Appendix D – Phase 1 Archaeological Reconnaissance Survey Report

Phase I Archaeological Reconnaissance Survey

for the

Regal Solar Project

BENTON COUNTY, MINNESOTA

Submitted to:

Geronimo Energy

7650 Edinborough Way, Suite 725

Edina, MN 55435

Submitted by:

Area M Consulting

7302 Claredon Drive

Edina, MN 55439

REPORT AUTHORS:

Garrett L. Knudsen & Jonathan R. Knudsen

REPORT DATE:

September 2018

MANAGEMENT SUMMARY

Geronimo Energy, LLC (Client) has proposed to develop the Regal Solar Project (Project) in Benton County, Minnesota. As currently defined, the Project is not considered a federal undertaking as defined by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations (36 CRF 800). Utility-scale solar projects are typically subject to state-level permitting. In this case, the Project is seeking approval from the Minnesota Public Utilities Commission. The Client contracted with Area M Consulting (Area M) to complete a Phase I Archaeological Reconnaissance Survey (Phase I) to ensure that no unrecorded cultural resources will be disturbed during Project activities. The general purpose of a Phase I survey is to identify any archaeological sites within the Project's *Area of Potential Effect* (APE) that are potentially eligible for inclusion in the National Register of Historic Places (NRHP). This archaeological study was conducted in accordance with the Minnesota Field Archaeology Act of 1963.

The Project will produce up to 100 MW of solar energy. Ground between rows of photovoltaic generators will be planted with seed and vegetation maintenance will occur for the life of the Project. The lifespan of solar equipment can be up to 40 years, with an energy contract between 20 and 25 years. All areas within the APE that may experience ground-disturbing activities, including interconnection, masts, road improvements, lay down areas, and water retention are included in this survey report.

The Phase I included literature search, predictive modeling, LiDAR analysis, and field survey of the APE. The archaeological field survey consisted of systematic pedestrian reconnaissance and sub-surface testing in those portions of the Project APE considered to have the highest potential for holding unrecorded cultural resources. Zero sites were identified during Phase I Reconnaissance survey conducted June 13-16, 2018. Garrett Knudsen served as Principal Investigator.

No previously-recorded archaeological resources or historical facilities were identified within the Project APE. No previously-recorded archaeological resources were identified within a half-mile buffer surrounding the APE. Area M believes that the current APE for the Project has low potential to hold unrecorded cultural resources. Therefore, Area M recommends that ***the project may proceed as planned with no negative impact to cultural resources***. If the Project APE is altered, a new survey must be conducted and a new report must be rendered.

TABLE OF CONTENTS

LIST OF FIGURES

1. INTRODUCTION

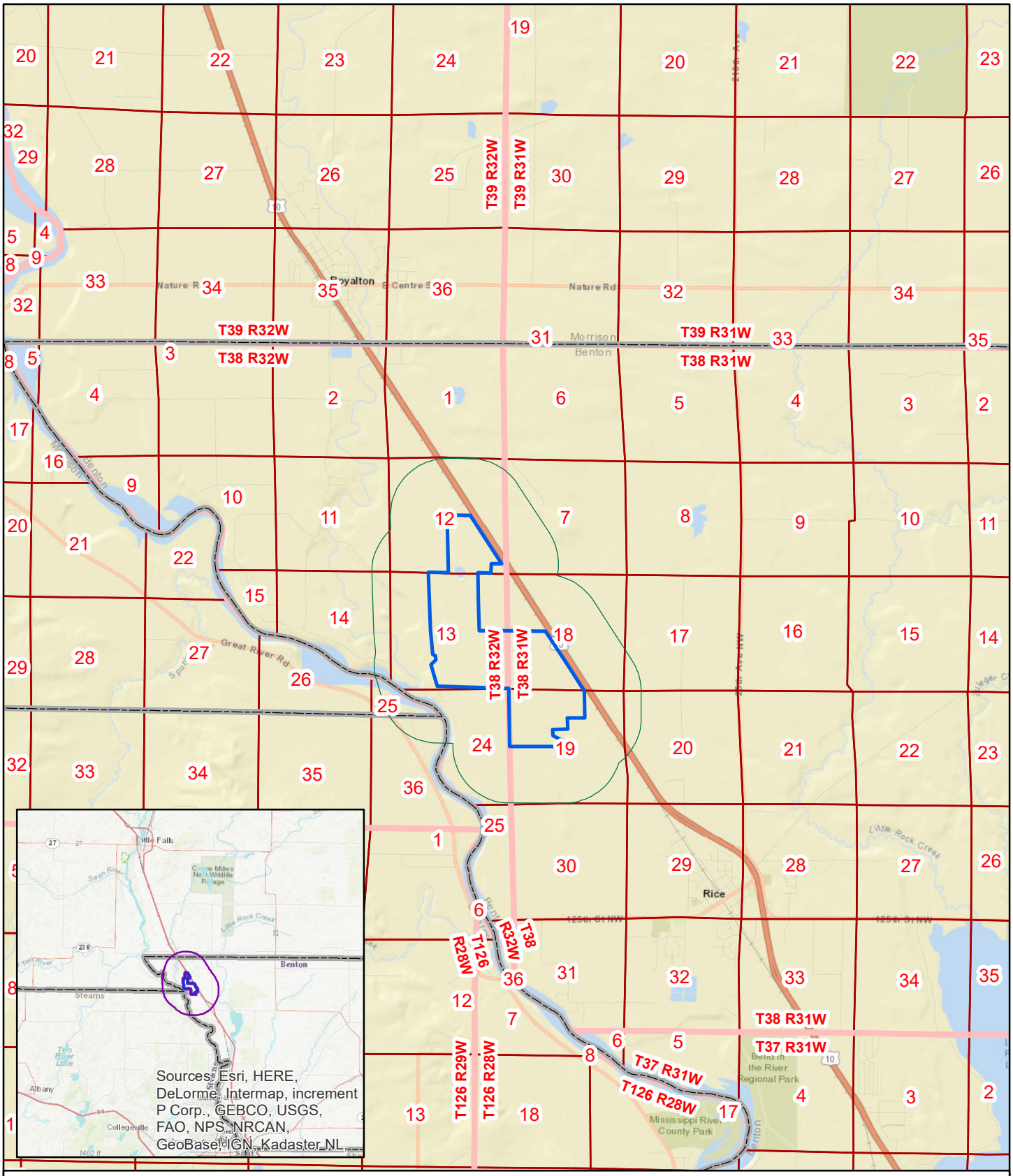
Geronimo Energy, LLC (Client) has proposed to develop the Regal Solar Project (Project) in Benton County, Minnesota. As currently defined, the Project is not considered a federal undertaking as defined by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations (36 CRF 800).

Utility-scale solar projects are typically subject to state-level permitting. In this case, the Project is seeking approval from the Minnesota Public Utilities Commission. The Client contracted with Area M Consulting (Area M) to complete a Phase I Archaeological Reconnaissance Survey (Phase I) to ensure that no unrecorded cultural resources will be disturbed during Project activities.

The general purpose of a Phase I survey is to identify any archaeological sites within the Project's *Area of Potential Effect* (APE) that are potentially eligible for inclusion in the National Register of Historic Places (NRHP). This archaeological study was conducted in accordance with the Minnesota Field Archaeology Act of 1963.

The Project is located in Sections 18 and 19, Township 38N, Range 31W and Sections 12 and 13, Township 38N, Range 32W in Benton County, Minnesota (Figure 1). The APE for archaeology includes the maximum potential construction limits and all areas of potential ground disturbance, such as staging areas, associated with the construction of the solar project. The study area is comprised of 800 acres within the *Central Lakes Deciduous* **(4e)** archaeological sub-region, as defined in the SHPO Manual for Archaeological Projects in Minnesota (Anfinson, 2005).

PROJECT	COUNTY	LEGAL LOCATION	ESTIMATED AREA
Regal Solar Project	Benton	T38N - R31W - Section 18 & 19, T38N - R32W - Section 12 & 13	800 Acres



Location Map

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

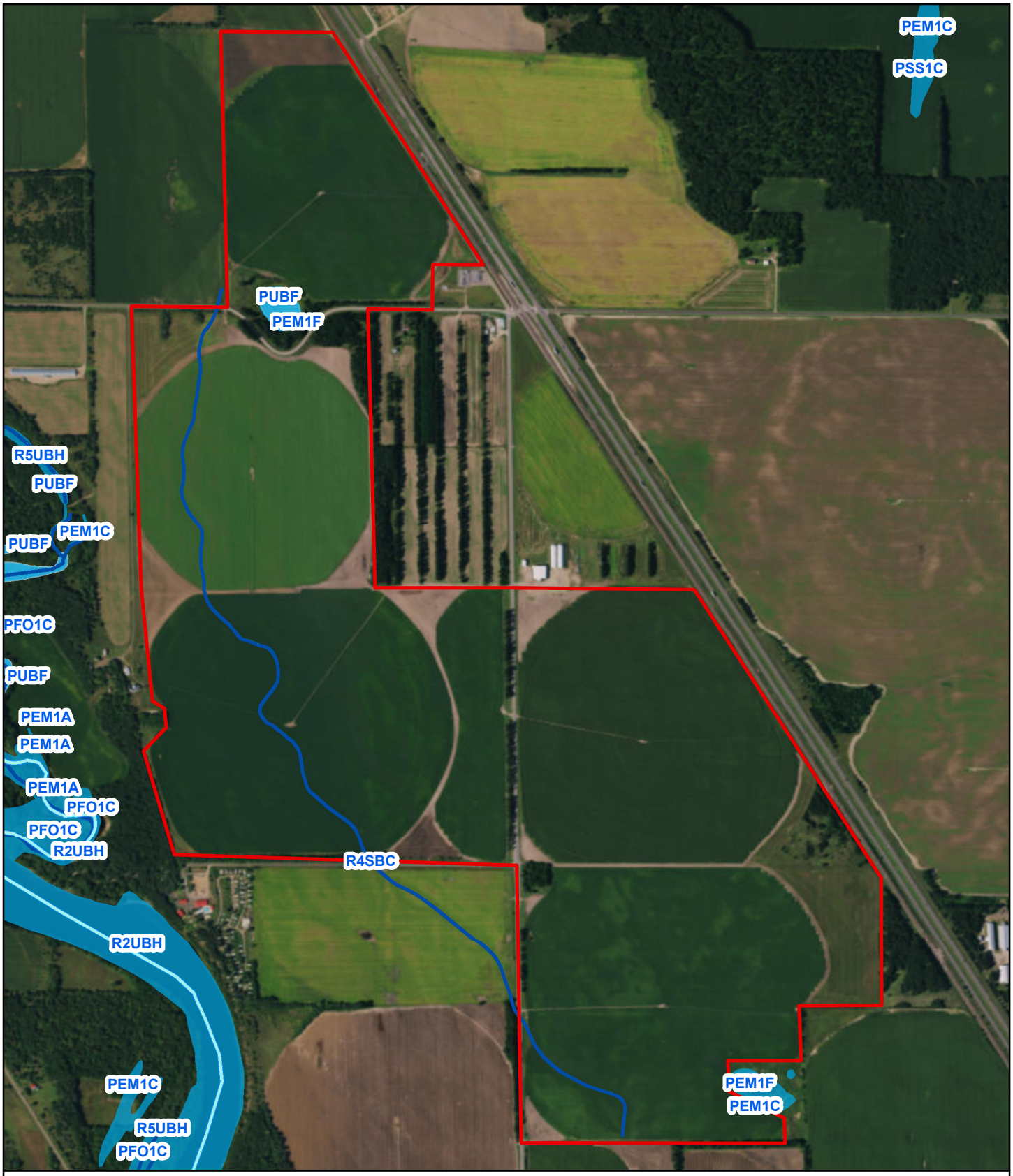
- Project Site
- 0.5-mile Buffer
- 2-mile Buffer

0 2,950 5,900 11,800

1:75,000 Feet

N

AREA M



Aerial Map

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

- Project Site
- PWI Watercourse
- NHD Flowline
- PWI Basin
- NWI Wetland
- NHD Waterbody

0 600 1,200 2,400 Feet

1:15,610

N

AREA M

2. METHODS

2.1. OBJECTIVES

The principal objectives of the Phase I Archaeological Reconnaissance survey (Phase I) are:

1) To identify all previously recorded archaeological resources within the archaeology Project Footprint that are listed in or are eligible for listing in the NRHP; and
2) To identify, to the extent possible by means of systematic in-field inspection and testing, other potentially NRHP-eligible resources within each Project Footprint.

Area M's investigation was guided by the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716) and by the *SHPO Manual for Archaeological Projects in Minnesota* (Anfinson 2006). Fieldwork, laboratory analysis, and preparation of the final report with recommendations were accomplished by Garrett Knudsen, a professional archaeologist meeting the standards set forth in 36 CFR 61.

2.2. LITERATURE SEARCH

Area M has reviewed information at the Minnesota State Historic Preservation Office (SHPO), located in St. Paul, Minnesota, as well as various private databases and online sources to perform an assessment of cultural resources within the Project area and within one-half mile. In addition, the new online database of archaeological data managed by the Office of the State Archaeologist (OSA) was reviewed in June, 2018 and September, 2018. The purpose of research at SHPO and OSA was to identify previously-recorded cultural resources and cultural resource surveys conducted near Project area. In addition, Area M has analyzed Century Public Land Survey (PLS) maps, Andreas maps, General Land Office (GLO) maps, Trygg maps, and historic aerial photographs in order to identify potential historic-period cultural features within the Project area. Finally, Area M conducted extensive analysis of LiDAR imagery at various sales and shadings for the Project area with a specific focus on the identification of unrecorded burial mound complexes.

2.3. PREDICTIVE MODELLING

Probability maps for unrecorded resources were completed for the Project. Assessments of the project area's potential to contain pre-contact archaeological resources was based on analyses of terrain, water sources, and other natural resources adjacent to the project area. Permanently wet areas (e.g., wetlands and streams), poorly drained areas, and areas with slopes greater than 20 percent are generally considered inhospitable to human occupation and are unlikely to contain cultural resources. In general, areas with higher pre-contact archaeological potential are in proximity to a relatively substantial water source, typically within 500 feet, though the exact distance often varies according to environmental conditions such as the size of the body of water, the nature of the water source (perennial versus intermittent), and the extent of the floodplain. Topographic prominence and/or proximity to previously recorded pre-contact sites are also typically indicative of high pre-contact archaeological potential.

2.4. FIELD METHODS

Phase I field investigations consist of systematic pedestrian survey, systematic shovel testing, and soil auger testing. The use of these methods is based on ground surface visibility, slope, distance to water, degree of previous disturbance, terrain, and vegetation as found within the survey areas.

Areas demonstrably disturbed through previous construction or other modern landuse practices are excluded from survey unless the potential exists for intact cultural deposits beneath the disturbance. In addition, permanently wet areas (wetlands, lakes, ponds, streams) and slopes greater than 20 percent are excluded from survey because they are generally inhospitable to human occupation and are unlikely to contain cultural resources.

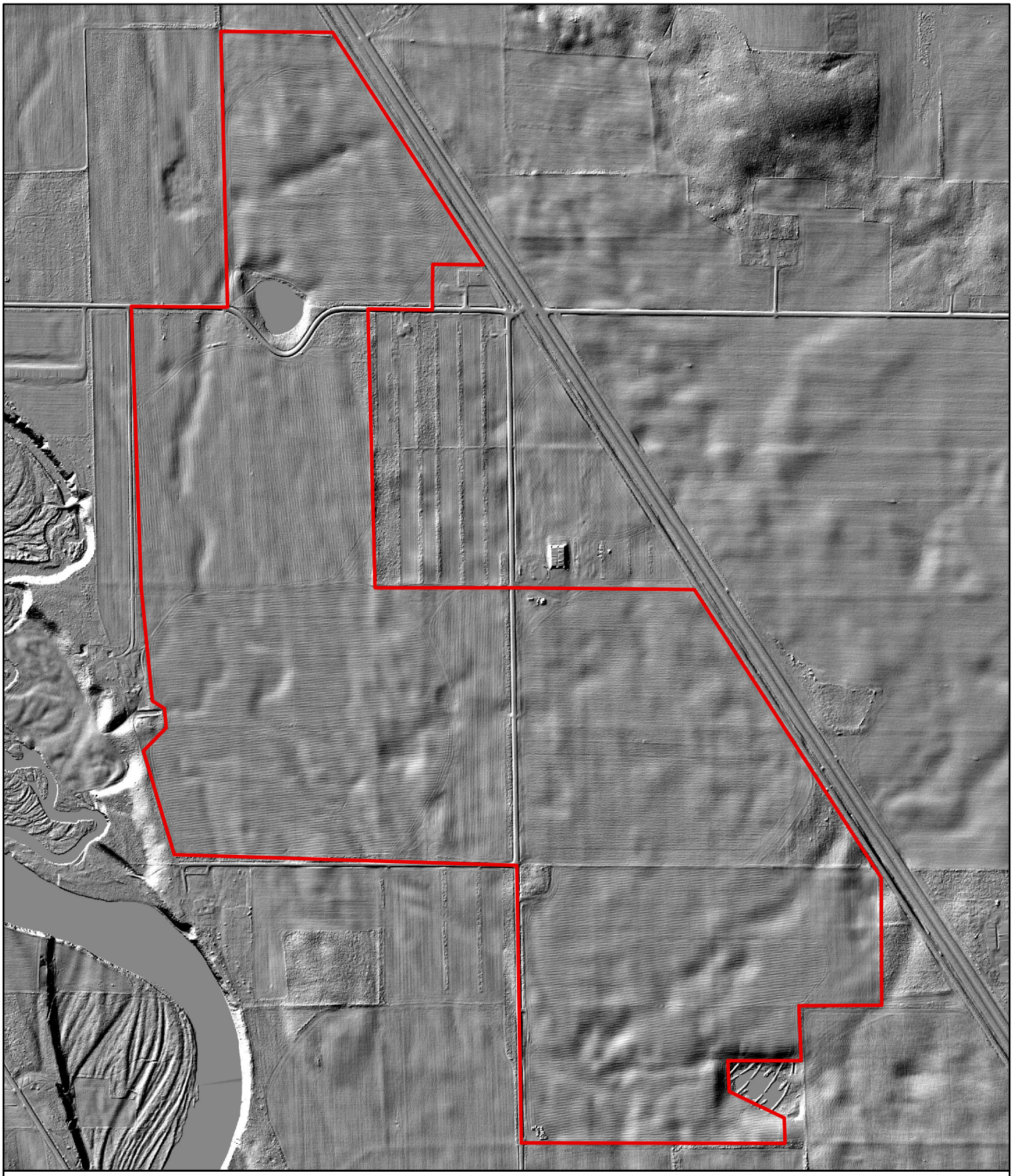
Visual reconnaissance of the Project Footprint is conducted during Phase I field survey to identify above-ground archaeological features or other indicators of the presence of past peoples, such as burial mounds. Areas of moderate to high archaeological potential exhibiting 25 percent or more surface visibility are examined through systematic pedestrian survey. A systematic pedestrian survey is a visual examination of the ground surface, during which field personnel walk across the project area at regular intervals to observe ground surfaces for the presence of cultural resources. During this project, pedestrian reconnaissance was conducted along transects spaced 3 meters apart.

Areas of medium- and high-potential for unrecorded cultural resources exhibiting less than 25 percent surface visibility are examined through systematic shovel testing. Systematic shovel testing involves the manual excavation of small holes 30 to 40 centimeters in diameter at regular intervals to identify subsurface archaeological materials. Shovel tests are placed at intervals of 15 meters.

In areas where archaeological sites are identified, shovel testing is used to define the boundaries of those sites within the Project Footprint. Shovel tests are excavated 5 or 10 meters from all positive shovel tests in the cardinal directions until two consecutive negative shovel tests spaced 5 meters apart are encountered, until severe disturbances were encountered, or until the edge of the Project Footprint was reached.

Shovel tests are excavated through all soil horizons with the potential for containing cultural remains and into the underlying sterile subsoil (C horizon), or to a maximum depth of one meter (three feet), depending on which condition was first encountered. Excavated soils are passed through ¼-inch hardware mesh to ensure consistency in the recovery of cultural materials. Shovel test data are recorded on standardized forms. Recorded information includes: 1) the designated field area within which each test was located; 2) the location of each shovel test in relation to natural or cultural features, or to other shovel tests, as appropriate; 3) a description of soil horizons, including depth, texture, and Munsell® color designation; and 4) the nature and depth of natural or cultural inclusions. The locations of all shovel tests are recorded using a Trimble.

When archaeological sites are encountered during fieldwork, they are documented and given a unique field number. Site locations, characteristics, and conditions are recorded manually and digitally. GPS coordinates are recorded for each site, also recorded on 7.5-minute USGS quadrangle maps of the project area.



LiDAR

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

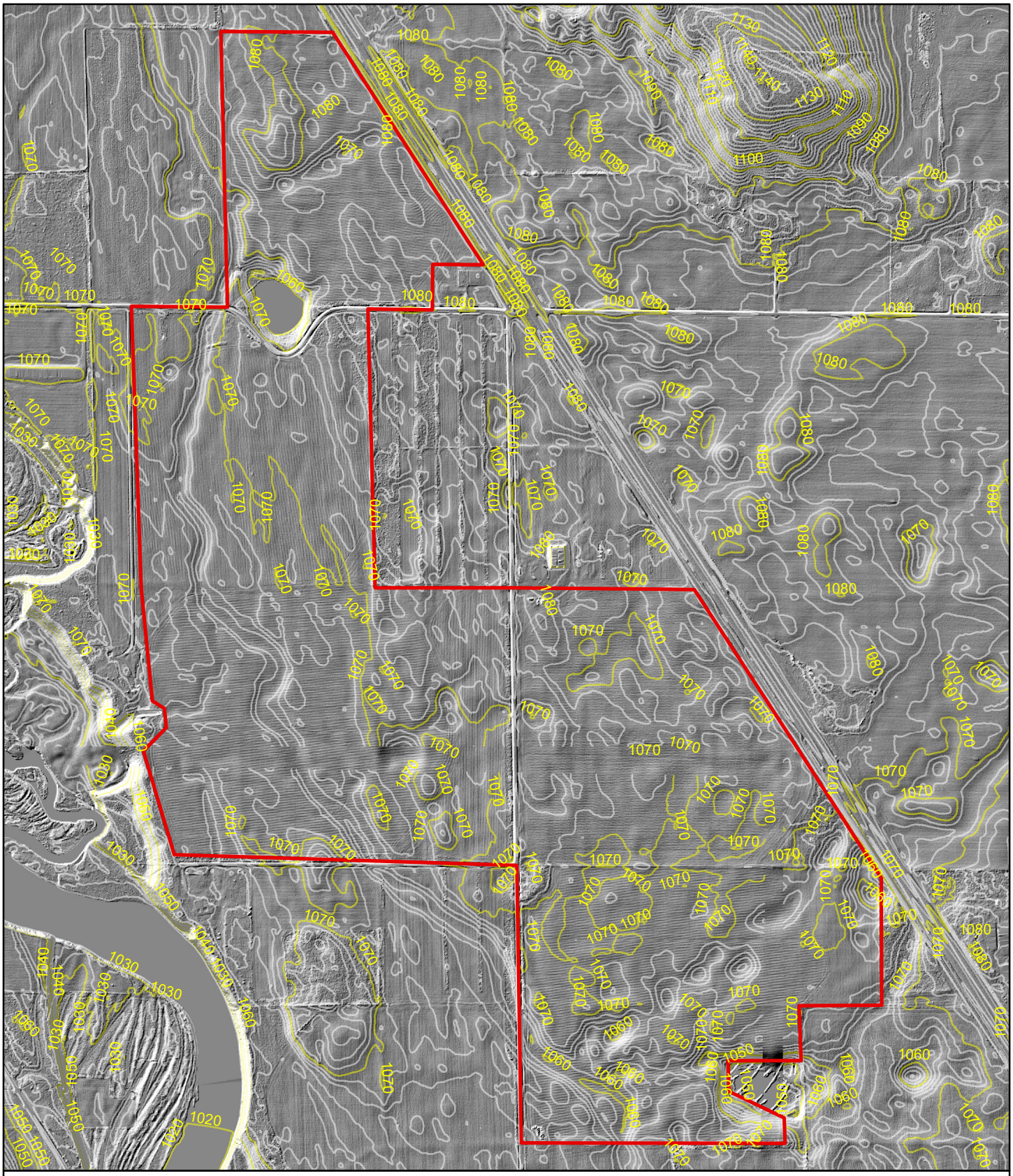
Project Site

N

0 600 1,200 2,400

1:15,610 Feet

AREA M



LiDAR

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

Topographic Contour

Project Site

Index (10-ft)

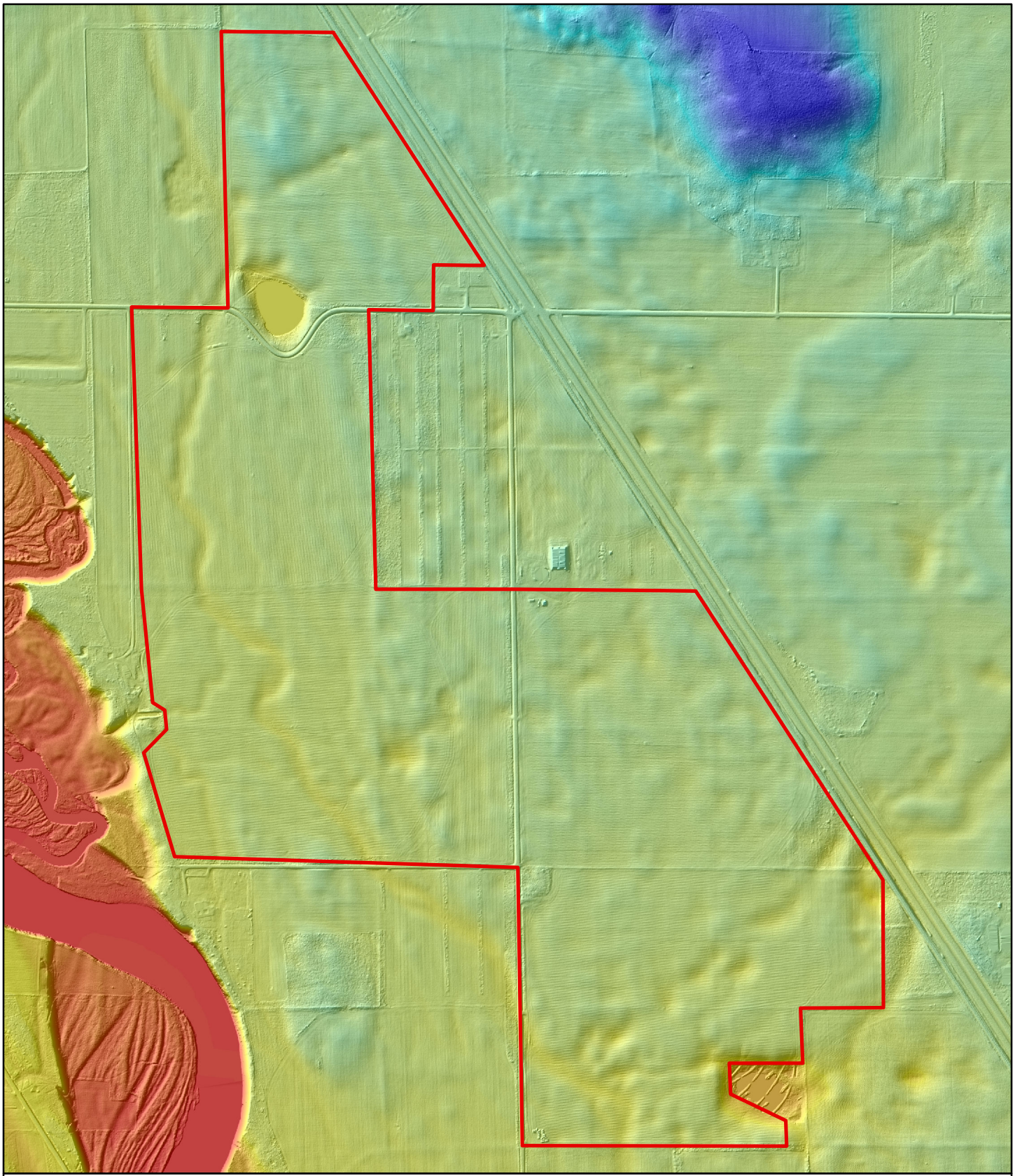
Intermediate (2-ft)

0 600 1,200 2,400 Feet

1:15,610

N

AREA M



Color LiDAR

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

Project Site

Elevation (Ft)

High : 347.86

Low : 310.788

0 600 1,200 2,400

1:15,610 Feet

N

AREA M

3. LITERATURE SEARCH RESULTS

3.1. PREVIOUS INVESTIGATIONS

Background research revealed that zero archaeological surveys have previously occurred within the Project APE.

3.2. RECORDED ARCHAEOLOGICAL RESOURCES

Literature and archival research indicates that zero pre-contact archaeological sites have been previously recorded (field verified) or reported (not field verified) within the project area. This was confirmed through review of the online database managed by OSA.

3.3. RECORDED HISTORICAL FACILITIES

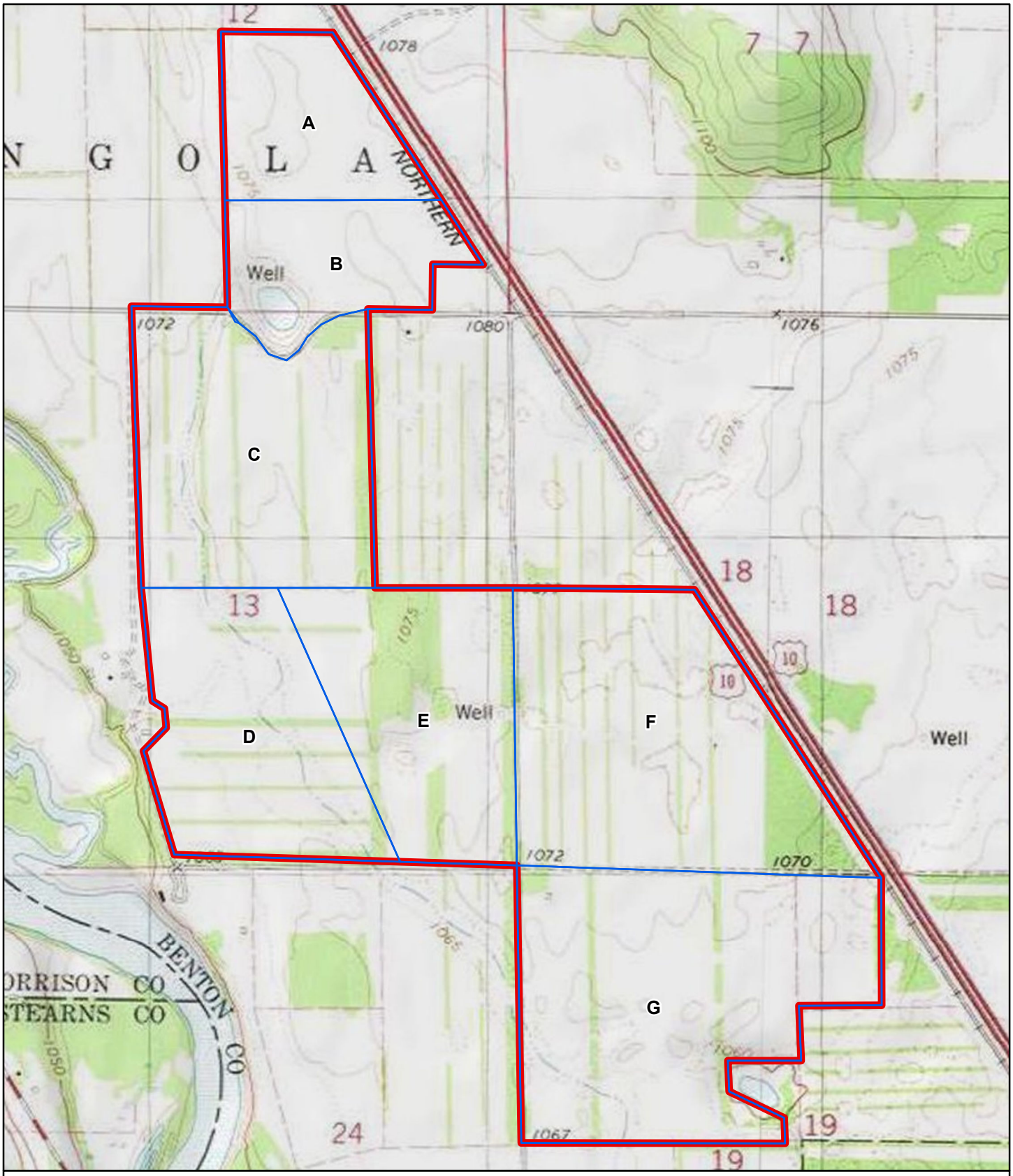
The records search at SHPO produced no previously-recorded historic facility resources within the Project area. No previously-recorded historical facilities were identified within a half-mile buffer of the Project area.

3.4. PREDICTIVE MODEL

The Project area was studied to estimate the potential for the Project area to hold unrecorded cultural resources. The majority of the Project APE has low-potential to hold unrecorded cultural resources. However, based on local chronologies and settlement patterns, prominent topographic features immediately adjacent to permanent water sources, including water sources that were permanent in past periods, were deemed moderate- to high-potential for holding unrecorded cultural resources. Within the APE these areas included: 1) the area adjacent to the Mississippi River in the southwest corner; 2) the edge of a pothole depression holding water in the northern portion; and 3) the plateau extended north and west from a small pond in the southeast corner.

3.5. HISTORIC CONTEXTS

Historic contexts are discussed in terms of a pre-contact period (before ca. 375 years ago), a contact period (A.D. 1630-1820), and a historical period (A.D. 1820-present) in North America in general and apply to Benton County, Minnesota in particular. These contexts are further divided into a number of periods and sub-periods, and constitute research themes under which archaeological resources identified are evaluated for NRHP significance. Since no pre-contact, contact, or historical properties were encountered during the survey, full contexts related to the pre-contact, contact, and historical periods are extraneous to this report and are not provided here.



Survey Zones

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

Project Site

Survey Zone

0 600 1,200 2,400

1:15,610 Feet

N

AREA M

4. FIELDWORK RESULTS

Area M conducted systematic survey, constituting a full Phase I Archaeological Reconnaissance of the Project APE June 13-16, 2018. Garrett Knudsen (Knudsen) served as Principal Investigator for the investigation. Predictive modeling, LiDAR analysis, literature review results, pedestrian reconnaissance, windshield survey, and models depicting natural features as they appeared historically were used to ascertain which portions of the Project APE had greater potential to contain intact unrecorded archaeological resources; 100 percent of the APE was surveyed at the request of the Client. The Project APE was divided into seven Survey Zones (A-G; see Figure 7); these are discussed individually below.

4.1. SURVEY ZONE A

Zone A was planted in corn at the time of survey; crop height was less than 36 inches and surface visibility was 75%. No unrecorded cultural resources were identified.

4.2. SURVEY ZONE B

Zone B was predominantly planted in corn (less than 36 inches in height) across its northern and eastern portions, with 75% surface visibility. In the southwest corner of the zone, a prominent pothole pond is present: the amount of grading and modification that dictated the current size and shape of the water body is unknown, but active ground-disturbing activities associated with the construction of a residential home were in progress on its west edge. No unrecorded cultural resources were identified.

4.3. SURVEY ZONE C

The majority of Zone C was planted in corn (under 36 inches tall), allowing 75% surface visibly. Two single family residences exist along the road that is the north boundary of the zone. No unrecorded cultural resources were identified.

4.4. SURVEY ZONE D

Zone D is made up of the portion of the APE closest to the Mississippi River. At the time of survey, this area was planted in soybean (under 6 inches in height), with a small amount of debris from the previous season's harvest of corn present on the surface: surface visibility was greater than 50%. No unrecorded cultural resources were identified.

4.5. SURVEY ZONE E

Zone D was planted in soybean (less than 12 inches tall) at the time of survey; surface visibility was 75%. Large portions of this zone were bare ground (no weeds or crops had established). No unrecorded cultural resources were identified.

4.6. SURVEY ZONE F

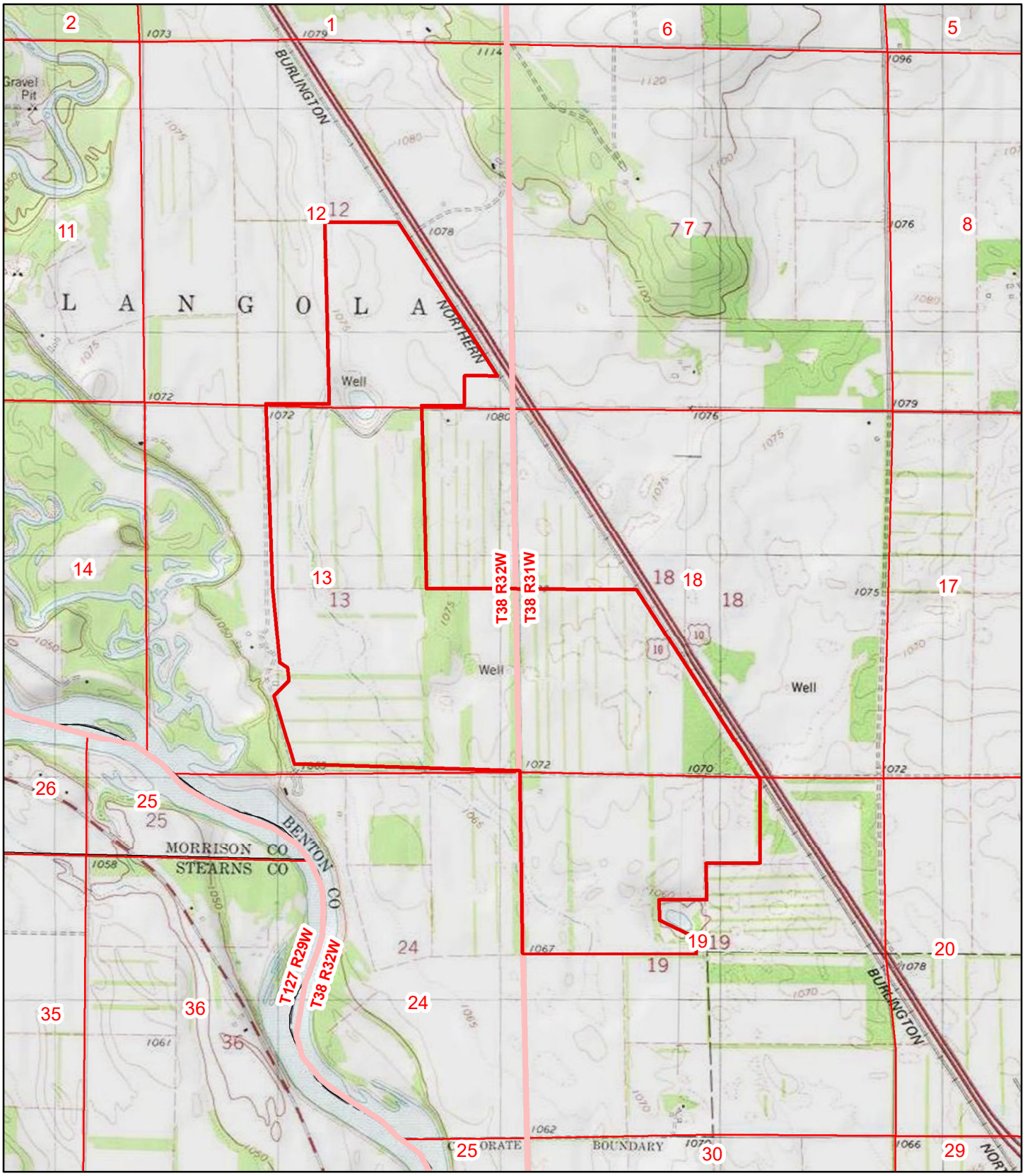
At the time of survey, Zone F was planted in corn (under 24 inches tall). The southeast and northern portions of the zone include broad swaths of exposed earth, where crops and weeds had not established. Where crops were planted, surface visibility was greater than 50%. No unrecorded cultural resources were identified.

4.7. SURVEY ZONE G

The majority of Zone G was planted in corn (less than 24 inches in height) at the time of survey, where surface visibility greater than 75%. Along the eastern edge of the zone, no crops or other vegetation were established, so surface visibility was 100%. The southeastern portion of Zone G is dominated by a basin containing a stagnant pond; evidence that the landscape has been altered were apparent, although a natural waterbody in some form may have been present in the past. No unrecorded cultural resources were identified.

Recommendations

Based on the absence of recorded and unrecorded cultural materials in this location, in any zone, no further archaeological work is recommended for the Project.



24K Topo Map

Regal Solar Project - Geronimo Energy, LLC

Benton County, Minnesota

Project Site

0 900 1,800 3,600

1:24,000 Feet

N

AREA M

5. SUMMARY OF RECOMMENDATIONS

No previously-recorded archaeological resources or historical facilities were identified within the Project area. No previously-recorded archaeological resources were identified within a half-mile buffer surrounding the Project APE. Area M completed systematic survey of the entire APE for the Regal Solar Project, and believes this project has low potential to hold unrecorded cultural resources. Therefore, Area M recommends that ***the project may proceed as planned with no negative impact to cultural resources***. If the Project APE is altered, a new survey must be conducted and a new report must be rendered.

REFERENCES CITED

Anfinson, Scott F.

2001 *SHPO Guidelines for Archaeological Projects in Minnesota*. State Historic Preservation Office, St. Paul.

General Land Office

1855 Original Public Land Survey Plat Map of Minnesota. Available online at: http://www.gis.state.mn.us/GLO/Index.htm.

APPENDIX A: LIST OF PROJECT PERSONNEL

Project Manager and Principal Investigator	Garrett L. Knudsen
Field Archaeologists	Garrett L. Knudsen Jonathan R. Knudsen
GIS/Graphics Specialist	Jonathan R. Knudsen

APPENDIX B: PROJECT PHOTOS

Photo 1: View South from northeast corner of survey Zone A.

Photo 2: View East showing northern edge of pothole pond in survey Zone B; uncertain if waterbody is manmade or modified.

Photo 3: View North from southwest corner of surveyZone C.

Photo 4: View South showing southwest corner of survey Zone D; adjacent to Mississippi River.

Photo 5: View East from center of survey Zone E.

Photo 6: View North from eastern edge of survey Zone F.

Photo 7: View South from eastern edge of survey Zone G, showing overview of basin containing small pond in background.