

**SEPTEMBER 2010**

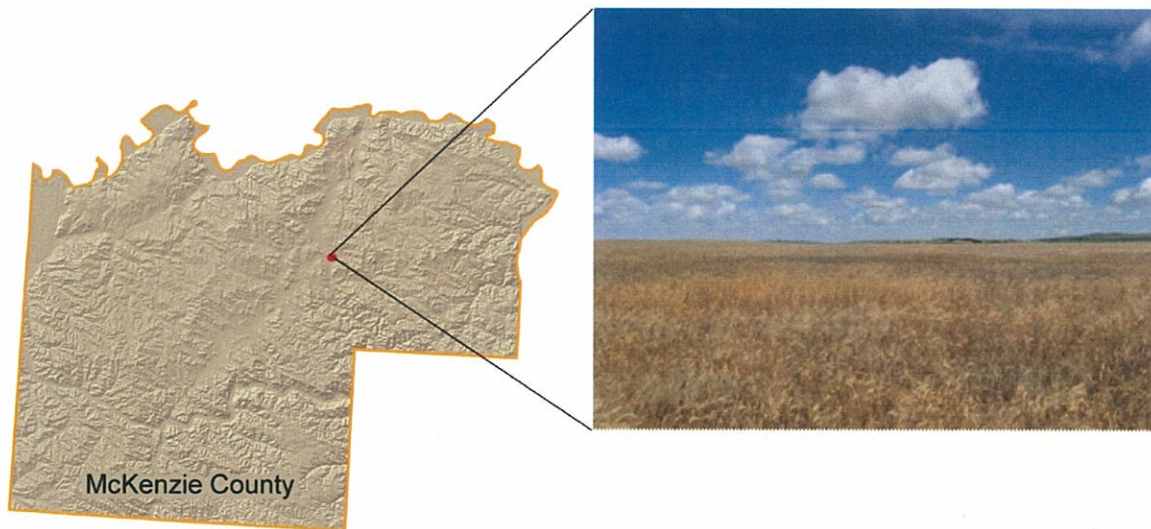
**APPLICATION TO**

**THE NORTH DAKOTA PUBLIC SERVICE COMMISSION**

**FOR A CERTIFICATE OF SITE COMPATIBILITY**

**FOR THE**

**GARDEN CREEK GAS PLANT**



**BEAR PAW  
ENERGY, LLC**

A SUBSIDIARY OF ONEOK PARTNERS, L.P.

## TABLE OF CONTENTS

|   |    |
|---|----|
| INTRODUCTION  | 1  |
| 1. DESCRIPTION  | 2  |
| 1.1.Type  | 3  |
| 1.2.Product   | 3  |
| 1.3.Size and Design   | 3  |
| 1.3.1. Gross Design Capacity  | 3  |
| 1.3.2. Net Design Capacity  | 3  |
| 1.3.3. Estimated Thermal Efficiency of the Energy Conversion Process and the Assumptions Upon Which the Estimate is Based | 3  |
| 1.4.Provide One Copy of the Design Data Reports Separate from the Application   | 3  |
| 1.5.Time Schedule   | 3  |
| 1.5.1. Certificate of Site Compatibility  | 3  |
| 1.5.2. Land Acquisition   | 3  |
| 1.5.3. Construction Start Date  | 3  |
| 1.5.4. Construction Completion Date   | 4  |
| 1.5.5. Test Operations  | 4  |
| 1.6.Commercial Production Data  | 4  |
| 1.7.100 Percent Capacity Factor   | 4  |
| 1.8.Any Expansions or Additions   | 4  |
| 2. STUDIES  | 5  |
| 2.1.Study Area  | 5  |
| 2.2.Site  | 5  |
| 2.3.Environmental Analysis  | 5  |
| 2.3.1. Natural Resource Inventory   | 5  |
| 2.3.2. U.S. Fish and Wildlife Service   | 6  |
| 2.3.3. U.S. Army Corps of Engineers   | 10 |
| 2.3.4. U.S. Farm Service  | 10 |
| 2.3.5. North Dakota Game and Fish Department  | 10 |
| 2.3.6. North Dakota Parks and Recreation Department   | 11 |
| 2.3.7. North Dakota State Historic Preservation Office  | 11 |
| 2.3.8. North Dakota Department of Health  | 12 |
| 3. NEED FOR FACILITY  | 15 |
| 3.1.Analysis of Need Based on Present and Projected Demand, Including System Studies                                      | 15 |
| 3.2.Description of Feasible Alternative Methods of Serving the Need   | 15 |
| 3.3.Bear Paw's most recent 10-year plan   | 16 |
| 4. LOCATION   | 18 |
| 4.1.Study Area  | 18 |
| 4.2.Identify and Map Criteria   | 18 |
| 4.3.Exclusion Area Inventory and Analysis   | 18 |
| 4.3.1. Federal Resource Review  | 19 |
| 4.3.2. State Resource Review  | 19 |
| 4.3.3. County Resource Review   | 19 |
| 4.3.4. Prime Farmland   | 19 |

|   |    |
|---|----|
| 4.3.5. Irrigated Farmland   | 19 |
| 4.3.6. Protected Species Resource Review  | 19 |
| 4.3.7. Critical Habitat for Protected Species   | 20 |
| 4.4. Avoidance Area Inventory and Analysis  | 20 |
| 4.4.1. Other Historical Resources Not Meeting Exclusion Area Criteria   | 20 |
| 4.4.2. Areas Within City Limits or Military Installation Boundaries   | 20 |
| 4.4.3. Areas Within Known 100-Year Floodplains  | 20 |
| 4.4.4. Areas of Known Geologic Instability  | 21 |
| 4.4.5. Woodlands and Wetlands   | 21 |
| 4.4.6. Areas of Recreational Significance not categorized as Exclusion Areas  | 21 |
| 4.4.7. Areas within 500 feet of inhabited rural residence   | 21 |
| 4.5. Factors to be Considered in Evaluating Applications and Designation of Sites,<br>Corridors and Routes                        | 22 |
| 4.5.1. Selection Criteria   | 22 |
| 4.5.2. Other new planned facilities or industrial developments at the Project<br>location   | 26 |
| 4.6. Policy Criteria  | 27 |
| 4.6.1. Policies and Commitments to Limit Environmental Impact   | 27 |
| 4.6.2. Recycling of the Conversion Byproducts and Effluents   | 27 |
| 4.6.3. Energy Conservation Through Location, Process and Design   | 27 |
| 4.6.4. Training and Utilization of Available Labor in This State for the General<br>and Specialized Skills Required               | 28 |
| 4.6.5. Use of a Primary Energy Source or Raw Material Located Within the State  | 28 |
| 4.6.6. Nonrelocation of Residents   | 28 |
| 4.6.7. The Dedication of an Area Adjacent to the Facility to Land Uses Such As<br>Recreation, Agriculture, or Wildlife Management | 28 |
| 4.6.8. Economies of Construction and Operation  | 28 |
| 4.6.9. Secondary Uses of Appropriate Associated Facilities for Recreation and<br>the Enhancement of Wildlife                      | 28 |
| 4.6.10. Use of Citizen Coordinating Committees  | 29 |
| 4.6.11. A Commitment of a Portion of the Transmitted Product for Use in This<br>State   | 29 |
| 4.6.12. Labor Relations   | 29 |
| 4.6.13. The Coordination of Facilities  | 29 |
| 4.6.14. Monitoring of Impacts   | 29 |
| 4.6.15. Problems Raised by Federal Agencies, Other State Agencies, and Local<br>Entities  | 29 |
| 5. MITIGATIVE MEASURES  | 31 |
| 6. LIST OF PREPARERS  | 32 |
| Appendix A: Engineering Documents   |    |
| Appendix B: Exclusion & Avoidance Maps  |    |
| Appendix C: Consultations   |    |
| Appendix D: Biology Report  |    |
| Appendix E: Cultural Resources Report   |    |

## INTRODUCTION

Bear Paw Energy, LLC (Bear Paw) owns and operates natural gas gathering, processing and fractionation facilities in the Williston Basin in Montana, North Dakota and Saskatchewan, Canada, as well as natural gas gathering facilities in the Powder River Basin in Wyoming. Bear Paw's facilities interconnect indirectly to the interstate natural gas pipeline grid, which serves markets in the Rocky Mountains, Midwest and California.

In the Williston Basin, Bear Paw has approximately 3,700 miles of gathering pipelines with approximately 125 million cubic feet per day of capacity at four processing plants. Most of the wells connected to the facilities produce casinghead gas in association with crude oil. This casinghead gas is generally high in natural gas liquids content, which are separated from the natural gas at the processing plants, fractionated into individual components and sold.

In response to growing demand for gas processing capacity of natural gas liquids produced in North Dakota, Bear Paw proposes to construct the Garden Creek Gas Processing Plant (Garden Creek Plant or Plant) to address the growing demand for added gas processing capacity in the region. Bear Paw's proposed plant would be located approximately 4.5 miles northeast of Watford City in McKenzie County.

Bear Paw hereby submits to the North Dakota Public Service Commission (PSC or Commission) a single filing containing a request for waiver or reduction of procedures and time schedules and an application for a Certificate of Site Compatibility for its Garden Creek Gas Plant Project.

This application provides the necessary information as stipulated by the:

North Dakota Century Code, Energy Conversion and Transmission Facility Siting Act, Chapter 49-22-08; and

PSC Administrative Code, Chapter 69-06-08-01 Energy Conversion Facility Siting Criteria

The information presented in this application is organized according to the format prescribed in the PSC Application Guidelines for a Certificate of Site Compatibility, which divides the information into the following four main categories:

- SECTION 1: DESCRIPTION
- SECTION 2: STUDIES
- SECTION 3: NEED FOR FACILITY
- SECTION 4: LOCATION

To assist the Commission in its review of Bear Paw's application, Bear Paw had included with this application the information described in Section 49-22-09 of the Century Code, Factors to Consider in Evaluating Applications and Designation of Sites, Corridors, and Routes. This information is placed toward the end of Section D, following the discussion of the Facility Siting Criteria.

## 1.0 DESCRIPTION

### 1.1 Type:

Bear Paw's proposed Garden Creek Plant would be located approximately 4.5-miles northeast of Watford City, North Dakota. As proposed, the facility would be constructed on an 80-acre plot located in the S1/2; SE1/4, Section 35, Township 151 North, Range 98 West of McKenzie County, as depicted in the map included in Appendix B.

The Garden Creek Plant has a design capacity of 100 MMscfd utilizing a cryogenic turboexpander process. The plant will process associated natural gas from oil production wells connected to Bear Paw's gathering system. The feed will be supplied to the proposed facility via Bear Paw's existing gathering system and once processed, the NGL product will be transferred to on site storage tanks prior to being transferred by pipeline to a remote product storage and railcar facility already owned and operated by Bear Paw. Residual gas, largely methane and ethane, will be transferred to the Williston Basin Interstate pipeline through a meter located in the southwestern corner of the property.

Once constructed the Garden Creek Plant will occupy approximately 40 acres of the 80 acre plot; the remaining acreage will serve as stormwater outfall, vehicle parking, and unused space for potential future expansion.

Construction of the Plant will include the installation of underground piping, above-ground piping, and above-ground gas processing facilities. The major processing systems shall be located within the battery limits of the Plant, originating from the inlet gas and condensate piping as they enter the plant. These systems include:

- Inlet gas slug catchers;
- Inlet gas condensate pumping, filtration, and stabilization;
- Mole sieve dehydration;
- NGL extraction (including refrigeration);
- HP residue gas compression;
- NGL product storage and pipeline pumps
- Flare system;
- Drain system;
- Plant control systems;
- Utility systems (electrical, instrument air, and heat medium).

A simplified engineering flow chart depicting the facility's process and an overview plot plan drawing showing the layout of the proposed processing equipment are included in Appendix A.

## 1.2 Product:

The Plant will produce a Y-grade natural gas liquids stream containing products such as propane, butane, and natural gasoline, as well as pipeline grade natural gas (a mixture of methane, ethane and carbon dioxide).

## 1.3 Size and Design

1.3.1 Gross Design Capacity: The Plant is designed with a nameplate capacity of 100 MMSCFD. Appendix A includes a Design Data Report, which discusses the nameplate capacity in more detail.

1.3.2 Net Design Capacity: The net design capacity of the proposed Plant using a feed stream benchmark is 81.73 MMSCFD less 0.5 MMSCFD for utility natural gas.

1.3.3 Estimated Thermal Efficiency of the Energy Conversion Process and the Assumptions Upon Which the Estimate is Based: This not applicable to the process.

## 1.4 Provide One Copy of the Design Data Reports Separate from the Application:

See Appendix A for complete Design Data Report.

## 1.5 Time Schedule

1.5.1 Certificate of Site Compatibility: Bear Paw seeks a Certificate of Site Compatibility as soon as possible, preferably by October 5, 2010.

1.5.2 Land Acquisition: Bear Paw is purchasing an 80 acre parcel from a private landowner for this Plant. The purchase agreement for this transaction was entered into on or about June 7, 2010, was pre-closed on September 2, 2010, and is scheduled for final closing and the recording of deeds and other appropriate documentation on or about September 15, 2010.

1.5.3 Construction Start Date: Bear Paw will begin construction of the Plant at site upon receipt of necessary authorizations. Bear Paw anticipates commencing construction work on the Plant no later than October 15, 2010 to allow site preparation activities to proceed to a benchmark that will allow construction to proceed through the winter.

1.5.4 Construction Completion Date: Bear Paw anticipates that Plant commissioning activities will begin in November 2011, followed by full in-service date approximately 30 to 45 days later. Site work including restoration may continue through May 2012.

1.5.5 Test Operations: Bear Paw anticipates testing will be completed before the end of June 2012.

1.6 Commercial Production Data:

| Product                | Production      |
|------------------------|-----------------|
| Inlet Gas Rate         | 100 MMscfd      |
| Mole Percent Ethane+   | 39%             |
| Residue Gas Production | 81 MMscfd       |
| NGL Production         | 2,170,000 lbs/d |

1.7 100 Percent Capacity Factor:

This not applicable to the process.

1.8 Any Expansions or Additions:

Bear Paw does not have plans to expand the proposed Plant at this time. There is space delineated within the battery limits to add a small amine unit should business needs require it.

## 2.0 STUDIES

2.1 Study Area: The Study Area is defined by the 80-acre project site and an approximately 1-mile-wide buffer area centered upon the Plant site. The project and the study areas are depicted in the maps found in Appendix B: Exclusion and Avoidance Areas, and Aerial Photography. The environmental analysis was conducted for the entire study area whose limit is delineated by the dashed line.

2.2 Site: The Site is an 80 acre parcel as depicted in the maps found in Appendix B. A natural resource inventory was conducted that encompassed this entire parcel; resources inventoried included habitat analysis, wetland delineation, and tree/shrub inventory. Cultural resource field studies were also conducted throughout the entire parcel.

Bear Paw initiated consultations with the federal and state agencies identified below for the purpose of environmental resource assessment relative to the potential impacts associated with the siting and construction of the proposed Plant at this location. Please refer to Appendix C for copies of these consultations.

- U.S. Fish and Wildlife Service (FWS);
- U.S. Army Corps of Engineers (COE);
- U.S. Farm Service Agency (FSA);
- North Dakota Game and Fish Department (GFD) ;
- North Dakota Parks and Recreation Department (PRD);
- North Dakota State Historic Preservation Office (SHPO);
- North Dakota State Lands Department (SLD); and
- North Dakota Department of Health (NDDoH).

Consultations and field studies are summarized as follows:

### 2.3 Environmental Analysis

2.3.1 Natural Resource Inventory: Bear Paw retained SWCA, Inc. (SWCA) to conduct a natural resource inventory of the Site. The inventory assessed the Site suitability to support federally protected species, presence or absence of protected species, inventoried trees, and delineated a mapped wetland feature on the Site. The inventory was completed on August 16, 2009. A copy of the report can be found in Appendix D.

The Site is characterized as agricultural, with no trees or shrubs, and one wetland feature that appears to have been manmade or an enhanced natural feature.

*Botanical Inventory*

The Site is dominated by cultivated wheat (*Triticum* sp.), which occurs over 99% (79.9 acres) of the site. A second botanical community comprised primarily of hydrophytic plants was identified that occurred on approximately 0.002% (0.127 acres) of the Site. No federal or state listed species or sensitive plant communities were observed on the Site.

No trees or shrubs were observed on the Site.

*Wetland and Waterbodies Inventory*

No waterbodies were observed on the Site. A feature characterized as a Palustrine Emergent Wetland (PEM) has been cataloged and mapped by the National Wetlands Inventory (NWI) on the Site. This feature has been previously modified to enhance water retention, likely serving as a stock pond. This feature was found to have wetland characteristics. This feature occupies 0.002% (0.127 acres) of the Site.

*Wildlife Inventory*

The wildlife observed on the Site are species commonly associated with agricultural communities. Various common avian, amphibian, and mammalian fauna were observed. No federal or state species of concern were observed on the Site.

2.3.2 U.S. Fish and Wildlife Service: The FWS administers several natural resource programs designed to identify and protect various plant and animal species of special status including habitats deemed critical. Bear Paw's efforts thus far to engage the FWS in consultation for purpose of identifying and addressing potential concerns are detailed in the following sections.

2.3.2.1 Federally Protected Species Review: Under the authority of the Endangered Species Act, FWS assess wildlife populations for viability throughout their current and historic ranges. Characterized as Threatened or Endangered Species and their critical habitats are identified and managed under the FWS ESA program.

E3 Environmental, LLC provided Bear Paw technical assistance with protected species review and subsequent consultations with the FWS. A review of the FWS published data identified the following listed species with the potential to occur within the study area:

- Least tern (*Sterna antillarum*) Interior Population – Endangered
- Whooping crane (*Grus americana*) – Endangered
- Pallid sturgeon (*Scaphirhynchus albus*) – Endangered
- Dakota skipper (*Hesperia dacotae*) – Candidate
- Black-footed ferret (*Mustela nigripes*) – Experimental population, non-essential
- Gray wolf (*Canis lupus*) – Endangered

E3 has reviewed the available data describing the life history, critical habitat, and conservation measures associated with each species to evaluate the potential effects of the project on these resources, the results of this analysis is as follows:

2.3.2.1.1 Least tern: The interior population(s) of the least tern has historically been associated with large river systems for breeding and migratory habitats. Breeding birds are known to breed colonies, utilizing sandbar habitat common to larger rivers. Regionally the Missouri River, which is greater than 25 miles from the project site, is known to host remnant breeding populations of the terns. No terns or their habitat were observed on the Site.

2.3.2.1.2 Whooping crane: The whooping crane is a large bodied marsh species that breeds primarily in Canada and winters in the Gulf of Mexico. This species has been closely studied and monitored in recent years due to its small population. North Dakota provides migratory habitat for the species, providing roosting and feeding opportunities during migration. This species prefers larger wetland complexes for roosting habitat typically using adjacent uplands for foraging opportunities. The proposed project will not

result in a loss of crane habitat; construction activities would likely serve as a deterrent, and once constructed, the proposed facility would present a fairly prominent feature to be avoided relative to its surrounding landscape. No cranes or their habitat were observed on the Site.

2.3.2.1.3 Pallid sturgeon: This species occupies benthic habitats of large waterbodies with sandy or gravel bottoms. The pallid sturgeon is known to occur in the Missouri River which is located more than 25 miles from the proposed project site. No sturgeon or their habitat were observed on the Site.

2.3.2.1.4 Gray wolf: The gray wolf a large carnivore which, through various conservation measures, has experienced strong population recovery particularly in the Great Lakes States of the upper mid-west. As populations rebound, individuals may break from packs to explore opportunities to establish packs in unoccupied territory. Roaming individuals can cover great distances without establishing viable breeding populations in previously unoccupied habitat(s). This species is not tolerant of human disturbance and will tend to avoid interaction with humans. The activities associated with construction and later plant operations would likely serve as a deterrent to this species. No wolves or their habitat were observed on the Site.

2.3.2.1.5 Dakota skipper: This native insect prefers moderately moist prairie habitats. The loss of preferred habitat throughout its range has raised the concern of the Service, though populations have not declined to the point that it would require the protected status of a listed species. No skippers or their preferred habitat were observed on the Site.

2.3.2.1.6 Black-footed ferret: Portions of North Dakota are host to experimental population of the Black-footed ferret. These populations are closely

studied by agencies but are not afforded legal status as protected. No ferrets or ferret habitat were observed on the Site.

On August 25, 2010, E3 Environmental initiated consultations with the Bismarck, ND office of the USFWS seeking concurrence with the conclusions drawn from the site analysis and natural history review for each species. See Appendix C for a copy of the correspondence. A response from the agency is pending.

2.3.2.2 FWS Migratory Bird Treaty Consultation: FWS is responsible for the protection of migratory birds; management of this responsibility has largely focused on protection of the birds while on their breeding grounds during the breeding season. It is generally understood that the FWS defines the breeding season in this region as occurring annually from February 1 through July 15. In recognition of these facts, Bear Paw proposes to initiate construction on or about October 15, 2010 and maintain an active construction site through plant commissioning and final restoration which is anticipated to occur approximately 18 months later. The proposed schedule would avoid the 2010 breeding season and migrants returning to the area would encounter an active construction site in the 2011 and 2012 breeding seasons which would serve as a deterrent to breeding birds. These efforts are intended to avoid direct impacts to breeding migratory birds.

On August 25, 2010, E3 Environmental initiated consultations with the Bismarck, ND office of the FWS seeking concurrence that the proposed measures will adequately avoid and mitigate potential impacts to migratory birds. See Appendix C for a copy of the correspondence. A response from the agency is pending.

2.3.2.3 FWS Managed Lands: Conservation programs such as Waterfowl Production Areas, wetland and grassland easements represent an important tool used by the Service to identify and manage high quality wildlife habitat. A review of public records failed to identify any of these Service managed lands in the project study area.

On August 25, 2010, E3 Environmental initiated consultations with the Bismarck, ND office of the FWS seeking confirmation regarding the presence or absence of Service managed lands within the proposed project study area. See Appendix C for a copy of the correspondence. A response from the agency is pending.

- 2.3.3 U.S. Army Corps of Engineers: A desktop review of the study area identified one mapped wetland feature. SWCA, Inc was contracted to conduct a wetland delineation and jurisdictional determination consultation for this feature. The field studies recorded a small landscape feature that was previously modified to enhance water retention typical of livestock watering holes. This 0.127 acre feature was delineated according to U.S. Army Corps of Engineers (COE) standards. See Appendix D for a copy of the report.

On August 24, 2010, the delineation results were submitted to the COE for concurrence and jurisdictional review. A response from the agency is pending.

- 2.3.4 U.S. Farm Service: Land conservation programs are administered at the county level through McKenzie County Farm Service Agency (FSA). These programs include Conservation Reserve Program (CRP) and Grassland Reserve Program (GRP) and are designed to compensate farmers for placing tillable lands into a non-agricultural conservation program; landowner participation is voluntary, yet financial considerations are available for participants.

On Bear Paw's behalf, E3 consulted with the local FSA office to confirm the presence or absence of CRP or GRP lands within the study area. McKenzie County FSA responded on August 16, 2010 and confirmed the absence of CRP and GRP contracted lands in the study area. See Appendix C for a copy of the correspondence.

- 2.3.5 North Dakota Game and Fish Department: The North Dakota Game and Fish Department (GFD) has oversight of the state's game and protected species.

On August 16, 2010, E3 Environmental initiated consultations with the GFD seeking to confirm the absence of wildlife concerns associated with the Site. See Appendix C for a copy the correspondence. A response from the agency is pending.

- 2.3.6 North Dakota Parks and Recreation Department: The North Dakota Parks and Recreation Department – Natural Resource Division (PRD) maintains a database comprised of the location and recorded occurrences of plant and animal species of special concern.

On August 17, 2010, E3 Environmental initiated consultations with PRD requesting a Natural Heritage Inventory review of the Site seeking to confirm the absence of state species of special concern at the Site. The PRD response dated August 31, 2010, confirmed the absence of special concern species or habitats within the Project Area and Site. See Appendix C for a copy of the correspondence.

- 2.3.7 North Dakota State Historic Preservation Office: The North Dakota State Historic Preservation Office (SHPO) is responsible for managing the historic and archaeological resources of the state. SWCA was retained by Bear Paw to survey the Site and report the results to the SHPO.

On August 10, 2010, SWCA conducted a Class I Cultural Resources Literature Search of SHPO records to identify previously completed cultural resource investigations and previously recorded cultural resources within 1 mile of the Site. There were two (2) previous cultural resource investigations within 1 mile of the Site. A review of the previous research identified two (2) previously recorded cultural resources located within 1 mile of the Site. Both are prehistoric in age, but neither has been evaluated with respect to eligibility for listing on the National Register of Historic Places. No previously recorded resources were identified within the Site boundaries.

On August 16, 2010 SWCA conducted a Class III Cultural Resource inventory of the Site. Archaeologists completed a pedestrian survey of the 80 acre Site. The site is generally described as an agricultural field. No cultural resources were identified by the Class III survey.

SWCA prepared a Negative Results Report that detailed results from the literature search and survey. The report recommended no further cultural resource work. See Appendix E for a copy of this report.

On August 31, 2010 SWCA submitted the survey report to the SHPO seeking concurrence with the results and recommendations of the report. The SHPO responded on August 31 and concurred with the conclusions and recommendations as presented. See Appendix C for a copy of the correspondence.

2.3.8 North Dakota Department of Health: The North Dakota Department of Health (NDDoH) administers regulatory programs governing the state's interest air quality and water discharges. Bear Paw is currently engaged at various stages in the permitting process with the NDDoH with respect to air emissions and water discharges.

2.3.8.1 Air Quality: The NDDoH administers the state's air quality protection programs. Bear Paw is applying for the required permits for construction and operation of a new emission source. Equipment such as electric-driven compressors, heat exchangers heaters, storage vessels, flares, and other ancillary equipment could be regulated emission sources and will be included in the permit application required by NDDoH for the construction and operation of air emission sources. Additionally, Bear Paw will obtain a permit for a temporary concrete batch plant if one is sited on location during construction.

Bear Paw's design plans include incorporating the necessary control measures to reduce total emissions for the Plant and ascertain compliance with all state and federal rules. The estimated emission reduction has not yet been finalized. The total estimated emissions for the plant have not been finalized.

Bear Paw will obtain a NDDoH Air Pollution Control Permit to Construct that will address net potential emissions from the Plant. The permit is required prior to construction initiation of new stationary emission source. Once the Plant is constructed and begins operations, Bear Paw will notify the NDDoH to procure an Operating Permit for the facility, as required.

2.3.8.2 ND Pollution Discharge Elimination System: The Pollution Discharge Elimination System (ND PDES) is regulatory program that regulates water discharges. Bear Paw will procure the following ND PDES permits from the NDDoH for regulated discharges associated with the construction and operation of the Plant.

2.3.8.2.1 Construction Stormwater: Bear Paw will be seeking coverage under NDR10-0000 *Authorization to Discharge Under the North Dakota Pollutant Discharge Elimination System* general permit for construction sites as required when disturbing an area greater than five (5) acres during construction. A project specific erosion control plan referred to as Storm Water Pollution Prevention Plan (SWPPP) will be prepared and maintained on-site for the duration of the project. Bear Paw will properly implement the SWPPP which will be designed to manage run-off in a manner that will minimize exposure to chemicals, waste, or petroleum products as well as describing erosion control measures designed to minimize off-site transfer of sediments. The NDDoH issued a Notice of Coverage on August 31, 2010; this permit will remain in effect until final restoration.

2.3.8.2.2 Construction site dewatering: Bear Paw will be seeking coverage under NDG07-0000 *Authorization to Discharge Under the North Dakota Pollutant Discharge Elimination* a general permit for various temporary discharges including both construction site dewatering and hydrostatic test water discharges. Site dewatering is required when groundwater infiltrated excavations (e.g., foundations and trenches) must be removed. Discharges are managed to minimize scouring and off-site transfer of sediments. Discharges are monitored and water quality samples will be collected, analyzed and reported as stipulated by the general permit.

2.3.8.2.3 Hydrostatic test water discharges: Bear Paw will be seeking coverage under NDG07-0000 *Authorization to Discharge Under the North Dakota Pollutant Discharge Elimination* a general permit for various temporary discharges including both construction site dewatering and hydrostatic test water discharges.

2.3.8.2.4 Industrial Discharges: Bear Paw understands that the plant will be exempt from a requirement to obtain an industrial discharge permit of stormwater. The facilities SIC code is 1321, which is exempt from stormwater permit requirements. Additionally, Bear Paw has developed a no-contact facility which is also eligible for exempt status, but requires an NDDoH review of the facility and stormwater control measures.

### 3.0 NEED FOR FACILITY:

#### 3.1 Analysis of Need Based on Present and Projected Demand, Including System Studies:

3.1.1 The development of hydrocarbon production from the Williston Basin has dramatically increased due to advances in drilling and completion technology for horizontal wells in the Bakken Shale and Three Forks formations in the Williston Basin. While oil production from these well can be trucked to market, the associated natural gas production must be collected via a gas gathering system. And, even when collected by a gathering system, the gas produced from the Bakken and Three Forks formations does not meet the quality specifications of the major interstate gas pipelines that transport gas from North Dakota to market; instead, in order to move the gas to market the gas must be processed for removal of natural gas liquids (NGLs) prior to delivering the residue gas production into interstate markets. Since June 2009, when the number of rigs operating in North Dakota was less than 40, the number of operating rigs have increased to 142 as of August 2010. The rapid increase in gas production from Bakken and Three Forks wells has exceeded the limited processing capacity available at existing facilities in the region. Absent the construction of additional processing capacity, gas produced in association with oil from these wells must be flared, which is a loss of revenue to the producers, royalty owners, and the state of North Dakota. Gas gathering and processing is a non-discretionary service that is required for the marketing and sale of natural gas produced in association with oil from these wells. As a result the construction of additional processing capacity is required to meet the demand of area producers.

#### 3.2 Description of Feasible Alternative Methods of Serving the Need:

3.2.1 Bear Paw had undertaken a thorough analysis of all reasonable alternatives to the Plant. Various factors were considered by Bear Paw, including engineering, economic, and environmental factors in multidisciplinary and iterative fashion. This process identified the following alternatives.

3.2.1.1 No Action Alternative: Overall regional production would continue to be constrained by gas processing capacity, resulting in increased flaring at well head and loss of natural resources. This alternative is not desirable.

3.2.1.2 Expansion of Existing Processing Facilities: Bear Paw initially considered the expansion of its Grasslands Gas Plant located near Sydney, Montana in western McKenzie County. The Grasslands Plant was expanded from 60 MMcfd to 100 MMcfd in 2009 when Bakken formation wells were first drilled in the Elm Coulee Field in Richland County, Montana. However, Bear Paw concluded that further expansion of the Grasslands Plant was uneconomical due to (i) a lack of sufficient space and limited capacity of peripheral equipment at Grasslands Plant to accommodate a major expansion and (ii) a lack of capacity in Bear Paw's high pressure gathering system necessary to deliver significant volumes of gas production from eastern McKenzie County to the Grasslands Plant, which is approximately 70-80 miles from the area where the production is currently being developed. This alternative is not desirable.

3.2.1.3 Alternative Plant Location A: Alternative locations were considered in the general vicinity of Watford City but were found to have greater direct impacts to the environment due to proximity to existing residences. This alternative is not desirable.

3.2.1.4 Alternative locations near the current site with different landowner, and with different parcels from the same landowner, were considered but were found to have greater indirect impact due to lack of infrastructure (primarily road access, lack of available power, and increased distance from Bear Paw's existing gas gathering system which will deliver gas to the plant). This alternative is not desirable.

3.3 Bear Paw's most recent 10-year plan was filed October 21, 2004 (PU-04-555).

3.3.1 In prior filings Bear Paw did not consider the need to construct additional processing capacity because gas production volumes in North Dakota had been declining as existing fields matured. Significant increases in crude oil prices starting in the mid-2000s, combined with the advent of horizontal drilling and advanced completion techniques in the Bakken and Three Forks formations,

however, have enhanced the economic viability for producers to develop the Bakken Shale. These technological advances have only recently stemmed the long-term decline in production rates in the region. Bear Paw, as a provider of gathering and processing services to area producers, must adjust its business plans in response to changes in the level of activity of its customers. Based on increasing volumes entering the gathering system in the past year and sentiment from area producers regarding their intent to continue to increase production volumes, Bear Paw has determined that a significant increase in its gas processing capacity is required to meet its customers' needs.

#### 4.0 LOCATION

4.1 Study Area: Bear Paw’s Study Area includes a 1-mile-wide area surrounding the 80-acre Site as described in Appendix B. Bear Paw initiated agency consultations, Geographic Information System mapping, internet based research and desktop analysis when conducting the resource inventory of the Site. These efforts were augmented with biological and cultural resource surveys of the Site.

4.2 Identify and Map Criteria: The information presented in this section was developed to demonstrate conformation with the Commission’s siting criteria for Energy Conversion facilities. Bear Paw has conducted a thorough inventory of the Study Area and evaluated the resources that occur within the Study Area and Site sufficiently to assess the compatibility of the Plant with the state’s siting criteria. The following sections identify and discuss the presence or absence of siting criteria within the Study Area or Site. Where siting criteria is identified, its location is shown on the maps in Appendix B.

4.3 Exclusion Area Inventory and Analysis: Exclusion areas are geographic areas that should be excluded from consideration when siting an energy conversion facility. The following table and text identify and discuss exclusion areas identified within the Study Area or Site.

| Exclusion Area |  | Project Site | Within Study Area |
|----------------|--|--------------|-------------------|
| Federal        |  |              |                   |
|                | National Parks or Memorial Parks                   | No           | No                |
|                | Historic Sites, Districts, or Landmarks            | No           | No                |
|                | Natural Landmarks or Monuments <sup>1</sup>        | No           | No                |
|                | Wilderness Areas or Wildlife Areas <sup>1</sup>    | No           | No                |
|                | Wild, Scenic or Recreational Rivers <sup>1</sup>   | No           | No                |
|                | Wildlife Refuges or Grasslands <sup>1</sup>        | No           | No                |
|                |  |              |                   |
| State          |  |              |                   |
|                | Forest or Forest Management Lands <sup>1</sup>     | No           | No                |
|                | Historic Sites, Monuments, or Historical Markers   | No           | No                |
|                | Archaeological Sites                               | No           | No                |
|                | Grasslands   | No           | No                |
|                | Wild, Scenic or Recreational Rivers                | No           | No                |
|                | Game Refuges or Game Management Areas <sup>1</sup> | No           | No                |
|                | Management Areas                                   | No           | No                |
|                | Nature Preserves                                   | No           | No                |
|                |  |              |                   |
| County         |  |              |                   |
|                | Parks  | No           | No                |

|       |  |    |    |
|-------|--|----|----|
|       | Recreation Areas   | No | No |
|       | Municipal Parks  | No | No |
|       |  |    |    |
| Other |  |    |    |
|       | Parks or public lands held by other government entities. | No | No |
|       | Prime Farmland   | No | No |
|       | Irrigated Farmland                                       | No | No |
|       | Critical habitat for protected species                   | No | No |

4.3.1 Federal Resource Review: Based upon a review of publicly available information, Bear Paw has concluded that there are no national parks, memorial parks, historic sites and landmarks, monuments, or wilderness areas within the Project Area or Site. Bear Paw has initiated consultations with agencies to confirm this conclusion. See Section B for a comprehensive discussion of Bear Paw's efforts. <sup>1</sup>Pending Agency Response.

4.3.2 State Resource Review: Based upon a review of field surveys and publicly available information, Bear Paw has concluded that there are no state parks, historic sites, monuments, historical markers, archaeological sites, or nature preserves within the Study Area or Site. Bear Paw has initiated consultations with agencies to confirm this conclusion. See Section B for a comprehensive discussion of Bear Paw's efforts. <sup>1</sup>Pending Agency Response.

4.3.3 County Resource Review: Based upon a review of publicly available information Bear Paw has concluded that there are no county parks, recreation areas, municipal parks, or parks owned by other subdivisions of government bodies within the Study Area or Site. Bear Paw has initiated consultations with agencies to confirm this conclusion. See Section B for a comprehensive discussion of Bear Paw's efforts. <sup>1</sup>Pending Agency Response.

4.3.4 Prime Farmland: Bear Paw conducted a review of published data and confirmed the absence of Prime Farmland for both the Study Area and Site.

4.3.5 Irrigated Farmland: Bear Paw's investigation found no evidence of irrigation within the Study Area or Site.

4.3.6 Protected Species Resource Review: Bear Paw has conducted field surveys of the Site and reviewed published information and has concluded that there are no areas critical to the life stages of threatened or endangered animal or plant species within the

Study Area or Site. Bear Paw has initiated consultations with agencies to confirm this conclusion. See Section B for a comprehensive discussion of Bear Paw’s efforts. <sup>1</sup>Pending Agency Response.

4.3.7 Critical Habitat for Protected Species: Based upon consultations with agencies and surveys of the Site, Bear Paw has confirmed the absence of critical habitat within the Study Area and Site. See Section B for a comprehensive discussion of Bear Paw’s efforts. <sup>1</sup>Pending Agency Response.

#### 4.4 Avoidance Area Inventory and Analysis

| Avoidance Area |   | Project Site | Within Study Area |
|----------------|---|--------------|-------------------|
| Other          |   |              |                   |
|                | Other Historic Resources not meeting Exclusion Areas criteria         | No           | No                |
|                | Areas within City Limits or Military Installation Boundaries          | No           | No                |
|                | Areas within Known 100-Year Floodplains                               | No           | No                |
|                | Areas of Known Geologic Instability                                   | No           | No                |
|                | Woodlands and Wetlands  | Yes          | Yes               |
|                | Areas of Recreational Significance not categorized as Exclusion Areas | No           | No                |
|                | Areas within 500 feet of an Inhabited Rural Residence                 | No           | No                |

4.4.1 Other Historical Resources Not Meeting Exclusion Area Criteria: Bear Paw conducted a Class I study of the Study Area and Site, and conducted a Class III cultural resource survey of the Site; these studies confirmed the absence of historical resources. Bear Paw has submitted survey results to the SHPO for review and comments seeking concurrence with this conclusion. See Section B for a comprehensive discussion of Bear Paw’s efforts.

4.4.2 Areas Within City Limits or Military Installation Boundaries: Bear Paw has confirmed that the Study Area and Site are not located within city limits or within the boundaries of military installations.

4.4.3 Areas Within Known 100-Year Floodplains: Typically flood hazards are benchmarked with Federal Emergency Management Administration’s (FEMA) 100-year floodplain analysis. Unfortunately many rural areas have not been mapped by FEMA. The Site’s lowest elevation is approximately 28 feet higher than the

nearest waterbody. This difference in elevation suggests the site is clear of a 100-year floodplain.

4.4.4 Areas of Known Geologic Instability: There are no known areas of geological instability within the Study Area or Site. North Dakota has not experienced an earthquake of sufficient magnitude to damage welded steel piping or structural steel in recorded history. Sink holes are known to occur in North Dakota but are more closely related to mining activities and no evidence of mining or sink holes were identified. Finally, the potential for landslides was evaluated. Earth movement of this nature is closely associated with areas of great topographic relief, high gradient slopes, recent deposits that have yet to reach a stable angle of repose, or where underground water movement may create a slurry of rock and mud resulting in a subsidence. Nothing of this sort was found.

4.4.5 Woodlands and Wetlands: Natural resource studies of the Site augmented GIS analysis and agency consultations when assessing wetland and woodland resources of the Study Area. Woodlands associated with waterways and property/section lines occur within the Study Area but none were found on the Site.

An inventory of the Site identified a mapped wetland feature. The presence of this 0.127 acre feature was confirmed and delineated. While the feature exhibited the characteristics consistent with a wetland, it also retained evidence of previous re-grading of soil to form a berm at a natural outlet, thereby enhancing water retention and creating conditions commonly associated with a wetland. Bear Paw assessed this feature to be an isolated feature and non-jurisdictional to the COE and below the de minimis threshold of the State Water Commission. Bear Paw has initiated consultations with agencies to confirm this conclusion. See Section B for a comprehensive discussion of Bear Paw's efforts.  
<sup>1</sup>Pending Agency Response.

4.4.6 Areas of Recreational Significance Not Categorized as Exclusion Areas: No areas of recreational significance occur within the Study Area or Site.

4.4.7 Areas within 500 Feet of Inhabited Rural Residence: Bear Paw has confirmed the absence of inhabited rural residence within the Study Area or within 500 feet of the Site.

#### 4.5 Factors to be Considered in Evaluating Applications and Designation of Sites, Corridors and Routes (Section 49-22-09, N.D.C.C.).

4.5.1 The selection criteria require a study of environmental impacts and changes in land use that may result from the siting of the proposed facility. Through this process, Bear Paw proposes that it has successfully avoided or minimized these effects to the maximum extent practicable, for Commission review and approval.

##### *Agricultural Impact Assessment*

4.5.1.1 **Agricultural Production:** The Plant will remove approximately 80 acres of tillable land from agricultural production. 80 acres is the minimum amount of surface area for a facility of this size and gas throughput given the size of the processing equipment, minimum spacing requirements for this equipment, and installation of necessary peripheral equipment such as a flare, power substation, roads, and continually occupied office building.

4.5.1.2 **Family Farms and Ranches:** The property was acquired through a purchase agreement negotiated by Bear Paw and the landowner. The Site will be converted from a family farm/rangeland to an industrial use. The Site is over three-quarters of a mile from the nearest occupied residence, which is owned by the current landowner selling the property. No other impacts to family farms or ranches are anticipated.

4.5.1.3 **Lands Suitable for Irrigation:** Construction activity will not impact irrigated lands. Land that is most efficient for irrigation is relatively level and has soils that are well drained and highly permeable. The combination of topographic relief and soil characteristics at the Site indicate that the Site is not suitable for irrigation. No above-ground irrigation systems have identified in the Study Area.

4.5.1.4 **Surface Drainage:** The Natural surface drainage pattern at the Site is to the west/southwest toward Cherry Creek. Bear Paw has studied the site and off-site introduction of stormwater run-off and has determined that the most effective means of controlling stormwater flows is to collect

run-off originating off-site from the west, route it via a ditch around the plant, and discharge to vegetated green space on the eastern portion of the property which will promote natural filtration and infiltration of the run-off. Stormwater collected from areas within the Plant will be collected and directed to stormwater retention basins. The basins will be designed of sufficient capacity to collect and hold this portion of the run-off to allow for later controlled discharges of the water. These discharges will also flow south and west where the closest waterbody is Cherry Creek approximately 1,200 feet away.

- 4.5.1.5 Ground Water: Ground water suitable for domestic and livestock supplies in McKenzie County is available from three aquifer systems. The Fox Hills and basal Hell Creek aquifer system, located at a depth of approximately 1,100 to 1,800 feet, is used as a source for livestock and domestic supplies. The Ludlow aquifer underlies all of McKenzie County at depths greater than 500 feet. The Tongue River aquifer is also suitable for domestic and livestock use is found at depths between 140 and 500 feet.

The 1985 study “Groundwater Resources in McKenzie County” conducted by the US Geological Survey reported and estimated 150 wells in the area tapping into the Fox Hills and basal Hell Creek aquifer system and the Ludlow aquifer system to provide a low volume source of stock water and other uses.

Ground excavation associated with the Project will generally be limited to depths no greater than 8 feet. Bear Paw will be seeking a permit to install a ground water well to provide a source of water during construction and as a source of utility water to the office building after construction.

- 4.5.1.6 Agricultural Quality of the Cropland: Land acquired for the Plant will be permanently removed from agricultural production. No other impact to agricultural lands is anticipated.

*Impact Upon the Availability and Adequacy of:*

4.5.1.7 Local public services: The potential impacts to local public services including law enforcement, fire department, health care, public schools and recreational facilities are anticipated to be temporary in duration and minimal in their overall effect to existing programs and systems.

Construction activities are anticipated to occur over an 18 to 24 month period. During this period there will be an influx of employees ranging from laborers, skilled trades, technicians, engineering and environmental professionals. The work force will typically engage 75 individuals, with periods where the workforce will increase to levels of up to 200 individuals for a period of up to 6 months (e.g. 2011).

Area resources may experience increased demand on services with the addition of construction workers temporarily residing in the area. The peak demands will likely occur in 2011. The most noticeable impact may be due to an increase in vehicle traffic associated with the plant.

Prior to construction, Bear Paw will coordinate with local health care providers and emergency responders to discuss emergency response coordination.

*The Impacts Upon:*

4.5.1.8 Local Institutions: Due to its proximity to the project site, Watford City may see the greatest impact from the project. These impacts from facility construction will be temporary as the majority of the construction will be completed by 2011. Once operational the Plant will employ approximately 25 full time employees and will conduct business with many local contractors and businesses. Generally, the impacts will be beneficial to the local economy due to the addition of revenues from outside of the community being spent on goods and services locally. The beneficial impacts of the additional workforce associated with permanent workforce required to operate the facility will have long term benefits on the economy that are

anticipated to be greater than the demands placed upon the institutions.

4.5.1.9 Noise-Sensitive Land Uses: There are no noise-sensitive resources located within the study area or within 500 feet of the Site. The closest occupied dwelling is located approximately 0.75 miles from the Site. The Project has been sited approximately 4.5 miles from Watford City in a rural setting, effectively isolating the Project from the majority of sensitive receptors. Local residents may experience additional motor vehicle volumes on area roadways, but the noise associated with vehicles will be similar to existing background levels and occur largely during normal business hours.

4.5.1.10 Rural Residences and Businesses: The project is located approximately 4.5 miles from Watford City. Residents may experience additional traffic congestion and an increase in commerce in response to the influx of temporary workers purchasing goods and services. The Plant will likely benefit the local economy for both the near and long term.

4.5.1.11 Aquifers: Water demands during and after construction are anticipated to be minimal. A ground water well has been planned to provide water during construction and serve as utility water during operations. Bear Paw assumes the permitting process associated with siting the well will ensure that the resource will be sufficient to support the anticipated demand without impacting other current or anticipated beneficial use of the resource.

4.5.1.12 Human Health and Safety: Bear Paw promotes a safe and healthy workplace during construction and operations of all its assets. A corporate policy that meets or exceeds federal and state laws, rules and regulations is enforced and adhered to by all regular and contract employees. Bear Paw governs operations and construction activities with various safe work procedures designed to protect property and personnel and maintaining regulatory compliance.

4.5.1.13 Animal Health and Safety: The wildlife currently inhabiting the Site are common and are generally mobile. The local wildlife inhabitants will be displaced by the

Project without a measurable impact to the viability of these populations. No species of special concern are anticipated to experience direct impacts due to construction or operation of the Plant.

4.5.1.14 Plant Life: The Project will result in the loss of negligible amount of cultivated crops, when measured on a county- or state-wide basis. No species of special concern will be impacted by the Project.

4.5.1.15 Temporary and Permanent Housing: The region has experienced increased demand for permanent and temporary housing as the result of the continued expansion of resource production. The area has witnessed this increased activity since the early 2000's and as a result has steadily increased lodging resources in response. The temporary work force is expected to be well aware of the situation and willing to accept non-traditional lodging opportunities such as work camps if necessary.

4.5.1.16 Temporary and Permanent Skilled and Unskilled Labor: Construction of the Plant will require a work force of approximately 100 to 200 temporary employees. The construction employees will be comprised of both skilled and unskilled personnel. Skilled labor will include craft workers such as operating engineers, iron workers, welders, electricians, carpenters and boilermakers. The unskilled workforce will be comprised of common laborers who work closely with the skilled trades.

Once the Plant is operational it will require approximately 25 full-time employees. These personnel will be responsible for day-to-day operations, maintenance, and support of local gathering assets that supply the Plant.

*Cumulative Effects of the Location of the Facility in Relation to Existing and Planned and Facilities and Other Industrial Development:*

4.5.2 Bear Paw is not aware of any new planned facilities or industrial developments at the Site. The introduction of additional gas processing capacity may expose existing demand that may result in development of additional gathering capacity. Also a result of

new processing capacity, there may be development of additional take-away capacity to bring the product to market.

#### 4.6 Policy Criteria:

The Commission may give preference to an applicant that will maximize benefits that result from the adoption of the following policies and practices, and in proper case may require the adoption of such policies and practices. The Commission may also give preference to an applicant that will maximize interstate benefits.

- 4.6.1 Policies and Commitments to Limit Environmental Impact: Bear Paw is committed to conducting its business in compliance with all applicable environmental laws and regulations. These laws, regulations and standards are designed to safeguard the environment, human health, wildlife, and natural resources. Our commitment to observe them faithfully is an integral part of our business and our values.

Bear Paw will make environmental considerations contained in the permits and authorizations received for this Project a priority. Bear Paw will conduct its activities with the objectives of providing a healthful and safe workplace for our employees, preventing accidents and environmental incidents, and controlling emissions and wastes to below harmful levels.

All persons and firms providing service to Bear Paw are required to conduct their work in compliance with environmental conditions, permit authorizations, and regulations, and will be held accountable for their actions in that regard.

- 4.6.2 Recycling of the Conversion Byproducts and Effluents: Not applicable to this type of project.

- 4.6.3 Energy Conservation Through Location, Process and Design: The siting of the Plant in close proximity to wellhead and gathering systems reduces emissions associated with shipping raw feed gas over greater distances. Waste energy is generated in the expansion of cooled inlet gas to the cyro-thermal gas plant. The gas is first chilled to condense liquids. After separation, the temperature of the gas lowered further via the process of throttling expansion in the expander section of the turbo-expander. The expander is tied by an integral shaft to a compressor to compress gassed from the stabilizer overhead prior to the residue

compressors. The mechanical efficiencies of the turbo-expanders can achieve 90 percent.

- 4.6.4 Training and Utilization of Available Labor in This State for the General and Specialized Skills Required: Gas plant construction is a specialized niche construction market and the labor force needed to build the Plant will be primarily comprised of a non-local workforce. The primary contractor will be a non-local contractor, supplying specialized skilled labor. Bear Paw will draw upon the local labor force to supply general laborers. The workforce is anticipated to reach a peak of approximately 200 personnel of which up to 10 percent could be drawn upon locally.
- 4.6.5 Use of a Primary Energy Source or Raw Material Located Within the State: The raw feed gas supplying the proposed Plant will be produced and processed entirely in State. The Plant products will be shipped to delivery points in State and transported out of state.
- 4.6.6 Nonrelocation of Residents: No residences shall be displaced or require relocation due to the Project.
- 4.6.7 The Dedication of an Area Adjacent to the Facility to Land Uses Such As Recreation, Agriculture, or Wildlife Management: Bear Paw does not own property adjacent to the proposed Project suitable for recreation, agricultural, or wildlife management purposes. The current land use of properties adjacent to the Project is agricultural/range land (see aerial photograph in Appendix B).
- 4.6.8 Economies of Construction and Operation: Bear Paw has designed the Plant to take advantage of the Site's proximity to existing electrical supply and gathering system piping for its location. The Plant will use an existing gathering line system to deliver raw feed stock to the Plant from the gathering fields and generate new delivery points for processed natural gas and Y-grade natural gas liquids. The Plant's location and design are clear examples of creating an economy of scale project concept, achieving additional production capacity in the most minimally intrusive and most efficient way possible, in terms of new infrastructure development.
- 4.6.9 Secondary Uses of Appropriate Associated Facilities for Recreation and the Enhancement of Wildlife: Construction of the Plant will

result in the development of an industrial facility and a setting not typically suitable for recreational or wildlife application.

- 4.6.10 Use of Citizen Coordinating Committees: Bear Paw did not engage with a Citizen Coordinating Committee. Bear Paw has established and maintained a good relationship with the local residents through its presence operating gathering systems in the area. Through these relationships Bear Paw has maintained several grass roots communication channels to inform local residents regarding the developments associated with the Plant.
- 4.6.11 A Commitment of a Portion of the Transmitted Product for Use in This State: The raw feed gas supplying the proposed Plant will be supplied and processed entirely in State. The products of the Plant will be transported to delivery or transfer points located both in State and out of state.
- 4.6.12 Labor Relations: Bear Paw does not anticipate encountering any adverse labor relations on this Project. The labor market in the Project area is supportive of the oil and gas industry.
- 4.6.13 The Coordination of Facilities: Bear Paw through its corporate parent, ONEOK Partners, L.P. is actively pursuing natural gas gathering and processing development projects in northwestern North Dakota. Bear Paw will coordinate the construction of the Project with its other gas gathering construction projects. Coordinating construction activities will result in greater efficiencies by using much of the same labor pool and often the same construction equipment. In addition, Bear Paw and its contractors working in the area intend to populate a temporary work camp within the general Watford City area.
- 4.6.14 Monitoring of Impacts: Bear Paw will coordinate with its primary contractor, Linde Process Plants, Inc., the oversight responsibilities for construction activities at the Site. Environmental responsibilities shall be coordinated in the same manner.
- 4.6.15 Problems Raised by Federal Agencies, Other State Agencies, and Local Entities: Bear Paw has initiated consultations with several federal, state, and local authorities who have environmental oversight authority. The purpose of these consultations is the identification of potential natural resource issues related to the

Plant. Responding agencies have not raised any concerns. Bear Paw will respond to any concerns raised by agencies with pending responses.

## 5 MITIGATIVE MEASURES

Bear Paw's commitment to minimize environmental impacts is a key mitigation element. As described previously, Bear Paw's design took into consideration various elements to maximize efficiencies while minimizing impacts to the environment. This combination of actions effectively mitigates the impacts of the Plant.

6 LIST OF PREPARERS

**Russ Clark, P.E.**

Project Engineer

ONEOK Partners, 100 W. Fifth Street, Tulsa, OK 74103

B.S. Chemical Engineering, Montana State University - Bozeman

Mr. Clark has worked as an engineer in the petroleum and natural gas industries for 10 years. As a process engineer, he has designed and overseen the implementation of several natural gas projects in the past two years. Mr. Clark is a licensed Professional Engineer by examination in the State of Colorado.

**Joseph Soerries, P.E.**

Project Manager

ONEOK Partners, 100 W. Fifth Street, Tulsa, OK 74103

B.S. Mechanical Engineering, University of Tulsa.

Mr. Soerries has worked in many different positions in the petroleum and natural gas industries for over 30 Years. As a project manager, he has managed over 10 natural gas processing plants in the past twenty years. Since 1982, Mr. Soerries has been a licensed Professional Engineer by examination in the State of Oklahoma.

**William McCarthy, C.W.B.**

Senior Environmental Compliance Analyst

E3 Environmental, LLC, 817 Vandalia Street, St. Paul, MN 55114

M.S. Wildlife Biology, University of Minnesota – Twin Cities; B.S. Wildlife Biology and B.S. Wildlife Biology, Michigan State University. Mr. McCarthy is an environmental compliance analyst with 15 years of environmental consulting experience working with various energy assets and regulatory agencies. As a compliance analyst he has managed the environmental requirements for facility siting, pipeline routing, federal licensing, and various federal, state and local permits. Mr. McCarthy is a certified wildlife biologist and in this role conducts and coordinates field studies, agency consultations, mitigation and avoidance plans.

**Tyson Schreiner, G.I.S.P.**

GIS Specialist

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E3 Environmental, LLC, 817 Vandalia Street, St. Paul, MN 55114

B.S. Natural Resources and Environmental Studies, University of Minnesota – Twin Cities. Mr. Schreiner has also obtained a Professional Certification in his area of technical expertise, Geographic Information Systems. Mr. Schreiner has 13 years of professional experience. Mr. Schreiner's GIS experience involves creating data from various sources and formats including: hard copy maps, Global Positioning Systems (GPS), Agency databases, CAD or other formats.

**Judy Cooper**

Archaeologist/ Principle Investigator

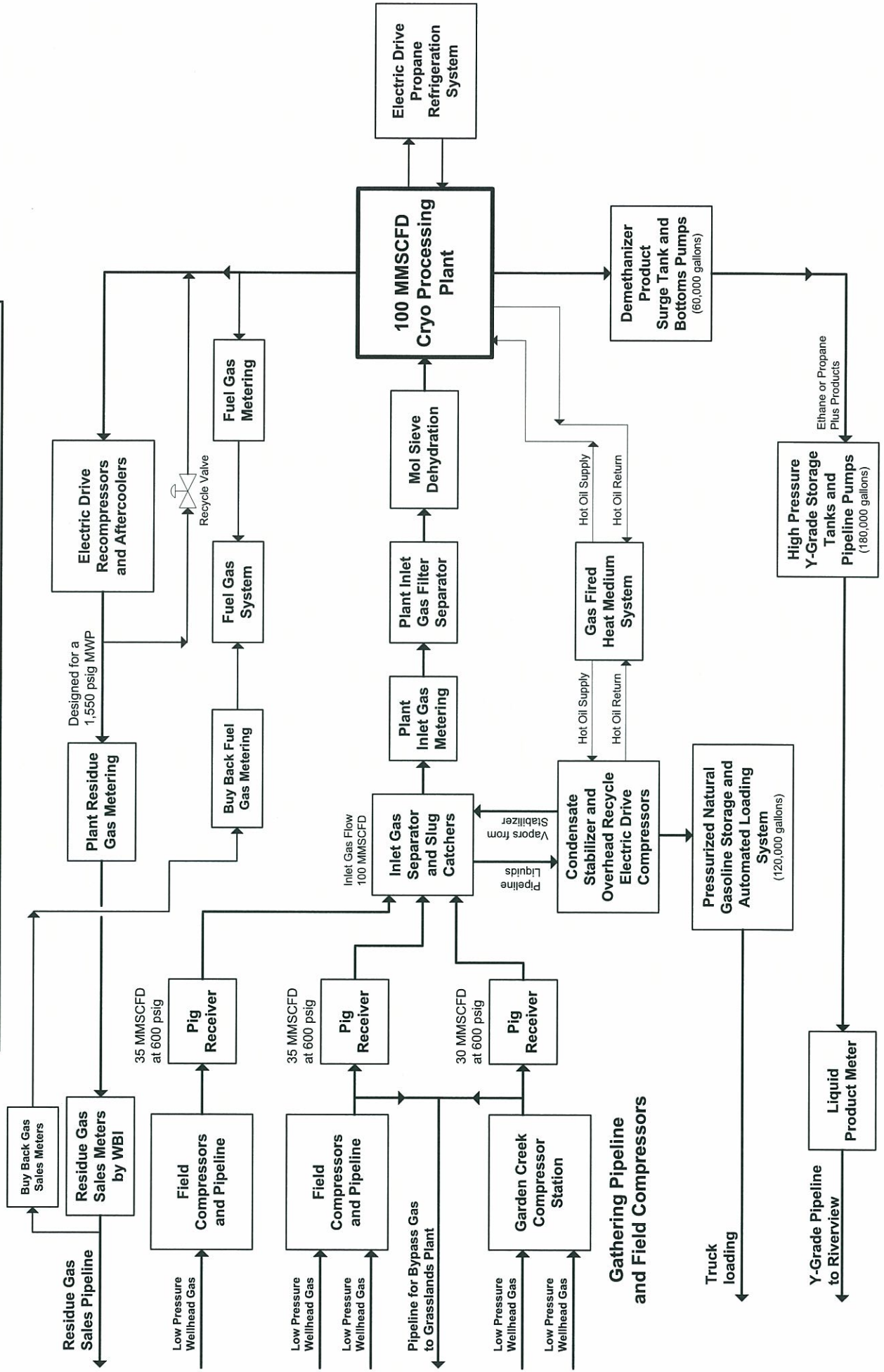
SWCA, Inc., 116 North 4<sup>th</sup> Street, Suite 200, Bismarck, ND 58501

Ph.D. and M.A. Anthropology, Southern Methodist University and B.A. Anthropology, Pennsylvania State University. Dr. Cooper has over ten years of experience in North American archaeology and has worked on field (survey, testing, and recovery) and research projects in the northern Great Plains and Rocky Mountains. Dr. Cooper is experienced in federal and state cultural resources law and regulations, including Section 106 of the National Historic Preservation Act. As the Cultural Resources Lead in the SWCA's Bismarck office, she serves as a member of multi-disciplinary project teams to assure cultural resource concerns are appropriately addressed during the regulatory process.

Appendix A  
Engineering Documents



# Garden Creek Plant Block Diagram for a New 100 MMSCFD Processing Plant August 30, 2010



## PROJECT DESIGN DATA

### 2.1. PLANT CAPACITY

Plant is to be designed with a **nameplate capacity of 100 MMSCFD** to accommodate the 2010 forecasted gas composition shown below. The plant must also have enough incremental capacity to accommodate intra-day flow swings of approximately - 10 MMSCFD. This and other design considerations are discussed further in the **Project Design Philosophy** document provided in Appendix 5.4.

### 2.2. FEED STREAM FLOWS & COMPOSITIONS

Raw associated gas from oil production wells was designed to enter the plant fence at a pressure between 550 and 1100 psig at a temperature between 40 °F and 90 °F. The inlet slug catcher is to rated to handle a maximum of 100 MMscfd of inlet gas flow at 1,100 psig (MAWP). Raw inlet gas is limited to 4 ppm Hydrogen Sulfide. For the purposes of design, refer to the table below.

#### Inlet Gas Flow

| Components       | Mol%                    | GPM  |
|------------------|-------------------------|--|
| Nitrogen         | 2.082                   |  |
| Carbon Dioxide   | 0.593                   |  |
| Hydrogen Sulfide | 0.000 (less than 4 ppm) |  |
| Methane          | 58.208                  |  |
| Ethane           | 21.859                  | 5.828                                      |
| Propane          | 11.553                  | 3.173                                      |
| Iso-butane       | 1.103                   | 0.360                                      |
| Butane           | 3.145                   | 0.989                                      |
| Iso-pentane      | 0.472                   | 0.172                                      |
| N-pentane        | 0.654                   | 0.236                                      |
| Hexane           | 0.199                   | 0.145                                      |
| Heptane          | 0.099                   | (included in the Hexane                    |
| Octane plus      | 0.033                   | GPM)                                       |
| <b>Totals</b>    | 100.000                 | Ethane + 10.904 gpm<br>Propane + 5.076 gpm |

### 2.3. BATTERY LIMIT CONDITIONS

#### Inlet gas conditions at the plant inlet

|                                 | Design    | Maximum   | Minimum |
|---------------------------------|-----------|-----------|---------|
| Gas Volume (MMscfd)             | 100       | 100       | 40      |
| Gas Pressure (psig)             | 600       | 1100      | 550     |
| Temperature (°F)                | 80        | 90        | 40      |
| Hydrogen Sulfide (ppm)          | 3.0       | 4.0       | 0.0     |
| Water Content (lbs water/MMscf) | Saturated | Saturated | 0.0     |

## 2.4. PRODUCT SPECIFICATIONS

### 2.4.1 NGL Product Specifications

| Y-Grade Product                              | Design | Maximum | Minimum |
|--|--------|---------|---------|
| Pipeline MAOP (psig)                         | 1,440  | 1,440   | N/A     |
| Carbon dioxide to ethane liquid volume ratio | 0.0035 | 0.0250  | N/A     |
| Methane to ethane liquid volume ratio        | 0.010  | 0.015   | 0.05    |
| Methane vol% of total hydrocarbons           | N/A    | 0.50    | N/A     |
| Vapor pressure at 100 °F (psig)              | 550    | 600     | N/A     |
| Copper Strip test at 100 °F                  | N/A    | N/A     | No. 1   |
| Minimum product temperature (°F)             | 60     | N/A     | 40      |
| Maximum product temperature (°F)             |        |         |         |
| - Product with >= 65 mol% ethane             | 80     | 90      | N/A     |
| - Product with < 65 mol% ethane              | 100    | 110     | N/A     |

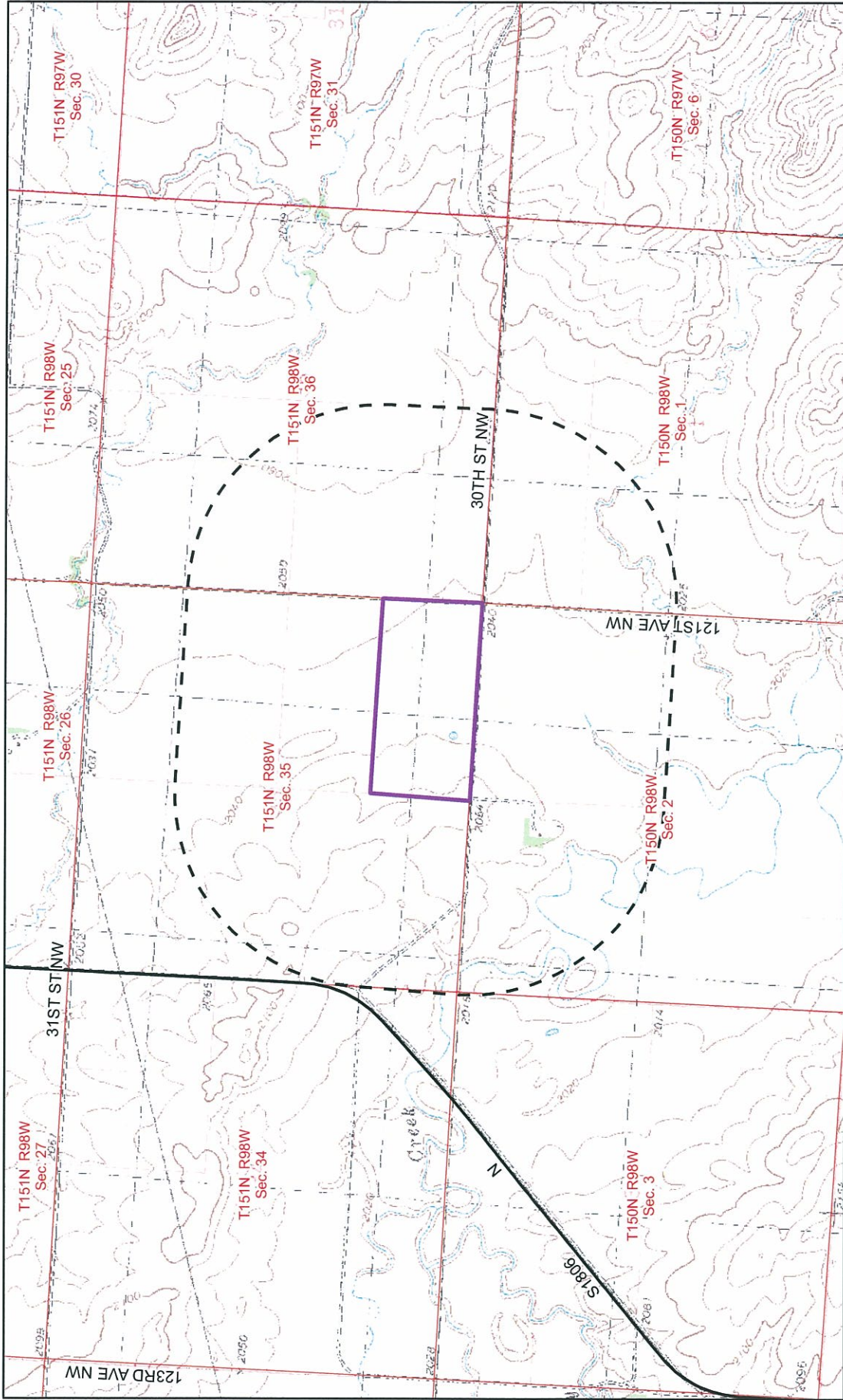
| Natural Gasoline (Condensate)      | Design | Maximum | Minimum |
|------------------------------------|--------|---------|---------|
| Reid Vapor Pressure at 100F        | 13.0   | 14.0    | 12.0    |
| Liquid vol% of Propane             | 0.0    | 0.0     | None    |
| Liquid vol% of Butanes             | 3.0    | 6.0     | 1.5     |
| Liquid vol% of Pentanes            | N/A    | N/A     | 40.0    |
| Liquid vol% of Hexanes and heavier | N/A    | 50.0    | N/A     |

### 2.4.2 Residue Gas Pipeline Specifications

|   | Design | Maximum |
|---|--------|---------|
| Pressure (psig)                                   | 1,440  | 1,550   |
| Temperature (°F)                                  | 120    | 120     |
| Water content (lbs/MMscf)                         | Nil    | 5.0     |
| Hydrogen sulfide (ppm)                            | 0.0    | 4.0     |
| Gross higher heating value (BTU/ft <sup>3</sup> ) | N/A    | 1,200   |
| Carbon dioxide (mol%)                             | 0.0    | 2.0     |
| Cricodentherm Temperature (°F)                    | N/A    | 20      |



Appendix B  
Exclusion & Avoidance Maps



**Garden Creek Gas Plant**

**Project Location**

0 0.25 0.5 Miles

N

Enhancing Execution with Experience

McKenzie Co.

North Dakota

- Half mile buffer
- Project Area
- Roadway
- Section Line

Source: Schaefer, ND USGS 7.5' series topographic map

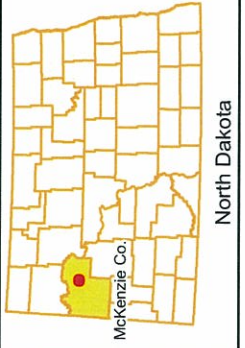


**Garden Creek Gas Plant  
National Wetlands  
Inventory Data &  
Aerial Photograph**



- Half mile buffer
- Project Area
- Roadway
- Section Line
- National Wetlands Inventory

Source: McKenzie County, ND NAIP Imagery, 2009  
USFWS National Wetlands Inventory (NWI)



Appendix C  
Consultations

## William McCarthy

---

**From:** FWSDdevelopment@fws.gov on behalf of NorthDakotaFieldOffice@fws.gov  
**Sent:** Monday, August 16, 2010 10:19 PM  
**To:** William McCarthy  
**Subject:** Thank you for contacting the US Fish and Wildlife Service

Thank you for contacting us at the US Fish and Wildlife Service. This response confirms that we have received your message. Someone will get back to you shortly on your response.



August 16, 2010

Mr. Jeffrey Towner, Field Supervisor  
U.S. Fish and Wildlife Service  
North Dakota Field Office  
3425 Miriam Avenue  
Bismarck, ND 58501-7926

RE: Bear Paw Energy - Garden Creek Gas Plant  
Federal-Listed Species, USFWS Managed Lands, and Migratory Bird Consultation

Bear Paw Energy, LLC (BPE), a subsidiary of Oneok Partners, LP, Tulsa, Oklahoma has proposed the development of a gas processing plant to be located in S1/2, SE1/4, of Section 35, Township 151N, Range 98W of McKenzie County, North Dakota. BPE has proposed to develop an 80 acre parcel to facilitate the construction of a gas processing plant. Project activities are scheduled to begin on or about September 1, 2010 and continue for approximately 18 months.

The purpose of this request is to compile U.S. Fish and Wildlife Service's (Service) comments on environmental topics that are relevant to the North Dakota's Public Service Commission's (Commission) siting requirements for Energy Conversion facilities. On August 16, 2010, a web-based consultation with the Service's IPaC system was conducted, however, due to the limitations of the system; this request has been prepared to augment that effort and facilitate a thorough project review.

E3 Environmental, LLC (E3) has been retained by BPE to provide environmental consulting support for this project.

**Federally- Listed Species Analysis:**

On August 16, 2010, E3 reviewed the Service's web site and conducted a protected species review. The results of the search found the following:

Least tern (*Sterna antillarum*) Interior Population – Endangered  
Whooping crane (*Grus americana*) – Endangered  
Pallid sturgeon (*Scaphirhynchus albus*) – Endangered  
Dakota Skipper (*Hesperia dacotae*) – Candidate  
Black-Footed ferret (*Mustela nigripes*) – Experimental Population, Non-Essential  
Gray wolf (*Canis lupus*) - Endangered

E3 has reviewed the available data describing the life history, critical habitat, and conservation measures associated with each species to evaluate the potential effects of the project on these resources, the results of this analysis is as follows:

Least tern: The interior population(s) of the least tern has historically been associated with large river systems for breeding and migratory habitats. Breeding birds are known to breed colonies, utilizing sandbar habitat common to larger rivers. Regionally the Missouri River, which is greater than 25 miles from the project site, is known to host remnant breeding populations of the terns.

Whooping crane: The whooping crane is a large bodied marsh species that breeds primarily in Canada and winters in the Gulf of Mexico. This species has been closely studied and monitored in recent years due to its small population. North Dakota provides migratory habitat for the species, providing roosting and feeding opportunities during migration. This species prefers larger wetland complexes for roosting habitat typically using adjacent uplands for foraging opportunities. The proposed project will not result in a loss of crane habitat; construction activities would likely serve as a deterrent, and once constructed the proposed facility would present a fairly prominent feature to be avoided relative to its surrounding landscape.

Pallid sturgeon: The pallid sturgeon is known to occur in the Missouri River which is located more than 25 miles from the proposed project site. This species is sensitive to changes in water quality due to turbidity, water temperature, and flow.

Gray wolf: The gray wolf a large carnivore, that through conservation measures has experienced strong population recovery particularly in the great lakes states of the upper mid-west. As populations rebound, individuals may break from packs to explore opportunities to establish packs in unoccupied territory. Roaming individuals can cover great distances without establishing viable breeding populations in previously unoccupied habitat(s). This species is not tolerant of human disturbance and will tend to avoid interaction with humans. The activities associated with construction and later plant operations would likely serve as a deterrent to this species.

Based upon this analysis it is concluded that the proposed project will not result in the taking of, or adverse impact to, these listed species. Species that the Service has listed as "Candidate" or populations identified as "Experimental" are not considered threatened or endangered and were not included in this study. BPE requests your comments regarding this analysis.

### **Service Managed Lands:**

Conservation programs such as Waterfowl Production Areas, wetland and grassland easements represent an important tool used by the Service to identify and manage high quality wildlife habitat. A review of public records failed to identify any of these Service managed lands in the project study area. BPE requests confirmation regarding the presence or absence of Service managed lands within the proposed project study area.

### **Migratory Bird Consultation:**

The Service administers various wildlife related mandates of national concern including the Migratory Bird Treaty Act (MBTA). BPE understands that unlike the Endangered Species

Act, the MBTA has no provisions for the allowance of a take and therefore compliance may best be achieved by avoiding or minimizing the potential to interact with migratory species during the active breeding season. BPE also understands that in North Dakota, the breeding season is typically defined as occurring annually from February 1 through July 15. In recognition of these facts, BPE proposes to initiate construction on or about September 1, 2010 and maintain an active construction site through plant commissioning and final restoration which is anticipated to occur approximately 18 months later. The proposed schedule would avoid the 2010 breeding season and migrants returning to the area would encounter an active construction site in the 2011 and 2012 breeding seasons which would serve as a deterrent to breeding birds. These efforts are intended to avoid direct impacts to breeding migratory birds. BPE seeks confirmation that the proposed measures adequately avoid and mitigate potential impacts to migratory birds.

On behalf of BPE, E3 seeks to complete the project analysis previously initiated with the IPaC web based project review by augmenting those efforts with Service comments on the topics detailed in this request. Should have questions or require additional information please contact me at 651.319.7456 or [wmccarthy@go2e3.com](mailto:wmccarthy@go2e3.com).

Sincerely,

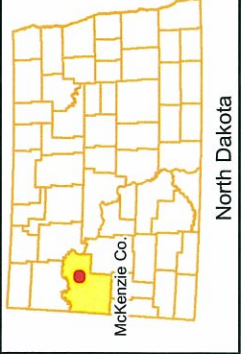
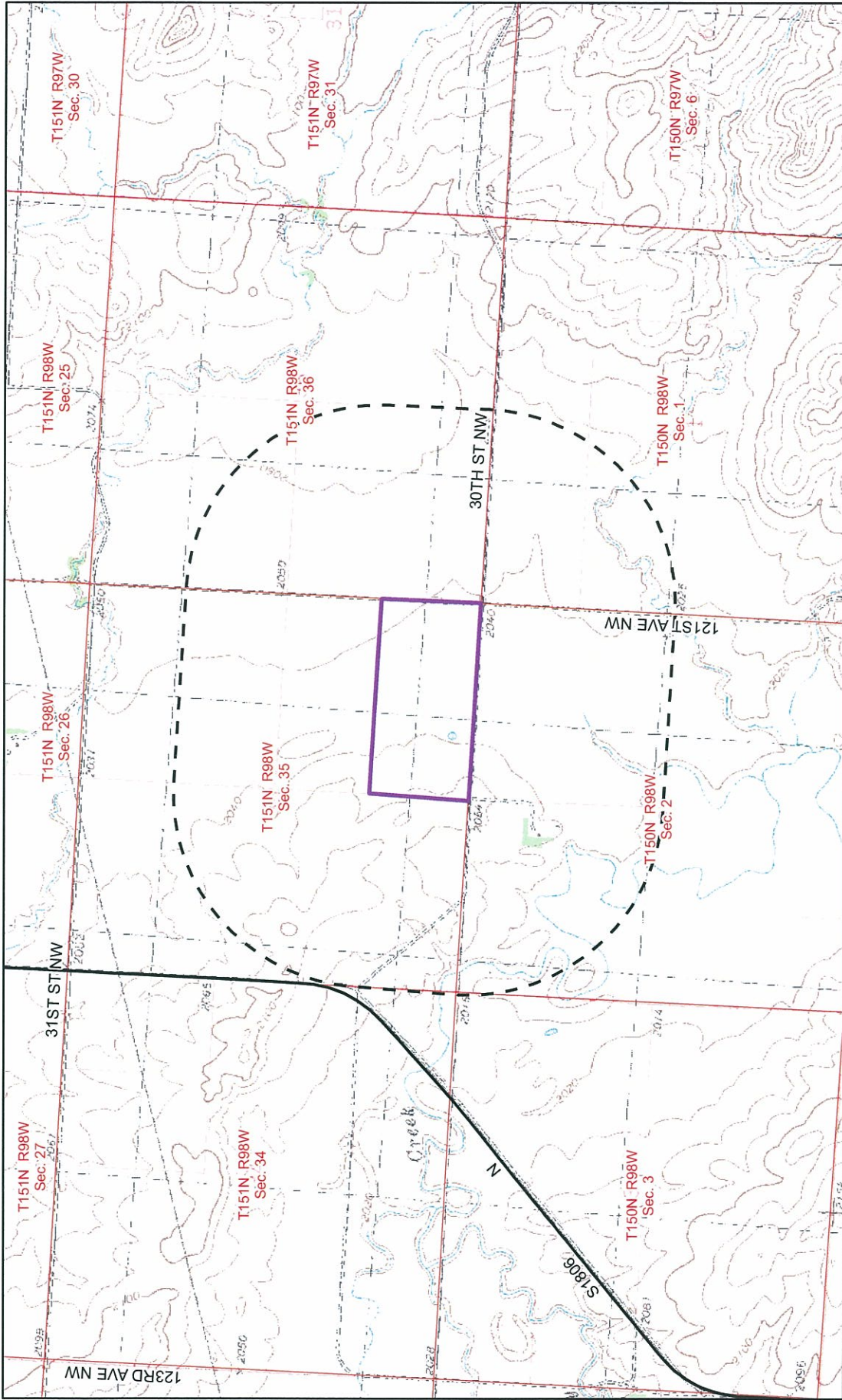


William F. McCarthy  
Project Manager  
E3 Environmental, LLC

Attachments:

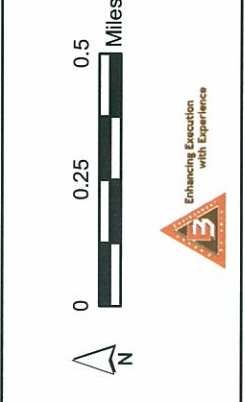
- Project map - USGS topographic
- Project aerial photograph

cc: Lynn Reed, Oneok



- Half mile buffer
- Project Area
- Roadway
- Section Line

Source: Schafer, ND USGS 7.5' series topographic map



## Garden Creek Gas Plant

### Project Location

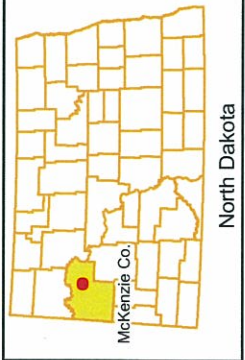


**Garden Creek Gas Plant  
National Wetlands  
Inventory Data &  
Aerial Photograph**



- Half mile buffer
- Project Area
- Roadway
- Section Line
- National Wetlands Inventory

Source: McKenzie County, ND NAIP Imagery, 2009  
USFWS National Wetlands Inventory (NWI)





# Trust Resources

This resource list is to be used for planning purposes only — it is not an official species list.

Species List Information for your project is available and listed below for the following FWS Field Offices:

NORTH DAKOTA ECOLOGICAL SERVICES FIELD OFFICE  
3425 MIRIAM AVENUE  
BISMARCK, ND 58501  
(701) 250-4481

**Project Name:**

Garden Creek

**Project Counties:**

McKenzie, ND

**Project Type:**

Other

**Endangered Species Act Species list**

There are a total of 6 species in your species list

Species that may be affected by your project: [\(View all critical habitat on one map\)](#)

|   |            |                              |   |
|---|------------|------------------------------|---|
| Birds   |            |                              |   |
| Least tern ( <i>Sterna antillarum</i> )<br>Population: interior pop.      | Endangered | <a href="#">species info</a> | North Dakota Ecological Services Field Office |
| Whooping crane ( <i>Grus americana</i> )<br>Population: except where EXPN | Endangered | <a href="#">species info</a> | North Dakota Ecological Services Field Office |
| Fishes  |            |                              |   |



## Trust Resources

|   |  |                              |   |
|---|--|------------------------------|---|
| Pallid sturgeon ( <i>Scaphirhynchus albus</i> )   | Endangered                             | <a href="#">species info</a> | North Dakota Ecological Services Field Office |
| Insects   |  |                              |   |
| Dakota Skipper ( <i>Hesperia dacotae</i> )  | Candidate                              | <a href="#">species info</a> | North Dakota Ecological Services Field Office |
| Mammals   |  |                              |   |
| Black-Footed ferret ( <i>Mustela nigripes</i> )<br>Population: U.S.A. (specific portions of AZ, CO, MT, SD, UT, and WY) | Experimental Population, Non-Essential | <a href="#">species info</a> | North Dakota Ecological Services Field Office |
| Gray wolf ( <i>Canis lupus</i> )<br>Population: Lower 48 States, except where delisted and where EXPN. Mexico.          | Endangered                             | <a href="#">species info</a> | North Dakota Ecological Services Field Office |

### ***FWS National Wildlife Refuge list***

There are no refuges found within the vicinity of your project.

## William McCarthy

---

**From:** Feilmeier, Marcy - Watford City, ND [Marcy.Feilmeier@nd.usda.gov]  
**Sent:** Tuesday, August 17, 2010 3:29 PM  
**To:** William McCarthy  
**Subject:** RE: Bear Paw Energy Garden Creek Gas Plant - request for a review of enrolled CRP Lands

Bill,

I completed a search of the area indicated on the attached map. There currently is no CRP or GRP located within the proposed project site or within the area bounded by the dashed line.

Let me know if you need further assistance!

**Marcy Feilmeier, CED**

McKenzie County FSA Office  
PO Box 604  
Watford City, ND 58854-0604  
(701) 842-3628

---

**From:** William McCarthy [mailto:wmccarthy@go2e3.com]  
**Sent:** Monday, August 16, 2010 10:35 PM  
**To:** Feilmeier, Marcy - Watford City, ND  
**Cc:** 'William McCarthy'; 'Reed, Lynn T.'  
**Subject:** Bear Paw Energy Garden Creek Gas Plant - request for a review of enrolled CRP Lands

Dear Ms. Feilmeier,

I am contacting you on behalf Bear Paw Energy, LLC (BPE), a subsidiary of Oneok Partners, LP, Tulsa, Oklahoma who has proposed the development of a gas processing plant to be located in S1/2, SE1/4, of Section 35, Township 151N, Range 98W of McKenzie County, North Dakota. BPE has identified the 80 acre parcel depicted in the attached maps to site the proposed gas processing plant. Currently the project is scheduled to begin construction on or about September 1, 2010 and require approximately 18 months to complete.

E3 Environmental has been retained by BPE to provide environmental support services and in this capacity I am requesting a review of the proposed project area for lands that are enrolled in the FSA's Conservation Reserve Program (CRP) or Grassland Reserve Program (GRP). In your response please note the presence or absence of CRP or GRP at the project site and within the study area bounded by the dashed line that depicts the extent of 1-mile limit of this request.

Should you have questions or require additional information please contact me by phone or e-mail.

Best regards,

**Bill McCarthy**

E3 Environmental, LLC

651.319.7456

888.414.2048

[www.go2e3.com](http://www.go2e3.com)



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with Experience

## William McCarthy

---

**From:** William McCarthy [wmccarthy@go2e3.com]  
**Sent:** Monday, August 16, 2010 10:35 PM  
**To:** 'Marcy.Feilmeier@nd.usda.gov'  
**Cc:** 'William McCarthy'; 'Reed, Lynn T.'  
**Subject:** Bear Paw Energy Garden Creek Gas Plant - request for a review of enrolled CRP Lands  
**Attachments:** Garden Creek topo.pdf; Garden Creek aerial.pdf

Dear Ms. Feilmeier,

I am contacting you on behalf Bear Paw Energy, LLC (BPE), a subsidiary of Oneok Partners, LP, Tulsa, Oklahoma who has proposed the development of a gas processing plant to be located in S1/2, SE1/4, of Section 35, Township 151N, Range 98W of McKenzie County, North Dakota. BPE has identified the 80 acre parcel depicted in the attached maps to site the proposed gas processing plant. Currently the project is scheduled to begin construction on or about September 1, 2010 and require approximately 18 months to complete.

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Should you have questions or require additional information please contact me by phone or e-mail.

Best regards,

**Bill McCarthy**

E3 Environmental, LLC

651.319.7456

888.414.2048

[www.go2e3.com](http://www.go2e3.com)



 Please consider the environment before printing this e-mail.



817 Vandalia Street  
Suite 100  
St Paul, MN 55114

August 16, 2010

Mr. Michael McKenna, Chief  
Conservation and Communication Division  
North Dakota Game and Fish Department  
100 N. Bismarck Expressway  
Bismarck, ND 58501-5095

RE: Bear Paw Energy - Garden Creek Gas Plant  
State Conservation Priority Species Consultation

Bear Paw Energy, LLC (BPE), a subsidiary of Oneok Partners, LP, Tulsa, Oklahoma has proposed the development of a gas processing plant to be located in S1/2, SE1/4, of Section 35, Township 151N, Range 98W of McKenzie County, North Dakota. BPE has proposed the development of the 80 acre parcel depicted in the attached USGS topographic map and aerial photograph by constructing a gas processing plant. Project activities are scheduled to begin on or about September 1, 2010 and will continue for approximately 18 months.

The purpose of this correspondence is to request confirmation of the presence or absence of North Dakota Game and Fish Department PLOTS land at the project site or within the study area. As such, when conducting this review please include the project site and a one-mile buffer surrounding the site as depicted in the attached maps where the dashed line delineates the extent of this request.

E3 Environmental, LLC (E3) has been retained by BPE to provide environmental consulting support for this project. Should have questions or require additional information please contact me at 651.319.7456 or [wmccarthy@go2e3.com](mailto:wmccarthy@go2e3.com).

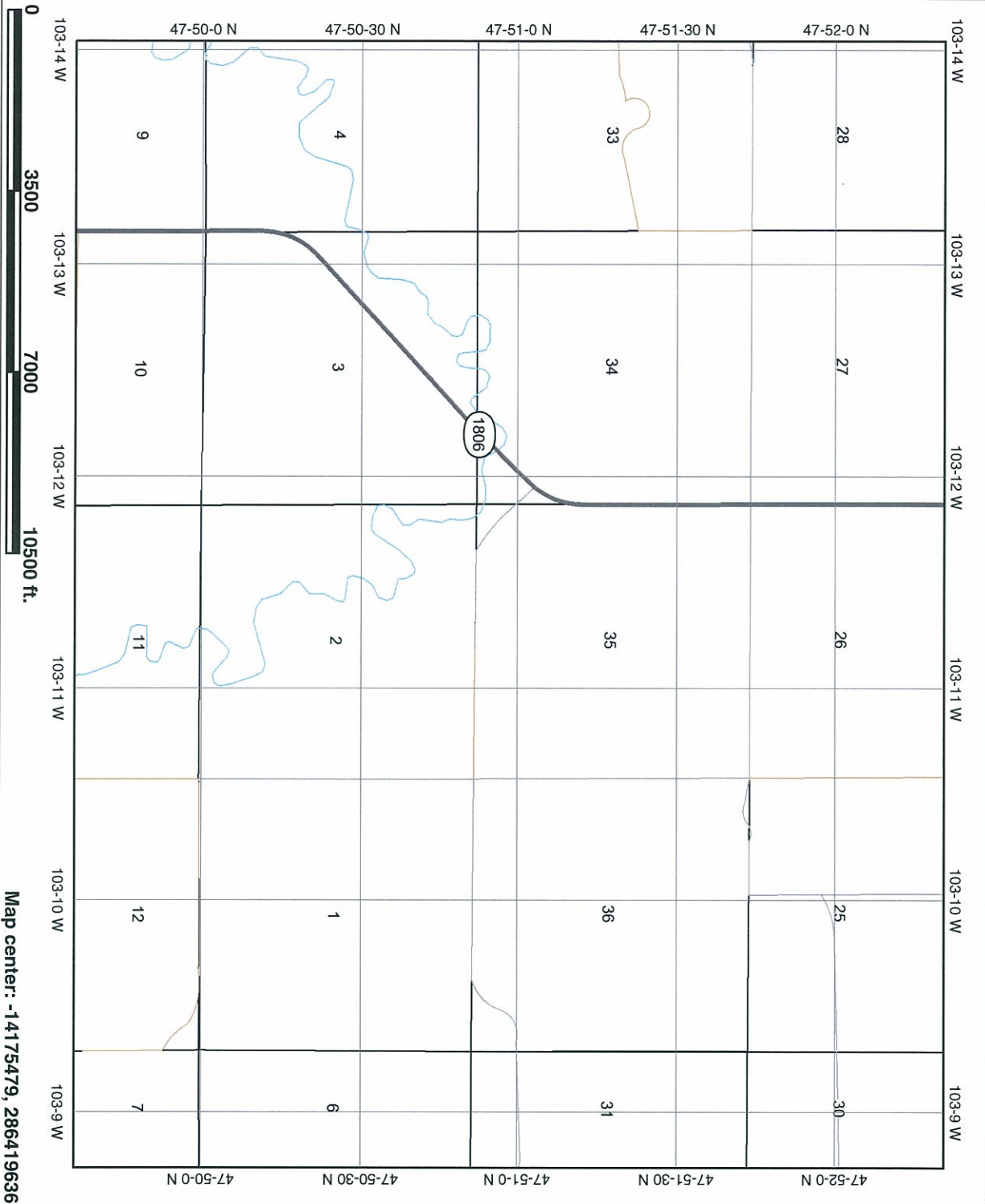
Sincerely,

William F. McCarthy  
Project Manager  
E3 Environmental, LLC

Attachments:  
Project map - USGS topographic  
Project aerial photograph

cc: Lynn Reed, Oneok

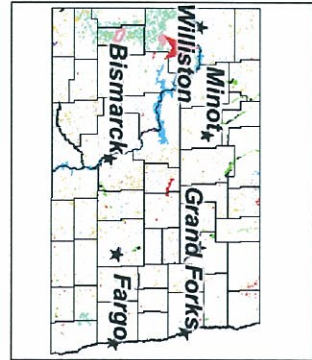
# ND Plots Land



The North Dakota Game and Fish Department has compiled this data according to conventional cartographic standards. Using what is thought to be the most reliable information available. The North Dakota Game and Fish Department does not guarantee freedom from errors or inaccuracies and disclaims and legal responsibility or liability for interpretations made from the data, or decisions based thereon.

Notes: Garden Creek Project Area

Map center: -14175479, 286419636



### Legend

- PLOTS Guide Index
- Cities and Towns
- State and Federal Roads
- Business Loop
- Freeway
- State Road
- Federal Road
- County and City Roads
- Graded/Gravel
- Paved
- Trail/Unimproved
- Other
- Rivers and Streams
- PLS Sections
- Counties
- Lakes, Ponds, Rivers
- Lake or Pond
- Marsh or Wetland
- River or Stream
- Spillway
- National Parks
- PLOTS Lands
- Wildlife Management Areas
- National Grasslands
- Army Corps of Engineers Lands
- State Land Surface Tracts
- State Forest
- BLM Surface and Mineral
- Waterfowl Production Areas
- WDA
- WPA

Scale: 1:35,775



John Hoeven, Governor  
Mark A. Zimmerman, Director

1600 East Century Avenue, Suite 3  
Bismarck, ND 58503-0649  
Phone 701-328-5357  
Fax 701-328-5363  
E-mail [parkrec@nd.gov](mailto:parkrec@nd.gov)  
[www.parkrec.nd.gov](http://www.parkrec.nd.gov)

August 31, 2010

Bill McCarthy  
E3 Environmental, LLC  
[www.go2e3.com](http://www.go2e3.com)

Re: Bear Paw Energy, LLC Garden Creek Gas Plant Project Proposal

Dear Mr. McCarthy:

The North Dakota Parks and Recreation Department has reviewed the above referenced project proposal submitted by Bear Paw Energy, LLC to build a gas processing plant located in Section 35, T151N, R98W, McKenzie County.

Our agency scope of authority and expertise covers recreation and biological resources (in particular rare species and ecological communities). The project as defined does not affect state park lands that we manage or Land and Water Conservation Fund recreation projects that we coordinate.

The North Dakota Natural Heritage biological conservation database has been reviewed to determine if any current or historic plant or animal species of concern or other significant ecological communities are known to occur within an approximate one-mile radius of the project area. Based on this review, there are no known occurrences within or adjacent to the project area.

Because this information is not based on a comprehensive inventory, there may be species of concern or otherwise significant ecological communities in the area that are not represented in the database. The lack of data for any project area cannot be construed to mean that no significant features are present. The absence of data may indicate that the project area has not been surveyed, rather than confirm that the area lacks natural heritage resources.

Regarding any reclamation efforts, we recommend that any impacted areas be revegetated with species native to the project area.

Thank you for the opportunity to comment on this project. Please contact Kathy Duttonhefner (701-328-5370 or [kgduttonhefner@nd.gov](mailto:kgduttonhefner@nd.gov)) of our staff if additional information is needed.

Sincerely,

A handwritten signature in black ink, appearing to read "Kathy Duttonhefner".

Kathy Duttonhefner, Coordinator  
Natural Resource Program

R.USNDNHI\*2010-219  
CD/0825/DL0831

.....  
*Play in our backyard!*

## William McCarthy

---

**From:** William McCarthy [wmccarthy@go2e3.com]  
**Sent:** Tuesday, August 17, 2010 10:08 AM  
**To:** 'kgduttonhefner@nd.gov'  
**Cc:** 'William McCarthy'; 'Reed, Lynn T.'  
**Subject:** Bear Paw Energy Garden Creek Gas Plant - Natural Heritage Inventory Review Request  
**Attachments:** Garden Creek topo.pdf; Garden Creek aerial.pdf

Dear Ms. Duttonhefner,

Bear Paw Energy, LLC (BPE), a subsidiary of Oneok Partners, LP, Tulsa, Oklahoma has proposed the development of a gas processing plant to be located in S1/2, SE1/4, of Section 35, Township 151N, Range 98W of McKenzie County, North Dakota. BPE has proposed the development of the 80 acre parcel depicted in the attached USGS topographic map and aerial photograph by constructing a gas processing plant. Project activities are scheduled to begin on or about September 1, 2010 and will continue for approximately 18 months.

The purpose of this correspondence is to request agency review of the proposed project site and the surrounding study area. As such, when conducting this review please consider both the project site and the one-mile buffer surrounding the site as depicted in the attached maps where the dashed line delineates the extent of this request.

We understand that Parks and Recreation Department administers the following state programs:

- State Park Lands
- Land and Water Conservation Fund
- Natural Heritage Inventory

We request confirmation of the presence or absence of managed lands, recreation projects or significant features cataloged in the Natural Heritage Inventory at the project site or within the study area.

E3 Environmental, LLC (E3) has been retained by BPE to provide environmental consulting support for this project. Should have questions or require additional information please contact me at 651.319.7456 or [wmccarthy@go2e3.com](mailto:wmccarthy@go2e3.com).

Best regards,

**Bill McCarthy**

E3 Environmental, LLC

651.319.7456

888.414.2048

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**STATE  
HISTORICAL  
SOCIETY**  
OF NORTH DAKOTA

John Hoeven  
Governor of North  
Dakota

**North Dakota  
State Historical Board**

Chester E. Nelson, Jr.  
Bismarck - President

Gereld Gerntholz  
Valley City - Vice President

Richard Kloubec  
Fargo - Secretary

Albert I. Berger  
Grand Forks

Calvin Grinnell  
New Town

Diane K. Larson  
Bismarck

A. Ruric Todd III  
Jamestown

Sara Otte Coleman  
Director  
Tourism Division

Kelly Schmidt  
State Treasurer

Alvin A. Jaeger  
Secretary of State

Mark A. Zimmerman  
Director  
Parks and Recreation  
Department

Francis Ziegler  
Director  
Department of  
Transportation

Merlan E. Paaverud, Jr.  
Director

Accredited by  
the American Association  
of Museums since 1986

August 31, 2010

Judith R. Cooper  
Principal Investigator  
SWCA Environmental Consultants  
116 North 4<sup>th</sup> Street, Suite 200  
Bismarck, North Dakota 58501

**NDSHPO REF.: 10-2123 PSC**  
E3 Environmental: Cultural Resources Class III Inventory Report  
Oneok's Garden Creek Gas Plant McKenzie County [T151N R98W Section 35]

Dear Judy:

We have received and reviewed correspondence and project document for: **10-2123 PSC E3 Environmental Cultural Resources Class III Inventory Report, Oneok's Garden Creek Gas Plant** : "A Class I and Class III Cultural Resource Inventory of the Garden Creek Gas Plant, McKenzie County, North Dakota " by Nicholas Smith (SWCA, August 2010) and find it acceptable.

We concur with "*No Historic Properties Affected*" and "*No significant Sites Affected*" determinations provided the project is of the nature stated and that it takes place in the location described in the report.

If you have questions please contact either Paul Picha at [ppicha@nd.gov](mailto:ppicha@nd.gov) or (701) 328-3574 or Susan Quinnell at [squinnell@nd.gov](mailto:squinnell@nd.gov) or (701) 328-3576.

Sincerely,

Merlan E. Paaverud, Jr.  
State Historic Preservation Officer (North Dakota)  
and  
Director, State Historical Society of North Dakota

c: Patrick Fahn, ND PSC



Bismarck Office  
116 North 4th Street, Suite 200  
Bismarck, North Dakota 58501  
Tel 701.258.6622 Fax 701.258.5957  
www.swca.com

SWCA Environmental Consultants  
116 N 4<sup>th</sup> Street, Suite 200  
Bismarck, ND 58501

August 31, 2010

Paul R. Picha  
Chief Archeologist  
State Historical Society of North Dakota  
Archeology & Historic Preservation Division  
612 East Boulevard Avenue  
Bismarck, ND 58505-0830

**RE: A Class I and Class III Cultural Resource Inventory of the Garden Creek Gas Plant, McKenzie County, North Dakota.**

Dear Mr. Picha:

Enclosed is a copy of a report entitled *A Class I and Class III Cultural Resource Inventory of the Garden Creek Gas Plant, McKenzie County, North Dakota*. This report documents the cultural resource inventory of the Oneok Garden Creek Gas Plant Project, performed by SWCA Environmental Consultants (SWCA) on behalf of E3 Environmental, LLC. The cultural resource inventory is required as part of Oneok's permit application to the North Dakota Public Service Commission.

No cultural resources were found within the project area. It is recommended that the project be granted a determination of *No Historic Properties Affected* and *No Significant Sites Affected*, pending agency concurrence. Please notify SWCA of the results of your review at the address listed below.

Please contact us if you have any questions or concerns regarding the attached report.

Sincerely,

A handwritten signature in black ink, appearing to read "Judith R. Cooper", is written over a horizontal line.

Judith R. Cooper, Ph.D.  
Cultural Resources Lead/Principal Investigator  
SWCA Environmental Consultants  
116 North 4th Street, Suite 200  
Bismarck, ND 58501  
Office: 701-258-6622  
Cell: 214-704-6280

Appendix D  
Biology Report

**Wetland Delineation Report and  
Endangered Species Review for the  
Garden Creek Gas Plant,  
McKenzie County, North Dakota**

Prepared for

**E3 Environmental, LLC**

Prepared by

**SWCA Environmental Consultants**

August 2010

**Wetland Delineation Report and Endangered Species Review for the  
Garden Creek Gas Plant, McKenzie County, North Dakota**

Prepared for:

**E3 Environmental, LLC  
205 Doty Street, Suite 202  
Green Bay, Wisconsin 54301**

Prepared by:

**Chris McLaughlin, B.S., Ecologist**

Reviewed by:

**Mike Cook, M.S., Ecologist**

**SWCA Environmental Consultants  
116 N. 4<sup>th</sup> Street, Suite 200  
Bismarck, North Dakota 58501  
Telephone: (701) 258-6622; Fax: (701) 258-5987**

SWCA Project No. 16867

**31 August 2010**

**TABLE OF CONTENTS**

|  | <u>Page</u> |
|--|-------------|
| 1.0 INTRODUCTION .....   | 1           |
| 2.0 METHODS.....   | 1           |
| 2.1 Study Area .....   | 1           |
| 2.2 Wetlands .....   | 1           |
| 2.2.1 Vegetation.....  | 1           |
| 2.2.2 Hydrology .....  | 2           |
| 2.2.3 Soil .....   | 2           |
| 2.3 Waterbodies .....  | 2           |
| 2.4 Wildlife Including Threatened and Endangered Species ..... | 3           |
| 2.5 TREE/SAPLING/SHRUB ENUMERATION.....                        | 3           |
| 2.6 MAPPING .....  | 3           |
| 3.0 RESULTS.....   | 4           |
| 3.1 Vegetation.....  | 4           |
| 3.1.1 Herbaceous Upland .....                                  | 4           |
| 3.1.2 Palustrine Emergent Wetland .....                        | 4           |
| 3.2 Hydrology .....  | 4           |
| 3.3 Soils .....  | 4           |
| 3.4 Wetlands .....   | 5           |
| 3.5 Waterbodies .....  | 5           |
| 3.6 Wildlife .....   | 5           |
| 3.6.1 Threatened and Endangered Species .....                  | 5           |
| 3.6.2 Wildlife Observed .....                                  | 7           |
| 3.7 TREE/SAPLING/SHRUB ENUMERATION.....                        | 7           |
| 4.0 CONCLUSIONS .....  | 7           |
| 5.0 LITERATURE CITED .....                                     | 8           |

**LIST OF TABLES**

| <u>Table</u>                                      | <u>Page</u> |
|---|-------------|
| 1 Monthly Recorded Rainfall at NWS-Williston..... | 4           |

**LIST OF APPENDICES**

**Appendix**

- A Site Layout Map
- B Photograph Log
- C USACE Datasheets

## **1.0 INTRODUCTION**

E3 Environmental, LLC requested SWCA Environmental Consultants (SWCA) perform a natural and cultural resource survey to assess the potential effect of activities associated with the construction of a gas processing plant, known as the Garden Creek Gas Plant (GCGP). The jurisdictional agency presiding over the construction of the GCGP is the North Dakota Public Service Commission (NDPSC). This report presents the results of the natural resource field survey completed on 16 August 2010. The results of the cultural resource survey are contained in a separate report under a separate cover.

## **2.0 METHODS**

### **2.1 STUDY AREA**

The GCGP will be constructed in the SE1/4 of Section 35, Township 151 North, Range 98 West, approximately 5.5 miles northeast of Watford City, McKenzie County, North Dakota. Construction of the GCGP is anticipated to impact approximately 80 acres. A site map of the GCGP is attached to this report as Appendix A. Additionally, photographs of the GCGP, taken during the field survey, are provided in Appendix B.

### **2.2 WETLANDS**

SWCA ecologists conducted delineations in accordance with guidelines provided in the 1987 U.S. Army Corps of Engineers (USACE) *Wetlands Delineation Manual* (Manual) (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Great Plains Region (Version 2.0)* (Supplement) (USACE 2010). According to the Manual, an area is a wetland if three mandatory wetland indicators are present in a given area, with special exceptions: 1) the presence of hydrophytic vegetation, 2) wetland hydrology, and 3) hydric soils.

SWCA recorded data at points within areas that resembled or had the potential to be wetlands based on visual observation. Data recorded at each point included all vegetation within prescribed sampling plots, indicators of wetland hydrology, and soil characteristics. USACE datasheets containing data derived at each data point are provided in Appendix C.

#### **2.2.1 Vegetation**

Ecologists recorded all plants within the vegetative community based on the respective stratum each species occupied. A tree is defined by the Supplement to be a woody-stemmed plant with a trunk diameter at breast height (DBH) of equal to or greater than 3 inches, regardless of height. The sapling and shrub stratum is defined by the Supplement to be composed of woody-stemmed plants with a trunk DBH of less than 3 inches, regardless of height. The herbaceous stratum includes all non-woody-stemmed plants regardless of height. Finally, the woody vine stratum includes all woody-stemmed vines, regardless of diameter.

SWCA recorded the binomial scientific name and percent cover of all plants within a 30-foot radius for the tree stratum, a 15-foot radius for the sapling/shrub stratum, a 5-foot radius for the herbaceous stratum, and a 30-foot radius for the woody vine stratum. SWCA ecologists

noted each plant species' respective U.S. Fish and Wildlife Service (USFWS) indicator status (i.e., upland [UPL], facultative upland [FACU], facultative [FAC], facultative wetland [FACW], and obligate [OBL]). In some instances the size and shape of the vegetative sampling plot was manipulated to better encompass each wetland or upland area, though the overall area assessed remained unchanged.

### **2.2.2 Hydrology**

A data point was determined to contain wetland hydrology if at least one primary indicator or at least two secondary indicators of wetland hydrology were present, as defined by the Manual and Supplement. Common hydrologic indicators included the presence of surface water, high water table, soil saturation, hydrogen sulfide (H<sub>2</sub>S) gas, sediment deposits, water-stained leaves, and oxidized rhizospheres on living roots.

### **2.2.3 Soil**

Ecologists recorded detailed notes regarding soil profiles including the hue, value, and chroma (i.e., color) of the soil (using Munsell Soil Color Charts); the depth and extent of that soil color within the entire soil profile; the concentration of any redoximorphic concentrations or depletions; and the texture of the soil at each depth where a color change was observed. A soil pit was excavated to a depth necessary to either prove or disprove the presence of hydric soil indicators. Common hydric soil indicators of the northern Great Plains subregion include the presence of H<sub>2</sub>S gas within the soil pit, redoximorphic depressions, and a depleted matrix.

## **2.3 WATERBODIES**

Waterbodies (i.e., creeks, streams, rivers), if observed, were identified by the presence of an ordinary high water mark (OHWM). Common indicators of an OHWM include a clear, natural line visible on the bank; shelving; changes in soil characteristics; the destruction of terrestrial vegetation; the presence of litter and debris; and watermarks on structures that are inundated during normal high water conditions. The OHWM typically represents the potential USACE jurisdictional limits.

Streams were classified as perennial, intermittent, or ephemeral based on field observations. During a typical year, a perennial stream contains flowing water year-round, and the water table is located above the stream bed. Groundwater is the primary water source for stream flow while precipitation runoff is supplemental. Ecologists classified streams that showed significant flow during the field survey or were named or designated as solid blue lines on the U.S. Geologic Survey 7.5-minute topographic maps as perennial.

An intermittent stream has flowing water for only portions of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not contain flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

## **2.4 WILDLIFE INCLUDING THREATENED AND ENDANGERED SPECIES**

Information regarding the presence of threatened or endangered species that may occur within or near the project area was obtained from the USFWS list of threatened and endangered species by North Dakota county (USFWS 2010). However, this document does not represent a comprehensive survey, but rather acknowledges the past and/or current presence of listed species. The lack of discovery of threatened or endangered species does not signify their non-existence within the area, but only that no primary or secondary indications of these species were recorded.

Prior to beginning the field survey, SWCA reviewed the USFWS list of threatened or endangered species for McKenzie County. SWCA conducted a cursory pedestrian survey concurrently with the wetland delineation for all listed species that potentially could be impacted by construction activities.

Additionally, SWCA ecologists noted any wildlife observed during the field survey. Wildlife sightings can involve either primary (i.e., actual sighting of an animal) or secondary observations (i.e., observation of scat, tracks, or fur deposits).

## **2.5 TREE/SAPLING/SHRUB ENUMERATION**

SWCA surveyed the GCGP for woody stemmed vegetation including trees, saplings, and shrubs. If observed, woody stemmed vegetation was taxonomically identified to species level and counted. The NDPSC generally requires that impacted woody stemmed vegetation be mitigated for at a 2:1 post- to pre-construction ratio.

## **2.6 MAPPING**

Each data point was geographically recorded using a Trimble GeoXH global positioning system (GPS) unit that is capable of providing spatial data with submeter accuracy, when post processed. SWCA used Universal Transverse Mercator Zone 13N as the projected coordinate system and North American Datum 1983 as the datum. ArcGIS v9.3 (Redlands, California) was used to analyze collected features, calculate areas, and generate the map provided in Appendix A. Please note that all data collected using the GPS unit and displayed on the attached map are for review purposes only and do not represent a professional civil survey.

### 3.0 RESULTS

#### 3.1 VEGETATION

Ecologists identified two vegetative community types within the GCGP: herbaceous upland and palustrine emergent wetland (PEM).

##### 3.1.1 Herbaceous Upland

The herbaceous upland community occurring throughout the GCGP was dominated by a relative monoculture of cultivated wheat (*Triticum* sp.). Additionally, cCuman ragweed (*Ambrosia psilostachya*) was noted within the herbaceous upland community.

##### 3.1.2 Palustrine Emergent Wetland

The PEM wetland community observed within the GCGP was dominated by hydrophytic vegetation including American slough grass (*Beckmannia syzigachne*) and smartweed (*Polygonum* sp.).

#### 3.2 HYDROLOGY

The wetland community observed during the field survey displayed at least one primary and/or two secondary indicators of wetland hydrology, as defined by the Supplement. Common hydrologic indicators observed during the field survey included cracked soil, sediment deposits, and algal mats.

From 1 June to 15 August 2010, approximately 7.61 inches of precipitation accumulated at the National Weather Service's Williston, North Dakota, monitoring station (NWS-Williston) (Table 1). This amount represents a 2.18-inch departure from normal for 1 June through 15 August. However, due to the distance of the GCGP from NWS-Williston, the accuracy of these data may be highly variable depending on localized variation in precipitation levels. It is SWCA's opinion that although a surplus of precipitation accumulated between 1 June and 15 August 2010, it did not significantly affect the presence of hydrologic indicators.

**Table 1. Monthly Recorded Rainfall at NWS-Williston.**

| Month (2010) | Recorded Rainfall (inches) | Normal Average Rainfall (inches) | Difference (inches) |
|--------------|----------------------------|----------------------------------|---------------------|
| June         | 2.70                       | 2.36                             | 0.34                |
| July         | 3.91                       | 2.28                             | 1.63                |
| August 1–15  | 1.00                       | 0.79                             | 0.21                |
| <b>Total</b> | <b>7.61</b>                | <b>5.43</b>                      | <b>2.18</b>         |

Source: National Oceanic and Atmospheric Administration 2010.

#### 3.3 SOILS

Wetland 1 exhibited the hydric soil indicator Redox Dark Surface (F6). Redox Dark Surface is technically defined by the Supplement as a layer that is at least 4 inches thick and within

the upper 12 inches of the mineral soil. This indicator requires a matrix value of  $\leq 3$  with a chroma of 1 or 2 coupled with 2% to 5% distinct or prominent redoximorphic concentrations (USACE 2010). Detailed soil profile notes are provided in the USACE Wetland Determination Forms located in Appendix C.

### **3.4 WETLANDS**

SWCA delineated one PEM wetland totaling approximately 0.127 acre (Table 2). SWCA estimates the entire 0.127 acre of PEM wetland will be impacted as a result of construction activities. Wetland 1 may be a relict stock pond, created to provide a drinking water source to livestock, and capable of collecting surface water run-off during precipitation events. This idea is further supported by the presence of a man-made berm at the southern edge of the depression.

### **3.5 WATERBODIES**

No ephemeral, intermittent, or perennial waterbodies were observed within the GCGP project area.

### **3.6 WILDLIFE**

SWCA ecologists performed a cursory wildlife field survey during which they searched for either primary (i.e., the actual sighting of an individual or group) or secondary (e.g. scat, tracks, or fur deposits).

#### **3.6.1 Threatened and Endangered Species**

The USFWS identified six threatened and endangered species currently known or that have been known to exist in McKenzie County. During SWCA's cursory field survey, no threatened or endangered species or suitable habitat were observed.

##### **3.6.1.1 Gray Wolf (*Canis lupus*), Listed: Endangered**

The gray wolf was believed extirpated from North Dakota in the 1920s and 1930s with only sporadic reports from the 1930s to present (Licht and Huffman 1996). Licht and Fritts (1994) indicated that a gray wolf mortality was confirmed in Dunn County in January 1992. Most documented gray wolf sightings that have occurred within North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). However, the re-establishment of significant gray wolf populations in North Dakota is unlikely considering the historically troubled relationship between humans and wolves and the open habitat of the Great Plains, which makes them vulnerable to being shot (Licht and Huffman 1996). Therefore, the potential for transient wolves to exist near the project areas remains but is not likely. Additionally, habitat fragmentation, in particular road construction as a result of oil and gas development, may further act as a barrier against gray wolf recolonization in western North Dakota.

##### **3.6.1.2 Pallid Sturgeon (*Scaphirhynchus albus*), Listed: Endangered**

The pallid sturgeon is a benthic dwelling fish that is most often found in highly turbid waters of large rivers. The species is most often found in sand and gravel substrates at variable depths and water velocities. Construction associated with the GCGP is extremely unlikely to

have a detrimental effect on the pallid sturgeon due to the distance between the GCGP and the Missouri River and Lake Sakakawea. Additionally, no intermittent or perennial waterbodies will be impacted within the GCGP, further reducing the likelihood for a detrimental effect.

3.6.1.3 Interior Least Tern (*Sterna antillarum*), Listed: Endangered

Interior least tern individuals are primarily piscivorous and frequent sparsely vegetated sand bars, gravel pits, and lake and reservoir shorelines. No perennial or intermittent waterbodies were observed within the GCGP. Therefore, due to the distance between the project area and suitable foraging and nesting habitat, the construction activities associated with this project are unlikely to affect any interior least terns.

3.6.1.4 Piping Plover (*Charadrius melodus*), Listed: Threatened

The USFWS has designated the shoreline of Lake Sakakawea as critical habitat for piping plover. However, due to the distance between the project area and the Lake Sakakawea shoreline, adverse impact as a result of construction activities is not likely. Additionally, the nearest designated critical habitat that is not Lake Sakakawea (Demicks Lake) is approximately 6.8 miles northeast of the GCGP. Piping plover require sand or gravel areas that usually have a relatively low vegetation density. Breeding piping plover may utilize PEM wetlands or saline flats. The construction of the GCGP is not anticipated to detrimentally affect piping plover individuals or critical habitat.

3.6.1.5 Whooping Crane (*Grus americana*), Listed: Endangered

The whooping crane was listed as Endangered in 1970 in the United States by the USFWS, and in 1978 in Canada. Historically, population declines were caused by shooting and destruction of nesting habitat in the prairies from agricultural development. Current threats to the species include habitat destruction, especially suitable wetland habitats that support breeding and nesting, as well as feeding and roosting during their fall and spring migration (Canadian Wildlife Service and USFWS 2007).

McKenzie County, including the GCGP, is within or near the primary migratory flyway of whooping cranes; however, the primary breeding/nesting area for the species is in Canada where approximately 83% of the wild nesting sites occur. Studies indicate that whooping cranes use a variety of habitats during migration and that they feed primarily in croplands and roost in small palustrine (marshy) wetlands within 1 kilometer of suitable feeding areas (Howe 1987, 1989). Whooping cranes have also been recorded in riverine habitats, with eight sightings along the Missouri River in North Dakota (Canadian Wildlife Service and USFWS 2007:18). In these cases they roost on submerged sand bars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

The project area is cultivated cropland which may act as a viable stop over area; however, no significant PEM wetlands which support aquatic life were observed within the GCGP. Therefore, the proposed GCGP is unlikely to support whooping crane migratory stopover use due to the absence of suitable foraging habitat. The proposed project may affect, but is not likely to adversely affect whooping crane.

3.6.1.6 Black-footed ferret (*Mustela nigripes*), Listed: Endangered

This species is presumed extirpated from North Dakota and has not been observed in the wild for more than 20 years. Additionally, no black-tailed prairie dog (*Cynomys ludovicianus*) colonies were observed within or nearby the project locations. Therefore, this species will not be impacted by construction activities.

**3.6.2 Wildlife Observed**

SWCA ecologists observed habitat capable of supporting various avian, mammal, and amphibian wildlife including a visual observation of the northern leopard frog (*Rana pipiens*) in Wetland 1.

These species may be affected during construction activities within the GCGP. However, they are likely to relocate to areas that will not be disturbed by construction activities. Additionally, the majority of construction activities are slated to occur outside of the migratory bird breeding season, thereby significantly limiting the potential for adverse impact.

**3.7 TREE/SAPLING/SHRUB ENUMERATION**

SWCA ecologists did not observe any trees, saplings, or shrubs within the GCGP.

**4.0 CONCLUSIONS**

1. SWCA ecologists observed one wetland within the GCGP. Approximately 0.127 acre of wetland is anticipated to be impacted through the construction of the GCGP.
2. SWCA ecologists observed no intermittent or perennial waterbodies within the GCGP project area.
3. No threatened or endangered species or suitable habitats were observed during the field survey. Known species that may be present in McKenzie County are not likely to be detrimentally impacted by construction activities.
4. Common wildlife species observed during the field survey are likely to relocate once construction activities have commenced.

## 5.0 LITERATURE CITED

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**APPENDIX A  
Site Layout Map**



151N 98W

121ST AVE NW



30TH ST NW

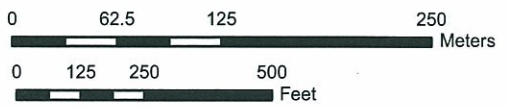
150N 98W

**Legend**

-  Delineated Wetland Boundary
-  Wetland Datapoint
-  Upland Datapoint
-  Active Construction Area
-  80-acre Project/Survey Area

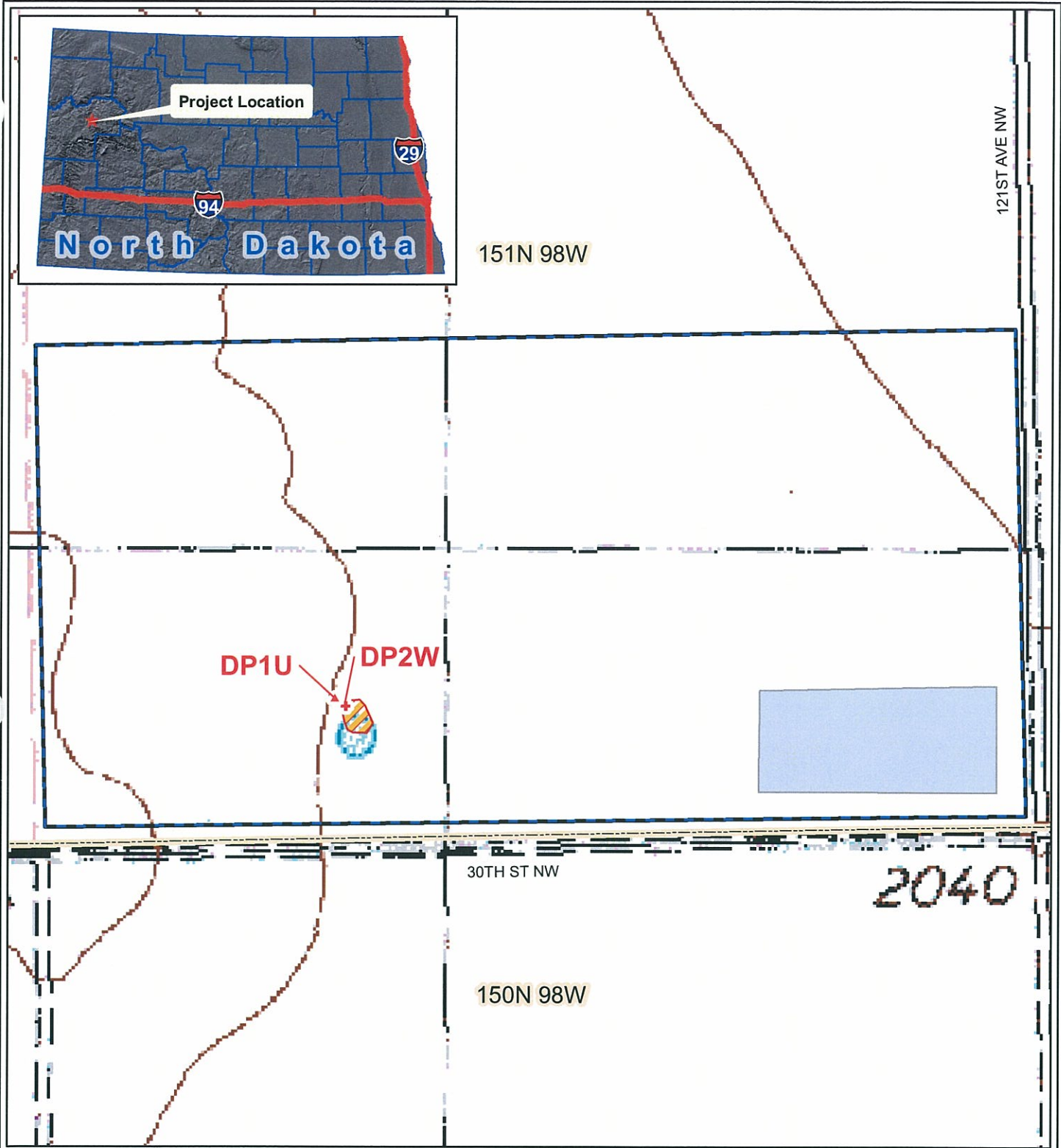


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 August 23, 2010



Scale: 1:4,500  
 Base Map: Aerial Photo, National  
 Agricultural Imagery Program  
 Quadrangle: Schafer, ND (1979)  
 McKenzie County, North Dakota  
 UTM Zone 13N, NAD83, Meters





**Legend**

-  Delineated Wetland Boundary
-  Wetland Datapoint
-  Upland Datapoint
-  Active Construction Area
-  80-acre Project/Survey Area

**SWCA**  
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www.swca.com  
 August 23, 2010

0 62.5 125 250 Meters

0 125 250 500 Feet

Scale: 1:4,500  
 Base Map: Aerial Photo, National Agricultural Imagery Program  
 Quadrangle: Schafer, ND (1979)  
 McKenzie County, North Dakota

UTM Zone 13N, NAD83, Meters



**APPENDIX B  
Photograph Log**



**Photograph 1. Overview of project area facing northeast.**



**Photograph 2. Overview of project area facing north.**



**Photograph 3. View facing north from DP1U.**



**Photograph 4. View facing south from DP1U.**



**Photograph 5. View facing east from DP2W.**



**Photograph 6. View facing south-southwest from DP2W.**

**APPENDIX C  
USACE Datasheets**



**SOIL - Profile Description: Describe to the depth needed to document the indicator or confirm the absence of indicators.**

| Depth (inches) | Matrix        |     |     | Redox Features |   |      |     | Texture    | Remarks |
|----------------|---------------|-----|-----|----------------|---|------|-----|------------|---------|
|                | Color (moist) |     | %   | Color (moist)  | % | Type | Loc |            |         |
| 0-4            | 10YR          | 4/1 | 100 |                |   |      |     | Clay Loam  |         |
| 4-18           | 2.5Y          | 3/1 | 100 |                |   |      |     | Silty Clay |         |

|  |   |  |  |
|--|---|--|--|
| <b>Hydric Soil Indicators (Applicable to all LRRs, unless otherwise noted.):</b> |   | <b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>  |  |
| <input type="checkbox"/> Histosol (A1)   | <input type="checkbox"/> Sandy Gleyed Matrix (S4)     | <input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)   |  |
| <input type="checkbox"/> Histic Epipedon (A2)                                    | <input type="checkbox"/> Sandy Redox (S5)             | <input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)   |  |
| <input type="checkbox"/> Black Histic (A3)                                       | <input type="checkbox"/> Stripped Matrix (S6)         | <input type="checkbox"/> Dark Surface (S7) (LRR G)   |  |
| <input type="checkbox"/> Hydrogen Sulfide (A4)                                   | <input type="checkbox"/> Loamy Mucky Mineral (F1)     | <input type="checkbox"/> High Plains Depressions (F16)   |  |
| <input type="checkbox"/> Stratified Layers (A5) (LRR F)                          | <input type="checkbox"/> Loamy Gleyed Matrix (F2)     | (LRR H outside of MLRA 72 & 73)  |  |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)                            | <input type="checkbox"/> Depleted Matrix (F3)         | <input type="checkbox"/> Reduced Vertic (F18)  |  |
| <input type="checkbox"/> Depleted Below Dark Surface (A11)                       | <input type="checkbox"/> Redox Dark Surface (F6)      | <input type="checkbox"/> Red Parent Material (TF2)   |  |
| <input type="checkbox"/> Thick Dark Surface (A12)                                | <input type="checkbox"/> Depleted Dark Surface (F7)   | <input type="checkbox"/> Other (Explain in Remarks)  |  |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)                                | <input type="checkbox"/> Redox Depressions (F8)       | <sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic |  |
| <input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)               | <input type="checkbox"/> High Plains Depression (F16) |  |  |
| <input type="checkbox"/> 5 cm Muck Peat or Peat (S3) (LRR F)                     | (MLRA 72 & 73 of LRR H)                               |  |  |

**Restrictive Layer (if present):**  
 Type: None  
 Depth (inches): N/A

**Hydric Soil Present?**  
 Yes  No

Remarks:  
 No positive indication of hydric soils was observed.

**HYDROLOGY**

|   |   |
|---|---|
| <b>Wetland Hydrology Indicators:</b>  |   |
| Primary Indicators (minimum of one required; check all that apply)<br><input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> Salt Crust (B11)<br><input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Aquatic Invertebrates (B13)<br><input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Hydrogen Sulfide Odor (C1)<br><input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Dry-Season Water Table (C2)<br><input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3)<br><input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> (where not tilled)<br><input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Presence of Reduced Iron (C4)<br><input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Thin Muck Surface (C7)<br><input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Other (Explain in Remarks)<br><input type="checkbox"/> Water-Stained Leaves (B9) | Secondary Indicators (minimum of two required)<br><input type="checkbox"/> Surface Soil Cracks (B6)<br><input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)<br><input type="checkbox"/> Drainage Patterns (B10)<br><input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) (where tilled)<br><input type="checkbox"/> Crayfish Burrows<br><input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)<br><input type="checkbox"/> Geomorphic Position (D2)<br><input type="checkbox"/> FAC-Neutral Test (D5)<br><input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F) |

**Field Observations:**

Surface Water Present?  Yes  No Depth N/A inches  
 Water Table Present?  Yes  No Depth N/A inches  
 Saturation Present?  Yes  No Depth N/A inches  
 (includes capillary fringe)

**Wetland Hydrology Present?**  
 Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:  
 Data gathered from the National Weather Service-Williston recording station indicates a 2.18-inch departure from normal for June-August 15, 2010.

Remarks:  
 No positive indication of wetland hydrology was observed.



**SOIL - Profile Description: Describe to the depth needed to document the indicator or confirm the absence of indicators.**

| Depth (inches) | Matrix        |     |    | Redox Features |     |      |     | Texture | Remarks |
|----------------|---------------|-----|----|----------------|-----|------|-----|---------|---------|
|                | Color (moist) |     | %  | Color (moist)  | %   | Type | Loc |         |         |
| 0-18           | 2.5Y          | 3/1 | 80 | 2.5Y           | 4/4 | 20   | C   | M       | Clay    |

|  |   |  |
|--|---|--|
| <b>Hydric Soil Indicators (Applicable to all LRRs, unless otherwise noted.):</b> |   | <b>Indicators for Problematic Hydric Soils<sup>3</sup>:</b>  |
| <input type="checkbox"/> Histosol (A1)   | <input type="checkbox"/> Sandy Gleyed Matrix (S4)           | <input type="checkbox"/> 1 cm Muck (A9) (LRR I, J)   |
| <input type="checkbox"/> Histic Epipedon (A2)                                    | <input type="checkbox"/> Sandy Redox (S5)                   | <input type="checkbox"/> Coast Prairie Redox (A16) (LRR F, G, H)   |
| <input type="checkbox"/> Black Histic (A3)                                       | <input type="checkbox"/> Stripped Matrix (S6)               | <input type="checkbox"/> Dark Surface (S7) (LRR G)   |
| <input type="checkbox"/> Hydrogen Sulfide (A4)                                   | <input type="checkbox"/> Loamy Mucky Mineral (F1)           | <input type="checkbox"/> High Plains Depressions (F16)   |
| <input type="checkbox"/> Stratified Layers (A5) (LRR F)                          | <input type="checkbox"/> Loamy Gleyed Matrix (F2)           | <b>(LRR H outside of MLRA 72 &amp; 73)</b>   |
| <input type="checkbox"/> 1 cm Muck (A9) (LRR F, G, H)                            | <input type="checkbox"/> Depleted Matrix (F3)               | <input type="checkbox"/> Reduced Vertic (F18)  |
| <input type="checkbox"/> Depleted Below Dark Surface (A11)                       | <input checked="" type="checkbox"/> Redox Dark Surface (F6) | <input type="checkbox"/> Red Parent Material (TF2)   |
| <input type="checkbox"/> Thick Dark Surface (A12)                                | <input type="checkbox"/> Depleted Dark Surface (F7)         | <input type="checkbox"/> Other (Explain in Remarks)  |
| <input type="checkbox"/> Sandy Mucky Mineral (S1)                                | <input type="checkbox"/> Redox Depressions (F8)             | <sup>3</sup> Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic |
| <input type="checkbox"/> 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)               | <input type="checkbox"/> High Plains Depression (F16)       |  |
| <input type="checkbox"/> 5 cm Muck Peat or Peat (S3) (LRR F)                     | <b>(MLRA 72 &amp; 73 of LRR H)</b>                          |  |

**Restrictive Layer (if present):**  
 Type: None  
 Depth (inches): N/A

**Hydric Soil Present?**  
 Yes  No

Remarks:  
 A positive indication of hydric soil was observed.

**HYDROLOGY**

|  |   |   |
|--|---|---|
| <b>Wetland Hydrology Indicators:</b>                               |   |   |
| Primary Indicators (minimum of one required; check all that apply) |   | Secondary Indicators (minimum of two required)                      |
| <input type="checkbox"/> Surface Water (A1)                        | <input type="checkbox"/> Salt Crust (B11)                           | <input checked="" type="checkbox"/> Surface Soil Cracks (B6)        |
| <input type="checkbox"/> High Water Table (A2)                     | <input type="checkbox"/> Aquatic Invertebrates (B13)                | <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)    |
| <input type="checkbox"/> Saturation (A3)                           | <input type="checkbox"/> Hydrogen Sulfide Odor (C1)                 | <input type="checkbox"/> Drainage Patterns (B10)                    |
| <input type="checkbox"/> Water Marks (B1)                          | <input type="checkbox"/> Dry-Season Water Table (C2)                | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) |
| <input checked="" type="checkbox"/> Sediment Deposits (B2)         | <input type="checkbox"/> Oxidized Rhizospheres on Living Roots (C3) | <b>(where tilled)</b>   |
| <input type="checkbox"/> Drift Deposits (B3)                       | <b>(where not tilled)</b>   | <input type="checkbox"/> Crayfish Burrows                           |
| <input checked="" type="checkbox"/> Algal Mat or Crust (B4)        | <input type="checkbox"/> Presence of Reduced Iron (C4)              | <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)  |
| <input type="checkbox"/> Iron Deposits (B5)                        | <input type="checkbox"/> Thin Muck Surface (C7)                     | <input checked="" type="checkbox"/> Geomorphic Position (D2)        |
| <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) | <input type="checkbox"/> Other (Explain in Remarks)                 | <input type="checkbox"/> FAC-Neutral Test (D5)                      |
| <input type="checkbox"/> Water-Stained Leaves (B9)                 |   | <input type="checkbox"/> Frost-Heave Hummocks (D7) (LRR F)          |

**Field Observations:**

Surface Water Present?  Yes  No Depth N/A inches  
 Water Table Present?  Yes  No Depth N/A inches  
 Saturation Present?  Yes  No Depth N/A inches  
 (includes capillary fringe)

**Wetland Hydrology Present?**  
 Yes  No

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:  
 Data gathered from the National Weather Service-Williston recording station indicates a 2.18-inch departure from normal for June-August 15, 2010.

Remarks:  
 A positive indication of wetland hydrology was observed (at least one primary indicator).

Appendix E  
Cultural Resources Report

**A Class I and Class III Cultural  
Resource Inventory of the Garden  
Creek Gas Plant, McKenzie County,  
North Dakota**

Prepared for

**E3 Environmental, LLC**

Prepared by

**SWCA Environmental Consultants**

August 2010

**A Class I and Class III Cultural Resource Inventory of the  
Garden Creek Gas Plant, McKenzie County, North Dakota**

Prepared for:

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Prepared by:

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Principal Investigator:

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SWCA Cultural Resource Report Number 10-353

**August 26, 2010**

## **ABSTRACT**

This report outlines the results of a Class I and intensive Class III cultural resource inventory conducted by SWCA Environmental Consultants (SWCA) on August 10 and 16, 2010, respectively, for a natural gas processing plant, known as the Garden Creek Gas Plant (GCGP). ONEOK proposes to construct the GCGP on a privately owned 80-acre parcel located in Section 35, Township 151 North, Range 98 West, approximately 5.5 miles northeast of Watford City, North Dakota.

The jurisdictional agency presiding over the construction of the GCGP is the North Dakota Public Service Commission (NDPSC). In compliance with NDPSC requirements, E3 Environmental, LLC, requested SWCA perform a cultural resource survey to assess the potential effect of activities associated with the construction of a gas processing plant. The area of project impact will not exceed 80 acres. At the time of survey, construction activities were underway for a separate Bear Paw Energy facility located in a small portion of the project area in the southeast corner of the survey.

SWCA inventoried 80 acres for the GCGP project. No cultural resources were identified during the course of the inventory. It is recommended that the project be granted determinations of *No Historic Properties Affected* and *No Significant Sites Affected* and clearance to proceed as planned.

## TABLE OF CONTENTS

|  | <u>Page</u> |
|--|-------------|
| ABSTRACT .....   | ii          |
| INTRODUCTION .....   | 1           |
| PROJECT SETTING .....  | 3           |
| Topography .....   | 3           |
| Climate .....  | 4           |
| Hydrology .....  | 4           |
| Geology .....  | 5           |
| Soils .....  | 5           |
| Flora and Fauna .....  | 5           |
| Environmental Constraints .....  | 6           |
| CULTURAL/HISTORIC OVERVIEW .....   | 7           |
| Prehistoric Contexts .....   | 7           |
| Paleoindian Tradition (ca. 11,500–7,900 years before present [B.P.]) ..... | 7           |
| Plains Archaic Tradition (ca. 8000–1500 B.P.) .....                        | 9           |
| Plains Woodland Tradition (ca. 2000–450 B.P.) .....                        | 10          |
| Plains Village Tradition (ca. 1050–350 B.P.) .....                         | 11          |
| Historic Contexts .....  | 13          |
| European Trade and Exploration (A.D. 1738–1858) .....                      | 13          |
| Post-Contact Tribal Overview (A.D. 1780–1900) .....                        | 13          |
| Homesteading in the Dakotas (A.D. 1860–1930) .....                         | 14          |
| BACKGROUND RESEARCH .....  | 15          |
| FIELDWORK METHODS .....  | 16          |
| Site Evaluation .....  | 17          |
| Prehistoric Archaeological Sites .....                                     | 17          |
| Historic Archaeological Sites or Components .....                          | 18          |
| Non-Archaeological Historic Sites or Components .....                      | 18          |
| INVENTORY RESULTS AND RECOMMENDATIONS .....                                | 19          |
| CONCLUSION .....   | 19          |
| REFERENCES CITED .....   | 20          |

## LIST OF TABLES

| <u>Table</u> |   | <u>Page</u> |
|--------------|---|-------------|
| 1            | Summary of Soil Series within the Project Area (NRCS 2010). .....   | 5           |
| 2            | Bibliographic Listing of Previous Archaeological and Historic Studies for Project<br>Lands in McKenzie County, North Dakota ..... | 15          |
| 3            | Previously Recorded Resources .....   | 15          |

**TABLE OF CONTENTS (continued)**

**LIST OF FIGURES**

| <b><u>Figure</u></b> |   | <b><u>Page</u></b> |
|----------------------|---|--------------------|
| 1                    | Project area map. ....  | 2                  |
| 2                    | Project area overview depicting general topography, facing north.....                 | 3                  |
| 3                    | Project area overview depicting general topography, facing southwest. ....            | 4                  |
| 4                    | Overview of the vegetation characteristic of the project area, facing northeast. .... | 6                  |
| 5                    | 1902 GLO survey plat showing Section 32 of T151N, R98W (GLO 1902). ....               | 16                 |

## **INTRODUCTION**

This report outlines the results of a Class I and intensive Class III cultural resource inventory conducted by SWCA Environmental Consultants (SWCA) on August 10 and 16, 2010, respectively, for the proposed Garden Creek Gas Plant (GCGP). ONEOK proposes to construct a natural gas processing plant within an 80-acre parcel 5.5 miles northeast of Watford City, North Dakota. The jurisdictional agency presiding over the construction of the GCGP is the North Dakota Public Service Commission (NDPSC). In compliance with NDPSC requirements, E3 Environmental, LLC (E3) requested SWCA perform a cultural resource survey to assess the potential effect of activities associated with the construction of a gas processing plant.

The GCGP project area is located on privately owned land in Section 35, Township (T) 151 North (N), Range (R) 98 West (W) (Figure 1). The area of project impact will not exceed the inventoried 80-acre parcel. At the time of survey, construction activities were underway for a separate Bear Paw Energy facility located in a small portion of the project area in the southeast corner of the survey.

For the cultural resource investigation, Judith Cooper served as Principal Investigator. Nicholas Smith (Field Principal Investigator) and Nelson Klitzka, both of SWCA, completed the fieldwork. All field notes and photographs are on file at SWCA's Bismarck, North Dakota, office under project number 16867.

*Contains Privileged Information -- Do Not Release*

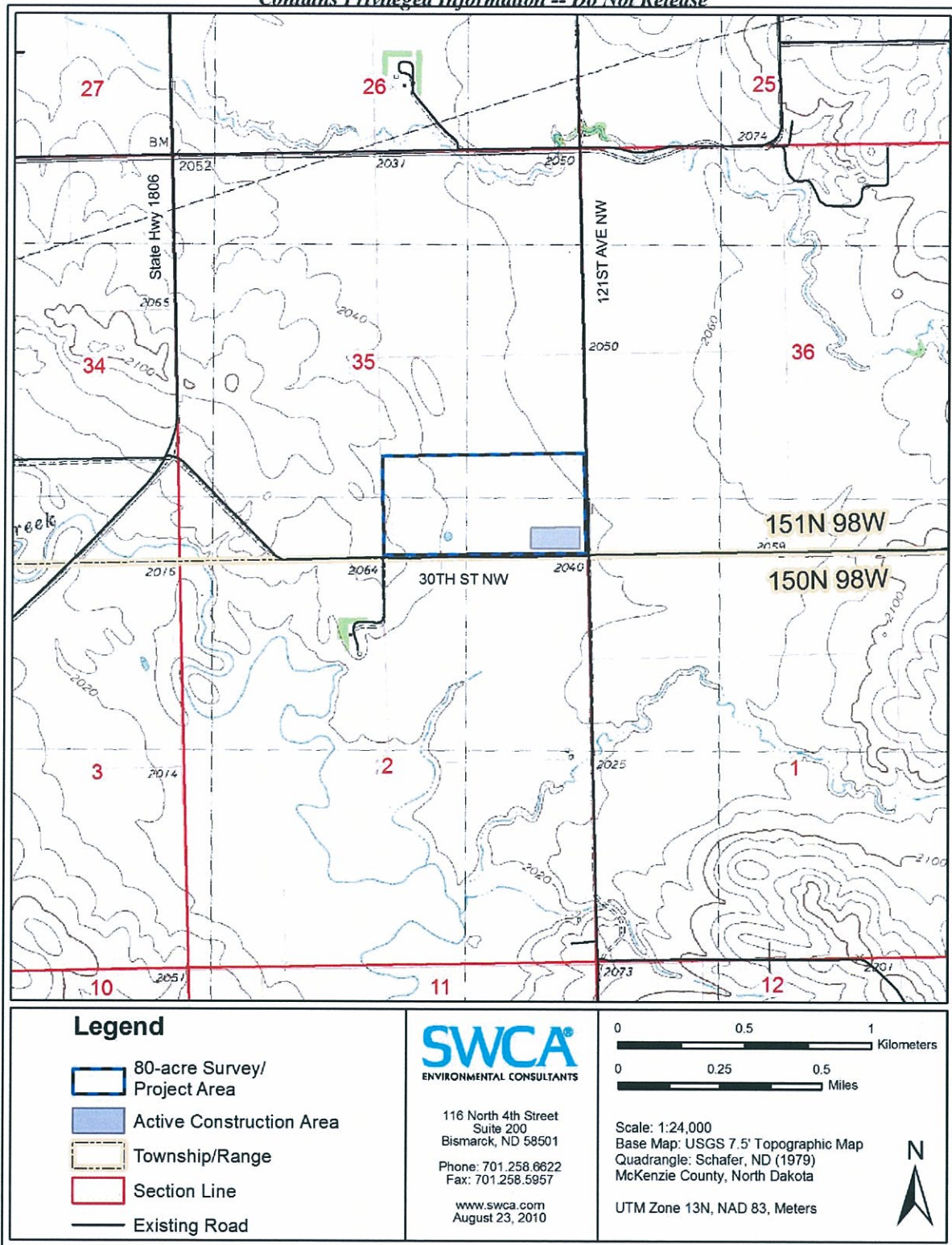


Figure 1. Project area map.

## **PROJECT SETTING**

### **TOPOGRAPHY**

The project area is located in the Missouri Plateau ecoregion of the Northwestern Great Plains physiographic province in northwest North Dakota (Fenneman 1931). The Missouri Plateau ecoregion is a semiarid rolling plain of shale, siltstone, and sandstone punctuated by occasional buttes and badlands (Fenneman 1931). While there are sparse drainages in the immediate project area, the Missouri River is approximately 15 miles directly to the north. The elevation in the project area ranges from approximately 1,750 to 3,300 feet, with the highest elevations in the eastern portions of the project area. The general topography of the proposed project area is unglaciated and retains its original soils and complex stream drainage pattern (Bryce et al. 1998) (Figures 2 and 3). Largely unaffected by glaciation, this ecoregion is composed of moderately dissected level to rolling plains with isolated sandstone buttes (Bryce et al. 1998).



**Figure 2. Project area overview depicting general topography, facing north.**



**Figure 3. Project area overview depicting general topography, facing southwest.**

## **CLIMATE**

The climate for northwest North Dakota is temperate. Based on climatic data collected from Watford City, North Dakota, between 1971 to 2000, January is the coldest month with a mean daily temperature of 8.2 degrees Fahrenheit (°F) while July is the warmest month with a mean daily temperature of 68.6°F (National Climatic Data Center [NCDC] 2009). Temperature extremes on record range from -43°F at the coldest to 111°F at the warmest. On average, 141 days are frost-free (28°F or above) and the average date of the first fall frost is September 25 and the average date of the last spring frost is May 6 (North Dakota Agricultural Statistics Service 2005). Per annum, Watford City receives 14.41 inches of precipitation (NCDC 2009). The wettest month is June, with an average of 3.05 inches of precipitation received; February is the driest, with only 0.39 inch of precipitation received on average. Thirty-five inches of snow are received annually, on average, with the highest accumulations (7.5 inches, on average) received in November (NCDC 2009). The highest monthly snow fall on record occurred in January at which time 22.3 inches of snow fell. Overall, northwest North Dakota, like much of the northwestern Great Plains, is characterized by a moderate to cool climate, with cold, dry winters and mild to warm, dry to moderately wet summers.

## **HYDROLOGY**

The project area is located 17.68 miles south of the Missouri River and 0.37 mile northeast of Cherry Creek, a northwest/southeast-trending perennial stream that drains the Little Missouri River approximately 13.50 miles to the south-southeast. While there are no intermittent or perennial waterbodies in the GCGP project area, a small isolated wetland is located in the southwest portion of the project area.

## GEOLOGY

In general, the geology of the project area is characterized by Oahe Formation – River Sediment. Oahe Formation – River Sediment consists of a mixture of dark, obscurely bedded clay and silt (overbank sediment); generally overlying cross-bedded sand (channel sediment) on floodplains of modern streams, up to 30 feet (10 meters [m]) thick (Clayton 1980).

## SOILS

Seven soil series are present in the project area (Natural Resources Conservation Service [NRCS] 2010); however, the dominant soil type is clayey alluvium derived from shale and siltstone. Table 1 summarizes the soils within the project area.

**Table 1. Summary of Soil Series within the Project Area (NRCS 2010).**

| Soil Series                     | Parent Material     | Drainage                | Slope | Landform                      |
|---------------------------------|---------------------|-------------------------|-------|-------------------------------|
| Farnuf loam                     | Fine-loamy alluvium | Well drained            | 0–2%  | Alluvial flats, terraces      |
| Belfield-Grail silty clay loams | Clayey alluvium     | Moderately well drained | 0–2%  | Flats                         |
| Rhoades-Daglum complex          | Clayey alluvium     | Moderately well drained | 0–6%  | Alluvial fans, alluvial flats |
| Williams-Zahl loams             | Fine-loamy till     | Well drained            | 3–6%  | Rises                         |
| Williams-Zahl loams             | Fine-loamy till     | Well drained            | 6–9%  | Knolls                        |
| Niobell-Williams loams          | Fine-loamy till     | Moderately well drained | 0–6%  | Rises                         |
| Zahl-Williams-Cabba complex     | Fine-loamy till     | Well drained            | 6–9%  | Knolls                        |

## FLORA AND FAUNA

The project area is situated within the Missouri Plateau ecoregion, characterized by a complex stream drainage pattern (Figure 4). Present vegetation includes such species as blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), needlegrass (*Nassella viridula*), little bluestem (*Schizachyrium scoparium*), and prairie sandreed (*Calamovilfa longifolia*) (Bryce et al. 1998).



**Figure 4. Overview of the vegetation characteristic of the project area, facing northeast.**

Approximately 160 wildlife species are resident or seasonal visitors to the Missouri River ecosystem, and hundreds of native fish species live in the mainstem and tributaries. Some of the animal species that would have been common and available for human use in the Missouri River Valley area—both prehistorically and historically—include fur bearing mammals such as beaver (*Castor canadensis*), muskrat (*Ondatra zibethicus*), eastern cottontail (*Sylvilagus floridanus*), elk (*Cervus elaphus*), moose (*Alces alces*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), pronghorn (*Antilocapra americana*), and bison (*Bison bison*); and bird and waterfowl species such as mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), sharp-tailed grouse (*Pedioecetes phasianellus campestris*), golden eagle (*Aquila chrysaetos*), and bald eagle (*Haliaeetus leucocephalus*) (Seabloom et al. 1978). At present, three federally listed threatened and endangered species reside in the area—the least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and pallid sturgeon (*Scaphirhynchus albus*) (National Research Council 2002).

#### **ENVIRONMENTAL CONSTRAINTS**

Preservation of archaeological materials within or adjacent to the project area has been impacted largely by natural erosion including ongoing aeolian and colluvial processes. Secondary sources of impact to archaeological resources include livestock grazing, agriculture, and oil and gas development. Some oil and gas development has occurred near the project area, and is presently increasing as demand for domestic energy sources has grown in recent years. In some places, these varied land uses have resulted in increased ground visibility and removal of overburden, allowing for the identification of numerous sites and an interpretation of high site density. In other cases, though, it has simply removed the archaeological materials and resulted in the identification of low site densities. In combination, these factors may have disrupted the contexts of a moderate percentage of cultural materials.

## **CULTURAL/HISTORIC OVERVIEW**

### **PREHISTORIC CONTEXTS**

The following discussion incorporates a variety of sources to develop a prehistoric overview for the work conducted for the GCGP project and includes information from the Garrison Study Unit (GSU) in which the project area is located (Gregg and Bleier 2008). As of 2007, 3,303 archaeological sites were identified in the GSU, the majority of which were identified on ridges (40.5 percent); hills, bluffs, and knolls (24.0 percent); and terraces (10.4 percent) (Gregg and Bleier 2008).

#### **Paleoindian Tradition (ca. 11,500–7,900 years before present [B.P.]**

Although speculation exists regarding the possibility of earlier habitation of the Great Plains, the Paleoindian tradition is the oldest of the region, and, in general, is associated with a hunting and gathering adaptation (Gregg 1985). The Paleoindian tradition is subdivided here into six main complexes: Clovis, Goshen, Folsom, Hell Gap/Agate Basin, Alberta/Cody, and Parallel Oblique Flaked. Fourteen Paleoindian archaeological resources have been identified in the GSU (Gregg and Bleier 2008). Paleoindian sites in the GSU include, but are not limited to, the Beacon Island site (32MN234A), the Beacon Island Agate Basin site (32MN234), the Moe site (32MN101), and 32ME946.

The Clovis complex (ca. 11,500–10,800 B.P.), defined by large, fluted lanceolate projectile points, is the earliest unequivocal complex in North America. Clovis artifacts have been found with megafauna, such as mammoth, in buried contexts in the Southwest and Great Plains (Grayson and Meltzer 2002); however, although megafauna were probably dietary constituents, it is debated to what degree Early Paleoindians pursued large game (Cannon and Meltzer 2004; Grayson and Meltzer 2002). In the South Dakota Badlands, the Lange-Ferguson site yields the best evidence for proboscidean exploitation (Hannus 1990). Here, modified mammoth bones are directly associated with a flake and three projectile points were recovered from deposits similar to those containing mammoth, indicating that Clovis hunter-gatherers either killed the animals or scavenged their carcasses (Hannus 1990). Skeletal remains from a single mammoth were unearthed during building construction in 1988 near Powers Lake within the GSU. These remains were shallowly buried, were not radiocarbon dated, and were not appraised for the potential of associated cultural remains (Gregg and Bleier 2008). Few Clovis sites have been recorded in the region. Clovis artifacts were recovered from two sites, a single Clovis point base was recovered from 32ME946 (Floodman 1988) and Clovis points have been recovered from the Beacon Island Agate Basin site (Ahler 2003).

Goshen (ca. 10,900–10,100 B.P.) is a technological complex first identified at Hell Gap, Wyoming (Irwin 1967, 1971), but it is also found at Mill Iron, Montana, Carter-Kerr/McGee, Wyoming, and the Jim Pitts site, located in the South Dakota Black Hills (Sellet 2001). Goshen is poorly understood—the basally thinned, unfluted projectile points share affinities with both Clovis and Folsom, but are also similar to Southern Plains Plainview points. In stratified deposits, Goshen materials typically underlie Folsom (Frison et al. 1996). Plainview or Goshen points were recovered from the Moe site in the GSU (Gregg and Bleier 2008).

The Folsom complex (ca. 10,900–10,200 B.P.) is typified by distinctive fluted lanceolate projectile points. With most large grazers extinct by Folsom times and grasslands dominating the Great Plains, bison populations flourished, providing resources for Folsom hunters (Frison 1991). However, many high-elevation Folsom sites, especially in the intermontane basins of the Rocky Mountains, also demonstrate broad diets of diverse small prey (Hill 2007). Probable structures recorded at the Mountaineer and Barger Gulch sites in Colorado suggest long-term occupations in mountain settings (Stiger 2006; Surovell and Waguespack 2007). In North Dakota, there are numerous documented Folsom sites (Gregg 1985), including the Bobtail Wolf (32DU955A), Big Black (32DU955C), and Young-Man-Chief (32DU955D) sites (Root 2000; Shifrin 2000; William 2000). These sites are interpreted as camps, quarries, and lithic workshops where Knife River flint was procured and used for tool production. In the GSU, Folsom points were recovered from the Moe (32MN101) and Beacon Island Agate Basin (32MN234) sites (Gregg and Bleier 2008).

Both the Agate Basin (ca. 10,500–10,000 B.P.) and Hell Gap (ca. 10,000–9,500 B.P.) technocomplexes are typified by lanceolate projectile points with thick lenticular cross-sections (Frison 1991). Based on morphological similarities and stratigraphic evidence, Hell Gap is technologically descended from Agate Basin. Agate Basin and Hell Gap hunter-gatherers were probably specialized bison hunters. Sites like Agate Basin II (Hill 2001) and Casper (Todd et al. 1997) indicate more frequent extraction of marrow and within-bone nutrients, suggesting a greater focus on long-range planning than previously evident. Some sites associated with this tradition have been recorded in North Dakota and South Dakota, but these mainly consist of isolated and surface finds (Gregg 1985). One of the most significant Paleoindian sites in the GSU is the Beacon Island Agate Basin site (Ahler 2003). Agate Basin points have also been recovered from the Moe site, and an isolated Knife River flint Agate Basin point was recorded in the same report as 32ME946 (Gregg and Bleier 2008).

Alberta (9800–9000 B.P.) is a poorly dated technology that probably descends from Hell Gap and is documented at the Hell Gap, Wyoming, and Hudson-Meng, Nebraska, sites (Agenbroad 1978; Frison 1991). Hudson-Meng is one of the largest documented bison kills and suggests that Alberta people focused on bison hunting (Agenbroad 1978); however, more recent work suggests that humans were not responsible for killing the bison and that they died of a natural event (Todd and Rapson 1999). The Cody Complex (9200–8800 B.P.), which includes stemmed/shouldered Eden and Scottsbluff projectile points and the distinctive Cody knife, apparently arose from Alberta (Frison 1991). These sites are widespread across the northwestern and central Great Plains, with components at the Wyoming Horner I, Finley, and Medicine Lodge Creek sites (Frison and Todd 1986; Frison and Walker 2007) and the Mammoth Meadows, Myers-Hindman, and MacHaffie sites in Montana (Davis 1993). Such sites indicate that Cody adaptations were diverse and utilized large fauna as well as small prey and floral resources (Frison et al. 1996; Galvan 2007). Alberta/Cody sites have been recorded in North Dakota and South Dakota. In fact, Hudson-Meng contains extensive Knife River flint, showing a strong connection to the Missouri River region. A single Scottsbluff point was recorded at the Moe site, and Metcalf et al. (1988) recorded a probable Alberta point as an isolated find near Scorio Creek.

The Parallel Oblique Flaked complex is a catch-all grouping of Paleoindian projectile point types (Gregg 1985) including Angostura, Milnesand, Browns Valley, Lusk, Allen, and

Frederick; these range in age from around 9400 to 7900 B.P. All types are lanceolate with parallel oblique flaking. Bison kill-butcherries became rare on the northwestern and northern Great Plains after approximately 8000 B.P. (Frison 1998), perhaps due to severe ecological deterioration that could no longer support large bison populations. Complex excavated and surface sites have been recorded in the Dakotas, including sites on the Missouri River. In the GSU, six archaeological resources defined under the general "Plano" category have been identified (Gregg and Bleier 2008).

### **Plains Archaic Tradition (ca. 8000–1500 B.P.)**

The transition from Paleoindian to Archaic is archaeologically visible as an abrupt shift to large notched projectile points (Frison 1991), perhaps indicating a shift to atlatl propelled darts from hand-thrown spears. This transition is also associated with warming/drying trends that prompted diverse subsistence adaptations among hunter-gatherers (Carlson 1994). Ground stone appears in the Archaic, suggesting a greater focus on processing floral resources. In conjunction with the appearance of pithouses and storage pits in the western intermontane basins, this suggests a shift in subsistence base, a reduction in overall residential mobility, and more predictable seasonal rounds (Frison 1991). In the GSU, 96 Archaic archaeological resources have been identified. Thirty-one of these are from unspecified associations (Gregg and Bleier 2008). Important Archaic-age sites in the GSU include the Mondrian Tree site (32MZ58) and the Moe site (32MN101).

The Logan Creek/Mummy Cave complex (5600–4000 B.P.) is the earliest example of large side-notched projectile points on the northern Great Plains. The blending of the Logan Creek and Mummy Cave for this complex is due to varied nomenclature used among archaeologists regionally for similar archaeological complexes (Gregg 1985). Settlement types associated with this complex include bison kills, transient camps, and some stone circle sites. Four archaeological resources containing large side-notched projectile point varieties have been identified in the GSU (Gregg and Bleier 2008).

The Oxbow complex (5000–4000 B.P.), typified by side-notched, deeply concave-based projectile points, is concentrated in northern Montana, Alberta, and Saskatchewan (Hannus 1994:180) but is also quite common in North and South Dakota, with numerous sites along the Missouri River and its tributary system. Oxbow subsistence apparently centered on bison and sites include bison impoundments and jumps, encampments on stream terraces, stone circles, and processing areas (Hannus 1994; Reeves 1969). However, numerous birds and small mammals were probably exploited (Aaberg et al. 2006:174). Some northern Great Plains sites further yield evidence of complex cultural behavior including bundle burials with elaborate grave goods (Bryan 1991). Four Oxbow archaeological resources have been identified in the GSU (Gregg and Bleier 2008).

The McKean complex (ca. 4500–3400 B.P.) encompasses three distinct sub-phases—the McKean lanceolate, Duncan, and Hannah. The McKean complex is widespread across the Great Plains, and sites from this period can be found associated with bison kills, stone circles, lithic caching, and seasonal settlements (Frison 1991). Slab-lined pit hearths are common, as are ground stone artifacts suggesting a greater reliance on plant resources (Carlson 1994; Frison 1991). McKean complex sites often demonstrate evidence of lithic raw material

exchange, including Swan River chert, Tongue River silicified sediment, and Knife River flint (Gregg 1985). In the GSU, 23 archaeological resources dating to the McKean complex have been identified (Gregg and Bleier 2008).

Pelican Lake (ca. 3000–2700 B.P.), typified by broad, thin corner-notched projectile points, is likely a descendant of McKean and is found across the northern and central Great Plains (Frison 1991). This wide spatial distribution may indicate significant population growth in response to the favorable moist conditions of the Sub-Atlantic episode (Reeves 1983). Numerous communal bison kills, such as Head-Smashed-In (Frison 1991), indicate communal bison hunting, but this does not suggest it was an exclusive feature of their subsistence. Rather, Pelican Lake populations probably relied on a broad-based economy across diverse ecozones (Hannus 1994). Thirty-four Pelican Lake archaeological resources have been identified in the GSU (Gregg and Bleier 2008).

### **Plains Woodland Tradition (ca. 2000–450 B.P.)**

Temporally overlapping with the Northwestern Plains Late Archaic, the Plains Woodland tradition is characterized by increased sedentism, garden horticultural activity, expanding regional exchange networks with eastern Woodland populations (Adena and Hopewell), and the elaboration of ceremonial activities and mortuary practices, specifically mound burials (Griffin 1967). Significant technological advances such as bow and arrow and ceramics-use are also apparent (Gregg 1985); however, the fundamental subsistence strategies of the Plains Woodland did not drastically differ from their Archaic predecessors (Zimmerman 1985). It is assumed that this tradition saw the beginning of horticultural practices in the region. For the purposes of this study the complexes that are classed as belonging to the Plains Woodland include Besant, Sonota, Laurel, Avonlea, Old Woman's, and Blackduck. The Besant and Sonata components are well represented in the GSU (Gregg and Bleier 2008). Of the 184 Woodland sites in the GSU, 119 are unspecified, and 37 are Besant and/or Sonata age sites (Gregg and Bleier 2008).

The Besant complex (ca. 2000–1500 B.P.), typified by small to medium-sized side-notched triangular projectile points, represents the earliest presence of ceramics in North Dakota, probably resulting from eastern woodland influence (Walde 2006). Besant ceramics are more common in the eastern half of the Dakotas; the vessels show a basic conoidal shape and suggest lump modeling manufacture with some coarse cording (Wood and Johnson 1973). Besant sites show extensive use of Knife River flint (Reeves 1970). Site types include stone circle sites, habitations on stream and river terraces, and bison kills. Numerous communal kill sites, including the Ruby bison pound in Wyoming (Frison 1991), suggest that Besant people were sophisticated bison hunters. The Sonota complex (1850–1350 B.P.) appears to be a possible sub-complex of Besant, but differs in that burial mounds are common at Sonota sites (Reeves 1983; Wood 1967). These mounds include rectangular subfloor pits/tombs with dismembered bodies and, commonly, articulated bison remains (Johnson and Johnson 1998). The presence of associated exotic artifacts is often cited as evidence of Hopewell influence on Middle Plains Woodland populations (Johnson and Johnson 1998). In the GSU, 37 Besant/Sonota archaeological resources have been identified, including at 32DU2, the Twin Buttes site (32DU32/32ME617), and 32ME254.

Sites from the Laurel complex (2100–850 B.P.) are generally found in the eastern portions of North Dakota, northern Minnesota, and southern Canada. Laurel pottery and mound building are fairly distinct, but lithics associated with this complex tend to be various and lack a particular style (Gregg 1985).

Avonlea complex (ca. 1800–1000 B.P.) sites occur across the northern Great Plains and are contemporaneous with Besant. This complex includes a variety of site types, including stone circles, bison kills, and rock shelter habitations (Reeves 1970). Avonlea represents the first regional complex to produce arrow points exclusively, suggesting a transition to bow and arrow technology (Frison 1988). Avonlea point types are small and indistinctly side-notched. Saskatchewan Basin Complex: Early Variant pottery is found at Avonlea sites (Byrne 1973). Avonlea subsistence in the north relied heavily on communal bison procurement, but in their southern range bison hunting was supplemented by smaller game (e.g., pronghorn), fish, and seasonal plant exploitation (Smith and Walker 1988). Avonlea sites are relatively rare in the Dakotas (Vickers 1994). In North Dakota, the Evans site (32MN301) contained Avonlea projectile points and ceramics (Schneider and Kinney 1978). Only one Avonlea-aged archaeological resource was identified in the GSU.

Rare in North Dakota is the Old Woman's complex (A.D. 700–1300). This complex is contemporary with the Plains Village tradition, so it would seem likely that many associated sites would be granted the latter designation (Gregg 1985).

The Blackduck complex (A.D. 1150–450) derives from northern Minnesota and was concentrated in southern Manitoba. It is contemporary with both Avonlea and Old Woman's complexes, and with Extended and Terminal Middle Missouri traditions. Some evidence of possible Blackduck pottery has been found along the Missouri River, which suggests trade between the Missouri River villagers and the Blackduck people to the north (Joyes 1970).

### **Plains Village Tradition (ca. 1050–350 B.P.)**

Lehmer (1971) defined the Plains Village tradition as possessing the following diagnostic traits: equal horticulture and hunting and gathering strategies; semi-permanent villages near the Missouri River floodplain; earthlodges; large storage and refuse pits; distinctive ceramics; abundant end scrapers and arrow points; bison scapula hoes; and a well-developed bone tool industry. The Plains Village Tradition is divided into the Middle Missouri tradition (A.D. 969–1500) and the Coalescent tradition (A.D. 1300–1650), discussed below. Only 15 Plains Village archaeological resources have been identified in the GSU (Gregg and Bleier 2008).

Three primary Middle Missouri variants are recognized: Initial Middle Missouri (A.D. 969–1297), Extended Middle Missouri (A.D. 1075–1443), and Terminal Middle Missouri (A.D. 1300–1500) (Eighmy and LaBelle 1996). These represent a continuation and intensification of Northern Plains Woodland lifeways and their appearance coincides with the onset of the Medieval Warm Period (Bryson et al. 1970) when a moisture increase likely permitted horticulture in areas previously characterized by tenuous farming conditions (Wood 2001).

The Initial Middle Missouri Variant (IMMV) is thought to have developed as an outgrowth of the Great Oasis (Tiffany 2007) or via the arrival of eastern populations already exploiting a

Plains Village lifeway (Lehmer 1971). The IMMV was concentrated in the southern portions of the Middle Missouri region and characterized by highly fortified villages of large, semi-subterranean rectangular houses (Lehmer 1971; Winham and Calabrese 1998).

The Extended Middle Missouri Variant (EMMV) is concentrated in the northern portions of the Middle Missouri region (Lehmer 1971). EMMV groups resided in small villages of semi-subterranean rectangular houses; southern villages were more often fortified than those in the north (Wood 2001). It is unclear whether the EMMV replaced the IMMV or represents a contemporaneous offshoot of the IMMV. Origins aside, it is assumed that IMMV populations were eventually absorbed into EMMV populations. The final expression of this tradition was the Terminal Middle Missouri (Winham and Calabrese 1998:282). These sites were concentrated in a smaller geographic area along the Missouri River in southern North Dakota and characterized by fewer but much larger villages (Wood 2001). Sites again contained long, rectangular semi-subterranean houses but were highly fortified (Wood 2001). A continuation of the Middle Missouri Tradition is recognized historically as the Siuwan-speaking Mandan and Hidatsa (Wood 2001).

The Coalescent period is temporally divided into Initial (650–350 B.P.), Extended (500–300 B.P.), and Post-Contact Coalescent (300 B.P.–Historic period) (Johnson 1998; Lehmer 1971). The Coalescent Tradition is thought to represent a geographic movement of Central Plains Tradition village-dwelling populations to the Missouri River Valley in South Dakota (Blakeslee 1993). Central Plains Traditions might have migrated from Nebraska and Kansas in response to drought brought on by the Pacific climatic episode (Lehmer 1971). Similar to Middle Missouri Tradition groups, Coalescent populations practiced an economy split between mixed cultigen horticulture and bison hunting (Johnson 1998).

Initial Coalescent Variant sites are located on bluffs overlooking the Missouri River and its drainages in southern South Dakota. Populations lived in fortified villages consisting of subrectangular to circular/oval earthlodges and often surrounded by complex fortifications (Johnson 1998). Violence amongst Coalescent groups is evidenced at the Crow Creek site (39BF11) where approximately 486 individuals were killed in the village fortification ditch around 625 B.P. (Willey and Emerson 1993). Crow Creek is interpreted as evidence of internecine warfare amongst Initial Coalescent groups over land competition (Zimmerman and Bradley 1993) or, conversely, as evidence of warfare between immigrant Coalescent groups and resident Middle Missouri Tradition peoples (Johnson 1998). The Extended Coalescent Variant apparently descended from the Initial Coalescent sometime in the fifteenth century A.D. Sites are concentrated along the Missouri River and its tributaries in central and northern South Dakota (Krause 2001). Extended Coalescent sites are far more abundant than during the Initial Coalescent and are characterized by a dispersed, unfortified village structure of circular earthlodges (Johnson 1998; Krause 2001; Lehmer 1971). The Extended Coalescent Variant evolved into the Post-Contact Coalescent during the Protohistoric and Historic and the Coalescent Tradition is recognized as the Arikara (Krause 2001). The last post-contact village was Like-a-Fishhook Village, occupied by the Arikara, Mandan, and Hidatsa; it was abandoned in 1886 when groups relocated to the Fort Berthold Reservation (Smith 1972).

## **HISTORIC CONTEXTS**

### **European Trade and Exploration (A.D. 1738–1858)**

Perhaps the earliest attempts at exploring the northern Great Plains came as a result of the ventures of Pierre Gaultier de Varennes Siure de la Verendrye (Dill 1983). His travels from New France into North Dakota led him as far as the Missouri River (somewhere near Bismarck), and led to subsequent expeditions by his sons, which went farther south into South Dakota (near Pierre) and west towards the Black Hills. While the elder la Verendrye met the Mandan, his sons encountered the Arikara and other tribes in South Dakota. Their reports heightened interest in the region and the possibilities that existed for trade with its inhabitants.

Following the la Verendryes, a modest fur trade developed in the region, but until the expedition of Captains Meriwether Lewis and William Clark returned successfully from their voyage up the Missouri, the region was considered a wild unknown (Schulenberg 1957).

In 1807, Manuel Lisa established a short-lived post at the mouth of the Bighorn, and by 1809 his St. Louis Missouri Fur Company was building posts among most of the tribes all along the Missouri River. Other notable companies, such as the Northwest Company, Hudson Bay Company, the Columbia Fur Company, and the American Fur Company, soon followed suit (Schulenberg 1957). The life of these posts tended to be short, but they did much to influence the tribes who frequented the Missouri River in both North and South Dakota. Fort Union—at the confluence of the Yellowstone and Missouri rivers—was the last of the great posts, and its waning during the late 1850s saw the fur trade in the Dakotas in its last throes.

### **Post-Contact Tribal Overview (A.D. 1780–1900)**

In addition to the tribes that arose from the Middle Missouri and Coalescent traditions (Mandan, Hidatsa, and Arikara), the northern Great Plains and the Missouri River were also used by countless other tribes since before European contact.

The Assiniboine were known to frequent the northern Missouri River (mainly near the confluence with the Yellowstone), and were active in the fur trade throughout the eighteenth and nineteenth centuries. As well, the Cheyenne were pushed westward by the Chippewa during the middle of the eighteenth century and took up at least a temporary settlement period on the Missouri River. At least one earthlodge village has been attributed to the Cheyenne in eastern North Dakota, and some Cheyenne villages on the Missouri River were located between the Mandan to the north, and the Arikara to the south, where they built earthlodges and pursued horticulture and buffalo hunting (Schlesier 1968).

The Plains Cree and Plains Chippewa also frequented the northern Missouri—mainly near the confluence with the Yellowstone, but also near Fort Clark. Both tribes traded actively with the Mandan and Hidatsa. The Crow, although more westerly in their territory, were related to the Hidatsa and would often trade and visit with the Missouri River tribes (Schulenberg 1957).

Based on linguistic evidence, the Sioux (or Dakota) originated from the southwest Great Lakes region (DeMallie 2001a). The timing of the migration is unclear, but ceramic evidence suggests that the Dakota were living on the plains several centuries before the arrival of

Europeans (Hanson 1998). Based on linguistics, it is thought that the Assiniboine split from the Sioux sometime before the mid-seventeenth century (Hanson 1998). The Teton Dakota are divided into seven sub-tribes, including the Oglala, Brule, Sans Arc, Hunkpapa, Blackfeet, Miniconjou, and Two Kettles (Hanson 1998). According to DeMallie (2001a), by the mid-eighteenth century, the Teton Dakota hunted bison in the area east of the Missouri River, their movements limited in part by the Arikara stronghold along the Missouri River. However, a series of smallpox epidemics from 1771 to 1781 devastated the Arikara villages (Johnson 1998) and permitted the Teton Dakota to move west of the Missouri River. Like the Teton Dakota, the Yankton and Yanktonai Dakota occupied the prairies east of the Missouri River and north into Minnesota in the mid-seventeenth century (DeMallie 2001a). By the mid-nineteenth century, the Yankton and Yanktonai occupied the prairies east of the Missouri River from the mouth of the Big Sioux River in the south to the Red River in the north (DeMallie 2001b).

The Reservation Period began in the 1860s and continues into today. This time period contains numerous accounts of hurt feelings and unjust actions—including government actions to stop tribal ceremonialism, forced boarding school education of Indian children, and attempts at termination and relocation to solve the “Indian Problem” in the Dakotas. Regardless of this checkered history, the tribes who lived on, and used, the Missouri River have persisted to the present as strong and vital people with a living culture which has survived for present and future generations.

In the GSU, 5 Hidatsa, 1 Arikara, 1 Chippewa, 1 Mandan, and 21 unspecified historic Native American archaeological resources have been identified (Gregg and Bleier 2008).

### **Homesteading in the Dakotas (A.D. 1860–1930)**

The first homestead in North Dakota was filed in 1868, which was the only homestead filed until 1871. The true rush for homesteads did not take place until 1885. This rush was spurred by the extension of the Northern Pacific Railroad across the Red River from Minnesota (Works Progress Administration [WPA] 1950). Western North Dakota—including Dunn County—did not see much settlement prior to the 1890s, and the major settlement of this region did not start in any great numbers until between 1900 and 1910. In general, those homesteaders who selected lands along the Missouri River were able to do some crop farming, but the majority of homesteads were arranged as ranch operations for sheep or cattle.

In addition to the homesteading, which brought an increasing number of people to western North Dakota, the discovery of large deposits of lignite coal further boosted interest in the development of Dunn County and the surrounding area (WPA 1950). Although slow at first, the mining industry started to flourish during the 1930s; to this day it remains a major focus of activity which drives the economy of both the county and the state. In total, eight historic Euro-American archaeological resources have been identified in the GSU (Gregg and Bleier 2008).

## BACKGROUND RESEARCH

As part of the initial phase of this investigation, SWCA conducted a background search of archaeological and historical literature and records for the project area and surrounding 1-mile area. Researchers searched relevant record holdings at the State Historical Society of North Dakota (SHSND) and other available sources for information regarding previously recorded historic and prehistoric sites located within the project area, including General Land Office (GLO) survey plats. Background research was conducted on August 10, 2010.

Based on the results of the SHSND records search, two previous cultural resource inventories have been performed within 1 mile of the project area since 1976. These are detailed in Table 2.

**Table 2. Bibliographic Listing of Previous Archaeological and Historic Studies for Project Lands in McKenzie County, North Dakota.**

| Manuscript Number | Location                   | Title  | Author(s)  | Year |
|-------------------|----------------------------|--|------------|------|
| 000140            | Section 3,<br>T150N, R98W  | Archaeological and Historic Site Survey of Project No. CRS 91(5), McKenzie County, North Dakota                | C. Dill    | 1976 |
| 009613            | Section 34,<br>T151N, R98W | Reservation Telephone Cooperative Cable Improvements: A Class II Cultural Resource Inventory, McKenzie Co., ND | D. Klinner | 2006 |

Results of the background search identified two previously recorded cultural resources within the surrounding 1-mile study area (Table 3). Both are prehistoric in age and include one cultural material scatter site (32MZ118) of unknown cultural affiliation and one quarry/mine site lead (32MZX375) also of unknown cultural affiliation. Regarding eligibility for listing on the National Register of Historic Places (NRHP), both resources remain unevaluated. None of the previously recorded resources are within the project area. Additionally, a search of the GLO plats for Section 35 of T151N, R98W (GLO 1902) did not show any historic resources or features located within the project area as of 1902 (Figure 5).

**Table 3. Previously Recorded Resources.**

| Site Number | Site Name    | Site Type                 | Legal Location (S/T/R)   | Cultural Affiliation | NRHP Recommendation |
|-------------|--------------|---------------------------|--|----------------------|---------------------|
| 32MZ118     | Cherry Creek | Cultural Material Scatter | SW $\frac{1}{4}$ SE $\frac{1}{4}$ SE $\frac{1}{4}$ ,<br>Section 34,<br>T151N, R98W | Unknown Prehistoric  | Unevaluated         |
| 32MZX375    | None         | Quarry/Mine               | NW $\frac{1}{4}$ , Section 27,<br>T151N, R98W                                      | Unknown Prehistoric  | Unevaluated         |

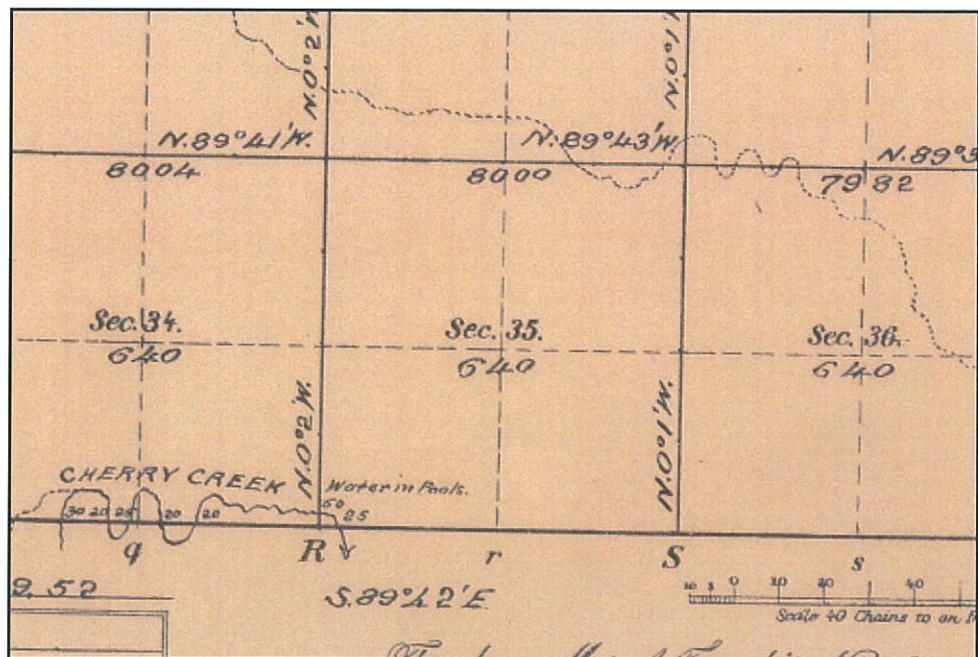


Figure 5. 1902 GLO survey plat showing Section 32 of T151N, R98W (GLO 1902).

## FIELDWORK METHODS

Fieldwork was designed so that project archaeologists could collect all appropriate and necessary data for the completion of the project report of results and recommendations, and to ensure accurate completion of site forms for all resources encountered.

In accordance with the scope of work, archaeologists surveyed the 80-acre GCGP project area using parallel linear transects with spacing not exceeding 30 m. The ground surface was examined for artifacts, features, or other evidence of cultural occupation. Cut banks, eroded surfaces, and other areas with significant exposure were examined intensively throughout fieldwork, especially where previously recorded cultural resources existed. In areas with high vegetation cover and high probability of cultural resources, survey transects were reduced to 10 m to maintain adequate visibility.

Where cultural resources were located, project archaeologists made an intensive effort to fully and accurately establish the extent and boundaries of new and previously recorded sites. As such, sites were mapped using sub-meter accurate Trimble Global Positioning System (GPS) units. When detailed mapping or remapping was required, all linear site features, such as site boundaries, roads, and fence lines, as well as point features, such as the site datum, cultural features, artifact concentrations, diagnostic artifacts and tools, and other necessary data, were mapped with the Trimble GPS unit for post-processing into ArcMap 9.3 shapefiles, and for plotting onto associated U.S. Geological Survey 7.5-minute quadrangles to ensure accuracy and to produce required location maps of all sites and resources.

In addition to site mapping, project personnel photographed sites in overview and for other data collection needs. Associated features and diagnostic artifacts were described, measured,

recorded with GPS, and photographed, as appropriate. Field personnel noted environmental setting, context, topography, and geographical location for each cultural resource. No collection or subsurface testing was conducted during the inventory.

## **SITE EVALUATION**

SWCA evaluated sites and their significance, as defined by criteria set forth in Title 36 Code of Federal Regulations 60.4 (National Park Service [NPS] 1991), which states:

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

- A) That are associated with events that have made a significant contribution to the broad patterns of our history; or
- B) That are associated with the lives of persons significant in our past; or
- C) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- D) That has yielded or may be likely to yield information important in prehistory or history.

Not eligible sites have lost integrity and are unlikely to contribute further data significant to knowledge of prehistory or history.

### **Prehistoric Archaeological Sites**

Prehistoric lithic scatters/campsites (sites without any structures or association with known significant events or persons) recorded for the project generally will not contain NRHP discussion for Criteria A, B, or C. Instead, for NRHP recommendation purposes, these properties will be discussed for their potential to yield information significant to prehistory or the archaeological record under NRHP Criterion D. Special cases generally apply to Criterion A, where a prehistoric site type (such as a stone circle site) may not be recommended eligible for the NRHP from an archaeological perspective, but may be considered important to cultures of Native American peoples.

Evaluation of the significance of archaeological sites under Criterion D considers general characteristics such as the nature, size, and diversity of the site assemblage; the potential presence or absence of subsurface cultural deposits; the nature of any features within the site (construction techniques, building materials, structural integrity); and the age range reflected by the site assemblage. Sites considered to be significant generally contain an assemblage of cultural remains that reflects sufficient diversity to permit identification of activities and to allow confirmation of the period of site use. Sites with the most potential to address research questions about human lifeways contain associated features, structures, and/or relatively intact and dateable artifacts.

### **Historic Archaeological Sites or Components**

Historic sites containing or consisting of preserved features or structures are evaluated primarily under Criteria A, B, and C. Historic trash scatters lacking associated features or structures are primarily evaluated under Criterion D. In general, these types of sites represent ephemeral prospecting or stock management activities, but they lack identifiable or important association with specific persons or events of regional or national history (Criteria A and B), and they lack the formal and structural attributes necessary to qualify as eligible under Criterion C. The evaluation of significance of historic archaeological sites under Criterion D focuses on the capacity of the sites or components to yield significant information regarding knowledge of history during the period(s) of site significance. Evaluation of the significance of historic sites considers general characteristics such as the nature, size, and diversity of the site assemblage; the potential presence or absence of subsurface cultural deposits; the nature of any features within the site; construction techniques; building materials; structural integrity; and the age range reflected by the site assemblage.

Historic sites considered to be significant under Criterion D generally contain an assemblage of cultural remains that reflects sufficient diversity to permit identification of activities and to allow confirmation of the period of site use. Sites with the most potential to address research questions contain associated features, structures, and relatively intact and datable artifacts. Significant sites are those that could impart information not available solely from historical documents. Although archival research may provide an essential form of information, often historical records are inaccurate or incomplete. For example, examination of construction techniques or household assemblages can provide information on economic slumps, reuse of structures for other than original purposes, and re-occupation cycles. As a result, insight may be gained into questions about human lifeways that are often asked in archaeology, but rarely specified directly in historical documentation.

### **Non-Archaeological Historic Sites or Components**

Non-archaeological historic sites or sites with non-archaeological components are those primarily assessed for NRHP eligibility under Criteria A, B, or C, rather than Criterion D and typically are not subject to subsurface testing. Individual segments of significant historic sites are evaluated as contributing or non-contributing in terms of physical and environmental integrity. Examples of historic site types include linear historic features, such as transportation routes and water conduits, standing building and structure sites, and potentially extend to any historic feature on an otherwise archaeological site, such as Traditional Cultural Property (TCP) features. Historic and ethnographic sites evaluated for potential contribution to history or cultural traditions for reasons beyond their possible future research value tend to have different evaluation and management considerations than archaeological sites. Typically, the integrity of historic sites is addressed using the guidelines presented in National Register Bulletin 15 (NPS 1991), which defines the seven elements of integrity as location, design, materials, workmanship, setting, feeling, and association. As such, properties are basically evaluated in consideration of their physical integrity and the integrity of their surroundings. TCPs are also considered under the guidelines of National Register Bulletin 38 (Parker and King 1998).

## INVENTORY RESULTS AND RECOMMENDATIONS

SWCA conducted a Class III inventory of the project area on August 16, 2010. The project area lies in an active agricultural field. Project area vegetation was dominated by cultivated wheat (*Triticum* sp.) and ground visibility ranged from less than 30 to 50 percent. Impacts to the project area include agricultural activity, trash dumping, and construction within a small portion of the project area in the southeast corner of the survey parcel.

No cultural resources were identified during the course of the inventory. It is recommended that the project be granted determinations of *No Historic Properties Affected* and *No Significant Sites Affected* and clearance to proceed as planned.

## CONCLUSION

SWCA conducted a Class I and intensive Class III cultural resource inventory on August 10 and 16, 2010, respectively, for the GCGP. Within the 80-acre survey parcel, ONEOK proposes to construct a natural gas processing plant. The jurisdictional agency presiding over the construction of the GCGP is the NDPSC. In compliance with NDPSC requirements, E3 requested SWCA perform a cultural resource survey to assess the potential effect of activities associated with the construction of a gas processing plant. The area of project impact will not exceed 80 acres. At the time of survey, construction activities were underway for a separate Bear Paw Energy facility located in a small portion of the project area in the southeast corner of the survey.

SWCA inventoried 80 acres for the GCGP project. No cultural resources were observed during the course of the inventory. It is recommended that the project be granted determinations of *No Historic Properties Affected* and *No Significant Sites Affected* and clearance to proceed as planned.

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