Memo

Date: April 9, 2018

Project: Prevailing Wind Park Project, Bon Homme, Charles Mix, Hutchinson, and Yankton Counties, South Dakota

To: Bridget Canty, sPower

From: Erika Eigenberger, M.A. (HDR)

Subject: Cultural Resources Desktop Review Summary

Cultural Resources Desktop Review Summary

sPower (the Owners) proposes to construct, own and operate the Prevailing Wind Park Project (Project) in portions of Bon Homme, Charles Mix, Hutchinson, and Yankton counties, South Dakota (Figure 1). The Project includes a 200-megawatt (MW) wind farm, with associated turbines, collector lines, and access roads and an approximately 28-mile transmission line.

At this time, only a preliminary turbine array is available and the preferred layout for collector lines, access roads, and other auxiliary project components has not been finalized. Also, the specific location and width of the associated transmission line right-of-way has not been determined, nor has Western Area Power Administration (Western) defined an Area of Potential Effects. In order to adequately address resources that may be affected by Project components, a Study Area larger than the proposed Project was created to establish a context and determine site density. The Study Area is defined as a one-mile buffer surrounding the wind farm boundary and transmission line (Table 1 and Figure 1). The Study Area includes a small portion of Douglas County, although Project components will not be sited in this county. At this time, the Study Area is approximately 117,531 acres in size.

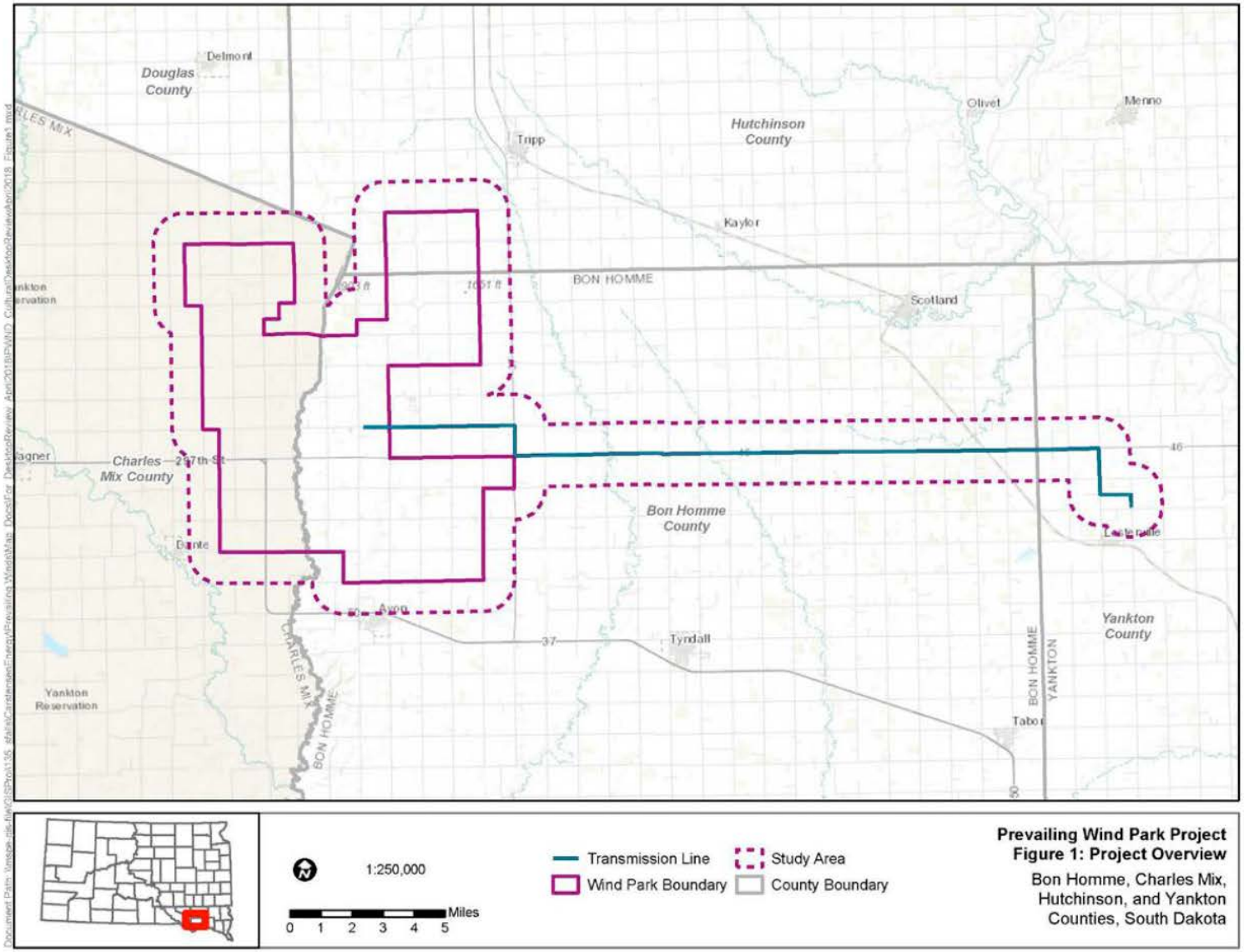
Table 1. Study Area Legal Description

County	Township	Range	Sections
Yankton	95N	57W	3–10, 15–17
Bon Homme	95N	58W	1–12
Bon Homme	95N	59W	1–12
Bon Homme	95N	60W	1–9, 12, 17–19, 30
Bon Homme **Charles Mix**	95N	61W	1–30, 32–33
Charles Mix	95N	62W	1–4, 9–16, 21–24
Yankton	96N	57W	31–33
Bon Homme	96N	58W	26–27, 31–36

County	Township	Range	Sections
Bon Homme	96N	59W	26–36
Bon Homme	96N	60W	5–7, 18–20, 25–36
Bon Homme **Charles Mix**	96N	61W	1–36
Charles Mix	96N	62W	1–5, 8–16, 20–29, 32–36
Hutchinson	97N	60W	18–20, 29–32
Charles Mix **Hutchinson**	97N	61W	13–16, 19–36
Charles Mix **Douglas**	97N	62W	21–29, 32–36

As part of the Project, HDR completed a Cultural Resources Desktop Review of the Study Area. The Cultural Resources Desktop Review included a review of files provided by the South Dakota Archaeological Research Center (SDARC), General Land Office (GLO) maps, and available aerial photographs. This information was used to develop a Geographic Information System-based (GIS-based) construction guidance grid (construction grid) (Figures 2.1 and 2.2). The purpose of the construction grid is to assist the Owners with siting facilities in areas that have a lower likelihood for containing intact cultural resources. The construction grid also identifies areas that have a higher likelihood for containing intact cultural resources eligible for listing on the National Register of Historic Places (NRHP), including Traditional Cultural Properties (TCPs).

The construction grid is designed to be used as a visual aid to assist the Owners in the Project siting process and is not intended to be used to identify cultural resource site locations. The construction grid does not guarantee that cultural resources will or will not be present or encountered in specific areas. Also, the Cultural Resources Desktop Review is a desktop exercise only. Findings during the review were not field verified via a windshield survey.


Delmont
Douglas County
Tripp
Hutchinson County
Olivet
Menno
Kaylor
BON HOMME
Scotland
Charles Mix County
Bon Homme County
Yankton County
Tyndall
Yankton Reservation
Transmission Line
Study Area
Wind Park Boundary
County Boundary
1:250,000
Miles
0 1 2 3 4 5
Prevailing Wind Park Project
Figure 1: Project Overview
Bon Homme, Charles Mix, Hutchinson, and Yankton Counties, South Dakota

The construction grid is based on the Public Land Survey System (PLSS) quarter-section grid and uses variable data to assess the likelihood of encountering intact archaeological or TCP resources in an approximately 160-acre (40 by 40 acres) cell. The data used to create the construction grid is listed in Table 2. The cultural resources data used for the model was requested on March 30, 2018 and obtained from the SDARC on April 3, 2018. Aerial imagery and GLO maps were acquired from free and publically available sources (Table 2).

Table 2. Construction Grid Variable Data

Variable Data Type	Data Source	Description
Archaeology Sites	SDARC	Previously inventoried archaeological sites
Historic Bridges	SDARC	Previously inventoried historic bridges
Historic Cemeteries	SDARC	Previously inventoried historic cemeteries
Historic Structures	SDARC	Previously inventoried historic structures
GLO Maps	Bureau of Land Management (BLM)	1863, 1867, 1869, 1874, and 1875 GLO survey maps
2016 NAIP Imagery	US Department of Agriculture (USDA)	2016 aerial photographs
2015–2017 Aerial Imagery	ESRI	2015–2017 ESRI digital globe world imagery

A PLSS quarter-section layer was used as the base for the construction grid layout. Since a PLSS quarter-section dataset was not publicly available, one was created. This quarter-section dataset was created by clipping the PLSS section layer to the Study Area. The CustomGridTools.tbx script, available at ArcGIS Online, was then used to create intersecting polylines that split the PLSS sections into four equal quarter sections. Each quarter section was then assigned a unique identification based upon its position within the PLSS section (NE, NW, SE, or SW). Since the PLSS sections in this area of South Dakota are not equality partitioned into 640 acres (320 by 320 acres) the cells of quarter section grid used to create the construction grid are also not equally divided into 160 acre cells. Due to the variance in the PLSS system HDR selected to use vector data in the creation of the construction grid.

To create the construction grid, each quarter-section was assigned an alphanumeric attribute in the ‘CODE’ field (Table 3). The value of this attribute was assigned based on the presence or absence of previously identified cultural resources from the SDARC datasets, cultural features identified on GLO maps, and land use.

As a first step, quarter-sections with previously identified cultural resources were reviewed and assigned appropriate values by Erika Eigenberger (HDR Archaeology Project Director). It should be noted that certain previously identified cultural resources were assigned greater “weight” than others. Quarter-sections that contained previously identified archaeological sites were always coded as Red – Area of Caution, regardless of land use. Likewise, quarter-sections

containing previously identified cemeteries and structures were always coded as Yellow – Areas of Concern, regardless of land use. Previously identified bridges and certain GLO features were reviewed individually to determine the appropriate level of coding. As bridges link segments of roads (often section line roads), the presence of a previously identified bridge does not necessarily correlate to the likelihood of encountering additional cultural resources within the particular quarter-section. In addition, the presence of a previously identified bridge has no bearing on the type of land use that may be encountered. As such, quarter-sections that contained previously identified bridges were each reviewed and coded based on the predominant land use. Quarter-sections that contain previously identified bridges may potentially include Red – Areas of Caution, Yellow – Areas of Concern, and/or Green – Areas of Minimal Concern.

GLO features with varying codes include named features that would not be represented physically. For example, the “North Boundary of the Yankton Sioux Indian Reservation” is a noted GLO feature, however, this feature would not be physically encountered during survey. GLO features such as the “51st Mile Post” or the “Road from Yankton to Ft James” could potentially be encountered as a physical remnant. As such, quarter-sections containing GLO features were reviewed in a similar manner to previously identified bridges. These quarter-sections may potentially include Red – Areas of Caution, Yellow – Areas of Concern, and/or Green – Areas of Minimal Concern.

As a second step, quarter-sections without cultural attributes were reviewed jointly by Erika Eigenberger (Archaeology Project Director) and Stephen Sabatke (HDR Archaeology Project Manager). During this second step of the review, land use was the major factor taken into consideration. Quarter-sections with higher values of pasture/grassland were assigned higher cultural concern values as there is a greater chance of encountering intact cultural resources and/or TCPs within undisturbed land. Quarter-sections with higher values of cultivated land were assigned lower cultural concern values as there is a lower chance of encountering intact cultural resources and/or TCPs in areas disturbed by cultivation. Quarter-sections with higher values of wetlands and open water were assigned lower cultural concern values due to the higher percentage of the area covered by water. The second step of the review process was completed by referencing available aerial imagery from multiple sources, as noted in Table 2.

The model code attribute was assigned based on a “hierarchy of cultural concern” (Table 3). The hierarchy of cultural concern was established to assist the Owners in the interpretation of the level of cultural concern associated with the likelihood of encountering intact archaeological or TCP resources potentially present in a grid cell.

Table 3. Construction Grid Codes and Descriptions

Hierarchy of Cultural Concern	Model Code	Map Color	Description
1	1a	Red (Area of Caution)	Quarter section contains or intersects a previously identified Native American site or site of unknown cultural affiliation.
2	1b	Red (Area of Caution)	Quarter section contains or intersects a previously identified non-Native American, post-contact archaeological site.
3	1c	Red (Area of Caution)	Quarter section contains 75% or >75% pasture/grassland and therefore has a higher likelihood of containing intact cultural resources including TCPs.
4	2a	Yellow (Area of Concern)	Quarter section contains or intersects a SDARC inventoried structure, cemetery, or bridge*.
5	2b	Yellow (Area of Concern)	Quarter section contains or intersects a historic feature identified during desktop review of GLO* maps and aerial photographs.
6	2c	Yellow (Area of Concern)	Quarter section contains at least 25% pasture/grassland or >25% and <75% of pasture/grassland. These areas have a higher likelihood of containing intact cultural resources including TCPs.
7	3	Green (Area of Minimal Concern)	Quarter section contains at least 75% or >75% of cultivated land, wetlands, and/or open water. These areas contain a lower likelihood of containing intact cultural resources.

*See discussion in the text above regarding how these resources were coded

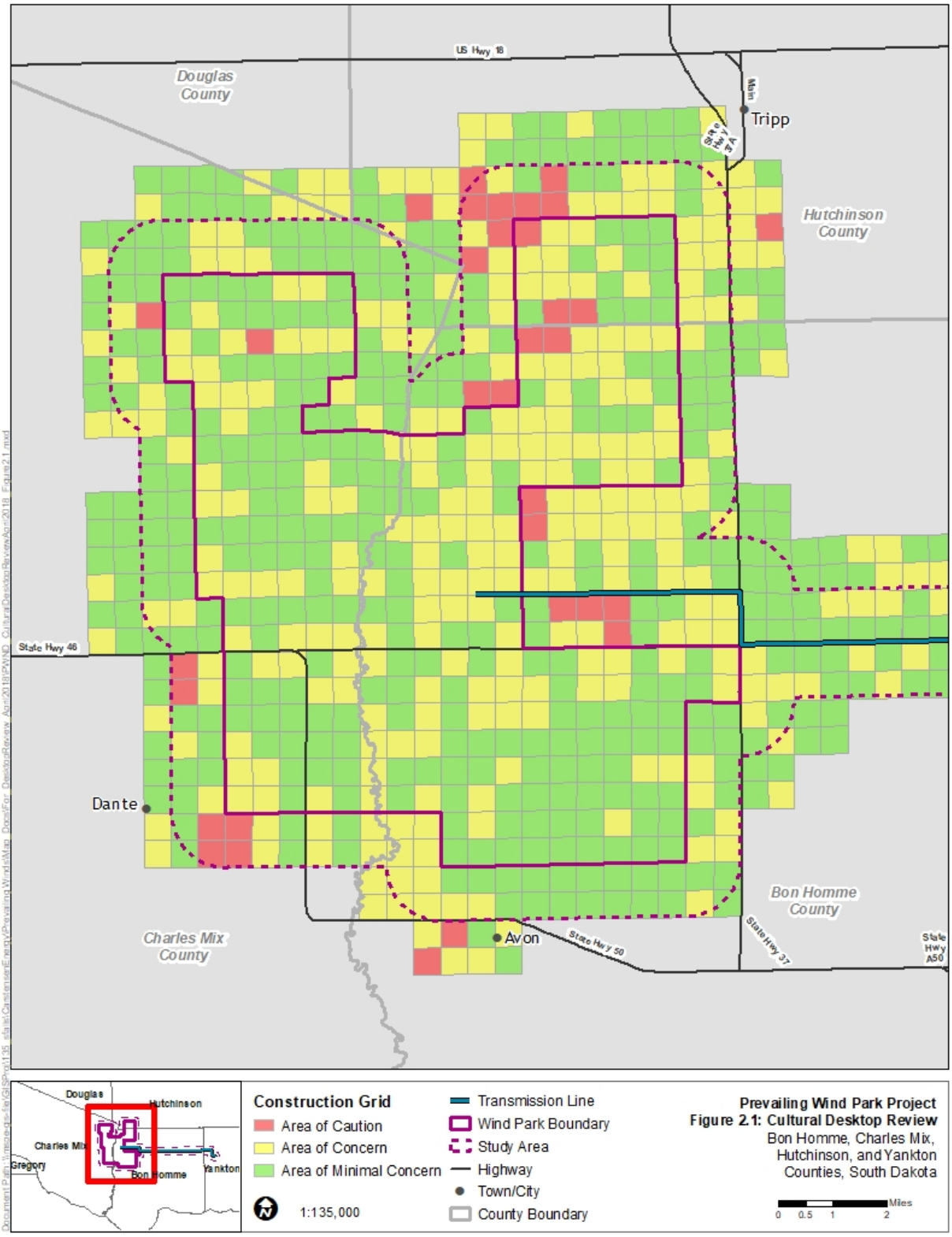
Conclusions

As part of the Project, HDR completed a Cultural Resources Desktop Review of the Study Area. The Cultural Resources Desktop Review included a review of files provided by SDARC, GLO maps, and available aerial photographs. This information was used to develop a construction grid to assist the Owners with siting facilities in areas that have a lower likelihood for containing intact cultural resources.

The Study Area includes 245 PLSS Sections and a PLSS quarter-section layer was used as the base for the construction grid layout. In total, 980 quarter-sections were reviewed and assigned an alphanumeric attribute based on the presence or absence of previously identified cultural resources from the SDARC datasets, cultural features identified on GLO maps, and land use. Of

the 980 quarter-sections, 41 were coded as Red (Area of Caution), 365 were coded as Yellow (Area of Concern), and 574 were coded as Green (Area of Minimal Concern).

The construction grid is designed to be used as a visual aid to assist the Owners in the Project siting process and is not intended to be used to identify cultural resource site locations. The construction grid does not guarantee that cultural resources will or will not be present or encountered in specific areas. Also, the Cultural Resources Desktop Review is a desktop exercise only. Findings during the review were not field verified via a windshield survey.


US Hwy 18
Douglas County
Tripp
Main
Hutchinson County
State Hwy 46
Dante
Charles Mix County
Avon
State Hwy 50
State Hwy 37
Bon Homme County
State Hwy A50
Douglas
Hutchinson
Charles Mix
Gregory
Bon Homme
Yankton
Construction Grid
Area of Caution
Area of Concern
Area of Minimal Concern
1:135,000
Transmission Line
Wind Park Boundary
Study Area
Highway
Town/City
County Boundary
Prevailing Wind Park Project
Figure 2.1: Cultural Desktop Review
Bon Homme, Charles Mix, Hutchinson, and Yankton Counties, South Dakota
Miles
0 0.5 1 2


Hutchinson County
Scotland
Fourth
Bon Homme County
Yankton County
State Hwy 46
State Hwy 25
Lesterville
State Hwy 37
State Hwy A50
State Hwy 50
Tyndall
Douglas
Hutchinson
Charles Mix
Gregory
Bon Homme
Yankton
Construction Grid
Area of Caution
Area of Concern
Area of Minimal Concern
Transmission Line
Wind Park Boundary
Study Area
Highway
Town/City
County Boundary
Prevailing Wind Park Project
Figure 2.2 Cultural Desktop Review
Bon Homme, Charles Mix, Hutchinson, and Yankton Counties, South Dakota
1:135,000
Miles
0 0.5 1 2

References: Construction Grid Datasets

Below are the geospatial datasets used to determine the construction grid values listed in Table 3. All datasets are currently housed in the CulturalData_2018 geodatabase: \\mspe-gis-file\gisproj\135_sfalls\CarstensenEnergy\Prevailing Winds\Spatial\gdb\CulturalData_2018.gdb.

ProjectArea_20180328_asPolygon
The *ProjectArea_20180328_asPolygon* dataset is the Project Area. The "Project Area" as provided by sPower is the anticipated extent of wind farm construction. The dataset only includes a wind farm boundary, it does not include individual wind farm components such as turbine locations, access roads, cabling, etc.
Source of data: This file was received from sPower on 03/28/2018.

ProjectAreaTransmissionLine_20180214
The *ProjectAreaTransmissionLine_20180214* dataset is the proposed transmission line that is part of the overall Project.
Source of data: This file was received from sPower on 02/14/2018.

StudyArea_20180328
The *StudyArea_20180328* dataset is the Study Area. The Study Area is a one-mile buffer surrounding the Project Area and the proposed transmission line.
Source of data: This file was created by HDR by adding a one-mile buffer to the *ProjectArea_20180328_asPolygon* dataset and the *ProjectAreaTransmissionLine_20180214* dataset.

SDARC_Sites_20180403
The *SDARC_Sites_20180403* dataset contains all of the previously SDARC inventoried archaeological sites within the Study Area.
Source of data: Dataset was provided by SDARC on 04/03/2018

SDARC_Structures_20180403
The *SDARC_Structures_20180403* dataset contains all of the previously SDARC inventoried structures within the Study Area.
Source of data: Dataset was provided by SDARC on 04/03/2018

SDARC_Bridges_20180403
The *SDARC_Bridges_20180403* dataset contains all of the previously SDARC inventoried bridges within the Study Area.
Source of data: Dataset was provided by SDARC on 04/03/2018

SDARC_Cemeteries_20180403
The *SDARC_Cemeteries_20180403* dataset contains all of the previously SDARC inventoried cemeteries within the Study Area.

Source of data: Dataset was provided by SDARC on 04/03/2018

GLOFeature_Line

The *GLOFeature_Line* dataset contains all of the historic linear features identified within the Study Area during the desktop review of historic GLO maps by HDR Archaeology Project Director Erika Eigenberger.
Source of data: Dataset was created by reviewing historic GLO maps obtained from the USGS website (http://www.glorecords.blm.gov/search/) in April 2018.

GLOFeature_Point

The *GLOFeature_Point* dataset contains all of the historic point features identified within the Study Area during the desktop review of historic GLO maps by HDR Archaeology Project Director Erika Eigenberger.
Source of data: Dataset was created by reviewing historic GLO maps obtained from the USGS website (http://www.glorecords.blm.gov/search/) in April 2018.

StudyArea_Sections_April2018

The *StudyArea_Sections_April2018* dataset is the PLSS grid clipped to the Study Area.
Source of data: Dataset was created by clipping the PLSS layer for South Dakota to the Study Area.

StudyArea_QuarterSections_April2018

The *StudyArea_QuarterSections_April2018* dataset is the PLSS quarter section grid created for the Study Area.
Source of data: Dataset was created by using the CustomGridTools.tbx script, available at ArcGIS Online. This tool was used to create intersecting polylines from the *StudyArea_Sections_April2018* dataset. The *StudyArea_Sections_April2018* dataset was divided into four quarter sections (each one-mile by one-mile section was divided into four, quarter sections).

ConstructionGrid_April2018

The *ConstructionGrid_April2018* is the Construction Grid created for the Study Area. Values are color-coded as red, yellow, and green depending on the value assigned as described in the document above.
Source of Data: Dataset was created by HDR Archaeology Project Director Erika Eigenberger and HDR Archaeology Project Manager Stephen Sabatke.