taken: June 1, 2022

Photo #19 View of small aboveground storage tank next to electrical building on northeast corner of site.

Photo #20 View of pad mounted transformer on northeast corner of site.

Photo #21 View of well on northeast corner of site.

APPENDIX D

BIOLOGICAL RESOURCES

Environmental Review Report

Project Information

Report Generation Date:	9/17/2022 01:42:32 PM
Project Title:	MEAN Solar Alliance
User Project Number(s):	0522P069
System Project ID:	NE-CERT-007688
Project Type:	Energy Production/Storage/Transfer, Solar
Project Activities:	None Selected
Project Size:	352.81 acres
County(s):	Box Butte
Watershed(s):	Niobrara
Watershed(s) HUC 8:	Upper Niobrara
Watershed(s) HUC 12:	City of Alliance-Snake Creek
Biologically Unique Landscape(s):	None
Township/Range and/or Section(s):	T24R48WS05; T24R48WS06; T25R48WS33; T25R48WS34
Latitude/Longitude:	42.092688 / -102.925404

Contact Information

Organization:	Terracon Consultants, Inc.
Contact Name:	Jean Ramer
Contact Phone:	4023302202
Contact Email:	jean.ramer@terracon.com
Contact Address:	15080 A Circle Omaha NE 68144
Prepared By:	Terracon Consultants, Inc.
Submitted On Behalf Of:	Municipal Energy Agency of Nebraska

Project Description

Solar generating facility for the City of Alliance

Introduction

The Nebraska Game and Parks Commission (Commission) and the U.S. Fish and Wildlife Service (Service) have special concerns for endangered and threatened species, migratory birds, and other fish and wildlife and their habitats. Habitats frequently used by fish and wildlife species are wetlands, streams, riparian areas, woodlands, and grasslands. Special attention is given to proposed projects which modify wetlands, alter streams, result in loss of riparian habitat, convert/remove grasslands, or contaminate habitats. When this occurs, the Commission and Service recommend ways to avoid, minimize, or compensate for adverse effects to fish and wildlife and their habitats.

CONSULTATION PURSUANT TO THE NEBRASKA NONGAME AND ENDANGERED SPECIES CONSERVATION ACT (NESCA)

The Commission has responsibility for protecting state-listed endangered and threatened species under authority of the Nongame and Endangered Species Conservation Act (NESCA) (Neb. Rev. Stat. § 37-801 to 37-811). Pursuant to § 37-807 (3) of NESCA, all state agencies shall, in consultation with the Commission, ensure projects they authorize (i.e., issue a permit for), fund or carry out do not jeopardize the continued existence of state-listed endangered or threatened species or result in the destruction or modification of habitat of such species which is determined by the Commission to be critical. If a proposed project may affect state-listed species or designated critical habitat, further consultation with the Commission is required.

Informal consultation pursuant to NESCA can be completed by using the Conservation and Environmental Review Tool (CERT). The CERT analyzes the project type and location, and based on the analysis, provides information about potential impacts to listed species, habitat questions and/or conservation conditions.

- If project proponents agree to implement conservation conditions, as outlined in the report and applicable to the project type, then this document serves as documentation of consultation and the following actions can be taken to move forward with the project:
    - Sign the report in the designated areas.
    - Upload the signed PDF as part of their "final" project submittal.
    - By agreeing to and implementing the conservation conditions as outlined (if applicable), then further consultation with the Commission is not required.
- If the report indicates the project may have impacts on state-listed species, then the following actions must be taken:
    - Project proponent is required to contact and consult with the Commission. Contact information can be found within this document.

TECHNICAL ASSISTANCE AND CONSULTATION PURSUANT TO THE ENDANGERED SPECIES ACT (ESA)

The Service has responsibility for conservation and management of fish and wildlife resources for the benefit of the American public under the following authorities: 1) Endangered Species Act of 1973 (ESA); 2) Fish and Wildlife Coordination Act; 3) Bald and Golden Eagle Protection Act; and 4) Migratory Bird Treaty Act. The National Environmental Policy Act (NEPA) requires compliance with all of these statutes and regulations.

Pursuant to section 7(a)(2) of ESA, every federal agency, shall in consultation with the Service, ensure that an action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.

If a proposed project may affect federally listed species or designated critical habitat, Section 7 consultation is required with the Service. It is the responsibility of the lead federal action agency to fully evaluate all potential effects (direct and indirect) that may occur to federally listed species and critical habitat in the action area. The lead federal agency provides their effect determination to the Service for concurrence. If federally listed species and/or designated/proposed critical habitat would be adversely affected by implementation of the project, the lead federal agency will need to formally request further section 7 consultation with the Service prior to making any irretrievable or irreversible commitment of federal funds (section 7(d) of ESA), or issuing any federal permits or licenses.

The information generated in this report DOES NOT satisfy consultation obligations between the lead federal agency and the Service pursuant to ESA. For the purposes of ESA, the information in this report should be considered as TECHNICAL ASSISTANCE, and does not serve as the Service's concurrence letter, even if the user signs and agrees to implement conservation conditions in order to satisfy the consultation requirements of NESCA.

Overall Results

The following result is based on a detailed analysis of your project.

- Potential impacts on listed species may occur as a result of this project. Please proceed with the following: Sign and date the certification section. Upload the document as "final." Email a copy of the report with a request for review to the Nebraska Game and Parks Commission (ngpc.envreview@nebraska.gov) and copy the U.S. Fish and Wildlife Service (nebraskaes@fws.gov) for further consultation.

Additional Information

Potential impacts on listed species may occur as a result of this project. Further consultation with the Nebraska Game and Parks Commission and the U.S. Fish and Wildlife Service is required.

Certification

I certify that ALL of the project information in this report (including project location, project size/configuration, project type, project activities, answers to questions) is true, accurate, and complete. If the project type, activities, location, size, or configuration of the project change, or if any of the answers to any questions asked in this report change, then this information is no longer valid and we recommend running the revised project through CERT to get an updated report.

Jean Ramer

Applicant/project proponent signature

9/24/2022

Date

Additional Considerations

Bald and Golden Eagle Protection Act

The federal Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668-668c) provides for the protection of the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*). Under the Eagle Act, “take” of eagles, their parts, nests or eggs is prohibited. Disturbance resulting in injury to an eagle or a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior is a form of “take.”

Bald eagles use mature, forested riparian areas near rivers, streams, lakes, and wetlands and occur along all the major river systems in Nebraska. The bald eagle southward migration begins as early as October and the wintering period extends from December-March. The golden eagle is found in arid open country with grassland for foraging in western Nebraska and usually near buttes or canyons which serve as nesting sites. Golden eagles are often a permanent resident in the Pine Ridge area of Nebraska. Additionally, many bald and golden eagles nest in Nebraska from mid-February through mid-July. Disturbances within 0.5-miles of an active nest or within line-of-sight of the nest could cause adult eagles to discontinue nest building or to abandon eggs. Both bald and golden eagles frequent river systems in Nebraska during the winter where open water and forested corridors provide feeding, perching, and roosting habitats, respectively. The frequency and duration of eagle use of these habitats in the winter depends upon ice and weather conditions. Human disturbances and loss of wintering habitat can cause undue stress leading to cessation of feeding and failure to meet winter thermoregulatory requirements. These affects can reduce the carrying capacity of preferred wintering habitat and reproductive success for the species.

To comply with the Eagle Act, it is recommended that the project proponent determine if the proposed project would impact bald or golden eagles or their habitats. This can be done by conducting a habitat assessment, surveying nesting habitat for active and inactive nests, and surveying potential winter roosting habitat to determine if it is being used by eagles. The area to be surveyed is dependent on the type of project; however for most projects we recommend surveying the project area and a ½ mile buffer around the project area. If it is determined that either species could be affected by the proposed project, the Commission recommends that the project proponent notify the

Nebraska Game and Parks Commission as well as the Nebraska Field Office, U.S. Fish and Wildlife Service for recommendations to avoid “take” of bald and golden eagles.

Migratory Bird Treaty Act and Nebraska Revised Statute §37-540

We recommend the project proponent comply with the Migratory Bird Treaty Act (16 U.S.C. 703-712: Ch. 128 *as amended*) (MBTA). The project proponent should also comply with Nebraska Revised Statute §37-540, which prohibits take and destruction of nests or eggs of protected birds (as defined in Nebraska Revised Statute §37-237.01). Construction activities in grassland, wetland, stream, woodland, and river bank habitats that would result in impacts on birds, their nests or eggs protected under these laws should be avoided. Although the provisions of these laws are applicable year-round, most migratory bird nesting activity in Nebraska occurs during the period of May 1 to July 15. However, some migratory birds are known to nest outside of the aforementioned primary nesting season period. For example, raptors can be expected to nest in woodland habitats during February 1 through July 15, whereas sedge wrens, which occur in some wetland habitats, normally nest from July 15 to September 10. If development in this area is planned to occur during the primary nesting season or at any other time which may result in impacts to birds, their nests or eggs protected under these laws, we request that the project proponent arrange to have a qualified biologist conduct a field survey of the affected habitats to determine the absence or presence of nesting migratory birds. If a field survey identifies the existence of one or more active bird nests that cannot be avoided by the planned construction activities, the Nebraska Game and Parks Commission and the Nebraska Field Office, U.S. Fish and Wildlife Service should be contacted immediately. For more information on avoiding impacts to migratory birds, their nests and eggs, or to report active bird nests that cannot be avoided by planned construction activities, please contact the U.S. Fish and Wildlife Service and/or the Nebraska Game and Parks Commission (contact information within report). Adherence to these guidelines will help avoid unnecessary impacts on migratory birds.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) requires consultation with the U.S. Fish and Wildlife Service (Service) and the State fish and wildlife agency (i.e., Nebraska Game and Parks Commission) for the purpose of preventing loss of and damage to fish and wildlife resources in the planning, implementation, and operation of federal and federaly funded, permitted, or licensed water resource development projects. This statute requires that federal agencies take into consideration the effect that the water related project would have on fish and wildlife resources, to take action to prevent loss or damage to these resources, and to provide for the development and improvement of these resources. The comments in this letter are provided as technical assistance only and are not the document required of the Secretary of the Interior pursuant to Section 2(b) of FWCA on any required federal environmental review or permit. This technical assistance is valid only for the described conditions and will have to be revised if significant environmental changes or changes in the proposed project take place. In order to determine whether the effects to fish and wildlife resources from the proposed project are being considered under FWCA, the lead federal agency must notify the Service in writing of how the comments and recommendations in this technical assistance letter are being considered into the proposed project.

Section 404 of the Clean Water Act

In general, the Nebraska Game and Parks Commission and the U.S. Fish and Wildlife Service have concerns for impacts to wetlands, streams and riparian habitats. We recommend that impacts to wetlands, streams, and associated riparian corridors be avoided and minimized, and that any unavoidable impacts to these habitats be mitigated. If any fill materials will be placed into waterways or wetlands, the U.S. Army Corps of Engineers Regulatory Office in Omaha should be contacted to determine if a 404 permit is needed.

Agency Contact Information

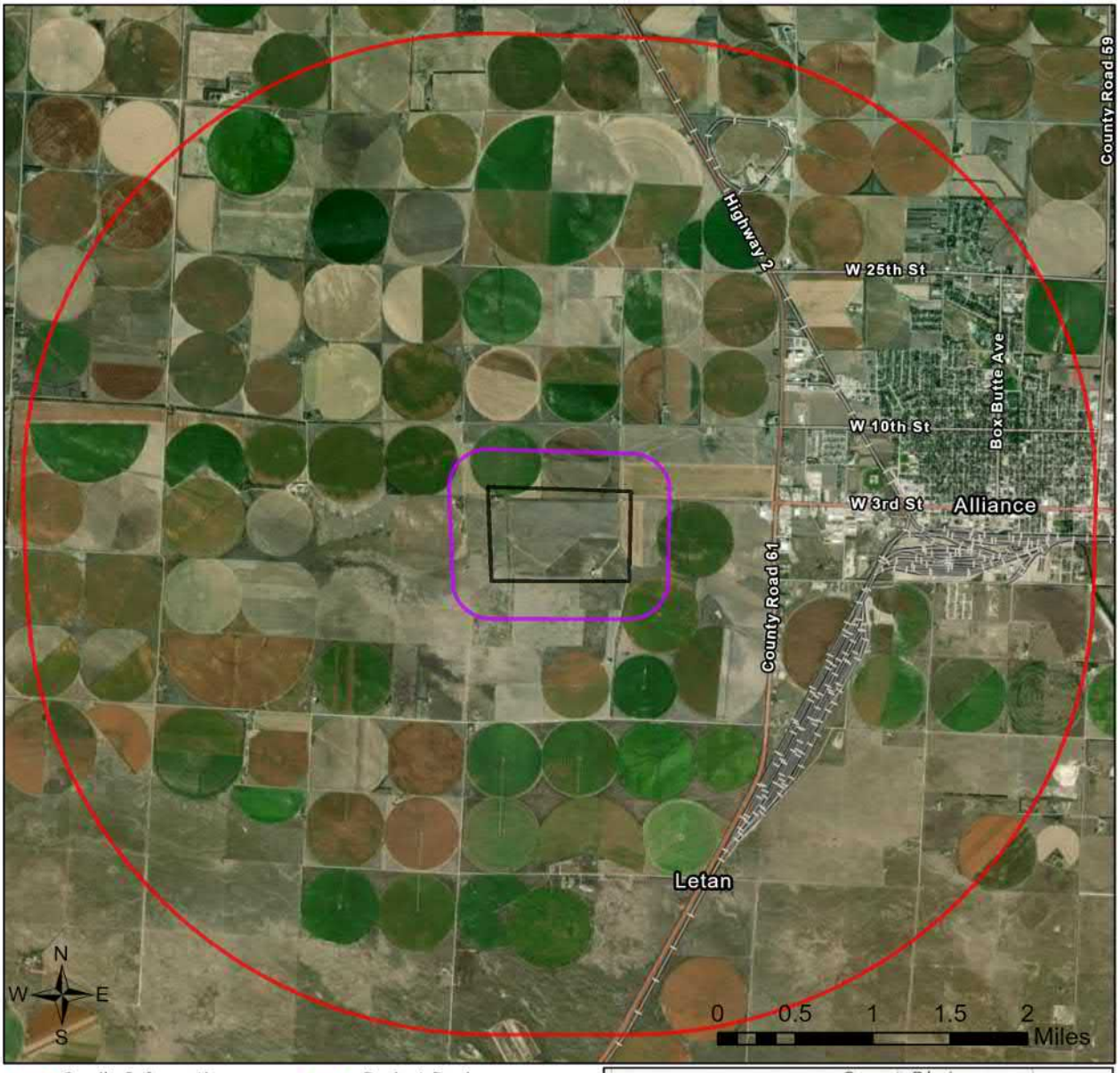
Nebraska Game and Parks Commission
Environmental Review Team
2200 North 33rd Street
Lincoln, NE 68503
phone: (402) 471-5423
email: ngpc.envreview@nebraska.gov

U.S. Fish and Wildlife Service

Nebraska Ecological Services
9325 South Alda Road
Wood River, NE 68883
phone: (308) 382-6468
email: nebraskaes@fws.gov

MEAN Solar Alliance

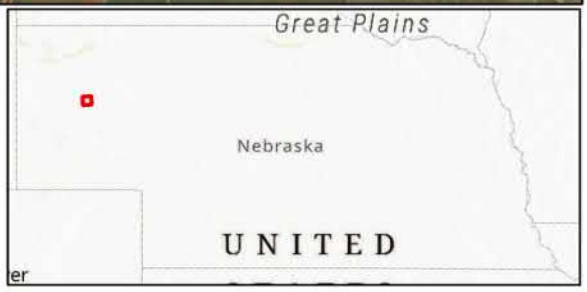
Aerial Image Basemap With Locator Map



3-mile Information Buffer Boundary

Project Review Boundary

Project Boundary



Project Size (acres): 352.81

Lat/Long (DD): 42.0927 / -102.9254

County(s): Box Butte

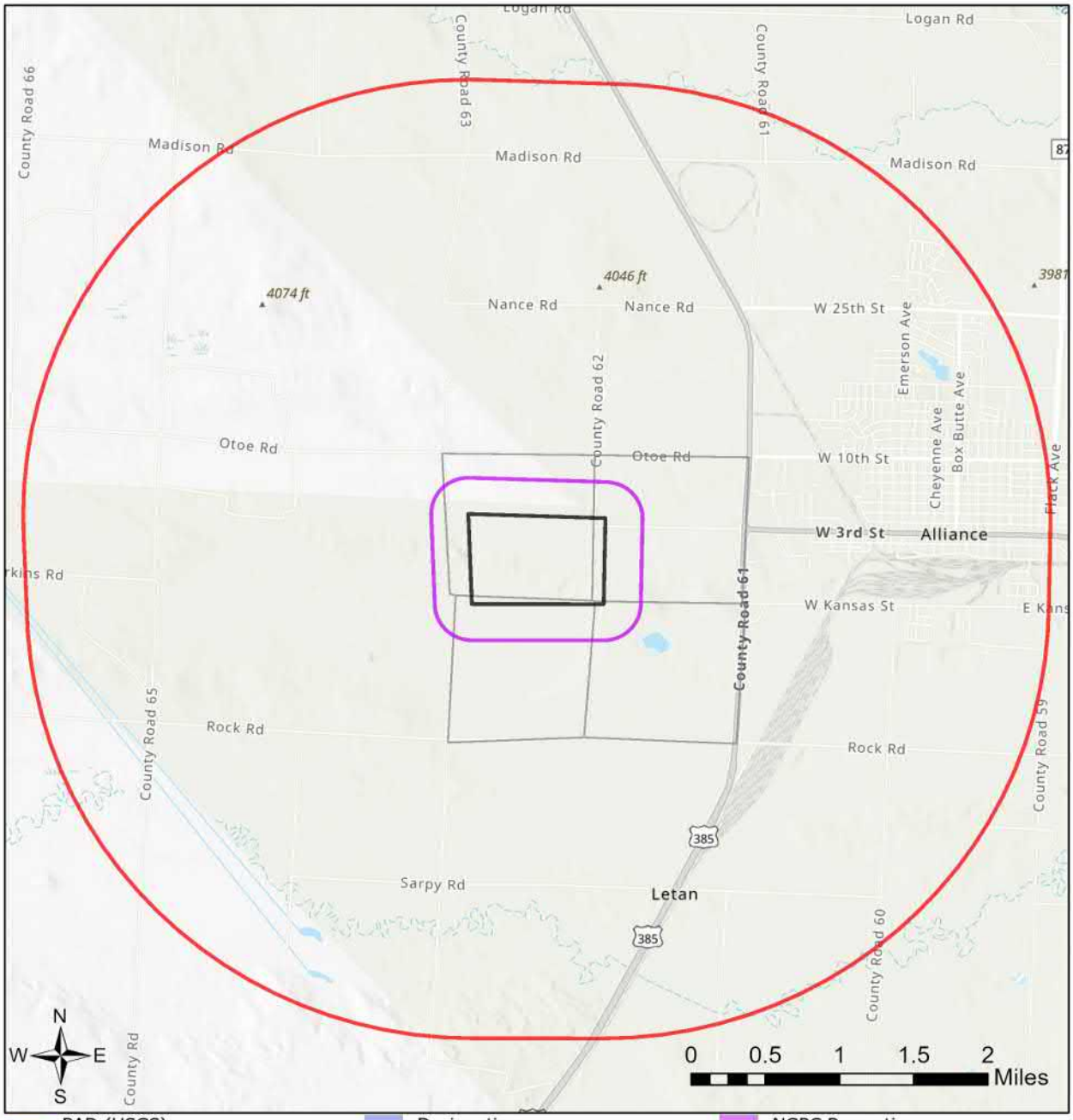
BUL(s):

Township/Range/Section(s): T24R48WS05; T24R48WS06; T25R48WS33; T25R48WS34

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

MEAN Solar Alliance

Topographic Basemap With Sections and Protected Areas



- PAD (USGS) - boundaries
- U.S. Fish and Wildlife Service
- U.S. Forest Service
- National Park Service
- Bureau of Reclamation
- Designation
- Regional Agency
- State (NGPC)
- Other State
- NGO or Private
- Other (City, Unknown)
- NGPC Properties
- Sections
- 3-mile Information Buffer Boundary
- Project Review Boundary
- Project Boundary

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

MEAN Solar Alliance

Web Map As Submitted By User

Critical Habitat - USFWS

Biologically Unique Landscapes

Project Review Boundary

Project Boundary

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Table 1
Protected Areas in Immediate Vicinity of Project (project review area)

This table has no results.

Table 2
Documented Occurrences in Immediate Vicinity of Project (project review area):
Natural communities and selected special areas

This table has no results.

Table 3
Regional Documented Occurrences of Species within 1 Mile of Project Review Area:
Tier 1 and 2 at-risk species and additional S1-S3 plants

Scientific Name	Common Name	USFWS	State	SGCN	SRank	GRank	Taxonomic Group
Athene cunicularia	Burrowing Owl			Tier 1	S2	G4	Vertebrate Animal - Birds

Table 4
Potential Occurrences in Immediate Vicinity of Project (project review area):
Special status species (Tier 1 at-risk species and Bald and Golden Eagle), based on models or range maps

Scientific Name	Common Name	Data Type	USFWS	State	SGCN	SRank	GRank	Taxonomic Group
Asio flammeus	Short-eared Owl	Range			Tier 1	S2	G5	Vertebrate Animal - Birds
Athene cunicularia	Burrowing Owl	Range			Tier 1	S2	G4	Vertebrate Animal - Birds
Boloria selene sabulocollis	Kohler's Fritillary	Range			Tier 1	S1S2	G5T3	Invertebrate Animal - Butterflies and Skippers
Branchinecta potassa	Potassium-loving Fairy Shrimp	Range			Tier 1	S2	G2	Invertebrate Animal - Fairy, Clam, and Tadpole Shrimps
Buteo regalis	Ferruginous Hawk	Range			Tier 1	S2	G4	Vertebrate Animal - Birds
Cicindela limbata limbata	Sandy Tiger Beetle	Range			Tier 1	S4	G5T3T4	Invertebrate Animal - Beetles
Coccinella novemnotata	Nine-spotted Ladybird Beetle	Range			Tier 1	S1	G5	Invertebrate Animal - Beetles
Dalea cylindriceps	Large-spike Prairie-clover	Range			Tier 1	S2	G3	Vascular Plant - Flowering Plants
Danaus plexippus	Monarch	Range			Tier 1	S2	G4	Invertebrate Animal - Butterflies and Skippers
Eristalis brousii	Hourglass Drone Fly	Range			Tier 1	S1	G1G2	Invertebrate Animal - Flower Flies or Hoverflies
Euphyes bimacula illinois	Two-spotted Skipper	Range			Tier 1	S3	G4T1T2	Invertebrate Animal - Butterflies and Skippers

Table 4
Potential Occurrences in Immediate Vicinity of Project (project review area):
Special status species (Tier 1 at-risk species and Bald and Golden Eagle), based on models or range maps

Scientific Name	Common Name	Data Type	USFWS	State	SGCN	SRank	GRank	Taxonomic Group
Fundulus sciadicus	Plains Topminnow	Range			Tier 1	S3	G4	Vertebrate Animal - Fishes
Haliaeetus leucocephalus	Bald Eagle	Range			Tier 2	S3	G5	Vertebrate Animal - Birds
Hesperia ottoe	Ottoe Skipper	Range			Tier 1	S2	G3	Invertebrate Animal - Butterflies and Skippers
Lanius ludovicianus	Loggerhead Shrike	Range			Tier 1	S3	G4	Vertebrate Animal - Birds
Lasiurus borealis	Eastern Red Bat	Range			Tier 1	S3	G3G4	Vertebrate Animal - Mammals
Lasiurus cinereus	Hoary Bat	Range			Tier 1	S3	G3G4	Vertebrate Animal - Mammals
Lethe eurydice fumosus	Smoky-eyed Brown	Range			Tier 1	S3	G5T3T4	Invertebrate Animal - Butterflies and Skippers
Myotis septentrionalis	Northern Long-eared Myotis	Range	T	T	Tier 1	S1S2	G1G2	Vertebrate Animal - Mammals
Numenius americanus	Long-billed Curlew	Range			Tier 1	S3	G5	Vertebrate Animal - Birds
Penstemon haydenii	Blowout Penstemon	Range	E	E	Tier 1	S1	G1G2	Vascular Plant - Flowering Plants
Perimyotis subflavus	Tricolored Bat	Range			Tier 1	S3	G2G3	Vertebrate Animal - Mammals
Speyeria idalia	Regal Fritillary	Range			Tier 1	S3	G3?	Invertebrate Animal - Butterflies and Skippers
Vulpes velox	Swift Fox	Range		E	Tier 1	S2	G3	Vertebrate Animal - Mammals

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Box Butte County, Nebraska

Local office

Nebraska Ecological Services Field Office

(308) 382-6468
(308) 384-8835

MAILING ADDRESS
9325 B South Alda Rd., Ste B
Wood River, NE 68883-9565

PHYSICAL ADDRESS
9325 South Alda Rd., Ste B

Wood River, NE 68883-9565

https://fws.gov/office/nebraska-ecological-services

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS

Northern Long-eared Bat Myotis septentrionalis — Threatened
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9045

Birds

NAME	STATUS
Piping Plover Charadrius melodus There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6039	Threatened

Fishes

NAME	STATUS
Pallid Sturgeon Scaphirhynchus albus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7162	Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Blowout Penstemon Penstemon haydenii Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6172	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

There are no critical habitats at this location.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Chimney Swift Chaetura pelagica This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Lark Bunting Calamospiza melanocorys This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 15
Red-headed Woodpecker Melanerpes erythrocephalus This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (▪)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

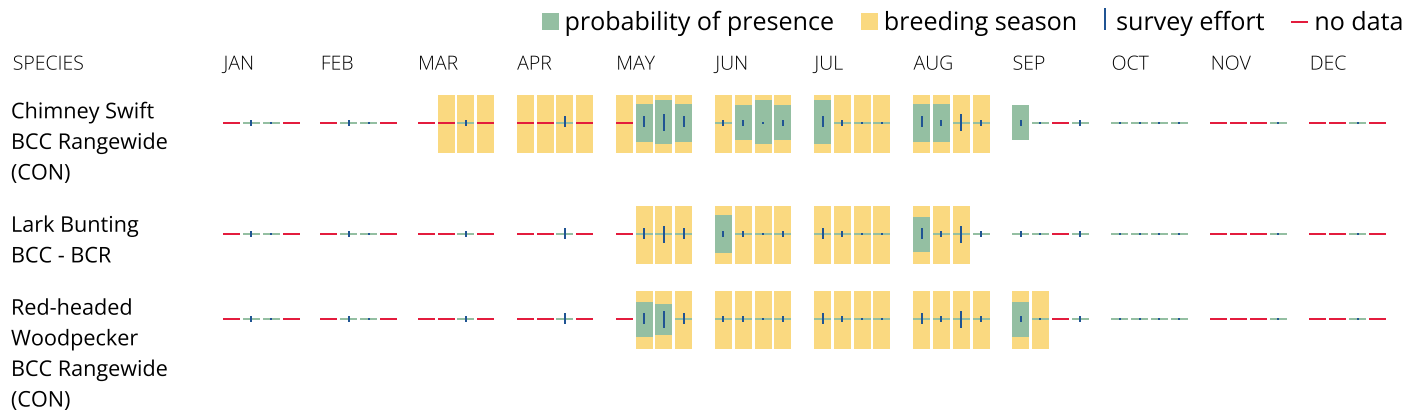
Breeding Season (▪)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a

breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

There are no known coastal barriers at this location.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

Background

SE Municipal Solar, LLC intends to apply for financial assistance from the United States Department of Agriculture (USDA)-Rural Utilities Service (RUS). An applicant seeking financial assistance from the USDA must sufficiently describe its proposal so that the USDA can apply the appropriate environmental review procedures for the National Environmental Policy Act (NEPA) of 1969, as amended (42 United States Code [U.S.C] 4321, et seq.), related to review and approval. Serving as the lead federal agency, the RUS is responsible for compliance with NEPA, and as such, RUS must decide whether or not to provide financing assistance for this proposed project. Pursuant to Title 7 of the Code of Federal Regulations (CFR), the USDA must demonstrate that any decision complies with NEPA and requires that the environmental consequences of the proposed action and its alternatives be examined. The RUS's decision to approve financial assistance will be the analysis outlined in this EA in addition to subsequent detailed engineering and financial reviews. The applicant, in this case, is applying for funds under the RUS Electric Program Project Loan for Distributed Generation Energy Project Financing. The EA is being prepared by Terracon Consultants, Inc. in Omaha, Nebraska. As of September 24, 2022 the EA is incomplete.

Project Description

The proposed project area is approximately 1.5 miles west of the City of Alliance (City), Nebraska and consists of a 59-acre tract of farmland located approximately 1,700 feet west of the intersection of Country Club Road and County Road 62 in Box Butte County (Box Butte County Assessor's Parcel Number 070046956, approximately 168 acres). A general location map is provided as Exhibit 1 (Appendix A). The project site is relatively level, with a gentle gradient toward the east and an approximate elevation of 4,000 feet above mean sea level. No surface water features are located within one mile of the site.

The majority of the 59-acre site will be developed with the solar facility, which includes the solar panels and associated support structures, including electrical inverters/transformers, buried electrical conduit, access apron, and security fencing. Solar generation facilities will be placed at on land leased from the City, connecting to its municipal electric distribution system. The Alliance facility will host additional generation to be purchased by MEAN. MEAN is the wholesale electrical provider for all participating communities. The municipal utility is obligated by a power purchase agreement to buy 100 percent of generation by the facility established to provide five percent of its electricity.

The project will deliver its generation to a transformer on site owned by the municipal buyer of the electricity and connecting to its distribution system. Power will not be exported to the transmission system. SE Municipal Solar will be responsible for running a line to the point of interconnection. The City's municipal utility will be responsible for providing a transformer at the point of interconnection and connecting it to its distribution system. Any upgrades in municipal distribution systems will be the responsibility of the municipal utilities.

The proposed Project area is shown in relation to the City of Alliance in **Error! Reference source not found.**.

Figure 1 Proposed Project Area outlined in green.

Figure 2. Approximate location of arrays (shaded blue) within property boundary (red) owned by City of Alliance.

APPENDIX E

ENVIRONMENTAL JUSTICE REPORTS

EJScreen Report (Version 2.0)

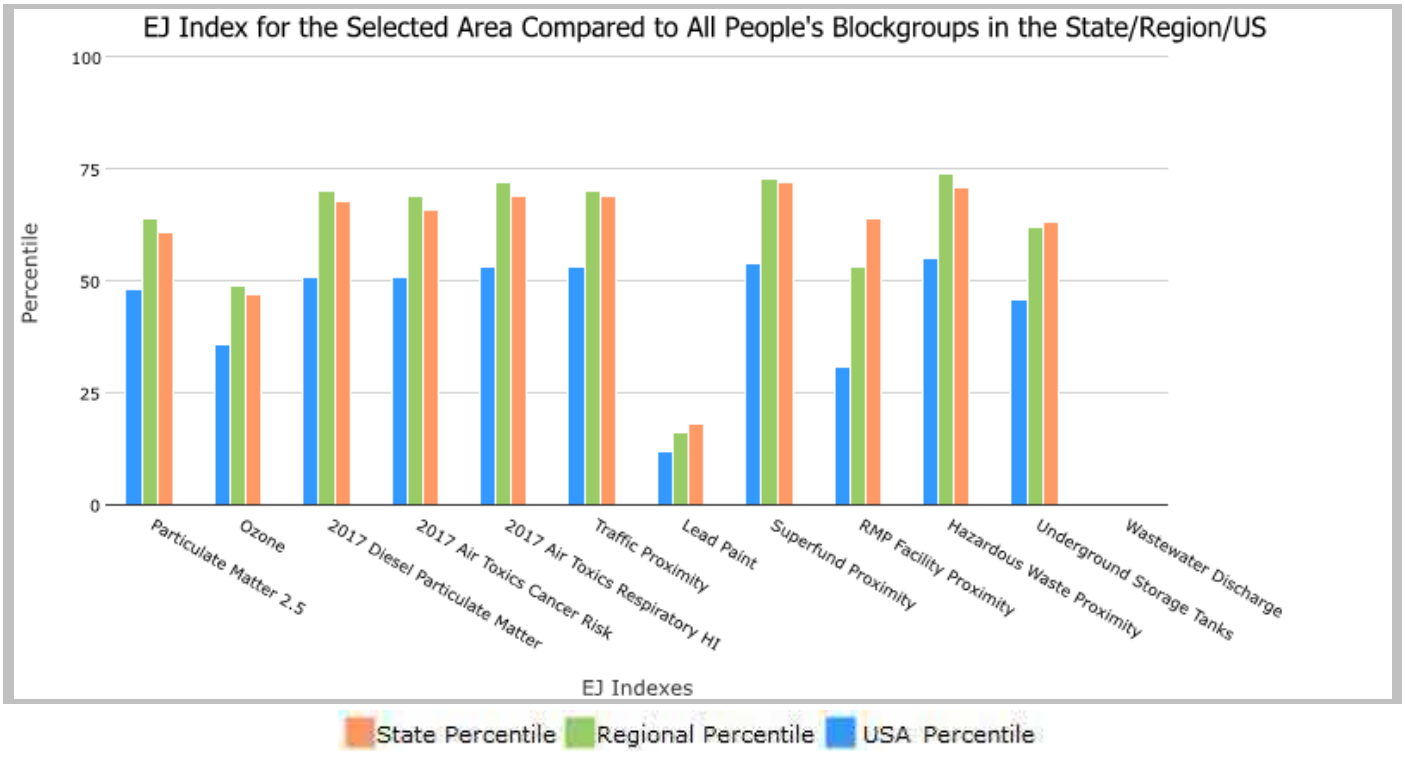
Blockgroup: 310139511002, NEBRASKA, EPA Region 7

Approximate Population: 868

Input Area (sq. miles): 506.68

Alliance

Selected Variables	State Percentile	EPA Region Percentile	USA Percentile
Environmental Justice Indexes			
EJ Index for Particulate Matter 2.5	61	64	48
EJ Index for Ozone	47	49	36
EJ Index for 2017 Diesel Particulate Matter*	68	70	51
EJ Index for 2017 Air Toxics Cancer Risk*	66	69	51
EJ Index for 2017 Air Toxics Respiratory HI*	69	72	53
EJ Index for Traffic Proximity	69	70	53
EJ Index for Lead Paint	18	16	12
EJ Index for Superfund Proximity	72	73	54
EJ Index for RMP Facility Proximity	64	53	31
EJ Index for Hazardous Waste Proximity	71	74	55
EJ Index for Underground Storage Tanks	63	62	46
EJ Index for Wastewater Discharge	N/A	N/A	N/A



This report shows the values for environmental and demographic indicators and EJSCREEN indexes. It shows environmental and demographic raw data (e.g., the estimated concentration of ozone in the air), and also shows what percentile each raw data value represents. These percentiles provide perspective on how the selected block group or buffer area compares to the entire state, EPA region, or nation. For example, if a given location is at the 95th percentile nationwide, this means that only 5 percent of the US population has a higher block group value than the average person in the location being analyzed. The years for which the data are available, and the methods used, vary across these indicators. Important caveats and uncertainties apply to this screening-level information, so it is essential to understand the limitations on appropriate interpretations and applications of these indicators. Please see EJSCREEN documentation for discussion of these issues before using reports.

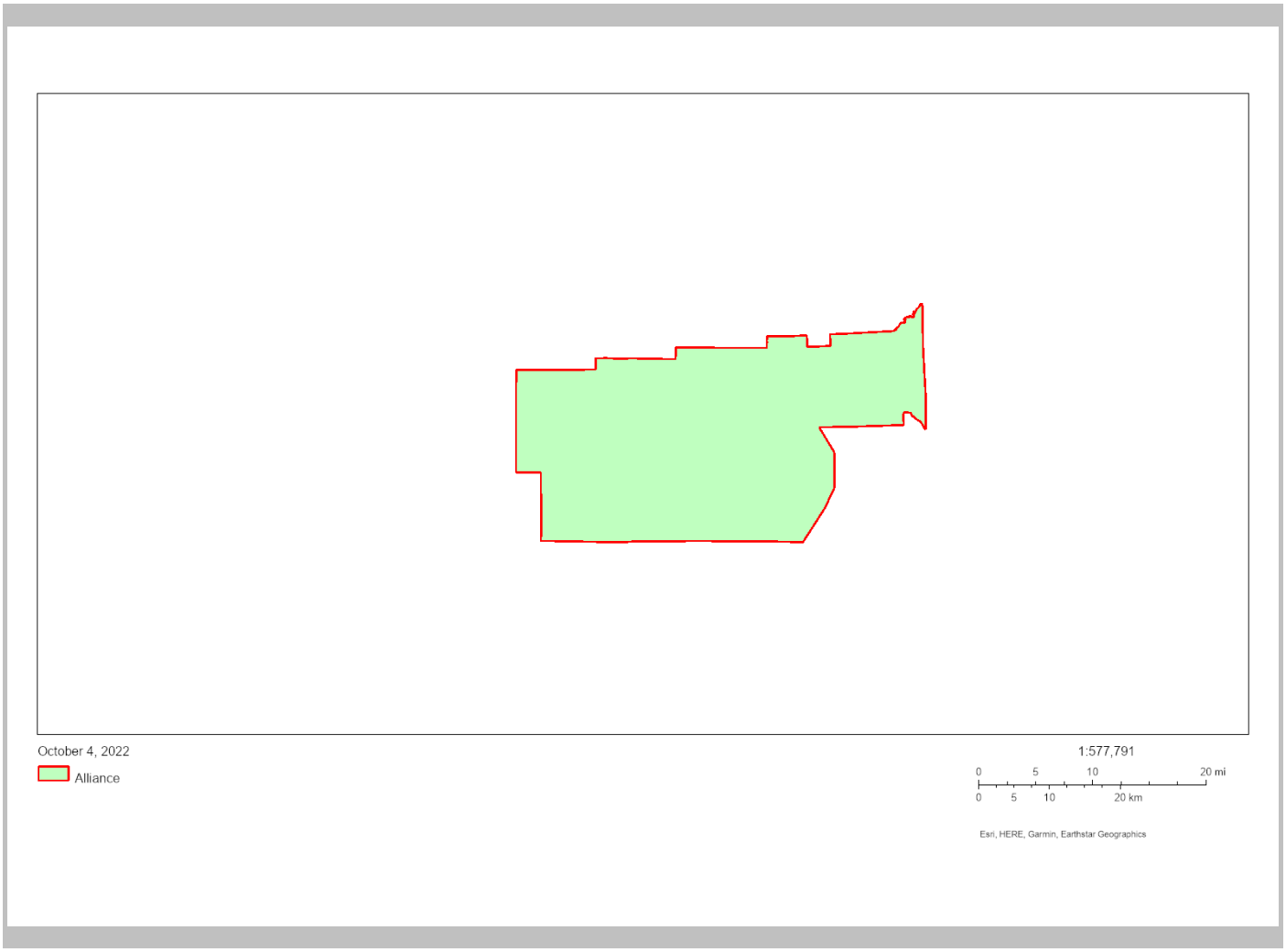
EJScreen Report (Version 2.0)

Blockgroup: 310139511002, NEBRASKA, EPA Region 7

Approximate Population: 868

Input Area (sq. miles): 506.68

Alliance



Sites reporting to EPA	
Superfund NPL	0
Hazardous Waste Treatment, Storage, and Disposal Facilities (TSDF)	0

EJScreen Report (Version 2.0)

Blockgroup: 310139511002, NEBRASKA, EPA Region 7

Approximate Population: 868

Input Area (sq. miles): 506.68

Alliance

Selected Variables	Value	State Avg.	%ile in State	EPA Region Avg.	%ile in EPA Region	USA Avg.	%ile in USA
Pollution and Sources							
Particulate Matter 2.5 (µg/m^3)	4.71	7.77	0	8.26	0	8.74	0
Ozone (ppb)	46.2	41.9	97	44.1	78	42.6	82
2017 Diesel Particulate Matter* (µg/m^3)	0.0542	0.18	2	0.221	<50th	0.295	<50th
2017 Air Toxics Cancer Risk* (lifetime risk per million)	10	22	6	26	<50th	29	<50th
2017 Air Toxics Respiratory HI*	0.1	0.26	2	0.33	<50th	0.36	<50th
Traffic Proximity (daily traffic count/distance to road)	4.6	720	8	410	7	710	4
Lead Paint (% Pre-1960 Housing)	0.54	0.35	71	0.33	75	0.28	79
Superfund Proximity (site count/km distance)	0.0065	0.13	1	0.1	0	0.13	1
RMP Facility Proximity (facility count/km distance)	0.31	1.5	21	0.95	39	0.75	49
Hazardous Waste Proximity (facility count/km distance)	0.016	0.73	4	1	1	2.2	1
Underground Storage Tanks (count/km^2)	0.0094	4.8	17	2.5	18	3.9	16
Wastewater Discharge (toxicity-weighted concentration/m distance)	N/A	0.17	N/A	2.9	N/A	12	N/A
Socioeconomic Indicators							
Demographic Index	15%	25%	36	25%	33	36%	20
People of Color	9%	21%	35	20%	39	40%	18
Low Income	22%	28%	41	30%	37	31%	39
Unemployment Rate	3%	3%	64	4%	53	5%	39
Linguistically Isolated	0%	3%	58	2%	65	5%	45
Less Than High School Education	4%	9%	37	9%	32	12%	25
Under Age 5	7%	7%	57	6%	63	6%	65
Over Age 64	18%	15%	64	16%	61	16%	65

*Diesel particular matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's 2017 Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

For additional information, see: www.epa.gov/environmentaljustice

EJSCREEN ACS Summary Report

Location: Blockgroup: 310139511002
Ring (buffer): 0-mile radius
Description: Alliance

Summary of ACS Estimates	2015 - 2019
Population	868
Population Density (per sq. mile)	2
People of Color Population	77
% People of Color Population	9%
Households	361
Housing Units	411
Housing Units Built Before 1950	201
Per Capita Income	30,259
Land Area (sq. miles) (Source: SF1)	505.57
% Land Area	100%
Water Area (sq. miles) (Source: SF1)	1.11
% Water Area	0%

	2015 - 2019 ACS Estimates	Percent	MOE (±)
Population by Race			
Total	868	100%	157
Population Reporting One Race	868	100%	211
White	859	99%	155
Black	0	0%	10
American Indian	0	0%	10
Asian	9	1%	16
Pacific Islander	0	0%	10
Some Other Race	0	0%	10
Population Reporting Two or More Races	0	0%	10
Total Hispanic Population	68	8%	94
Total Non-Hispanic Population	800		
White Alone	791	91%	137
Black Alone	0	0%	10
American Indian Alone	0	0%	10
Non-Hispanic Asian Alone	9	1%	16
Pacific Islander Alone	0	0%	10
Other Race Alone	0	0%	10
Two or More Races Alone	0	0%	10
Population by Sex			
Male	423	49%	78
Female	445	51%	96
Population by Age			
Age 0-4	62	7%	34
Age 0-17	180	21%	61
Age 18+	688	79%	103
Age 65+	153	18%	49

Data Note: Detail may not sum to totals due to rounding. Hispanic population can be of any race.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2015 - 2019 .

EJSCREEN ACS Summary Report

Location: Blockgroup: 310139511002
Ring (buffer): 0-mile radius
Description: Alliance

	2015 - 2019 ACS Estimates	Percent	MOE (±)
Population 25+ by Educational Attainment			
Total	606	100%	94
Less than 9th Grade	3	0%	12
9th - 12th Grade, No Diploma	22	4%	20
High School Graduate	232	38%	49
Some College, No Degree	159	26%	64
Associate Degree	119	20%	41
Bachelor's Degree or more	71	12%	33
Population Age 5+ Years by Ability to Speak English			
Total	806	100%	141
Speak only English	797	99%	126
Non-English at Home[1+2+3+4]	9	1%	19
[1]Speak English "very well"	0	0%	10
[2]Speak English "well"	9	1%	19
[3]Speak English "not well"	0	0%	10
[4]Speak English "not at all"	0	0%	10
[3+4]Speak English "less than well"	0	0%	10
[2+3+4]Speak English "less than very well"	9	1%	19
Linguistically Isolated Households*			
Total	0	0%	10
Speak Spanish	0	0%	10
Speak Other Indo-European Languages	0	0%	10
Speak Asian-Pacific Island Languages	0	0%	10
Speak Other Languages	0	0%	10
Households by Household Income			
Household Income Base	361	100%	70
< $15,000	4	1%	12
$15,000 - $25,000	20	6%	19
$25,000 - $50,000	111	31%	47
$50,000 - $75,000	86	24%	38
$75,000 +	140	39%	42
Occupied Housing Units by Tenure			
Total	361	100%	70
Owner Occupied	310	86%	61
Renter Occupied	51	14%	37
Employed Population Age 16+ Years			
Total	688	100%	112
In Labor Force	374	54%	80
Civilian Unemployed in Labor Force	12	2%	13
Not In Labor Force	314	46%	77

Data Note: Datail may not sum to totals due to rounding. Hispanic population can be of anyrace.
N/A means not available. **Source:** U.S. Census Bureau, American Community Survey (ACS)
*Households in which no one 14 and over speaks English "very well" or speaks English only.

EJSCREEN ACS Summary Report

Location: Blockgroup: 310139511002
Ring (buffer): 0-mile radius
Description: Alliance

	2015 - 2019 ACS Estimates	Percent	MOE (±)
Population by Language Spoken at Home*			
Total (persons age 5 and above)	N/A	N/A	N/A
English	N/A	N/A	N/A
Spanish	N/A	N/A	N/A
French	N/A	N/A	N/A
French Creole	N/A	N/A	N/A
Italian	N/A	N/A	N/A
Portuguese	N/A	N/A	N/A
German	N/A	N/A	N/A
Yiddish	N/A	N/A	N/A
Other West Germanic	N/A	N/A	N/A
Scandinavian	N/A	N/A	N/A
Greek	N/A	N/A	N/A
Russian	N/A	N/A	N/A
Polish	N/A	N/A	N/A
Serbo-Croatian	N/A	N/A	N/A
Other Slavic	N/A	N/A	N/A
Armenian	N/A	N/A	N/A
Persian	N/A	N/A	N/A
Gujarathi	N/A	N/A	N/A
Hindi	N/A	N/A	N/A
Urdu	N/A	N/A	N/A
Other Indic	N/A	N/A	N/A
Other Indo-European	N/A	N/A	N/A
Chinese	N/A	N/A	N/A
Japanese	N/A	N/A	N/A
Korean	N/A	N/A	N/A
Mon-Khmer, Cambodian	N/A	N/A	N/A
Hmong	N/A	N/A	N/A
Thai	N/A	N/A	N/A
Laotian	N/A	N/A	N/A
Vietnamese	N/A	N/A	N/A
Other Asian	N/A	N/A	N/A
Tagalog	N/A	N/A	N/A
Other Pacific Island	N/A	N/A	N/A
Navajo	N/A	N/A	N/A
Other Native American	N/A	N/A	N/A
Hungarian	N/A	N/A	N/A
Arabic	N/A	N/A	N/A
Hebrew	N/A	N/A	N/A
African	N/A	N/A	N/A
Other and non-specified	N/A	N/A	N/A
Total Non-English	N/A	N/A	N/A

Data Note: Detail may not sum to totals due to rounding. Hispanic popultion can be of any race.
N/A meansnot available. **Source:** U.S. Census Bureau, American Community Survey (ACS) 2015 - 2019.
*Population by Language Spoken at Home is available at the census tract summary level and up.

APPENDIX F

AGENCY CORRESPONDENCE

NEBRASKA
GAME PARKS

2200 N. 33rd St. • P.O. Box 30370 • Lincoln, NE 68503-0370 • Phone: 402-471-0641

October 25, 2022

Ms. Jean Ramer
Terracon Consultants Inc.
15080 A Circle
Omaha, NE 68144

Re: MEAN Solar Alliance, CERT-007688 (NGPC Proj SOLR22017; Terracon Proj 0522P069), Box Butte County, Nebraska

Dear Ms. Ramer:

Please make reference to your email and associated CERT Environmental Review Report (ERR), dated September 24, 2022. This letter is in response to a request for a review of this project location's potential impacts to endangered and threatened species in Box Butte County, Nebraska. As we understand it, the project would involve the installation of a Solar Array for renewable energy generation and associated collection and interconnection lines. The Nebraska Game and Parks Commission has responsibility for protecting endangered and threatened species under authority of the Nongame and Endangered Species Conservation Act (NESCA) (Neb. Rev. Stat. § 37-801 to 37-811). We have reviewed the project pursuant to NESCA and offer the following comments. This letter should be used in combination with the CERT ERR to constitute a complete environmental review for this project.

This project is within the range of the federal and state listed endangered blowout penstemon (*Penstemon haydenii*); the federal and state listed threatened northern long-eared bat (*Myotis septentrionalis*); and the state listed endangered swift fox (*Vulpes velox*). There are no known records of any state-listed species within the immediate vicinity of the project area. The proposed project location consists of a regularly disturbed, agricultural fields approximately 1-mile west of the city limits of Alliance. It does not appear that any suitable habitat exists within the project area for any of the aforementioned species. Due to the lack of suitable habitat, it is unlikely this project would have an adverse impact on any state-listed threatened or endangered species.

Based on the information provided and the absence of suitable habitat for listed species, we acknowledge the determination that the Project would have "**no effect**" to state-listed endangered or threatened species. There is no requirement under the state statute and implementing regulations of the Nebraska Nongame and Endangered Species Conservation Act (Neb. Rev. Stat. § 37-807 (3); Title 163 Chap. 4 Sec. 012.02B8) for action agencies to receive Commission concurrence with "no effect" determinations; therefore, the responsibility for "no effect" determinations remain with the State agency responsible for approval, funding, permitting, or carrying out the proposed action. We recommend you retain the documentation for this conclusion in your decisional record and ensure that any state agency involved in the development of this project receives this information.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Nebraska Ecological Services Field Office
9325 B South Alda Rd., Ste B
Wood River, NE 68883-9565
Phone: (308) 382-6468 Fax: (308) 384-8835

In Reply Refer To:
Project Code: 2023-0061834
Project Name: Solar Farm

March 29, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: https://www.fws.gov/media/endangered-species-consultation-handbook or at our Nebraska Field Office webpage (https://www.fws.gov/office/nebraska-ecological-services/project-planning-and-review-under-endangered-species-act).

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts and permitting see https://www.fws.gov/program/migratory-bird-permit

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit:

https://www.federalregister.gov/documents/2012/10/03/2012-24433/migratory-bird-conservation-executive-order-13186

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Consultation Code

(YEAR-XXXXXXX) in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Nebraska Ecological Services Field Office
9325 B South Alda Rd., Ste B
Wood River, NE 68883-9565
(308) 382-6468

PROJECT SUMMARY

Project Code: 2023-0061834
Project Name: Solar Farm
Project Type: Power Gen - Solar
Project Description: The 60-acre site will be developed for distributed solar power generation, which includes the solar panels and associated support structures (racking), electrical inverters/transformers, buried electrical conduit, access apron, and security fencing. The proposed solar generation facility will be placed on land owned by Alliance, connecting to its municipal electric distribution system.

Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@42.094011,-102.9277267264907,14z

Counties: Box Butte County, Nebraska

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened

FISHES

NAME	STATUS
Pallid Sturgeon *Scaphirhynchus albus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7162	Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Lark Bunting *Calamospiza melanocorys* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds May 10 to Aug 15
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

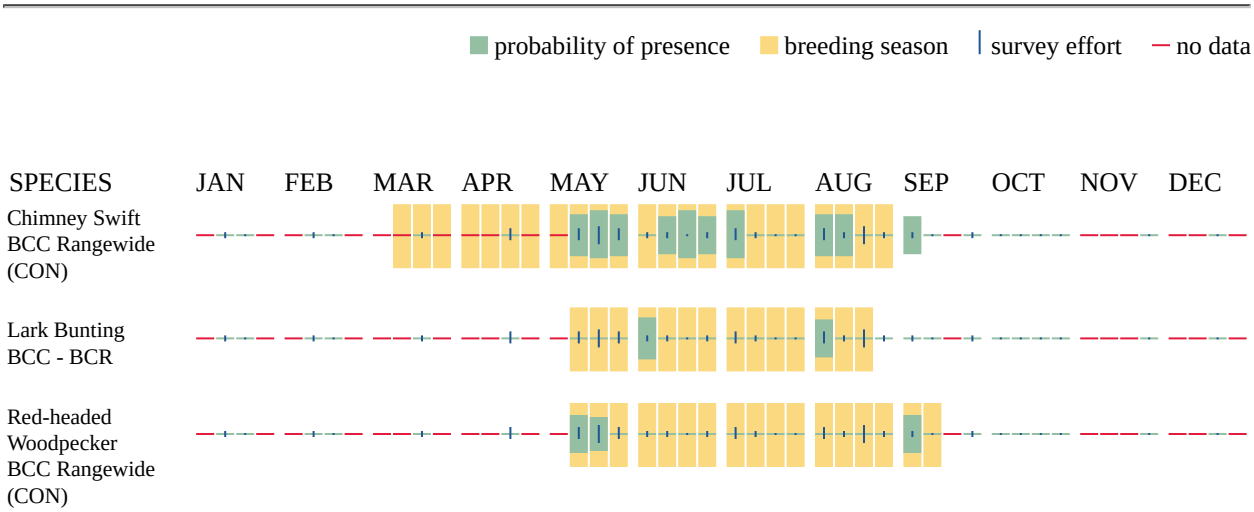
Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe

Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?
Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects
For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?
If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report
The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

THERE ARE NO WETLANDS WITHIN YOUR PROJECT AREA.

IPAC USER CONTACT INFORMATION

Agency: Terracon Consultants, Inc.
Name: Jean Ramer
Address: 15080 A Circle
City: Omaha
State: NE
Zip: 68144
Email jean.ramer@terracon.com
Phone: 4068307621

This information is being provided based on a review of the material you sent, aerial photographs, and our Nebraska Natural Heritage Database. If the proposed project moves forward or is changed, then we recommend further coordination with the Nebraska Game and Parks Commission Planning & Programming Division.

We also strongly recommend that solar project developers plan, construct, and operate their project in such a way as to avoid adverse impacts to all at-risk species, particularly pollinator species, such as monarch butterfly (*Danaus plexippus*) and Iowa skipper (*Atrytone arogos iowa*). The Commission encourages cooperative conservation efforts for Tier 1 At-Risk species, as identified in Table 4 of the ERR, on renewable energy projects. The Rights-of-Way as Habitat Working Group has identified a number of best management practices (BMPs) for pollinator-friendly solar energy located here: http://rightofway.erc.uic.edu/resources/best-management-practices/.

For an assessment of potential impacts to habitats and species protected under federal wildlife laws, including federally listed, candidate or proposed endangered or threatened species, please contact the Nebraska Field Office (nebraskaes@fws.gov), U.S. Fish and Wildlife Service, 9325 South Alda Road, Wood River, NE 68883.

Thank you for the opportunity to comment. If you have any questions or need additional information, please feel free to contact me at (402) 471-5422 or melissa.marinovich@nebraska.gov.

Sincerely,

Melissa Marinovich
Assistant Division Administrator
Planning and Programming Division

ec: USFWS (nebraskaes@fws.gov)

Ramer, Jean L

From: Brent Kusek <BKusek@cityofalliance.net>
Sent: Wednesday, March 1, 2023 10:11 AM
To: Ramer, Jean L
Subject: RE: MEAN Solar Site - Comments Requested Kusek Floodplain

That is correct, the 100 year floodplain is Zone A, and the 100-500 year floodplain is Zone B. Areas of minimal flooding are Zone C.

Thank you,

Brent

From: Ramer, Jean L <Jean.Ramer@terracon.com>
Sent: Wednesday, March 1, 2023 9:07 AM
To: Brent Kusek <BKusek@cityofalliance.net>
Subject: RE: MEAN Solar Site - Comments Requested Kusek

Thanks Brent,
My understanding is that Zone C is outside of both the 500- and 100-year floodplains. Is that correct?

Jean Ramer, CESCP
Senior Scientist
Terracon
15080 A Circle I Omaha, NE 68144
D (402) 384-7046 I F (402) 330-7606 I M (406) 830-7621
jean.ramer@terracon.com I Terracon.com

Learn more about how we can help by visiting our **video channel**

From: Brent Kusek <BKusek@cityofalliance.net>
Sent: Wednesday, March 1, 2023 9:47 AM
To: Ramer, Jean L <Jean.Ramer@terracon.com>
Subject: RE: MEAN Solar Site - Comments Requested Kusek

Jean,

According to the FIRM 310011 0015A, that area is Zone C. It is an area of minimal flooding.

Thank you,

Brent

From: Ramer, Jean L <Jean.Ramer@terracon.com>
Sent: Tuesday, February 28, 2023 4:26 PM
To: Brent Kusek <BKusek@cityofalliance.net>
Subject: RE: MEAN Solar Site - Comments Requested Kusek

Hello Brent,
Our USDA NEPA reviewer has asked for a determination as to whether the proposed Sandhills Municipal Solar site near Alliance lies within the 100-year or 500-year floodplain. I looked on the FEMA website and the NDNR website and wasn't able to find anything that would indicate floodplain status.

The NDNR site lists you as the floodplain administrator. Could you please reply with indication of the floodplain status of the proposed solar farm parcel?

Thank you for your assistance.

Jean Ramer, CESCP
Senior Scientist
Terracon
15080 A Circle I Omaha, NE 68144
D (402) 384-7046 I F (402) 330-7606 I M (406) 830-7621
jean.ramer@terracon.com I Terracon.com

Learn more about how we can help by visiting our **video channel**

From: Brent Kusek <BKusek@cityofalliance.net>
Sent: Monday, October 3, 2022 1:24 PM
To: Ramer, Jean L <Jean.Ramer@terracon.com>
Subject: RE: MEAN Solar Site - Comments Requested Kusek

Jean,

The City of Alliance requires the issuance of a Conditional Use Permit for this type of land use in Agriculture Zoning. Information on many of the issues you are asking feedback for would be discussed and noted during the CUP process.

I believe Kirby Bridge was working with you and the City attorney to determine what code issues may crop up. The only one that I was asked about was the zoning portion which would also be taken care of with the Conditional Use Permit.

Please note that the sooner the application and supporting material (site plan, etc.) are received the better. Our Planning Commission only meets once a month and we have very stringent advertising deadlines that we need to meet.

Please let me know if you have any other questions or need anything at this point in time.

Thank you,

Brent Kusek
Community Development Director
City of Alliance
P.O. Box D
324 Laramie Avenue
Alliance, NE 69301
(308)762-5400

From: Ramer, Jean L <Jean.Ramer@terracon.com>
Sent: Monday, September 26, 2022 4:16 PM
To: Brent Kusek <BKusek@cityofalliance.net>
Subject: RE: MEAN Solar Site - Comments Requested

Referenced map included. Please pardon the oversight.

From: Ramer, Jean L
Sent: Monday, September 26, 2022 5:01 PM
To: bkusek@cityofalliance.net
Subject: RE: MEAN Solar Site - Comments Requested

Dear Mr. Kusek

SE Municipal Solar, LLC is requesting information on the possible effects of the proposal on the resources above and any recommendations you may have to minimize or avoid potential adverse effects. We also seek your assessment of the compatibility of the proposal with state and local government or any private programs and policies within your jurisdiction to protect important resources. We would appreciate a response within 60 days or by November 25, 2022.

Thank you!

Jean Ramer, CESCP
Senior Scientist
15080 A Circle I Omaha, NE 68144
D (402) 384-7046 I F (402) 330-7606 I M (406) 830-7621
jean.ramer@terracon.com I Terracon.com

Ramer, Jean L

From: Brent Kusek <BKusek@cityofalliance.net>
Sent: Monday, October 3, 2022 1:24 PM
To: Ramer, Jean L
Subject: RE: MEAN Solar Site - Comments Requested Kusek

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Brent Kusek
Community Development Director
City of Alliance
P.O. Box D
324 Laramie Avenue
Alliance, NE 69301
(308)762-5400

Alliance
Nebraska

From: Ramer, Jean L <Jean.Ramer@terracon.com>
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Subject: RE: MEAN Solar Site - Comments Requested

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Thank you!

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Senior Scientist
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Upper Niobrara White Natural Resources District

Serving Box Butte, Dawes, Sheridan and Sioux Counties

430 East Second Street * Chadron, Nebraska 69337 * Phone (308) 432-6190
Fax (308) 432-6187 * www.unwnrd.org

September 28, 2022

Jean Ramer
Terracon
15080 A Circle
Omaha, NE 68144

RE: City of Alliance Solar Project

Dear Ms. Ramer:

The Upper Niobrara White NRD (UNWNRD) has received the notice of the proposed solar project being pursued by the City of Alliance located in the south ½ of Section 33, Township 25N and Range 48 West. Based on the letter of description, it is unclear of what activity will take place on the property before, during or after construction. Based on the lack of information, the following comments are being submitted on behalf of the UNWNRD.

- A moratorium on the development of high-capacity wells, greater than 50 gallons per minute is in place for the project site. Prior to drilling any high-capacity well, a variance would need to be applied for and granted by the UNWNRD board of directors.
- The UNWNRD administers sediment and erosion control regulations within the district and would investigate any complaints of soil erosions stemming from either wind or water events. In the case of an industrial site, the UNWNRD would consult with the Nebraska Department of Environment and Energy to investigate the situation and make recommendations. To avoid any complaints, the UNWNRD encourages the implementation of best management practices to prevent any erosion.

Feel free to contact the UNWNRD with any questions you may have regarding the above comments.

Sincerely

Patrick O'Brien
General Manager

Ramer, Jean L

From: Seth Sorensen <ssorensen@cityofalliance.net>
Sent: Monday, November 21, 2022 4:58 PM
To: Ramer, Jean L
Subject: Re: MEAN Solar Site - Comments Requested

Follow Up Flag: Follow up
Flag Status: Flagged

Mrs. Ramer,

On behalf of the City of Alliance, please consider the following comments in response to your inquiry dated 9/26/22:

1. The land is currently being used for hay and cattle grazing.
2. The electrical structures should be built with wildlife clearances or "raptor build" specifications.
3. Proposed site will be off of the major road by a significant distance so the impact to aesthetics should be minimal
4. Site should be a fenced in enclosure for safety

Thank you,

Seth Sorensen
City Manager
324 Laramie Avenue
P.O. Box D
Phone: (308) 762-5400
Fax: (308) 762-7848
ssorensen@cityofalliance.net

From: Ramer, Jean L <Jean.Ramer@terracon.com>
Sent: Monday, September 26, 2022 4:20 PM
To: Seth Sorensen <ssorensen@cityofalliance.net>
Subject: RE: MEAN Solar Site - Comments Requested

Dear Seth Sorensen,

SE Municipal Solar, LLC is requesting information on the possible effects of the proposal on the resources above and any recommendations you may have to minimize or avoid potential adverse effects. We also seek your assessment of the compatibility of the proposal with state and local government or any private programs and policies within your jurisdiction to protect important resources. We would appreciate a response within 60 days or by November 25, 2022.

Thank you!

Jean Ramer, CESCP
Senior Scientist

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History NEBRASKA

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8/24/2022

Addresses these sites:
Alliance (EA), Ansley (ER), Pender (ER), Sidney (EA), and Stuart (ER)

Brad Oeltjenbruns
Ebenezer Management, LLC
VIA EMAIL

RE: HP# 2205-090-01, 2205-091-01, 2205-101-01, 2205-102-01, 2205-103-01; *A Phase II Cultural Resources Investigation of the Ebenezer Management, LLC Municipal Solar Project Localities in Box Butte, Cheyenne, Custer, Holt, and Thurston Counties, Nebraska*

Mr. Oeltjenbruns:

Thank you for submitting the cultural resource survey report prepared for the above referenced project for Nebraska State Historic Preservation Office (NeSHPO) review and comment. Our comment on this project and its potential to affect historic properties is required by Section 106 of the National Historic Preservation Act of 1966, as amended in 2014, and implementing regulations 36 CFR Part 800.

This report documents the results of a cultural resources investigation prior to the project. Based on the information provided, the proposed undertaking is unlikely to affect any cultural resources listed on the National Register of Historic Places or eligible for such a listing. Therefore, the NeSHPO concurs that the determination of **no historic properties affected** is appropriate for this undertaking and the project should proceed as planned.

However, even though the project occurs within an area that has been evaluated by a professional archeologist, there is the possibility that buried or otherwise obscured cultural or human remains may be discovered during the undertaking. If any such discovery is made, please contact this office immediately for further instruction.

Be advised that this determination does not necessarily reflect the opinion of Native American Tribes that may have an interest in the area, nor does it pertain to Traditional Cultural Properties, if they exist in the area.

Please retain this correspondence and your documented finding in order to show compliance with Section 106 of the National Historic Preservation Act, as amended and submit this letter to the project's lead federal agency to fulfill the statutory obligation of Section 106 consultation with the NeSHPO. If you have any questions, please contact me at john.swigart@nebraska.gov or 402-560-0574.

Sincerely,

John Swigart
Preservation Archeologist

1500 R Street
Lincoln, NE 68508-1651
P: 402.471.3270
P: 800.833.6747
F: 402.471.3100
history.nebraska.gov

Gmail

Brad Oeltjenbruns <brad.oeltjenbruns@gmail.com>

Municipal Solar project

2 messages

cchistory@midstatesd.net <cchistory@midstatesd.net> Tue, May 24, 2022 at 9:02 AM
To: brad.oeltjenbruns@gmail.com

The Crow Creek Sioux Tribe THPO has reviewed the proposed solar array project, the CCST has no concerns or objections with the project,any inadvertent discoveries during construction should be reported to the CCST-THPO
Thank you
Merle Marks
Crow Creek Sioux Tribe
THPO - Director
605.245.2221

Brad Oeltjenbruns <brad.oeltjenbruns@gmail.com> Wed, May 25, 2022 at 4:59 PM
To: "cchistory@midstatesd.net" <cchistory@midstatesd.net>

Thank you!
Will do.
BJO
[Quoted text hidden]

United States Department of Agriculture

Natural Resources Conservation Service
Nebraska State Office
Federal Building, Room 152
100 Centennial Mall North
Lincoln, NE 68508-3866
(402) 437-5300 http://www.ne.nrcs.usda.gov

Subject: LNU – Farmland Protection
Proposed Solar Project - Alliance
NEPA/FPPA Evaluation
Box Butte County, Nebraska

Date: June 28, 2022

To: Ebenezer Management LLC
Attn: Brad Oeltjenbruns (opeople@lvcta.com)

File Code: 310

We have reviewed the information provided in your correspondence dated June 9, 2022, concerning the proposed solar project located in Box Butte County, Nebraska. This review is part of the National Environmental Policy Act (NEPA) evaluation for the U.S. Department of Agriculture, Rural Development (RD). We have evaluated the proposed site as required by the Farmland Protection Policy Act (FPPA).

The proposed site contains areas of Statewide Important Farmland and we have completed the Farmland Conversion Impact Rating form (AD-1006) for the proposed site. The combined rating of the site is 150. The FPPA law states that sites with a rating less than 160 will need no further consideration for protection and no additional evaluation is necessary. We encourage the use of accepted erosion control methods during the construction of this project.

If you have further questions, please contact Carlos Villarreal at 402.437.4105 or by email at carlos.villarreal@usda.gov (preferred).

Sincerely,

CARLOS J. VILLARREAL
USDA-NRCS Nebraska State Soil Scientist

Attachment: EM Solar Installation Project Alliance_NE013.pdf (AD1006)

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*		Date Of Land Evaluation Request 6/28/22	
Name of Project EM Solar Installation Project Alliance		Federal Agency Involved USDA RD	
Proposed Land Use Solar Panel Installation		County and State Box Butte County, Nebraska	
PART II *(To be completed by NRCS)*		Date Request Received By NRCS 6/9/2022	Person Completing Form: Carlos J. Villarreal
Does the site contain Prime, Unique, Statewide or Local Important Farmland? *(If no, the FPPA does not apply - do not complete additional parts of this form)*	YES ☑ NO ☐	Acres Irrigated 138,458	Average Farm Size 1571.0
Major Crop(s) Corn, Cotton, Small Grains	Farmable Land In Govt. Jurisdiction Acres: 677,164 % 98.2	Amount of Farmland As Defined in FPPA Acres: 381,980 % 55.4	
Name of Land Evaluation System Used NCCPI	Name of State or Local Site Assessment System NONE	Date Land Evaluation Returned by NRCS 6/28/22	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	186			
B. Total Acres To Be Converted Indirectly	0			
C. Total Acres In Site	186			
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	105			
B. Total Acres Statewide Important or Local Important Farmland	0			
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	0.02746			
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	43			
PART V (To be completed by NRCS) Land Evaluation Criterion Relative Value of Farmland To Be Converted (Scale of 0 to 100 Points)	67			

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(Criteria are explained in 7 CFR 658.5 b. For Corridor project use form NRCS-CPA-106)*	**Maximum Points**	Site A	Site B	Site C	Site D
1. Area In Non-urban Use	(15)	15			
2. Perimeter In Non-urban Use	(10)	10			
3. Percent Of Site Being Farmed	(20)	20			
4. Protection Provided By State and Local Government	(20)	20			
5. Distance From Urban Built-up Area	(15)	8			
6. Distance To Urban Support Services	(15)	10			
7. Size Of Present Farm Unit Compared To Average	(10)	0			
8. Creation Of Non-farmable Farmland	(10)	0			
9. Availability Of Farm Support Services	(5)	0			
10. On-Farm Investments	(20)	0			
11. Effects Of Conversion On Farm Support Services	(10)	0			
12. Compatibility With Existing Agricultural Use	(10)	0			
TOTAL SITE ASSESSMENT POINTS	160	83	0	0	0
PART VII ***(To be completed by Federal Agency)***					
Relative Value Of Farmland *(From Part V)*	100	67	0	0	0
Total Site Assessment *(From Part VI above or local site assessment)*	160	83	0	0	0
TOTAL POINTS ***(Total of above 2 lines)***	260	150	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? YES ☐ NO ☑

Reason For Selection:

Name of Federal agency representative completing this form:	Date:

(See Instructions on reverse side) **Form AD-1006 (03-02)**

STEPS IN THE PROCESSING THE FARMLAND AND CONVERSION IMPACT RATING FORM

Step 1 - Federal agencies (or Federally funded projects) involved in proposed projects that may convert farmland, as defined in the Farmland Protection Policy Act (FPPA) to nonagricultural uses, will initially complete Parts I and III of the form. For Corridor type projects, the Federal agency shall use form NRCS-CPA-106 in place of form AD-1006. The Land Evaluation and Site Assessment (LESA) process may also be accessed by visiting the FPPA website, http://fppa.nrcs.usda.gov/lesa/.

Step 2 - Originator (Federal Agency) will send one original copy of the form together with appropriate scaled maps indicating location(s)of project site(s), to the Natural Resources Conservation Service (NRCS) local Field Office or USDA Service Center and retain a copy for their files. (NRCS has offices in most counties in the U.S. The USDA Office Information Locator may be found at http://offices.usda.gov/scripts/ndISAPI.dll/oip_public/USA_map**,** or the offices can usually be found in the Phone Book under U.S. Government, Department of Agriculture. A list of field offices is available from the NRCS State Conservationist and State Office in each State.)

Step 3 - NRCS will, within 10 working days after receipt of the completed form, make a determination as to whether the site(s) of the proposed project contains prime, unique, statewide or local important farmland. (When a site visit or land evaluation system design is needed, NRCS will respond within 30 working days.

Step 4 - For sites where farmland covered by the FPPA will be converted by the proposed project, NRCS will complete Parts II, IV and V of the form.

Step 5 - NRCS will return the original copy of the form to the Federal agency involved in the project, and retain a file copy for NRCS records.

Step 6 - The Federal agency involved in the proposed project will complete Parts VI and VII of the form and return the form with the final selected site to the servicing NRCS office.

Step 7 - The Federal agency providing financial or technical assistance to the proposed project will make a determination as to whether the proposed conversion is consistent with the FPPA.

INSTRUCTIONS FOR COMPLETING THE FARMLAND CONVERSION IMPACT RATING FORM

(For Federal Agency)

Part I: When completing the "County and State" questions, list all the local governments that are responsible for local land use controls where site(s) are to be evaluated.

Part III: When completing item B (Total Acres To Be Converted Indirectly), include the following:

1. Acres not being directly converted but that would no longer be capable of being farmed after the conversion, because the conversion would restrict access to them or other major change in the ability to use the land for agriculture.
2. Acres planned to receive services from an infrastructure project as indicated in the project justification (e.g. highways, utilities planned build out capacity) that will cause a direct conversion.

Part VI: Do not complete Part VI using the standard format if a State or Local site assessment is used. With local and NRCS assistance, use the local Land Evaluation and Site Assessment (LESA).

1. Assign the maximum points for each site assessment criterion as shown in § 658.5(b) of CFR. In cases of corridor-type project such as transportation, power line and flood control, criteria #5 and #6 will not apply and will, be weighted zero, however, criterion #8 will be weighed a maximum of 25 points and criterion #11 a maximum of 25 points.

2. Federal agencies may assign relative weights among the 12 site assessment criteria other than those shown on the FPPA rule after submitting individual agency FPPA policy for review and comment to NRCS. In all cases where other weights are assigned, relative adjustments must be made to maintain the maximum total points at 160. For project sites where the total points equal or exceed 160, consider alternative actions, as appropriate, that could reduce adverse impacts (e.g. Alternative Sites, Modifications or Mitigation).

Part VII: In computing the "Total Site Assessment Points" where a State or local site assessment is used and the total maximum number of points is other than 160, convert the site assessment points to a base of 160.
Example: if the Site Assessment maximum is 200 points, and the alternative Site "A" is rated 180 points:

$$\frac{\text{Total points assigned Site A}}{\text{Maximum points possible}} = \frac{180}{200} \text{ X } 160 = 144 \text{ points for Site A}$$

For assistance in completing this form or FPPA process, contact the local NRCS Field Office or USDA Service Center.

NRCS employees, consult the FPPA Manual and/or policy for additional instructions to complete the AD-1006 form.

NEBRASKA

Good Life. Great Resources.

DEPT. OF ENVIRONMENT AND ENERGY

Pete Ricketts, Governor

October 21, 2022

ATTN: Mr. Brian Boerner

RE: MEAN Solar Project - Box Butte County NOI

Dear Mr.Boerner,

The Nebraska Department of Environment and Energy (NDEE) has reviewed the above referenced project. As with any project, permits may be required prior to beginning construction or operation. At a minimum, you should be aware of the possible requirements or permits:

	Contact	**Phone**
Air Quality	Lindsey Hollmann	(402) 471-4212
Construction Storm Water	Daniel Kroll	(402) 471-4370
Drinking Water	Hillary Stoll	(402) 471-4252
Wastewater	Hillary Stoll	(402) 471-4252
Water Quality	Dane Pauley	(402) 471-1056
Waste Disposal	Erik Waiss	(402) 471-8308

Air Quality: Fugitive Dust Title 129 Chapter 15 Section 003 regulations shall apply to all demolition, grading, and construction activities.

Construction Storm Water: The proposed project will require authorization under the Construction Storm Water General Permit (CSW-GP).
A Threatened and Endangered Species consultation may be required prior to CSW-GP notice of intent (NOI) approval. The Nebraska Game and Parks Commission, Conservation and Environmental Review Tool (CERT), is used to complete this consultation.
The land application of concrete grooving/grinding slurry generated from any Public Agency, or their contractor, in a transportation right-of-way requires authorization under the general NPDES permit for the Land Application of Concrete Grooving/Grinding Slurry
Excavation dewatering requires authorization under a general permit unless comprised entirely of storm water. Notification to the Department is required for excavations encountering contamination, or in areas of known contamination.

Drinking Water: No comments for this project.

Wastewater: No comments for this project.

Water Quality: The project is located within a Wellhead Protection (WHP) area, check the City of Alliance to see if they have ordinances within their WHP boundaries. There is not a Title 117 stream or wetland on this site but proper BMPs should be applied to the construction site to prevent possible runoff to streams.

Waste Disposal: Construction and operation of a 2.8 MW solar array, and associated infrastructure - No Waste Permit Required. All waste generated or discovered on site must be properly handled, contained, and disposed as per all applicable regulations found in NE Title 128 - Nebraska Hazardous Waste Regulations and NE Title 132 - Integrated Solid Waste Management Regulations. This includes proper waste determinations and characterization before disposal. Where possible, NDEE urges reuse and recycling of any materials generated by the project. If you have any questions about solid or hazardous waste regulations, please contact the Environmental Assistance Coordinator for the Waste Compliance Section of DEE at (402) 471-8308.

If you have any other questions, feel free to contact the individuals listed above. For more information, please visit our website at dee.ne.gov

Sincerely,

Alicia Boss

Alicia Boss
Administrative Specialist

Ramer, Jean L

From: Porath, Mark T <mark_porath@fws.gov> on behalf of Nebraskaes, FW6 <Nebraskaes@fws.gov>
Sent: Thursday, October 6, 2022 5:48 AM
To: Ramer, Jean L
Cc: Stansberry, Brooke
Subject: Re: [EXTERNAL] RE: NE-CERT-007688 - SE Municipal Solar - Alliance, NE

Jean,
Thank you for forwarding the species list included as part of the Technical Assistance Letter generated by the CERT process (your attachment). Your interest in protecting and conserving Nebraska's and our Nation's natural resources is deeply appreciated. As indicated at the bottom of page 2 (highlighted for your convenience) this is the initial step for the project proponent to begin working with the lead federal agency responsible for complying with several resource federal protection acts. If you are unsure of which federal agency is the lead, consider that the most common connections are through grant funding or issuance of permits with a federal nexus (i.e., FEMA funds, 404 or stormwater permitting, etc.).

Both the CERT and IPaC programs generate a list of public trust species that should be considered when undertaking a project. The list generated is based entirely on your submitted location information and is intended to narrow the review scope to only those species potentially impacted by the proposed project, as they are known to occur or may be influenced by activities in the area.

Once the list is generated, the next step is to evaluate whether the project activities (i.e., construction, planning, restoration, etc.) may potentially effect these species. The project activities are then reviewed for potential impacts for each species listed, and specifically address how potential negative impacts to can and will be avoided or minimized by the proponent. The lead federal agency will then evaluate the submitted information and make a determination for each species on whether the project activities at this location with have "no effect", "may effect, but not adversely affect", "may effect, likely to adversely affect", or "likely to jeopardize". The lead federal agency will then consult with our office on their determination.

It is often most efficient if the proponent proactively incorporates avoidance and/or minimization features, and then provides this information to the lead federal agency. Species information continues to be updated and is available at the US Fish and Wildlife Service (https://www.fws.gov/) and Nebraska Ecological Services Field Office (https://www.fws.gov/office/nebraska-ecological-services) websites.

The Service also has responsibility for the conservation and management of fish and wildlife resources for the benefit of the American public under the following authorities: Endangered Species Act (ESA); Fish and Wildlife Coordination Act (FWCA); Bald and Golden Eagle Protection Act (Eagle Act); and the Migratory Bird Treaty Act (MBTA). We have included below some general recommendations to assist you as you finalize your projects submittal package.

> Wildlife Friendly Solar Recommendations (fencing and migratory birds protection)
> The Service understands that utility-scale solar facilities must comply with the National Electric and National Fire Protection Codes, which require fencing that is at least seven feet high with the top foot consisting of barbed wire. The Service recommends that developers consider implementing wildlife-permeable fencing such as Pine Gate Renewables has researched with The Nature Conservancy in North Carolina. Pine Gate installs perimeter fencing with larger holes at the bottom to allow smaller mammals such as raccoons, rabbits, and foxes to pass through. This helps maximize benefits to wildlife from solar development and prevent barriers to wildlife movements.

Avian interactions with photovoltaic (PV) facilities are not well understood. Primary threats are from collisions with PV equipment and transmission lines and electrocutions from the substation and distribution lines. Collisions from PV systems can include direct collisions into guy wires or transmission lines. Other collisions are less understood such as the "lake effect" theory where migrating waterfowl, songbirds, and shorebirds may be confused by the polarized light reflecting off artificial surfaces from the PV facility and collide with them as they attempt to land on the panels. The Service recommends developers work with Omaha Public Power District (OPPD) to develop an Avian Protection Plan (APP). An APP is voluntary but outline BMPs that help to minimize avian mortality from utility infrastructure and its operation and management. OPPD already has an APP in place, (https://www.oppd.com/media/316688/avian-protection-plan.pdf) that the Project could also utilize.

We sincerely hope that this information and the generated species list assists you in the project review process. Our goal is to assist you towards a successful project that also protects, conserves or enhances our natural resources.

Regards,
Mark

Mark Porath
Nebraska Project Leader/Field Supervisor
Ecological Services, Mountain-Prairie Region
U.S. Fish and Wildlife Service
Office: 308-382-6468
Cell: 308-216-2077
mark_porath@fws.gov
nebraskaes@fws.gov

Nebraska Field Office
U.S. Fish and Wildlife Service
9325 South Alda Road
Wood River, Nebraska 68883
NebraskaES@fws.gov
For a species list, visit https://ecos.fws.gov/ipac/
Office information https://www.fws.gov/nebraskaes/index.php

From: Ramer, Jean L <Jean.Ramer@terracon.com>
Sent: Saturday, September 24, 2022 2:44 PM
To: NGPC EnvReview <ngpc.envreview@nebraska.gov>
Cc: Nebraskaes, FW6 <Nebraskaes@fws.gov>; Espinoza, Kayla <Kayla.Espinoza@terracon.com>
Subject: [EXTERNAL] RE: NE-CERT-007688 - SE Municipal Solar - Alliance, NE

Correction: please respond by October 25th, 2022.

From: Ramer, Jean L
Sent: Saturday, September 24, 2022 2:34 PM
To: NGPC EnvReview <ngpc.envreview@nebraska.gov>

Cc: nebraskaes@fws.gov; Espinoza, Kayla <Kayla.Espinoza@terracon.com>
Subject: NE-CERT-007688 - SE Municipal Solar - Alliance, NE

Dear NGPC and USFWS,
Please review this report describing a proposed solar generating facility near the City of Alliance, Nebraska. The project proponent is applying for USDA funding and a NEPA Environmental Assessment is being prepared. If possible, please provide your comments within 30 days or by October 10, 2022.

Thank you!

Jean Ramer, CESCP
Senior Scientist
Terracon
15080 A Circle I Omaha, NE 68144
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