CERTIFICATE OF SITE COMPATIBILITY

Bill Sanderson Gas Processing Plant Project

February 2020

Prepared for:

OUTRIGGER ENERGY

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TABLE OF CONTENTS

Section **Page**

INTRODUCTION 1

1.0 FACILITY DESCRIPTION 3

1.1 Type of Energy Conversion Facility 3

1.2 Size and design 3

1.2.1 Gross Size Capacity 3

1.2.2 Net Design Capacity 3

1.3 Estimated Thermal Efficiency of the Conversion Process and the Assumptions on which the Estimate is Based 5

1.4 Time and Schedule 5

1.4.1 Certificate of Site Compatibility 5

1.4.2 Land Acquisition 5

1.4.3 Construction Start Date 5

1.4.4 Construction Completion Date 5

1.4.5 Test Operations 5

1.4.6 Commencing Commercial Production 5

1.4.7 Beginning Any Expansions or Additions 5

1.5 Commercial Production Data for the Plant 5

1.6 Estimated Cost of Construction 5

2.0 STUDIES 6

2.1 Study Area 6

2.2 Site 6

2.3 Federal, State, and Local Agency Consultations 6

2.3 Environmental Analysis 7

2.4.1 Natural Resources Inventory 7

2.4.2 Cultural Resources Inventory 10

3.0 NEED FOR FACILITY 12

3.1 Analysis of Need Based on Present and Projected Demand, Including System Studies 12

3.2 Description of Feasible Alternative Methods of Serving the Need 12

4.0 ENERGY CONVERSION FACILITY SITING CRITERIA 14

4.1 Study Area 14

4.2 Indentify and Map Criteria 14

4.3 Exclusion Area Inventory and Analysis 14

4.3.1 Federal Exclusion Areas 15

4.3.2 State Exclusion Areas 15

4.3.3 County Exclusion Areas 15

4.3.4 Prime Farmland 15

4.3.5 Irrigated Farmland 16

4.3.6 Protected Species Resources 16

4.3.7 Critical Habitat for Protected Species 16

4.3.8 Areas in Proximity to ICBM Facilities 16

4.4 Avoidance Areas Inventory and Analysis 16

4.4.1 Other Historical Resources Not Meeting Exclusion Area Criteria 17

4.4.2 Areas Within City Limits or Military Installation Boundaries 17

4.4.3 Areas Within Known 100-Year Floodplains 17

4.4.4 Areas of Known Geologic Instability 17

4.4.5 Woodlands and Wetlands 17

4.4.6 Areas of Recreational Significance Not Categorized as Exclusion Areas 17

4.5 Factors to be Considered in Evaluating Applications and Designations of Sites, Corridors, and Routes (N.D.C.C § 49.22.1-09) 18

4.5.1 Selection Criteria (N.D.A.C. § 69-06-08-01(5)) 18

4.5.2 Cumulative Effects of the Location of the Facility in Relation to Existing and Planned Facilities and Other Industrial Development 21

4.6 Policy Criteria 21

4.6.1 Policies and Commitments to Limit Environmental Impact 21

4.6.2 Recycling of the Conversion Byproducts and Effluents 22

4.6.3 Energy Conservation Through Location, Process, and Design 22

4.6.4 Training and Utilization of Available Labor in this State for the General and Specialized Skills Required 22

4.6.5 Use of a Primary Energy Source or Raw Material Located within the State 22

4.6.6 Non-Relocation of Residents 22

4.6.7 The Dedication of an Area Adjacent to the Facility to Land Uses Such as Recreation, Agriculture, or Wildlife Management 23

4.6.8 Economies of Construction and Operation 23

4.6.9 Secondary Uses of Appropriate Facilities for Recreation and the Enhancement of Wildlife 23

4.6.10 Use of Citizen Coordinating Committees 23

4.6.11 A Commitment of a Portion of the Energy Produced for Use in this State 23

4.6.12 Labor Relations 23

4.6.13 Coordination of Facilities 23

4.6.14 Monitoring of Impacts 24

4.6.15 Problems Raised by Federal Agencies, Other State Agencies, and Local Entities 24

5.0 MITIGATION MEASURES 25

6.0 LIST OF PREPARERS 26

7.0 RESOURCES CITED 28

TABLES

1 Exclusion Areas Summary
2 Avoidance Areas Summary

APPENDICES

A Site Plot Plans with Equipment Lists
B Criteria Maps
C Natural Resource Report
D Cultural Resource Class I Summary
E Agency Correspondence
F Unanticipated Discovery Plan
G Emergency Action Plan

ACRONYMS AND ABBREVIATIONS

AOI	Areas of Influence
APE	Area of Potential Effect
Commission	North Dakota Public Service Commission
FEMA	Federal Emergency Management Administration
GIS	Geographic Information System
GMEC	Grouse Mountain Environmental Consultants
GSU	Garrison Study Unit
ICBM	Intercontinental Ballistic Missile
IPaC	Information for Planning and Consultation
NAIP	National Agriculture Imagery Program
MMscfd	million standard cubic feet per day
N.D.A.C	North Dakota Administrative Code
N.D.C.C	North Dakota Century Code
NGL	natural gas liquids
NHD	National Hydrologic Dataset
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
OE2	OE2 North LLC
OSHA	Occupational Safety and Health Administration
PEM	palustrine emergent
PSC	Public Service Commission
Project	Bill Sanderson Gas Processing Plant Project
RSV	recycle split vapor
SHPO	State Historic Preservation Office
SWCA	SWCA Environmental Consultants, Inc.
SWD	salt water disposal
T&E	Threatened and endangered
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	volatile organic compound
XTO	XTO Energy, Inc. and its applicable affiliate(s)
WBD	Watershed Boundary Dataset
WOTUS	Waters of the United States
WSS	Wet Soils Survey

NORTH DAKOTA PUBLIC SERVICE COMMISSION SITING APPLICATION CHECKLIST

Citation	Criteria	Section
North Dakota Century Code		
49.22.1-03	**Exclusion and avoidance areas – Criteria**	4.3 and 4.4
49.22.1-06	**Application for a certificate – Notice of Filing – Amendment Designation of a site or corridor**	
	1. A description of the size and type of facility.	1.1 and 1.2
	2. A Summary of any studies that have been made of the environmental impact of the facility.	2.4 Appendices C and D
	3. A statement explaining the need for the facility.	3.1
	4. An identification of the location of the preferred site for any gas or liquid energy conversion facility.	3.1
	5. An identification of the location of the preferred corridor for any gas or liquid transmission facility.	N/A (separate application)
	6. A description of the merits and detriments of any location identified and a comprehensive analysis with supporting data showing the reasons why the preferred location is the best suited for the facility.	3.2
	7. A description of mitigative measures that will be taken to minimize all foreseen adverse impacts resulting from the location, construction, and operation of the proposed facility.	5.0
	8. An evaluation of the proposed site or corridor with regard to the applicable considerations set out in section 49.22.1-09 and the criteria established pursuant to section 49-22.1-03.	4.0
	9. Any other information as the applicant considers relevant or the commission may require.	N/A
49-22.1-09	**Factors to be considered in evaluating applications and designation of sites, corridors, and routes.**	
	1. Available research and investigations relating to the effects of the location, construction, and operation of the proposed facility on public health and welfare, natural resources, and the environment.	4.6.1
	2. The effects of new gas or liquid energy conversions and gas or liquid transmission technologies and systems designed to minimize adverse environmental effects.	4.6.1
	3. The potential for beneficial uses of waste energy from a proposed gas or liquid conversion facility.	N/A
	4. Adverse direct and indirect environmental effects that cannot be avoided should the proposed site or route to be designated.	4.5.1.1
	5. Alternatives to the proposed site, corridor, or route that are developed during the hearing process and which minimize adverse effects.	3.2
	6. Irreversible and irretrievable commitments of natural resources should the proposed site, corridor, or route be designated.	4.5.1.3
	7. The direct and indirect economic impacts of the proposed facility.	4.5.1.3

Citation	Criteria	Section
	8. Existing plans of the state, local government, and private entities for other developments at or in the vicinity of the propose site, corridor, or route.	4.5.2
	9. The effect of the proposed site or route on existing scenic areas, historic sites and structures, and paleontological or archaeological sites.	4.3
	10. The effect of the proposed site or route on areas that are unique because of biological wealth or because the site or route is a habitat for rare and endangered species.	4.3
	11. Problems raised by federal agencies, other state agencies, and local entities.	2.3
North Dakota Administrative Code		
69-06-08-01	**Energy conversion facility siting criteria**	
69-06-08-01(1)	**Exclusion areas.** Geographical areas that must be excluded in the consideration of a site for an energy conversion facility.	4.3 Table 1
69-06-08-01(3)	**Avoidance areas.** Geographical areas that may not be approved as a site for an energy conversion facility unless the applicant shows that under the circumstances there is no reasonable alternative.	4.4 Table 2
69-06-08-01(5)	**Selection criteria.** A site may be approved in an area only when it is demonstrated to the commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum. The effects to be considered include:	4.5
	a) The impact upon agriculture (1) Agricultural production. (2) Family farms and ranches. (3) Land which the owner demonstrates has soil, topography, drainage, and an available water supply that cause the land to be economically suitable for irrigation. (4) Surface drainage patters and ground water flow patterns. (5) The agricultural quality of the cropland.	4.5.1.1
	b) The impact upon the availability and adequacy of: (1) Law enforcement. (2) School systems and education programs. (3) Governmental services and facilities. (4) General and mental health facilities. (5) Recreational programs and facilities (6) Transportation facilities and networks. (7) Retail service facilities. (8) Utility services.	4.5.1.2

Citation	Criteria	Section
	c) The impact upon: (1) Local institutions. (2) Noise-sensitive land uses. (3) Rural residences and businesses. (4) Aquifers. (5) Human health and safety. (6) Animal health and safety. (7) Plant life. (8) Temporary and permanent housing. (9) Temporary and permanent skilled and unskilled labor.	4.5.1.3
	d) The cumulative effects of the location of the facility in relation to existing and planned facilities and other industrial development.	4.5.2
69-06-08-01(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 a 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. The benefits to be considered include:	4.6
	a. Recycling of the conversion byproducts and effluents.	4.6.2
	b. Energy conservation through location, process, and design.	4.6.3
	c. Training and utilization of available labor in this state for the general and specialized skills required.	4.6.4
	d. Use of a primary energy source or raw material located within the state.	4.6.5
	e. Not relocating residents.	4.6.6
	f. The dedication of an area adjacent to the facility to land uses such as recreation, agriculture, or wildlife management.	4.6.7
	g. Economies of construction and operation.	4.6.8
	h. Secondary uses of appropriate associated facilities for recreation and the enhancement of wildlife.	4.6.9
	i. Use of citizen coordinating committess.	4.6.10
	j. A commitment of a portion of the energy produced for use in this state.	4.6.11
	k. Labor relations.	4.6.12
	l. The coordination of facilities.	4.6.13
	m. Monitoring of impacts.	4.6.14

INTRODUCTION

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a gas processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The nameplate processing capacity of the Plant will be 250 million standard cubic feet of gas per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

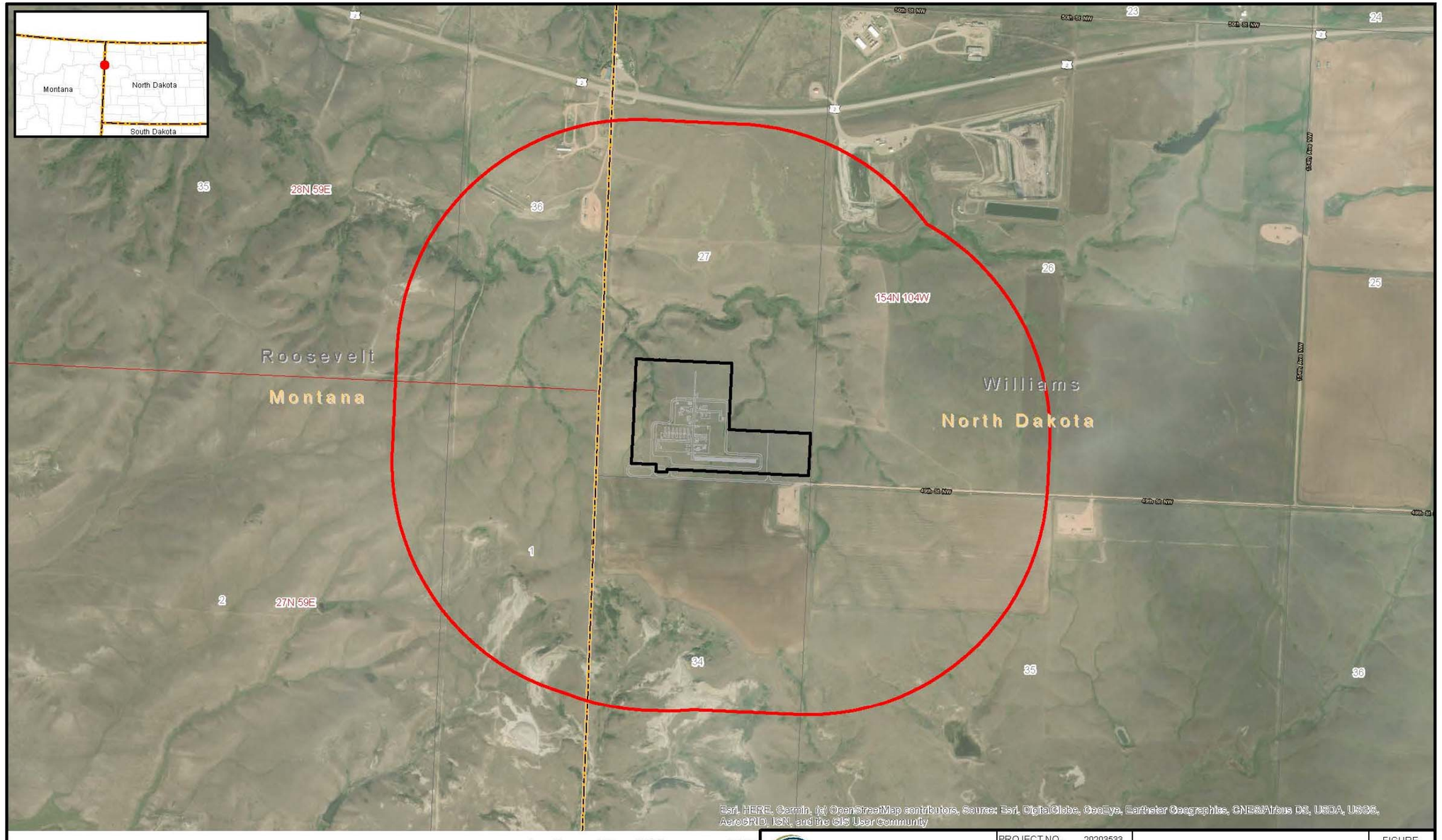
Upon completion of the project, OE2 will own and operate a gas gathering and processing system that will process raw wellhead gas produced from wells in Williams County and surrounding areas and deliver marketable natural gas and natural gas liquids (NGLs) to downstream markets. The Project will feed products into third-party interstate natural gas and NGL pipelines that service the Rocky Mountains, Midwest, and Gulf regions. The Project is both economically and environmentally beneficial for the state, as the Project will not only add valuable midstream services for exploration and production companies in the region, but also significantly reduce flaring and associated volatile organic compound (VOC) emissions in the state. At nameplate capacity, the Plant is expected to reduce state-wide VOC emissions by approximately 25,000 tons per year through such flaring reductions.

The Project will be located approximately 15 miles west of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota on a parcel owned by OE2 (henceforth referred to as the Project Site). The Project location is shown on **Figure 1, Project Overview Map**. The Project Study Area is a 0.5-mile buffer around the Project Site that encompasses Sections 26, 34, and 35, Township 154 North, Range 104 West in North Dakota (hereinafter referred to as the Study Area).

OE2 submits this application to the PSC and requests a Certificate of Site Compatibility for construction of the Project. This application provides the necessary information as required by N.D.C.C. Chapter 49-22.1, Energy Conversion and Transmission Facilities, and by the North Dakota Administrative Code (N.D.A.C.) Section 69-06-08-01, Energy Conversion Facility Siting Criteria.

The information presented in this application is organized into the following four main categories.

- Section 1: Facility Description
- Section 2: Studies
- Section 3: Need for Facility
- Section 4: Energy Conversion Facility Siting Criteria



LEGEND

- Facility Boundary
- Study Area
- Site Features
- County Boundary
- Township/Range
- Section

0 500 1,000 2,000
Feet

N

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OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	Fig1_Overview.mxd

Project Overview Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE
1

1.0 FACILITY DESCRIPTION

1.1 TYPE OF ENERGY CONVERSION FACILITY

The Plant will be utilized to convert unprocessed wellhead gas produced in the state to marketable natural gas and Y-grade NGLs. The Plant will include a slug catcher, a liquids stabilization system, a Recycle Split Vapor (RSV) cryogenic gas processing facility, and residue compression to boost the residue gas to interstate pipeline pressures. The Y-grade NGLs and residue gas from the facility will be sold into nearby transmission pipelines. OE2 has included the Site Plans and Equipment list for the Plant in **Appendix A**.

1.2 SIZE AND DESIGN

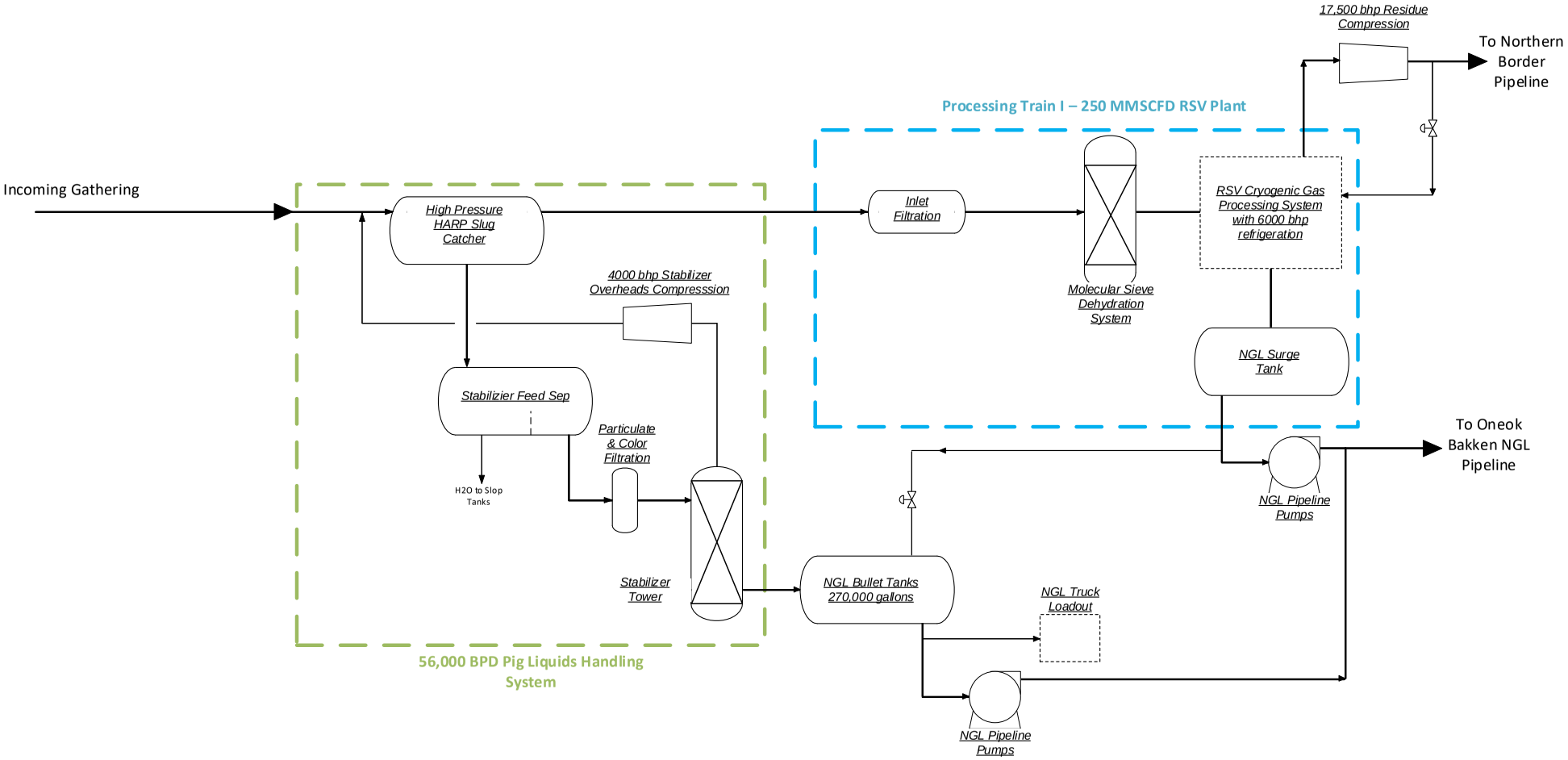
1.2.1 Gross Size Capacity

The Plant is composed of one process train with a nameplate capacity of 250 MMscfd. **Exhibit 1** on the following page provides the layout of the Plant.

1.2.2 Net Design Capacity

The net design capacity of the proposed Plant using the Sanderson influent stream is 250 MMscfd, less 5.3 MMscfd of utility fuel gas usage at the Plant.

Exhibit 1 – Bill Sanderson Gas Processing Plant



1.3 ESTIMATED THERMAL EFFICIENCY OF THE CONVERSION PROCESS AND THE ASSUMPTIONS ON WHICH THE ESTIMATE IS BASED

This item is not applicable to the proposed Project.

1.4 TIME AND SCHEDULE

1.4.1 Certificate of Site Compatibility

OE2 anticipates issuance of the Certificate of Site Compatibility by April 2020.

1.4.2 Land Acquisition

OE2 acquired the land in February 2020.

1.4.3 Construction Start Date

OE2 intends to begin the civil grading site work on the site by mid-April 2020.

1.4.4 Construction Completion Date

Construction of the Plant is anticipated to end by December 1, 2020.

1.4.5 Test Operations

Test operations at the new Plant is anticipated to take place December 1 through 5, 2020.

1.4.6 Commencing Commercial Production

OE2 anticipates commencing commercial production at the Plant by December 15, 2020.

1.4.7 Beginning Any Expansions or Additions

OE2 does not anticipate any expansion or additions to the Plant at this time.

1.5 COMMERCIAL PRODUCTION DATA FOR THE PLANT

The Plant is commercially justified through a long-term definitive gas gathering and processing agreement with XTO Energy, Inc. and its applicable affiliate(s) (XTO) to service XTO's production in Williams County, North Dakota. Through that arrangement, OE2 will provide midstream services to XTO that will allow XTO to capture its natural gas production from wells in the state instead of flaring such gas.

OE2 is also in negotiations with additional wellhead producers in the area, and intends to contract additional gas into the facility, thus bringing more North Dakota wellhead gas to market and further reducing flaring.

1.6 ESTIMATED COST OF CONSTRUCTION

The estimated cost of the Plant is $150 million.

2.0 STUDIES

2.1 STUDY AREA

The Study Area is defined as the 39-acre Site and the approximately 0.5-mile-wide buffer area around the perimeter of the Site, as illustrated on **Figure 1**. Additional maps showing the proposed Project Site and other resources are included in **Appendix B**. The environmental analysis was conducted for the entire Study Area.

2.2 SITE

The Project comprises 39 acres of a 143-acre parcel owned by OE2. OE2 contracted Grouse Mountain Environmental Consultants (GMEC) to conduct desktop analyses for wildlife, cultural, and Waters of the United States (WOTUS) natural resources potentially impacted by the construction of the Plant. GMEC also conducted an on-site field assessment on January 29, 2020 to supplement findings from the offsite wetland assessment. In concurrence with the on-site field visit, GMEC also completed an assessment of wildlife resources. The findings of the desktop analysis and field surveys are summarized in **Section 2.4**, and the complete report is included as **Appendix C**.

A Class I cultural resource inventory was conducted to identify any previously recorded cultural resources within the Study Area. The results of the Class I inventory are summarized in **Section 2.5**, and the summary of what was sent to the State Historic Preservation Office (SHPO) is included as **Appendix D**.

2.3 FEDERAL, STATE, AND LOCAL AGENCY CONSULTATIONS

OE2 has sent out notification of the proposed Project to agencies on February 17, 2020. OE2 has requested that they respond with any questions or concerns by March 17, 2020. The following agencies received a letter notifying them of the Project and providing them with the Project Overview Map.

- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- Federal Aviation Administration
- North Dakota Game and Fish Department
- North Dakota Department of Agriculture
- North Dakota Parks and Recreation Department
- North Dakota Geological Survey
- North Dakota Department of Career and Technical Education
- North Dakota Energy Development Impact Office
- North Dakota State Historic Preservation Office
- North Dakota Indian Affairs Commission
- North Dakota Industrial Commission
- North Dakota Labor Department
- North Dakota Pipeline Authority
- North Dakota Department of Trust Lands

- North Dakota Department of Health
- North Dakota Department of Commerce
- North Dakota Department of Human Services
- North Dakota Department of Transportation
- North Dakota State Water Commission
- Job Service North Dakota
- North Dakota Attorney General
- North Dakota Office of the Governor
- Williams County Planning and Zoning Board of Commissioners

Copies of the Agency Correspondence are included in **Appendix E** of Application document. No responses have been received at the time of the filing of this application with the PSC.

2.3 ENVIRONMENTAL ANALYSIS

Resource assessments, both field and desktop, were performed based on the Commission's siting requirements. The Study Area is a 0.5-mile wide area centered on the Project Site.

OE2 performed the following resource assessments for the Project:

- A Class I Cultural Resource Inventory,
- A wetland and waterbody desktop evaluation, consultation and assessment for threatened and endangered species, and
- An on-site field assessment to supplement findings from the offsite wetland assessment. In concurrence with the on-site field visit, GMEC also completed an assessment of wildlife resources.

2.4.1 Natural Resources Inventory

2.4.1.1 Waters and Wetlands

Prior to conducting field surveys, GMEC conducted an offsite wetland and hydrology assessment using spatial layers from applicable state and federal agencies. Hydrologic watershed data was acquired from the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD). Wetland data was obtained from the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI; USFWS 2012b). Spatial data for rivers, streams, and tributaries were acquired from the USGS National Hydrologic Dataset (NHD). Soils data was acquired from the Natural Resources Conservation Service (NRCS) Wet Soils Survey (WSS; SSSNRCS- USDA 2020). NHD in combination with the WBD and NWI were overlaid with the Plant boundary and additional survey area in ArcGIS to assess potential areas of jurisdictional concern. However, as these datasets are based on aerial or satellite imagery and infrequently updated, they may not accurately represent resources on the ground. GMEC used the North Dakota NRCS's *State Guidance for Wetland Determinations Including State Offsite Methods* (NRCS 2017) and *Minnesota's USACE Guidance for Offsite Hydrology/Wetland Determinations* (USACE 2016) to delineate wetlands within these areas of concern. Imagery used for offsite assessments was acquired from the National Agriculture Imagery Program (NAIP) and representative of 2009-2010, 2012, and 2014-2019. WSS data was overlaid on these images to assess hydric soils. In areas where hydric soils were present, sample areas were delineated based on changes to vegetation

greenness or inundation during years of normal climatic conditions. GMEC calculated the climatic conditions for the 3 months prior to the month the imagery was taken for each year according to the procedure outlined in the NRCS *Hydrology Tools for Wetland Determination* (NRCS 1997) and using the NRCS WETS monthly precipitation data. GMEC determined wetland status of sample units by comparing hydric soils, whether the area had previously been classified as a wetland, and the percentage of images across years that had indicators of wetland hydrology (i.e. greener color tones in vegetation).

To supplement the offsite determination, GMEC conducted a field assessment on January 29, 2020. Due to the time of year and snow cover present, wetland delineation in accordance with the Great Plains Regional Supplement to the Corp of Engineers Wetland Delineation Manual protocols to assess jurisdictional boundaries (USACE 2010) and assessment of OHWM/bed and bank features were not possible in the field. However, GMEC biologists were able to identify major vegetation along the drainages and overall topography to assist in offsite assessments.

During the initial desktop analysis, NWI-designated wetlands were identified within the northern half of the parcel boundary (Lot 3 and NESE, Section 27, T154N-R104W). These wetlands are classified as intermittent riverine wetlands and are associated with an intermittent tributary of Little Muddy Creek. The proposed Plant footprint does not overlap these mapped NWI wetlands. Additionally, one NWI wetland extends into the additional survey area to the south (NWNW Section 35, T154N-R104W). No NWI or NHD mapped data was present within the southern portion of the Plant parcel boundary; however, two distinct channels running south to north are visible on aerial imagery (see Figure B-4 in **Appendix B**). These channels will be referred to throughout as the western drainage and the eastern drainage (as labeled on Figure B-4 in **Appendix B**). Although these drainages are not identified within the NHD or NWI datasets, spatial data shows evidence of a high water table and potential water pooling.

Analysis of antecedent precipitation for each year of NAIP imagery showed 6 years of normal climatic conditions, 2 years that were wetter than normal, and 1 year that was drier than normal. According to WSS data, hydric soils were not present within the corresponding Map Unit for the western drainage within the southern portion of the parcel boundary. The ground assessment of the drainage in question indicated steep slopes were present along the extent of the reach and would likely not allow for significant water accumulation and associated wetland formation before draining directly into the intermittent drainage downstream. Additionally, the majority of vegetation present within the drainage was woody upland vegetation visible above the snow cover, a strong indication that no wetlands were associated with this drainage. As such, an offsite wetland was not conducted for the western most drainage of concern.

WSS data identified the Map Unit encompassing the eastern drainage as having potential for hydric soils. GMEC identified 16 sampling units using wetland indicators on aerial imagery during years of normal. During initial analysis, four units were determined not to be wetlands, as they showed indications of wet signatures in less than half of the images from “normal” years (Sampling Units 12 and 14-16; see table included in full report in **Appendix C**). Ground surveys indicated that the wet signatures in 11 units were an artefact of patches of western snowberry (*Symphoricarpos occidentalis*; an upland shrub) producing deep color tone differences in the imagery (Sampling Units 1-11; see table included in full report in **Appendix C**). Based on the

vegetation that was identified during the onsite field assessment, it is likely that western snowberry and other upland plants comprise the majority of the vegetative cover within this eastern drainage (see the report included in **Appendix C**), eliminating the potential for classification as wetland sites. However, at one of these sites (Sampling Unit 9), the snowberry was located on the edge of a potential depression with facultative vegetation (*Rosa spp., Deschampsia caespitosa*) present. One other site lacked western snowberry but still showed indicators of wet signatures in greater than 80 percent of the imagery from "normal" years (Sampling Unit 13). The same facultative plants were identified in this sampling unit, suggesting some level of water tolerance. Due to snow cover and frozen ground conditions, GMEC biologists were unable to dig soil pits to assess the presence of hydric soils at this site. Based on this analysis, 14 sampling units have been classified as not a wetland and two units (Sampling Units 9 and 13) have been classified as "unknown" features due to the presence of facultative vegetation. However, a complete inventory of vegetation and analysis of hydric soils and hydrology indicators during the growing season may verify that these areas are not wetlands.

2.4.1.2 Threatened and Endangered Species

GMEC used the USFWS's Information for Planning and Consultation (IPaC) to assess potential impacts to threatened and endangered (T&E) species within the Project Area. IPaC identifies any designated critical habitat within the area as well as any species potentially affected based on the location of their historical ranges and Areas of Influence (AOI). If a species is identified as potentially affected but no critical habitat is present, it does not necessarily imply suitable habitats associated with that species are present within the Project Area. The IPaC pulled for this Project lists six species as potentially affected by activities within the Project Area: Northern long-eared bat (*Myotis septentrionalis*), Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), and Pallid sturgeon (*Scaphirhynchus albus*).

The Northern long-eared bat is primarily associated with mature forests with large decaying or partially dead trees during the breeding season and caves or mines during winter hibernation. The Least Tern nests near water, using primarily riverine sandbars or salt flats from low tide during the breeding season in the interior U.S. The majority of Piping Plovers in the Great Plains use shorelines along small, alkaline lakes. Suitable habitat includes large beaches with highly clumped vegetation that provides low overall cover. Red Knots require elevated ridges and slopes near wetlands and lakes where food is abundant during the breeding season and winter in coastal areas, such as tidal flats, estuaries, or bays. Pallid sturgeon are large river obligates that require year-round water flows. Whooping Cranes nest in dense emergent vegetation around shallow ponds, wet prairies, or freshwater marshes. During spring and fall migration, the Aransas/Wood Buffalo population of Whooping Cranes use marshes, salt flats, lagoons, barrier islands, palustrine wetlands as well as stubble/grain fields and cropland adjacent to or near wetland features. During the wetland survey conducted January 29, 2020, GMEC biologists assessed potential suitable habitat for relevant T&E species within the Project Area.

No currently defined critical habitats are located within the Plant Project Area and no birds of conservation concern are expected. Further, no suitable habitats for Northern long-eared bat, Least Tern, Piping Plover, Red Knot, or Pallid sturgeon were identified within the Project Area.

The Project is currently located within the area in which 85 percent of migratory sightings of Whooping Crane are recorded for the Aransas/Wood Buffalo population; however, the Plant Project Area is located outside of the central flyway and in an area where no e-bird sightings of Whooping Cranes have been reported during migration. While the adjacent parcels of interest located within sections 34 and 35 T154N-R104W currently encompass cropland, no critical stopover habitats are designated nearby. Field surveys indicated that small wetlands may be present in the northern portion of the parcel boundary, within 1 kilometer (km) of the cropland. However, the use of the Plant Project Area by Whooping Cranes as a stopover during migration is unlikely. Therefore, it is assumed that the Project would have no effect on T&E species.

2.4.1.3 Soils

Four different soil types are present within the Project Site (USDA 2019). According to the NRCS, the soil composition of the site is as follows:

- Vida-Zahill loams (2 to 8 percent slopes) cover approximately 51 percent of the property
- Zahill loam (15 to 60 percent slopes) covers approximately 30 percent of the property
- Williams-Bowbells loams (3 to 6 percent slopes) cover approximately 17 percent of the property
- Zahill-Vida loams (4 to 15 percent slopes) cover the remaining property area

Each of the loams are characterized as a fine-loamy till, made up dominantly of nonhydric soils, and well-drained. Each of the soils are somewhat susceptible to water erosion and not susceptible to flooding or wind erosion.

Furthermore, the Williams-Bowbells loams soil is classified as a farmland of statewide importance. According to the United States Department of Agriculture (USDA), farmland of statewide importance is generally characterized as an area that nearly meets the criteria for prime farmland and that economically produce high yields of crops when treated and managed with acceptable farming methods (USDA 2002). Some areas may produce as high a yield as prime farmland if conditions are favorable. The criteria used in defining and delineating these areas are determined by appropriate state and federal agencies.

2.4.2 Cultural Resources Inventory

OE2 engaged GMEC to conduct a Class I file search at the State Historical Society of North Dakota (SHSND) on January 27, 2020 for Sections 27, 34, and 35 Township 154 North Range 104 West. Because this was a preliminary Class I, the proposed project is characterized as a Fee action.

The records search through the SHSND revealed there are no previously recorded sites or isolated resources within the Project Area. Further, there have been no previous inventories conducted within the Project Area boundaries. However, five previous inventories have occurred within a 1-mile indirect Area of Potential Effect (APE) where eight sites and one isolated resource were identified. There are no cultural heritage sites listed on the National Register of Historic Places (NRHP) and no historic Districts within the Study Area or the 1-mile indirect APE.

A review of the Federal Land Patent Records for Sections 27 and 34 indicate seven patents were issued between 1910 and 1926 (US DOI BLM 2019). The patents during this time are generally

ranching and grazing allotments. All seven patents were issued under either the 1880 Indian Trust Patent or the 1865 Indian Fee Patent. This suggests the area has been under private ownership through the 19th and 20th centuries with low to moderate settlement in the general area. A preliminary online search of the patent holder names revealed none of the names listed on the Federal Land Patent records are connected to or associated with events that have made a significant contribution to the broad patterns of history or are associated with the lives of persons significant in the past (Criterion A or B of the NRHP).

The Project Area is within the Missouri River Drainage system and the Garrison Study Unit (GSU). This study unit has produced diagnostic artifacts dating to Clovis times roughly 13,000 bp. The natural setting of rivers, tributary stream valleys, and upland grasslands offered reliable big game and vegetative resources for hunting and gathering peoples. As of 2015, there is one site recorded for every 1.9 square miles in the GSU, ranking second in site density in North Dakota. Typical sites identified in the GSU include stone circles, cairns, and rock features which account for over half of the archaeological sites recorded.

Information that was sent to the SHPO summarizing the Class I records review is included as **Appendix D**. Additionally, and Unanticipated Discovery Plan that OE2 will follow when constructing the Project is included as **Appendix F**.

3.0 NEED FOR FACILITY

3.1 ANALYSIS OF NEED BASED ON PRESENT AND PROJECTED DEMAND, INCLUDING SYSTEM STUDIES

Based on historical production data from the North Dakota Oil and Gas Division, state-wide flaring has increased over 8 times from November of 2009 to November of 2019, as the pace of horizontal drilling and production has out-paced the ability of midstream companies such as OE2 to effectively bring wellhead gas to market. This Project will drastically improve the ability of OE2's upstream customers to economically continue oil and gas production in the Williams County and surrounding areas of the state, while maximizing stewardship of the environment and the state's mineral reserves through reduced wellhead flaring.

3.2 DESCRIPTION OF FEASIBLE ALTERNATIVE METHODS OF SERVING THE NEED

Gas processing through cryogenic processes is a well-known and common method of segregating the rich wellhead natural gas of North Dakota into marketable products. Oil and gas exploration and production has outpaced midstream development in gathering and processing, which has resulted in wellhead flaring across the state. More gathering and processing systems such as the proposed project are required to serve the need of producers across the state.

Siting gathering and processing systems requires striking a balance between different and sometimes conflicting criteria. The content throughout this application aims to address the merits and detriments of the OE2 Project Site with analysis and data supporting why it is the best suited location for this facility. OE2 evaluated multiple sites within North Dakota and Montana before deciding to move forward on this Site. The primary geographic location evaluation criteria centered around proximity to the following (this is not intended to be an exhaustive list, nor is it in a specific order):

- Customers' production
- Product market outlets
- Pipeline takeaway capacity
- Federal, state and local regulatory requirements
- Environmental considerations (ie: topography, soils, hydrology, wildlife, cultural)
- Sparsely populated area with willing stakeholders and appropriate setbacks
- Utility access
- Road access
- Cost feasibility

Ultimately the need to be near customers' production in Williams County and to access specific pipeline outlets for product takeaway drove the decision to locate within Williams County, North Dakota or Roosevelt County, Montana. If locating in Williams County, ND, the county land use regulations require a rezone to Heavy Industrial and a Conditional Use Permit, both of which have strict criteria and a lengthy process to obtain approval. Both of those processes, along with multiple other county and local approvals, are currently underway for this Site. This Site is in the only area in North Dakota which maintains proximity to OE2 customers and outlets yet would be eligible for a rezone and conditional use permit based on Williams County criteria. Other sites

evaluated that could meet the county land use criteria are too close to residences and too far from the customers or product outlets. The land OE2 purchased for this Site not only fits the commercial need and county land use criteria but is also in a remote area with property owners in support of the Project. The Site provides the opportunity to utilize existing ridgelines and other topography to limit impacts to surrounding farms' viewshed and mitigate any concerns regarding noise or lighting. The Project use is consistent with other industrial uses surrounding the Site including a landfill, electric transmission, transmission pipeline corridors, communications towers, and oil and gas production facilities. OE2 has ensured good road and utility access through coordination with surrounding landowners, tenant farmers, township boards, county officials, and local utilities.

4.0 ENERGY CONVERSION FACILITY SITING CRITERIA

The information presented in this section demonstrates conformance with the PSC's siting criteria for Energy Conversion Facilities, as promulgated in N.D.A.C. § 69-06-08-01.

4.1 STUDY AREA

OE2's Study Area includes a 0.5-mile buffer surrounding the approximately 39-acre Plant Site, as shown on the Figures included in **Appendix B**. OE2 initiated agency correspondence, geographic information system (GIS) mapping, internet-based research, and a desktop analysis when conducting the resource inventory of the Study Area. These efforts were augmented by a natural resources survey of the Site. See Section 2 for additional information regarding the environmental analysis performed for the Project Site.

4.2 INDENTIFY AND MAP CRITERIA

OE2 has conducted a thorough inventory of the Study Area and evaluated the resources that occur within the Site and Study Area 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 Site or Study Area.

4.3 EXCLUSION AREA INVENTORY AND ANALYSIS

Exclusion areas are geographic areas that should be excluded from consideration when siting an Energy Conversion Facility, as specified in N.D.A.C. § 69-06-08-01(1). Table 1 and the following sections identify and discuss exclusion areas within the Study Area or Site.

Table 1 – Exclusion Areas

Exclusion Area	Within Project Site	Within Study Area
Federal		
National or Memorial Parks	No	No
Historic Sites, Districts, or Landmarks	No	No
National Landmarks or Monuments	No	No
Wilderness Areas or Wildlife Areas	No	No
Wild, Scenic, or Recreational Rivers	No	No
Wildlife Refuges or Grasslands	No	No
State		
Parks, Forests, or Forest Management Lands	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	No	No
Management Areas	No	No
Nature Preserves	No	No
County		
Parks	No	No
Recreation Areas	No	No
Municipal Parks	No	No

Exclusion Area	Within Project Site	Within Study Area
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
Areas within 1,200 feet of ICBM Facilities or 30' of ICBM Lines	No	No

4.3.1 Federal Exclusion Areas

Based on a review of publicly available information, OE2 has concluded that no national parks, memorial parks, historic sites and landmarks, monuments, or wilderness areas are within the Site or Study Area. OE2 provided Project notification to the appropriate federal agencies to offer the opportunity to review and confirm this conclusion, as discussed in Section 2.3.

4.3.2 State Exclusion Areas

Based on a review of field surveys, publicly available information, and agency correspondence, OE2 has concluded that no state parks, historic sites, monuments, historical markers, archaeological sites, or nature preserves are within the Site or the Study Area.

4.3.3 County Exclusion Areas

Based on a review of publicly available information, OE2 has concluded that no Williams County parks, recreation areas, municipal parks, or parks owned by other governmental bodies are within the Site or Study Area. OE2 provided Project notification to various agencies to offer the opportunity to review and confirm this conclusion, as discussed in Section 2.3.

4.3.4 Prime Farmland

OE2 conducted a review of published data to assess both the Site and Study Area for the presence of Prime Farmland. OE2 confirmed that no Prime Farmland is present on the Site.

This analysis also evaluated Farmland of Statewide Importance. Generally, Farmland of Statewide Importance includes areas considered nearly Prime Farmland and has the potential to produce economically high yields of crops when treated and managed according to acceptable farming methods. This analysis concluded that approximately 17 percent (6.63 acres) of the Site is comprised of Farmland of Statewide Importance, however most of the soil classes on the site have severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing. Current use of the Site is as seasonal cattle grazing pasture. Grazing on the surrounding acreage will be able to continue while OE2 site is under construction as well as after it is operational.

North Dakota has an estimated 9,761,025 acres of Prime Farmland and an estimated 10,063,663 acres of Farmland of Statewide Importance. As such, the acreages within the Project Site represent approximately 0.0 percent and 0.000074 percent of the total Farmland of Statewide Importance in North Dakota. Thus, the proposed development of the Site will have a negligible

impact on Prime Farmland or Farmland of Statewide Importance when assessed on a state-wide basis.

4.3.5 Irrigated Farmland

OE2's investigation found no evidence of irrigation within the Site or Study Area. 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 and surrounding areas are not suitable for irrigation. The Study Area is comprised of non-irrigated cultivated lands and grazing pasture. Current use of the Site is as seasonal cattle grazing pasture. The Site soils' Irrigated Capability Class range from 3-7 indicating severe limitations that reduce the choice of plants or that may be unsuitable for cultivation and restrict their use mainly to grazing.

4.3.6 Protected Species Resources

Based on field surveys of the Site by qualified biologists and review of published information, no areas critical to the life stages of threatened or endangered animal or plant species are within the Site or Study Area. In addition to field studies, OE2 has provided Project notification to federal and state agencies to offer the opportunity to review and confirm this conclusion. See Section 2.3 for a comprehensive discussion of OE2's efforts.

4.3.7 Critical Habitat for Protected Species

OE2 has confirmed the absence of critical habitat within the Site or Study Area. See Section 2.3 for a comprehensive discussion of OE2's efforts.

4.3.8 Areas in Proximity to ICBM Facilities

OE2 has confirmed that there are no Intercontinental Ballistic Missiles (ICBM) facilities located within 1,200 feet of the Site.

4.4 AVOIDANCE AREAS INVENTORY AND ANALYSIS

Avoidance areas are geographic areas that may not be approved as a site for an energy conversion facility unless the applicant shows that under the circumstances there is no reasonable alternative, as specified in N.D.A.C. § 69-06-08-01(3). Table 2 and the following sections identify and discuss avoidance areas within the Study Area or Site and no direct lines between ICBM launch or launch control facilities exist within the Site.

Table 2 – Avoidance Areas

Avoidance Area	Within Project Site	Within Study Area
Other Historical Resources Not Meeting Exclusion Area Criteria	No	No
Areas within City Limits or Military Installation Boundaries	No	No
Areas within Known 100-year Floodplain	No	No
Areas of Known Geologic Instability	No	No
Woodlands or Wetlands	No	Yes
Areas of Recreational Significance Not Categorized as Exclusion Aras	No	No

4.4.1 Other Historical Resources Not Meeting Exclusion Area Criteria

OE2 commissioned a Class I study of the Site and Study Area and has determined that the Site contains no registered sites and has not been previously field surveyed for cultural resources.

4.4.2 Areas Within City Limits or Military Installation Boundaries

OE2 has confirmed, based on publicly available information, that the Site and Study Area are not located within city limits or within the boundaries of military installations.

4.4.3 Areas Within Known 100-Year Floodplains

Flood hazards are benchmarked with Federal Emergency Management Administration's (FEMA) 100-year floodplain analysis. There is no FEMA floodplain mapping for Williams County, therefore OE2 has determined that the Site and Study Area are not located within the 100-year or 500-year floodplain.

4.4.4 Areas of Known Geologic Instability

No known areas of geologic instability are within the Site or Study Area. North Dakota has not experienced an earthquake of sufficient magnitude to damage welded steel piping or structural steel in recorded history. Sinkholes are known to occur in North Dakota but are more closely related to mining activities and no evidence of mining or sinkholes was identified. A desktop analysis indicated that no landslide deposits are located in the Site or Study Area (Carlson 1985). See Figure B-5, **Appendix B** for the Surficial Geology of the Project Area.

4.4.5 Woodlands and Wetlands

Natural resource studies of the Study Area and Site used GIS analytical capabilities. Field studies of the Site were also used to enhance assessment of the physical characteristics of the Site. A field survey of the entire Site was completed on January 29, 2020, to assess the presence or absence of these features within the boundaries of the Site. Site conditions were not suitable for surveys as there was 100 percent snow coverage present. The Site was evaluated for the presence of trees, saplings, or shrubs. No woody vegetation was identified on the Site, and woody vegetation in the surrounding Study Area is sparse and limited to woody draws and ravines associated with drainage ways.

There is an NHD mapped intermittent stream within the Study Area to the north of the proposed Site in Section 27 that also contain mapped NWI wetlands. The proposed Project Site does not overlap these mapped features. Additionally, there are two drainages (the western drainage and the eastern drainage) that were identified within the Site and Study Area that are not mapped by NHD or NWI that were evaluated in the offsite and onsite field survey.

4.4.6 Areas of Recreational Significance Not Categorized as Exclusion Areas

No areas of recreational significance not categorized as exclusion areas occur within the Site or Study Area.

4.5 FACTORS TO BE CONSIDERED IN EVALUATING APPLICATIONS AND DESIGNATIONS OF SITES, CORRIDORS, AND ROUTES (N.D.C.C § 49.22.1-09)

4.5.1 Selection Criteria (N.D.A.C. § 69-06-08-01(5))

The selection criteria require a study of environmental impacts and changes in land use that may result from the siting of the proposed facility. A site may be approved in an area only when it is demonstrated to the Commission by the applicant that any significant adverse effects resulting from the location, construction, and operation of the facility in that area as they relate to the following, will be at an acceptable minimum, or that those effects will be managed and maintained at an acceptable minimum. OE2 has successfully avoided or minimized these effects to the maximum extent practicable, which in all cases is at or below an acceptable minimum. The results of this effort are presented below.

4.5.1.1 Agricultural Impact Assessment

Agricultural Production: Land for the Plant will be temporarily removed from agricultural production until the Plant is no longer needed, is decommissioned, and the land is reclaimed. No other impact to agricultural lands is anticipated. Current use of the Site is as seasonal cattle grazing pasture. Grazing on the surrounding acreage will be able to continue while OE2 site is under construction as well as after it is operational. OE2 has coordinated with the family that farms and grazes the areas surrounding the Site to ensure all agricultural activities are able to continue without interruption.

Family Farms and Ranches: The property was acquired through a fee purchase that will allow the previous owner to allocate additional capital and time to more productive agricultural lands than the Site. The Site will be converted from agricultural/rangeland to industrial use. No other impacts to family farms or ranches are anticipated, and OE2 is in communication with surrounding landowners and farming/ranching lessees to ensure that.

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 and surrounding areas are not suitable for irrigation. No above-ground irrigation systems have been identified on the Site or in the Study Area.

Surface Drainage: The Site is within the Lower Little Muddy Creek (HUC-12 [100600050704]) subwatershed of the Missouri-Poplar basin. Aerial images show two distinct channels running south to north (labeled as the western drainage and the eastern drainage on project mapping) located within the Study Area and Site. These drainages are not NHD mapped but have been evaluated and incorporated into a grading and drainage layout designed to avoid negative impacts on drainage patterns.

Ground Water Flow: The Site is located within the Northwest Rural Water District and Western Area Water Supply. Water demands during and after construction are anticipated to be minimal and purchased commercially.

Agricultural Quality of the Cropland: A portion of the land acquired for the Plant will be temporarily removed from current use as seasonal grazing pasture. No other impact to agricultural

lands is anticipated. The National Commodity Crop Productivity Index ratings for the Site indicate the combination of soil, site, and climate are unfavorable for crop production at this location.

4.5.1.2 Impact on the Availability and Adequacy of 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 8-month period. During this period, there will be an influx of employees ranging from laborers, skilled tradespeople, technicians, and engineering and environmental professionals. The work force will typically engage 80 individuals, with periods of peak activity where the work force will increase to levels of up to 260 individuals for a period of up to 2 months.

Area resources may experience increased demand on services with the addition of construction workers temporarily residing in the area. Provided timely receipt of authorizations to construct, the peak demands will occur in 2020. The most noticeable impact may be due to an increase in vehicle traffic associated with the Plant construction activities. OE2 is currently working with surrounding landowners, tenant farmers, the County, and the Township to ensure that a temporary traffic increase does not result in negative impacts to the road infrastructure or the surrounding farms. Prior to construction, OE2 will coordinate with local health care providers and emergency responders to discuss emergency response coordination. Additionally, OE2 has included a copy of their Emergency Action Plan (EAP) for the Plant as **Appendix G** to this Application document.

4.5.1.3 Potential Impacts

Local Institutions: Due to its proximity to the Site, Williston, North Dakota, may see the greatest impact from the Project. These impacts from facility construction will be temporary, as construction will occur over a period of approximately 8 months. To operate the Plant, OE2 will hire 12 new full-time employees. Plant operations will engage local businesses and contractors to support the facility. 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 on the institutions.

Noise-Sensitive and Light-Sensitive Land Uses: No noise-sensitive or light-sensitive resources, including residences, schools, hospitals, or care facilities are located within 500 feet of the Site. The Project has been sited approximately 15 miles west of Williston in a rural setting adjacent to existing industrial and oil & gas uses, 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 will occur largely during normal business hours.

Rural Residences and Businesses: The Project is located approximately 15 miles from Williston. The nearest rural residence is approximately 1.2 miles northeast of the Site and the nearest business (a landfill) is 8 miles Northeast of the Site. OE2 plans to utilize existing

topography and grading design to minimize the visibility of the site from the nearest residences. Residents may experience additional traffic and an increase in commerce in response to the influx of temporary workers purchasing goods and services. OE2 is currently working with surrounding landowners, tenant farmers, the County, and the Township to ensure that a temporary traffic increase does not result in negative impacts to the road infrastructure or the surrounding farms. The nearby oil & gas wells and the Landfill, which specializes in oil field waste disposal, could directly benefit from the Plant location. The Plant will likely benefit the local economy for both the near and long term.

Aquifers: The sedimentary rocks that contain aquifers which underlay Williams County are divided into the rocks of pre-Cretaceous age, Dakota Group of Cretaceous Age, Fox Hills and Hell Creek Group of Cretaceous Age, Fort Union Group of Tertiary age, and the glacial drift of Quarternary age. The glacial drift of Quarternary age contain the only aquifers that are presently of economic importance and are suitable for domestic, livestock, municipal, industrial, and irrigation uses. These glacial drift aquifers with available groundwater consist of the Little Muddy, Ray, Grenora, Wildrose, West Wildrose, Trenton, and Hoffland aquifers which range from 0 – 225 feet below land surface. The proposed Project is not located within any of these groundwater resource areas. The nearest surficial aquifer is the Trenton Aquifer located approximately 9 miles to the south/southwest of the Site (North Dakota State Water Commission MapService 2020).

Human Health and Safety: OE2 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 employees and contractors. OE2 governs operations and construction activities with safe work procedures designed to protect property, persons, and the environment while maintaining regulatory compliance. Safety inspectors will be onsite throughout active construction and an OE2 employee will oversee safety upon operation of the Project.

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 be impacted due to construction or operation of the Plant.

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

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 2000s and as a result has steadily increased lodging resources in response. The temporary workforce often mobilizes with trailers and fifth wheels in addition to some requiring rental properties and hotel/motel lodging. OE2 already has existing relationships and availability with Williston hotels and camps. All employees and contractors are well aware of the situation and willing to accept non-traditional lodging opportunities if necessary.

Temporary and Permanent Skilled and Unskilled Labor: Construction of the Plant will require an average work force of approximately 80 with a maximum expected of 260 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 12 full-time employees. These personnel will be responsible for day-to-day operations and maintenance of the Plant.

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

The site is located adjacent to an existing industrial zoned use along Highway 2 currently being utilized as a landfill which specializes in oil field waste processing and disposal. Several oil & gas production facilities exist within the Study Area in all directions. OE2 is not involved in any of those adjacent uses and is unaware of any planned expansions but is coordinating with the owners of those facilities to ensure their road access or future plans are not impeded by Plant construction. OE2 will have two pipelines under 5 miles in length associated with this Plant which will file separate applications to the PSC as applicable. Both of those pipelines utilize existing corridors and will parallel existing infrastructure. OE2 is also coordinating with Lower Yellowstone Rural Electric Cooperative for the build-out of utility electric power for the facility, including a substation located on the Site and 2 miles of associated powerline that will utilize existing corridors and parallel existing infrastructure as well.

4.6 POLICY CRITERIA

4.6.1 Policies and Commitments to Limit Environmental Impact

OE2 recognizes its responsibility to environmental stewardship and strives for excellence in environmental performance. OE2 is committed to strict compliance with all governmental regulations, applicable industry standards and corporate policies related to the environment. OE2's commitment to environmental stewardship includes:

- Training on environmental regulation, control, and best management practices for employees.
- Implementation of robust mechanical integrity measures to ensure equipment is well maintained.
- Emissions tracking measures to verify compliance.
- Unique engineering solutions to minimize or eliminate emissions from operating equipment.
- Regular leak detection surveys.
- Review of contractor practices ensuring compliance with OE2 standards.
- Relationships with response contractors in order to respond quickly to any release from an OE2 system.

OE2 determines, evaluates and mitigates the environmental impacts of its business during project planning, implementation, operation and decommissioning. OE2 is dedicated to preserving the environment in which it operates and maintaining its reputation as a good neighbor and a valued asset to the communities in which it conducts business and in which its employees live and work.

4.6.2 Recycling of the Conversion Byproducts and Effluents

Byproducts from the conversion process include heat, air emissions, and wastewater. Heat, where possible, will be used through heat integration through the facility to minimize the use of utility fuel gas, and has been thoroughly considered in the process design for the facility. OE2 routinely employs hot-cold process exchangers in the stabilization and cryogenic portions of the plant to minimize utility use.

Air emissions will be mitigated as such to comply with all applicable state and federal air permitting requirements. An air permit application has been filed with the North Dakota Department of Environmental Quality (NDDEQ) for a true-minor source permit. Emissions will be tracked on a weekly or monthly basis as required to ensure permit compliance.

Wastewater from the facility will be stored in lined steel-tanks, prior to transfer to nearby saltwater disposal (SWD) injection facilities. OE2 expects to produce no more than 50 barrels (BBL) of wastewater per day.

4.6.3 Energy Conservation Through Location, Process, and Design

The process utilizes well-known thermodynamic properties of the wellhead gas to cool and process raw, untreated gas into sellable products. The RSV process will be self-contained within the Plant location. All products will be sold from that location.

4.6.4 Training and Utilization of Available Labor in this State for the General and Specialized Skills Required

OE2 intends to hire 12 full-time employees for operation of the Plant. OE2 intends to use a mix of employees with previous operational experience and those with no previous midstream experience. If no experience is obtained, OE2 intends to hire students from Bismarck State College with a 2-year petroleum technologies degree, or a similar level of education.

All operators will be trained through a blend of external and internal training programs in order to meet Occupational Safety and Health Administration (OSHA) Process Safety Management programs and internal requirements. Operators will work under the direction of a local Plant Manager and Plant Foreman.

4.6.5 Use of a Primary Energy Source or Raw Material Located within the State

The primary objective of the Plant will be to convert un-marketable raw wellhead gas into marketable products, for export out of the facility and for use in other residential and commercial areas. The Plant will burn some utility fuel gas, as processed by the Plant, for the purposes of compression of the gas up to transmission pressures.

4.6.6 Non-Relocation of Residents

No residences shall be displaced or require relocation due to the Project. The nearest residence is 1.2 miles away. Residence locations and their viewsheds were considered prior to selecting the site and OE2 consulted with nearby landowners in advance of its decision to purchase the property for the Site.

4.6.7 The Dedication of an Area Adjacent to the Facility to Land Uses Such as Recreation, Agriculture, or Wildlife Management

Of the 143 acres OE2 owns, 39 acres for the Plant will be temporarily removed from agricultural production until the plant is no longer needed, is decommissioned, and the land is reclaimed. The remaining 104 acres of the land adjacent to the Plant will be utilized as cattle grazing pasture. Grazing on the surrounding acreage will be able to continue while OE2 site is under construction as well as while it is operational. OE2 has coordinated with the family that farms and grazes the areas surrounding the Site to ensure all agricultural activities are able to continue without interruption.

4.6.8 Economies of Construction and Operation

OE2's Plant will allow XTO and other customers to get their gaseous wellhead products to market. The Plant will also help reduce flaring in the state.

4.6.9 Secondary Uses of Appropriate Facilities for Recreation and the Enhancement of Wildlife

There are no appropriate associated facilities suitable for recreation or enhancement of wildlife.

4.6.10 Use of Citizen Coordinating Committees

Outrigger has engaged potential stakeholders individually as well as through organized channels including but not limited to the Round Prairie Township board, the City of Williston, the Williams County Planning and Zoning Committee, the Williams County Water Board, and the Williams County Commissioners. Additional outreach by OE2 to solicit feedback and support local coordination is planned for the duration of the Project.

4.6.11 A Commitment of a Portion of the Energy Produced for Use in this State

A portion of the product gas will be utilized for compression and heating at the plant. The balance of the products will be sold to transmission pipelines, with interconnectivity to local natural gas distribution lines, refineries, and fractionation facilities. Local demand for propane, natural gasoline, and natural gas are all expected to be supplied through the Plant. Excess products not demanded locally will be exported from the state by third-party interstate transmission pipelines.

4.6.12 Labor Relations

OE2 does not anticipate encountering any adverse labor relations on this Project. The labor market in the Study Area is supportive of the oil and gas industry.

4.6.13 Coordination of Facilities

OE2 is coordinating with the owners of surrounding facilities to ensure their road access or future plans are not impeded by Plant construction. OE2 will have two pipelines associated with this Plant which will utilize existing corridors and will parallel existing infrastructure. OE2 is also coordinating with Lower Yellowstone Rural Electric Cooperative for the build-out of utility electric power for the facility, including a substation located on the OE2 Site, and 2 miles of associated powerline that will utilize existing corridors and parallel existing infrastructure as well. OE2 works closely with the pipeline operators it delivers products into and the customers it processes gas for

to ensure all parties are aligned and coordinating for the responsible development of those resources.

4.6.14 Monitoring of Impacts

OE2 will retain inspection oversight either directly or through a third party to ensure compliance with all applicable rules, regulations, and permit/certificate conditions. Inspection services will be retained throughout the Project construction and ultimately transition to operation staff, inclusive of environmental responsibilities.

4.6.15 Problems Raised by Federal Agencies, Other State Agencies, and Local Entities

OE2 has solicited engagement with all applicable stakeholders including federal, state, and local authorities who have various forms of oversight authority. To date, no responses have been received from the 23 agencies contacted; OE2 does not anticipate any significant impacts associated with the proposed Project (see **Section 2.3** and **Appendix E**).

OE2 will remain responsive to agency input throughout construction, restoration, and operation of the Project.

5.0 MITIGATION MEASURES

OE2's commitment to minimize environmental impacts is a key mitigation element. As described previously, OE2'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.

OE2 in design has sought to minimize health and safety impacts for the public as well, hence the rural setting and proposed summer and fall construction months. OE2 will strive to minimize construction duration and associated impacts to surrounding areas. OE2 also routinely engages with local stakeholders and surrounding property owners to ensure OE2 maintains its status as a good neighbor in the community, while also meeting or exceeding all local, state, and federal environmental, health and safety requirements.

6.0 LIST OF PREPARERS

Andrew Perdue, OE2 – Director of Operations and Engineering

Mr. Perdue has 10 years' experience in all aspects of oil and gas midstream development, including facility siting, environmental permitting, engineering, construction, commissioning, and operations. This experience includes the front-end development, construction, and safe commissioning and operation of (4) gas processing facilities while employed at OE2. Mr. Perdue is a trained OSHA PSM facilitator and has served as the lead engineer and project manager for hundreds of miles of pipeline projects, has installed over 20,000 horsepower (hp) of compression, and has managed the construction and operation of over 150 MMscfd of processing capacity.

Education

M.S. Chemical Engineering, Colorado School of Mines, 2011

B.S. Chemical Engineering, Colorado School of Mines, 2010

Nanette Elzinga, PE, Kleinfelder – Project Manager III

Ms. Elzinga has more than 31 years of experience in environmental permitting and review of pipeline and transmission projects, National Environmental Policy Act (NEPA) documentation, environmental construction services, and remediation. Ms. Elzinga's pipeline experience includes compiling Federal Energy Regulatory Commission (FERC) Resource Reports, preparing Environmental Assessments (EA) and Environmental Impact Statements (EIS), preparing Spill Prevention, Control, and Countermeasure (SPCC) Plans, Facility Response Plans, and Emergency Response plans, as well as environmental compliance activities.

Education

B.S. Mechanical Engineering, Bucknell University, 1988

Registration

Registered Professional Engineer: CO, WY, UT, AZ, NM, TX, MN

Annie Daniel, Kleinfelder – Project Professional

Ms. Daniel has 12 years' experience in environmental studies and environmental project permitting and coordination. This experience includes FERC pipeline and facility permitting, NEPA coordination and support, and environmental planning and permitting for energy projects. She specializes in federal, state, and local permitting for projects as well as coordination and communication with agencies on behalf of clients.

Education

M.S. Environmental Policy and Management, University of Denver, 2013

B.A. English, Colorado State University, 2008

Katie Taylor, GMEC – Lead Wildlife Biologist

Ms. Taylor has 9 years of experience working in the wildlife field. Her direct work experience includes applied field work and research for universities, private industry, and federal and state agencies. Ms. Taylor has worked on research projects involving raptors, grouse species, songbirds, wolves, and various species of ungulates throughout the continental U.S. More specifically, she has 5 years of experience conducting surveys in accordance with BLM wildlife survey protocols for nesting raptors, sage-grouse and sharp-tailed grouse leks, mountain plover, and other sensitive species in Wyoming. In addition, Ms. Taylor has experience in wildlife data management and GIS support for the Bureau of Land Management – Buffalo Field Office. Ms. Taylor has also completed wetland delineation training and has experience with wetland determinations and working with the USACE for hydrology determinations.

Education

M.S. Rangeland Ecology, University of Wyoming, 2014

B.S. Biology, Seattle Pacific University, 2009

Kirstie Lawson, GMEC – Wildlife Biologist

Ms. Lawson has over 6 years of experience working in the wildlife field. With a focus on grouse research, Ms. Lawson's background also includes conducting research and surveys for mesocarnivores, songbirds, and raptors in the U.S. and Canada. Her previous work has required interacting with various stakeholders, including private landowners, government agencies, and industry.

Education

M.S. Biology, University of British Columbia Okanagan, 2018

B.S. Wildlife Biology, University of Montana, 2012

Gregory Shedd, GMEC – Biologist

Mr. Shedd has over 15 years of combined experience in the wildlife field. His primary experience is private consulting in Wyoming and surrounding states performing surveys, monitoring and applied research for various stakeholders including private landowners, government agencies, and industry. Mr. Shedd has completed wetland delineation training and has conducted wetland determinations for over 10 years.

Education

B.S. Wildlife Biology, Unity College, 2002

7.0 RESOURCES CITED

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United States Government. 1988. Endangered Species Act of 1973, as amended through the 100th Congress. U.S. Department of the Interior.

United States Government. 2017. Solicitor's Opinion M-37041. Incidental Take Prohibited Under the Migratory Bird Treaty Act. U.S. Department of Interior.

APPENDIX A
SITE PLOT PLAN AND EQUIPMENT LISTS

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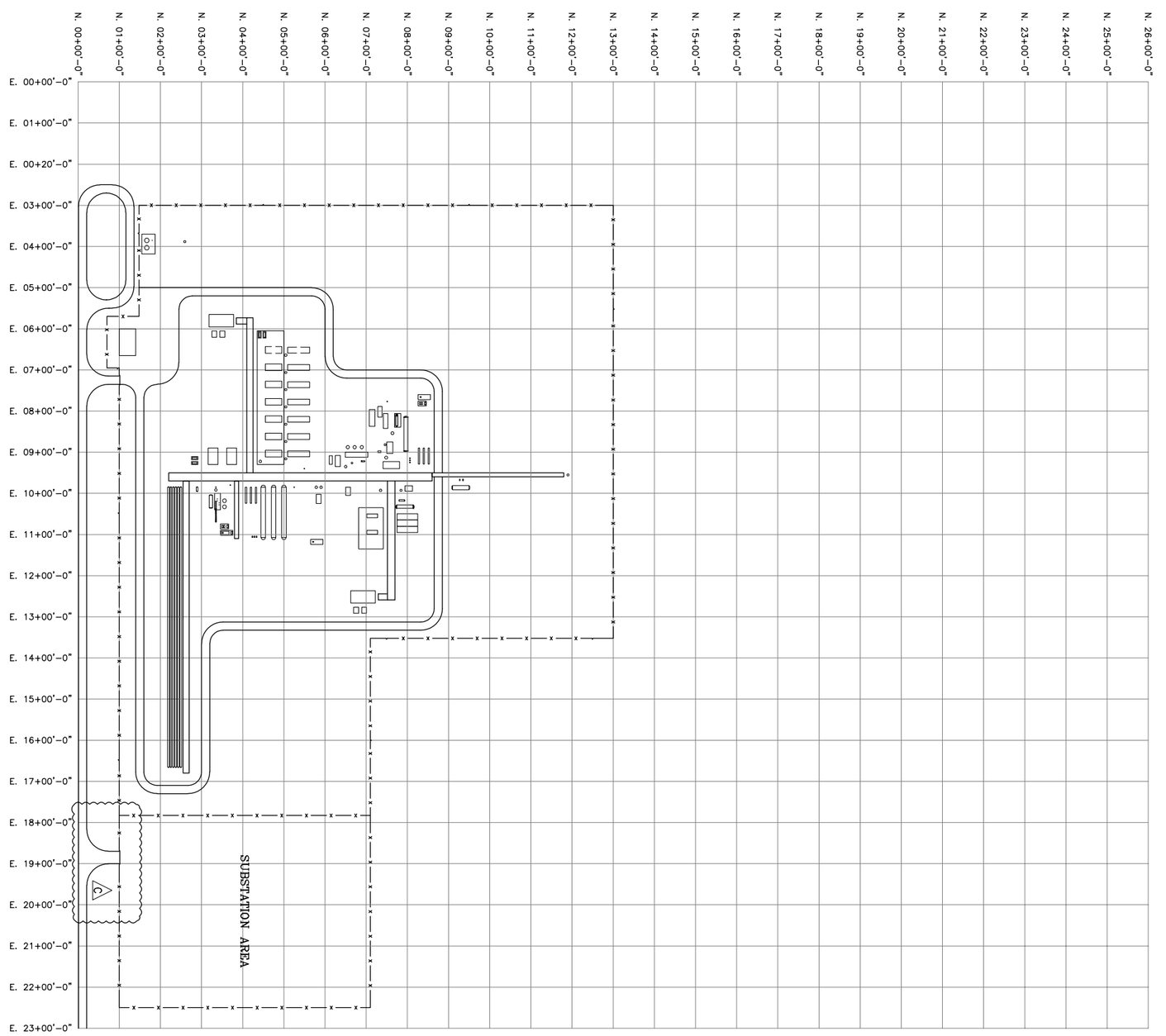

BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

OVERALL SITE PLAN

REV. C
DWG. No. D-19063-04-10-001

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-6095

	NAME	DATE
DESIGN	JEH	12/19
DRAWN	JEH	1/20
CHK.		
Q. A.		
CAD FILE	D-19063-04-10-001	
PLOT DATE		
SCALE	1"=150'-0"	

	NAME	DATE
C/S		
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

REF. DWG. NUMBER	REFERENCE DWG TITLE

NO	DATE	REVISIONS	D/C	APP.
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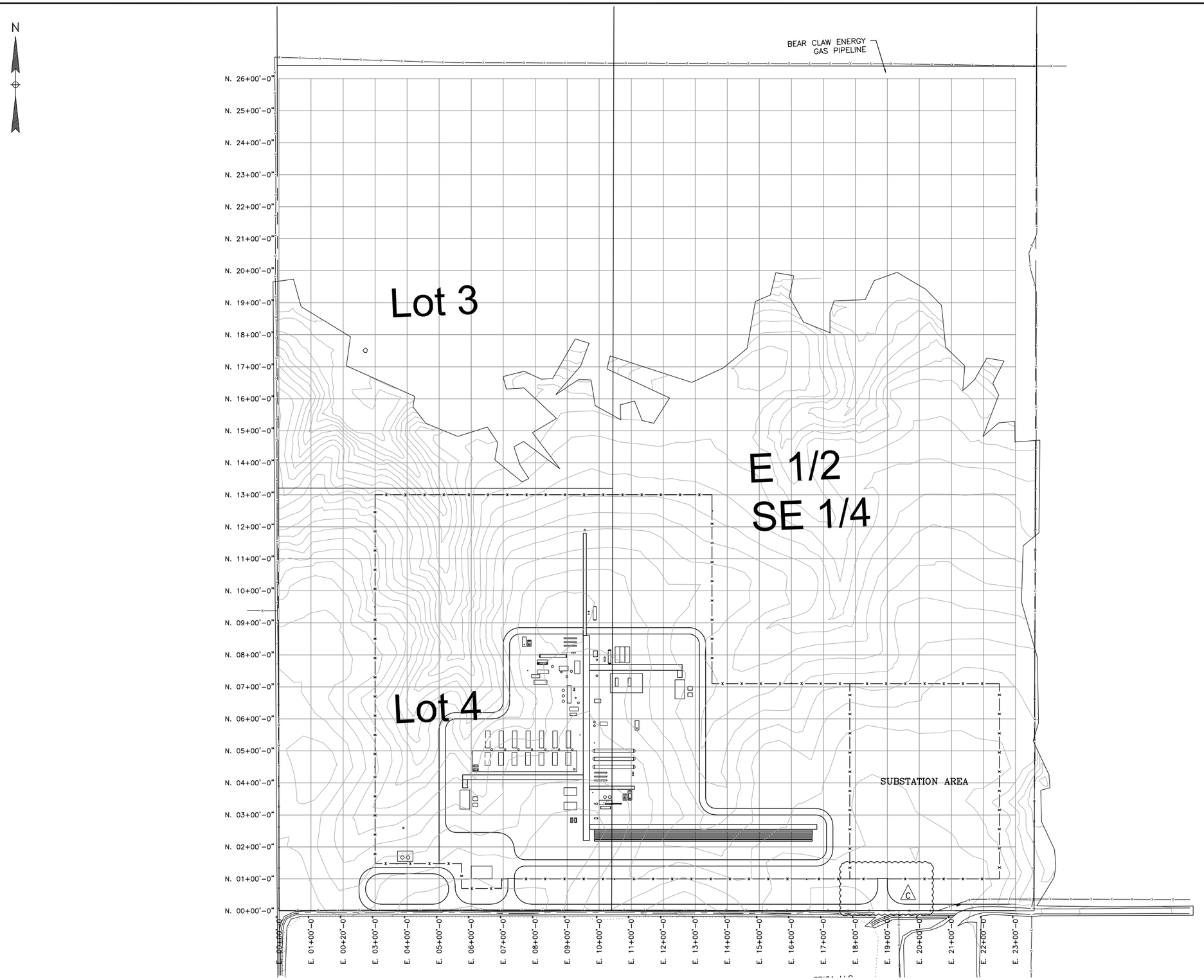
B	2/7/20	REVISED SUBRATION AREA	JEH SKM	JEH
A	1/24/20	ISSUED FOR BID	JEH RWD	JEH

OE2 039



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B	2/7/20	REVISED SUBSTATION AREA	JEH	SKM
A	1/24/20	ISSUED FOR BID	JEH	RWO

	NAME	DATE
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C/S		
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PROJ. MGR.		

REFERENCE DWG TITLE

REF. DWG. NUMBER

BCCK CONFIDENTIAL INFORMATION

PROPERTY TOPO
OVERAL SITE
PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-6095

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

REV.	DWG. No.
C	D-19063-04-10-001A

N

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MAN GATE

SEE DWG. D-19063-04-10-001D

SEE DWG. D-19063-04-10-001C

SUBSTATION AREA

MARK	DESCRIPTION
1	FLARE STACK
2	FLARE K.O. DRUM
3	FLARE K.O. DRUM PUMP
4	CLOSED DRAIN FLASH TANK
5	STABILIZER COMPRESSOR L.O. TANKS
6	HARP SLUG CATCHER
7	TANK FARM FLARE
8	TANK FARM FLARE K.O.
9	TANK FARM FLARE K.O. PUMP
10	SLOP TANK
11	CCR/WAREHOUSE

NO	DATE	REVISIONS	D/C	APP.
D	2/7/20	REVISED SUBSTATION ACCESS ROAD	JEH	JEH
C	2/7/20	REVISED SUBSTATION AREA	SKM	SKM
B	2/3/20	REVISED PER CLIENT COMMENTS	JEH	JEH
A	1/24/20	ISSUED FOR BID	RWO	RWO

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Q. A.		
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C/S		
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

REV	DWG. No.	REFERENCE DWG	DWG. NUMBER	DATE	TITLE
D	D-19063-04-10-001B				

BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

OVERALL PLOT PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-6095

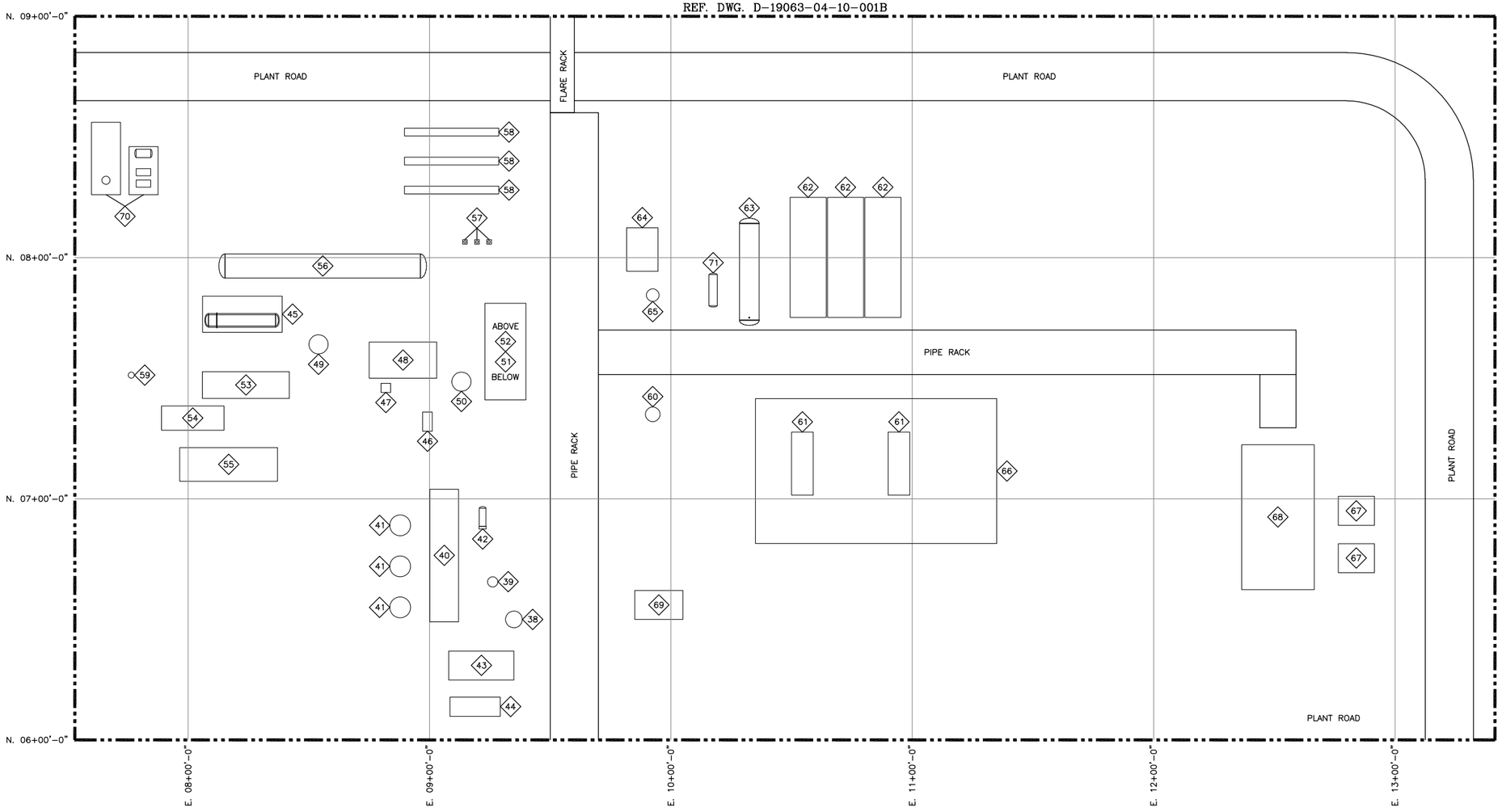
R:\01-Projects design\19063 OUTRIGGER FEED STUDY\04 PLOT PLAN\D-19063-04-10-001.dwg, 2/7/2020 12:19:34 PM, Jeheam

MARK	DESCRIPTION
38	DEHY INLET SCRUBBER
39	DEHY INLET COALESCING FILTER
40	DEHY VALVE SKID (402)
41	DEHYDRATOR
42	DEHYDRATOR DUST FILTER
43	REGEN GAS COMPRESSOR SKID (404)
44	REGEN GAS COOLER
45	REBOILER SKID (504)
46	GAS/GAS EXCHANGER
47	RSV SUBCOOLER HEAT EACHANGER
48	RSV VALVE SKID (508)

MARK	DESCRIPTION
49	DEMETHANIZER
50	COLD SEPARATOR
51	PROPANE SUBCOOLER SKID (502)
52	PROPANE CHILLER SKID (501)
53	EXPANDER VALVE SKID (507)
54	EXPANDER/COMPRESSOR
55	BOOSTER COMPRESSOR VALVE SKID (506)
56	NGL SURGE TANK
57	NGL BOOSTER PUMP
58	NGL PIPE LINE PUMP
59	CRYO AREA SUMP W/PUMP

MARK	DESCRIPTION
60	PROPANE COMP. SUCTION SCRUBBER
61	PROPANE COMPRESSOR
62	PROPANE CONDENSER
63	PROPANE ACCUMULATOR
64	PROPANE VALVE SKID (801)
65	PROPANE ECONOMIZER
66	PROPANE COMPRESSOR BUILDING
67	TRANSFORMER
68	PDC #2 BUILDING
69	G.C. BUILDING
70	TRIM REBOILER HOT OIL PACKAGE
71	PROPANE STORAGE TANK

REF. DWG. D-19063-04-10-001B



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	NAME	DATE
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PIPING		
PROJ. MGR.		

BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

NORTH PROCESS AREA
PLOT
PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-0095

REV.	DWG. No.
B	D-19063-04-10-001D

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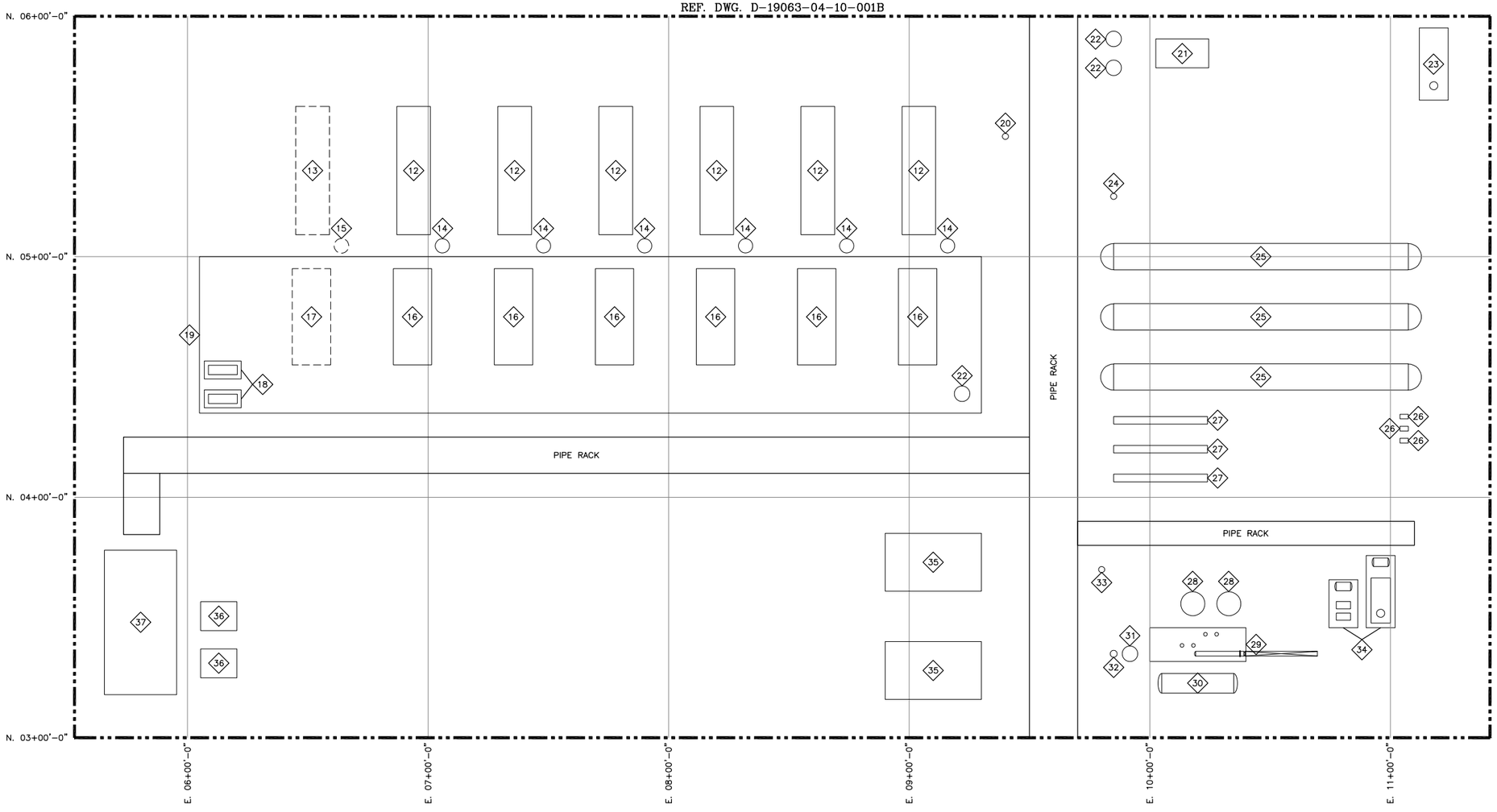
MARK	DESCRIPTION
12	RESIDUE COMPRESSOR COOLER
13	FUTURE RESIDUE COOLER
14	CONVERTER / SILENCER
15	FUTURE CONVERTER / SILENCER
16	RESIDUE COMPRESSOR
17	FUTURE RESIDUE COMPRESSOR
18	COMPRESSOR COOLANT TANK
19	RESIDUE COMPRESSOR BUILDING
20	RESIDUE COMPRESSOR AREA SUMP W/PUMP
21	INSTRUMENT AIR COMPRESSOR PACKAGE
22	AIR RECEIVERS
23	REGEN GAS HEATER
24	FUEL GAS SCRUBBER

MARK	DESCRIPTION
25	STABILIZER PRODUCT STORAGE TANK
26	STABILIZER PRODUCT BOOSTER PUMP
27	STABILIZER PRODUCT PIPELINE PUMP
28	STABILIZER SAYBOLT FILTER
29	STABILIZER SKID
30	STABILIZER THREE PHASE SEPARATOR
31	STABILIZER COLUMN/SURGE TANK
32	STABILIZER REBOILER
33	STABILIZER AREA SUMP W/PUMP
34	STABILIZER HOT OIL PACKAGE
35	STABILIZER OVERHEAD COMPRESSOR
36	TRANSFORMER
37	PDC #2 BUILDING

REF. DWG. D-19063-04-10-001B



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	NAME	DATE
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DRAWN	JEH	1/20
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Q. A.		
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BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

SOUTH PROCESS AREA
PLOT
PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-6085

REV.	DWG. No.
B	D-19063-04-10-001C

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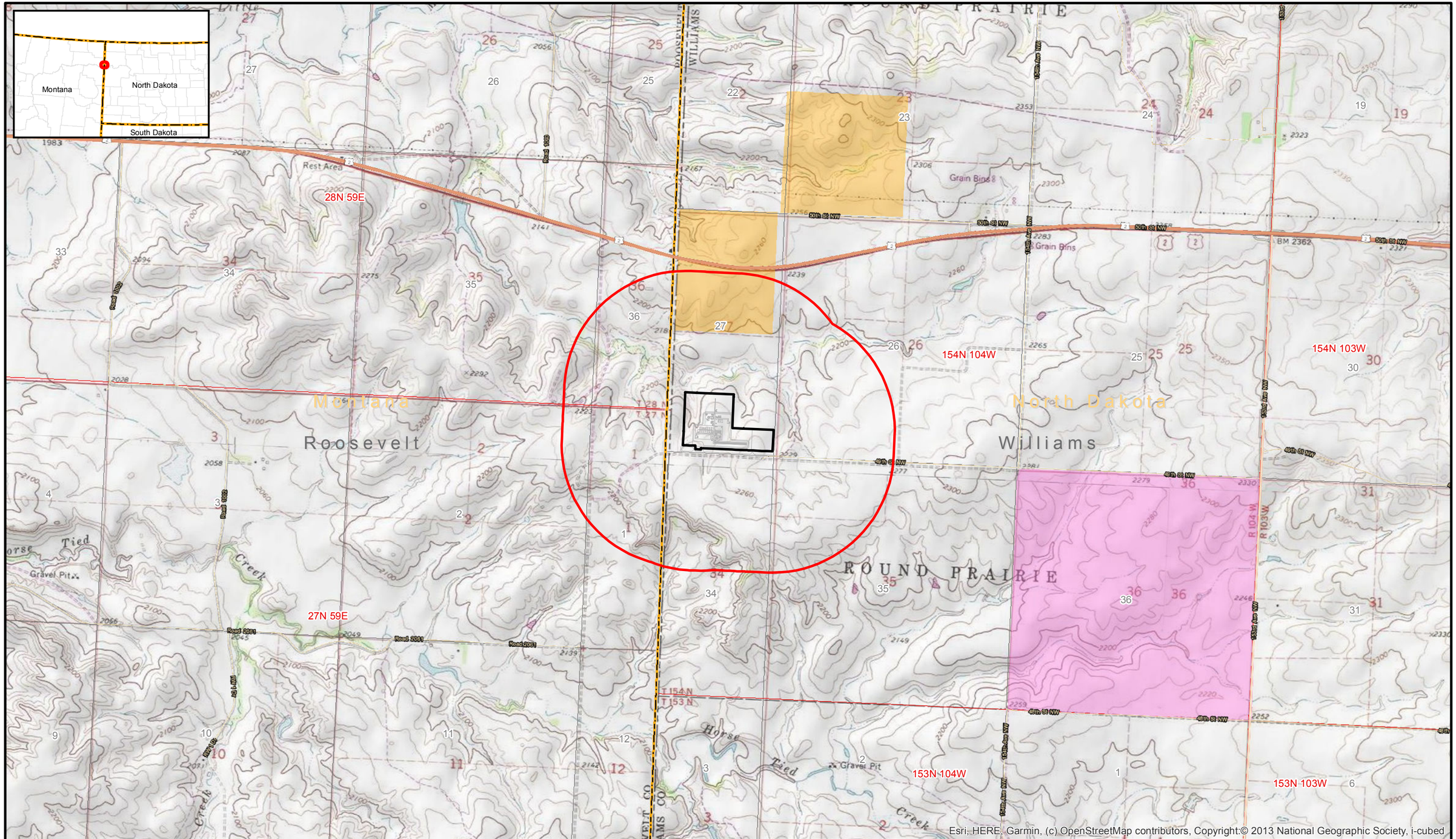
APPENDIX B
CRITERIA MAPS



LEGEND

- Facility Boundary
- Study Area
- Site Features
- Tribal Land
- State Land
- County Boundary
- Township/Range
- Section

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Feet

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OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	FigB1_Topo.mxd

Topography Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE

B-1

OE2 045

Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\FigB1_Topo.mxd

Esri, HERE, Garmin, (c) OpenStreetMap contributors, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- Facility Boundary
- Study Area
- Site Features
- Tribal Land
- State Land
- County Boundary
- Township/Range
- Section

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Feet

N

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OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	FigB2_Aerial.mxd

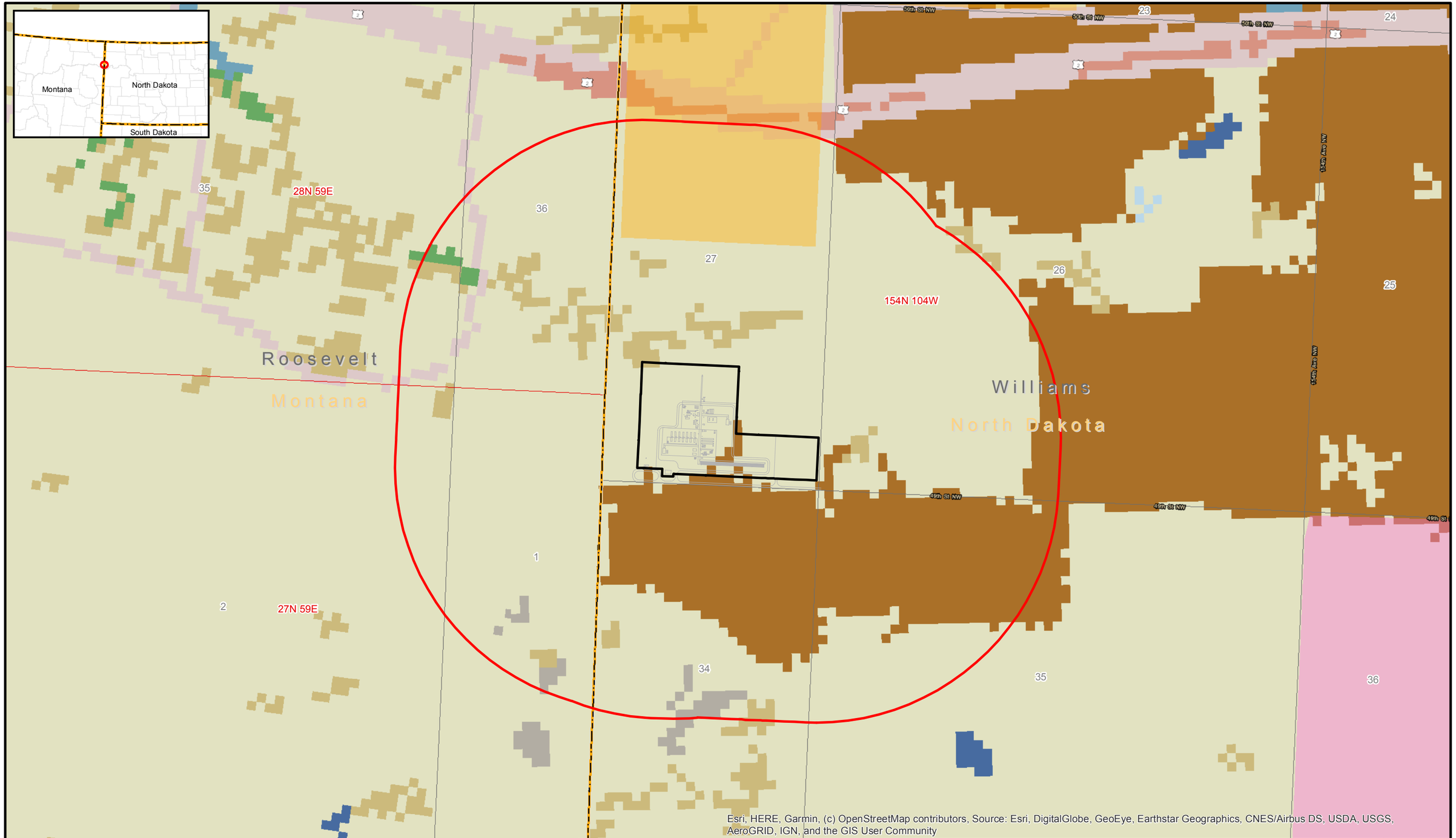
Aerial Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE
B-2

OE2 046

Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\FigB2_Aerial.mxd



Esri, HERE, Garmin, (c) OpenStreetMap contributors, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- Facility Boundary
- Study Area
- Site Features
- Tribal Land
- State Land
- County Boundary
- Township/Range
- Section

Land Cover

- Open Water
- Developed, Open Space
- Developed, Low Intensity
- Barren Land
- Shrub/Scrub
- Herbaceuous
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceuous Wetlands
- Deciduous Forest

0 500 1,000 2,000
Feet

N

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OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	FigB3_LandUse.mxd

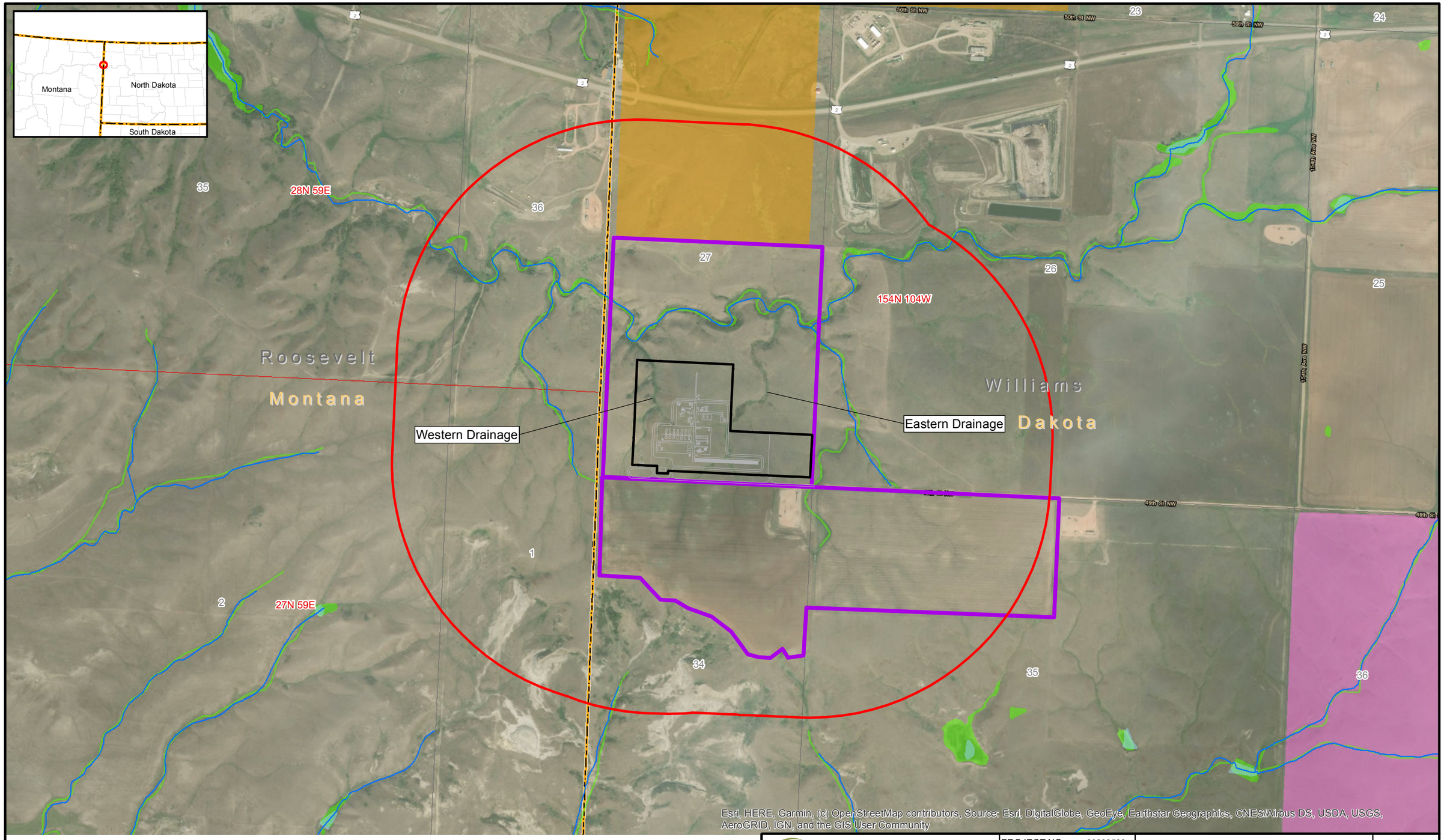
Land Use Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE
B-3

OE2 047

Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\FigB3_LandUse.mxd



LEGEND

- Facility Boundary
- Study Area
- Site Features
- Field Survey Boundary
- NHD Flowline
- NHD Waterbody
- NWI Wetland
- Tribal Land
- State Land
- County Boundary
- Township/Range
- Section

0 500 1,000 2,000
Feet

N

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KLEINFELDER
Bright People. Right Solutions.

OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	FigB4_Hydro.mxd

Wetlands and Waterbodies Map

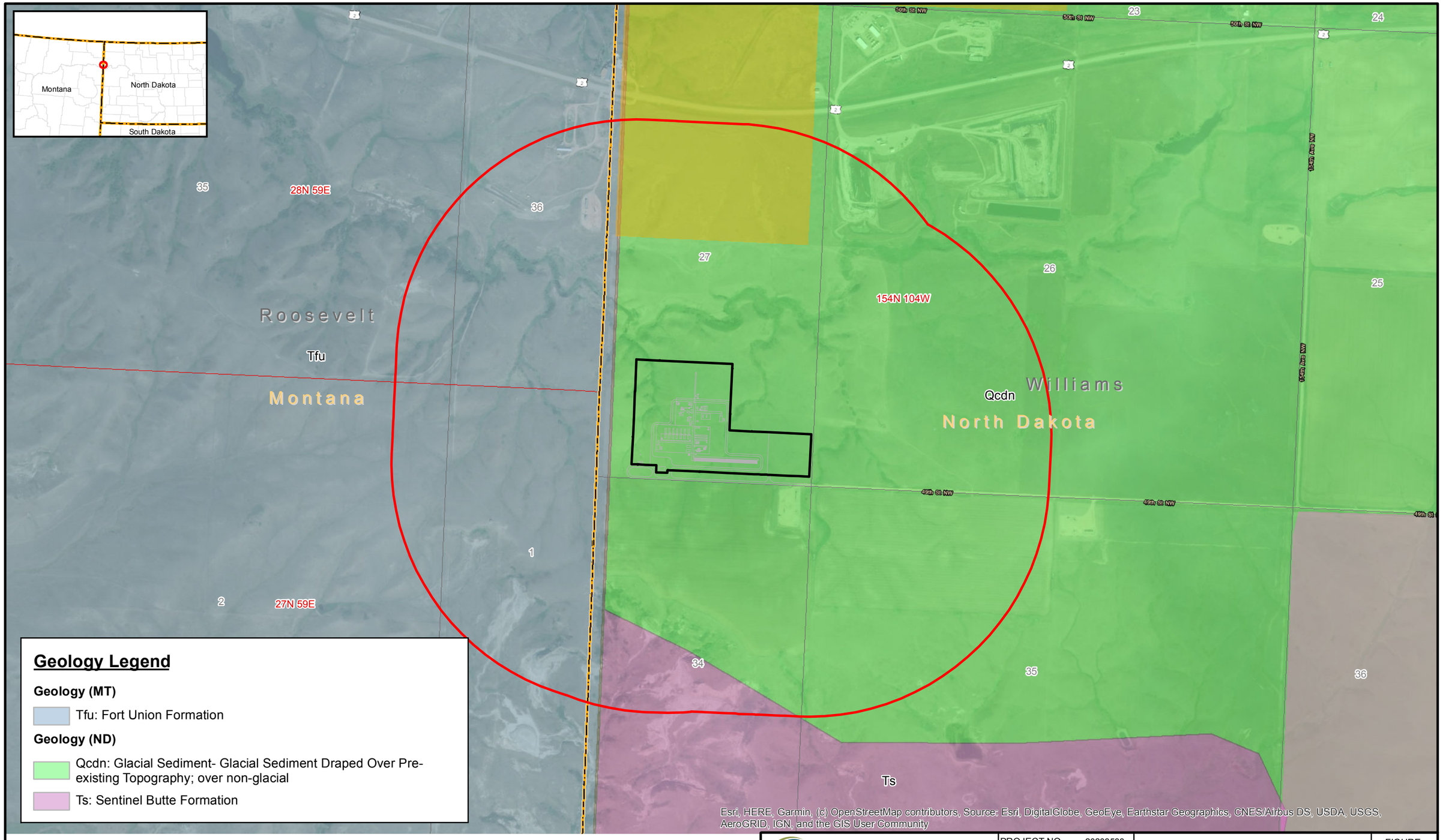
OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE

B-4

OE2 048

Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\FigB4_Hydro.mxd



Geology Legend

Geology (MT)

- Tfu: Fort Union Formation

Geology (ND)

- Qcdn: Glacial Sediment- Glacial Sediment Draped Over Pre-existing Topography; over non-glacial
- Ts: Sentinel Butte Formation

LEGEND

- Facility Boundary
- Study Area
- Site Features
- Tribal Land
- State Land
- County Boundary
- Township/Range
- Section

0 500 1,000 2,000
Feet

N

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OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	FigB5_Geology.mxd

Surficial Geology Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE

B-5

Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\FigB5_Geology.mxd

APPENDIX C
NATURAL RESOURCES REPORT

Bill Sanderson Gas Processing Plant Project
Wildlife and Waters of the US
Field Assessment and Offsite Assessment Report

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Updated
February 17, 2020

TABLE OF CONTENTS

1.0 INTRODUCTION **4**

1.1 Project Description **4**

1.2 Jurisdictional Waters and Wetlands **4**

1.3 Federally Protected Wildlife **4**

2.0 ENVIRONMENTAL SETTING **5**

3.0 METHODS AND RESULTS **6**

3.1 Jurisdictional Waters and Wetlands **6**

3.1.1 Methods **6**

3.1.2 Results **6**

3.2 Threatened and Endangered Species **8**

3.2.1 Methods **8**

3.2.2 Results **9**

4.0 SUMMARY AND RECOMMENDATIONS **9**

4.1 Jurisdictional Waters and Wetlands **9**

4.2 Threatened and Endangered Species **10**

5.0 References **11**

6.0 Qualifications **13**

TABLES

Table 1. Hydrologic Unit Codes (HUC) for Bill Sanderson Location 5

Table 2. Bill Sanderson Gas Processing Plant - Antecedent Precipitation 7

Table 3. Bill Sanderson Gas Processing Plant - Offsite Assessment Results 8

FIGURES

Figure 1. OE2: Bill Sanderson Gas Processing Plant Offsite Wetland Assessment Report Map 14

APPENDICES

Appendix A. Bill Sanderson Gas Processing Plant Field Survey Plant List 15

Appendix B. Bill Sanderson Field Survey Drainage Photographs 16

1.0 INTRODUCTION

1.1 Project Description

OE2 North LLC (OE2) is planning to develop the Bill Sanderson Gas Processing Plant Project (Bill Sanderson) facilities pad on private surface in Williams County, North Dakota. The Bill Sanderson project will be located somewhere in sections 27, 34, and/or 35 T154N-R104W. The Bill Sanderson facility will be approximately 40-50 acres and include gas processing and compression equipment. OE2 contracted Grouse Mountain Environmental Consultants (GMEC) to conduct desktop analyses for wildlife, cultural, and Waters of the United States (WOTUS) natural resources potentially impacted by the construction of the Bill Sanderson facility. GMEC previously submitted a resource desktop analysis summary report to Trent Taylor on January 31, 2020 (GMEC 2020). Preliminary findings were outlined where two (2) unknown tributaries within section 27 were identified as a potential jurisdictional concern. As construction is anticipated to occur prior to the growing season, not allowing for an official wetland delineation to be conducted, OE2 contracted GMEC to conduct an offsite wetland assessment using long-term aerial imagery, hydric soils information, and other hydrologic data to draw inference on jurisdictional water boundaries. GMEC also conducted an on-site field assessment on January 29, 2020 to supplement findings from the offsite wetland assessment. In concurrence with the on-site field visit, GMEC also completed an assessment of wildlife resources.

1.2 Jurisdictional Waters and Wetlands

Under section 404 of the Clean Water Act (CWA) of 1972, the U.S. Army Corps of Engineers (USACE) may issue permits for the discharge of dredge or fill material into WOTUS (Clean Water Act 2002). Following the repeal of the 2015 rule in October 2019, the Department of the Army and the Environmental Protection Agency finalized the Navigable Waters Protection Rule (Final Rule). The Final Rule was intended to clarify the pre-2015 regulatory language and definition of WOTUS. Under the Final Rule released within a pre-publication notice published January 23, 2020 (33 CFR Part 328), the term "waters of the United States" means: 1) Territorial seas, waters which are currently used, or were in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide; 2) Tributaries; 3) Lakes and ponds, and impoundments of jurisdictional waters; and 4) Adjacent wetlands. Within the Final Rule, the agencies clarify twelve (12) exclusions from the definition of WOTUS including ephemeral streams, swales, gillies, rills, and pools (see the pre-publication notice for full list of exclusions and additional detail regarding the Final Rule). The Final Rule is expected to take effect 60 days following the publication in the federal registry. Until then, the pre-2015 definition of WOTUS will still be in effect (40 CFR 230.3). In 2017, under section 404 of the CWA, the USACE issued general permits authorizing activities resulting in minimal impacts to WOTUS, known as Nationwide Permits (NWP). NWP 12 or NWP 39 may apply to this project given determination by USACE. General conditions still apply and a preconstruction notification (PCN) may be required (USACE 2017). Additionally, a 401 certification is required by the North Dakota Department of Health (NDDoH) for all NWP permits. Please see USACE (2017) and the NDDoH website for detailed guidelines regarding NWPs and section 401 certification.

1.3 Federally Protected Wildlife

Under the Endangered Species Act (ESA) of 1978, the U.S. Fish and Wildlife Service (USFWS) regulates all terrestrial and freshwater plant and animal species listed as threatened or endangered. Section 9 of the

ESA prohibits the "take", export/import, possession, and other specified activities of any federally listed endangered or threatened species. The term "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct". Any company/person who violates provisions of the ESA are subject to penalties and enforcement outlined within section 11 of the ESA (United States Government 1988, USFWS 2013).

The USFWS also regulates the "take", export/import, possession, and other specified activities of migratory bird species listed under the Migratory Bird Treaty Act (MBTA) of 1918 (United States Government 1918, USFWS 2017). According to the Solicitor's Opinion M-37041 (United States Government 2017a), the MBTA prohibits "incidental take" of migratory birds, where "incidental take" is defined as "take that results from an activity but is not the purpose of that activity." However, in accordance with the Solicitor's Opinion M-37050 (United States Government 2017a), the MBTA's prohibition of "take" applies only to "direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control."

Bald and Golden Eagle Protection Act (BGEPA) of 1978 prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) or their body parts, nests, chicks or eggs, which includes collection, possession, molestation, disturbance, destruction, or killing, where "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." (United States Government 1978, USFWS 2012*a*).

2.0 ENVIRONMENTAL SETTING

The Bill Sanderson facility is approximately 15 miles west of Williston, North Dakota and located along the North Dakota-Montana border. The local climate can be characterized by long cold winters and short hot summers. Average temperatures range from 1.7 °F to 21.3 °F in January and from 57.0 °F to 85.4 °F in July. Mean annual precipitation is 14.17 inches (WRCC 2016). Elevation of the project area ranges from 2,180 to 2,270 feet. The project area is dominated by loamy ecosites with minor components of limy and limy steep ecosites. Many other ecosites occur within the project area, but at very low occurrences. Horse Tied Creek lies 0.8 mile south of the project area. The majority of the project area falls within the Lower Little Muddy Creek (HUC-12 [100600050704]) subwatershed of the Missouri-Poplar basin (HUC-6[100600]); a small portion of the additional survey areas in the south lie in the Horse Tied Creek (HUC-12 [100600050703]; Table 1) subwatershed of the Missouri-Poplar basin. Livestock grazing and mineral development are the predominant land uses in the area.

Table 1. Hydrologic Unit Codes (HUC) for Bill Sanderson Location

Project Name	Basin (HUC-6)	Subbasin (HUC-8)	Watershed (HUC-10)	Subwatershed (HUC-12)
Bill Sanderson Gas Processing Plant	Missouri-Poplar (100600)	Charlie-Little Muddy (10060005	Little Muddy Creek (1006000507)	Lower Little Muddy Creek (100600050704) Horse Tied Creek (100600050703)

OE2 055

3.0 METHODS AND RESULTS

3.1 Jurisdictional Waters and Wetlands

3.1.1 Methods

Prior to conducting field surveys, GMEC conducted an offsite wetland and hydrology assessment using spatial layers from applicable state and federal agencies. Hydrologic watershed data was acquired from the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD). Wetland data was obtained from the USFWS National Wetlands Inventory (NWI; USFWS 2012b). Spatial data for rivers, streams, and tributaries were acquired from the USGS National Hydrologic Dataset (NHD). Soils data was acquired from the Natural Resources Conservation Service (NRCS) Web Soils Survey (WSS; SSS-NRCS-USDA 2020). NHD in combination with the WBD and NWI were overlaid with the provided parcel boundary and additional survey area in ArcGIS to assess potential areas of jurisdictional concern. However, as these datasets are based on aerial or satellite imagery and infrequently updated, they may not accurately represent resources on the ground. GMEC used the North Dakota NRCS's *State Guidance for Wetland Determinations Including State Offsite Methods* (NRCS 2017) and Minnesota's USACE *Guidance for Offsite Hydrology/Wetland Determinations* (USACE 2016) to delineate wetlands within these areas of concern. Imagery used for offsite assessments was acquired from the National Agriculture Imagery Program (NAIP) and representative of 2009-2010, 2012, and 2014-2019. WSS data was overlaid on these images to assess hydric soils. In areas where hydric soils were present, sample areas were delineated based on changes to vegetation greenness or inundation during years of normal climatic conditions. GMEC calculated the climatic conditions for the three (3) months prior to the month the imagery was taken for each year according to the procedure outlined in the NRCS *Hydrology Tools for Wetland Determination* (NRCS 1997) and using the NRCS WETS monthly precipitation data. GMEC determined wetland status of sample units by comparing hydric soils, whether the area had previously been classified as a wetland, and the percentage of images across years that had indicators of wetland hydrology (i.e. greener color tones in vegetation).

To supplement the offsite determination, GMEC conducted a field assessment on January 29, 2020. Due to the time of year and snow cover present, wetland delineation in accordance with the Great Plains Regional Supplement to the Corp of Engineers Wetland Delineation Manual protocols to assess jurisdictional boundaries (USACE 2010) and assessment of OHWM/bed and bank features were not possible in the field. However, GMEC biologists were able to identify major vegetation along the drainages and overall topography to assist in offsite assessments.

3.1.2 Results

During the initial desktop analysis (GMEC 2020), NWI-designated wetlands were identified within the northern half of the parcel boundary (Lot 3 and NESE, Section 27, T154N-R104W). These wetlands are classified as intermittent riverine wetlands and are associated with an intermittent tributary of Little Muddy Creek. Additionally, one (1) NWI wetland extends into the additional survey area to the south (NWNW Section 35, T154N-R104W). No NWI or NHD data was present within the southern portion of the parcel boundary in Section 27; however, two (2) distinct channels running south to north are visible on aerial imagery (Section 27, T154N-R104W). These channels will be referred to throughout as the western drainage (Lots 3 and 4, Section 27, T154N-R104W) and the eastern drainage (NESE and SESE,

Section 27, T154N-R104W). Although these drainages are not identified within the NHD or NWI datasets, spatial data shows evidence of a high water table and potential water pooling.

Table 2. Bill Sanderson Gas Processing Plant - Antecedent Precipitation

Imagery	Imagery Date[1]	Climatic Condition
2019 NAIP	7/25/2019	Normal
2018 NAIP	July 15 – Oct. 23, 2018	Normal
2017 NAIP	10/4/2017	Wet
2016 NAIP	7/25/2016	Normal
2015 NAIP	9/14/2015	Normal
2014 NAIP	8/19/2014	Dry
2012 NAIP	6/27/2012	Wet
2010 NAIP	6/29/2010	Normal
2009 NAIP	June – Sept. 2009	Normal

[1]For years where no imagery date was found, climatic conditions were calculated for all possible three-month prior time periods. All calculations gave the same result, so the data was included.

Analysis of antecedent precipitation for each year of NAIP imagery showed six (6) years of normal climatic conditions, two (2) years that were wetter than normal, and one (1) year that was drier than normal (Table 2). According to WSS data, hydric soils were not present within the corresponding Map Unit for the western drainage within the southern portion of the parcel boundary (Lots 3 and 4, Section 27, T154N-R104W). The ground assessment of the drainage in question indicated steep slopes were present along the extent of the reach and would likely not allow for significant water accumulation and associated wetland formation before draining directly into the intermittent drainage downstream. Additionally, the majority of vegetation present within the drainage was woody upland vegetation visible above the snow cover, a strong indication that no wetlands were associated with this drainage. As such, an offsite wetland assessment was not conducted for the western most drainage of concern.

WSS data identified the Map Unit encompassing the eastern drainage as having potential for hydric soils. GMEC identified sixteen (16) sampling units using wetland indicators on aerial imagery during years of normal circumstances (Table 3; Figure 1). During initial analysis, four (4) units were determined not to be wetlands, as they showed indications of wet signatures in less than half of the images from "normal" years (Sampling Units 12 and 14-16; Table 3). Ground surveys indicated that the wet signatures in eleven (11) units were an artefact of patches of western snowberry (*Symphoricarpos occidentalis*; an upland shrub) producing deep color tone differences in the imagery (Sampling Units 1-11; Table 3). Based on the vegetation that was identified during the onsite field assessment, it is likely that western snowberry and other upland plants comprise the majority of the vegetative cover within this eastern drainage (Appendix A), eliminating the potential for classification as wetland sites. However, at one (1) of these sites (Sampling Unit 9), the snowberry was located on the edge of a potential depression with facultative vegetation (*Rosa* spp., *Deschampsia caespitosa*) present. One (1) other site lacked western snowberry but still showed indicators of wet signatures in >80% of the imagery from "normal" years (Sampling Unit 13). The same facultative plants were identified in this sampling unit, suggesting some level of water

tolerance. Due to snow cover and frozen ground conditions, GMEC biologists were unable to dig soil pits to assess the presence of hydric soils at this site. Based on this analysis, fourteen (14) sampling units have been classified as not a wetland and two (2) units (Sampling Units 9 and 13) have been classified as "unknown" features due to the presence of facultative vegetation. However, a complete inventory of vegetation and analysis of hydric soils and hydrology indicators during the growing season may verify that these areas are not wetlands.

Table 3. Bill Sanderson Gas Processing Plant - Offsite Assessment Results

Sampling Unit	Hydric Soils Present	Identified NWI	% Wet Signatures	Key Vegetative Characteristics	Wetland?
1	Possible	No	100	Snowberry	No
2	Possible	No	83.3	Snowberry	No
3	Possible	No	66.6	Snowberry	No
4	Possible	No	100	Snowberry	No
5	Possible	No	100	Snowberry	No
6	Possible	No	50	Snowberry, *Deschampsia*	No
7	Possible	No	100	Snowberry	No
8	Possible	No	100	Snowberry	No
9	Possible	No	100	Snowberry, *Deschampsia*	Unknown
10	Possible	No	66.6	Snowberry	No
11	Possible	No	83.3	Snowberry	No
12	Possible	No	0		No
13	Possible	No	83.3	*Deschampsia*	Unknown
14	Possible	No	33.3		No
15	Possible	No	33.3		No
16	Possible	No	33.3		No

3.2 Threatened and Endangered Species

3.2.1 Methods

GMEC used the USFWS's IPaC: Information for Planning and Consultation to assess potential impacts to threatened and endangered (T&E) species within the project area. IPaC identifies any designated critical habitat within the area as well as any species potentially affected based on the location of their historical ranges and Areas of Influence (AOI). If a species is identified as potentially affected but no critical habitat is present, it does not necessarily imply suitable habitats associated with that species are present within the project area. IPaC lists six (6) species as potentially affected by activities within the project area: Northern long-eared bat (*Myotis septentrionalis*), Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), and Pallid sturgeon (*Scaphirhynchus albus*). The Northern long-eared bat is primarily associated with mature forests with large decaying or partially dead trees during the breeding season and caves or mines during winter hibernation. The Least Tern nests near water, using primarily riverine sandbars or salt flats from low tide during the breeding season in the interior U.S. The majority of Piping Plovers in the Great Plains use shorelines along small, alkaline lakes. Suitable habitat includes large beaches with highly clumped vegetation that provides low overall cover. Red Knots require elevated ridges and slopes near wetlands and lakes where food is abundant during the breeding season and winter in coastal areas, such as tidal flats, estuaries, or bays.

Pallid sturgeon are large river obligates that require year-round water flows. Whooping Cranes nest in dense emergent vegetation around shallow ponds, wet prairies, or freshwater marshes. During spring and fall migration, the Aransas/Wood Buffalo population of Whooping Cranes use marshes, salt flats, lagoons, barrier islands, palustrine wetlands as well as stubble/grain fields and cropland adjacent to or near wetland features. During the field survey conducted January 29, 2020, GMEC biologists assessed potential suitable habitat for relevant T&E species within the project area.

3.2.2 Results

No currently defined critical habitats are located within the Bill Sanderson project area and no birds of conservation concern are expected. Further, no suitable habitats for Northern long-eared bat, Least Tern, Piping Plover, Red Knot, or Pallid sturgeon were identified within the project area. The project is currently located within the area in which 85% of migratory sightings of Whooping Crane are recorded for the Aransas/Wood Buffalo population; however, the Bill Sanderson project area is located outside of the central flyway and in an area where no e-bird sightings of Whooping Cranes have been reported during migration. While the additional parcels of interest located within sections 34 and 35 T154N-R104W currently encompass cropland, no critical stopover habitats are designated nearby. Field surveys indicated that small wetlands may be present in the northern portion of the parcel boundary, within 1km of the cropland. However, the use of the Bill Sanderson project area by Whooping Cranes as a stopover during migration is unlikely.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Jurisdictional Waters and Wetlands

Offsite assessments were conducted by GMEC using available data and supplemental data retrieved during an onsite field assessment conducted outside of the growing season. Data not otherwise specified within the outlined methods above may not have been made available to GMEC and, thus, not considered in the overall evaluation of WOTUS presented in this report. Results and recommendations outlined within this report are provided based on GMEC's best assessment of hydrologic resources from aerial imagery and an onsite field visit; however, field conditions did not allow for all wetland indicators nor other features associated with WOTUS to be assessed.

The western drainage (Lots 3 and 4, Section 27, T154N-R104W) is characterized by steep slopes and woody upland vegetation, likely not allowing for significant water accumulation and wetland formation before reaching the intermittent drainage downstream. This drainage is likely ephemeral. Under the new Navigable Waters Protection Rule (which will likely go into effect sometime in April), ephemeral drainages will be considered non-jurisdictional. The upstream drainages that extend into the southern crop fields within sections 34 and 35 were characterized by little to no visibly distinct channel (Appendix B), indications that the function of these portions of the drainage may have been altered by previous cultivation of croplands. Additionally, these sections appear to have been developed for agricultural production prior to December 1985 (according to aerial imagery), potentially resulting in a designation as non-jurisdictional waters according to the Final Rule (33 CRF Part 328- pg. 324).

Based on offsite analysis of the eastern drainage (NESE and SESE, Section 27, T154N-R104W), several sampling units showed consistent soil saturation, indicated by an increase in the greenness of vegetation across all years of NAIP imagery. However, field surveys indicated that much of this increased greenness

is likely due to the presence of western snowberry, an upland shrub. Some remnants of wetland vegetation were identified beneath the snow in certain areas, though it did not appear to make up a dominant proportion of vegetation. Specifically, fourteen (14) of the sampling units within the eastern drainage were characterized by a predominance of snowberry and classified as not a wetland. Two (2) of the total sampling units were classified as wetland status "unknown" due to consistent wetland signatures present in over half of the imagery years assessed as well as a high prevalence of facultative vegetation and lack of upland shrubs. Although, there is the potential for wetland vegetation indicators to be present within these two sampling units, hydric soils and hydrology indicators were unable to be properly assessed in the field. Additionally, assessing ordinary high-water marks was not possible given the amount of the snow cover present; thus, hydrological connection of these "unknown" features to the downstream drainage was unable to be assessed. According to available data acquired during the offsite aerial wetland assessment and the onsite field visit, it is GMEC's opinion that the eastern and western drainages may not be of jurisdictional concern. However, given the onsite assessment was conducted outside of the growing season with 100% snow cover, all hydrologic indicators for determining WOTUS were not considered. Further, determinations of jurisdictional waters are subject to the USACE.

4.2 Threatened and Endangered Species

IPaC indicated six (6) species may be potentially affected by the Bill Sanderson project. However, no critical habitats are currently designated within the project area. Further analysis of habitat requirements for the six (6) listed species suggest no suitable habitats are located within the project boundary and GMEC does not anticipate any issues with T&E species. However, if construction is anticipated to take place from January 15 – September 15, during the raptor breeding season, GMEC recommends a search for raptor nesting activity be conducted. Additionally, if construction is anticipated to take place from April 1 – August 15, GMEC recommends surveys be conducted for ground-nesting passerine birds within the proposed construction footprint.

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6.0 Qualifications

Katie Taylor holds a B.S. degree in Biology (2009) from Seattle Pacific University and a M.S. degree in Rangeland Ecology (2014) from the University of Wyoming. She is currently Lead Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Ms. Taylor has 9 years of experience working in the wildlife field. Her direct work experience includes applied field work and research for universities, private industry, and federal and state agencies. Ms. Taylor has worked on research projects involving raptors, grouse species, songbirds, wolves, and various species of ungulates throughout the continental U.S. More specifically, she has 5 years of experience conducting surveys in accordance with BLM wildlife survey protocols for nesting raptors, sage-grouse and sharp-tailed grouse leks, mountain plover, and other sensitive species in Wyoming. In addition, Ms. Taylor has experience in wildlife data management and GIS support for the Bureau of Land Management – Buffalo Field Office. Ms. Taylor has also completed wetland delineation training and has experience with wetland determinations and working with the USACE for hydrology determinations.

Kirstie Lawson holds a B.S. degree in Wildlife Biology (2012) from the University of Montana and a M. S. degree in Biology (2018) from the University of British Columbia Okanagan. She is currently a Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Ms. Lawson has over 6 years of experience working in the wildlife field. With a focus on grouse research, Ms. Lawson's background also includes conducting research and surveys for mesocarnivores, songbirds, and raptors in the U.S. and Canada. Her previous work has required interacting with various stakeholders, including private landowners, government agencies, and industry.

Gregory Shedd holds a B.S. in Wildlife Biology (2002) from Unity College. He is currently a Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Mr. Shedd has over 15 years of combined experience in the wildlife field. His primary experience is private consulting in Wyoming and surrounding states performing surveys, monitoring and applied research for various stakeholders including private landowners, government agencies, and industry. Mr. Shedd has completed wetland delineation training and has conducted wetland determinations for over 10 years.

FIGURES

Figure 1. OE2: Bill Sanderson Gas Processing Plant Offsite Wetland Assessment Report Map

GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS
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Phone: 307.684.2112 Fax: 307.684.2142

OUTRIGGER ENERGY

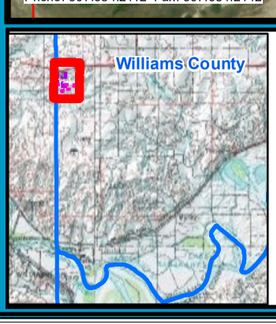


Figure 1. OE2 North LLC: Bill Sanderson Gas Proccessing Plant
Offsite Wetland Assessment Report Map

- Facility Boundary
- Site Features
- Parcel Boundary
- Additional Survey Area
- Northern Extent

Offsite Assessment
- Unknown
- Not Wetland
- National Wetlands Inventory Wetland

Soils
- Not Hydric
- 0-5% Hydric
- Intermittent Stream

Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Scale: 1:6,000
Date: 2/17/2020
Created by: KLawson
File Name: OUT-004_WetlandDelineation_Map_020320

N
W E
S

APPENDICES

Appendix A. Bill Sanderson Gas Processing Plant Field Survey Plant List

Common Name	Scientific Name	Indicator Status	Comment(s)
Western snowberry	*Symphoricarpos occidentalis*	UPL	
Crested wheatgrass	*Agropyron cristatum*	UPL	
Silver buffaloberry	*Shepherdia argentea*	UPL	
Tufted hair grass	*Deschampsia caespitosa*	FACW	
Big bluestem	*Andropogon gerardii*	FACU	
Prairie sandreed	*Calmovilfa longifolia*	UPL	
Common Yarrow	*Achillea milleflium*	UPL	
Tall hedgemustard	*Sisymbrium altissimum*	FACU	
Stiff goldenrod	*Oligoneuron rigidum*	FACU	
Spotted Knapweed	Cenaurea stoebe	UPL	
Rose	*Rosa* spp.	FACU	
Needlegrass	*Nassella* spp.	UPL	
Coneflower	*Echinecea* or *Rudbeckia* spp.	Unknown	Unable to identify to species at this time.
Unknown Sedge	*Carex* spp.	Unknown	Possibly threadleaf sedge, but unable to identify at this time.

Appendix B. Bill Sanderson Field Survey Drainage Photographs

Bill Sanderson: Facing north toward Unit 16 at the fence line

Bill Sanderson: Facing south from Unit 16 at the fence line

Bill Sanderson: Facing south toward Unit 11

Bill Sanderson: Facing north from Unit 11

Bill Sanderson: Facing north toward Unit 15 from fence line

Bill Sanderson: Facing south from Unit 15 at the fence line

Bill Sanderson: Facing northeast in Unit 15

Bill Sanderson: Facing north in Unit 14

Bill Sanderson: Facing north in Unit 14

Bill Sanderson: Facing north in Unit 10

Bill Sanderson: Facing north in Unit 9

Bill Sanderson: Facing south towards Unit 8

Bill Sanderson: Facing northeast in Unit 7

Bill Sanderson: Facing northeast in Unit 6

Bill Sanderson: Facing east in Unit 6

Bill Sanderson: Facing north in Unit 13

Bill Sanderson: Facing north in Unit 2

Bill Sanderson: Facing south in Unit 12

Bill Sanderson: Facing north to Unit 1

Bill Sanderson: Western drainage facing northwest toward main drainage
Easting: 571199; Northing: 5331120

Bill Sanderson: Western drainage facing southeast away from main drainage
Easting: 571199; Northing: 5331120

Bill Sanderson: Western drainage facing south halfway up drainage
Easting: 571212; Northing: 5330982

Bill Sanderson: Western drainage facing south
Easting: 571183; Northing: 5330888

Bill Sanderson: Western drainage facing north from fence line
Easting: 571109; Northing: 5330724

Bill Sanderson: Western drainage facing south from fence line
Easting: 571109; Northing: 5330724

Bill Sanderson: Facing south from road at existing well pad
Easting: 571740; Northing: 5330728

Bill Sanderson: Facing south from road at the eastern crop field
Easting: 572033; Northing: 5330729

APPENDIX D
CULTURAL RESOURCE CLASS I SUMMARY

GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS

February 17, 2020

State Historical Society of North Dakota
Archeology & Historic Preservation Division
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck, North Dakota 58505

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

Upon completion of the project, OE2 will own and operate a gas gathering and processing system that will process raw, wellhead gas from wells in Williams and additional counties into marketable natural gas and natural gas liquids (NGLs). The project will feed products into third-party interstate natural gas and NGL pipelines that service the Rocky Mountains, Midwest, and Gulf regions. The project is both economically and environmentally impactful for the state, as the project will not only add valuable midstream service for exploration and production companies in the region, but also significantly reduce flaring and associated volatile organic compound (VOC) emissions in the state. At full capacity, the plant is expected to reduce state-wide VOC emissions by approximately 25,000 tons per year.

The Project will be located approximately 15 miles west of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota. Please see the attached **Project Overview Map (Figure 1)** for the project location and details.

OE2 contracted Grouse Mountain Environmental Consultants (GMEC) to conduct a Class I cultural resource inventory to identify any previously recorded cultural resources within the Project's direct and indirect Area of Potential Effect (APE). An intensive Class III survey and

Tel: 307-684-2112
760 W. Fetterman St.
Buffalo, WY 82834
grousemtnconsultants.com

inventory was not conducted within the proposed Plant footprint due to snow cover and zero ground visibility. The results of the Class I inventory are discussed below:

Background research consisted of a record search through the State Historical Society of North Dakota (SHSND) State Historic Preservation Office (SHPO) for a 1-mile indirect surrounding the proposed Plant footprint. This search was conducted for resources recommended as eligible or that are Listed on the National Register of Historic Places (NRHP). Additional background research was conducted through an online historic map search, local literature review, and a search of the online Bureau of Land Management (BLM) land patent and General Land Office (GLO) plats. A Class I file search was conducted at the SHSND on January 27, 2020 for Sections 27, 34, and 35 T154N-R104W. The file search was conducted under the former project name "Bakken Sites" and was documented in the SHSND system under this name; however, the search was in anticipation for the finalized Bill Sanderson Gas Processing Plant footprint.

Based on the Fee classification of the Project, and as the final Project footprint does not physically cross onto State of Montana surface, GMEC did not conduct a records review on known historical and archaeological site locations or past surveys through the Montana Historical Society State Historic Preservation Office (SHPO) State Antiquity Database- Cultural Resource Annotated Bibliography System (CRABS) or Cultural Resource Information System (CRIS). A preliminary review of the online public State Antiquities Database indicates there are known prehistoric and historic sites within the adjacent sections in Montana to the west of the proposed Project area.

The records search through the SHSND revealed there are no previously recorded sites or isolated resources within the Project footprint. Further, there have been no previous inventories conducted within or adjacent to the project area (Figure 2). However, five (5) previous inventories have occurred within a 1-mile indirect APE where eight (8) sites and one (1) isolated resource were identified (Attachment A-Tables 1 and 2). There are no cultural heritage sites listed on the NRHP and no historic Districts within the Project footprint or the 1-mile indirect APE.

A review of the online BLM Federal Land Patent Records for Sections 27 and 34 indicate seven (7) patents were issued between 1910 and 1926 (Attachment A-Table 3). The patents during this time are generally ranching and grazing allotments. All seven (7) patents were issued under either the 1880 Indian Trust Patent or the 1865 Indian Fee Patent. The Indian Fee Patent was issued under the general Allotment Act of February 8, 1887 whereas the patent is the actual title to a property (land) and is owned in its entirety by the individual and their heirs. This suggests the area has been under private ownership through the nineteenth and twentieth centuries with low to moderate settlement in the general area. A preliminary online search of the patent holder names

revealed none of the names listed on the Federal Land Patent records are connected to or associated with events that have made a significant contribution to the broad patterns of history or are associated with the lives of persons significant in the past (Criterion A and B of the NRHP).

The project area is within the Missouri River Drainage system and the Garrison Study Unit (GSU). Cultural affiliations observed in the GSU span from Paleo-Indian to Historic settlement. This study unit has produced diagnostic artifacts dating to Clovis times roughly 13,000 bp. The natural setting of rivers, tributary stream valleys, and upland grasslands offered reliable big game and vegetative resources for hunting and gathering peoples. As of 2015, there is one (1) site recorded for every 1.9 square miles in the GSU, ranking second in site density in North Dakota. Typical sites identified in the GSU include stone circles, cairns, and rock features which account for over half of the archaeological sites recorded. Many artifacts associated with Paleo-Indian occupations have been discovered near rivers or established water courses. Based on this, Paleo-environmental modeling suggests many sites can be anticipated above today's reservoir level within certain landforms within the Missouri Valley. However, a variety of cultural properties can be expected in upland landscapes such as lithic scatters, earthlodge villages, or even isolated Native American truck burials or former cemetery locations. Overall, certain geographical settings such as alluvial fans, valley wall footslope, or in a relatively rapidly deposited sedimentary context can produce buried cultural remains. Given the water course located approximately 546 feet north, with ephemeral drainages trending through the Project footprint, the possibility of buried cultural remains is likely.

Based on the results of the SHSND records search and the known site density within the GSU, the likelihood of discovering archaeological sites or isolated materials within the project area and surrounding area is moderate to high, specifically in areas near alluvial settings or along established water courses. Because no previous inventory has been conducted within the Project area, it is difficult to determine whether direct impacts to sensitive cultural resources may occur during project construction. Therefore, GMEC recommends conducting a Class III cultural resource survey for the defined project footprint.

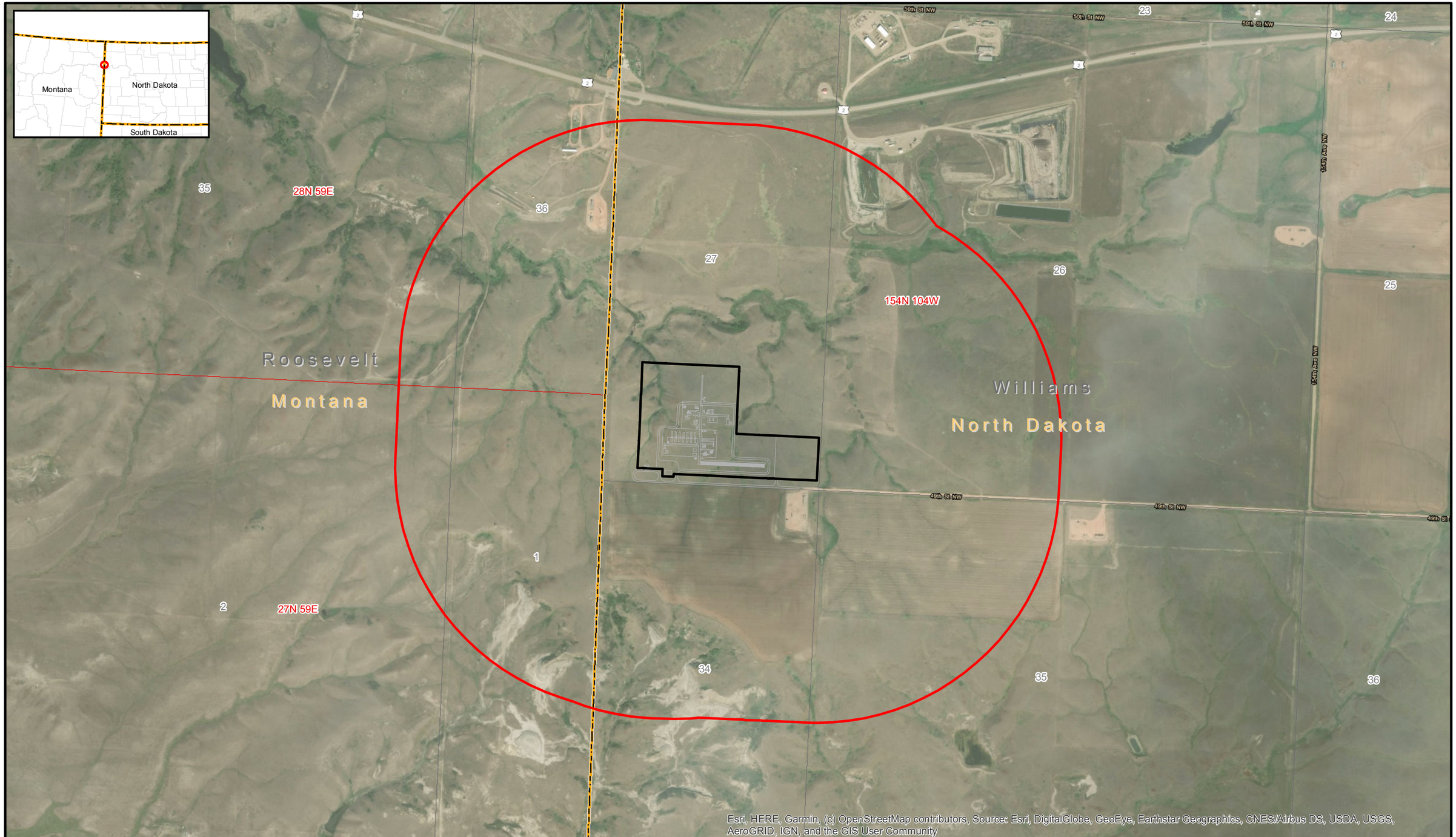
GMEC is requesting the SHSND provide recommendations and/or requirements regarding whether a Class III cultural resource inventory is necessary. As stated above, GMEC has recommended an intensive survey be completed prior to earth moving activities to further assess undocumented cultural resources within the Plant footprint. As a result, OE2 has requested a Class III survey covering a minimum of 40 to 45-acres surrounding the proposed Plant footprint pending favorable weather and ground conditions. Please contact Becca Mashak at 307-684-2112 or rmashak@gmecwy.com with any questions regarding the proposed Project.

Sincerely,

Becca Mashak

Rebecca L. Mashak
Grouse Mountain
Environmental Consultants (GMEC)
Lead Archaeologist
rmashak@gmecwy.com
O: 307-684-2112
M: 307-760-2643

Enclosures: Figure 1 - Project Overview Map
Figure 2 – Resource Locations



Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\Fig1_Overview.mxd

LEGEND

- Facility Boundary
- Study Area
- Site Features
- County Boundary
- Township/Range
- Section

0 500 1,000 2,000
Feet

N

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

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OUTRIGGER ENERGY

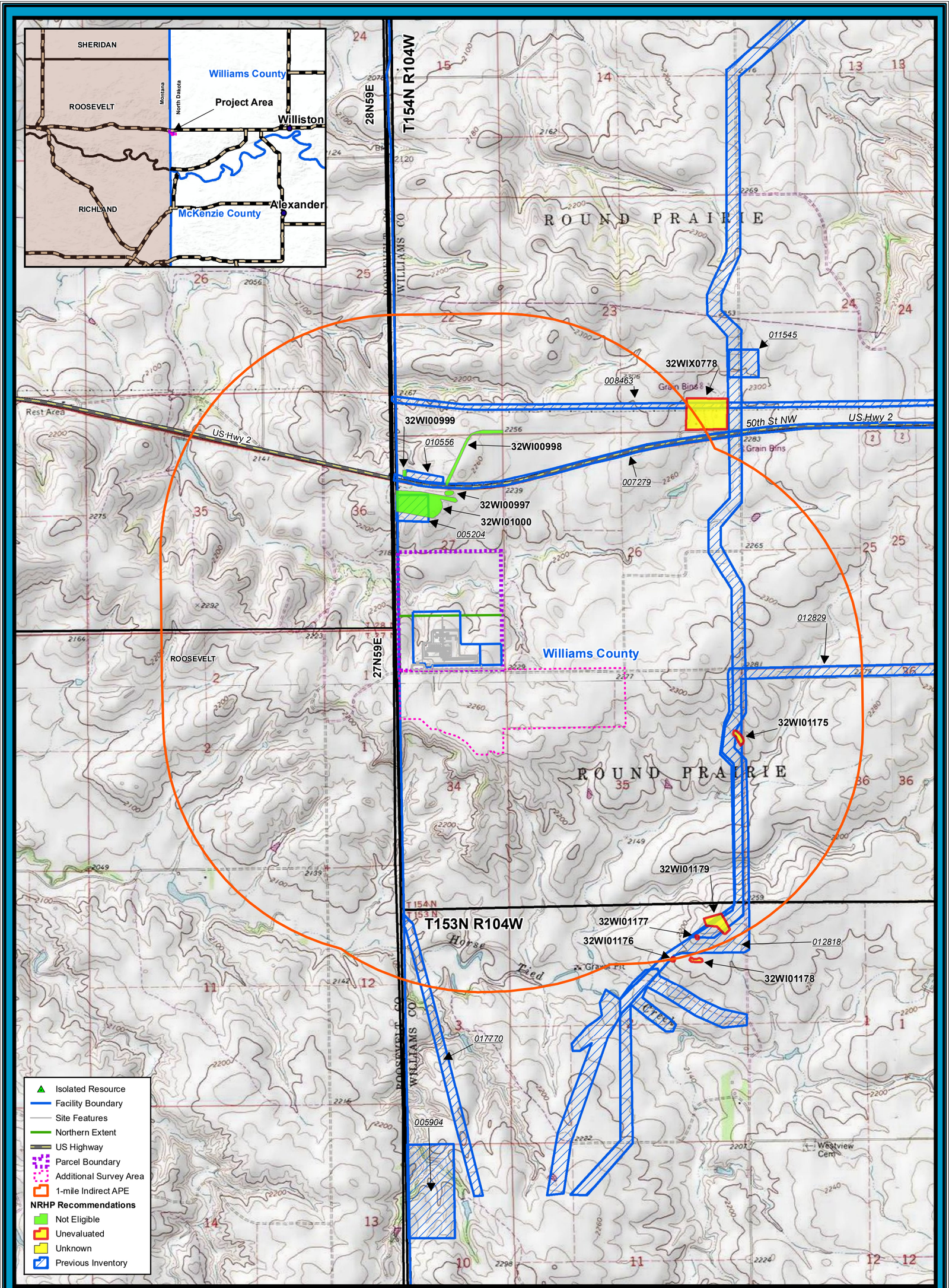
PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	Fig1_Overview.mxd

Project Overview Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE
1

OE2 086



Project No.: OUT-004 Class I Desktop
Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Map Scale: 1:24,000
Quadrangle(s):
1989 Red Bank Creek, MT-ND (48104-B-1)
1989 Red Bank Creek, MT-ND (48104-B-1)

GROUSE MOUNTAIN ENVIRONMENTAL CONSULTANTS
www.grousemtnconsultants.com
760 West Fetterman, Buffalo, WY 82834
O: 307-684-2112 / F: 307-684-2142

For Official Use Only: Disclosure of Site Locations Prohibited (43 CFR 7.18)

Class I Cultural Resource Desktop Analysis

Bill Sanderson Gas Processing Plant

Williams County

T154N-R104W Section(s): 27, 34, 35

N

0 0.25 0.5 1 1.5 2 Kilometers

0 0.25 0.5 1 1.5 2 Miles

OUTRIGGER ENERGY

Figure 2

Resource Locations

Document Name: OUT-004_Desktop_24Jan2020

OE2 087

User Name: rmashak Date Saved: 2/17/2020 4:48:54 PM

Attachment A: Tables

Table 1. Previous Inventory

Manuscript Number	Title	Date	T-R, Sec.	In Direct APE	Within Indirect APE
5904	Results of the 1991-1992 Class III Cultural Resource Inventory of Selected Bureau of Land Management Tracts, Divide, McHenry, Williams, Pierce, McKenzie, Ward, Benson, Grant, Sheridan, and McLean Co., North Dakota Vol. I & II	1992	T153N-R103W, Sec. 9	No	Yes
10556	Bainville: A Cultural Resource Inventory of a 0.25 Mile Segment of U.S. Highway 2 in Williams Co., ND	2008	T154N-R104W, Sec. 27	No	Yes
11545	Miller Environmental: Stateline Cell Tower: A Class III Cultural Resource Inventory in Williams Co., ND	2010	T154N-R104W, Sec. 23, 24	No	No
12256	Williams County Rural Water Development Phase V Improvements: A Class III Cultural Resource Inventory, Williams Co., ND.	2010	T154N-R103W, Sec. 21	No	No
12818	WBI Holding's Stateline Pipeline: A Class III Cultural Resources Inventory in Williams County, North Dakota	2011	T154N-R104W, Sec. 26, 35 T153N-R104W, Sec. 2	No	Yes
12829	A Class I and Class III Cultural Resource Inventory of the ONEOK Rockies Midstream Stateline NGL Pipeline, Williams County, North Dakota	2011	T154N-R104W, Sec. 25, 35, 36 T153N-R104W, Sec. 2	No	Yes
005204	A Gravel Pit Near Belcourt and a Gaming Hall at the State Line: Intensive Cultural Resources Inventories of Proposed Projects for the Turtle Mountain Agency, Rolette and Williams Counties, North Dakota	1990	T154N-R104W, Sec. 27	No	Yes
007279	Results of a Class II and Class III Cultural Resource Inventory for NDDOT Project Area NH-7-002(038)000, Williams County, ND	1998	T154N-R104W, Sec. 25, 26, 27	No	Yes
008463	Cultural Resource Investigation Williston To Wolf Point Transmission Line Roosevelt Co., MT & Williams Co., ND	2002	T154N-R104W, Sec. 22, 23	No	Yes
013260	A Class III Cultural Resource Inventory of the Proposed Telecommunications Tower ND01 Round Prairie, Williams County, North Dakota	2012	T154N-R103W, Sec. 30	No	No
013271	A Class I and Class III Cultural Resource Inventory of the EOG Resources Hardscrabble #14-0607H and #22-0607H Well Pad and Access Road, Williams County, North Dakota	2012	T154N-R103W, Sec. 31 T153N-R103W, Sec. 6	No	No
014026	WI-1041 Class III Inventory Report	2013	T154N-R103W, Sec. 29, 30	No	No
017403	Cenex Pipeline, LLC Refined Fuels Pipeline: A Class III Cultural Resource Inventory in Williams, Mountrail, and Ward Counties, North Dakota	2017	T154N-R103W, Sec. 21, 28, 33 T153N-R103W, Sec. 4, 5, 6, 7	No	No
017770	A Cultural Resource Survey for the Marley-Bainville 115 kV Transmission Line in Williams County, North Dakota	2018	T153N-R104W, Sec. 3	No	Yes

OE2 088

Attachment A: Tables

Table 2. Previously Recorded Sites

Smithsonian No.	Eligibility Recommendation	Description	T-R, Sec.	Surface Ownership	Manuscript Number	Project Title	In Direct APE	Within the Indirect APE
32WI00332	Unevaluated	Stone circle	T153N- R104W, Sec. 10	BLM Tract 52	005904	910821a; Class III Cultural Resource Inventory of Selected Isolated Tracts of BLM Public Lands in North Dakota	No	No
32WI00333	Unevaluated	Stone circle	T153N- R104W, Sec. 10	BLM Tract 52	005904	910821a; Class III Cultural Resource Inventory of Selected Isolated Tracts of BLM Public Lands in North Dakota	No	No
32WI00997	Not Eligible (avoidance)	Two cairns and a unique rock cluster	T154N-R104W, Sec. 27	Private	010556	MDOT Bainville: A Cultural Resource Inventory of a Segment of US Highway 2, Williams County, North Dakota.	No	Yes
32WI00998	Not Eligible	Railroad grade; Railroad tracks; Railroad spur; Railroad siding; Road; Highway; Trail	T154N-R104W, Sec. 27	Private	010556	MDOT Bainville: A Cultural Resource Inventory of a Segment of US Highway 2, Williams County, North Dakota.	No	Yes
32WI00999	Not Eligible	Farm; Farmstead	T154N-R104W, Sec. 27	Private	010556	MDOT Bainville: A Cultural Resource Inventory of a Segment of US Highway 2, Williams County, North Dakota.	No	Yes
32WI01000	Not Eligible	Fairgrounds; Rodeo grounds	T154N-R104W, Sec. 27	Private	010556	MDOT Bainville: A Cultural Resource Inventory of a Segment of US Highway 2, Williams County, North Dakota.	No	Yes
32WI01175	Unevaluated	Cairn, eight stone circles	T154N-R104W, Sec. 35	Private	NA[1]	A Class I and Class III Cultural Resource Inventory of the Stateline Pipeline, Williams County, North Dakota	No	Yes
32WI01176	Unevaluated (avoidance)	Rock lined depression	T153N- R104W, Sec. 2	Private	012818	WBI - Stateline PL: A Class III Cultural Resource Inventory in Williams County, North Dakota	No	Yes

[1] *NA denotes the information was not available through the SHSND*

OE2 089

Attachment A: Tables

32WI01177	**Unevaluated (avoidance)**	**Stone circle**	**T153N- R104W, Sec. 2**	**Private**	**012818**	**WBI - Stateline PL: A Class III Cultural Resource Inventory in Williams County, North Dakota**	**No**	**Yes**
32WI01178	Unevaluated (avoidance)	Four stone circles	T153N- R104W, Sec. 2	Private	012818	WBI - Stateline PL: A Class III Cultural Resource Inventory in Williams County, North Dakota	No	No
32WI01179	Unevaluated pending tribal consulation	Nine stone circles and ground stone tool	T153N- R104W, Sec. 2	Private	12829	A Class I and Class III Cultural Resource Inventory of the ONEOK Rockies Midstream Stateline NGL Pipeline, Williams County, North Dakota	No	Yes
32WI02287	Not Eligible	Dump; Sanitary landfill; Sewage treatment plant	T154N- R103W, Sec. 19	Private	NA	200K Rural Distribution Waterline Project: Class III Inventory, Williams County, North Dakota	No	No
32WI02288	Unevaluated pending tribal consulation	Four stone circles and one depression	T154N- R104W, Sec. 24	Private	NA	200K Rural Distribution Waterline Project: Class III Inventory, Williams County, North Dakota	No	No
32WIX0107	NA	Post Office	T154N- R103W, Sec. 19	Private	NA	Unknown	No	No
32WIX0776	Unevaluated	Farm; Farmstead	T154N- R103W, Sec. 19	Private	NA	200K Rural Distribution Waterline Project: Class III Inventory, Williams County, North Dakota	No	No
32WIX0778	Unevaluated	Farm; Farmstead	T154N- R104W, Sec. 23	Private	NA	200K Rural Distribution Waterline Project: Class III Inventory, Williams County, North Dakota	No	Yes

OE2 090

Attachment A: Tables

Table 3. General Land Office Land Patent Records

Name	Issue Date	T/R, Sec.	Authority	Accession No.
Azure, Israel	6/29/1914	T154N-R104W, Sec. 27	1865 Indian Fee Patent	418283
	6/20/1910	T154N-R104W, Sec. 27	1880 Indian Trust Patent	138798
Marion, Beatrice	6/20/1910	T154N-R104W, Sec. 27	1880 Indian Trust Patent	138800
Turcotte, Daniel Turcotte, Rosin Turcotte, William	4/19/1918	T154N-R104W, Sec. 34	1865 Indian Fee Patent	626289
Turcotte, Joseph	6/20/1910	T154N-R104W, Sec. 34	1880 Indian Trust Patent	138624
	7/20/1926	T154N-R104W, Sec. 34	1865 Indian Fee Patent	982559
	6/20/1910	T154N-R104W, Sec. 34	1880 Indian Trust Patent	138627

APPENDIX E
AGENCY CORRESPONDENCE

February 17, 2020

Federal Aviation Administration
FAA Logistics Center
6500 S. MacArthur Boulevard
Bldg 2 (LSF), Mail Stop AML030
Oklahoma City, OK 73169

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

Upon completion of the project, OE2 will own and operate a gas gathering and processing system that will process raw, wellhead gas from wells in Williams and additional counties into marketable natural gas and natural gas liquids (NGLs). The project will feed products into third-party interstate natural gas and NGL pipelines that service the Rocky Mountains, Midwest, and Gulf regions. The project is both economically and environmentally impactful for the state, as the project will not only add valuable midstream service for exploration and production companies in the region, but also significantly reduce flaring and associated volatile organic compound (VOC) emissions in the state. At full capacity, the plant is expected to reduce state-wide VOC emissions by approximately 25,000 tons per year.

The Project will be located approximately 15 miles West of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota. Please see the attached Project Overview Map for the project location and details.

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

1801 California Street, Suite 1100
Denver, CO 80202
d|303.297.5791
o| 303.237.6601
m| 303.909.7359

© 2020 Kleinfelder

February 17, 2020

Job Service North Dakota
PO Box 5507
Bismarck, ND 58506-5507

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

1801 California Street, Suite 1100
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d|303.297.5791
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m| 303.909.7359

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February 17, 2020

Wayne Stenehiem
North Dakota Attorney General
Office of the Attorney General
600 East Boulevard Avenue, Department 125
Bismarck, ND 58505-0040

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

Dear Mr. Stenehiem,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

1801 California Street, Suite 1100
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February 17, 2020

North Dakota Department of Agriculture
600 E Boulevard Ave Dept 602
Bismarck, ND 58505-0020

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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The Project will be located approximately 15 miles West of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota. Please see the attached Project Overview Map for the project location and details.

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602 **OE2 099**

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

1801 California Street, Suite 1100
Denver, CO 80202
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o| 303.237.6601
m| 303.909.7359

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February 17, 2020

North Dakota Department of Career and Technical Education
600 E Boulevard Ave #15
Bismarck, ND 58505

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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February 17, 2020

North Dakota Department of Commerce
1600 E Century Ave Suite #2
Bismarck, ND 58503

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602 **OE2 103**

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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February 17, 2020

North Dakota Department of Health
600 E Boulevard Ave
Bismarck, ND 58505

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602 **OE2 105**

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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February 17, 2020

North Dakota Department of Human Services
600 E. Boulevard Ave Dept. 325
Bismarck, ND 58505

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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February 17, 2020

North Dakota Department of Trust Lands
1701 N 9th Street
Bismarck, ND 58501

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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m| 303.909.7359

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February 17, 2020

North Dakota Department of Transportation
608 E Boulevard Ave
Bismarck, ND 58505-0700

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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© 2020 Kleinfelder

February 17, 2020

North Dakota Energy Development Impact Office
1707 N 9th Street
Bismarck, ND 58501

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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February 17, 2020

North Dakota Game and Fish
100 N E Bismarck Expressway
Bismarck, ND 58501

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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m| 303.909.7359

© 2020 Kleinfelder

February 17, 2020

North Dakota Geological Survey
1016 E Calgary Ave
Bismarck, ND 58503

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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© 2020 Kleinfelder

February 17, 2020

North Dakota Indian Affairs Commission
600 East Boulevard Avenue #316
Bismarck, ND 58505

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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© 2020 Kleinfelder

February 17, 2020

North Dakota Industrial Commission
State Capitol 14th Floor
600 E Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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m| 303.909.7359

© 2020 Kleinfelder

February 17, 2020

North Dakota Labor Department
600 E Boulevard Ave Ste 406
Bismarck, ND 58505

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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© 2020 Kleinfelder

February 17, 2020

North Dakota Parks & Recreation
1600 E Century Ave Ste 3
Bismarck, ND 58503

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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February 17, 2020

North Dakota Pipeline Authority
600 E Boulevard Ave Dept. 405
Bismarck, ND 58505-0840

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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The Project will be located approximately 15 miles West of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota. Please see the attached Project Overview Map for the project location and details.

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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February 17, 2020

North Dakota State Water Commission
900 E Boulevard Ave
Bismarck, ND 58505

SUBJECT: Proposed Gas Plant
OE2 North, LLC Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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February 17, 2020

North Dakota Department of Environmental Quality
918 E. Divide Avenue, 4th Floor
Bismarck, ND 58501

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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February 17, 2020

Doug Burgum
North Dakota Governor
Office of the Governor
600 East Boulevard Avenue
Bismarck, ND 58505-0001

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

Dear Governor Burgum,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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KLEINFELDER 1801 California Street, Suite 1100, Denver, CO 80202 p | 303.237.6601 f | 303.237.6602 **OE2 133**

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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February 17, 2020

US Fish & Wildlife Service
3425 Miriam Avenue
Bismarck, ND 58501

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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OE2 contracted Grouse Mountain Environmental Consultants (GMEC) to conduct a desktop analyses for natural resources (i.e. wildlife, cultural, and Waters of the United States [WOTUS]) potentially impacted by the construction of the Plant. GMEC also conducted an on-site field assessment on January 29, 2020 to supplement findings from the offsite desktop assessment. The results of the analysis of threatened and endangered species is summarized in the following paragraphs.

GMEC used the USFWS's Information for Planning and Consultation (IPaC) to assess potential impacts to threatened and endangered (T&E) species within the Project Area. IPaC identifies any designated critical habitat within the area as well as any species potentially affected based on the location of their historical ranges and areas of influence (AOI). If a species is identified as potentially affected but no critical habitat is present, it does not necessarily imply suitable habitats associated with that species are present within the Project Area. The IPaC pulled for this project lists six species as potentially affected by activities within the Project Area, these species include: Northern long-eared bat (*Myotis septentrionalis*), Least Tern (*Sterna antillarum*), Piping Plover

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(*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), and Pallid sturgeon (*Scaphirhynchus albus*).

The Northern long-eared bat is primarily associated with mature forests with large decaying or partially dead trees during the breeding season and caves or mines during winter hibernation. The Least Tern nests near water, using primarily riverine sandbars or salt flats from low tide during the breeding season in the interior U.S. The majority of Piping Plovers in the Great Plains use shorelines along small, alkaline lakes. Suitable habitat includes large beaches with highly clumped vegetation that provides low overall cover. Red Knots require elevated ridges and slopes near wetlands and lakes where food is abundant during the breeding season and winter in coastal areas, such as tidal flats, estuaries, or bays. Pallid sturgeon are large river obligates that require year-round water flows. Whooping Cranes nest in dense emergent vegetation around shallow ponds, wet prairies, or freshwater marshes. During spring and fall migration, the Aransas/Wood Buffalo population of Whooping Cranes use marshes, salt flats, lagoons, barrier islands, palustrine wetlands as well as stubble/grain fields and cropland adjacent to or near wetland features. During the wetland survey conducted January 29, 2020, GMEC biologists assessed potential suitable habitat for relevant T&E species within the Project Area.

No currently defined critical habitats are located within the Project Area and no birds of conservation concern are expected. Further, no suitable habitats for Northern long-eared bat, Least Tern, Piping Plover, Red Knot, or Pallid sturgeon were identified within the Project Area. The Project is currently located within the area in which 85 percent of migratory sightings of Whooping Crane are recorded for the Aransas/Wood Buffalo population; however, the Plant Site is located outside of the central flyway and in an area where no e-bird sightings of Whooping Cranes have been reported during migration. While the additional parcels of interest located within sections 34 and 35 T154N-R104W currently encompass cropland, no critical stopover habitats are designated nearby. Field surveys indicated that small wetlands may be present in the northern portion of the parcel boundary, within 1 kilometer of the cropland. However, the use of the Project Area by Whooping Cranes as a stopover during migration is unlikely.

On behalf of OE2, Kleinfelder is seeking comments regarding the referenced project in compliance with the North Dakota Energy Conversion and Transmission Facility Siting Act. We request comments be submitted by March 17, 2020. Please call me at 303-297-5791 if you have any questions.

Sincerely,

KLEINFELDER

Nan Elzinga, PE
Project Manager III

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Denver, CO 80202
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m| 303.909.7359

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February 17, 2020

Williams County Commission
Planning and Zoning Division
PO Box 2047
Williston, ND 58802-2047

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

To Whom it May Concern,

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant) that will consist of a processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The processing capacity of the Plant will be up to 250 million standard cubic feet per day (MMscfd), which exceeds the PSC's processing capacity criteria and thus, defines the Plant as a gas or liquid energy conversion facility under North Dakota Century Code (N.D.C.C.) Section 49-22.1-01(6).

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Project Manager III

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GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS

February 17, 2020

US Army Corps of Engineers
3319 University Drive
Bismarck, ND 58504

SUBJECT: Proposed Gas Plant
OE2 North LLC, Bill Sanderson Gas Processing Plant Project

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OE2 contracted Grouse Mountain Environmental Consultants (GMEC) to conduct a desktop analysis for natural resources (i.e. wildlife, cultural, and Waters of the United States [WOTUS]) potentially impacted by the construction of the Plant. Based on conversations with North Dakota USACE, GMEC conducted an offsite assessment of wetlands and hydrologic characteristics based on aerial images and available spatial data. GMEC also conducted an on-site field assessment on January 29, 2020 to supplement findings from the offsite wetland assessment. In concurrence with the on-site field visit, GMEC also completed an assessment of wildlife resources. The findings of the desktop analysis and field surveys are summarized in the attached ***Wildlife and Waters of the US Field Assessment and Offsite Assessment Report*.**

Tel: 307-684-2112
760 W. Fetterman St.
Buffalo, WY 82834
grousemtnconsultants.com

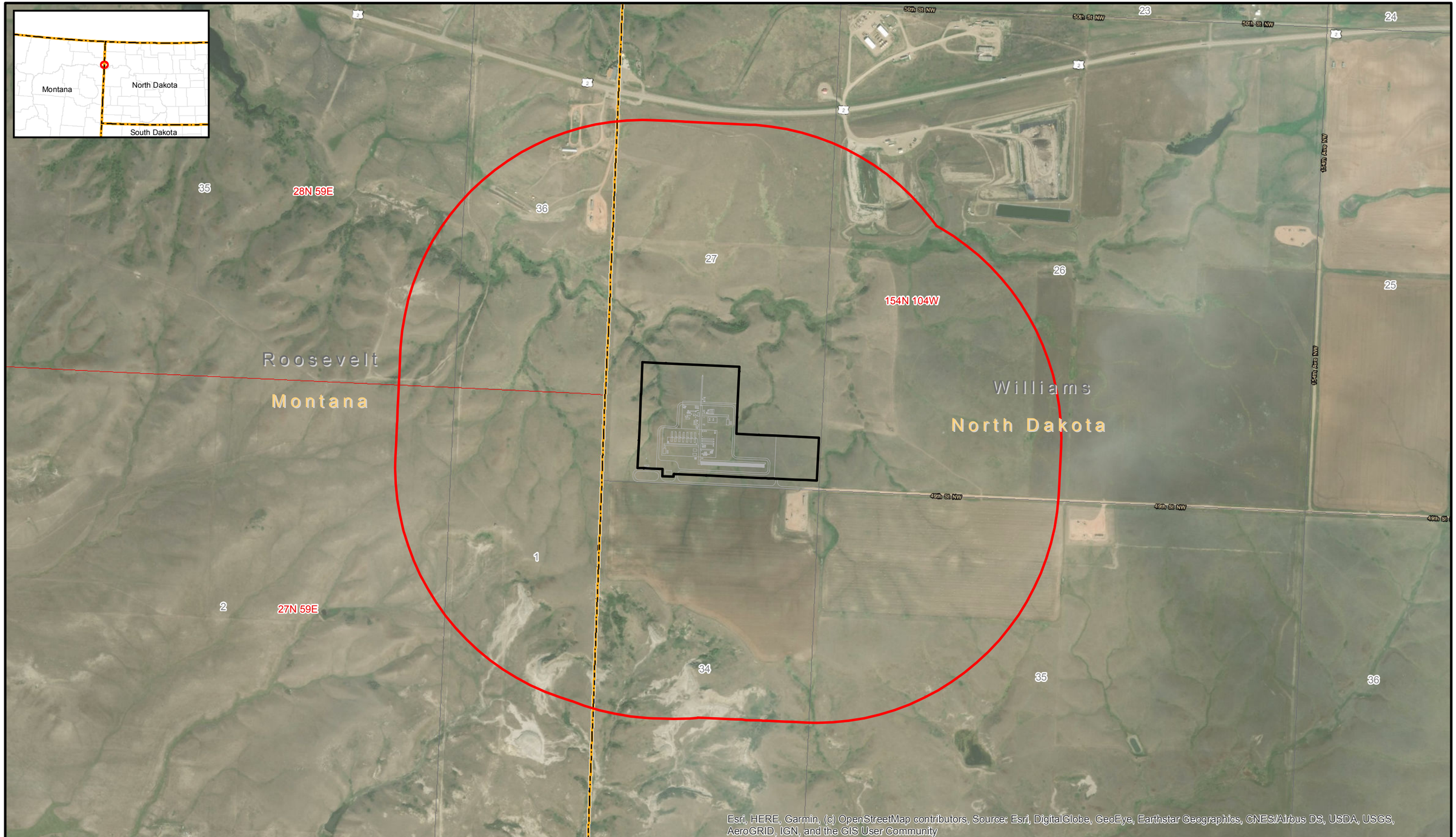
GMEC is requesting your review and comment on the attached report summarizing GMEC's analysis of the potentially jurisdictional features within the Project Site and how OE2 should proceed with potential jurisdictional concerns. Please contact Kirstie Lawson, GMEC Wildlife Biologist, at 307-684-2112 with any questions or comments regarding the proposed Plant.

Sincerely,

Grouse Mountain Environmental Consultants (GMEC)

Kirstie Lawson
Wildlife Biologist
Grouse Mountain Environmental
Office: 307-684-2112
Cell: 406-544-6902
klawson@gmecwy.com

Enclosures: Project Overview Map
Wildlife and Waters of the US Field Assessment and Offsite Assessment Report



Date: 02/17/2020 User: ALeonard Path: \\azrgisstorp01\GIS_Projects\Client\OutriggerEnergy\20203533_SandersonGasPlantMXD\Fig1_Overview.mxd

LEGEND

- Facility Boundary
- Study Area
- Site Features
- County Boundary
- Township/Range
- Section

0 500 1,000 2,000
Feet

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OUTRIGGER ENERGY

PROJECT NO.	20203533
CREATED:	02/17/2020
CREATED BY:	A. Leonard
CHECKED BY:	A. Daniel
FILE NAME:	Fig1_Overview.mxd

Project Overview Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE
1

Bill Sanderson Gas Processing Plant Project
Wildlife and Waters of the US
Field Assessment and Offsite Assessment Report

Prepared For:

OE2 North LLC
1200 Seventeenth Street, suite 900
Denver, CO 80202

Prepared by:

Katie Taylor
Wildlife Biologist
Grouse Mountain Environmental Consultants
760 West Fetterman
Buffalo, WY 82834
307-684-2112
ktaylor@gmecwy.com

Updated
February 17, 2020

TABLE OF CONTENTS

1.0 INTRODUCTION 4

1.1 Project Description 4

1.2 Jurisdictional Waters and Wetlands 4

1.3 Federally Protected Wildlife 4

2.0 ENVIRONMENTAL SETTING 5

3.0 METHODS AND RESULTS 6

3.1 Jurisdictional Waters and Wetlands 6

3.1.1 Methods 6

3.1.2 Results 6

3.2 Threatened and Endangered Species 8

3.2.1 Methods 8

3.2.2 Results 9

4.0 SUMMARY AND RECOMMENDATIONS 9

4.1 Jurisdictional Waters and Wetlands 9

4.2 Threatened and Endangered Species 10

5.0 References 11

6.0 Qualifications 13

TABLES

Table 1. Hydrologic Unit Codes (HUC) for Bill Sanderson Location 5

Table 2. Bill Sanderson Gas Processing Plant - Antecedent Precipitation 7

Table 3. Bill Sanderson Gas Processing Plant - Offsite Assessment Results 8

FIGURES

Figure 1. OE2: Bill Sanderson Gas Processing Plant Offsite Wetland Assessment Report Map 14

APPENDICES

Appendix A. Bill Sanderson Gas Processing Plant Field Survey Plant List 15

Appendix B. Bill Sanderson Field Survey Drainage Photographs 16

1.0 INTRODUCTION

1.1 Project Description

OE2 North LLC (OE2) is planning to develop the Bill Sanderson Gas Processing Plant Project (Bill Sanderson) facilities pad on private surface in Williams County, North Dakota. The Bill Sanderson project will be located somewhere in sections 27, 34, and/or 35 T154N-R104W. The Bill Sanderson facility will be approximately 40-50 acres and include gas processing and compression equipment. OE2 contracted Grouse Mountain Environmental Consultants (GMEC) to conduct desktop analyses for wildlife, cultural, and Waters of the United States (WOTUS) natural resources potentially impacted by the construction of the Bill Sanderson facility. GMEC previously submitted a resource desktop analysis summary report to Trent Taylor on January 31, 2020 (GMEC 2020). Preliminary findings were outlined where two (2) unknown tributaries within section 27 were identified as a potential jurisdictional concern. As construction is anticipated to occur prior to the growing season, not allowing for an official wetland delineation to be conducted, OE2 contracted GMEC to conduct an offsite wetland assessment using long-term aerial imagery, hydric soils information, and other hydrologic data to draw inference on jurisdictional water boundaries. GMEC also conducted an on-site field assessment on January 29, 2020 to supplement findings from the offsite wetland assessment. In concurrence with the on-site field visit, GMEC also completed an assessment of wildlife resources.

1.2 Jurisdictional Waters and Wetlands

Under section 404 of the Clean Water Act (CWA) of 1972, the U.S. Army Corps of Engineers (USACE) may issue permits for the discharge of dredge or fill material into WOTUS (Clean Water Act 2002). Following the repeal of the 2015 rule in October 2019, the Department of the Army and the Environmental Protection Agency finalized the Navigable Waters Protection Rule (Final Rule). The Final Rule was intended to clarify the pre-2015 regulatory language and definition of WOTUS. Under the Final Rule released within a pre-publication notice published January 23, 2020 (33 CFR Part 328), the term "waters of the United States" means: 1) Territorial seas, waters which are currently used, or were in the past, or may be susceptible to use in interstate or foreign commerce, including waters which are subject to the ebb and flow of the tide; 2) Tributaries; 3) Lakes and ponds, and impoundments of jurisdictional waters; and 4) Adjacent wetlands. Within the Final Rule, the agencies clarify twelve (12) exclusions from the definition of WOTUS including ephemeral streams, swales, gillies, rills, and pools (see the pre-publication notice for full list of exclusions and additional detail regarding the Final Rule). The Final Rule is expected to take effect 60 days following the publication in the federal registry. Until then, the pre-2015 definition of WOTUS will still be in effect (40 CFR 230.3). In 2017, under section 404 of the CWA, the USACE issued general permits authorizing activities resulting in minimal impacts to WOTUS, known as Nationwide Permits (NWP). NWP 12 or NWP 39 may apply to this project given determination by USACE. General conditions still apply and a preconstruction notification (PCN) may be required (USACE 2017). Additionally, a 401 certification is required by the North Dakota Department of Health (NDDoH) for all NWP permits. Please see USACE (2017) and the NDDoH website for detailed guidelines regarding NWPs and section 401 certification.

1.3 Federally Protected Wildlife

Under the Endangered Species Act (ESA) of 1978, the U.S. Fish and Wildlife Service (USFWS) regulates all terrestrial and freshwater plant and animal species listed as threatened or endangered. Section 9 of the

ESA prohibits the "take", export/import, possession, and other specified activities of any federally listed endangered or threatened species. The term "take" is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct". Any company/person who violates provisions of the ESA are subject to penalties and enforcement outlined within section 11 of the ESA (United States Government 1988, USFWS 2013).

The USFWS also regulates the "take", export/import, possession, and other specified activities of migratory bird species listed under the Migratory Bird Treaty Act (MBTA) of 1918 (United States Government 1918, USFWS 2017). According to the Solicitor's Opinion M-37041 (United States Government 2017a), the MBTA prohibits "incidental take" of migratory birds, where "incidental take" is defined as "take that results from an activity but is not the purpose of that activity." However, in accordance with the Solicitor's Opinion M-37050 (United States Government 2017a), the MBTA's prohibition of "take" applies only to "direct and affirmative purposeful actions that reduce migratory birds, their eggs, or their nests, by killing or capturing, to human control."

Bald and Golden Eagle Protection Act (BGEPA) of 1978 prohibits knowingly taking, or taking with wanton disregard for the consequences of an activity, any bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*) or their body parts, nests, chicks or eggs, which includes collection, possession, molestation, disturbance, destruction, or killing, where "disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." (United States Government 1978, USFWS 2012*a*).

2.0 ENVIRONMENTAL SETTING

The Bill Sanderson facility is approximately 15 miles west of Williston, North Dakota and located along the North Dakota-Montana border. The local climate can be characterized by long cold winters and short hot summers. Average temperatures range from 1.7 °F to 21.3 °F in January and from 57.0 °F to 85.4 °F in July. Mean annual precipitation is 14.17 inches (WRCC 2016). Elevation of the project area ranges from 2,180 to 2,270 feet. The project area is dominated by loamy ecosites with minor components of limy and limy steep ecosites. Many other ecosites occur within the project area, but at very low occurrences. Horse Tied Creek lies 0.8 mile south of the project area. The majority of the project area falls within the Lower Little Muddy Creek (HUC-12 [100600050704]) subwatershed of the Missouri-Poplar basin (HUC-6[100600]); a small portion of the additional survey areas in the south lie in the Horse Tied Creek (HUC-12 [100600050703]; Table 1) subwatershed of the Missouri-Poplar basin. Livestock grazing and mineral development are the predominant land uses in the area.

Table 1. Hydrologic Unit Codes (HUC) for Bill Sanderson Location

Project Name	Basin (HUC-6)	Subbasin (HUC-8)	Watershed (HUC-10)	Subwatershed (HUC-12)
Bill Sanderson Gas Processing Plant	Missouri-Poplar (100600)	Charlie-Little Muddy (10060005	Little Muddy Creek (1006000507)	Lower Little Muddy Creek (100600050704) Horse Tied Creek (100600050703)

OE2 146

3.0 METHODS AND RESULTS

3.1 Jurisdictional Waters and Wetlands

3.1.1 Methods

Prior to conducting field surveys, GMEC conducted an offsite wetland and hydrology assessment using spatial layers from applicable state and federal agencies. Hydrologic watershed data was acquired from the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD). Wetland data was obtained from the USFWS National Wetlands Inventory (NWI; USFWS 2012b). Spatial data for rivers, streams, and tributaries were acquired from the USGS National Hydrologic Dataset (NHD). Soils data was acquired from the Natural Resources Conservation Service (NRCS) Web Soils Survey (WSS; SSS-NRCS-USDA 2020). NHD in combination with the WBD and NWI were overlaid with the provided parcel boundary and additional survey area in ArcGIS to assess potential areas of jurisdictional concern. However, as these datasets are based on aerial or satellite imagery and infrequently updated, they may not accurately represent resources on the ground. GMEC used the North Dakota NRCS's *State Guidance for Wetland Determinations Including State Offsite Methods* (NRCS 2017) and Minnesota's USACE *Guidance for Offsite Hydrology/Wetland Determinations* (USACE 2016) to delineate wetlands within these areas of concern. Imagery used for offsite assessments was acquired from the National Agriculture Imagery Program (NAIP) and representative of 2009-2010, 2012, and 2014-2019. WSS data was overlaid on these images to assess hydric soils. In areas where hydric soils were present, sample areas were delineated based on changes to vegetation greenness or inundation during years of normal climatic conditions. GMEC calculated the climatic conditions for the three (3) months prior to the month the imagery was taken for each year according to the procedure outlined in the NRCS *Hydrology Tools for Wetland Determination* (NRCS 1997) and using the NRCS WETS monthly precipitation data. GMEC determined wetland status of sample units by comparing hydric soils, whether the area had previously been classified as a wetland, and the percentage of images across years that had indicators of wetland hydrology (i.e. greener color tones in vegetation).

To supplement the offsite determination, GMEC conducted a field assessment on January 29, 2020. Due to the time of year and snow cover present, wetland delineation in accordance with the Great Plains Regional Supplement to the Corp of Engineers Wetland Delineation Manual protocols to assess jurisdictional boundaries (USACE 2010) and assessment of OHWM/bed and bank features were not possible in the field. However, GMEC biologists were able to identify major vegetation along the drainages and overall topography to assist in offsite assessments.

3.1.2 Results

During the initial desktop analysis (GMEC 2020), NWI-designated wetlands were identified within the northern half of the parcel boundary (Lot 3 and NESE, Section 27, T154N-R104W). These wetlands are classified as intermittent riverine wetlands and are associated with an intermittent tributary of Little Muddy Creek. Additionally, one (1) NWI wetland extends into the additional survey area to the south (NWNW Section 35, T154N-R104W). No NWI or NHD data was present within the southern portion of the parcel boundary in Section 27; however, two (2) distinct channels running south to north are visible on aerial imagery (Section 27, T154N-R104W). These channels will be referred to throughout as the western drainage (Lots 3 and 4, Section 27, T154N-R104W) and the eastern drainage (NESE and SESE,

Section 27, T154N-R104W). Although these drainages are not identified within the NHD or NWI datasets, spatial data shows evidence of a high water table and potential water pooling.

Table 2. Bill Sanderson Gas Processing Plant - Antecedent Precipitation

Imagery	Imagery Date[1]	Climatic Condition
2019 NAIP	7/25/2019	Normal
2018 NAIP	July 15 – Oct. 23, 2018	Normal
2017 NAIP	10/4/2017	Wet
2016 NAIP	7/25/2016	Normal
2015 NAIP	9/14/2015	Normal
2014 NAIP	8/19/2014	Dry
2012 NAIP	6/27/2012	Wet
2010 NAIP	6/29/2010	Normal
2009 NAIP	June – Sept. 2009	Normal

[1]For years where no imagery date was found, climatic conditions were calculated for all possible three-month prior time periods. All calculations gave the same result, so the data was included.

Analysis of antecedent precipitation for each year of NAIP imagery showed six (6) years of normal climatic conditions, two (2) years that were wetter than normal, and one (1) year that was drier than normal (Table 2). According to WSS data, hydric soils were not present within the corresponding Map Unit for the western drainage within the southern portion of the parcel boundary (Lots 3 and 4, Section 27, T154N-R104W). The ground assessment of the drainage in question indicated steep slopes were present along the extent of the reach and would likely not allow for significant water accumulation and associated wetland formation before draining directly into the intermittent drainage downstream. Additionally, the majority of vegetation present within the drainage was woody upland vegetation visible above the snow cover, a strong indication that no wetlands were associated with this drainage. As such, an offsite wetland assessment was not conducted for the western most drainage of concern.

WSS data identified the Map Unit encompassing the eastern drainage as having potential for hydric soils. GMEC identified sixteen (16) sampling units using wetland indicators on aerial imagery during years of normal circumstances (Table 3; Figure 1). During initial analysis, four (4) units were determined not to be wetlands, as they showed indications of wet signatures in less than half of the images from "normal" years (Sampling Units 12 and 14-16; Table 3). Ground surveys indicated that the wet signatures in eleven (11) units were an artefact of patches of western snowberry (*Symphoricarpos occidentalis*; an upland shrub) producing deep color tone differences in the imagery (Sampling Units 1-11; Table 3). Based on the vegetation that was identified during the onsite field assessment, it is likely that western snowberry and other upland plants comprise the majority of the vegetative cover within this eastern drainage (Appendix A), eliminating the potential for classification as wetland sites. However, at one (1) of these sites (Sampling Unit 9), the snowberry was located on the edge of a potential depression with facultative vegetation (*Rosa* spp., *Deschampsia caespitosa*) present. One (1) other site lacked western snowberry but still showed indicators of wet signatures in >80% of the imagery from "normal" years (Sampling Unit 13). The same facultative plants were identified in this sampling unit, suggesting some level of water

tolerance. Due to snow cover and frozen ground conditions, GMEC biologists were unable to dig soil pits to assess the presence of hydric soils at this site. Based on this analysis, fourteen (14) sampling units have been classified as not a wetland and two (2) units (Sampling Units 9 and 13) have been classified as "unknown" features due to the presence of facultative vegetation. However, a complete inventory of vegetation and analysis of hydric soils and hydrology indicators during the growing season may verify that these areas are not wetlands.

Table 3. Bill Sanderson Gas Processing Plant - Offsite Assessment Results

Sampling Unit	Hydric Soils Present	Identified NWI	% Wet Signatures	Key Vegetative Characteristics	Wetland?
1	Possible	No	100	Snowberry	No
2	Possible	No	83.3	Snowberry	No
3	Possible	No	66.6	Snowberry	No
4	Possible	No	100	Snowberry	No
5	Possible	No	100	Snowberry	No
6	Possible	No	50	Snowberry, *Deschampsia*	No
7	Possible	No	100	Snowberry	No
8	Possible	No	100	Snowberry	No
9	Possible	No	100	Snowberry, *Deschampsia*	Unknown
10	Possible	No	66.6	Snowberry	No
11	Possible	No	83.3	Snowberry	No
12	Possible	No	0		No
13	Possible	No	83.3	*Deschampsia*	Unknown
14	Possible	No	33.3		No
15	Possible	No	33.3		No
16	Possible	No	33.3		No

3.2 Threatened and Endangered Species

3.2.1 Methods

GMEC used the USFWS's IPaC: Information for Planning and Consultation to assess potential impacts to threatened and endangered (T&E) species within the project area. IPaC identifies any designated critical habitat within the area as well as any species potentially affected based on the location of their historical ranges and Areas of Influence (AOI). If a species is identified as potentially affected but no critical habitat is present, it does not necessarily imply suitable habitats associated with that species are present within the project area. IPaC lists six (6) species as potentially affected by activities within the project area: Northern long-eared bat (*Myotis septentrionalis*), Least Tern (*Sterna antillarum*), Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), and Pallid sturgeon (*Scaphirhynchus albus*). The Northern long-eared bat is primarily associated with mature forests with large decaying or partially dead trees during the breeding season and caves or mines during winter hibernation. The Least Tern nests near water, using primarily riverine sandbars or salt flats from low tide during the breeding season in the interior U.S. The majority of Piping Plovers in the Great Plains use shorelines along small, alkaline lakes. Suitable habitat includes large beaches with highly clumped vegetation that provides low overall cover. Red Knots require elevated ridges and slopes near wetlands and lakes where food is abundant during the breeding season and winter in coastal areas, such as tidal flats, estuaries, or bays.

Pallid sturgeon are large river obligates that require year-round water flows. Whooping Cranes nest in dense emergent vegetation around shallow ponds, wet prairies, or freshwater marshes. During spring and fall migration, the Aransas/Wood Buffalo population of Whooping Cranes use marshes, salt flats, lagoons, barrier islands, palustrine wetlands as well as stubble/grain fields and cropland adjacent to or near wetland features. During the field survey conducted January 29, 2020, GMEC biologists assessed potential suitable habitat for relevant T&E species within the project area.

3.2.2 Results

No currently defined critical habitats are located within the Bill Sanderson project area and no birds of conservation concern are expected. Further, no suitable habitats for Northern long-eared bat, Least Tern, Piping Plover, Red Knot, or Pallid sturgeon were identified within the project area. The project is currently located within the area in which 85% of migratory sightings of Whooping Crane are recorded for the Aransas/Wood Buffalo population; however, the Bill Sanderson project area is located outside of the central flyway and in an area where no e-bird sightings of Whooping Cranes have been reported during migration. While the additional parcels of interest located within sections 34 and 35 T154N-R104W currently encompass cropland, no critical stopover habitats are designated nearby. Field surveys indicated that small wetlands may be present in the northern portion of the parcel boundary, within 1km of the cropland. However, the use of the Bill Sanderson project area by Whooping Cranes as a stopover during migration is unlikely.

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Jurisdictional Waters and Wetlands

Offsite assessments were conducted by GMEC using available data and supplemental data retrieved during an onsite field assessment conducted outside of the growing season. Data not otherwise specified within the outlined methods above may not have been made available to GMEC and, thus, not considered in the overall evaluation of WOTUS presented in this report. Results and recommendations outlined within this report are provided based on GMEC's best assessment of hydrologic resources from aerial imagery and an onsite field visit; however, field conditions did not allow for all wetland indicators nor other features associated with WOTUS to be assessed.

The western drainage (Lots 3 and 4, Section 27, T154N-R104W) is characterized by steep slopes and woody upland vegetation, likely not allowing for significant water accumulation and wetland formation before reaching the intermittent drainage downstream. This drainage is likely ephemeral. Under the new Navigable Waters Protection Rule (which will likely go into effect sometime in April), ephemeral drainages will be considered non-jurisdictional. The upstream drainages that extend into the southern crop fields within sections 34 and 35 were characterized by little to no visibly distinct channel (Appendix B), indications that the function of these portions of the drainage may have been altered by previous cultivation of croplands. Additionally, these sections appear to have been developed for agricultural production prior to December 1985 (according to aerial imagery), potentially resulting in a designation as non-jurisdictional waters according to the Final Rule (33 CRF Part 328- pg. 324).

Based on offsite analysis of the eastern drainage (NESE and SESE, Section 27, T154N-R104W), several sampling units showed consistent soil saturation, indicated by an increase in the greenness of vegetation across all years of NAIP imagery. However, field surveys indicated that much of this increased greenness

is likely due to the presence of western snowberry, an upland shrub. Some remnants of wetland vegetation were identified beneath the snow in certain areas, though it did not appear to make up a dominant proportion of vegetation. Specifically, fourteen (14) of the sampling units within the eastern drainage were characterized by a predominance of snowberry and classified as not a wetland. Two (2) of the total sampling units were classified as wetland status "unknown" due to consistent wetland signatures present in over half of the imagery years assessed as well as a high prevalence of facultative vegetation and lack of upland shrubs. Although, there is the potential for wetland vegetation indicators to be present within these two sampling units, hydric soils and hydrology indicators were unable to be properly assessed in the field. Additionally, assessing ordinary high-water marks was not possible given the amount of the snow cover present; thus, hydrological connection of these "unknown" features to the downstream drainage was unable to be assessed. According to available data acquired during the offsite aerial wetland assessment and the onsite field visit, it is GMEC's opinion that the eastern and western drainages may not be of jurisdictional concern. However, given the onsite assessment was conducted outside of the growing season with 100% snow cover, all hydrologic indicators for determining WOTUS were not considered. Further, determinations of jurisdictional waters are subject to the USACE.

4.2 Threatened and Endangered Species

IPaC indicated six (6) species may be potentially affected by the Bill Sanderson project. However, no critical habitats are currently designated within the project area. Further analysis of habitat requirements for the six (6) listed species suggest no suitable habitats are located within the project boundary and GMEC does not anticipate any issues with T&E species. However, if construction is anticipated to take place from January 15 – September 15, during the raptor breeding season, GMEC recommends a search for raptor nesting activity be conducted. Additionally, if construction is anticipated to take place from April 1 – August 15, GMEC recommends surveys be conducted for ground-nesting passerine birds within the proposed construction footprint.

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6.0 Qualifications

Katie Taylor holds a B.S. degree in Biology (2009) from Seattle Pacific University and a M.S. degree in Rangeland Ecology (2014) from the University of Wyoming. She is currently Lead Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Ms. Taylor has 9 years of experience working in the wildlife field. Her direct work experience includes applied field work and research for universities, private industry, and federal and state agencies. Ms. Taylor has worked on research projects involving raptors, grouse species, songbirds, wolves, and various species of ungulates throughout the continental U.S. More specifically, she has 5 years of experience conducting surveys in accordance with BLM wildlife survey protocols for nesting raptors, sage-grouse and sharp-tailed grouse leks, mountain plover, and other sensitive species in Wyoming. In addition, Ms. Taylor has experience in wildlife data management and GIS support for the Bureau of Land Management – Buffalo Field Office. Ms. Taylor has also completed wetland delineation training and has experience with wetland determinations and working with the USACE for hydrology determinations.

Kirstie Lawson holds a B.S. degree in Wildlife Biology (2012) from the University of Montana and a M. S. degree in Biology (2018) from the University of British Columbia Okanagan. She is currently a Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Ms. Lawson has over 6 years of experience working in the wildlife field. With a focus on grouse research, Ms. Lawson's background also includes conducting research and surveys for mesocarnivores, songbirds, and raptors in the U.S. and Canada. Her previous work has required interacting with various stakeholders, including private landowners, government agencies, and industry.

Gregory Shedd holds a B.S. in Wildlife Biology (2002) from Unity College. He is currently a Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Mr. Shedd has over 15 years of combined experience in the wildlife field. His primary experience is private consulting in Wyoming and surrounding states performing surveys, monitoring and applied research for various stakeholders including private landowners, government agencies, and industry. Mr. Shedd has completed wetland delineation training and has conducted wetland determinations for over 10 years.

FIGURES

Figure 1. OE2: Bill Sanderson Gas Processing Plant Offsite Wetland Assessment Report Map

GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS
760 W. Fetterman Buffalo, WY 82834
Phone: 307.684.2112 Fax: 307.684.2142

OUTRIGGER ENERGY

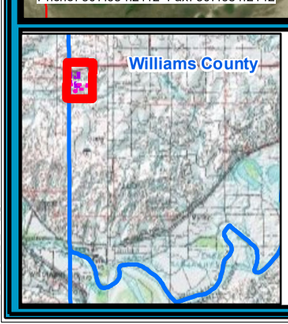

Figure 1. OE2 North LLC: Bill Sanderson Gas Proccessing Plant
Offsite Wetland Assessment Report Map

- Facility Boundary
- Site Features
- Parcel Boundary
- Additional Survey Area
- Northern Extent

Offsite Assessment
- Unknown
- Not Wetland
- National Wetlands Inventory Wetland

Soils
- Not Hydric
- 0-5% Hydric
- Intermittent Stream

Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Scale: 1:6,000
Date: 2/17/2020
Created by: KLawson
File Name: OUT-004_WetlandDelineation_Map_020320

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APPENDICES

Appendix A. Bill Sanderson Gas Processing Plant Field Survey Plant List

Common Name	Scientific Name	Indicator Status	Comment(s)
Western snowberry	*Symphoricarpos occidentalis*	UPL	
Crested wheatgrass	*Agropyron cristatum*	UPL	
Silver buffaloberry	*Shepherdia argentea*	UPL	
Tufted hair grass	*Deschampsia caespitosa*	FACW	
Big bluestem	*Andropogon gerardii*	FACU	
Prairie sandreed	*Calmovilfa longifolia*	UPL	
Common Yarrow	*Achillea milleflium*	UPL	
Tall hedgemustard	*Sisymbrium altissimum*	FACU	
Stiff goldenrod	*Oligoneuron rigidum*	FACU	
Spotted Knapweed	Cenaurea stoebe	UPL	
Rose	*Rosa* spp.	FACU	
Needlegrass	*Nassella* spp.	UPL	
Coneflower	*Echinecea* or *Rudbeckia* spp.	Unknown	Unable to identify to species at this time.
Unknown Sedge	*Carex* spp.	Unknown	Possibly threadleaf sedge, but unable to identify at this time.

Appendix B. Bill Sanderson Field Survey Drainage Photographs

Bill Sanderson: Facing north toward Unit 16 at the fence line

Bill Sanderson: Facing south from Unit 16 at the fence line

Bill Sanderson: Facing south toward Unit 11

Bill Sanderson: Facing north from Unit 11

Bill Sanderson: Facing north toward Unit 15 from fence line

Bill Sanderson: Facing south from Unit 15 at the fence line

Bill Sanderson: Facing northeast in Unit 15

Bill Sanderson: Facing north in Unit 14

Bill Sanderson: Facing north in Unit 14

Bill Sanderson: Facing north in Unit 10

Bill Sanderson: Facing north in Unit 9

Bill Sanderson: Facing south towards Unit 8

Bill Sanderson: Facing northeast in Unit 7

Bill Sanderson: Facing northeast in Unit 6

Bill Sanderson: Facing east in Unit 6

Bill Sanderson: Facing north in Unit 13

Bill Sanderson: Facing north in Unit 2

Bill Sanderson: Facing south in Unit 12

Bill Sanderson: Facing north to Unit 1

Bill Sanderson: Western drainage facing northwest toward main drainage
Easting: 571199; Northing: 5331120

Bill Sanderson: Western drainage facing southeast away from main drainage
Easting: 571199; Northing: 5331120

Bill Sanderson: Western drainage facing south halfway up drainage
Easting: 571212; Northing: 5330982

Bill Sanderson: Western drainage facing south
Easting: 571183; Northing: 5330888

Bill Sanderson: Western drainage facing north from fence line
Easting: 571109; Northing: 5330724

Bill Sanderson: Western drainage facing south from fence line
Easting: 571109; Northing: 5330724

Bill Sanderson: Facing south from road at existing well pad
Easting: 571740; Northing: 5330728

Bill Sanderson: Facing south from road at the eastern crop field
Easting: 572033; Northing: 5330729

APPENDIX F
UNANTICIPATED DISCOVERY PLAN

The purpose of this Unanticipated Discovery Plan (UDP) is to assist OE2 North LLC (OE2) with the avoidance of impacts to historical resourcesas well as compliance with applicable North Dakota laws related to human remains. This UDP is specific to the Bill Sanderson Gas Processing Plant construction project located in North Dakota (Project) and is to be implemented should cultural resources be found after construction has begun on the Project.

The plan detailed here will be implemented by OE2 if previously undiscovered archaeological resources and/or human remains are identified during soil disturbance (excavation, boring, and coring) or during plant construction.

The following steps will be implemented should an unanticipated discovery be made by an OE2 employee, inspector, contractor, or subcontractor during an undertaking:

1) Construction activities within the immediate area of an unanticipated discovery will be halted ("immediate area" is a context-specific measure. However, approximately 30 to 50 feet (10-15 meters) feet should be adequate, although special attention should be given to the possible extension of a new find beyond this buffer zone), and the discovery protected from further disturbance.
2) OE2 will notify their cultural resources consultant (potential consultants are listed at the end of this plan) on the Project who will notify by telephone the North Dakota State Historic Preservation Office (SHPO) contactand, if necessary, the applicable law enforcement agency and coroner (the latter parties will be notified only in the case of a finding of human remains). These notifications will take place within 24 hours of an unanticipated discovery.
3) Specific SHPO suggestions concerning an unanticipated discovery resulting from the notification as described above will be factored in to determining a course of action. That course of action may include any of the following; sufficient archaeological work will be performed on the unanticipated discovery location to stabilize deposits, protect deposits from scavengers or looters, and to collect readily available samples (e.g., for radiocarbon dating) that may help pinpoint the age of deposits or the presence (in the case of burials) of data that may serve to identify lineal or cultural descendants.
4) OE2 and their cultural resources consultant will consult with the SHPO to follow through on the course of action. This may involve further archaeological study or consultation with additional groups.

In the case of an unanticipated discovery of human remains, OE2 will follow all relevant federal and/or state law which may include some of the following:

Federal Statutes and Guidelines:

- Native American Graves Repatriation Act (NAGPRA) – Public Law 101-601; 25 U.S.C. 3001 et seq.
- Advisory Council on Historic Preservation (ACHP) Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects.

North Dakota Statutes and Regulations:

- North Dakota Century Code §23-06-27: Protection of human burial sites, human remains, and burial goods.

- North Dakota Century Code §55-03-06: Protection of prehistoric sites and deposits: upon sale of land by state or municipality archeological or paleontological materials retained.
- North Dakota Century Code §55-03-07: Protection of prehistoric sites and deposits: violation; penalty.
- North Dakota Administrative Code §40-02-03: Protection of prehistoric and historic human burial sites, human remains, and burial goods

OE2 recognizes the importance of providing careful and respectful treatment for human remains recovered as an unanticipated discovery or as part of an archaeological investigation. In the event of an unanticipated discovery of human remains, OE2 will contact the applicable agency to identify and coordinate consultation with the appropriate groups. Lastly, in coordination with the applicable agency, a decision will be made for the treatment of the remains (e.g., reburial, preservation in place, scientific study, sacred rituals, or a combination thereof).

The following table provides the contact information for the OE2 point of contact, the North Dakota SHPO, and potential cultural resources consultants that can be contacted in the event of an unanticipated discovery during the construction of the gas processing plant project.

<table>
<tr><th colspan="2">OE2 Logistics Contacts</th></tr>
<tr><th colspan="2">(Main Contact)</th></tr>
<tr><td colspan="2">Andrew Perdue
Director of Operations and Engineering
1200 17th Street, Suite 900
Denver, CO 80202
720-361-2580
aperdue@outriggerenergy.com</td></tr>
<tr><th colspan="2">North Dakota State Historic Preservation Office</th></tr>
<tr><td colspan="2">The State Historical Society of North Dakota
612 East Boulevard Ave.
Bismarck, North Dakota 58505
701-328-2666
histsoc@nd.gov</td></tr>
<tr><th colspan="2">Cultural Resources Consultants in North Dakota</th></tr>
<tr><td>Metcalf Archaeological Consultants, Inc.
PO Box 2154
Bismarck, ND 58502
701-258-1215

Golder Associates Inc.
400 East Broadway Ave, Suite 300
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701-258-5905

AECOM
1000 E. Calgary Ave Suite 1
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Carlson McCain, Inc.
600 S. 2nd St., Suite 105
Bismarck, ND 58504
701-255-1475</td><td>KLJ
4585 Coleman Street
Bismarck, ND 58503-0431
701-355-8400

Barr Engineering Company
234 West Century Avenue
Bismarck, ND 58503
701-255-5460

SWCA
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Bismarck, ND 58501
701-258-6622

Grouse Mountain Environmental
760 West Fetterman Street
Buffalo, WY 82834
307-684-2112</td></tr>
</table>

APPENDIX G
EMERGENCY ACTION PLAN

Emergency Action Plan

OE 2 North, LLC/Sanderson Gas Plant

720-638-7312

February 10, 2020

Sanderson Gas Plant – South ½ S27, T152N, R104W

Facility Overview

The Sanderson Gas Plant will be a 250 million standard cubic feet per day ("MMSCFD") cryogenic gas processing facility utilized to remove water and Y-grade natural gas liquids ("NGL's") from a raw natural gas stream.

Gas will enter the high-pressure slug catcher, at which point the free hydrocarbon liquids will be separated from the gas stream and sent to the NGL stabilizer. The stabilizer tower will be used to boil off enough vapor to make an NGL product. From the stabilizer system, liquids will be fed down into three (3) 90,000-gallon bullet tanks. From these bullet tanks, booster and pipeline pumps will be provided to pump the liquids up to NGL pipeline pressure.

The gas off the slug catcher will be routed to a horizontal coalescing filter-separator for solids and trace liquids removal before heading to the dehydrator ("dehy") inlet filter coalescer and the remaining cryogenic system. Product residue gas from the plant will be compressed prior to entering the discharge pipeline. Process

Flammable gases and liquified-petroleum-gases ("LPGs") are the primary chemical hazards associated with the plant.

1. OE 2 North, LLC – Sanderson Gas Plant
2. Location – South ½ S27, T152N, R104W
3. Emergency Telephone Numbers

   *IN CASE OF EMERGENCY DIAL 911

   i. Facility Primary, Andrew Perdue 720-361-2580 Cell: 720-244-0456
   ii. Facility Secondary, Wade Janecek 720-361-2549 Cell: 970-270-5584
   iii. Alternate, Grant Burchell 720-361-2589 Cell: 303-941-4435.

   Williston Rural Fire Department: 701-572-3400

   Ambulance Service: 701-572-3400

   Medical – CHI St. Alexius Health: 701-774-7400

4. Agency Notification Non-Emergency
   i. Williston Rural Fire Protection District 701-572-3400
   ii. Williams County Sheriff 701-577-7700
   iii. North Dakota State Highway Patrol 701-328-2467

5. **Surrounding Occupancies & Land Use** – parcel is surrounded by farmland and natural grasses. There is a landfill to the north of the facility.
6. **Personal Protective Equipment Available** – When the facility is operational, all personnel on site will be required to wear hard hats, FR clothing, steel toed boots, and eye protection. Hearing protection will be required in certain areas. There will be an eye wash station and a place to shower.
7. **Location of Emergency Equipment & Supplies** – Fire extinguishers will be placed strategically throughout the site, buildings will have gas detection and fire eyes, a first aid kit will be in the office.
8. **Location & Types of Water Supplies** – A commercial well is being permitted but currently bottled water is the only source of water supply.
9. **Transportation Routes** – Access to the site will be from the east, from 153rd Avenue NW.
10. **Action Items and Response**
    i. Large Liquid Release – The emergency response to a spill of one of these liquids would be to first stop the flow if possible. Try to control the liquids which were spilled such as using dirt to dike the area in front of the spill. If the spill is condensate or LPG do not do anything which might cause a spark. Use pumps or a vacuum truck to remove as much liquid as possible. Remediate the soil as soon as possible to prevent the liquids from going any deeper in the soil. In case of exposure to any of these liquids see the proper Safety Data Sheet ("SDS") for health effects and emergency procedures. SDS for all materials located in the Facility can be found in the SDS manual, located at the OE 2 Sanderson Gas Plant Office.
    ii. Large Gas Release - For large gas releases not associated with normal operations, call 911, isolate the area in question and blow down the pressure. Record all details pertaining to the incident. Notifications should proceed as in any other emergency.
    iii. Fire - At the scene of a fire, OE 2 employees shall take every corrective action necessary to protect life first and then property from danger. The employee shall assess the danger to public, surrounding building occupants, and property by use of visual observance, leak detectors, pressure gauges, etc. Call 911. Evacuate or assist all persons to safety. Blockade area if necessary and maintain communication with fire, police and other public officials that are on the scene.
11. **Coordination with First Responder Agencies** - When at the scene of an emergency, the most senior OE 2 representative shall develop a tentative course of action. Actions should be directed toward protecting people first, then property. First responders at the scene will want to help OE 2 personnel in coping with the situation they are in. However, during all circumstances, first responders are to remain outside of the facility limits until approved to enter by an OE 2 supervisor on scene.
12. **Safety and Training Review** - OE 2 employees are trained for emergency response upon hiring and annually thereafter. OE 2 will conduct annual emergency shutdown tests at the Sanderson Gas Plant.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF NORTH DAKOTA

IN THE MATTER OF THE APPLICATION OF OE2 NORTH LLC FOR A CERTIFICATE OF SITE COMPATIBILITY FOR THE BILL SANDERSON GAS PROCESSING PLANT AND ASSOCIATED FACILITIES IN WILLIAMS COUNTY, NORTH DAKOTA	CASE NO. PU-20-_____

Application of OE2 North LLC
for Waiver or Reduction of Procedures and Time Schedules

In connection with its submission of an application for a Certificate of Site Compatibility ("Application") for the Bill Sanderson Gas Processing Plant Project located in Williams County, North Dakota, OE2 North LLC ("OE2"), submits to the North Dakota Public Service Commission ("Commission") this application for a waiver or reduction of procedures and time schedules set forth in Chapter 49-22.1 of the North Dakota Century Code ("Siting Act") and Article 69-06 of the North Dakota Administrative Code ("Siting Rules"). In accordance with Section 49-22.1-05 of the North Dakota Century Code and Chapter 69-06-06 of the North Dakota Administrative Code, OE2 requests the following:

1. That the Commission waive the requirement to hold a separate hearing on a waiver request and a Certificate of Site Compatibility application as may be required by Sections 49-22.1-05, 49-22.1-06, and 49-22.1-10 of the North Dakota Century Code and Chapter 69-06-01-02 of the North Dakota Administrative Code. OE2 requests that the Commission hold a single consolidated hearing on this waiver request and its application for a Certificate of Site Compatibility.
2. That the Commission shorten the six-month period specified in Section 49-22.1-06(5) of the North Dakota Century Code.

Consistent with the Commission's Energy and Transmission Facility Siting Guidelines ("Commission's Guidelines"), OE2 provides the following information in support of its waiver requests:

A. Description of Proposed Facility.

1. **Type:** The Application for Certificate of Site Compatibility is for the construction of a new gas processing facility known as the Bill Sanderson Gas Processing Plant (the "Facility"). Once the Facility is constructed and operational, the Facility will have a net nameplate gas processing capacity of 250 million standard cubic feet per day ("MM SCFD"), less 5.3 MM SCFD of utility fuel gas usage at the Facility.

2. **Product:** The primary products to be produced at the Facility are marketable natural gas and Y-grade natural gas liquids ("NGLs").

3. **Size and Design:** The Facility will be composed of one process train with a nameplate capacity of 250 MM SCFD. The gross nameplate gas processing capacity of the Facility will be 250 MM SCFD.

The design of the Facility will accommodate raw, wellhead gas from oil and gas wells located in Williams County, North Dakota and surrounding areas. The Facility will utilize a slug catcher, a liquids stabilization system, a Recycle Split Vapor (RSV) cryogenic gas processing facility, and residue compression to boost the product natural gas to transmission pipeline pressure.

4. **Location:** The Facility will be located approximately 15 miles west of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota. The Facility site comprises 39 acres of a 143-acre parcel owned by OE2.

5. **Geographic Service Area:** Wellhead gas will be gathered from crude oil production wells connected to OE2's system. Once processed, the NGL product extracted from the gas is transferred to the ONEOK pipeline system and the residue gas will be transferred to the

Northern Border pipeline system, ultimately serving markets located in the Rocky Mountains, Midwest and Gulf regions.

6. **Time Schedule:** OE2 anticipates commencement of commercial production at the Facility will begin by December 15, 2020. OE2 proposes to construct the Facility on the following schedule:

- OE2 acquired the land upon which the Facility will be located in February 2020. No additional land acquisition is required.
- Construction will begin upon receipt of necessary authorizations. OE2 anticipates construction will commence on or about April 15, 2020.
- Construction is anticipated to be completed by December 1, 2020.
- Test operations are anticipated to take place December 1 through December 5, 2020.
- OE2 anticipates commencement of operations will begin by December 15, 2020.

7. **Future Plans:** OE2 does not anticipate future expansion or development at this time.

B. Need for the Facility.

North Dakota gas production and flaring of unsold gas has attracted negative attention in past years. This negative attention has resulted in a number of actions. In late 2013, several groups of mineral owners filed numerous class action lawsuits seeking damages due to unpaid royalties resulting from flaring of unsold gas. In mid-2014, the North Dakota Industrial Commission approved policy aimed at reducing the amount of natural gas flaring from the Bakken and Three Forks Formations. The policy establishes oil production limits that will take effect if producers fail to meet requirements to capture natural gas at the well site. As part of the proposed and enacted regulation of gas flaring, North Dakota has established reduced flaring goals for the industry to meet. Additional gas processing capacity is needed in North Dakota in order for oil and gas producers to avoid flaring wellhead gas, or reducing production.

For additional analysis of the need for the Facility, including a discussion of alternatives evaluated, please see Section 3 of OE2's Application, which accompanies this waiver application.

C. Cost.

The estimated cost for the Facility is $150,000,000.00.

D. Waiver Request.

OE2 requests that the Commission grant the waivers requested herein because said waivers are needed to prevent potentially significant delays to construction of the Facility. As noted above, the Facility is needed to provide gas processing capacity in North Dakota in order for oil and gas producers to avoid flaring wellhead gas or reducing production. Utilizing the Facility will provide a full-scale gas plant to process a large volume of gas, remove valuable liquid components, and provide residue gas directly to a pipeline, all within economical boundaries. Without the waivers of time schedules and procedures requested, construction and operation of the Facility will be delayed and the Facility will not be able to satisfy the immediate need for a full-scale gas processing plant facility.

Section 49-22.1-05 of the North Dakota Century Code provides that the Commission may waive procedures and time schedules upon a finding that "the proposed facility is of such length, design, location, or purpose that it will produce minimal adverse effects." Based upon the investigation and analysis set forth in OE2's Application, granting the waivers requested is appropriate because the proposed facility will produce minimal adverse effects due to its design (a gas processing facility which will accommodate the rich gas production from the Bakken and Three Forks Formations), its location (located on agricultural land in Williams County and avoiding Exclusion and Avoidance Areas), and its purpose (residue gas and NGL processing facility).

In determining whether the proposed facility will result in adverse impacts on the environment, OE2 evaluated the Facility using the criteria set forth in the Siting Act, the Siting Rules, and the Commission's Guidelines. More specifically, OE2 evaluated the impacts of the Facility considering the siting criteria set forth in Section 69-06-08-01 of the North Dakota Administrative Code and the factors set forth in Section 49-22.1-09 of the North Dakota Century Code. Impacts associated with the Facility, and mitigation measures that will be taken with respect to said impacts, are summarized in Sections 4 and 5 of the Application. Based upon the siting criteria evaluation performed by OE2, and the factors set forth in the Guidelines, the Facility will have minimal adverse effects.

Accordingly, OE2 respectfully requests that the Commission grant the requested waivers and render an expeditious decision.

Dated this 19th day of February, 2020.

FREDRIKSON & BYRON, P.A.

By _____

LAWRENCE BENDER, ND Bar #03908
1133 College Drive, Suite 1000
Bismarck, ND 58501-1215
lbender@fredlaw.com
(701) 221-8700

Attorneys for OE2 North LLC

STATE OF NORTH DAKOTA)
) ss.
COUNTY OF BURLEIGH)

LAWRENCE BENDER, of lawful age, being first duly sworn, on oath deposes and says:

That he is one of the attorneys for Applicant in the foregoing application; that he executed the foregoing application for and on behalf of said Applicant and as its said attorney that he has read said application and knows the contents thereof, and that the statements made and contained therein are, to the best of his knowledge and belief, true and correct.

LAWRENCE BENDER

Subscribed and sworn to before me this 19th day of February, 2020.

Bethany Hughes
Notary Public
My Commission Expires:

BETHANY HUGHES
Notary Public
State of North Dakota
My Commission Expires February 5, 2022

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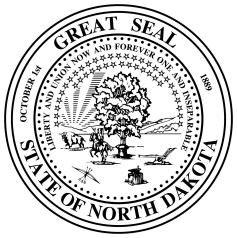
State of North Dakota
SECRETARY OF STATE



Certificate of Good Standing
of
OE2 NORTH LLC

SOS Control ID#: 0002958496

Certificate #: 017914229

The undersigned, as Secretary of State of the state of North Dakota, hereby certifies that, according to the records of this office,

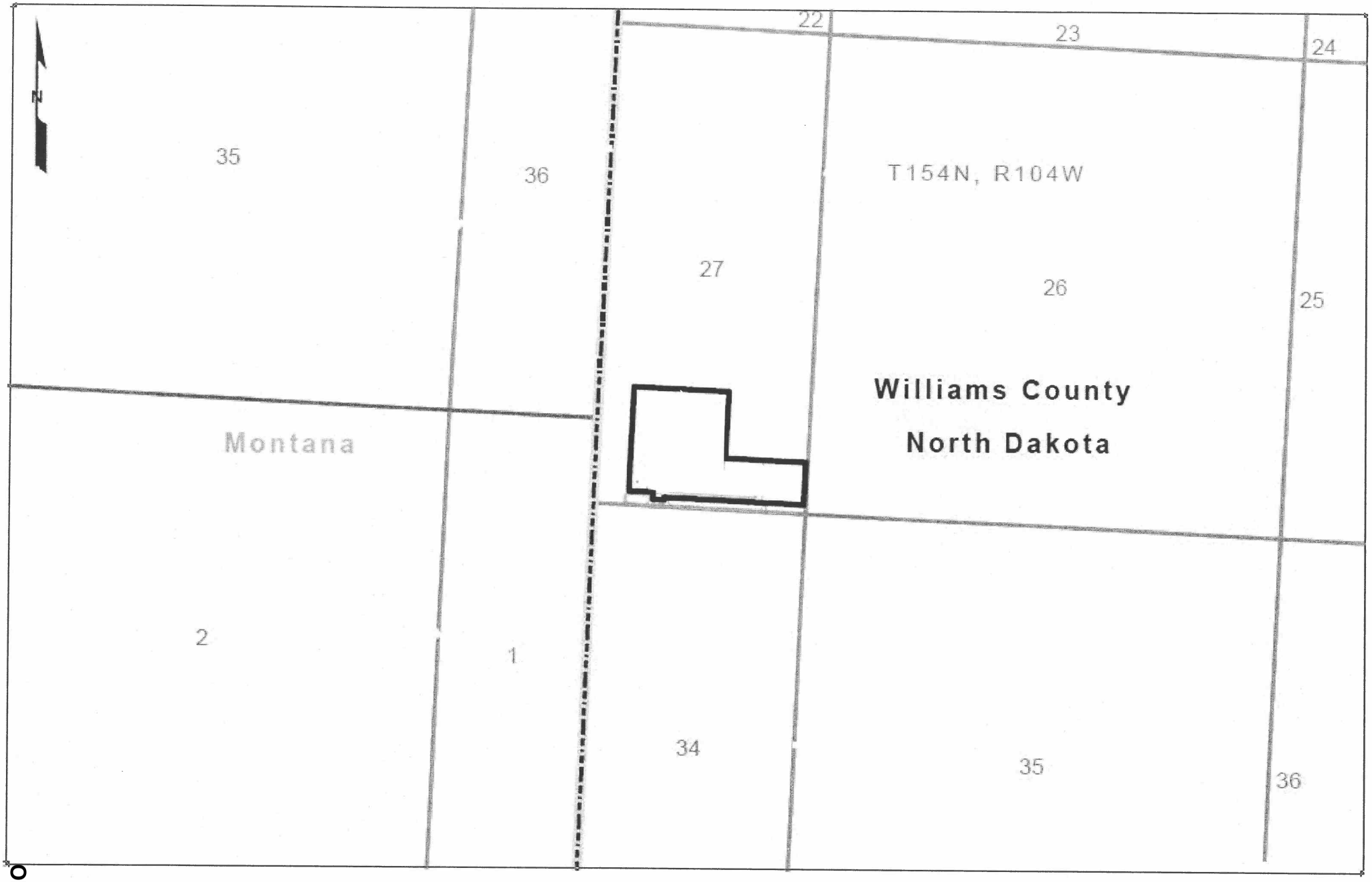
OE2 NORTH LLC

a Limited Liability Company - Business - Foreign was formed under the laws of DELAWARE and filed with this office effective October 23, 2019. This entity has, as of the date set forth below, complied with all applicable North Dakota laws.

ACCORDINGLY, the undersigned, as such Secretary of State, and by virtue of the authority vested in him by law, hereby issues this Certificate of Good Standing.

DATE: February 19, 2020

Alvin A. Jaeger
Secretary of State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Williams County
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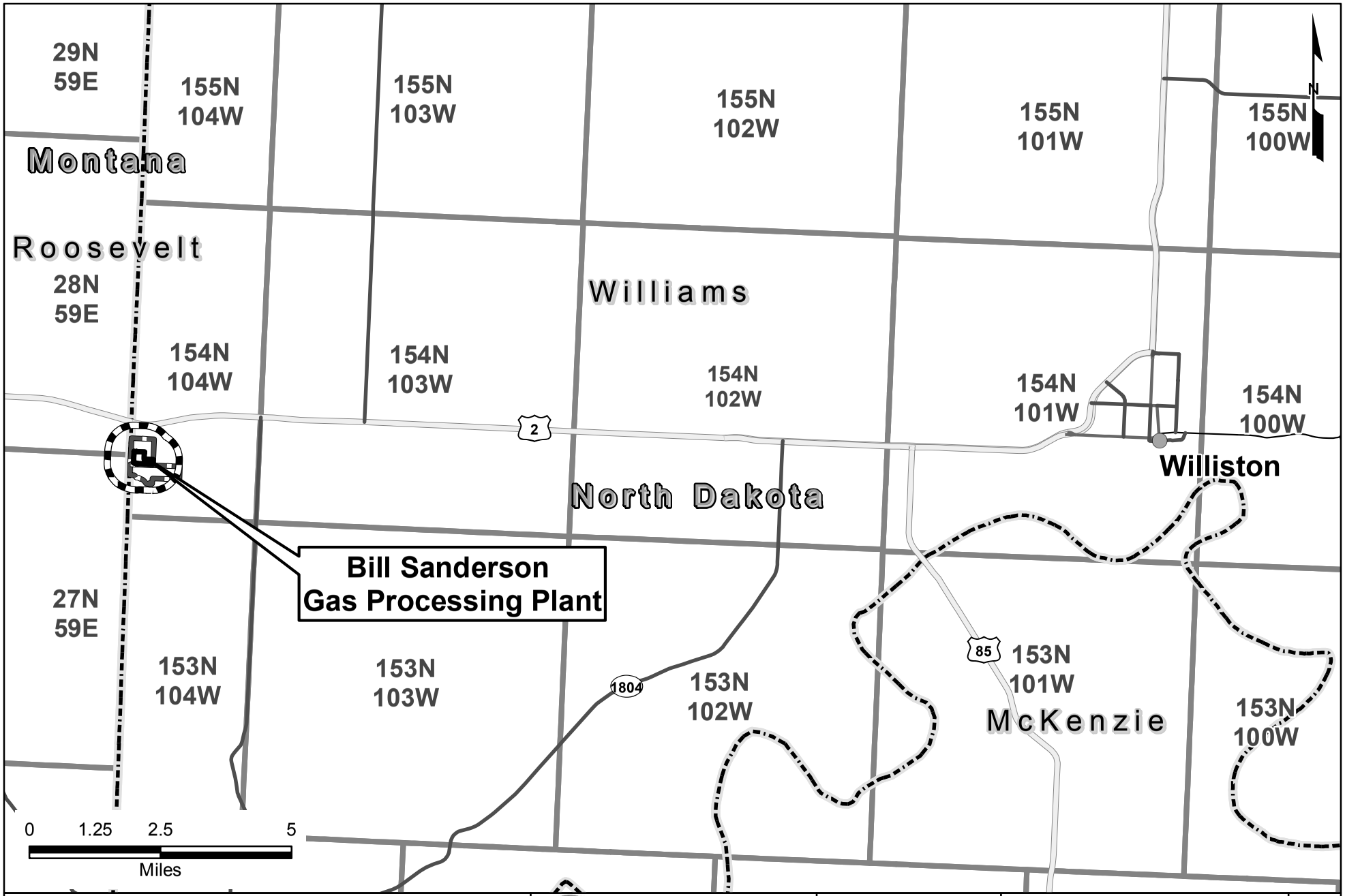
OE2 187

OE2 North LLC
Bill Sanderson Gas Plant PU-20-82
Response to ND PSC Staff's February 21, 2020 Information Request

Item	*Request for Information*	*Response*	*Attachment*
1	Revise Map for newspaper publication– zoom out and show the nearest town and roads	Revised the map included as an attachment to this response.	Yes
2	**The following Project control documents, and for those not complete, provide the status and completion date(s):**		
2a	Construction and Environmental Program Plan	Construction and environmental controls are included in the Project SWPPP and Spill Contingency Plan included as an attachment to this response. The SWPPP will be submitted by February 28, 2020.	Yes
2b	Erosion Control Plan	Erosion control details are included in the Project SWPPP. The SWPPP will be submitted by February 28, 2020.	No
2c	Revegetation Plan	Revegetation details are included in the Project SWPPP. The SWPPP will be submitted by February 28, 2020.	No
2d	Weed Management Plan	Weed Management Plan included as an attachment to this response.	Yes
2e	Dust Control Plan	Dust Control Plan included as an attachment to this response.	Yes
2f	Environmental Training Plan	Prior to commencing construction of the Project, OE2 North will conduct a comprehensive environmental training for all Project personnel and contractors who will be working in the field. OE2 North will conduct a Project-specific training presentation for Project personnel that covers all aspects of environmental expectations, regulations, and OE2 North policy. Topics covered will include General Guidelines & Contractor Expectations, Project Staff, Project Permits and Plans, Compliance and Mitigation Measures, Migratory Bird Treaty Act, Cultural Resources and Unanticipated Discoveries, Environmentally Sensitive Areas, and Public Relations. An open question and answer session will be provided to ensure contractors and all Project personnel have an understanding of Project-related environmental requirements and processes.	No
3	Additional information regarding the plant expansion. Reference to the press release for the project that talks about future expansion.	Outrigger has no definitive plans at this time to expand the Plant beyond what is included in the application.	No



LEGEND

- Study Area
- Facility Boundary
- Field Survey Boundary
- County Boundary
- Township/Range
- City/Town

KLEINFELDER
Bright People. Right Solutions.

OUTRIGGER ENERGY

PROJECT NO.	20203533
DRAWN:	02/27/2020
DRAWN BY:	A.Leonard
CHECKED BY:	N. Elzinga
FILE NAME:	PSC.mxd

Project Location Map

OE2 North, LLC
Bill Sanderson Gas Processing Plant Project
Sec. 27, T154N, R104W
Williams County, North Dakota

FIGURE
1

OE2 189

OE2 North LLC

Spill Contingency Plan

Contents

Introduction 1
Purpose and Scope 1
Resources at Risk 1
Risk Assessment 1
Response Strategy 1
Spill Discovery and Response 2
Distribution of Responsibilities 2
Response Activities 2
Discharge Notification 3
Response Resources and Preparedness Activities 4
Equipment, Supplies, Services, and Manpower 4
Access to Receiving Waterbody 4
Communications and Control 4
Training Exercises and Updating Procedures 4
Appendix A – Emergency Contacts 5
Appendix B – Discharge Notification Procedures 6
Appendix C – Facility Diagram 7

Introduction

Purpose and Scope

OE2 North LLC ("Outrigger") has prepared this Spill Contingency Plan in accordance with 40 CFR 112.7(d) to address the possibility of discharges of oil and other hazardous substances from Outrigger construction activities in Williams County North Dakota. The purpose of the plan is to define procedures for responding to discharges that may threaten navigable waters.

The plan outlines procedures to ensure the protection of the public, employees, contractors, and other first responders in the event of a discharge. Additionally, the response procedures outlined in the plan will minimize damage to the environment, natural resources, and equipment from a discharge of hazardous substances. The plan follows the content and organization of 40 CFR part 109 and describes the distribution of responsibilities and basic procedures for responding to a discharge and performing cleanup operations.

Resources at Risk

The primary construction area is located approximately 19 miles west of Williston, North Dakota within the watershed of the Missouri River. The facility diagram included in Appendix C indicates the layout of proposed site and drainage. Ground cover during construction will consist of compacted soil, gravel, and low-lying vegetation. Drainage slopes generally northwest.

Due to the remote nature of the site risk to the public is minimal in the event of a discharge. Outrigger will coordinate with local emergency responders in the event of a discharge that could affect public health and safety.

Risk Assessment

Operations at the site will involve the use of portable fueling equipment and the presence of various quantities of hydrocarbon fuels and oils, generally approximately 500 gallons per container. Additionally, various other chemicals will be stored on-site including coolants, lubricants, and other hazardous liquids. The discharge of these substances could reach local waterways that feed into the Missouri River.

Response Strategy

Outrigger personnel and contractors are equipped and trained to respond to minor discharges from activities at the site. Minor discharges can generally be described as those where the quantity of product discharged is small, the discharged material can be easily stopped and controlled, the discharge is localized, and the product is not likely to seep into groundwater or reach surface water. Response to minor discharges as well as larger spills may necessitate the assistance of outside contractors or other responders.

Spill Discovery and Response

Distribution of Responsibilities

Outrigger has the primary responsibility for providing the initial response to discharge incidents originating from its construction activities. To accomplish this, Outrigger has designated the construction manager, Mel Palmer, as the response coordinator (RC) in the event of a spill or discharge. The RC will coordinate spill response in the event of a discharge and has the authority to commit the necessary services and equipment to respond to a discharge (including local first responders, contractors, or others, as appropriate).

The RC will also direct initial notifications and initial response actions in accordance with training and capabilities. In the event of a fire or emergency that threatens the health and safety of those present at the site, the RC will direct evacuations and contact local first responders.

In the event of an emergency involving outside response agencies, the RC's primary responsibility is to provide information regarding the characteristics of the materials and equipment involved and to provide access to Outrigger resources as requested. The RC shall also take necessary measures to control the flow of people, emergency equipment, and supplies and obtain the support of local law enforcement as needed to maintain control of the site. These controls may be necessary to minimize injuries and confusion.

Finally, the RC serves as the coordinator for communications by acquiring all essential information and ensuring clear communication of information to emergency response personnel. The RC has access to reference material at the field office either as printed material or on computer files that can further assist the response activities.

Whenever circumstances permit, the RC will transmit assessments and recommendations to Outrigger management for direction. Management is contacted in the following order: (1) Director of Engineering; (2) EHS Manager.

In the event that the construction manager is not available, the responsibility and authority for initiating a response to a discharge rests with the most senior Outrigger employee on site at the time the discharge is discovered or with the contractor Field Supervisor (or next person in command) if contractor personnel are the only personnel on site.

Response Activities

In the event of a discharge, the priority is to stop the product flow and to shut off all ignition sources, followed by the containment, control, and mitigation of the discharge. This plan outlines actions to be performed to respond to a spill.

The construction area will be manned daily and the maximum amount of time until a major or minor discharge would be discovered can be up to 8 hours. Appropriate notifications will occur immediately upon discovery of reportable discharges.

Upon discovery of a discharge, if safe to do so, personnel will remove ignition sources, work to isolate or stop the leak, and notify the RC. Initial notification to the RC should include the exact location of the discharge, material involved, estimate of the quantity, environmental conditions, circumstances that may

hinder response, and any injuries. The RC will then assess the situation to determinate whether the discharge threatens site personnel, the public, waterways, or equipment. After assessment the RC will request outside assistance from local emergency responders and/or contractors as needed, evaluate the need to evacuate employees, notify local fire and/or police departments if appropriate, communicate with neighboring property owners should their property be threatened, and finally inform Outrigger management of the situation.

The RC will direct the initial control of a discharge by Outrigger or it's contractors. After ensuring the safety of the public and employees all effort will be made to prevent hazardous materials from reaching water. Actions taken to control a discharge may include, but are not limited to, use of sorbent materials, use of trenches or berms to direct flow, digging of temporary containment pits, or use of a cleanup contractor. Once cleanup is complete all contaminated materials will be disposed of in accordance with state and federal regulations. Following cleanup, Outrigger will document the cause, response to and, and cleanup efforts and provide closure to any agencies requiring notice.

Discharge Notification

Instructions and phone numbers for reporting a discharge to the National Response Center and other federal, state, and local authorities are provided in Appendix B to this Plan. Any discharge to water must be reported immediately to the National Response Center. The Response Coordinator must ensure that details of the discharge are recorded on Outrigger's discharge notification form.

If the discharge qualifies under 40 CFR 112 (see Appendix B for conditions), the EHS Manager is responsible for ensuring that all pertinent information is provided to the EPA Regional Administrator.

Response Resources and Preparedness Activities

Equipment, Supplies, Services, and Manpower

Spill response equipment will be available onsite include sorbent materials, "Oil-dry" loose sorbent material, absorbent pads, personal protective equipment, brooms, and combustible gas meters. This material is sufficient to respond to most minor discharge occurring at the facility and to initially contain a major discharge while waiting for additional material or support from outside contractors.

Contractors and employees on-site during construction will be familiar with response procedures for a discharge. Employees and contractors will be familiar with the facility layout, location of spill response equipment, ad response strategies. To respond to large discharges and ensure the removal and disposal of cleanup debris, Outrigger is establishing agreements with local specialized cleanup contractors. These contractors will have immediate access to an assortment of equipment and materials, including mechanical recovery equipment for use on water and on land. Outrigger will ensure contractors are able to respond to a spill in a timely manner.

Access to Receiving Waterbody

The nearest waterways are intermittent tributaries of the Little Muddy Creek and would be the first affected by a spill. The site will be graded so to direct flows into a retention pond that would mitigate access to these waters.

Communications and Control

The RC is responsible for communicating the status of the response operations and for sharing relevant information with involved parties, including local, state, and federal authorities. Primary communication will be via cell phone; however, radios and other means of communication may be used as well.

Training Exercises and Updating Procedures

Outrigger will provide necessary on-the-job training to ensure proper response to a spill can be achieved. Training may include briefings on the location and use of spill response materials, review of contractor training and policies, and training for Outrigger personnel on this plan.

Following a response to a discharge, the RC will evaluate the actions taken and identify procedural areas where improvements are needed. The RC will conduct a briefing with field personnel, contractors, and local emergency responders as appropriate to share lessons learned.

Appendix A – Emergency Contacts

Facility Operations

Name	Title	Telephone
Mel Palmer	Construction Manager	307-371-2303
Andrew Perdue	Engineering Director	720-361-2580
Wade Janecek	EHS Manager	720-361-2549

Local Emergency Responders

Name	Telephone	Address
Fire/Police Departments	911 (701) 572-2196 (fire)	317 11th St. W, Williston ND (fire)
CHI St. Alexius Health Williston	(701) 774-7400	1301 15th Ave West, Williston ND

Appendix B – Discharge Notification Procedures

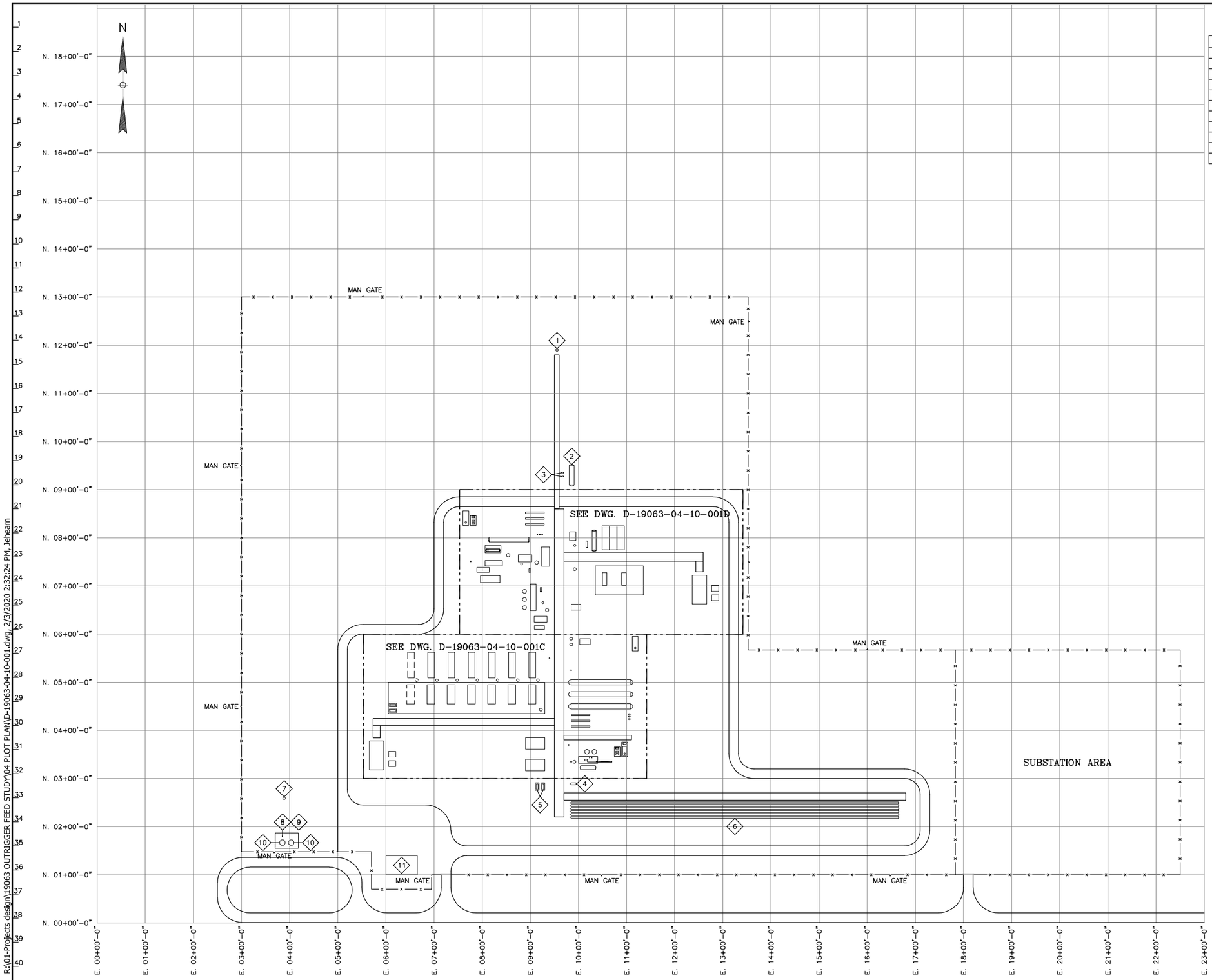
Circumstances, instructions, and phone numbers for reporting a discharge to the National Response Center and other federal, state, and local agencies, and to other affected parties, are provided below. Note that any discharge to water must be reported immediately to the National Response Center.

Construction Manager, Mel Palmer (24 hours) (307) 371-2303

Local Emergency (fire, explosion, or other hazards) 911

Agency/Organization	Agency Contact	Circumstances	When to Notify
Federal Agencies			
National Response Center	1-800-424-8802	Discharge reaching navigable waters	Immediately (verbal)
EPA Region VIII (Hotline)	(303) 312-6312	Discharge reaching navigable waters; or, discharge of 1,000 gallons or more; or, second discharge of 42 gallons or more over a 12-month period.	Immediately (verbal)
State Agencies			
North Dakota Department of Environmental Quality	1-701-328-5210	Spills that threaten the waters of the state.	Immediately (verbal)
North Dakota Oil and Gas Division	1-701-328-8020		
North Dakota Department of Emergency Services	1-701-328-8100 or 1-800-472-2121		

Appendix C – Facility Diagram



MARK	DESCRIPTION
1	FLARE STACK
2	FLARE K.O. DRUM
3	FLARE K.O. DRUM PUMP
4	CLOSED DRAIN FLASH TANK
5	STABILIZER COMPRESSOR L.O. TANKS
6	HARP SLUG CATCHER
7	TANK FARM FLARE
8	TANK FARM FLARE K.O.
9	TANK FARM FLARE K.O. PUMP
10	SLOP TANK
11	CCR/WAREHOUSE

NO	DATE	REVISIONS	D/C	APP.
			JEH	RWD
B	2/3/20	REVISED PER CLIENT COMMENTS	JEH	RWD
A	1/24/20	ISSUED FOR BID		JEH

	NAME	DATE
DESIGN	JEH	12/19
DRAWN	JEH	1/20
CHK.		
Q. A.		
CAD FILE	D-19063-04-10-001	
PLOT DATE		
SCALE	1"=100'-0"	

	NAME	DATE
C/S		
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

DWG TITLE
REFERENCE DWG
REF. DWG. NUMBER
DATE
NAME

BCCK CONFIDENTIAL INFORMATION

OVERALL PLOT PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-6095

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

REV. B
DWG. No. D-19063-04-10-001B

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OE2 199

Bill Sanderson Gas Processing Plant Project

Weed Management Plan

February 2020

OE2 200

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 GOALS AND OBJECTIVES 1
3.0 NOXIOUS WEED SPECIES LISTS 1
4.0 NOXIOUS WEED SPECIES MANAGEMENT 2
4.1 Identification of Problem Areas 2
4.2 Treatment Measures 2
4.3 Preventative Measures 3
4.4 Post-Construction Treatment Methods 3
5.0 MONITORING 4
6.0 HERBICIDE USE 4
6.1 Herbicide Application and Handling 4
6.2 Herbicide Spills and Cleanup 5
6.3 Worker Safety and Spill Reporting 5

ATTACHMENTS

Attachment 1 Noxious Weed Fact Sheets – North Dakota State University

LIST OF ACRONYMS AND ABBREVIATIONS

EI	Environmental Inspectors
OE2	OE2 North LLC
Plan	Weed Management Plan
Project	Bill Sanderson Gas Processing Plant Project
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

Noxious weed control practices for the OE2 North LLC (OE2) Bill Sanderson Gas Processing Plant Project (Project or Plant) described in this *Weed Management Plan (Plan)* are being developed in compliance with the Williams Weed District and the 2020 North Dakota Weed Control Guide.

2.0 GOALS AND OBJECTIVES

This Plan prescribes methods to prevent and control the spread of noxious weeds during and following construction of the Project. OE2 and its contractors will be responsible for implementing the methods described in this Plan.

This Plan is applicable to the construction and operation of the proposed 39-acre Plant Site that is disturbed during the construction and operation of the proposed facilities.

3.0 NOXIOUS WEED SPECIES LISTS

A weed is commonly defined as a plant that grows out of place. A noxious weed is any plant officially designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property (Sheley, Petroff, and Borman, 1999). Noxious weeds are opportunistic plant species that readily flourish in disturbed areas, thereby preventing native plant species from establishing successive communities.

Invasive species in North Dakota are controlled and regulated under North Dakota Law (NDCC § 4.1-47-02). Counties and cities have the option to add additional weeds for enforcement only in their jurisdiction.

The State of North Dakota has 13 state-listed noxious weeds:

- Absinth Wormwood (*Artemisia absinthium L.)*
- Canada Thistle (*Cirsium arvense (L.) Scop.*)
- Dalmatian Toadflax (*Linaria genistifolia spp. dalmatica*)
- Diffuse Knapweed (*Centaurea diffusa Lam.*)
- Houndstongue (*Cynoglossum officinale L.*)
- Leafy Spurge (*Euphorbia esula L.*)
- Musk Thistle (*Carduus nutans L.*)
- Palmer amaranth (*Amaranthus palmeri*)
- Purple Loosestrife (*Lythrum salicaria L., Lythrum virgatum L.,* and all cultivars)
- Russian Knapweed (*Centaurea repens L.*)
- Saltcedar (*Tamarisk spp.*)
- Spotted Knapweed (*Centaurea maculosa Lam.*)
- Yellow Toadflax (*Linaria vulgaris*)

Williams County, North Dakota recognizes the following additional plant as an invasive weed:

- Narrowleaf Hawksbeard (*Crepis tectorum*)

To comply with North Dakota Law (NDCC § 4.1-47-02), OE2 has prepared this Plan specifying the weed management procedures to be implemented. **Attachment 1** to this Weed Management Plan includes the fact sheets for the *Identification and Control of Invasive and Troublesome Weeds in North Dakota* developed by the North Dakota State University (NDSU) for each of the species listed above. Regulations also require that OE2 reseed, plant, or otherwise manage the area to establish a beneficial plant cover. To this end, OE2 has included the methods to be used to accomplish

revegetation, the time and method of seeding, fertilization practices, and recommended plant species for the Project in the Project SWPPP document.

4.0 NOXIOUS WEED SPECIES MANAGEMENT

This Plan is designed to:

- Treat specific infestation areas as recommended by weed districts prior to construction, pending seasonal limitations;
- Prevent the introduction and spread of weeds via construction equipment during construction;
- Contain weed seeds and propagules by preventing segregated topsoil from being spread to adjacent areas; and
- Treat infestations that may develop during operations.

4.1 Identification of Problem Areas

OE2 will work with the County Weed Control Board to identify known locations of weed infestations in the Project area. In addition to infestation areas identified by the weed districts and landowners, additional areas containing noxious species may be identified prior to construction by the Environmental Inspectors (EI), which will be demarcated using color-coded flagging or signage within the Plant Site. Identification of existing noxious weed locations will alert environmental inspection and construction personnel to implement weed control measures during construction.

4.2 Treatment Measures

OE2 will implement weed control at identified infestation areas based on County weed agency input or by the EIs. Weed control measures may include the application of herbicide or mechanical, and/or alternative methods. The weed control measure chosen will be the best method available for the time, place, and species of weed as identified through consultation with the appropriate regulatory agencies. OE2 will follow the treatment measures listed on the Fact Sheets for each of the species of concern included in **Attachment 1**.

Herbicide application is an effective means of reducing the size of weed populations. Herbicide treatment methods will be based on species-specific and area-specific conditions (e.g., proximity to wetlands, open water, riparian areas or agricultural areas, and time of year) and will be applied in accordance to the 2020 North Dakota Weed Control Guide (available online). Spot herbicide applications will be the preferred option. In areas of dense infestation, a broader application may be used. Pending the seasonal start of construction, preconstruction treatment of infestation areas may be conducted and will be controlled as described in section 7.1, to minimize the impacts on the surrounding vegetation. Preconstruction applications will be completed in accordance with applicable chemical contact times (as specified by the manufacturer) in advance of clearing and grading within the construction right-of-way. Treatment may be restricted in areas that are not readily accessible (e.g., difficult topography, saturated/inundated soils, etc.).

Mechanical control (e.g., mowing) can also be an effective control measure specifically for annual species (i.e., not for perennial rhizomatous species). The efficacy of mechanical control measures is dependent upon proper timing to cut the vegetation prior to the maturation of seed and may require multiple treatments during the growing season.

4.3 Preventative Measures

The following measures will be implemented to prevent the spread of noxious weeds.

- Prior to the beginning of construction of the project, all contractor vehicles and equipment (including timber mats) will be cleaned of soil and debris capable of transporting weed propagules. The contractor will maintain logs documenting the cleaning history of each piece of equipment and will make logs available to OE2, upon request. Contractor vehicles and equipment will be inspected and may require additional cleaning, if necessary, prior to mobilization to the Site. Cleaning will be conducted using high pressure washing equipment or compressed air, and/or manually remove excess soil from the tracks, tires, and blades of equipment.
- Areas of the Plant Site where weed infestations are identified will be clearly marked prior to construction. In these areas, the contractor may elect to conduct full topsoil stripping and will stockpile cleared vegetation and segregated topsoil within the Site. The stockpiles will be identified as noxious weed stockpiles with signs and be maintained adjacent to the areas from which they were obtained to eliminate the transport of soil-borne noxious weed propagules to other areas within the Site. During reclamation, the contractor will return topsoil and vegetative material to the areas from which they were obtained. Alternately, for annual weed species the contractor may elect to mow the infested area before the species begins seeding, thus eliminating the threat of spreading seeds during topsoiling and construction.
- In areas where full topsoil stripping is implemented, equipment required for initial vegetation clearing and topsoil segregation will be cleaned using one of the methods described above prior to leaving the area. Once the topsoil has been segregated, subsequent equipment will not require cleaning, as it will not come into contact with noxious weeds or the topsoil containing weed seeds and propagules.
- The contractor will ensure straw bales used to construct sediment control devices or used as mulch applications are certified weed free and obtained from approved certified sources as recommended by the County weed agency.
- The contractor will ensure seed mixes and mulching materials used for revegetation are certified weed free and obtained from approved certified sources as recommended by County weed agencies.

4.4 Post-Construction Treatment Methods

OE2's objective is to comply with the requirements to prevent the spread of noxious weeds and treat areas of the Plant Site where weed species form a significant portion of the vegetation community in comparison to adjacent undisturbed areas.

In the event noxious weed species become established in the Plant Site, OE2 will make good faith efforts to control weeds within the Site and to work with adjacent landowners to prevent the spread of the species to adjacent lands. Post-construction weed control measures may include the application of herbicide or mechanical methods. OE2 will control noxious weed species at OE2-managed aboveground facility sites to prevent the spread onto adjacent properties.

Post-construction herbicide applications will be conducted prior to seed maturation where possible.

Applications will be controlled, as described in Section 7, to minimize the impacts on the surrounding vegetation. As discussed in Section 5.2, herbicide treatment methods will be based on species-specific and area-specific conditions (e.g., proximity to water, riparian areas or agricultural areas, and time of year) and will be coordinated with the local county and regulatory agencies. Spot herbicide applications will be the preferred option. In areas of dense infestation, a broader application will be used and a follow-up seeding program implemented according to revegetation measures discussed in the Project SWPPP. The timing of subsequent revegetation efforts will be based on the persistence of the selected herbicide. OE2 will communicate with a designated representative of each county to inform them of the location and type of treatment administered by OE2 or its contractor.

Mechanical methods entail the use of equipment to mow weed populations for annual species (i.e., not for perennial rhizomatous species). Mechanical treatments will be conducted prior to seed maturation where required. If such a method is used, subsequent seeding will be conducted if necessary to re-establish a desirable vegetative cover that will stabilize the soils and slow the potential re-invasion of weeds.

During routine operations activities, if noxious weed species are identified that are not listed on the county or state weed lists, OE2 will treat the affected area as quickly as possible by means of chemical, cultural, or biological control measures.

5.0 MONITORING

EIs will periodically monitor the Plant Site to capture revegetation growth. Should the EIs identify noxious weed populations in the Plant Site, they will report their findings to the OE2 operations and maintenance division to determine the appropriate action to control the spread of the weeds. Noxious weed management will be conducted in accordance with state and county regulations.

6.0 HERBICIDE USE

6.1 Herbicide Application and Handling

Herbicide application will be based on information gathered from consultations with local weed districts and state agencies. Before application, OE2 or its contractor will obtain required permits from the local weed district or the state agency. Herbicide application will be conducted in accordance with applicable laws and regulations by a state-licensed contractor

All herbicide applications will follow United States Environmental Protection Agency (USEPA) label instructions. Application of herbicides will be suspended when any of the following conditions exists:

- Wind velocity exceeds 6 miles per hour during application of liquid or granular herbicides;
- Snow or ice covers the foliage of noxious weeds; or
- Precipitation is occurring or is imminent.

Vehicle-mounted sprayers (e.g., handgun, boom, and injector) may be used mainly in open areas that are readily accessible by vehicle. Hand application methods (e.g., backpack spraying) that target individual plants may be used to treat small or scattered weed populations or in rough terrain. Calibration checks of equipment will be conducted at the beginning of spraying and periodically to ensure that proper application rates are achieved.

Herbicides will be transported to the Project Site daily with the following provisions:

- On-site herbicide quantities will be limited where practical;
- Concentrate will be transported in approved containers only, in a manner that will prevent tipping or spilling, and in a compartment that is isolated from food, clothing, and safety equipment;
- Mixing will be conducted in an upland area at a distance greater than 100 feet from open or flowing water and wetlands, greater than 200 feet from private wells, and greater than 400 feet from public wells. The property owner would be consulted about the presence and location of wells prior to herbicide application; and
- All herbicide equipment and containers will be maintained as needed and inspected for leaks daily.

6.2 Herbicide Spills and Cleanup

OE2 has developed a Spill Contingency Plan for the Project that incorporates all reasonable precautions to be taken to avoid spills of all potentially hazardous materials. In the event of a spill, cleanup will be immediate and will be conducted in accordance with the Spill Contingency Plan.

Herbicide contractors are responsible to keep spill kits in their vehicles and in herbicide storage areas to allow for quick and effective response to spills. Items to be included in the spill kit are:

- Protective clothing and gloves;
- A minimum of 20 pounds of suitable commercial adsorbent and barrier materials;
- Plastic bags and bucket;
- Shovel;
- Fiber brush and screw-in handle;
- Dust pan;
- Caution tape; and
- Detergent.

Response to an herbicide spill will vary depending on the material spilled and the size and location of the spill. The order of priorities after discovering a spill are to protect the safety of personnel and the public, minimize damage to the environment, and conduct cleanup and remediation activities.

6.3 Worker Safety and Spill Reporting

All herbicide contractors will obtain and have readily available copies of the appropriate safety data sheets and the herbicide labels for the herbicides used. All herbicide spills will be reported in accordance with applicable laws and requirements. Further information regarding spill response and reporting is detailed in the Spill Contingency Plan.

ABSINTH WORMWOOD

(*Artemisia absinthium* L.)

ABSINTH WORMWOOD

State Listed Noxious Weed

Absinth wormwood is a member of the sagebrush family, which is easily recognized by the strong sage odor. The plant also is known as American or common wormwood, mugwort or madderwort, and wormwood sage. Unlike other plants in the sagebrush family, absinth wormwood dies back to the root crown each winter, with new shoots emerging each spring. Absinth wormwood is grown in herb gardens for the sage flavor of the leaves. The young flower heads are the source of aromatic oil used to prepare vermouth and absinth. The oil of absinth wormwood is also an active ingredient in antiseptic liniments.

Identification and growth form:

Absinth wormwood is a perennial fragrant forb or herb. The plant commonly grows 3 to 5 feet tall at maturity. Absinth wormwood is woody at the base and regrows from the soil level each spring from a large taproot. Leaves are light to olive green, 2 to 5 inches long and divided two or three times into deeply lobed leaflets. Leaves and stems are covered with fine, silky hairs that give the plant a grayish appearance. Flower stalks appear at each upper leaf node and produce numerous yellow flower heads 1/8 inch in diameter, which appear from late July through mid-August in North Dakota. Each fruit contains one seed, which is less than 1/16 inch long, smooth, flattened and light gray-brown. These small seeds are scattered easily by wind, water and animals, and in hay. Absinth wormwood is a prolific seed producer but also can spread by short roots. The plant is most often found on dry soils, in overgrazed pasture and rangeland, wastelands and roadsides.

Why is this plant a concern?

Absinth wormwood causes economic losses by reducing available forage, tainting the milk of cattle that graze it, and medically as a pollen source for allergies and asthma. Absinth wormwood can reduce forage production severely in pasture and rangeland and is especially troublesome when land is overgrazed. Allergy sufferers should avoid walking through absinth wormwood infestations when the plant is flowering in late July and August.

How do I control this plant?

Chemical. A variety of auxin-type herbicides, including products that contain clopyralid (Stinger, Transline or Curtail), dicamba (various), Milestone (aminopyralid), 2,4-D, Tordon (picloram) and glyphosate (various), will control absinth wormwood. These herbicides should be applied when the plant is at least 12 inches tall and actively growing. Herbicides applied too early in the growing season generally result in poor control. If a fall treatment is desired, the plants should be mowed in early to midsummer to promote active regrowth and to improve herbicide coverage.

Cultural. Livestock generally will not graze absinth wormwood except in early spring. Mowing and cultivation do not control this weed.

Biological. No biological control agents or pathogens are available for this weed.

CANADA THISTLE

[*Cirsium arvense* (L.) Scop.]

Female flower

Male flower

CANADA THISTLE

State Listed Noxious Weed

Canada thistle was introduced in North America as a seed contaminant in both French and British colonies. The first legislation to control the weed was passed by Vermont in 1795. Canada thistle has the dubious distinction of being one of three weeds listed in 1885 by Dakota Territory as required of "every person" to be destroyed. The native distribution of Canada thistle includes Europe, North Africa and central Asia. It also is found in China and Japan and has spread so extensively that it is difficult to distinguish the plant's original native range. Canada thistle is considered to be naturalized in the northern Great Plains

Identification and growth form:

Canada thistle is a long-lived perennial that usually grows 2 to 3 feet tall and bears alternate, dark green leaves that vary in size. The leaves are oblong, usually deeply cut, and have spiny, toothed edges. Canada thistle has small (3/4 inch diameter), compact flower heads that appear on the upper stems.

Canada thistle has been classified into several varieties. Within these varieties are many ecotypes, which differ in growth characteristics, response to day length, and susceptibility to herbicides and cultivation. For example, leaf shape, head structure, and the number and size of spines can differ with ecotypes. Canada thistle requires a 14- to 16-hour photoperiod to bolt and flower (April 19 to Aug. 22 in North Dakota). Flower color can range from purple to light lavender or even white. Stem color also can differ from green to lavender.

Flowering occurs from June to September. Male and female flowers are produced on different plants, so cross-pollination is necessary for seed production. Flowers produce from 40 to 80 seeds per head, which can move long distances, although most seed remain in the head until winter and eventually germinate nearby.

The smooth, light brown seeds (achenes) have a conical point and are loosely attached to a tannish pappus at the tip, which aids in seed dispersal by wind. Seeds mature rapidly and are able to germinate within eight to 10 days after pollination. Canada thistle overwinters in the rosette growth stage.

Canada thistle has an extensive underground root system that may penetrate the soil to a depth of 10 feet or more and grow laterally 12 to 15 feet per year. Root buds occur randomly along the roots and initiate new shoots whenever environmental conditions are favorable. Root segments as small as 0.6 inch can initiate shoot growth and become established. Canada thistle is adapted to a wide range of soils, but it produces deeper roots in clay or muck soils than in sand, gravel or limestone soils.

Root bud development can occur nearly anytime during the growing season, but is greatest when soil temperatures are warm, air temperatures are cool and the photoperiod shortens to 13 hours. These conditions generally are found during the fall growing season. Therefore, more Canada thistle root-bud development occurs in the fall than any other time of the year. Canada thistle grows best in the northern regions of North America where temperature and rainfall are moderate. Growth ceases when temperatures exceed 85 degrees for extended periods.

Why is this plant a concern?

Canada thistle has the potential to form dense infestations rapidly through vegetative reproduction, and the spread of these clones may continue indefinitely, crowding out and displacing native grasses and forbs through shading, competition and possibly allelopathy. Canada thistle spread can change structure and species composition of natural areas and reduce plant and animal diversity. Infestations of Canada thistle may contribute to the elimination of endangered and/or endemic plant species. In wildlands, Canada thistle has the potential to increase fire frequency and perhaps severity as a result of its abundant and readily ignited litter and flammable above-ground biomass.

Canada thistle can reduce yield of many crops severely. Yield losses are directly proportional to the density and patchiness of the infestation, with more than $40 million annually lost in production in North Dakota alone. Wheat is a poor competitor and Canada thistle infestations often increase in a continuous-wheat farming program. Canada thistle also can be a severe problem in corn and soybean grown in rotation, with greater losses in soybean than corn.

CANADA THISTLE

How do I control this plant?

Canada thistle is the only thistle in North Dakota that has become a cropland pest. Control strategies differ for Canada thistle in cropland compared with pasture, range and wildland.

Chemical. *Cropland.* The best approach to Canada thistle control in cropland should include an in-crop herbicide treatment to suppress Canada thistle growth, minimize crop yield losses and prepare the thistle for a fall postharvest treatment. Preharvest and fall-applied treatments provide the most effective long-term control. The best herbicide to use will vary depending on crop rotation. However, the control program must be uninterrupted for two to three years if the infestation is to be reduced.

Glyphosate (various trade names) can be used to control Canada thistle in glyphosate-resistant crops. In-crop applications will not kill established thistle stands. However, when used as part of an overall management program, glyphosate can reduce infestations.

Pasture, range and wildlands. Herbicides that control Canada thistle in noncropland include products that contain clopyralid (various), Tordon (picloram), dicamba (various) dicamba plus diflufenzopyr (Overdrive), Method (aminocyclopyrachlor) and Milestone (aminopyralid). Control is greatest when applied to Canada thistle at the early bud growth stage (early summer) or in the fall to plants in the rosette form. These herbicides applied at low rates may be the most cost-effective method for controlling dense infestations that require broadcast application. Re-treatment will be necessary for several years to obtain long-term control.

Cultural. *Cropland.* Canada thistle roots are much less winter hardy then many other perennial weeds and timely cultivation actually can increase winter kill. Soil temperatures of 20 degrees or colder can reduce Canada thistle regrowth from roots by more than 50 percent. Following crop harvest, cultivate fields before the Canada thistle is 3 inches tall and repeat before regrowth reaches 3 inches tall until freeze-up. This method has the combined advantage of decreasing carbohydrate root reserves and the bare ground from the tillage will lead to colder soil temperatures, which increases winter-kill.

An option for Canada thistle in row crops and fallow that includes both tillage and herbicides is known as the rosette technique. The objective is to prevent the plants from bolting by using tillage and/or herbicide treatments until the day length is less than 15 hours, the photoperiod required for most Canada thistle plants to bolt. The thistles then will regrow as rosettes only. Research at North Dakota State University has found herbicide absorption and translocation to the roots of Canada thistle is greater when applied to the rosette growth stage than when applied to bolted plants, making fall treatment of rosettes the most cost-effective method for long-term Canada thistle control.

The rosette technique for Canada thistle control in fallow includes the use of tillage and fall-applied herbicides, while control in row crops includes in-crop herbicide treatments, tillage and fall-applied herbicides. Periodic tillage in fallow is used to control Canada thistle shoots and other weeds until late July, when the day length is less than 15 hours. Herbicides used for Canada thistle control, such as glyphosate or clopyralid, then are applied to rosettes in late September or early October. Research at NDSU has found that cultivation until late June prevented more than 90 percent of Canada thistle from bolting in corn and soybean.

CANADA THISTLE

Pasture, range, and wildlands. Repeated mowing will reduce Canada thistle infestations. Mow whenever the plants are in the early bud growth stage to prevent seed-set. Several mowings a year are needed because plant populations vary in maturity. Mow as close to the surface as possible. If plants are cut above the terminal bud before the stems elongate, they likely will regrow. Mowing before the flowers start showing color is important because plants mowed after that likely will produce some viable seed. Mowing for several years will reduce the root vitality of Canada thistle and will prevent seed production, reducing the seed reserve. Mowing should be combined with a chemical control program for best results.

Controlled burns often are used to help restore wildlands to a more natural plant community. Contrary to popular thought, research at North Dakota State University found that fall prescribed burns did not cause a long-term increase in Canada thistle density; rather, Canada thistle emerged earlier in the burned compared with the nonburned areas. The effect was short-lived and Canada thistle densities were similar regardless of burn treatment the second growing season after the burn. Also, no differences in Canada thistle control occurred when herbicides were used alone or combined with a prescribed burn.

Biological. Two biological control agents have been introduced for Canada thistle control, and a third was introduced accidentally. To date, none have been effective at reducing the weed on a large scale. The most widespread insect is *Hadroplontus litura* (formerly *Ceutorhynchus litura*) weevil, which first was released in North Dakota in the 1970s. The larvae feed on the underground parts of Canada thistle for a short time but infestations generally are not reduced. One may take advantage of the early season stress on Canada thistle from *H. litura* feeding by using additional control methods such as mowing or applying herbicides. In addition, natural soil pathogens may become more destructive due to multiple entry sites established by the insect. However, do not expect these insects alone to reduce a Canada thistle infestation.

A gall-producing fly, *Urophora cardui*, causes meristematic galls but does little long-term damage to the perennial thistle. The Canada thistle bud weevil *Larinus planus* was an accidental introduction into North America and is not permitted for distribution. The insect feeds on developing flowers to prevent seed production. Although *L. planus* can survive under a wide range of climates, it has not reduced established Canada thistle stands.

The painted lady butterfly *(Vanessa cardui)* can be a very effective biological control agent but only on an intermittent basis. Larvae of the butterfly feed on Canada thistle plants and can eliminate an infestation. However, the insect generally is found only in southern states such as Arizona and New Mexico and will build up populations large enough to migrate north only once every eight to 11 years. The insect will migrate north as far as Canada and those fortunate enough to reside within the migratory pathway will see a dramatic decrease in the Canada thistle population. Unfortunately, the insect feeds on many plants, including crops such as soybean and sunflower, and is not a candidate for long-term biological control of Canada thistle.

A native pathogen, *Pseudomonas syringae* pv. *tagetis* (Pst), causes the top of Canada thistle plants to turn yellow to white. This pathogen may release a toxin into the phloem of Canada thistle and kill the plant. The pathogen is most widespread during wet periods. Attempts to produce this pathogen as a commercial biocide have not been successful. A native rust (*Puccinia punctiformis*) has reduced Canada thistle in the wild but has not been introduced successfully as an effective biological control agent.

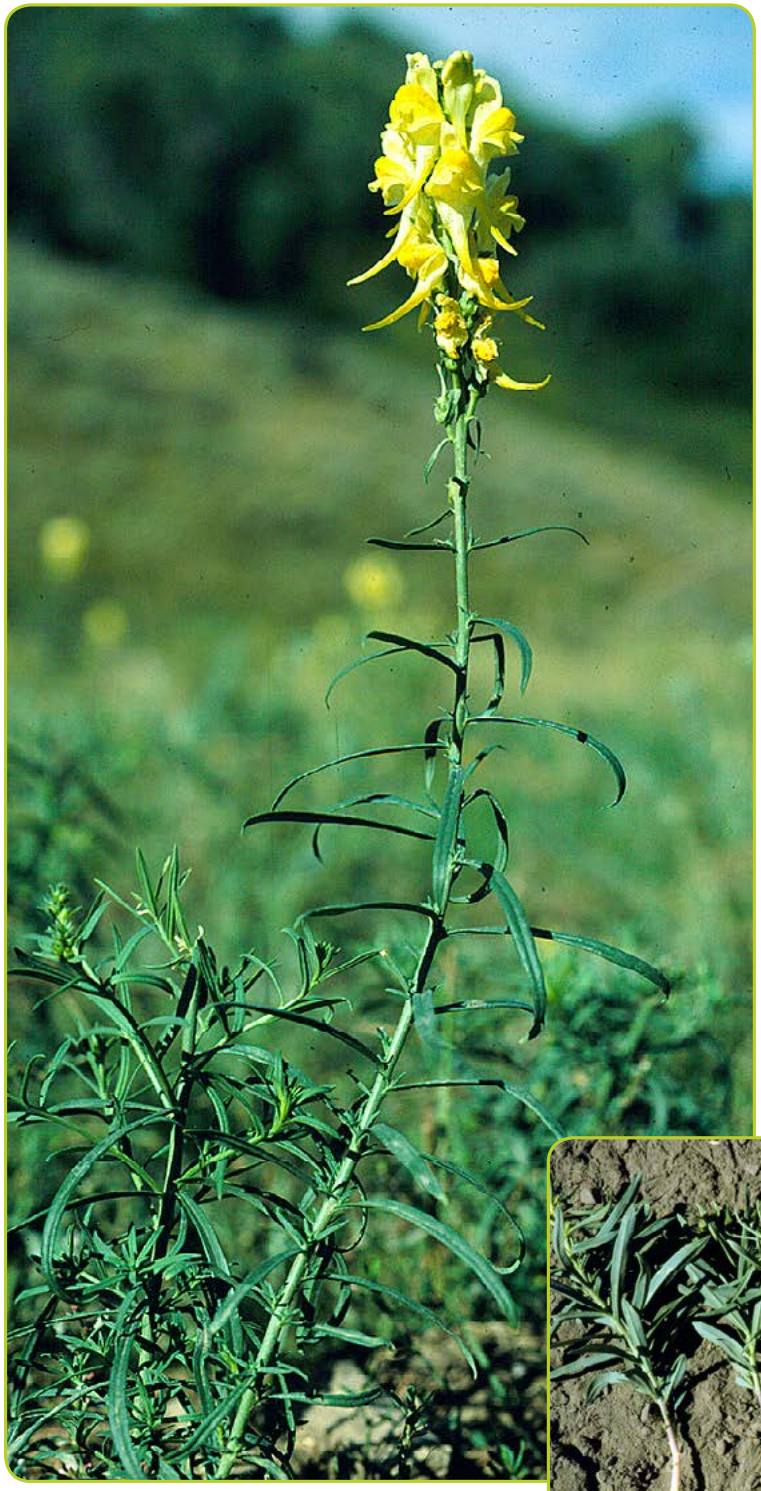
DALMATIAN TOADFLAX and YELLOW TOADFLAX

[*Linaria dalmatica* (L.) Mill.] and (*Linaria vulgaris* Mill.)

Dalmatian toadflax

Dalmatian toadflax has broad heart-shaped leaves

DALMATIAN TOADFLAX and YELLOW TOADFLAX



Yellow toadflax

Yellow toadflax has narrow linnear leaves

Yellow toadflax flowers have orange throats

DALMATIAN TOADFLAX and YELLOW TOADFLAX

State Listed Noxious Weed – both species

Both Dalmatian and yellow toadflax are escaped perennial ornamental plants that were introduced in the mid-1800s. Dalmatian toadflax is native to the Mediterranean region, specifically the Dalmatian Coast of Croatia, while yellow toadflax is from Eurasia. Yellow toadflax first was recorded in North Dakota by H.L. Bolley from a collection made in Fargo and described as "most abundant in Barnes County" in the 1940s by O.A. Stevens. The first record of Dalmatian toadflax is from Walhalla in Pembina County in 1937 by Stevens.

The toadflaxes are most likely to be found along highways, railroad tracks and other transportation or communication lines, or anywhere livestock is brought into the state. Often the origins of an infested area can be traced back to an escape from an ornamental planting. Dalmatian toadflax has been reported only as small patches in a few counties, generally in the western part of North Dakota. However, yellow toadflax has been found in many counties across the state and is on the verge of becoming a major problem for land managers in North Dakota.

Identification and growth form:

Dalmatian and yellow toadflax are members of the snapdragon family and thus easily recognizable by the bright yellow flowers, which have swollen corolla tubes that flare into two "lips" with an orange throat (yellow toadflax) and long spur. The flowers are 1 to 1.5 inches long with many flowers on a raceme. Both species have an extensive creeping rhizomatous root system that spreads like leafy spurge. The most distinctive difference between the species is that Dalmatian toadflax has broad, heart-shaped leaves that clasp a woody stem, whereas yellow toadflax has narrow, linear leaves with a narrow stem.

The plants begin regrowth from the roots as soon as the soil warms in early spring. Toadflax flowers from late June through August in North Dakota and single plants may produce more than 500,000 seeds that are dispersed by wind, rain, wildlife, and movement of forage and livestock. The seed is disk-shaped, 0.08 inch in diameter and dark brown to black, and often have irregular papery wings. Seed dispersal begins a few weeks after flowering and continues into winter. The roots of a single plant can extend 10 feet and give rise to daughter plants every few inches.

Why are these plants a concern?

The toadflax species are aggressive and will displace forage in pastureland and native species in wildland. Yellow toadflax can be mildly poisonous to livestock that graze it. Although the toadflaxes may be slow to establish, once plants take root, control is very difficult since most herbicides are ineffective.

Dalmatian toadflax seedlings are relatively poor competitors with grass species, but once established, the weed can become extremely invasive, especially on dryland sites, disturbed areas and roadsides. Yellow toadflax is adapted to more moist sites than Dalmatian toadflax and often is found in pasture, meadows and ditches.

DALMATIAN TOADFLAX and YELLOW TOADFLAX

How do I control these plants?

Prevention is the best method to keep Dalmatian and yellow toadflax from invading North Dakota pasture, rangeland and wildlands. Herbicides can be effective but require repeated treatments at high rates.

Chemical. Tordon (picloram), Plateau (imazapic) and Telar (chlorsulfuron) will control Dalmatian toadflax when applied at maximum use rates during flowering or late fall. No herbicide is labeled for yellow toadflax control, but research has found that a combination treatment of Tordon plus Overdrive (dicamba plus diflufenzopyr) applied from mid-June through mid-September will reduce yellow toadflax infestations for a least two years. See the latest edition of the "North Dakota Weed Control Guide" for application rate and timing recommendations.

Cultural. The long-term use of proper stocking rates to maintain competitive forage species has helped reduce the spread of toadflax into grazing lands. Burning is not effective because soil temperatures do not get high enough to kill the roots. Burning even may have a detrimental effect and cause an increase in the number of stems due to reduced cover.

Biological. Several insects have been introduced for toadflax control. The stem-boring weevil *Mecinus janthiniformis* has been the most successful and can reduce Dalmatian toadflax stands relatively quickly. *M. janthiniformis* larvae mine in Dalmatian toadflax stems, which slowly causes the plants to wilt and die. Repeated attempts to establish *M. janthiniformis* on yellow toadflax in North Dakota have failed, likely because the larvae cannot survive in the much narrower diameter stem of yellow compared with Dalmatian toadflax. *Mecinus janthinus* is currently being evaluated for yellow toadflax control.

A foliage feeding moth, *Calophasie lunula*, was introduced in the U.S. in 1968 but has had little effect on controlling yellow toadflax. Several other insects have been introduced for biological control of both toadflax species but have not established or have not controlled the weeds

SPOTTED and DIFFUSE KNAPWEED

[*Centaurea stoebe* spp. *micranthos* (Gugler) Hyek] and (*C. diffusa* Lam.)

Diffuse knapweed flower with spiny bracts

Spotted and diffuse knapweed

Spotted knapweed flower with black bracts

SPOTTED and DIFFUSE KNAPWEED

State Listed Noxious Weed (both species)

The knapweeds are one of the most rapidly spreading invasive species in the western U.S. Knapweeds already infest more acreage than leafy spurge in Montana and Minnesota, and have been found in more than 25 counties in North Dakota. Knapweeds are related to thistles and can spread even faster. For instance, spotted knapweed infested approximately 25 acres in eight North Dakota counties in 1984 and had spread to more than 1,000 acres in 14 counties by 1997. Diffuse knapweed can spread as quickly as spotted knapweed but has been kept in check in North Dakota and infests less than 650 acres. Spotted knapweed had infested more than 30,000 acres by 2017.

Identification and growth form:

Both are short-lived perennials or sometimes biennial plants reproducing solely by seed. Seed remains viable in the soil five years or more, so infestations may occur a number of years after vegetative plants have been eliminated. The seeds can germinate from spring through early fall. Seedlings emerging in the fall often overwinter as a rosette of leaves, resuming growth again in the spring. The plants grow 2 to 4 feet tall with one or more stems. The leaves are pale green and 3 to 4 inches long. Rosette leaves are deeply lobed. The physical appearance of these two knapweed species is similar, except diffuse knapweed is generally shorter and more highly branched. Plants flower from early July through August and produce 1,000 or more seeds per plant.

These species are distinguished by the bracts below the flower. Spotted knapweed has stiff, black-tipped bracts while diffuse knapweed has a rigid terminal spine about one-third of an inch long with four to five pairs of shorter, lateral spines (crablike). If the plant is not flowering, search for last season's flower stalk and identify the plant based on the flower bracts. Both species have pink to light purple and occasionally white flowers.

Why is this plant a concern?

Spotted and diffuse knapweed are aggressive, introduced weed species that rapidly invade pasture, rangeland and fallow land and cause a serious decline in forage and crop production. Spotted knapweed has few natural enemies and is not preferred by livestock as forage. Knapweed infestations in North Dakota largely can be traced to seed or hay brought in from neighboring states. Researchers in Montana have observed that spotted knapweed may remain in a confined location for several years and then spread rapidly to adjacent areas. Controlling spotted and diffuse knapweed plants when they are first observed and monitoring the site for several years to prevent reinfestation from seed are important

How do I control these plants?

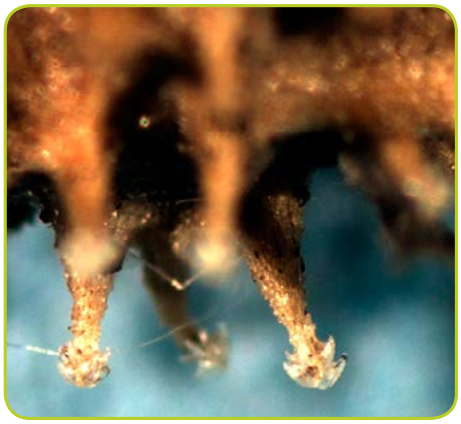
Chemical and Cultural. Spotted and diffuse knapweed confined to small, well-defined areas should be pulled by hand or treated with a herbicide as soon as detected to avoid spread of the weed. First, all visible knapweed plants should be removed and destroyed by burning or mulching. Then the areas should be treated with a herbicide to prevent reinfestation from seedlings. The most effective herbicides for spotted and diffuse knapweed control include Milestone (aminopyralid), Tordon (picloram) and dicamba (various). Treat an extra 10 to 15 feet around the knapweed patches to control seedlings. A careful follow-up program is necessary to control missed plants and seedlings. Many attempts to control knapweed have failed because follow-up treatments were not applied.

Biological. In general, the knapweed infestations are small enough that herbicide and hand removal are the best and most cost-effective treatments in North Dakota. Biological control agents have been introduced in neighboring states to control spotted knapweed. There are 13 biological control agents currently permitted for use against knapweed species. Consult the N.D. Dept. of Agriculture or NDSU weed specialists for the latest information on which agents may be successful in the state.

OE2 218

HOUNDSTONGUE

(*Cynoglossum officinale* L.)



HOUNDSTONGUE

State Listed Noxious Weed

Houndstongue is a biennial poisonous herb that is native to Eurasia. The plant is a member of the Borage family, which includes more commonly known plants such as Virginia Bluebells, Forget-Me-Nots and the fiddlenecks. Houndstongue commonly is found in disturbed areas, including roadsides, trails, and in pasture and woodlands following soil disturbance or overgrazing.

Identification and growth form:

Houndstongue is a biennial that forms a rosette the first year of growth and bolts and flowers the second season. The plant only reproduces from seed, but can spread great distances because the barbs on the nutlets cling to clothing, machinery and animals. The leaves are oblong, very pubescent and rough, which resembles a hound's tongue. Plants bolt during early summer, the second year of growth, to a height of 1 to 4 feet and flower in mid-June. The flowers are small, arranged in clusters and not showy. Flower color ranges from red to burgundy. Each flower produces three to four nutlets, which are flat and tear-drop shaped with a very hard seed coat and numerous barbs. Plants generally are found along trails and roadsides, on the edge of wooded areas and in disturbed habitats. Infestations often establish near areas where cattle and other livestock rub against something such as fence posts and trees or shrubs.

Why is this plant a concern?

Houndstongue tends to be a nuisance weed rather than a noxious plant unless infestations grow to become large patches. The nutlets often become imbedded in the wool or hair of livestock, which can cause a loss of value of the wool and/or increase costs to remove the burs. Eye damage can occur if burs become embedded in the eye or eyelids. The burs can be problematic for hikers, hunters and fishermen and also to their pets.

Houndstongue contains alkaloids that are especially toxic to cattle and horses. The plant is rarely eaten in the green state; however, animals will eat the dried plant in hay. Sheep are more resistant to the pyrrolizidine alkaloids than other livestock, while horses, especially when confined to small areas infested with houndstongue, are more likely to ingest toxic levels. Fatal liver disease in horses occurred following two weeks of feeding hay with as little as 6 percent houndstongue.

How do I control this plant?

Prevention is the best method to keep houndstongue from invading North Dakota. Use only certified weed seed-free hay and eradicate new infestations before the plant can spread.

Chemical. Escort (metsulfuron) is very effective for controlling houndstongue and can be applied throughout the growing season. First-year houndstongue rosettes are easily controlled with 2,4-D applied from late May to mid-June. Second-year plants are much less susceptible to 2,4-D. Plateau (imazapic) at high rates will control houndstongue both pre- and post-emergence, but grass injury, especially to the cool season species is likely when Plateau is applied at the maximum rate.

Biological. A root weevil, *Mogulones crucifer,* has been released for control of houndstongue in Canada. The insect has become well-established in Alberta and has greatly reduced the houndstongue infestation in that province. The insect has spread naturally and become established in Washington state. However, this biological control agent has not been approved for release in the U.S. and interstate movement is not allowed. Several other insects have been evaluated for biological control of houndstongue; however, initial results were not nearly as promising as those of the root weevil.

LEAFY SPURGE

(*Euphorbia esula* L.)

State Listed Noxious Weed

Leafy spurge was once the most difficult noxious weed to control in North Dakota and infests all 53 counties. Scientists at the North Dakota Agricultural College (NDAC) recognized leafy spurge could be a problem soon after it was first identified in the state, growing along a Fargo street in 1909. However, the plant was not added to the state noxious weed list until 1935, when leafy spurge was found growing in all but 10 counties. The largest single infestation at that time was estimated to be 193 acres in Foster County.

Latex is found in all plant parts

True flower

Leafy spurge gall

Aphthona lacertosa

Aphthona nigriscutis

LEAFY SPURGE

Despite several control programs led by the State Agriculture Department and NDSU Extension, leafy spurge doubled in acreage every 10 years, reaching nearly 1.8 million acres in the 1980s. A coordinated integrated program of biological, chemical and cultural methods directly led to the first-ever reports of a decline in leafy spurge infestation in the state in the 1990s.

Identification and growth form:

Leafy spurge is a long-lived perennial that normally grows 2 to 3 feet tall from a woody crown from below the soil surface. Each crown area produces several upright stems, giving the plant a clumplike appearance. The plant bears numerous linear-shaped leaves with smooth margins. The leaves have a characteristic bluish-green color but turn yellow or reddish orange in the fall. Stems originating from crown buds and roots begin growth in late April, making leafy spurge one of the first plants to emerge in the spring. The early and rapid growth gives leafy spurge a competitive advantage over crop and pasture plants. All parts of the plant contain a milky juice called latex, which is a useful identifying characteristic.

Leafy spurge produces a flat-topped cluster of yellowish-green petal-like structures called bracts, which surround the true flowers. The showy, yellow bracts appear in late May and early June, giving the plant the appearance of "blooming." However, the true flowers, which are small and green, do not develop until mid-June. Spring-applied herbicides are more effective on plants with developing true flower parts than on plants with developed bracts but undeveloped flowers.

Seeds are borne in pods, which contain three gray-brown, oblong, smooth seeds. After the seed has matured, the seed pods burst explosively and throw seeds up to 15 feet from the parent plant. An average of 140 seeds is produced per stem, and seeds may remain viable in the soil at least eight years.

Leafy spurge seeds may germinate to re-establish infestations where total control of leafy spurge tops and roots has been achieved. The peak period of germination is late May and early June, but seeds can germinate and seedlings become established throughout the growing season. Leafy spurge seedlings have a remarkable capacity for vegetative reproduction and can reproduce vegetatively within seven to 10 days after emergence. Seedlings typically do not flower during the first year.

The root system of leafy spurge is extensive and consists of numerous coarse and fine roots that occupy a large volume of soil. Roots are most abundant in the upper foot of soil, but some roots can extend to a depth of 15 feet or more. The roots are woody and durable in structure, with numerous buds capable of producing new shoots. The root system contains a large nutrient reserve capable of sustaining the plant for years.

Why is this plant a concern?

Leafy spurge infestations may have more than 200 stems per square yard in sandy soil and even higher densities in heavy clay soil. Patches of leafy spurge usually spread vegetatively from 1 to 3 feet per year and form dense stands that crowd out other plants by shading and competing for moisture and nutrients. Forage production may be reduced to 20 percent or less and most native plants are eliminated because they cannot out-compete this weed.

Leafy spurge contains a toxic substance that, when consumed by livestock, is an irritant, emetic and purgative. It causes scours and weakness in cattle and may result in death. The toxin has produced inflammation and loss of hair on the feet of horses from freshly mowed stubble during haying and has caused mortality of sheep that grazed leafy spurge exclusively. However, sheep and goats will graze leafy spurge as a portion of their diet and can be used as a form of cultural control. Animals will eat dried plants in hay, but many livestock, particularly cattle, avoid eating live plants

LEAFY SPURGE

Aphthona larvae

Longhorned beetle larvae

Leafy spurge hawkmoth

How do I control this plant?

Leafy spurge control must be considered a long-term management program. Generally, less than 6 inches of the root system is destroyed regardless if the control method is biological, chemical or cultural. Research at North Dakota State University has shown that more of the root system is killed when a combination of control methods are used, compared with any method used alone.

Chemical. Proper timing of herbicide applications is essential for good leafy spurge control. Leafy spurge is most susceptible to dicamba (Banvel and other trade names), Facet L (quinclorac), Method (aminocyclopyrachlor), and Tordon (picloram). Plateau (imazapic), fall-applied, provides better long-term control and less grass injury than spring or summer treatments. Combinations of Tordon plus Plateau or Tordon plus Plateau plus 2,4-D applied in June provide improved leafy spurge control compared with Tordon plus 2,4-D or Plateau applied alone in June. The Tordon plus Plateau combination is not recommended for use in the fall.

The combination of Tordon plus Overdrive also will improve leafy spurge control compared with Tordon used alone. Overdrive contains dicamba plus difluenzopyr, which is an anti-auxin compound that often improves broadleaf weed control when applied with auxin-like herbicides such as Tordon, dicamba and 2,4-D.

Glyphosate (various) applied for leafy spurge control has a different optimum application timing than the auxin herbicides (2,4-D, dicamba, picloram and quinclorac) or Plateau. Glyphosate is most effective for leafy spurge control when applied either after seed filling in midsummer or after fall regrowth has begun but before a killing frost. Glyphosate alone applied during spring growth stages generally provides poor long-term control.

Grazing. Sheep and goats provide an alternative for controlling leafy spurge top growth in pasture and rangeland. Grazing alone will not eradicate leafy spurge but will reduce the infestation, slow the spread of the weed and allow grasses to be grazed by cattle and horses.

Grazing should be started early in the spring when the plant first emerges. On large infestations, pastures should be divided so animals can be rotated regularly and the entire infestation grazed in a timely manner.

Sheep and goats are best suited to control leafy spurge on large infestations or along waterways and tree areas where chemical control is restricted or cost is prohibitive and/or where success with biological control agents has been minimal.

Leafy spurge provides good forage value and compares favorably with widely used regional forages such as alfalfa (*Medicago sativa* L.), smooth brome (*Bromus inermis* Leyss.) and crested wheatgrass (*Agropyron desertorum* Fischer ex Link). Before moving animals to a leafy spurge-free area, they should be contained for three to five days so viable seed can pass through the digestive system.

Biological. Biological control of leafy spurge was initiated in the mid-1980s. To date, 10 species of insects have been released in North Dakota for control of leafy spurge, and six have become established. Four of the six established insects are flea beetles (*Aphthona* spp.), which have reduced the leafy spurge density more than any other agent.

LEAFY SPURGE

The first flea beetle released in North Dakota was *Aphthona flava* Guill in 1986. This flea beetle has established at only a few sites in the state and occurs at densities too low to be effective. In 1988, a mixed population of *Aphthona czwalinae* Weise and *Aphthona lacertosa* Rosenhauer were released near Valley City, N.D. By 1995, the majority (greater than 90 percent) of this mixed population was *A. lacertosa*. Two additional flea beetles, *Aphthona cyparissiae* Koch and *Aphthona nigriscutis* Foudras, were released the following year. *A. lacertosa* and *A. nigriscutis* were established in almost every county in North Dakota by 1996 and have become the major biocontrol agents used for leafy spurge control.

Although *Aphthona* spp. adults feed on leafy spurge foliage, the major damage to the plant occurs when the larvae feed on the roots. Larvae feed on both the fine feeder roots used by the plant to absorb water and nutrients and the storage tissue of the root crown. This feeding both destroys root tissue directly and causes the plant to be more susceptible to other methods of control, such as herbicides and infection from soil borne pathogens.

Research at North Dakota State University found flea beetle establishment was best on silt loam, silt clay loam, clay loam and clay soils with an organic matter content of 6 percent to 9.5 percent. Flea beetles were least productive in fine sand to loamy fine sand soils with an organic matter content of 1 percent to 3 percent. In addition, the release area needs to be well-drained and not subject to frequent prolonged flooding or standing water, which will kill the larvae. Generally, flea beetles have not been very successful in controlling leafy spurge growing along waterways, in shaded areas or in very sandy soil.

The *Spurgia esulae* gall midge causes stem tip galls on leafy spurge, thereby decreasing seed production. It has been most successful near wooded areas. However, a second control method was needed to reduce the original leafy spurge infestation and to prevent spread from roots. A stem-boring beetle, *Oberea erythrocephala* Shrank, has been released and established in North Dakota in the 1980s, but to date, the population never has increased to sufficient numbers to decrease leafy spurge. The spurge hawkmoth (*Hyles euphorbiae* L.), a foliar feeder, was introduced in the 1970s but generally has not survived and when it did survive, control was too late in the growing season to be very useful.

Limitations to biological control. Although flea beetles have become established throughout North Dakota, they have not been successful in all environments. To date, approximately 30 percent of the releases have established and the leafy spurge stem density has been reduced. In another 30 percent of the releases, the insects have become established but the population density is too low to be effective. In the remaining releases, flea beetles have not established.

Cultural. Cultural control of leafy spurge includes properly timed cultivation and/or planting of competitive grass species. Cultural methods that only control leafy spurge top growth include mowing and fire. All cultural control methods are more successful when combined with herbicide treatments than when used alone.

Leafy spurge infestations must be controlled with herbicides such as glyphosate prior to seeding grass species. Some perennial grass species that have competed effectively to provide leafy spurge control include: Bozoisky Russian wildrye [*Psathyrostachys juncea* (Fisch.) Nevski] and Luna pubescent wheatgrass [*Agropyron trichophorum* (Link) Richter], Rebound smooth brome (*Bromus inermis* Leyss.) and Rodan western wheatgrass [*Pascopyrum smithi* (Rydb.) A. Löve]. They are examples of grass species that can compete relatively well with leafy spurge. Not only were the grasses very competitive with leafy spurge, but they also provided high yields and good nutritive value for grazing. Grazing following grass establishment should be limited and conducted at the proper growth stage of the grasses or leafy spurge will re-infest the seeded area rapidly.

Mowing and burning have been ineffective for reducing leafy spurge infestations, but may result in uniform regrowth that allows a more timely herbicide treatment. Also, mowing will reduce seed production if repeated every two to four weeks during the growing season.

MUSK THISTLE

(*Carduus nutans* L.)

State Listed Noxious Weed

Musk thistle is the most common biennial invasive thistle in North Dakota. Musk thistle is native in southern Europe and western Asia and was introduced into North America in the early 1900s. Two subspecies that differ in flower size and pubescence occur in North Dakota.

Identification and growth form:

Musk thistle likely is the most easily identified invasive thistle in North Dakota, yet many people confuse this plant with either bull thistle or plumeless thistle. Musk thistle often grows in excess of 6 feet tall, has very large flowers that tend to droop, and the flower has very characteristic brown bracts that resemble a pine cone. The flowers usually are deep rose, solitary and very large, ranging from 1.5 to 3 inches in diameter. Rosettes are dark green with a light green midrib, usually smooth and lacking pubescence and often grow 2 feet or more in diameter.

Musk thistle stems are usually very branched with spiny wings; however, the wings are interrupted and not complete along the stem as with bull or plumeless thistle. The leaves are oblong to lanceolate and lobed with slender spines along the margin. They generally have little pubescence underneath, which helps distinguish musk thistle from plumeless thistle. However, the subspecies *C. nutans macrocephalus* (Desf.) has very pubescent leaves.

Musk thistle flowers from July to late September. The average musk thistle plant produces in excess of 10,000 seeds per plant and, under favorable conditions, may produce 120,000 seeds per plant. Seed germination averages 30 percent. The seed generally germinates in the summer and fall, and the plant overwinters as a rosette. The following spring, the plant resumes vegetative growth, bolts and flowers. After setting seed, the plant

MUSK THISTLE

dies, thereby completing the life cycle. Occasionally biennial thistles have winter annual, annual or short-lived perennial characteristics.

Why is this plant a concern?

Musk thistle tends to invade overgrazed or otherwise disturbed pastures, rangeland, roadsides and waste areas. Movement into cropland is generally from nearby noncropland or roadsides. Musk thistle spreads rapidly and can form very dense stands that crowd out desirable forages and native species.

How do I control this plant?

Since biennial plants such as musk thistle reproduce only from seed, the key to a successful management program is to control the plants before flowering.

Chemical. Fall is the preferred time for applying herbicides for biennial thistle control. Fall treatment allows more time for herbicide application than in the spring and thistle control is generally best with fall treatments. Seedlings that emerge in summer after tillage or previous herbicide applications will not bolt but remain in the rosette stage. Biennial thistles are most susceptible to herbicides in the rosette form.

Biennial thistles can be controlled effectively with Milestone (aminopyralid), Stinger, Transline or Curtail (clopyralid), Tordon (picloram), Method (aminocyclopyrachlor), or dicamba (various) or dicamba plus diflufenzopyr (Overdrive). Products that contain metsulfuron (Escort, Cimarron Max, others) will control biennial thistles in the spring and will eliminate seed production when applied in the bolting to bud growth stages.

Cultural. Repeated mowing will reduce musk thistle infestations. Mow whenever the plants are in the early bud growth stage to prevent seed-set. Several mowings a year are needed because plant populations vary in maturity. Mow as close to the surface as possible. Plants should be cut below the terminal bud before the stem elongates or the weed will regrow. Mowing before the flowers start showing color is important because plants mowed after that likely will produce some viable seed. Mowing should be combined with a chemical control program for best results.

Biological. The seed weevil *Rhinocyllus conicus* was introduced from Eurasia to control musk thistle by reducing seed production. Larvae develop in the flower head and consume the seed as it develops. The weevils can reduce seed production by nearly 80 percent, but they are attracted more to earlier blooming rather than to later blooming flowers. The late-season flowers produce seeds with little damage from the weevil, which sustains the musk thistle population. Building a high enough population of insects to greatly reduce seed production takes five to 10 years. These insects first were introduced into North Dakota in the early 1970s. *R. conicus* is not specific to musk thistle and has been found feeding on other invasive thistles, such as Canada thistle. However, this insect also feeds on native thistles, including several that are on the protected or endangered species list and interstate transport is not permitted.

The thistle crown weevil *(Trichosirocalus horridus)* was introduced into North America from Europe in the mid-1970s. Larvae of this insect feed on the growing tip as the musk thistle rosette bolts. While seldom effective by itself, it does help control musk thistle when combined with *Rhinocyllus conicus.* Feeding by *T. horridus* larvae on musk thistle growing tips causes the plant to produce multiple shoots. The resulting flower heads are reduced in size and produce fewer seeds, and the increased number of flower heads results in an increased population of *R. conicus*. Interstate transport of *T. horridus* is no longer permitted.

The rust fungus *Puccinia carduorum* was released in the eastern U.S. in 1987 for Canada thistle control. The rust has moved westward by natural unaided spread and can reduce musk thistle, especially when in combination with the previously mentioned insects.

PALMER AMARANTH

(*Amaranthus palmeri* S. Watson)

County Listed Noxious Weed

Palmer amaranth is a member of the pigweed family and is native to the southwestern and southcentral U.S. as far south as northwestern Mexico and as far north as southern Nebraska. The plant is one of the more aggressive pigweed species and often hybridizes with other pigweeds, including redroot pigweed (*A. retroflexus* L.) and waterhemp [*A. rudis tuberculatus* (Moq.) Sauer]. Palmer amaranth has developed resistance to multiple classes of herbicides and become one of the most difficult to control weeds in croplands of the Midwest and northern Great Plains.

Identification and growth form:

Palmer amaranth is a summer annual that emerges from seed throughout the growing season. The plant commonly grows 6 to 8 feet tall and can reach more than 10 feet in height. The plant has one very thick central stem, often more than 5 inches in diameter, which supports many lateral

PALMER AMARANTH

branches. Under optimum conditions, the plant can grow 2 to 3 inches per day. Palmer amaranth leaves are smooth, 2 to 8 inches long, arranged in an alternate pattern and lance or egg-shaped. The leaves have a small, sharp spine on the leaf tip. A whitish V-shaped or thumbprint mark is found on leaves of some but not all plants. Palmer amaranth is dioecious, with male and female flowers appearing on long leafless branching spikes at the top of the plant. The flowers are green, not showy, and end in three spiny bracts. The seed head spikes can be up to 3 feet long, and the female flowers are very prickly.

Palmer amaranth reproduces only by seed. Seed viability is more than 90 percent the first year after flowering and declines slowly through time, with some seed remaining viable for three to five years. Each plant can produce from 100,000 to more than 500,000 seeds, which are small (1 to 1.3 millimeters) and dark reddish brown. Palmer amaranth spreads from region to region as a contaminant in seed, livestock feed and hay. Once established in an area, the plant can be spread on farm equipment, in manure and by wildlife that feed on the seed.

Why is this plant a concern?

Palmer amaranth has reduced yield up to 91 percent in corn and 79 percent in soybean. The weed has a wide genetic diversity, which allows the plant to adapt to new environments and has enabled the weed to develop resistance to many herbicides used to control pigweed species. Palmer amaranth has developed resistance to ALS, HPPD and PPO inhibitors, dinitroanilines triazines and glyphosate, leaving few options for control in cropland. Once introduced, Palmer amaranth can spread quickly. For instance, it infested four southern Iowa counties in 2016 but was found statewide in more than a third of the counties one year later.

How do I control this plant?

Chemical. Palmer amaranth is difficult to control because it can be resistant to multiple classes of herbicides and their different modes of action. Foliar-applied herbicides must be applied before Palmer amaranth plants are taller than 4 inches. Herbicides that control or suppress susceptible Palmer amaranth include auxins such as dicamba, chloroacetamide, diphenylethers, glufosinate, glyphosate and HPPD inhibitors. Consult the latest edition of the "North Dakota Weed Control Guide" (W253) and the NDSU Palmer amaranth website (www.ag.ndsu.edu/palmeramaranth) for updates on controlling Palmer amaranth infestations.

Cultural. Early identification and eradication are the best method to prevent Palmer amaranth from becoming established in North Dakota. Use seed from reliable sources that are certified weed-free. Much of the spread of Palmer amaranth in neighboring states was due to planting infested seed. If plants are found, they should be removed by hand and destroyed. Place plants into large plastic garbage bags when removing them from fields to prevent seed spread, then burn or compost the plant material. Mowing is not an effective control method because plants will regrow from cut stalks and set-seed, often out of sight below the crop canopy.

Crop rotation is important to prevent Palmer amaranth from becoming established in North Dakota. Rotate soybean with grass crops such as wheat or corn or a perennial forage to help prevent the weed from spreading. Rotating crops allows the use of herbicides from various chemical families that are more effective on Palmer amaranth and other pigweed species than soybean herbicides and will reduce the buildup of herbicide-resistant populations.

Palmer amaranth sometimes is called carelessweed. Carelessness in allowing just a few plants to become established can result in large crop losses in only a few years. Be vigilant in scouting and removing even a single Palmer amaranth plant.

Biological. No biological control agents or pathogens are available for this weed.

PURPLE LOOSESTRIFE

(*Lythrum salicaria* L.)

State Listed Noxious Weed

Purple loosestrife, a beautiful garden plant with an aggressive nature, first was introduced into North America in the early 1800s. The plant was sold in North Dakota by its genus name, *Lythrum,* for at least 50 years. Lythrum plants were brought to North Dakota for flower gardens because of their striking color, ease of growth, winter hardiness and lack of insect or disease problems. The garden varieties of purple loosestrife were sold by many cultivar names, including Morden Pink, Dropmore Purple and Morden Gleam. These garden cultivars were thought to be sterile but now have been shown to cross-pollinate with the wild *Lythrum* type and sometimes with other *Lythrum* cultivars.

Identification and growth form:

Purple loosestrife is a rhizomatous perennial forb. Wild infestations are associated with moist or marshy sites. The stems are erect (1.5 to 8 or more feet tall) and four to six angled, and can be smooth or pubescent with few branches. Leaves are simple (0.75 to 4 inches long, 0.2 to 0.5 inch wide), entire, and can be opposite or whorled.

The most identifiable characteristic of purple loosestrife is the striking rose to purple flowers. The flowers are

Galerucella spp. feeding on leaves

PURPLE LOOSESTRIFE

arranged on a spike, which can be a few inches to 3 feet long. Each flower has five to seven petals arising from a cylindrical green tube. The plant usually flowers from early July to mid-September in North Dakota. The seed capsule is two-celled and contains many very small seeds (1 millimeter long or less). The roots become thick and woody in mature plants. The aerial shoots die in the fall and new shoots arise the following spring from buds at the top of the root crown. Although the root crown expands and produces more shoots each year, the maximum growth of the root crown diameter is limited to about 20 inches.

Spread of purple loosestrife is primarily by seed, but the plant also can spread vegetatively from stem cuttings. Research at NDSU has shown that seed viability of purple loosestrife growing in North Dakota wetlands ranged from 50 percent to 100 percent. With approximately 2.7 million seeds produced per plant, purple loosestrife has the potential to spread rapidly once established in an area.

Why is this plant a concern?

The most destructive impact of purple loosestrife invasions is on the ecology of aquatic sites. Purple loosestrife forms dense monotypic stands as it displaces native wetland plants. Under optimum conditions, a small, isolated group of purple loosestrife plants can spread to cover aquatic sites in just one growing season. When purple loosestrife replaces native vegetation, it also can displace wildlife. Waterfowl, especially ducks, avoid wetlands that have become dominated with purple loosestrife. In addition, overall waterfowl production decreases as suitable nesting habitat is eliminated. The plant's growth is generally too compact to offer cover, and cover may be as crucial to wildlife as food.

How do I control this plant?

Several methods are available for purple loosestrife control, including mechanical, biological and chemical. The size and location of a specific infestation will determine the best control methods. In general, small infestations of a few plants can be controlled by digging, especially when plants are only a few years old. Larger infestations require treatment with herbicides and/or biological control agents.

Chemical. Herbicides can be used to control purple loosestrife in areas too large to be controlled by digging. Also, herbicides can be applied to individual plants selectively in landscape situations to prevent killing desirable plants. Infestations growing along streams or in marshy areas may require specialized equipment and application by trained professionals.

Glyphosate (various trade names) will provide good control of purple loosestrife when applied from July to early September. Many formulations of glyphosate are sold but only those labeled for aquatic use can be applied in or near water. Garlon (triclopyr) is a selective broadleaf herbicide that will not kill cattail or other desirable monocot species. Garlon will provide good to excellent purple loosestrife control when applied in the pre- to early flower or late-flower growth stages but should not be used in landscapes or flower beds because soil residual of the herbicide may prevent establishment of other horticultural plants. Milestone (aminopyralid) and Capstone (aminopyralid plus triclopyer) can be used in seasonally dry wetlands.

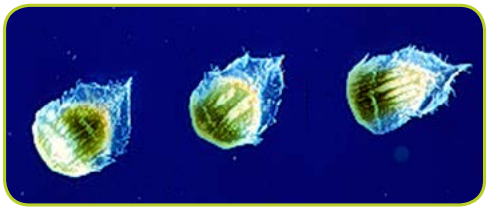
Biological. Three biocontrol insect species were introduced in North Dakota in 1997. They were:

Galerucella pusilla — a leaf-feeding beetle
Galerucella calmariensis — a leaf-feeding beetle
Hylobius transversovittatus — a root-mining weevil

Of these insects, the two *Galerucella* spp. leaf-feeding beetles have been most successful. These insects overwinter as adults and lay eggs in early June in North Dakota. The adults and especially the larvae feed on the leaves and flowers of purple loosestrife. Following several summers of heavy feeding, purple loosestrife infestations have been reduced greatly. However, since the largest infestations in North Dakota are in urban areas, mosquito control programs have kept these insects from becoming well established.

RUSSIAN KNAPWEED

[*Acroptilon repens* (L.) DC.] syn. (*Centaurea repens* L.)



RUSSIAN KNAPWEED

State Listed Noxious Weed

Russian knapweed is the most widespread of the knapweeds in North Dakota. It also is the only perennial of the noxious knapweeds and is the most difficult to control. Russian knapweed often is found in poorly drained and saline/alkaline soils with supplemental water sources such as rivers and streams. This persistent weed often is found in southwestern North Dakota, but increasingly infestations have been found statewide. Russian knapweed grows especially well in areas with supplemental water sources such as the Little Missouri and Heart rivers in North Dakota.

Identification and growth form:

Russian knapweed is a long-lived, deep-rooted perennial with growth characteristics similar to Canada thistle. The weed emerges in the spring from roots and grows to 2 to 3 feet tall and is shrublike with spreading branches. Once established, Russian knapweed spreads mainly by underground root stocks as seed production is limited compared with other knapweed species. The leaves are alternate and lobed lower on the plant while upper leaves are entire. Flowering occurs from June to September and flowers vary from light pink to lavender. The stems die back to the soil surface each year.

Two key characteristics distinguish Russian knapweed from spotted and diffuse knapweed. First, the flowers have rounded bracts with transparent tips that are quite different in appearance than the dark bracts of spotted and diffuse knapweed. Second, the root of this perennial is dark brown to black, scaly as if the plant had been burned, and can grow to depths of greater than 20 feet. The flowers of Russian knapweed vary from light pink to lavender.

Why is this plant a concern?

Russian knapweed can spread rapidly and is very competitive with native species. Russian knapweed will reduce forage production to near zero as the site often becomes a monoculture. Russian knapweed also will infest roadsides, pasture and rangeland and is the only knapweed in the state that causes significant losses in cropland.

How do I control this plant?

Russian knapweed is one of the most difficult perennial weeds to control. If the plant is found in cropland, then a combination of cultivation and herbicide treatments will suppress the plant. However, herbicides at labeled rates for cropland use will not control Russian knapweed.

Chemical. Tordon (picloram) is one of the most effective herbicides used for Russian knapweed control. The best control is obtained when picloram is applied following several hard frosts (mid-October). Russian knapweed plants may be dormant with gray stems and no leaves, but control the following spring is nearly 100 percent. Application in mid-September or during flowering in midsummer provides shorter-term control than late applications. Other herbicides used for Russian knapweed control include Escort (metsulfuron) and Milestone (aminopyralid).

Cultural. Livestock generally will not graze Russian knapweed. Mowing and cultivation do not control this weed.

Biological. Exploration and evaluation of biocontrol agents for Russian knapweed are in progress. The gall fly *Jaapiella ivannikovi* was released in 2009, has established and will be available for wider distribution. A gall wasp, *Aulacidea acroptilonica*, also was released but has had minimal impact.

SALTCEDAR

(*Tamarix* spp.)

SALTCEDAR

State Listed Noxious Weed

Saltcedar is the common name for several introduced species of shrubs or small trees, including *Tamarix chinensis, T. parviflora* and *T. ramosissima.* Saltcedar is native to Eurasia and first was introduced into the U.S. to reclaim eroded areas and prevent further loss of stream banks, primarily in the southwest. Saltcedar has been sold in the horticultural industry, primarily for its wide adaptability and pink flowers. Saltcedar became established in North Dakota as escapes from ornamental plantings or from seed floating along rivers.

Identification and growth form:

Saltcedar is a shrubby bush or tree that can range in size from 5 to 20 feet tall. The bark is a reddish brown, especially on younger branches. The leaves are small and flat and resemble evergreen shrubs such as arborvitae. Flowers are pink to white and five-petaled, and appear from mid to late summer. The seeds are extremely tiny and similar in size and color to pepper. Each seed has a pappus, which allows it to float long distances in water or move in the wind. Seeds are short-lived and usually germinate within a few months after dispersal.

Once saltcedar seed germinates, it can grow rapidly to a small flowering shrub in one to two years. The plant is deciduous and very hardy, and horticultural varieties are advertised to grow "in sun or shade, and in wet or dry areas" from USDA hardiness zones 2 to 7. The plant quickly establishes a long, woody taproot to support a voracious thirst for water. The root system is capable of producing many new shoots if the top growth is removed by mechanical control methods or fire.

Why is this plant a concern?

Saltcedar can become a monoculture quickly along lakes and waterways. In the early morning and evening, moisture with high salt content is exuded from the foliage, causing the soil to become saline. Saltcedar can choke waterways and even has dried up entire lakes. Native riparian species are quickly displaced by saltcedar, which in turn causes displacement of native birds and animals that generally do not feed on the leaves or eat the saltcedar seeds. Saltcedar, even in the seedling stage, will tolerate short-term flooding and can establish away from waterways when seeds are washed in during flooding. Once established, the plants can become so thick cattle will not graze the area.

How do I control this plant?

Prevention is the best method to keep saltcedar from invading North Dakota wetlands and wildlands. Scouting along waterways and removal of ornamental plantings have been effective in reducing the spread of saltcedar in North Dakota.

Chemical. Arsenal (imazapyr) is the most widely used herbicide to control saltcedar. Arsenal also can be applied with a glyphosate formulation labeled for use in water. Do not remove saltcedar top growth for three years following herbicide application or resprouting will occur. Garlon (triclopyr) has been effective when applied in the spring or late fall.

Cultural. Control methods such as burning or bulldozing have not been successful.

Biological. Several leaf beetles (*Diorhabda* spp.) have been released in North America to control saltcedar. The insects feed on leaves of saltcedar and slowly reduces plant vigor. However, the insects have not been consistently successful in reducing saltcedar infestations. Biological control of saltcedar in North Dakota is not recommended because of the small size of most plants and low infestation levels in the state.

NARROWLEAF HAWKSBEARD

(*Crepis tectorum* L.)

County Listed Noxious Weed

Narrowleaf hawksbeard is native to Siberia and much of Eurasia. The plant is a member of the sunflower family and has bright yellow flowers very similar to dandelion or sowthistle. Narrowleaf hawksbeard commonly is found in most of Canada, including the neighboring provinces of Manitoba and Saskatchewan, where it is listed as a noxious weed. Narrowleaf hawksbeard will grow in many ecological zones, ranging from forests, lakeshores and seashores to dry prairies, mountains and parklands. Although narrowleaf hawksbeard can be found as far south as New Mexico and north to Alaska, the weed is primarily problematic in the northern tier of U.S. states and Canadian Prairie Provinces. Prior to 1950, O.A. Stevens of the North Dakota Ag College reported narrowleaf hawksbeard was well-established along a road in Walhalla, N.D., and had collected samples from Bottineau and Stark counties.

NARROWLEAF HAWKSBEARD

Identification and growth form:

Narrowleaf hawksbeard is a winter or spring annual that grows 2 to 3 feet tall from a tap-rooted basal rosette. The plant has a single main stem and often branches. The leaf shape gradually changes, going from the base to the tip of the plant. Rosette leaves are up to 6 inches long, 1 inch wide and coarsely toothed with a pointed tip. Basal leaves die off as the plant matures, which can help distinguish this plant from common dandelion or annual sowthistle. Stem leaves are alternate, and go from 4 inches long to less than an inch at the tip of the plant. Leaves are wider at the tip than the stem and often have a pair of small lobes at the base and curled edges. A white milky sap is found throughout the plant.

Mature narrowleaf hawksbeard has bright yellow dandelion-like flowers, which are found from late May through September in North Dakota. The seed are dark purple to brown, ribbed and attached to a pappus that will carry them in the wind or on animals. Each plant contains 30 to 70 flowers and can produce up to 50,000 seeds. Narrowleaf hawksbeard reproduces only by seed, which has a short dormancy and can germinate shortly after dispersal. Up to 90 percent of the seedlings that emerge from August to mid-September will overwinter. Survival declines the later in the season that seeds germinate, but even those that emerge in early to mid-October can overwinter and should be controlled.

Why is this plant a concern?

Narrowleaf hawksbeard traditionally was found along roadsides and disturbed land in North Dakota but now has become especially troublesome in no-till cropland, cropland seeded with cereals, pulses or oilseed crops, hay fields, and along newly established pipelines. Narrowleaf hawksbeard develops rapidly in the spring, which gives the species a competitive advantage, especially in forage crops. The weed will outcompete annual crops for nutrients and moisture, thus reducing yield, and can displace native plants in wildlands.

How do I control this plant?

Chemical. Narrowleaf hawksbeard is best controlled in late fall or very early spring with herbicides. The plant is much more difficult to control after bolting. Glyphosate applied alone or with other herbicides such as dicamba or 2,4-D will control rosettes in the fall. High rates of 2,4-D alone will control narrowleaf hawksbeard but can damage some crops. 2,4-DB is more effective than 2,4-D for control of this weed and is useful in forage crops such as alfalfa. Low rates of 2,4-D and dicamba generally do not control narrow leaf hawksbeard in the spring; rather glyphosate at 2 quarts per acre or more is required. ALS-inhibiting herbicides such as metsulfuron or tribenuron also will control this weed and often are mixed with glyphosate. Consult the latest edition of the "North Dakota Weed Control Guide" (W253) for additional herbicides used to control narrowleaf hawksbeard.

Cultural. Because narrowleaf hawksbeard only spreads by seed, plant certified weed-free seed and clean all farm equipment before moving from an infested to a noninfested field. Cultivation in late fall or very early spring will remove this weed from cropland. Preventive management such as maintaining good crop cover, minimizing disturbance and removing infestations when they are small will help contain the spread of narrowleaf hawksbeard. Mowing of noncrop sites before seed-set will reduce the spread of this weed.

Biological. No biological control agents or pathogens are available for this weed.

Bill Sanderson Gas Processing Plant Project

Dust Control Plan

February 2020

OE2 237

Introduction

OE2 North LLC (OE2) proposes to construct the Bill Sanderson Gas Processing Plant Project (Project or Plant), that will consist of a gas processing plant permitted under the North Dakota Public Service Commission (PSC) Certificate of Site Compatibility. The nameplate processing capacity of the Plant will be 250 million standard cubic feet per day (MMscfd). The 39-acre Plant Site will be located approximately 15 miles west of Williston, North Dakota, in Section 27, Township 154 North, Range 104 West, Williams County, North Dakota on a parcel owned by OE2 (henceforth referred to as the Project Site).

Construction of the Project will involve land-disturbing activities, which can increase the susceptibility of soils to erosion caused by wind and water. Wind erosion can damage the productivity of the land by reducing soil moisture, altering soil structure, and carrying away soil nutrients and topsoil. A small amount of soil loss from wind erosion occurs naturally; however, human activity, such as construction of a gas processing plant, can dramatically increase soil loss due to wind erosion (fugitive dust) and potentially create conditions that could affect air quality and safety. Fugitive dust is a type of non-point source air pollution that can cause respiratory distress for construction workers, as well as for nearby residents and wildlife. Additionally, fugitive dust can create a safety hazard by obscuring visibility for equipment operators, construction personnel, and traffic on public roads near the Project.

OE2 has developed this *Dust Control Plan* as a guide for construction and field personnel on implementation of appropriate measures to minimize and control the generation of fugitive dust during construction activities associated with the Project. It will be the responsibility of the Project contractors, working with OE2's field representatives, to identify activities that are generating dust and to at all times control airborne dust levels during construction activities to acceptable levels that are in compliance with any applicable standards, including those established by the North Dakota Department of Health (NDDOH), and other regulating agencies and local ordinances.

Fugitive Dust Sources

OE2 has attempted to identify the primary potential sources of fugitive dust, which include:

- Vegetation clearing activities;
- Initial grading of topsoil and subsoil;
- Excavation and backfilling;
- Grading associated with reestablishing contours and restoring segregated topsoil;
- Vehicle traffic on unimproved public and private access roads;
- Vehicle and equipment travel within the Site;
- Open-bodied trucks hauling sand, soil, gravel, or other materials; and
- Activities at Project facilities such as material storage yards, contractor yards, parking areas, and aboveground facility locations.

OE2's Contractors and field representatives will identify activities that are generating fugitive dust, implement feasible dust abatement techniques or Best Management Practices (BMPs) to control dust, and maintain compliance with applicable fugitive dust regulations.

Fugitive Dust Control Measures

Dust suppression measures will be employed as necessary to control fugitive dust emissions during the construction of the proposed Plant where dust could compromise safety or become a public nuisance. This will also apply to access roads where dust raised by construction vehicles may irritate or inconvenience local residents as they approach the Plant Site. To minimize wind erosion and fugitive dust emissions during construction, OE2 will implement the following reasonably available control measures:

- Disturb no more earth than required for construction to occur;
- Use dust abatement techniques (i.e., applying water or approved nontoxic chemical dust suppressants) on unpaved or un-vegetated areas or other areas susceptible to wind erosion within the Plant Site footprint. (Note: utilization of chloride-containing additives is limited to roads. Application of dust suppressants will be repeated as necessary and as determined by the Environmental Inspector (EI) or OE2 representative);
- Water for dust control will be obtained from wells, municipal sources, and nearby rivers where the necessary water purchase agreements and permits required by federal, state, and local agencies for the procurement of water have been secured. No unapproved water sources will be used for Project activities, including dust control;
- Temporarily stockpiled soils (topsoil and spoil) will be sprayed with water or approved chemical dust suppressant to create a semi-hard protective layer to minimize wind erosion, if necessary, and as determined by the EI or OE2 representative. (Note: utilization of chloride-containing additives is limited to roads and is not permitted on stockpiled soils);
- Emissions from construction equipment combustion, open burning, and temporary fuel transfer systems and associated tanks will be controlled to the extent required by state and local agencies through the permitting process;
- Project-related traffic speeds will be controlled within the Project facility and the access road to the Plant Site; where construction activities approach dwellings, farm buildings, commercial areas, and other areas occupied by people; and on unpaved access roads. A speed limit of 25 mph will be followed on unimproved roads. Additional speed limit restrictions may be required by the property owner/tenant on private lands or by the county on public roads (e.g., posted speed limits);
- Speed limits will be decreased when excessive winds prevail and where sensitive areas such as public roads are adjacent to access roads or the Plant Site;
- Open-bodied trucks carrying sand, soil, gravel, or other materials will be covered where necessary to prevent such materials from being expelled;
- Construction entrance/exit access locations onto paved roads will be cleaned at a minimum of once every 48 hours, or as needed or specified by the EI if materials are observed to be accumulating on the road surface;

- When opacity along dirt roads exceeds 20 percent (objects partially obscured), construction activity will cease until dust control measures are employed; and
- Other dust control measures, such as the use of wind fences or berms, may also be implemented as needed.

The frequency of water application will largely depend on weather conditions. If seasonal or other weather conditions prevent compliance with the time frames, the contractor will stabilize the Plant Site and maintain erosion and sediment control measures until cleanup can be conducted.

Regulatory Applicability

The following agencies are responsible for air quality management in areas of Project construction activities:

- North Dakota Department of Health

This Dust Control Plan has been developed to meet the regulatory requirements of North Dakota Administrative Code Article 33-15. While the state of North Dakota has no specific regulations in relation to construction dust control, OE2 and its contractors will utilize measures outlined in this Plan to minimize dust during construction.

OE2 North LLC Bill Sanderson Gas Plant PU-20-082 Response to ND PSC Staff's February 26 and 27, 2020 Information Request			
Item	***Request for Information***	***Response***	***Attachment***
1	Provide all GIS layers for all maps in Appendix B and the Figure 1 map in the Natural Resources Report.	GIS layers for all maps in Appendix B and Figure 1 map in the Natural Resource Report have been submitted on a thumb drive via Fed Ex for delivery March 4, 2020.	No
2	Page one of the application indicates that the "Project Study Area is a 0.5-mile buffer around the Project Site that encompasses Sections 26, 34, and 35, Township 154 North, Range 104 West in North Dakota". Is Section 27 Township 154 North, Range 104 West also included in the Project Study Area?	Section 27 Township 154 North, Range 104 West is also included in the Project Study Area.	No
3	When does OE2 intend to complete a Class III cultural survey? Will OE2 file the survey results with the Commission once complete?	OE2 will complete a Class III cultural survey on March 5-6, 2020. The survey will be conducted in accordance with the *Subsurface Testing Plan for the Proposed Gas Plant OE2 North LLC, Bill Sanderson Gas Processing Plant Project*, submitted to the State Historical Society of North Dakota (SHSND) on February 28, 2020. The Subsurface Testing Plan is included as an attachment to this response. OE2 will file the survey results with the Commission once complete.	Yes
4	File with the Commission any inventories that OE2 has conducted for trees, saplings, and shrubs and noxious weeds. If the inventories have not been completed, explain why, and provide the anticipated completion date(s). Will OE2 file the results of the inventories with the Commission once complete?	OE2 will complete a complete inventory of trees, saplings, shrubs, and noxious weeds on March 5-6, 2020. OE2 will file the survey results, which will supplement the previous survey results included in Appendix C of the original Application, with the Commission once complete.	No

OE2 North LLC Bill Sanderson Gas Plant PU-20-082 Response to ND PSC Staff's February 26 and 27, 2020 Information Request			
Item	***Request for Information***	***Response***	***Attachment***
5	Sampling Unit 9 and 13 of Table 3 to the Natural Resources Report indicates that Grouse Mountain Environmental Consultants were unable to determine if the sample unit locations indicated the presence of wetlands. Page 8 of The Natural Resources Report reads "a complete inventory of vegetation and analysis of hydric soils and hydrology indicators during the growing season may verify that these areas are not wetlands". Is OE2 committed to conducting a complete inventory? If yes, when will these surveys take place, and will OE2 file the results of the inventory and analyses with the Commission once complete?	OE2 will complete a complete inventory of vegetation on March 5-6, 2020. OE2 will file the survey results with the Commission once complete. If wetlands are determined to be present in the Project Area, OE2 will avoid impacts to these wetlands through project design or best management practices.	No
6	Section 4.2 on page 10 of the Natural Resources Report recommends that OE2 search for raptor nesting activity during January 15 through September 15, (i.e., during raptor breeding season), and survey for ground-nesting passerine birds within the proposed construction footprint during April 1 through April 15. Will OE2 follow these recommendations? If raptor nests or ground-nesting passerine birds are located during such surveys, what is OE2's plan to mitigate any adverse effects resulting from construction of the facility on the habitats and species?	OE2 will conduct preconstruction raptor and ground-nesting passerine bird surveys. If raptor nests or ground-nesting passerine birds are identified in the Project Area during the surveys, OE2 will implement mitigation strategies to minimize potential impacts.	No
7	Provide a table listing all field surveys that have been conducted and provide the anticipated completion dates for any that remain incomplete. Include any planned field surveys in the table.	A table listed completed and planned desktop and field surveys is included as an attachment to this response.	Yes
8	Provide a table showing the status of the issuance of each required permit, and the timeline to obtain each.	A Permit Matrix is included as an attachment to this response.	Yes

OE2 North LLC Bill Sanderson Gas Plant PU-20-082 Response to ND PSC Staff's February 26 and 27, 2020 Information Request			
Item	***Request for Information***	***Response***	***Attachment***
9	File with the Commission any wetland delineation report(s).	The *Bill Sanderson Gas Processing Plant Project Wildlife and Waters of the US Field Assessment and Offsite Assessment Report* was included as Appendix C to the PSC Application. OE2 will complete a wetland delineation on March 5-6, 2020. OE2 will file the wetland delineation report with the Commission once complete.	No
10	Address whether any Exclusion Areas listed in NDAC Section 69-06-08-01(1)(e) are located within the Project Site or Study Area.	There are no Exclusion Areas within the Project Site or Study Area that are listed in NDAC Section 69-06-08-01(1)(e): *Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.*	No
11	What is the Parcel Boundary on the Class I Culture Resource Desktop Analysis map? Was a Class I desktop analysis conducted on this area?	The Class I desktop analysis was conducted for the 1-mile indirect APE around the Parcel Boundary, which was the proposed location of the Plant (which includes a little more than the actual Plant footprint).	No
12	Are any hardwood draws or enrolled woodlands in the ND Game and Fish Department's Habitat Plot Program located within the Project Site or Study Area? If yes, update the application's "Table 1 - Exclusion Areas" to reflect their presence and briefly discuss.	On behalf of OE2, Kleinfelder spoke with the ND Game and Fish Department who confirmed that there are no enrolled woodlands or hardwood draws in the ND Game and Fish Department's Habitat Plot Program within the Study Area for the Project.	No

GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS

February 28, 2020

Andrew Clark
State Historical Society of North Dakota
Archeology & Historic Preservation Division
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck, North Dakota 58505

SUBJECT: **Subsurface Testing Plan for the Proposed Gas Plant OE2 North LLC, Bill Sanderson Gas Processing Plant Project**

Dear Andrew;

Below is the proposed evaluative subsurface testing plan GMEC will conduct within or adjacent to site boundaries for the OE2 Bill Sanderson Gas Plant. This plan is based on anticipated field conditions such as limited surface visibility and the potential for subsurface deposits to occur in certain soil depositions (e.g. dense vegetation or the presence of alluvial or eolian deposits). Typical strategies used for subsurface testing include shovel/surface scrapes, shovel testing, auger probes, or even mechanical trenching with a backhoe. Surface scrapes are appropriate in areas where a landform contains poor deposition such as rocky, well exposed or deflated surfaces and scraping can better determine or confirm shallow deposits. Surface scrapes are also useful in areas with dense vegetation or thick forest duff cover. Shovel test pits are square or round excavations that generally measure up to 50 centimeters in width and bottom depths are dependent on the maximum depth to a restrictive feature. In both circumstances, the excavated spoils are screened through ¼ inch mesh wire for general site testing, and 1/8 inch for actual or suspected human remains.

Shovel testing or auger probing will not be conducted in areas with adequate surface visibility or in areas with shallow deposition based on these surfaces have limited potential for subsurface archaeological materials. Shovel testing will occur in both upland and lowland areas. Specifically, shovel tests will focus on upper terraces above drainages and in areas with low surface visibility in addition to areas with suspected deeper deposition. A maximum of 10 shovel tests may be excavated in upland landscapes, with a minimum of 5 pending on ground visibility at the time of the Class III survey. A Munsell soil chart and the NRCS Field Book for Describing and Sampling Soils will be used to determine soil horizons and typical constituents in each shovel test. Each shovel test or probe will be photographed, profiled, and mapped using a handheld GPS unit that meets the ND accuracy standards.

Tel: 307-684-2112
760 W. Fetterman St.
Buffalo, WY 82834
grousemtnconsultants.com

Additional testing will be completed by GMEC biologists at the time of the Class III survey and within wetland areas where testing will conform to the Army Corp of Engineers wetland delineation guidelines. Typical soil testing units are excavated in a 2 by 2 feet trench, with final depths of up to 2 feet or more. The GMEC archaeologist will be present at the time of the wetland delineation tests and will use the data to support shovel testing conducted for cultural resources.

Visible upland surfaces and exposed subsurface soils will be closely examined throughout the survey area. Surface scrapes with a hand trowel may be performed in or near soils with suspected shallow deposition or within natural exposures or rodent mounds to confirm soil composition. Subsurface testing such as formal test units, soil cores, backhoe trenches or similar mechanical excavation methods are not being prescribed at this time.

Prior to the pedestrian survey, soil data from the Natural Resources Conservation Service (NRCS) Web Soil Survey (WSS) was overlaid onto project maps (Figure 1; Table 1). Soils in the project area are dominated by Holocene to Pleistocene clay and mud. Based on the NRCS data, soil horizons throughout the survey area are primarily derived from fine-loamy till with a typical profile of loam overlying clay loam and over 80 inches depth to a restrictive feature. These soils are found on rises, moraines, hillslopes intermixed with alluvial deposits.

If unique or unusual artifacts are recovered during the Class III survey (with the exception of human remains and associated items subject to NAGPRA), and collection is warranted, artifacts will be cleaned by dry brushing to remove excess soil and packaged in clear polyethylene bags. All locations and proveniences will be enclosed in the bag. Collected artifacts are to be curated using the *Guidelines for Submitting Archaeological Collections to the State Historical Society of North Dakota* or will be returned to the appropriate landowner. GMEC will arrange the necessary agreements to provide adequate and permanent curation of recovered specimens and will request an SHSND accession number via the *Accession Number Request* form prior to cataloging any artifacts.

In some cases, follow-up surveys or testing may be requested based on the findings of the initial site investigation. The Senior Archaeologist will coordinate with the Society/SHPO for the appropriate level of permitting for limited testing and excavation. Limited testing, excavation, and data recovery plans will be written to conform to the *North Dakota SHPO Guidelines Manual for Cultural Resource Inventory Projects*.

Please do not hesitate to contact me for any additional requirements or documentation.

Sincerely,

Becca Mashak

Rebecca L. Mashak
Grouse Mountain
Environmental Consultants (GMEC)
Lead Archaeologist
rmashak@gmecwy.com
O: 307-684-2112
M: 307-760-2643

Attachments: Table 1 – Resource Locations
Figure 1 – Environmental and Soil Data

Table 1.Soil Descriptions (NRCS 2019[1])

Map Unit Symbol / Soil Series	Soil Unit Name	Landform	Typical Profile (inches)	Depth to Restrictive Feature (inches)	Parent Material
2015 – (70) Williams-Bowbells loams, 3 to 6 percent slopes	Williams	Rises	Ap – 0 to 6: loam Bt1 – 6 to 10: clay loam Bt2 – 10 to 15: clay loam Btk – 15 to 24: clay loam Bk – 24 to 36: clay loam C – 36 to 60: clay loam	More than 80 inches	Fine-loamy till
	Bowbells	Rises	Ap – 0 to 6: loam Bt1 – 6 to 14: clay loam Bt2 – 14 to 23: clay loam Bk – 23 to 36: clay loam C – 36 to 60: clay loam	More than 80 inches	Fine-loamy till
2032 – Vida-Zahill Loams, 2 to 8 percent slopes	Vida	Moraines	Ap – 0 to 5: loam Bt – 5 to 9: clay loam Bk – 9 to 30: clay loam BCk – 30 to 55: loam C – 55 to 79: loam	More than 80 inches	Fine-loamy till
	Zahill	Moraines	Ap – 0 to 5: loam Bk – 5 to 31: loam BCk – 31 to 51: loam C – 51 to 79: loam	More than 80 inches	Fine-loamy till
2081 – Zahill-Vida loams, 4 to 15 percent slopes	Zahill	Moraines	0 to 5: loam Bk – 5 to 31: loam BCk – 31 to 51: loam C – 51 to 79: loam	More than 80 inches	Fine-loamy till
	Vida	Moraines	Ap – 0 to 5: loam Bt – 5 to 9: clay loam Bk – 9 to 30: clay loam BCk – 30 to 55: loam C – 55 to 79: loam	More than 80 inches	Fine-loamy till
2176 – Zahill loam, 15 to 60 percent slopes	Zahill	Hillslopes	A – 0 to 5: loam Bk – 5 to 31: loam BCk – 31 to 51: loam C – 51 to 79: loam	More than 80 inches	Fine-loamy till
2340 – Arnegard-Shambo loams, 2 to 6 percent slopes	Arnegard	Alluvial fans	Ap – 0 to 13: loam Bw – 13 to 36: loam Bk – 36 to 60: loam	More than 80 inches	Loamy alluvium derived from sedimentary rock
	Shambo	Alluvial fans, stream terraces	Ap – 0 to 9: loam Bw1 – 9 to 13: loam Bw2 – 13 to 29: loam Bk – 29 to 48: loam C – 48 to 60: loam	More than 80 inches	Fine-loamy alluvium derived from sedimentary rock

[1] Natural Resources Conservation Services (NRCS)
2019 Web Soil Survey. Map Unit Description Area of Interest for T154N-R104W, Sections 27, 34, and 35. Electronic document, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, Retrieved February 28, 2020.

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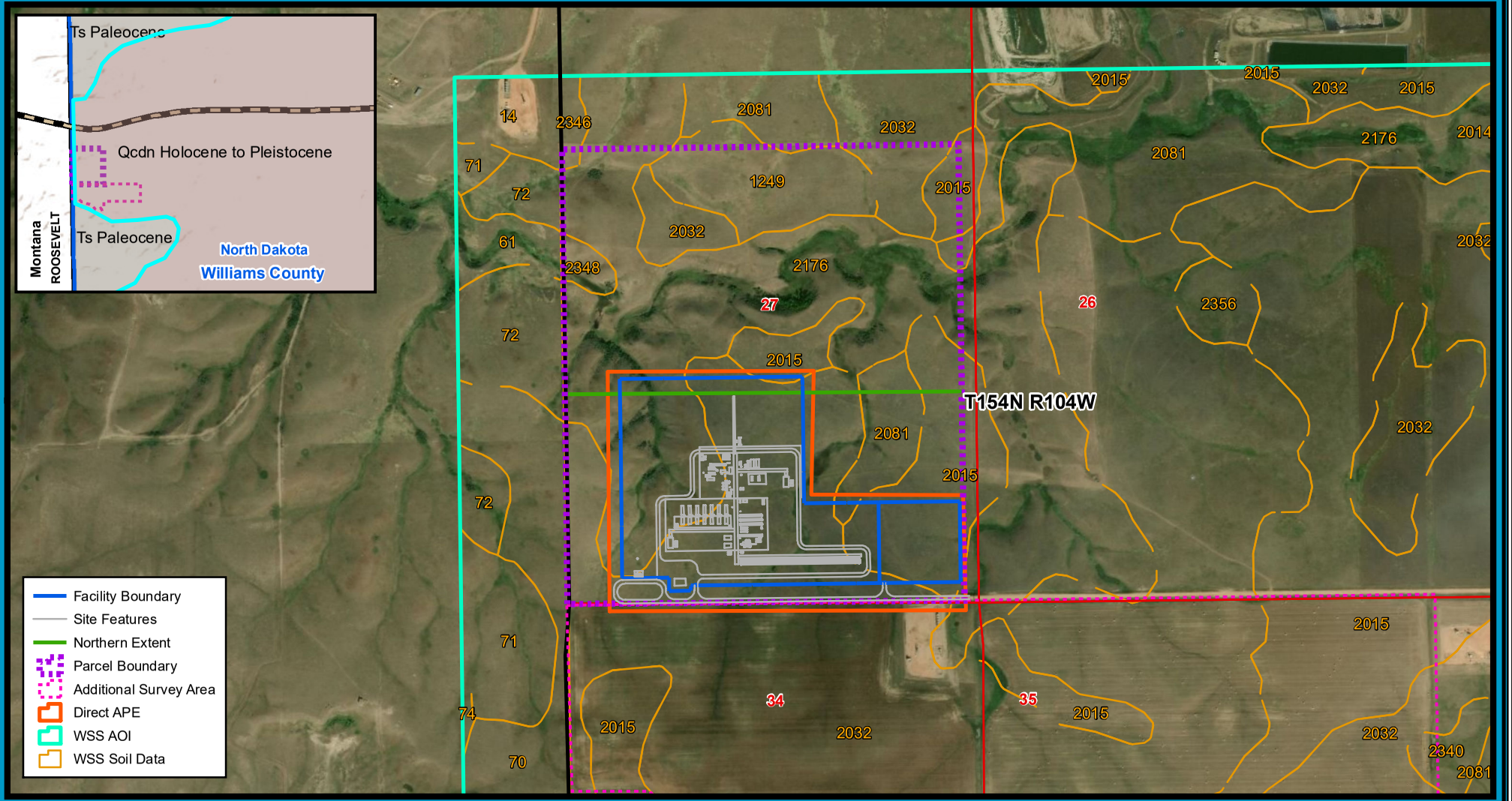

Project No.: OUT-004 Class I Desktop
Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Map Scale: 1:10,000
Quadrangle(s):
1989 Red Bank Creek, MT-ND (48104-B-1)
1989 Red Bank Creek, MT-ND (48104-B-1)

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N

Class III Cultural Resource Investigation:

Bill Sanderson Gas Processing Plant

Williams County, North Dakota

T154N-R104W Section(s): 27, 34, 35

Kilometers 0 0.1 0.2 0.4 0.6 0.8

Miles 0 0.1 0.2 0.4 0.6 0.8

OUTRIGGER ENERGY

Figure 1

Environmental & Soil Data

Document Name: OUT-004_SoilData_Testing

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OE2 North Bill Sanderson Gas Processing Plant
Desktop Analyses and Field Survey Summary

Desktop Analyses	Date Conducted
Wildlife and Waters of the US	01/2020
Class I File Search (cultural resources)	1/27/2020
Field Survey	**Date Conducted or Planned**
Wildlife and Waters of the US Field Assessment	1/29/2020
Class III cultural resources survey	3/5/2020 and 3/6/2020
Inventory of trees, saplings, shrubs, and noxious weeds	3/5/2020 and 3/6/2020
Inventory of vegetation and wetland delineation	3/5/2020 and 3/6/2020
Preconstruction raptor and ground-nesting passerine bird surveys	Prior to construction

OE2 North Bill Sanderson Gas Processing Plant
Permit Matrix

Permit	Anticipated Issuance
NDDEQ Stormwater Notice of Intent	3/4/2020[1]
Williams County Stormwater Permit	3/10/2020
Williams County Conditional Use Permit	4/7/2020
NDDEQ Air Permit	5/6/2020
Williams County Septic and Building Permits	6/10/2020

1 - Anticipated submittal

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF NORTH DAKOTA

OE2 North LLC
B. Sanderson Gas Processing Plant – Williams County

Case No. PU-20-082
OAH File No. 20200088

CERTIFICATE OF SERVICE

I, the undersigned, hereby certify that a true and correct copy of the Letter to Mr. Steve Kahl, at the North Dakota Public Service Commission forwarding the following documents:

1. Consolidated response of OE2 North LLC to the request for additional information submitted by the North Dakota Public Service Commission ("Commission") in its letter dated February 21, 2020; and

2. Consolidated response of OE2 North LLC to the requests for additional information submitted by the Commission in its letters dated February 26, 2020 and February 27, 2020;

for filing in the above-referenced case were, on March 9th, 2020, served by placing the same in the United States mail, postage prepaid, properly addressed to the following:

Timothy J. Dawson
ND Office of Administrative Hearings
2911 N 14th Street
Bismarck, ND 58503

Mitchell D. Armstrong
Brian Schmidt
P.O. Box 460
Bismarck, ND 58502-0460

DATED this 9th day of March, 2020.

FREDRIKSON & BYRON P.A.

By: _____

Lawrence Bender, ND Bar #03908
1133 College Drive, Suite 1000
Bismarck, ND 58501-1215
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Counsel for OE2 North LLC

69529416.1

Stormwater Pollution Prevention Plan
Bill Sanderson Gas Plant
Williams County, North Dakota

MARCH 2020

PREPARED FOR

OE2 North LLC

PREPARED BY

SWCA Environmental Consultants

STORMWATER POLLUTION PREVENTION PLAN
BILL SANDERSON GAS PLANT
WILLIAMS COUNTY, NORTH DAKOTA

Prepared for

OE2 North LLC
1200 17th Street, Suite 900
Denver, Colorado 80202

Prepared by

SWCA Environmental Consultants
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501

March 2020

CONTENTS

1 Stormwater Pollution Prevention Plan Administration 1
1.1 Regulatory Overview 1
1.2 Owner/Operator Information 2
1.3 SWPPP Administration 2
1.4 SWPPP Implementation Team 4
1.4.1 SWPPP Team Administrator 4
1.4.2 SWPPP Team Coordinator 4
1.5 Spill Notification Contact Information 4
1.6 Permit Compliance 5
2 Project Overview 6
2.1 Project Description 6
2.2 Project Area 6
2.2.1 Land Disturbance Area 6
2.2.2 Climate 6
2.2.3 Soils 8
2.2.4 Geology 10
2.3 Construction Narrative and Timeframe 10
2.3.1 Phase 01 – Pre-Construction Activities 10
2.3.2 Phase 02 – Active Construction 10
2.3.3 Phase 03 – Post-Construction Inspection and Maintenance 10
2.4 Nearby Surface Water Discharges 11
2.4.1 Location of Stormwater Outfalls 11
2.4.2 Drainage Controls Within the Outfalls 14
2.5 Nearby Section 303(D) Impaired Waterbodies 14
2.6 Construction Dewatering 14
3 Potential Pollution Sources and Material Inventory 16
3.1 Structural Controls to Reduce Stormwater Pollution 16
3.2 Materials Handling, Loading, and Storage Areas 16
3.2.1 Materials Handling, Loading, and Storage Area Locations 16
3.2.2 Description of Significant Material Storage 16
3.3 Description of Significant Spills, Leaks, and Releases 19
3.4 Potential Pollution Sources 19
3.4.1 Construction Materials 19
3.4.2 Sediment 19
3.4.3 Petroleum Products 19
3.4.4 Laydown Areas, Equipment Cleaning and Maintenance, and Solid Waste 20
3.4.5 Human Waste/Chemical Toilets 20
3.4.6 Concrete Washout Areas 20
4 Stormwater Management Controls 21
4.1 Erosion and Sediment Control Requirements 21
4.2 Selection of Structural Controls 22
4.2.1 Berms 22
4.2.2 Check Dams 23
4.2.3 Diversion Ditch or Berm 23

4.2.4 Drainage Dip 23
4.2.5 Erosion-Control Blankets 23
4.2.6 Filter Berm 23
4.2.7 Level Spreader 23
4.2.8 Mulching 24
4.2.9 Revegetation 24
4.2.10 Sediment Trap 24
4.2.11 Silt Fence 24
4.2.12 Slope Stabilization 24
4.2.13 Stabilized Construction Entrance 24
4.2.14 Straw Bale Barrier 24
4.2.15 Straw Wattles 25
4.2.16 Surface Roughening 25
4.2.17 Terracing 25
4.2.18 Vegetative Buffer 25
4.2.19 Water Bar 25
4.2.20 Stormwater Detention Pond 25
4.3 Operational Controls 25
4.3.1 Dust Control 25
4.3.2 Construction Site Housekeeping 26
4.3.3 Operations and Maintenance Techniques 26
4.3.4 Petroleum Products, Material Storage, and Management 26
4.3.5 Petroleum Product Storage and Management Guidelines 27
4.3.6 Employee and Contractor Training 28
4.3.7 SWPPP Revisions 28
4.3.8 Inspection and Maintenance Procedures 28
4.3.9 Recordkeeping Procedures 28
4.3.10 Other Operational Controls 28
4.4 Stabilization Requirements 28
4.4.1 Steep Slopes 29
4.4.2 Exposed Areas 29
4.4.3 Frozen Ground Conditions 29
4.4.4 Diversion Ditches with Continuous Flows 29
4.5 Chemical Treatment 29
4.6 Final Stabilization 30
4.7 Local Requirements 31
4.8 Spill Response Plans 31
4.8.1 Spill Response Procedure 32
4.8.2 Disposal of Recovered Materials 32
5 Inspection and Maintenance Procedures 33
5.1 Stormwater Inspection Procedures 33
5.2 Maintenance and Corrective Action Procedures 34
5.2.1 Personnel 34
5.2.2 Scheduling 34
5.2.3 Maintenance/Corrective Action Requirements 35
6 Recordkeeping Procedures 36
7 Non-Stormwater Discharges 37
8 Certifications 38

8.1 Owner/Applicant Certification 38
8.2 Contractor/Subcontractor Certification 38
9 Literature Cited 40

Appendices

Appendix A. Notice of Intent (NOI)
NDPDES General Permit for Stormwater Discharges from Construction Activity
Permit Coverage Letter
Delegation of Authority Letter
SWPPP Amendment Log
Appendix B. Plant Layout and Equipment
Grading Plan and Construction Details
Hydrology and Hydraulics Calculations
Appendix C. BMP Location Maps
Appendix D. BMP Details and Construction Specifications
Appendix E. Stormwater Pollution Prevention Plan Training Log
Appendix F. Stormwater Inspection Form and Corrective Action/Maintenance Log
Appendix G. Completed Inspection Reports

Figures

Figure 1. Site location map. 3
Figure 2. Bill Sanderson Gas Plant layout. 7
Figure 3. Soils map. 9
Figure 4. Pre-construction surface topography and water flow paths. 12
Figure 5. Initial BMP locations. 13

Tables

Table 1. SWPPP Team. 4
Table 2. Notification of Outside Parties, Public Safety Officials, and Government Agencies for the Bill Sanderson Gas Plant Project 5
Table 3. Soils within the Plant Perimeter Fence 8
Table 4. Bill Sanderson Gas Plant Construction Timeframe 11
Table 5. Stormwater Outfall Location Information 14
Table 6. Inventory of Potential Pollutants and Associated BMPs 17
Table 7. BMP Selection Guidelines 22
Table 8. Spill Response Kit Contents 31

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1 STORMWATER POLLUTION PREVENTION PLAN ADMINISTRATION

1.1 Regulatory Overview

The U.S. Environmental Protection Agency controls stormwater and sewer overflow discharges through its National Pollutant Discharge Elimination System (NPDES) program and provides guidance to municipalities, and state and federal permitting authorities on how to meet stormwater pollution control goals as flexibly and cost-effectively as possible. Responsibility for implementation of these regulations has been delegated to the North Dakota Department of Environmental Quality (NDDEQ), Division of Water Quality through the North Dakota Pollutant Discharge Elimination System (NDPDES). NDPDES general permit NDR100000 (NDDEQ 2020)applies to stormwater discharges associated with large construction activity and small construction activity, as defined in Title 40 of the Code of Federal Regulations (CFR), Parts 122.26(b)(14)(x) and (b)(15), respectively, and summarized below.

- Large construction activity includes clearing, grading, and excavation that disturbs a land area equal to or greater than 5 acres and includes the disturbance of less than 5 acres that is part of a larger common plan of development or sale, if the larger common plan will ultimately disturb 5 acres or more.
- Small construction activity includes clearing, grading, and excavation that disturbs a land area equal to or greater than 1 acre and includes the disturbance of less than 1 acre that is part of a larger common plan of development or sale, if the larger common plan will ultimately disturb a total area equal to or greater than 1 acre and less than 5 acres.
- Discharges of stormwater from oil and gas exploration, production, processing, or treatment operations, or transmission facilities composed of contaminated runoff by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

Stormwater discharges from support activities (e.g., concrete or asphalt batch plants, equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) may be covered by NDR100000 as part of a related construction site. Similar facilities that will serve multiple projects or are commercial in nature must be covered by a different permit. In many cases, it will be appropriate for construction support facilities to be covered under general permit NDR320000, stormwater discharges from mining, extraction, or paving material preparation activities.

NDDEQ regulations require submittal of a complete application (Notice of Intent [NOI]) and development of a Stormwater Pollution Prevention Plan (SWPPP). Permit coverage becomes effective automatically 7 days after submittal of the NOI unless otherwise notified by the NDDEQ.

Construction activities potentially produce many kinds of pollutants that may adversely impact stormwater. The goal of a SWPPP and the use of best management practices (BMPs) is to improve water quality by reducing pollutants in stormwater discharges. The main pollutant of concern with construction projects is sediment, which can become entrained in stormwater runoff after excavation and/or grading activities that remove the protective vegetative cover. When the stormwater runoff carrying these sediments reaches a lake or stream and slows down, the suspended sediments are deposited, and can choke the stream channel or cover areas where fish spawn and aquatic plants grow. The sediment can cloud surface waters and cause aquatic respiration problems, potentially resulting in the death of fish and plants in these systems. Further, sediment-laden stormwater runoff can adversely impact downgradient

land resources and wildlife habitats. Construction activities may also involve the use of toxic or hazardous materials, such as petroleum products (fuels, lubricants, solvents), fertilizers, pesticides, herbicides, building materials (asphalt, sealants, concrete), and other chemicals, that can be harmful to humans and aquatic life, and these materials can be transported in stormwater runoff.

OE2 North LLC (OE2) prepared this SWPPP for implementation during construction of the Bill Sanderson Gas Plant in Williams County, North Dakota (Figure 1) to: 1) satisfy the NDPDES permit requirements for large and small construction activities as defined in Title 40 CFR Parts 122.26(b)(14)(x) and (b)(15), respectively; 2) provide guidance for a minimum standard of care for the use of erosion- and sediment-control BMPs where permit coverage is not required; and 3) to satisfy the NDR100000 general permit conditions and SWPPP requirements. The NOI was submitted on February 28, 2020, to the NDDEQ to obtain regulatory permit coverage for stormwater discharges associated with construction activity. Copies of the NOI and the stormwater construction permit coverage letter are provided in Appendix A. Copies of the SWPPP will be maintained at OE2's Denver, Colorado, offices and at the construction trailer at the site.

1.2 Owner/Operator Information

OE2 North LLC
1200 17th Street, Suite 900
Denver, Colorado 80202
Telephone: 720-638-7312

1.3 SWPPP Administration

Grant Burchell
Senior Vice President, Engineering and Operations
OE2 North LLC
1200 17th Street, Suite 900
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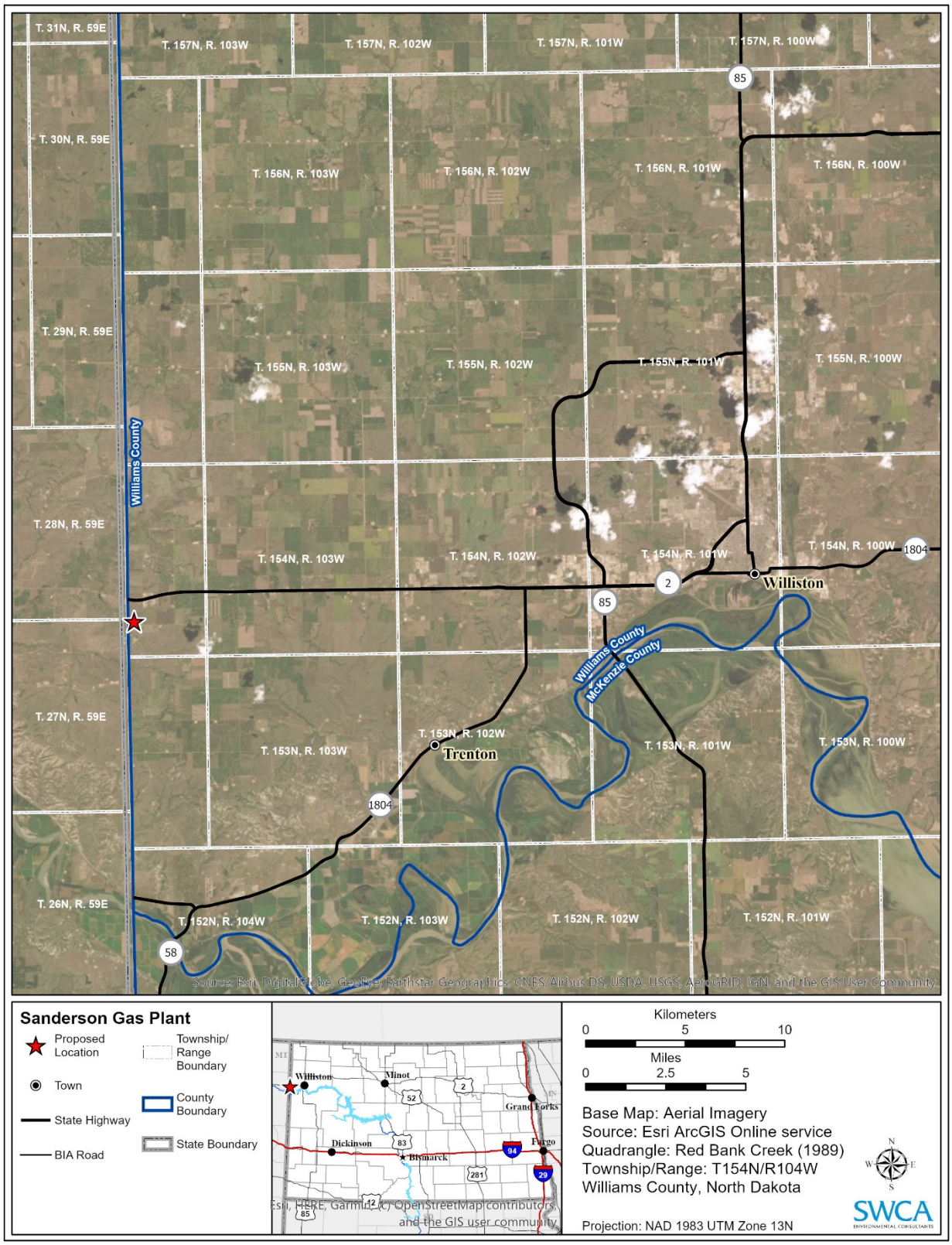

Figure 1. Site location map.

1.4 SWPPP Implementation Team

The persons listed in the Table 1 will ensure that the SWPPP is effectively implemented and that appropriate BMPs are installed correctly, inspected regularly, and maintained until the construction site has achieved final stabilization.

Table 1. SWPPP Team

Name	Telephone Number
Grant Burchell	(720) 638-7312
Andrew Perdue	(720) 361-2580
Jim Dawson	(701) 258-6622
Additional SWPPP Inspectors	TBD

1.4.1 SWPPP Team Administrator

The SWPPP Team Administrator will be Grant Burchell, Senior Vice President, Engineering and Operations, or his designee. The Team Administrator is responsible for the following actions.

- Dedicating the necessary financial and human resources to implement the SWPPP.
- Implementing spill response clean ups.
- Assigning responsibilities and working with the SWPPP Team Coordinator.
- Notifying local authorities and residents or landowners and the appropriate agencies in the event that a significant release of impacted stormwater leaves the site.
- Signatory authority.

The Team Administrator will either designate a Team Coordinator or assume some or all the duties listed in Section 1.4.2.

1.4.2 SWPPP Team Coordinator

The SWPPP Team Coordinator is responsible for the following.

- Notifying the SWPPP Administrator of any spills.
- Coordinating various stages of SWPPP development and implementation.
- Coordinating employee training and conducting inspections.
- Implementing and improving housekeeping measures.
- Coordinating implementing the preventive maintenance program.
- Maintaining all records.

1.5 Spill Notification Contact Information

Spill notification contact information for outside parties, public safety officials, and government agencies is summarized in Table 2. Spill prevention, response, and notification procedures are discussed in Section 4.8.

Table 2. Notification of Outside Parties, Public Safety Officials, and Government Agencies for the Bill Sanderson Gas Plant Project

PUBLIC SAFETY NOTIFICATION	
Fire	911
Police	911
GOVERNMENT AGENCY NOTIFICATIONS – VERBAL	
National Response Center	1-800-424-8802 24 hours/day, 7 days/week
North Dakota Department of Environmental Quality	
24-hour Environmental Emergency Spill Reporting Line – from inside North Dakota	1-800-472-2121
Environmental Health Section – normal business hours	701-328-5210 or 701-328-5166
Online Spill Reporting Website	https://deq.nd.gov/eir/NonOilfield/
North Dakota Industrial Commission	
Oil and Gas Division – normal business hours	701-328-8020
Online Spill Reporting Website	https://www.dmr.nd.gov/oilgas/mvc/wincident/
North Dakota Emergency Management	24-Hour Hotline: 1-800-472-2121
Williams County	
Emergency Management (Mike Smith, Director)	701-577-7707
Williams County Sheriff's Department (Verlan Kvande, Sheriff)	701-577-7707
GOVERNMENT AGENCY NOTIFICATIONS – WRITTEN	
Reporting spills that have the potential to reach, or have reached, state waters	
North Dakota Department of Environmental Quality 918 East Divide Avenue Bismarck, North Dakota 58501	701-328-5210 or 701-328-5166
National Response Center c/o United States Coast Guard (G-OPF) Room 2611 2100 2nd Street SW Washington, DC 20593-0001	1-800-424-8802 (24-hour) or 202-267-2675
North Dakota Industrial Commission Department of Mineral Resources, Oil and Gas Division 600 East Boulevard Avenue, Department 405 Bismarck, North Dakota 80505	701-328-8020
Environmental Protection Agency - Region 8 999 18th Street, Suite 300 Denver, Colorado 80202-2466	1-800-227-8917 303-312-6312

1.6 Permit Compliance

OE2 will comply with the general permit conditions and provisions of this SWPPP until a Notice of Termination (NOT) has been submitted to the NDDEQ. The NOT will be submitted when one of the following conditions has been met.

- Final stabilization, as specified in Part II(E) of the general permit and discussed in Section 4.6, has been achieved on all portions of the project.
- Another owner, operator, or permittee has assumed control, in accordance with the transfer provisions of Part I(F) of the general permit, over all areas of the project that have not achieved final stabilization.

2 PROJECT OVERVIEW

2.1 Project Description

OE2 will construct the Bill Sanderson Gas Plant in the SW¼SE¼ and SE¼SE¼ of Section 27, Township 154 North, Range 104 West, Fifth Principal Meridian, Williams County, North Dakota (see Figure 1). The plant will be a 250-million standard cubic feet per day (MMscfd) cryogenic natural gas processing facility that will produce natural gas liquids (NGLs) and pipeline-quality natural gas. The plant will have the capability of producing 60,000 barrels per day of NGLs and 200 MMscfd of pipeline-quality natural gas. All incoming natural gas and outgoing NGLs and processed natural gas will be transported by pipeline. Process wastewater and slop oil will be stored in aboveground storage tanks and removed by tanker truck for transport to a state-approved oilfield treatment and disposal facility. The general layout of the plant is illustrated in Figure 2; engineering drawings, equipment descriptions, the grading plan, and construction details are presented in Appendix B.

This SWPPP covers the activities associated with construction of the Bill Sanderson Gas Plant as well as any off-site temporary workspaces required for construction equipment staging, pipeline or equipment fabrication, and materials storage (e.g., pipe yards, soil stockpiles, borrow areas) that are part of the proposed project.

Construction activities associated with this project include, but are not limited to, clearing and grubbing; topsoil removal and segregation; trenching, backfilling, and compaction; pipe placement and welding (i.e., chemical and/or electric arc); establishing temporary workspaces; and site grading. Upon completion of gas plant construction, disturbed land areas outside of the plant perimeter road, the electrical substation, and the stormwater detention pond will be seeded to re-establish vegetative cover to meet the requirements of the permit.

2.2 Project Area

2.2.1 Land Disturbance Area

The plant site and electrical substation area inside the perimeter fence is approximately 38.63 acres. The total land disturbance area for the project includes approximately 14.9 acres for the plant site, 8.9 acres for the stormwater detention pond and conveyances, 5.3 acres for improvements to 49th Street NW, and 3.6 acres for the electrical substation, for a total of 32.7 acres.

2.2.2 Climate

Annual precipitation in western North Dakota averages 15 to 17 inches. Most of the precipitation originates as frontal storms, with some of it deposited as snow, or from thunderstorms. The prevailing winds in western North Dakota are generally from the northwest.

From May through September, precipitation comes primarily from thunderstorms, with the preponderance of storms occurring from June through August. Thunderstorms occasionally produce intense showers that can deposit 1.5 inches or more of rain within a few hours. Flash floods sometimes occur in streambeds that are normally dry.

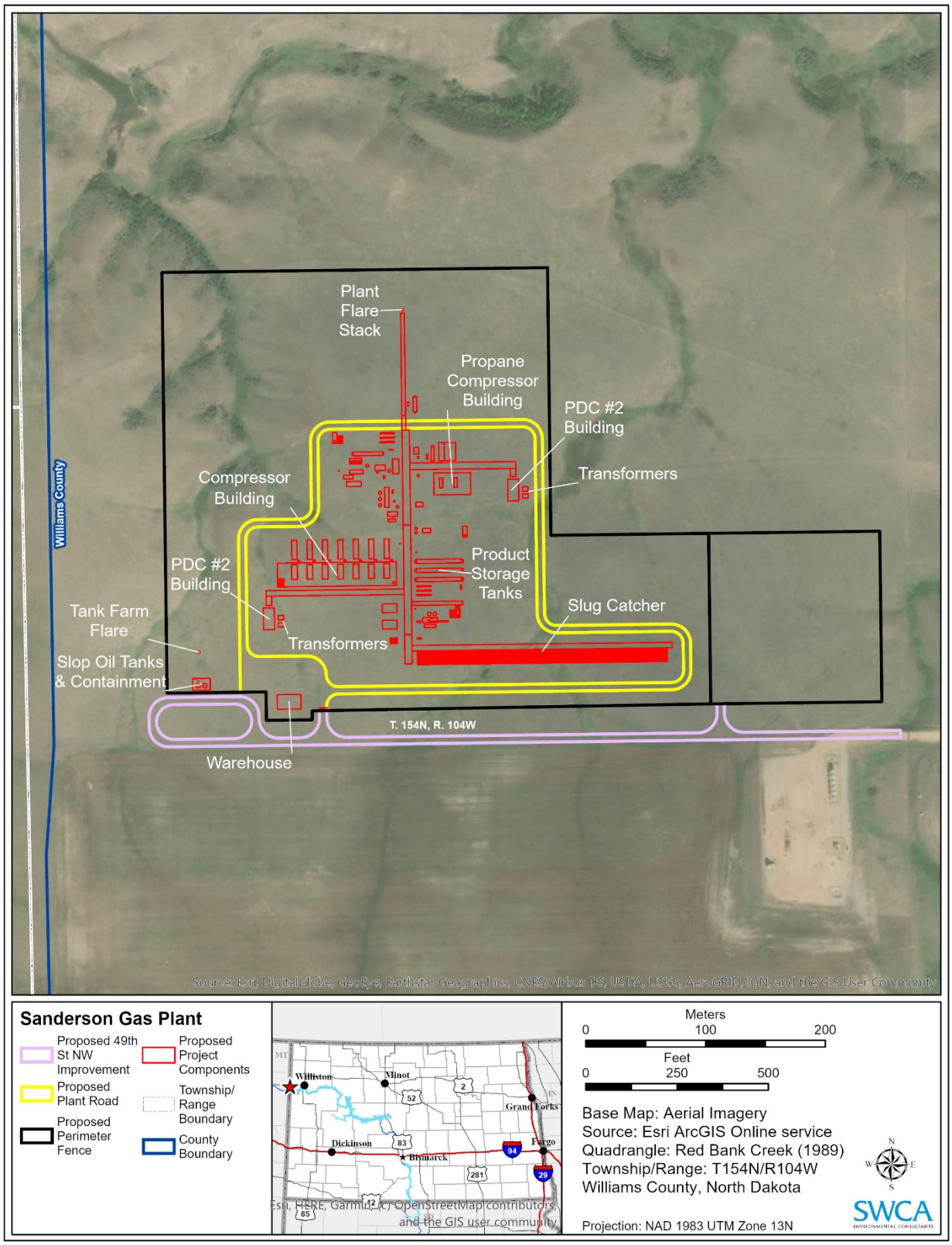

Figure 2. Bill Sanderson Gas Plant layout.

The intensity and amount of precipitation in North Dakota varies by location geography. The Permit requires that BMPs be designed and implemented to function properly and minimize sediment-laden stormwater discharges for the 2-year, 24-hour storm event, which amounts to about 1.9 inches in Williams County. Precipitation amounts for different frequency storm events are listed below.

- 2-year, 24-hour event: 1.9 inches
- 2-year, 10-day event: 3.2 inches
- 25-year, 24-hour event 3.6 inches
- 100-year, 24-hour event: 4.5 inches
- 25-year, 10-day event: 6.0 inches

2.2.3 Soils

Based on data from the Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2020), four soil associations are present within the vicinity of the plant site (Figure 3; Table 3). Within the plant site perimeter fence, these soil associations include 1) Vida-Zahill loam, 2 to 8 percent slopes, described as well-drained, deep (55–79 inches) clay loams and loams developed on fine loamy till, with a depth to the water table greater than 80 inches; 2) Zahill loam, 15 to 60 percent slopes, described as a well-drained, deep (51–79 inches) loam developed on fine loamy till, with a depth to the water table greater than 80 inches; 3) Williams-Bowbells loams, 3 to 6 percent slopes, described as well-drained, moderately deep (36–60 inches) clay loams developed on fine loamy till, with a depth to the water table greater than 80 inches; and 4) Zahill-Vida loams, 4 to 15 percent slopes, described as well-drained, deep (51–79 inches) loams and clay loams developed on loamy till, with a depth to the water table greater than 80 inches. All of these soils are classified as Hydrologic Group C soils, which have a moderate runoff potential.

Table 3. Soils within the Plant Perimeter Fence

MUSYM	Description	Area	
		Acres	Percent
2015	Williams-Bowbells loams, 3 to 6 percent slopes	6.59	17.0
2032	Vida-Zahill loams, 2 to 8 percent slopes	20.19	52.3
2081	Zahill-Vida loams, 4 to 15 percent slopes	0.29	0.8
2176	Zahill loam, 15 to 60 percent	11.56	29.9
Total		**38.63**	**100.0**

MUSYM = map unit symbol

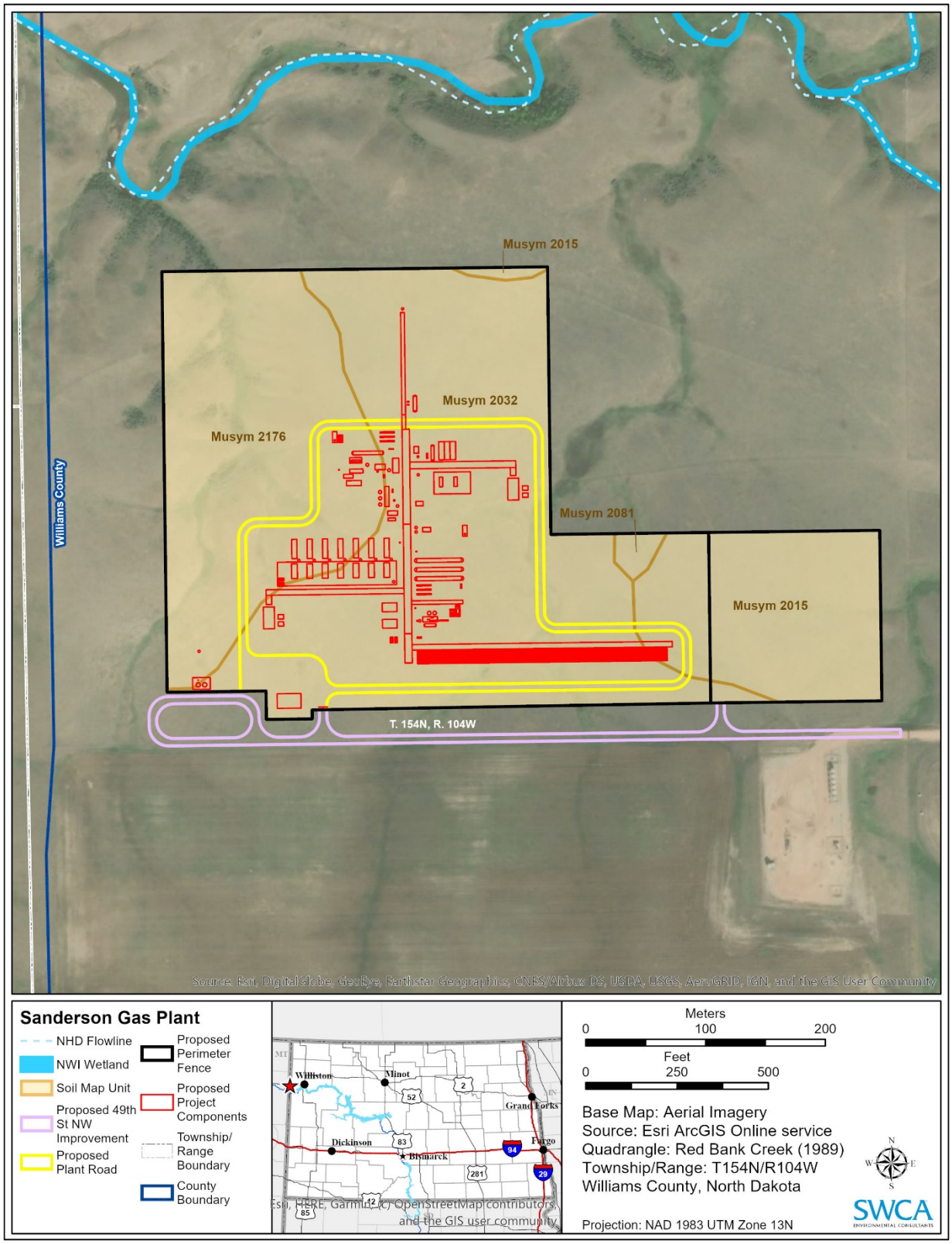

Figure 3. Soils map.

2.2.4 Geology

As described by Freers (1970), the surficial geology consists primarily of Pleistocene-age glacial till of the Cole Harbor formation and is characterized as olive-gray to tan pebbly deposits of clay, silt, sand, and gravel up to 100 feet in thickness. The till may contain lignite and clinker pebbles, while cobble- and boulder-size erratics may be composed of granite, gneiss, banded iron, basalt, limestone, and dolostone. The bedrock geology consists of the Paleocene-age Sentinel Butte formation which is characterized as grayish brown deposits of silt, sand, clay, sandstone, and lignite (Freers 1970).

2.3 Construction Narrative and Timeframe

Stormwater management has two primary objectives: 1) to prevent or minimize surface water from flowing onto the site (i.e., run-on) so that the site is maintained in good condition and is accessible for site operations; and 2) to control stormwater runoff so that any deleterious effects (e.g., erosion and sedimentation) from this runoff on the downgradient land and water resources are prevented or minimized. An integral aspect of these two objectives is to prevent precipitation and surface water run-on/run-off on the site from coming into contact with toxic or hazardous materials.

As described in the following sections and summarized in Table 4, the project will be developed in three phases. The BMPs to be implemented in each phase are identified in the following sections, while more specific BMP information is provided in Section 4.0. BMP location maps are presented in Appendix C, and BMP details and construction specifications are included in Appendix D.

2.3.1 Phase 01 – Pre-Construction Activities

Pre-construction activities will include the project kick-off meeting, contractor and employee SWPPP training, and installation of the selected temporary pre-disturbance BMPs in the project area. Such temporary controls may include silt fences and/or straw wattles at the locations identified on the BMP location maps presented in Appendix C. In conjunction with the silt fences/straw wattles, existing vegetation bordering the project site will be preserved (i.e., a permanent BMP) to the extent possible to help retard stormwater run-on and runoff, and to provide a vegetative buffer on the downhill sides of the project site.

2.3.2 Phase 02 – Active Construction

Active construction will entail concurrent and sequential activities, including clearing; topsoil removal/stockpiling; excavation; equipment/building construction, fabrication, and installation; hydrostatic testing; and plant start-up and troubleshooting. Detailed topography of the plant site is presented in Appendix B and shown on the BMP location maps in Appendix C.

2.3.3 Phase 03 – Post-Construction Inspection and Maintenance

During the post-construction final stabilization period, temporary and permanent stormwater BMPs will be regularly inspected and maintained, as required, to ensure that they are functioning properly. Once final stabilization has been achieved as specified in the permit conditions, any temporary BMPs will be removed and a Notice of Termination (NOT) will be submitted to the NDDEQ to terminate the permit.

Table 4. Bill Sanderson Gas Plant Construction Timeframe

Description	Duration (days)	Cumulative Total (days)
Phase 01 – Pre-Construction		
Project kick-off meeting/SWPPP training	0.5	0.5
Install pre-construction stormwater BMPs†	1.5	3.0
Phase 02 – Active Construction		
Clearing, grubbing, and topsoil removal/stockpiling	7	10
Cut and fill operations; stormwater detention pond construction; final grading, ditch construction, riprap placement, plant pad construction, 49th Street improvements, topsoil spreading, seeding, stabilization	50	60
Gas plant construction (shop fabrication, building foundations, electrical and equipment installation and construction, hydrostatic testing, etc.)	213	273
Plant startup/troubleshooting	13	286
BMP inspections, installation, and maintenance	22	N/A
Phase 03 – Post-Construction		
Final stabilization period	180	466
BMP inspection and maintenance	12	N/A
Final inspection and remove temporary BMPs	2	468
File NOT	1	469

Notes:

- Duration and total are expressed as calendar days.
- BMP installation and construction activities will be staged in a manner that will minimize the time between initial disturbance and the start of reclamation.
- BMP inspection, installation, and maintenance is a concurrent activity throughout the active construction and post-construction phases of the project and thus, the estimated duration of this activity is not included in the total project timeline. The estimated duration of this activity is based on the anticipated inspection schedule during active construction (every 14 days) and post-construction (every 30 days) phases, assumed precipitation-required inspections (active construction = 6 days; post-construction = 0 days), and required in-field BMP installation/maintenance activities (active construction = 6 days; post-construction = 6 days).
- Once final stabilization has been achieved, temporary BMPs (e.g., silt fence) will be removed and disposed of at an approved disposal facility, and the NOT will be submitted to the NDDEQ.

2.4 Nearby Surface Water Discharges

As shown in Figure 3, the nearest surface waterbody is an unnamed intermittent tributary to Little Muddy Creek that is slightly more than 900 feet due north of the plant site. Pre-construction drainage from the plant site occurs in northeastern and northwestern drainageways. A stormwater detention pond has been designed to capture sediment and regulate discharge volumes (see Appendix B). Site grading will direct the majority of the runoff from the plant site to the northwestern drainageway where the stormwater detention pond will be constructed. Stormwater runoff from the agricultural lands to the south of 49th Street will be diverted to the east and west and will not run onto the site.

2.4.1 Location of Stormwater Outfalls

Pre-construction topography of the site and surface water runoff directions are illustrated in Figure 4, which indicates that the general direction of surface water runoff is to the northwest and northeast. Stormwater outfalls and initial BMP locations are illustrated in Figure 5, and outfall locations are summarized in Table 5.

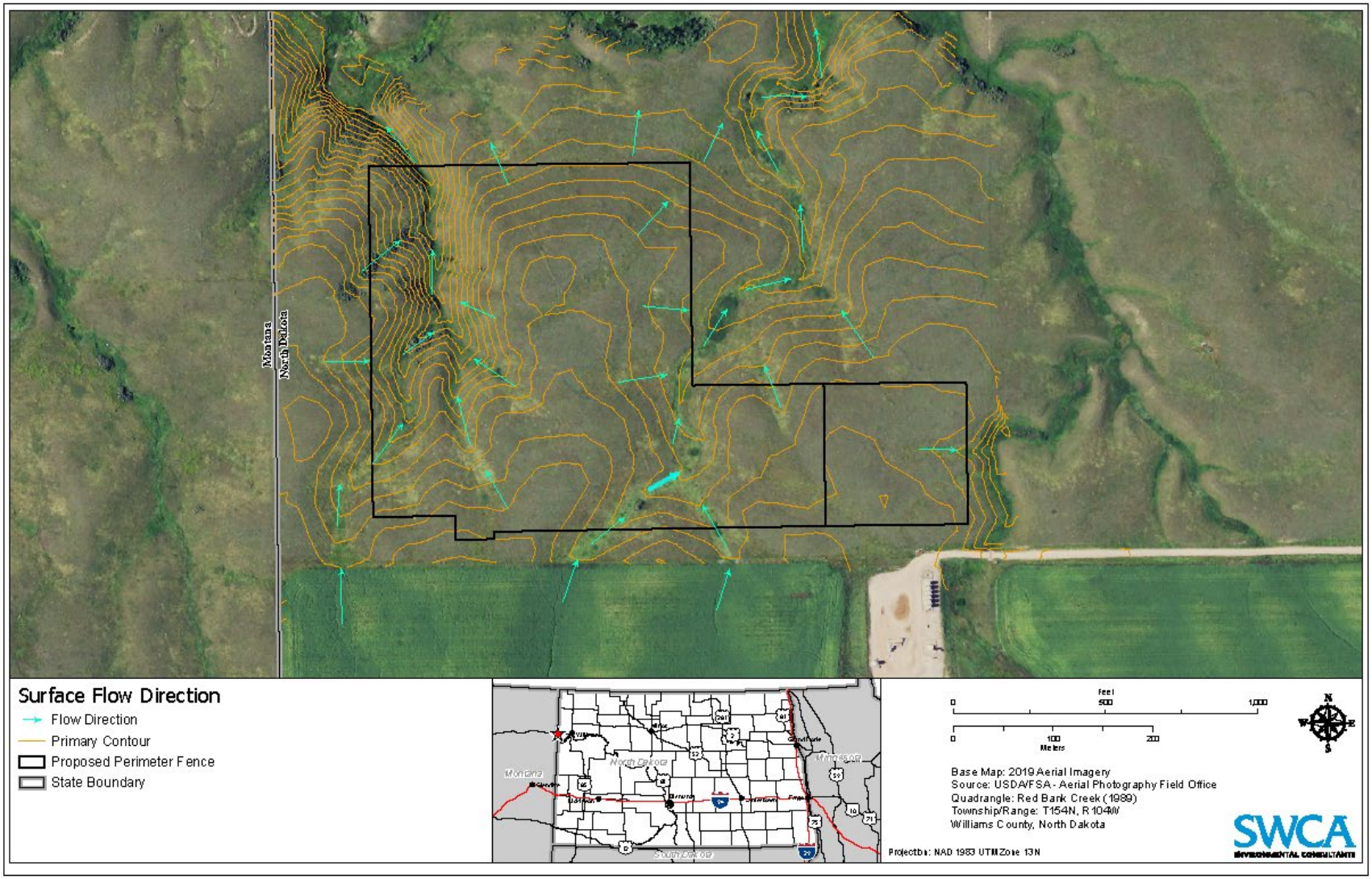

Figure 4. Pre-construction surface topography and water flow paths.

OE2 268

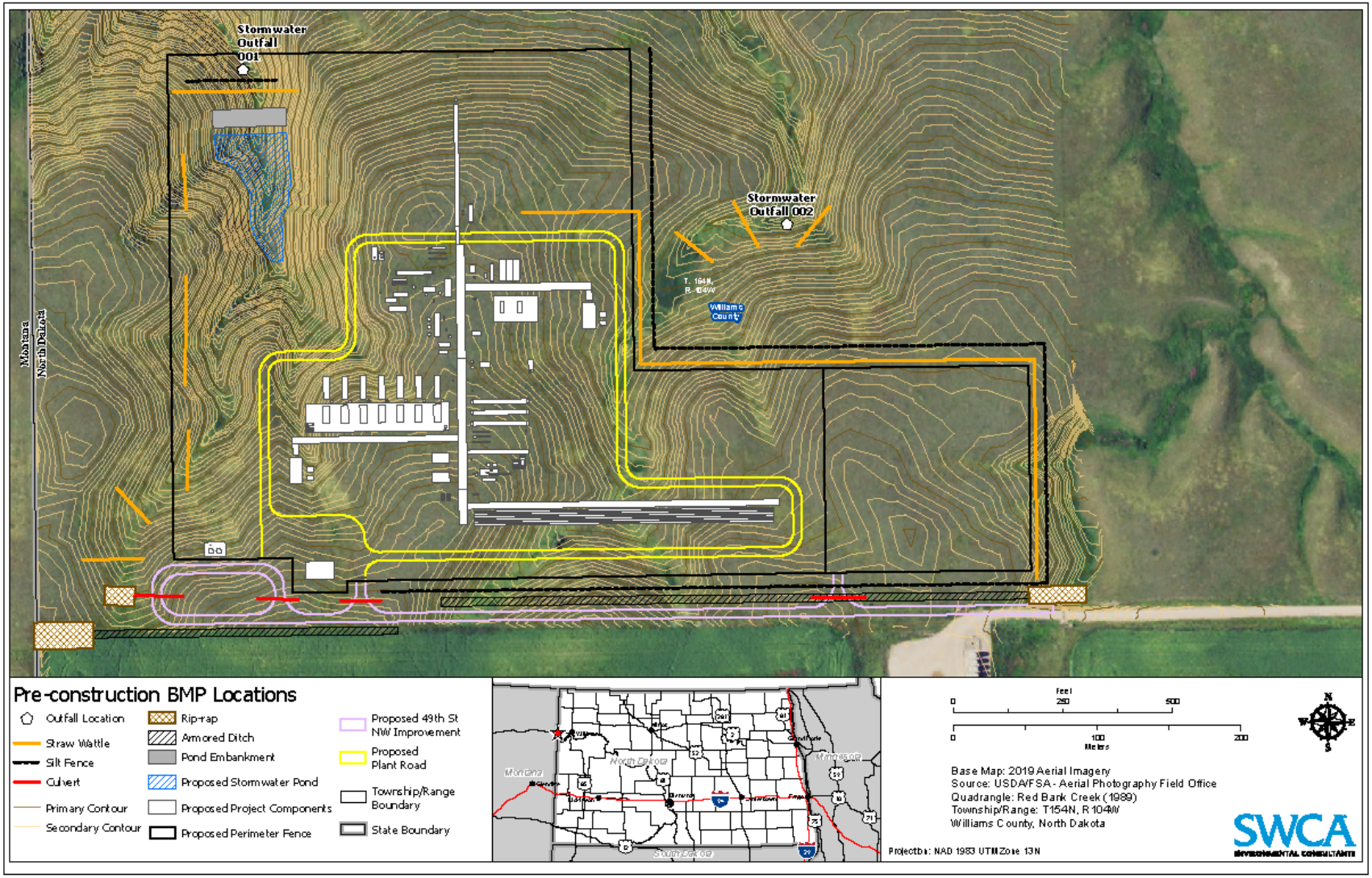

Figure 5. Initial BMP locations.

OE2 269

Table 5. Stormwater Outfall Location Information

Outfall	Location		Receiving Stream
	Latitude	Longitude	
001	48.129277°	-104.043211°	Unnamed intermittent tributary to Little Muddy Creek
002	48.128250°	-104.038249º	

2.4.2 Drainage Controls Within the Outfalls

During facility construction, engineering controls and work practices will be used to prevent potential stormwater impacts resulting from erosion of excavated materials or chemical impacts due to stormwater coming into contact with construction materials, fuel products, or equipment and being transported off site. Diversionary dikes or swales may be necessary to prevent or control stormwater running onto disturbed areas of the site.

Stormwater runoff may leave the site construction area via small drainage channels to the northeast and northwest to the stormwater detention pond. In cleared areas or on slopes, stormwater may form rills or gullies before flowing into a nearby tributary draw or drainageway. Structural controls will be placed at the outfalls to prevent erosion and reduce the amount of sediment that is entrained in the stormwater runoff.

2.5 Nearby Section 303(D) Impaired Waterbodies

No total maximum daily load (TMDL) surface waterbodies are within 2,000 feet of the project site. Waterbodies within this area have been reviewed to determine if they are listed as TMDL-listed streams and lakes, as presented in the *North Dakota 2018 Integrated Section 305(b) Water Quality Assessment Report and Section 303(d) List of Waters Needing Total Maximum Daily Loads* (North Dakota Department of Health 2018).

This SWPPP primarily addresses pollutants derived from land-disturbing activities; however, it also addresses those pollutants associated with construction materials, equipment, and operations (e.g., steel, plastic, thermal and chemical welding products, concrete, trash, debris, petroleum products, and solvents and other chemicals). See Section 3.3 for a summary of potential pollutant sources associated with facility and pipeline construction activities.

2.6 Construction Dewatering

Uncontaminated stormwater, surface water, and groundwater that collects on the project site in excavations or diked areas or the stormwater detention pond may be discharged under the general permit. Adequate control measures (e.g., filter bags, discharge containment structures, etc.) will be used for these discharges to minimize soil erosion and sedimentation at the discharge location.

While not anticipated, there is a potential for dewatering during site construction and/or discharges from onsite operations, such as hydrostatic testing. If the need for these discharges becomes apparent, OE2 will submit an application (NOI, Short Form C, SFN 8319) for a general permit (NDG070000) for discharges associated with hydrostatic testing and dewatering. The NOI will be submitted a minimum of 30 days prior to the anticipated discharge date. Water generated from these activities will be directed to a sediment pond, settlement trap, filter bag, or other control device to remove sediment and minimize downgradient erosion.

Dewatering activities will be inspected daily to ensure that the BMPs at the discharge location are being implemented correctly and that they are functioning as intended to prevent discharges of pollutants to state waters. The dewatering inspection report will contain the following information.

- Date and time of the inspection.
- Inspector name.
- Approximate volume of water discharged.
- Findings of the inspection, including recommendations and schedule for corrective actions.
- Corrective actions taken (including dates, times, and party completing maintenance activities).
- Documentation that the SWPPP has been amended when changes are made to the dewatering activity in response to inspections.

3 POTENTIAL POLLUTION SOURCES AND MATERIAL INVENTORY

3.1 Structural Controls to Reduce Stormwater Pollution

Potential pollution sources and associated BMP selection guidelines to address the potential pollution sources during the different phases of site construction are summarized in Table 6. Each of the structural control measures for these BMPs is discussed in Section 4.0, and BMP details and construction specifications are presented in Appendix D.

Structural control measures will be used to protect slopes and dissipate erosive energy along cut/fill slopes, shoulders of the plant access road and 49th Street, and at stormwater outfalls as shown on the BMP location maps (see Figure 5 and Appendix C). Stormwater diversion structures and/or secondary containment structures (e.g., straw wattles) will be placed around soil stockpiles to prevent eroded sediments from becoming entrained in stormwater runoff from these areas. Excavated topsoil, ground cover, and overburden will be stored in locations away from natural drainages.

3.2 Materials Handling, Loading, and Storage Areas

3.2.1 Materials Handling, Loading, and Storage Area Locations

Materials stored at the site during construction activities may include pipe sections, valves, supports, connectors, construction supplies, petroleum products, solvents, concrete, and other materials, as summarized in Table 6. Materials handling, loading, and storage areas will be located away from natural stormwater drainageways and/or will be surrounded with earthen, gravel-clad berms to prevent stormwater impacts. Areas used for construction materials and chemical storage will be kept covered to prevent stormwater impacts.

3.2.2 Description of Significant Material Storage

During plant construction, chemical storage is expected to be minimal. Chemical containers will be covered and properly stored in areas where they will not come in contact with stormwater. Stockpiles of excavated soils will be bermed at base levels to prevent stormwater from transporting sediments into nearby drainages. Any fuel storage tanks for trucks, heavy construction equipment, or other purposes will be contained in prefabricated secondary containment structures or in an earthen, gravel-clad berm capable of containing the entire volume of the largest tank and sufficient freeboard to contain impounded stormwater. Additional specific recommendations for material storage and management are provided in Section 4.5 and Section 4.6.

Table 6. Inventory of Potential Pollutants and Associated BMPs

Material Trade Name or Type of Activity	Applicable to Site? (Y or N)	Potential Pollutant	Associated BMP(s)
Glue, adhesives, epoxy powders	Y	Polymers, epoxies	Disposal of used containers must follow manufacturer specifications. Proper application (see manufacturer recommendations). Storage of products: properly sealed containers indoors, on a pallet, preferably under shelter or tarp, or inside a vehicle tool cabinet.
Asphalt	Y	Oil, petroleum distillates	Follow manufacturer application specifications. Disposal of used containers and excess material must follow manufacturer specifications.
Concrete, concrete washout water	Y	Limestone, sand, pH	Designated concrete washout tank or pit. Do not clean out hopper or chute onto ground or into drainage channels. Concrete washout area must be within a bermed containment area. It must be cleaned out when it reaches 75% capacity. Recommend cleanout at 50%. All washout areas will be in the site boundary.
Cleaning solvents	Y	Perchloroethylene, methylene chloride, trichloroethylene, petroleum distillates	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment.
Wood preservatives	N	Stoddard solvent, petroleum distillates, arsenic, copper, chromium, creosote, pentachlorophenol	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment.
Hydraulic oil/fluids (brake, power steering, etc.), greases, lubrication oils	Y	Mineral oil	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment. All on-site vehicles will be routinely inspected for leaks and drips.
Gasoline/diesel fuel	Y	Benzene, ethyl benzene, toluene, xylene, methyl tertiary butyl ether	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment. All on-site vehicles will be routinely inspected for leaks and drips.
Kerosene	N	Coal oil, petroleum distillates	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment.

Material Trade Name or Type of Activity	Applicable to Site? (Y or N)	Potential Pollutant	Associated BMP(s)
Antifreeze/coolant	Y	Ethylene glycol, propylene glycol, heavy metals (copper, lead, zinc)	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment. All on-site vehicles will be routinely inspected for leaks and drips.
Detergents	N	Phosphorous	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: tightly sealed containers indoors, or within a shed or truck toolbox. If product is stored outdoors, must be stored under a shelter or tarp, preferably within secondary containment.
Dust- or particulate-generating processes	Y	Dust, particulates	BMPs used on site to reduce the movement of dust and particulates include, but are not limited to, watering practices during earth-moving activities; the application of a chemical dust suppressant substance to bind the dirt to the earth during construction; speed limit controls to ensure minimal dust kick up produced by moving vehicles; ceasing any earth-moving activity during high wind. Other BMPs may be introduced on site during construction.
Drilling activities	N	Bentonite, diesel-based drilling muds, barium-based drilling muds, saline solutions (potassium chloride, calcium chloride)	Proper application (see manufacturer recommendations). Disposal of used containers and excess material must follow manufacturer specifications. Storage: mud storage tank/trailer, tightly sealed containers, placed on a pallet, use of plastic shrink-wrap, under shelter or tarp. Use of secondary containment practices. Use of a designated containment pit and/or a vacuum truck for removal from project site and/or reuse. Hay bales, wattles, and earthen berms are to be used for containment of bentonite releases.
Sediment	Y	Nutrients, suspended solids, sediment	Sediment erosion and sedimentation on site should be controlled by structural and non-structural BMPs. Structural BMPs can include, but are not limited to, sediment control logs, erosion-control blankets, riprap, earth berms, and silt fence. Non-structural BMPs can include, but are not limited to, seed and mulch, exposure time of disturbed soils, education of on-site personnel.

3.3 Description of Significant Spills, Leaks, and Releases

The Bill Sanderson Gas Plant is a new construction and thus, any existing significant spills, leaks, or releases discovered prior to initiation of the proposed facility construction activities would be adequately addressed before construction commences. If petroleum hydrocarbon-impacted soil or other potentially hazardous conditions are discovered during soil excavation activities, an OE2 representative will be notified immediately. The OE2 SWPPP Team Administrator will evaluate the construction activity and existing safety and environmental hazards, and advise the contractor regarding future work efforts in that area. However, if soil contaminated with petroleum hydrocarbons such as diesel fuel, or if other potentially hazardous conditions are discovered during excavation activities, work will be stopped, and an assessment of the situation will be initiated. The type of contamination will be identified, and specific plans will be made to obtain approvals for removal, transport, and disposal of the contaminated soil or to modify the construction plans.

3.4 Potential Pollution Sources

It is the responsibility of the stormwater inspector to continually monitor and update the materials inventory in this SWPPP and to ensure that each identified potential pollutant has a BMP installed to prevent discharges.

3.4.1 Construction Materials

Table 6 provides an inventory of potential materials that may be on site during facility construction and equipment installation activities as well as the potential pollutants associated with those materials and the BMPs that will be used on site to eliminate the possible discharge of pollutants.

3.4.2 Sediment

The most common source of pollution from the plant construction area will be sediment, which can be carried away from the work site with stormwater runoff and impact the water quality of a receiving stream or wetland. Clearing, grading, and otherwise altering previously undisturbed land can increase the rate of soil erosion over pre-disturbance rates. Stockpiles of excavated soil and aggregate (soil, gravel, and similar materials) and access roads will also be constructed with erosion protection measures.

3.4.3 Petroleum Products

Petroleum products can also be potential stormwater pollutants. These products are used in construction activities to power or lubricate equipment and include gasoline, diesel fuel, lubricant oils, hydraulic oils, used oils, brake fluid, grease, and solvents. Sources of petroleum product leaks include vehicle and equipment engines, fuel transfers, oil drips/leaks, and fuel from aboveground storage tanks. In addition, paints and solvents used to coat piping/equipment welds, sealants, emulsions, concrete, pesticides, and herbicides may be used in project activities. Mobile refuelers may frequently transfer fuel to on-site construction vehicles, equipment, and portable tanks.

3.4.4 Laydown Areas, Equipment Cleaning and Maintenance, and Solid Waste

Debris from laydown areas, residue from equipment cleaning and maintenance, and solid waste generated from land clearing operations and human activity (trees, brush, paper, trash, etc.) represent other potential pollution sources within the construction site. Additionally, the project area may contain construction supplies such as pipe, culverts, empty tanks, drums and vessels, and fencing.

3.4.5 Human Waste/Chemical Toilets

Chemical toilets will be provided for worker use during construction activities. The toilets will be conveniently located for worker use and ease of access, servicing, and maintenance by a third-party commercial vendor. The toilets will be securely fastened to the ground so they cannot be tipped over by the wind or by accident. Contained wastes will be routinely removed by the service contractor for disposal at an approved facility.

3.4.6 Concrete Washout Areas

If concrete is used during plant construction activities, concrete truck washout waters will be managed to prevent them from being transported off site and reaching waters of the state. A designated concrete truck washout water tank or earthen pit will be installed at the site to capture and hold the water so it can evaporate. Concrete truck washout will only occur at this designated location. Dried and hardened solids will be removed, broken, and used to supplement gravel surfaces as needed or removed for disposal at an approved off-site facility.

4 STORMWATER MANAGEMENT CONTROLS

Stormwater management controls include both erosion and sediment controls and operational controls that are used to prevent or minimize stormwater impacts and control soil erosion and subsequent sedimentation. The use of a combination of physical BMPs, good work practices, and proper fuel, chemical, and materials storage practices will prevent or minimize stormwater impacts. The types and locations of physical BMPs to be used in the project area are shown on the BMP location maps (Appendix C), and BMP construction details and specifications presented in Appendix D illustrate how project construction will be executed.

4.1 Erosion and Sediment Control Requirements

The objective of erosion and sediment controls is to minimize the release of sediments to stormwater runoff. This can be accomplished using structural and operational controls to prevent stormwater run-on, enhance on-site stormwater containment and management, and reduce stormwater runoff volume and velocity.

Stormwater controls implemented at the site are selected to withstand and function properly during precipitation events up to the 2-year, 24-hour storm event, which in North Dakota ranges from 2.3 inches in the east to 1.9 inches in the west. If stormwater inspections or other information indicates that the selected stormwater control has been used inappropriately or incorrectly, the control will be replaced or modified within 24 hours or prior to the next rainfall event (whichever comes first) or as field conditions allow. All stormwater controls will be implemented in accordance with the manufacturer's specifications, unless justification is provided for a deviation from those requirements.

A 50-foot natural buffer or equivalent erosion and sediment control will be provided when project activities are within 50 feet of surface water and stormwater runoff flows to that surface water. If equivalent erosion and sediment controls are used, the rationale for using equivalent controls will be included in Appendix C.

Temporary soil stockpiles will have effective sediment controls implemented, and will not be placed in surface waters, including stormwater conveyances, drainageways, or ditches.

If off-site sediment transport occurs, any off-site accumulations will be removed in a manner and frequency that minimizes off-site impacts. If such off-site sedimentation occurs, the SWPPP will be modified accordingly to prevent further off-site sediment deposition.

The following commonly used erosion and sediment controls and practices will be implemented, as appropriate.

- Grade or extend terraces across slopes to prevent stormwater from flowing onto the construction area and plant open areas with native grasses or low-growing plants soon after work is completed.
- Place energy-dissipating material, such as riprap, check dams, straw bales, wattles, and/or gabions, at stormwater outfalls to slow water runoff, thereby minimizing erosion and preventing entrained sediments from entering waterways.
- Prevent erosion damage by using geotextiles or energy-dissipating devices such as check dams, gabions, or riprap along stream courses or their banks or drainageways that may be impacted by the construction.

- Armor culverts with inlet protection to prevent suspended particles from entering stormwater drainages.
- Maintain gravel entrance/exit pads at the construction site entrance/exit location to provide a buffer to reduce the amount of mud and soil transported on vehicle tires from the site to paved public roadways.
- Temporary or permanent erosion protection and stabilization (e.g., cover crop or mulching) will be implemented immediately for all exposed soil surface areas where activities have been completed or temporarily stopped for at least 14 days.

4.2 Selection of Structural Controls

Physical erosion and sediment controls that may be used at the construction site to minimize possible sediment impacts to stormwater runoff are described in the following sections. A number of different controls may be used at the construction site, either individually or in combination, to manage stormwater and minimize erosion and sedimentation. Specific BMP installation details and specifications are provided in Appendix D, and selection guidelines for each construction phase are summarized in Table 7.

Table 7. BMP Selection Guidelines

BMP	Pre-Construction	Active Construction	Post-Construction
Berms	--	X	--
Check dams	--	X	X
Diversion ditch or berm	--	X	X
Drainage dip	--	X	X
Erosion-control blanket	--	X	X
Filter berm	--	X	X
Level spreader	--	--	X
Mulching	--	X	X
Revegetation	--	X	X
Sediment trap	--	X	--
Silt fence	X	X	X
Slope stabilization	--	X	X
Stabilized construction entrance	X	--	--
Stormwater detention pond	--	X	X
Straw bale barrier	X	X	X
Straw wattles	X	X	X
Surface roughening	-	X	X
Terracing	--	X	X
Vegetative buffer	X	X	X
Water bar	--	X	X

4.2.1 Berms

A berm is a ridge of compacted soil located at the top or base of a sloping disturbed area to contain or divert surface runoff. Where used, soil berms will be constructed of soil with enough fines to minimize

flow through the berm. The purpose of a berm is to control runoff velocity, divert onsite surface runoff to a sediment trapping or filtration device, and/or divert clean water away from disturbed areas.

4.2.2 Check Dams

Check dams are small, temporary dams constructed across a diversion or roadside ditch. Check dams can be constructed using gravel, rock, gravel bags, geo-ridges, earth with erosion-control blanketing, straw bales, or wattles and are used to slow the velocity of concentrated flow in a channel. As a secondary function, check dams can also be used to catch sediment from the channel itself or from the contributing drainage area as stormwater runoff flows through or over the structure.

4.2.3 Diversion Ditch or Berm

A diversion ditch or berm is used to prevent sediment-laden stormwater runoff from leaving the construction site or disturbed area, to prevent flows from eroding slopes, and to direct sediment-laden flows to a trapping device. A diversion ditch or berm can also be used to divert surface runoff from upgradient areas away from the construction area.

4.2.4 Drainage Dip

Drainage dips intercept and remove surface water from the access roads, facilities, pipelines, and roadside ditches before the combination of water volume and velocity begin to erode the structures. Drainage dips are constructed diagonally across the flow of the surface water and tend to reduce the speed of vehicles, while dispersing surface water.

4.2.5 Erosion-Control Blankets

Erosion-control blankets and turf reinforcement mats are porous fabrics and are manufactured by weaving or bonding fibers made from organic or synthetic materials. Erosion-control blankets are installed on steep slopes, over berms, or in channels to prevent erosion until final vegetation is established. Erosion-control blankets can also be used as separators or to aid in plant growth.

4.2.6 Filter Berm

A filter berm is a temporary ridge made of natural materials that already occur on the project site. Brush filter berms use small tree branches, root mats, grass, leaves, stone, or other debris or material naturally available or left over from the site clearing and grubbing. Rock filter berms use site gravel, stone, or rock. Both types of filter berms are placed along a level contour to slow, filter, and divert flow and act as an efficient form of sediment control.

4.2.7 Level Spreader

A level spreader is used to prevent erosion and to improve infiltration by spreading concentrated stormwater runoff evenly over the ground as shallow sheet flow instead of through channels. It usually involves a depression in the soil surface that disperses flow onto a flatter area across a slight slope and then releases the flow onto level, vegetated areas. This reduces flow speed and increases infiltration and promotes evaporation.

4.2.8 Mulching

Mulching is a temporary erosion-control practice in which materials such as grass, straw, hay, wood fibers, or wood chips are placed or implanted into soils on exposed or recently planted soil surfaces. Mulching stabilizes soils by minimizing rainfall impact and reducing stormwater runoff velocity. When mulching is used in combination with seeding, surface soils retain moisture, promote seed germination, and help insulate roots from extreme temperatures.

4.2.9 Revegetation

Revegetation involves planting seed to establish a vegetative cover on disturbed areas to reduce erosion by stabilizing disturbed areas. It also reduces runoff volumes by increasing water percolation into the soil, binds soil with roots, and protects soil from wind erosion. The permanent seed mixture, rate, application method, and supplemental materials will be selected in coordination with the revegetation contractor and the Williams County NRCS office.

4.2.10 Sediment Trap

Sediment traps are intended to intercept, trap, and retain sediment from runoff while allowing detained runoff to slowly drain, infiltrate, or both. They are usually installed in a drainageway or other point of discharge from a disturbed area and are formed by excavating below grade and/or constructing an earthen embankment with a protected spillway to slow the release of runoff.

4.2.11 Silt Fence

Silt fences are temporary perimeter control structures designed to slow, temporarily impound, and filter sediment-laden water. Installation technique and maintenance is critical to proper performance.

4.2.12 Slope Stabilization

The use of appropriate materials, such as mulch, staked sod, riprap, erosion-control blanket, or other materials that prevents erosion on slopes from occurring.

4.2.13 Stabilized Construction Entrance

A stabilized construction entrance is a pad of gravel laid over filter cloth where construction traffic will be entering or leaving a construction site to or from a public right-of-way, street, or highway. The purpose of a stabilized entrance to a site is to minimize the amount of tracked mud and dust that leaves the site. As a vehicle drives over the gravel, mud and sediment are removed from the vehicle's wheels and offsite transport of soil is reduced. This BMP reduces erosion and tire rutting, and the filter fabric separates the gravel from the soil below by minimizing gravel migration into the subsurface soil caused by heavy vehicle loads. A stabilized construction entrance should be used at facility ingress and egress locations.

4.2.14 Straw Bale Barrier

A straw bale barrier is a series of entrenched and staked straw bales placed on a level contour to intercept sheet flows. The barrier reduces runoff velocity and filters sediment-laden runoff from small drainage areas of disturbed soil and may also be used to protect against erosion in small, shallow drainage channels.

4.2.15 Straw Wattles

Straw wattles or rolls are intended to capture and keep sediment on slopes or in small shallow drainage channels. Straw rolls can be used to temporarily stabilize slopes by reducing soil creep, and sheet and rill erosion, until permanent vegetation can be established. Straw rolls will last an average of 1 to 2 years.

4.2.16 Surface Roughening

Soil surface roughening is a temporary erosion-control practice often used in conjunction with grading. Soil roughening involves increasing the relief of a bare soil surface with horizontal grooves (corrugating) or tracks (tracking) using construction equipment. Slopes that are not fine-graded and that are left in a roughened condition can reduce erosion, trap sediment, and prepare ground surfaces for seeding.

4.2.17 Terracing

Terraces are made of either earthen embankments or ridge and channel systems that are properly spaced along a fill slope. Terraces are constructed with an adequate grade to promote drainage to a stabilized outlet. They reduce damage from erosion by collecting and redistributing surface runoff to stable outlets at slower speeds and by decreasing the distance of overland runoff flow. They also surpass smooth slopes in holding moisture and help to minimize sediment loading of surface runoff.

4.2.18 Vegetative Buffer

Vegetative buffers are areas of either natural or established vegetation that are maintained to protect the water quality of neighboring areas. Vegetative buffers reduce stormwater runoff velocity, prevent soil erosion, promote infiltration, and act as a filter to remove sediment. Vegetated buffers will have a minimum width of 1 foot for every 5 feet of disturbed area that drains to the buffer. The width of the buffer will have a slope of 5% or less and the area draining to the buffer will have a slope of 6% or less. Buffers will consist of dense grassy vegetation, 3 to 12 inches tall, with a uniform coverage area greater than 90% and less than 10% composed of woody vegetation.

4.2.19 Water Bar

A water bar is an earthen ridge, or ridge and channel, constructed diagonally across the slope of a road, trail, or disturbed area. Water bars are normally used for drainage and erosion protection of closed, blocked, or infrequently used roads to divert stormwater runoff and minimize erosion.

4.2.20 Stormwater Detention Pond

A stormwater detention pond is designed to capture the runoff from a specific disturbed area for a certain precipitation intensity, provide for entrained sediment to drop out of the water in the pond, and then discharge relatively sediment-free water from the pond (see Appendix D).

4.3 Operational Controls

4.3.1 Dust Control

Wind can cause erosion, particularly in dry climates or during the dry season. Wind erosion can occur where surface soil is loose and dry. Wind erosion may also occur in areas where vegetation is sparse or

absent and can transport sediments to where they can be washed into receiving waters during the next storm event or snowmelt runoff.

The prevailing winds in western North Dakota are generally from the northwest, although a southeasterly wind direction occurs occasionally. The excavated topsoil, ground cover, and overburden materials will be stockpiled for future reuse during dry cuttings pit closure activities and final site reclamation. If possible, these stockpiles should be laid out perpendicular to the predominant wind direction to serve as wind breaks and vegetated cover should be established to minimize erosion.

During construction, disturbed areas, excavated materials, soil piles, and stockpiled materials will be watered regularly to minimize fugitive dust. Access roads associated with the construction activities will also require frequent watering or use of chemical dust suppressants to prevent fugitive dust from blowing offsite.

4.3.2 Construction Site Housekeeping

Housekeeping will consist of neat and orderly storage of materials and containerized fluids. Wastes will be temporarily stored in sealed containers and regularly collected and disposed of at off-site, suitable facilities. If spills occur, prompt cleanup is required to minimize any commingling of waste materials with stormwater runoff.

Cleanup of trash and discarded materials will be conducted at the end of each workday. Cleanup will consist of patrolling the roadway, access areas, and other work areas to pick up trash, scrap debris, other discarded materials, and any contaminated soil. These materials will be disposed of appropriately.

Deposited sediment will be removed from paved surfaces, using loaders, shovels, and/or brooms, by the end of the workday or within 24 hours of tracking the sediment

4.3.3 Operations and Maintenance Techniques

Developing and implanting operations and maintenance techniques help ensure that the SWPPP requirements are carried out on a regular basis and in a manner that is compliant with the general stormwater permit conditions. Some of these operations and maintenance techniques are outlined below.

- Develop and maintain inspection schedules; correct deficiencies noted during these inspections; clean and maintain stormwater management system components.
- Perform routine trash collection and disposal, and grounds maintenance.
- Dispose of trash generated by project activities at a suitable solid waste disposal facility.
- Familiarize employees with good housekeeping procedures, tips, reminders, and pollution prevention concepts.

4.3.4 Petroleum Products, Material Storage, and Management

Petroleum products that may be present at the construction site include gasoline, diesel fuel, lubricant oils, hydraulic oils, used oils, and solvents. Gasoline and diesel fuel will be stored in portable storage tanks with secondary containment. Lubricant, hydraulic, and miscellaneous oils and solvents will be stored in 55-gallon or smaller containers within a secondary containment area or in approved tool and equipment sheds or other protected structures.

Routine maintenance will be limited to fueling and lubrication of equipment. Drip pans, mats, or similar methods will be used during routine fueling and maintenance to contain spills or leaks. Any waste product from maintenance will be containerized and transported offsite for disposal or recycling. No major equipment overhauls will be conducted within the project area. Equipment will be transported offsite for major overhauls.

Pollutants from petroleum products used during construction activities adhere easily to soil particles and other surfaces. In case of a spill or leak, soils contaminated with petroleum products will be contained and removed to a proper disposal site. Soil erosion and sediment control practices will aid in retention of spills or leaks. Maintenance and safe storage practices will reduce the chance of petroleum products contaminating the project area. Oily wastes such as crankcase oil, cans, rags, and paper containing oils will be placed in proper receptacles and disposed of or recycled. An additional source of petroleum contamination is leaks from equipment and vehicles. Routine daily inspections will be conducted to identify leaks and initiate corrective actions, if needed.

4.3.5 Petroleum Product Storage and Management Guidelines

The following guidelines for storing and managing petroleum products will be used.

- All product containers will be clearly labeled and stored in areas away from vehicle traffic.
- All drums will be kept off the ground within secondary containment, labeled, securely fastened, and stored under cover if needed.
- Bulk storage fuel tanks will be stored within secondary containment.
- Emergency spill response procedures/materials will be available at the project area. Persons trained in handling spills will always be on call.
- Employees will be familiar with the storage locations for spill cleanup equipment and trained in the use of spill cleanup equipment.
- Spill cleanup and containment materials (absorbent, shovels, etc.) will be easily accessible. Spills will be immediately cleaned up and contaminated materials will be properly stored on site until they can be disposed of in accordance with applicable regulations.
- Storage areas and containers will be regularly monitored for leaks and repaired or replaced as necessary. Contractors and subcontractors should be reminded about proper storage, handling, and transferring of petroleum products or other hazardous materials during safety meetings.
- Chemical substances used at the site will be identified, properly labeled, and inventoried, and the Material Safety Data Sheets will be kept on file.

A hazardous substance release in any amount which enters or threatens to enter waters of the state shall be reported to the National Response Center and to the NDDEQ. Refer to Table 2 for notification information.

State reportable spills and/or releases of petroleum products/materials that result in a visible sheen on water, or a visible deposit on the bottom or shoreline of any waterbody must be reported to the NDDEQ at 701-328-5210 as soon as practical after discovery. A NDDEQ General Environmental Incident Report Form should be used for any environmental incident or release that is not exempt under Resource Conservation and Recovery Act oilfield exemptions.

4.3.6 Employee and Contractor Training

OE2 will implement a training program to address the areas of concern listed below. All employees, including contractors and subcontractors, will be trained to ensure proper awareness and implementation of stormwater management controls. Training will cover the following topics.

- Purpose and requirements of the stormwater permit.
- Components of the SWPPP and stormwater regulations.
- Stormwater management controls.
- Inspections, recordkeeping, and reporting.
- Stormwater and non-stormwater discharges.
- Changes to the SWPPP.

Records of the training, including the topics discussed, attendees, and an evaluation of BMPs in use, will be maintained and kept at the OE2 Denver, Colorado, offices for a minimum of 3 years. A Training Log to document training is provided in Appendix E.

4.3.7 SWPPP Revisions

This SWPPP is a working document and will be modified as necessary when there are changes in the design, construction, and operation or maintenance activities during the life of the construction project or until final stabilization is achieved. Updates and revisions to the SWPPP will be made as soon as practicable. Errors in paperwork, changes to BMPs, or the removal, addition, or adjustment of erosion and sediment control measures must be made to the SWPPP or appropriate site maps. Revisions and updates to this SWPPP will be recorded on the SWPPP Amendment Log included in Appendix A.

4.3.8 Inspection and Maintenance Procedures

See Section 5.0 for a discussion of inspection and maintenance procedures.

4.3.9 Recordkeeping Procedures

See Section 6.0 for a discussion of recordkeeping procedures.

4.3.10 Other Operational Controls

Other operational controls include implementing stormwater controls before beginning construction; considering predominant wind directions, soil types, topography, and drainage features in project design; prohibiting or modifying work practices that may cause or increase erosion; and scheduling work for times of the year or times of the day when precipitation is less likely.

4.4 Stabilization Requirements

To meet the permit conditions, stabilization means that the exposed ground surface will be covered by appropriate materials, such as mulch, staked sod, riprap, erosion-control blankets, or other material that prevents erosion from occurring on the exposed surface. Grass seeding alone does not constitute stabilization, nor does snow cover and/or frozen ground conditions.

If stabilization requirements cannot be met due to circumstances beyond control of OE2, the following actions will be implemented.

- If vegetative stabilization is to be used, immediately initiate, and within 14 calendars days complete the installation of temporary non-vegetated stabilization; or
- Complete all methods of initiating stabilization as soon as conditions or circumstances allow.

If any above conditions are encountered, OE2 will document the circumstances that prevented achieving the stabilization requirements contained in this SWPPP and will provide a schedule to be followed to meet the stabilization requirements.

4.4.1 Steep Slopes

For all steep slopes, with a grade equal to or greater than 15% (6.7:1 [horizontal:vertical]), stabilization will be initiated immediately once activities have been completed or temporarily ceased. Stabilization will be completed as soon as practicable, but no later than 7 calendar days after the initiation of soil stabilization.

4.4.2 Exposed Areas

All exposed soil areas will be stabilized, and stabilization will be initiated immediately where activities have been permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding 14 calendar days. Stabilization will be completed as soon as practicable, but no later than 14 calendar days after the initiation of soil stabilization activities. Temporary stockpiles without significant silt, clay, or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) will not be stabilized.

4.4.3 Frozen Ground Conditions

OE2 will implement winter stabilization methods during frozen ground conditions, if the site was not stabilized prior to the ground freezing.

4.4.4 Diversion Ditches with Continuous Flows

Stream diversions or any temporary or permanent drainage ditches that will have a continuous water flow will be stabilized with appropriate controls prior to connection with any surface water. The entire area (channel and bank) of the diversion ditch will be appropriately stabilized to bankfull height.

The normal wetted perimeter of any temporary or permanent drainage ditch that conveys water from the project site, or diverts water around the site, will be stabilized at least 200 linear feet from the project or property boundary, or from the point of discharge to any surface water. Stabilization of the conveyance will be completed prior to connection with a surface water. Any remaining portion of the temporary or permanent drainage ditch must be stabilized within 14 calendar days for portions which construction activities have temporarily or permanently ceased.

4.5 Chemical Treatment

While not anticipated, if chemical treatment is to be used for sediment removal, it will be used in accordance with the manufacturer's specifications. Treatment chemicals will be selected in consideration of the anticipated soil particle size and stormwater characteristics (e.g., pH, turbidity, stormwater flow

rate into the chemical treatment system, etc.) and a description of the chemical treatment process will be included herein.

If chemical treatment will be pursued, OE2 will comply with the following.

- OE2 will submit a written request to the NDDEQ for review and approval to ensure that the selection and management of chemicals will minimize the potential for harmful effects from the discharge.
- The request to discharge chemically treated stormwater will be submitted 60 days prior to the anticipated usage date and will include all of the following information.
    - Material Safety Data Sheet/Safety Data Sheet
    - Proposed water additive discharge concentration
    - Discharge frequency (i.e., number of hours per day/number of days per year)
    - Proposed discharge monitoring point
    - Type of treatment, if any, to remove additive prior to discharge
    - Product function (e.g., coagulant, flocculant, etc.)
    - A 48-hour LC50 or EC50 for a North American freshwater planktonic crustacean (*Ceriodaphnia* sp., *Daphnia* sp., or *Simocephalus* sp.)
    - Toxicity test results for one other North American freshwater aquatic species (other than a planktonic crustacean)
- OE2 understands that any discharges from the chemical treatment of stormwater must not cause a violation of the standards of quality for waters of the state and that the discharge must be consistent with the dewatering requirements of Part II(C)(3)(g) of the general permit and Section 2.6 of this SWPPP.

4.6 Final Stabilization

Achieving final stabilization for the site ensures that stormwater runoff from the site will not result in soil erosion and sedimentation, will not contribute pollutants to waters of the state, and will not contravene water quality standards. Implementation of this SWPPP will continue until the final stabilization criteria, as specified in Part II, Section E of the General Permit and outlined below, have been met and a NOT has been submitted to the NDDEQ.

Final stabilization can be achieved in three different ways.

1. All soil-disturbing activities have been completed and all soils have been stabilized by a uniform perennial vegetative cover, with a density of 70% of the pre-existing cover over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions, and:
    a. all drainage ditches constructed to drain water from the site after construction is complete have been stabilized to prevent erosion;
    b. all temporary erosion and sediment control BMPs (e.g., silt fence) have been removed; and
    c. all sediment has been removed from conveyances and temporary sedimentation basins that will be used as permanent water quality management basins. Removed sediment will be stabilized to prevent it from being washed into basins, conveyances, or drainageways

and discharging off-site or to surface waters. Permanent basins must be sufficiently cleaned out to return the basin to design capacity.

2. In areas of the state where the average annual rainfall is less than 20 inches, all soil-disturbing activities have been completed and erosion-control measures (e.g., degradable rolled erosion-control products) and stabilization methods have been selected, designed, and installed, along with an appropriate seed mixture, to provide erosion control for at least 3 years and achieve 70% of the pre-existing vegetative cover within 3 years, without active maintenance, so that the site meets the criteria outlined in items 1 a, b, and c, above.

3. Disturbed areas on land used for agricultural purposes that are restored to their pre-construction agricultural use do not have to meet the foregoing final stabilization criteria. If the construction activity removed a standing crop, the area must be restored in accordance with the landowner's requirements.

   Disturbed areas that were not previously used for agricultural activities, such as buffer strips immediately adjacent to state waters and areas that are not being returned to their pre-disturbance use, must meet the final stabilization criteria listed in items 1 or 2 above.

4.7 Local Requirements

The Williams County Water Resource District Storm Water Management Plan regulations were addressed through the submission and granting of a de minimus effect review which revealed that post-construction peak flow discharges from the site will be slightly less than pre-construction peak flows for the 60-minute duration 100-year return frequency storm event.

4.8 Spill Response Plans

Contractors and subcontractors working on-site will have individual spill control and response plans or conform to OE2's spill control and response plan, as outlined herein. A minimum of one Spill Response Kit (see Table 8) will be available from the Construction Superintendent at all times.

Table 8. Spill Response Kit Contents

Quantity	Item
Booms and Sorbent Materials	
4	5-inch × 10-foot absorbent booms
100	17 × 19-inch absorbent pads
3	50-pound bags of sorbent material
Personal Protective Equipment	
2	Pair of gloves
2	Pair of safety glasses
2	Protective coveralls
Equipment	
1	Flat-bladed non-sparking shovel
1	Box heavy duty (3 mil) garbage bags

4.8.1 Spill Response Procedure

In the event of a spill, leak, or release, the following procedure will be implemented.

- Account for personnel, assure their safety, and evacuate if a fire, explosion, or exposure hazard exists.
- Remove all sources of ignition. Position fire suppression equipment. Alert the OE2 Construction Manager, SWPPP Team Coordinator, or on-site inspector, who will contact the local fire department, if necessary.
- Shut off pumps and close valves that allow oil to flow to the segment of the system causing the spill. Plug or patch leak/discharge if possible.
- The OE2 Construction Manager or SWPPP Administrator will alert adjacent property owners/operators, as warranted by the incident.
- As safety allows, attempt to contain the spill. Prevent or divert spilled oil from approaching structures or draining toward water or storm drains. Absorbent material, spark-proof shovels, brooms, neoprene gloves, and other spill response materials are kept in the Spill Response Kit that is stored at the site.
- The OE2 Construction Manager or SWPPP Administrator will conduct a safety assessment and determine additional cleanup actions as needed.

For all occurrences, the OE2 Construction Superintendent or SWPPP Administrator will evaluate the incident and determine if notification is necessary. If a reportable quantity spill occurs, the SWPPP will be amended to include a description of the spill, equipment changes, and/or operational changes required to prevent a recurrence.

4.8.2 Disposal of Recovered Materials

Waste oil, oily material, or other potentially contaminated material recovered from spill cleanup operations will, in every case, be disposed of in a manner approved by the local, state, and federal agencies. Permits required for disposal vary on a case-by-case basis depending on type, volume, and condition of the material to be disposed. The designated OE2 Construction Superintendent or SWPPP Administrator is responsible for arranging the disposal of all recovered oil, contaminated absorbents, and other oily or contaminated debris.

The following disposal methods for recovered materials may be used by OE2.

- Off-site bioremediation, or off-site disposal for contaminated soils.
- Off-site disposal for liquids and surface water recovered from impacted surface waters.
- Off-site disposal of wastes generated from recovery activities.

5 INSPECTION AND MAINTENANCE PROCEDURES

Inspection and maintenance of erosion and sediment controls will occur during all phases of the project, as described in Section 2.3. Continued inspection and maintenance are required for specific erosion and sediment controls after construction is completed until final stabilization is achieved. Additionally, inspections will identify potential sources of pollutants that could impact stormwater discharges.

5.1 Stormwater Inspection Procedures

The stormwater inspection program will include the following.

1. A trained and qualified person familiar with this SWPPP and stormwater controls will conduct facility inspections by completing the Stormwater Inspection and Maintenance Form included Appendix F. The form will summarize the scope of the inspection, the name of the inspector, date of the inspection, the functional condition of the stormwater controls, and recommended corrective actions, if any.
2. Inspections will cover the following.
    - Disturbed areas without stabilization, slopes, and berms.
    - Material and chemical storage areas, perimeter runoff.
    - Straw bales, wattles, riprap areas, culverts, and settling ponds.
    - Surface water diversions and downgradient areas.
    - Culverts and inlet protection, check dams, and silt fences.
    - Perimeter runoff and stormwater outfalls.
    - New access roads, ditches, water bars, and surface diversions.
    - Locations where vehicles enter or exit the site.

    Inspections of the site and adjoining land area may need to be separated into several segments such as the following.

    - Access roads and site perimeters.
    - On-site construction, development, and installation activities.
    - Material and fuel storage areas.
3. Inspections will occur every 14 calendar days during active construction and within 24 hours (or the next business day) after a 0.25-inch or greater precipitation event or snowmelt event that causes or may cause surface erosion. For multiple-day precipitation events, inspections will be performed within 24 hours or the next business day after rainfall of 0.25 inch or greater occurs within a 24-hour period, even if it is still precipitating. At the conclusion of the extended rainfall event, another inspection will be performed within 24 hours or the next business day.
4. Post-construction inspections of areas that have been stabilized, but do not meet the final stabilization criteria, will occur every 30 days. Inspections will continue until final stabilization is achieved and a NOT has been filed with the NDDEQ.
5. A log of inspections will be completed and maintained in OE2's Denver, Colorado, offices for a minimum of 3 years.
6. Inspections are not required for disturbed areas when snow cover exists or the ground is frozen, provided that melting conditions do not exist.

7. Water quality will be visually assessed for all receiving streams or wetlands and discharge areas during each inspection, if present.
8. Disturbed areas and material storage areas that are exposed to precipitation will be inspected for evidence of pollutants entering nearby drainages.
9. Check dams, straw wattles, and other BMPs will be inspected for evidence of deterioration, under-cutting, and buildup of sediment. Sediment will be removed when it has built up one-third to one-half of the height of the specific control structure, as discussed in Section 5.2.3 and specified in Appendix C.
10. Roads used for vehicle access will be inspected for formation of rills and channels and for evidence of off-site sediment transport.
11. The results of the inspections will be used to update and revise the list of potential pollutant sources identified in Section 3.2.
12. This SWPPP will be modified as necessary whenever there is a change in project design, construction, or operation that changes the potential for pollutant discharge to waters of the state.
13. An inspection report summarizing the scope of the inspection, the name of the person conducting the inspection, date of inspection, and observations relating to the inspection will be prepared using the inspection and maintenance form included in Appendix F.
14. Actions taken to modify stormwater control measures will be recorded and maintained with this SWPPP. Revisions to the SWPPP will be performed as soon as practicable, but no later than 72 hours after the corrective actions have been identified.
15. If no deficiencies are found during the inspection, the report will contain a certification statement that the site is in compliance with this SWPPP.

5.2 Maintenance and Corrective Action Procedures

5.2.1 Personnel

Personnel performing the stormwater inspections will record site conditions, BMP status, and recommended corrective actions on the Stormwater Inspection and Maintenance Form included in Appendix F. The SWPPP Team Coordinator will be apprised immediately of any discovered deficient conditions and recommended corrective actions. The SWPPP Team Coordinator will direct designated personnel (e.g., employees or subcontractors) to perform BMP maintenance, replacement, or new installation activities.

5.2.2 Scheduling

Corrective actions for erosion- and sediment-control structures that are found to be performing inadequately or deteriorating will be performed before the next significant rainfall event (i.e., $\geq$0.25 inch) or within 24 hours (whichever comes first) or as field conditions allow. Rill or gully surface erosion and steep slopes (i.e., $\geq$15% slope) will be immediately repaired and stabilized. The SWPPP Team Coordinator has the authority and will direct subcontractors to install new and/or additional stormwater-control BMPs as needed.

5.2.3 Maintenance/Corrective Action Requirements

All control devices like, and including, silt fences or fiber rolls must be repaired, replaced, maintained, or supplemented when they become nonfunctional (e.g., torn from posts, visible tears, eaten, etc.). Collected sediment must be removed as it approaches one-half of the aboveground capacity of the control device.

- Fiber rolls/straw wattles must be replaced when one-half of the original aboveground height of the device when it was installed has been lost as a result of flattening, other damage, or sediment build-up.
- Sedimentation basins must be drained, and the sediment removed when the depth of sediment collected in the basin reaches one-half the storage volume. Drainage and removal must be completed within 72 hours of discovery, or as soon as field conditions allow. Documentation must be provided in the maintenance records if field conditions do not allow access along with a plan of action for performing maintenance activities.
- Maintenance and cleaning of inlet protection devices must be performed when sediment accumulates, the filter becomes clogged, and/or performance is compromised.
- Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment deposited by erosion. All deltas and sediment deposits in surface waters, drainageways, catch basins, and other drainage systems must be removed as soon as practicable.
- Areas where sediment removal results in exposed soil must be stabilized. Removal and stabilization will take place immediately, but no more than 7 calendar days after the discovery, unless precluded by legal, regulatory, or physical access constraints.
- If precluded, removal and stabilization will take place immediately, but no more than 7 calendar days after obtaining access. OE2 is responsible for contacting all local, regional, state, and federal authorities, and receiving any applicable permits prior to conducting any work.
- Vehicle tracking of sediment from the site must be minimized by BMPs, which may include having a designated egress with aggregate surfacing from the site or by designating off-site parking. OE2 will be responsible for (or make arrangements for) street sweeping and/or scraping of paved roads/highways, if BMPs are not adequate to prevent sediment from being tracked onto the paved road/highway surface.
- Accumulations of tracked and deposited sediment will be removed from all off-site paved surfaces by the end of the workday or shift, or if applicable, within a shorter time specified by local authorities or the North Dakota Department of Health.
- If sediment escapes the construction site, off-site accumulations of sediment will be removed in a manner and at a frequency to minimize off-site impacts.
- Vegetative buffers must be inspected for proper distribution of flows, sediment accumulation, and signs of rill formation. If a buffer becomes silt covered, contains rills, or is otherwise rendered ineffective, other control measures will be implemented. Eroded areas will be repaired and stabilized within 24 hours of discovery, or as soon as field conditions allow. Documentation will be provided in the maintenance records if field conditions do not allow access along with a plan of action for performing maintenance activities.

6 RECORDKEEPING PROCEDURES

Records of project inspections, spills, and maintenance activities will be maintained by OE2 at their Denver, Colorado, offices and at the site construction trailer, and will be included with this SWPPP as Appendix G. If a reportable-quantity petroleum hydrocarbon spill occurs, an Oilfield Related Environmental Incident Report will be filed electronically through the North Dakota Industrial Commission's website at: https://www.dmr.nd.gov/oilgas/spills/reportspill.asp. For a general environmental incident or non-exempt oilfield incident, a General Environmental Incident Report Form will be filed electronically through the NDDEQ's website at: http://https://deq.nd.gov/eir/NonOilField.

Records and reports will be maintained for a period of at least 3 years or until final stabilization is achieved and the stormwater permit is canceled or terminated.

7 NON-STORMWATER DISCHARGES

Non-stormwater discharges are not expected from plant construction or equipment installation activities, with the following possible exceptions: fire prevention/suppression activities, hydrostatic testing, and potable water used for dust control and watering seeded areas to promote germination. The intent is that potable water will remain within the disturbed areas of the project area and not run off or be discharged to receiving waters or wetlands. Stormwater will leave the project area along the ground surface via natural drainage swales or constructed ditches, and not through sewers or other buried piping; therefore, non-stormwater discharges are unlikely to occur once the project construction and equipment installation activities are completed.

8 CERTIFICATIONS

8.1 Owner/Applicant Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

By: Grant Burchell

Title: Senior Vice President, Engineering and Operations

Signature: _____

Date: MARCH 9, 2020

Owner Home Office Address: OE2 North LLC
1200 Seventeenth Street, Suite 900
Denver, Colorado 80202

8.2 Contractor/Subcontractor Certification

All contractors and subcontractors that will perform construction activities that could impact stormwater will be familiar with the SWPPP and will sign the following certification.

I certify under penalty of law that I understand the terms and conditions of the Bill Sanderson Gas Plant SWPPP and associated NDDEQ Construction Permit NDR100000 that authorizes stormwater discharges associated with the construction of this site.

Signature: _____

Name: _____

Title: _____

Date: _____

Representing:

Company: _____

Address: _____

Address: _____

Phone: _____

Work to be conducted:

Activity 1: _____

Activity 2: _____

Activity 3: _____

Activity 4: _____

9 LITERATURE CITED

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APPENDIX A

NOTICE OF INTENT

NDPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITY (NDR 100000)

PERMIT COVERAGE LETTER

DELEGATION OF AUTHORITY LETTER

SWPPP AMENDMENT LOG

NOTICE OF INTENT

COPY OF NOTICE OF INTENT TO BE INSERTED

NDPDES GENERAL PERMIT FOR STORMWATER DISCHARGES FROM CONSTRUCTION ACTIVITY (NDR 100000)

Permit No: NDR10-0000
Effective Date: April 01, 2015
Expiration Date: March 31, 2020

AUTHORIZATION TO DISCHARGE UNDER THE

NORTH DAKOTA POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with Chapter 33-16-01 of the North Dakota Department of Health rules as promulgated under Chapter 61-28 (North Dakota Water Pollution Control Act) of the North Dakota Century Code,

Facilities both qualifying for and satisfying the requirements identified in Part I of the permit

are authorized to discharge stormwater associated with **construction activity**

to waters of the state

in accordance with conditions set forth in this permit.

This permit and the authorization to discharge shall expire at midnight,

March 31, 2020.

Signed this 31 day of March, 2015.

Karl H. Rockeman, P.E.
Director
Division of Water Quality

BP 2014.06.12

Table of Contents

I. PERMIT COVERAGE AND LIMITATIONS 3
A. Discharges Covered 3
B. Discharges Not Covered 4
C. Obtaining Coverage and Authorization Effective Date 4
D. Application (Notice of Intent) Process 5
E. Notice of Termination (NOT) 6
F. Transfer of Ownership or Control 6
II. STORMWATER DISCHARGE REQUIREMENTS 7
A. Prohibition of Non-Stormwater Discharges 7
B. Releases in Excess of Reportable Quantities 7
C. Stormwater Pollution Prevention Plans 7
D. Local Requirements 13
E. Final Stabilization 13
III. SELF MONITORING AND REPORTING 14
A. Inspection and Maintenance Requirements 14
B. Records Location 16
IV. STANDARD CONDITIONS 17
A. COMPLIANCE RESPONSIBILITIES 17
B. GENERAL REQUIREMENTS 20
V. DEFINITIONS 22
Appendix 1 – Erosion and Sediment Control Requirements 25

I. PERMIT COVERAGE AND LIMITATIONS

A. Discharges Covered

1. This permit applies to all areas within the state of North Dakota, except for those areas defined as Indian Country. Construction activity located within Indian Country within the state of North Dakota must obtain a permit through the United States Environmental Protection Agency. If the construction activity is located with the jurisdiction of the state of North Dakota, and the United States Environmental Protection Agency, a permit must be obtained from both regulatory entities.

2. This permit applies to stormwater discharges associated with construction activity and small construction activity as defined in Title 40 of the Code of Federal Regulations (CFR), Parts 122.26(b)(14)(x) and (b)(15), respectively. The reference to construction activity in this permit includes both large construction activity and small construction activity as described below.

    a. Large construction activity includes clearing, grading and excavation, that disturbs land of equal to or greater than five (5) acres and includes the disturbance of less than five (5) acres of total land area that is a part of a larger common plan of development or sale if the larger common plan will ultimately disturb five (5) acres or more.

    b. Small construction activity includes clearing, grading and excavation, that disturbs land of equal to or greater than one (1) acre, and includes the disturbance of less than one (1) acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater that one (1) and less than five (5) acres.

    c. Discharges of stormwater from oil and gas exploration, production, processing or treatment operations, or transmission facilities composed of contaminated runoff by contact with or that has come into contact with, any overburden, raw material, intermediate products, finished product, byproduct, or waste products located on the site of such operations.

3. Stormwater discharges from support activities (e.g., equipment staging yards, material storage areas, excavated material disposal areas, borrow areas) may be covered by this permit as part of a related construction site. The support activities may only be in association with one project. If the support activity is associated with more than one project, a separate stormwater permit (Industrial or mining, extraction or paving material preparation) is required.

4. Certain non-stormwater discharges from facilities covered by this permit and meeting the requirements specified in Part II(A).

5. Stormwater discharges from construction activity covered by the previous permit, issued October 12, 2009, where a notice has been submitted to obtain coverage under this permit.

6. Projects which have obtained coverage under this permit shall amend and implement a Stormwater Pollution Prevention Plan (SWPPP) that meets the requirements of this permit within ninety (90) days of the effective date of this permit.

7. Discharges from dewatering activities related to construction activities (discharges of uncontaminated stormwater).

8. Local Authority. This permit does not preempt or supersede the authority of local agencies or operators of municipal separate storm sewer systems to prohibit, restrict, or control discharges of stormwater to storm sewer systems or other water courses within their jurisdiction.

B. Discharges Not Covered

1. Stormwater discharges associated with industrial activity from any source other than construction activities described in Part I(A).

2. Post-construction discharges from industrial activity that originate from the site after construction activities have been completed at the site. Industrial and post-construction stormwater discharges may need to be covered by a separate stormwater permit.

3. The placement of fill into waters of the state requiring local, state, or federal authorizations (such as U.S. Army Corps of Engineers Section 404 permits).

4. This permit does not substitute for obligations under the National Environmental Policy Act (NEPA), Endangered Species Act (ESA), Wild and Scenic Rivers Act, or National Historic Preservation Act (NHPA), it is your responsibility to ensure the project and resulting discharges comply with the respective requirements.

5. Discharges to waters for which there is a total maximum daily load (TMDL) allocation for sediment and/or parameters associated with sediment transport are not covered unless you develop a Stormwater Pollution Prevention plan (SWPPP) that is consistent with the assumptions and requirements in the approved TMDL. To be eligible for coverage under this general permit, the SWPPP must incorporate the conditions applicable to the discharge necessary for consistency with the assumptions, allocations and requirements of the TMDL. If a specific numeric wasteload allocation has been established that would apply to discharges from construction activity, the permittee must incorporate that allocation into the SWPPP and implement necessary steps to meet that allocation. Information about TMDL allocations may be found at the following website: www.ndhealth.gov/WQ/SW/Z2_TMDL/default.htm.

6. Stormwater discharges that the department determines will cause, or have the reasonable potential to cause or contribute to a violation of the standards for quality for waters of the state (North Dakota Administrative Code (N.D.A.C.) 33-16-02.1).

7. Discharges from hydrostatic testing, well points, water line disinfection and treatment of gasoline or diesel contaminated groundwater.

8. Discharges of wash water using detergents, wastewater, or sanitary waste.

C. Obtaining Coverage and Authorization Effective Date

1. To obtain authorization under this general permit for stormwater discharges you must submit a complete application and develop a SWPPP in accordance with Part II(C) of this permit. A SWPPP must be in place as a condition of the permit and a copy of the SWPPP must be retained by the permittee.

2. Permit coverage will become effective seven (7) days after you submit a complete application unless otherwise notified by the department (based on the department receipt date).

3. Upon the effective date of permit coverage you, as the permit applicant, are authorized to discharge stormwater from eligible activities under the terms and conditions of this permit.

D. Application (Notice of Intent) Process

1. You must use a Notice of Intent (NOI) to complete your application. An NOI form (or a replacement application form) is available at the following website: www.ndhealth.gov/WQ/Storm/Construction/ConstructionHome.htm.

2. Application Content and Conditions.

   a. The owner, or owner jointly with the operator (usually the general contractor), shall submit a completed application for this permit. The owner is responsible for compliance with all terms and conditions of this permit. The operator has day to day supervision of construction activities and is jointly responsible with the owner for compliance with the permit conditions as they pertain to the construction activities delegated to the operator.

   b. The application (Notice of Intent) shall contain, at a minimum, the following information:

      (1) Owner name, mailing address and phone number;
      (2) Project contact name and phone number;
      (3) Project/site name;
      (4) Project/site location (street address; section, township, range; or latitude and longitude) and county;
      (5) A brief description of the construction activity;
      (6) The anticipated start date and the anticipated completion date for the project (if known);
      (7) The estimated total area of the site and the total area of disturbance in acres;
      (8) The name of receiving water(s), or the name of the municipal storm sewer system and receiving water(s);
      (9) The signature of the applicant(s), owner (and operator if co-applicants) signed in accordance with the signatory requirements in Part IV(A)(6) of this permit.

   c. A SWPPP (Part II(C)) for the project must be prepared and available for review, upon request, by the department at the time of application. A partially complete plan is acceptable when it clearly identifies the item(s) to be completed, the person(s) responsible for completing the item(s) and the deadline for completing the item(s). The SWPPP must be completed prior to the start of construction (or the applicable construction phase). You are not required to submit the SWPPP with the application unless otherwise notified by the department.

3. For residential construction activity occurring within a common plan of development (such as a subdivision) subject to the permit requirements, coverage may be obtained by the following:

   a. The owner of the lot(s) shall submit one (1) NOI for all of the owner's construction activity within the common plan of development, or

   b. The operator, such as a homebuilder who may represent one (1) or more lot owners, shall submit one (1) NOI for all of the operator's construction activity within each addition of the common plan of development.

      In addition, a SWPPP must be developed and implemented for the permittee's activities within the common plan of development. Additional phases of the common plan of development may be included under the initial application and permit coverage provided the SWPPP is amended to include the additional area or phases.

4. For oil and gas exploration, production, processing, treatment operations, or transmission facilities, which discharge contaminated stormwater, permit applications may be submitted for individual project sites or for an area of operations such as well field or by county.

5. Completed applications and any reports required by this permit shall be submitted to:

North Dakota Department of Health
Division of Water Quality
918 East Divide Avenue
Bismarck, ND 58501-1947

E. Notice of Termination (NOT)

1. Permittees wishing to terminate coverage under this permit must submit a Notice of Termination (NOT) or other written request identifying the facility, reason why the permit is no longer needed and signed in accordance with Part IV(A)(6) of this permit. Compliance with the conditions of this permit is required until a NOT is submitted to the department.

2. Permittees may only submit a NOT after one of the following conditions have been met:

   a. Final stabilization (Part II(E)) has been achieved on all portions of the site for which the permittee is responsible.

   b. Another owner/operator/permittee has assumed control, in accordance with the transfer provisions (Part I(F)), over all areas of the site that have not achieved final stabilization.

   c. For residential construction only, a NOT is not required for each lot that is sold, transferred, or has achieved final stabilization. The permittee must modify their SWPPP to indicate that permit coverage is no longer required for that lot. The SWPPP shall indicate the reason why coverage is no longer needed and the date the lot was sold, transferred, or achieved final stabilization. In order to terminate coverage, all lots under the control of the owner or operator must be sold, transferred, or achieved final stabilization (Part II(E)).

F. Transfer of Ownership or Control

1. When the owner or operator of a construction project changes, the new owner or operator must submit a written request for permit transfer/modification within fourteen (14) days of assuming control of the site or commencing work on-site, or of the legal transfer, sale or closing on the property; except as provided in Part I(F)(2). Late submittals will not be rejected; however the department reserves the right to take enforcement for any unpermitted discharges or permit noncompliance. For stormwater discharges from construction activities where the owner or operator changes, the new owner or operator can implement the original SWPPP created for the project or develop and implement their own SWPPP. Permittee(s) shall ensure either directly or through coordination with other operators that their SWPPP meets all terms and conditions of this permit and that their activities do not interfere with another party's erosion and sediment control practices.

2. A permit transfer/modification request is not required for the legal transfer, sale or closing on a property between permittees covered by this permit. Examples include the sale of a property parcel from a developer to a builder, or the transfer of an easement from a developer to a local government authority. If the new party is not covered by this permit at the time of transfer or sale, then the new owner/operator must submit a completed application/NOI within 14 days of assuming control of the site.

II. STORMWATER DISCHARGE REQUIREMENTS

A. Prohibition of Non-Stormwater Discharges

The discharge of wastewater is not authorized by this permit. The following sources of non-stormwater discharges are allowed if they are not a significant source of pollution and are identified in the SWPPP: fire-fighting, fire hydrant flushing, potable water line flushing, equipment wash down without detergents or hazardous cleaning products, uncontaminated foundation drains, springs, surface water, lawn watering, chemical treatment of stormwater and air conditioning condensate. Impervious surface wash water may not be directed into any surface water or storm drain inlet unless appropriate pollution prevention measures have been implemented. Discharges may not come into contact with oil and grease deposits or any other toxic or hazardous materials (unless cleaned up using dry clean-up methods). The SWPPP must include a description of the pollution prevention measures to be implemented while non-stormwater discharges are occurring.

If chemical treatment for sediment removal is intended to be used on-site, the permittee shall provide the department with the information outlined in Appendix 1(A)(14) of this permit for approval prior to use. This information shall be provided to the department no later than sixty (60) days prior to use.

B. Releases in Excess of Reportable Quantities

This permit does not relieve the permittee of the reporting requirements of 40 CFR 110, 40 CFR 117, and 40 CFR 302, nor the reporting requirements found in Chapter 33-16-02.1 of the North Dakota Administrative Code. Any releases which meet any reporting requirement, must be reported to the agencies identified in Part IV(A)(7).

C. Stormwater Pollution Prevention Plans

All permittees shall implement a SWPPP for any construction activity requiring this permit until final stabilization is achieved. The SWPPP and revisions are subject to review by the department. The objectives of the SWPPP is to identify potential sources of sediment and other sources of pollution associated with construction activity, and to ensure practices are implemented and maintained to reduce the contribution of pollutants in stormwater discharges from the construction site to waters of the state and storm sewer systems. Stormwater management documents developed under other regulatory programs may be included or incorporated by reference in the SWPPP, or used in whole as a SWPPP if it meets the requirements of this part.

The SWPPP may identify more than one permittee and may specify the responsibilities of each permittee by task, area, and/or timing. Permittees may coordinate and prepare more than one SWPPP to accomplish this. However, in the event there is a requirement under the SWPPP for which responsibility is ambiguous or is not included in the SWPPP, each permittee shall be responsible for implementation of that requirement. Each permittee is responsible for assuring that their activities do not render another permittee's controls ineffective.

The SWPPP must incorporate the requirements provided in Appendix 1 and shall include the following information.

1. **Site Description**. Each plan shall provide a description of the construction activity and potential sources of pollution as indicated below:

    a. A description of the overall project and the type of construction activity;

b. Estimates of the total area of the site and the total area that is expected to be disturbed by excavation, grading, grubbing, or other activities during the life of the project;

c. A proposed timetable/schedule, or chart, of activities that includes major phases/stages, BMP implementation, BMP removal, disturbances, and stabilization for major portions of the site;

d. A description of the soil within the disturbed area(s);

e. The name of the surface water(s) and municipal storm sewer system at or near the disturbed area that will receive stormwater runoff from the project site; and

f. A site map which indicates the following items as applicable (more than one (1) map may be needed). If an item is not applicable, provide rationale describing why the item is not applicable to the construction activity:

1) Project boundaries;
2) Areas of ground disturbance during each phase/stage of the project;
3) Areas where disturbance will not occur, such as avoidance areas (e.g. wetlands, critical habitat, Threatened and Endangered Species, etc);
4) Drainage patterns including: flow direction (run-on and runoff);
5) Dividing lines, discharge points, and storm sewer system inlets which the site drains to or may be affected by the activity;
6) Pre-existing and final grades;
7) Location of all temporary and permanent sediment and erosion controls during each particular phase;
8) Location of any stormwater conveyances such as: retention ponds, detention ponds, ditches, pipes, swales, stormwater diversions, culverts, and ditch blocks;
9) Location of potential sources of pollution (e.g. portable toilets, trash receptacles, etc.);
10) Location of soil stockpiles;
11) Identify steep slopes;
12) Surface waters, including an aerial extent of wetland acreage;
13) Location of surface water crossings;
14) Locations where stormwater is discharged to surface waters;
15) Location of dewatering discharge points;
16) Locations of where chemical treatment of stormwater will be performed, including discharge points;
17) Fueling locations, vehicle and equipment maintenance areas, designated wash water collection site, lubricant and chemical storage, paint storage, material storage, staging areas, and debris collection area;
18) Location of any impervious surfaces upon completion of construction; and
19) Where included as part of the project, the site maps for off-site concrete/asphalt batch plants, equipment staging areas, borrow sites or excavated fill material disposal sites. Site maps must show items 1 through 18 of this section.

g. Projects that discharge stormwater which flows to a water body listed as impaired under section 303(d) of the Federal Clean Water Act due to sediment, suspended solids or turbidity must identify the water body and impairment in the SWPPP. The Department's 303(d) list may be found at the following website under Integrated Reports: www.ndhealth.gov/WQ/SW/Z2_TMDL/Integrated_Reports/B_Integrated_Reports.htm.

h. For water bodies which have a TMDL, the SWPPP must describe and conform to the Waste Load Allocations (WLA) of the water body as per Part II(C)(4)(g) of this permit. Information about TMDL allocations may be found at the following website: www.ndhealth.gov/WQ/SW/Z2_TMDL/default.htm.

2. **Narrative.** The SWPPP must include a narrative description of the selected operational controls and sediment and erosion controls as outlined in Part II(C)(3), Part II(C)(4), and Appendix 1 of this permit. When applicable, a description of the requirements for any additional environmental regulations (federal) and local requirements related to the project, as it relates to waters of the state, must also be included or incorporated by reference (e.g. The Wild and Scenic Rivers Act, The National Historic Preservation Act, The Endangered Species Act, Fish and Wildlife Coordination Act, National Environmental Policy Act, Section 404 of the Clean Water Act, etc.).

   The narrative shall describe at a minimum:

   a. The installation, removal (if applicable), and maintenance requirements of selected Best Management Practices (BMPs) for each phase/stage of construction activity;
   b. The rationale for the selection of all BMPs (calculations should be included if appropriate);
   c. Whether selected BMPs are temporary or permanent;
   d. Any descriptions of infeasibility or explanations as required in Part II, Part III(A), and Appendix 1 of this permit.

3. **Operational Controls**. The SWPPP shall describe the BMPs used in day to day operations on the project site that reduce the contribution of pollutants in stormwater runoff.

   a. The SWPPP must identify a person knowledgeable and experienced in the application of erosion and sediment control BMPs who will oversee the implementation of the SWPPP, and the installation, inspection and maintenance of the erosion and sediment control BMPs before and during construction, until a NOT is filed or the permit is transferred. A knowledgeable and experienced person is someone who meets the requirements of Part II(C)(3)(e) of this permit.

      The owner shall develop a chain of responsibility with all operators on the site to ensure that the SWPPP will be implemented and stay in effect until the construction project is complete, the entire site has undergone final stabilization, and a NOT has been submitted to the department.

   b. The SWPPP must include a description of good housekeeping practices used to maintain a clean and orderly site. The SWPPP shall describe how litter, debris, chemicals and parts will be handled to minimize exposure to stormwater. The SWPPP also shall describe what measures will be used to reduce and remove sediment tracked off-site by vehicles or equipment. In addition, the SWPPP shall describe methods which will be used to reduce the generation of dust.

   c. The SWPPP shall describe preventative maintenance practices used to ensure the proper operation of erosion and sediment control devices (e.g., fiber rolls, erosion control blankets and silt fences) and equipment used or stored on site. The SWPPP shall describe proper inspection procedures for ensuring proper operation of erosion and sediment control devices.

   d. The SWPPP shall describe spill prevention and response procedures where potential spills can occur. Specific handling procedures, storage requirements, spill containment, cleanup procedures, and disposal must be identified. Storage structures for petroleum products and other chemicals shall have adequate leak and spill protection to prevent any spilled materials from entering waters of the state or storm sewer systems.

      The potential discharge of hazardous substances in stormwater discharges shall be minimized by including measures onsite, detailed in the SWPPP to prevent and respond to releases of hazardous substances. If a reportable quantity release occurs, the SWPPP shall be revised to prevent the reoccurrence of such a release.

e. The SWPP shall outline how employees and responsible parties shall be trained on the implementation of the SWPPP. Training must be provided at least annually, as new employees or responsible parties are hired or as necessary to ensure compliance with the SWPPP and the general permit. Employees and responsible parties include individuals who are responsible for design, installation, maintenance and repair of stormwater controls and conducting inspections.

    1) On-site personnel must understand the requirements of this permit as it pertains to their role in implementing the SWPPP. On-site personnel must know:

        a. The purpose of the SWPPP, requirements of the SWPPP, and how the SWPPP will be implemented;

        b. The location of all BMPs identified in the SWPPP; and

        c. Correct installation, function, maintenance and removal (if applicable) of BMPs identified in the SWPPP.

    2) Personnel responsible for performing site inspections must understand when inspections must be conducted (Part III(A)), what must be inspected (Part II(C)(7), how to record findings, when to initiate corrective actions, and properly document corrective actions.

    3) Maintenance personnel must understand when maintenance must be performed on BMPs in order to maintain properly functioning BMPs and what needs to be recorded for corrective actions/maintenance records in accordance with Part III(A)(5) of this permit.

f. The SWPPP must describe how concrete grindings and slurry will be managed. Wastewater from concrete washout, cleanout or washout from: stucco, paint, joint compound, and other building materials shall not be discharged to waters of the state, storm sewer systems or curb and gutter systems.

    1) Wash water must be collected in leak-proof containers or leak-proof pits. Containers or pits must be designed and maintained so that overflows cannot occur due to inadequate sizing, precipitation events, or snowmelt.

g. The SWPPP shall describe any dewatering activities planned at the site. Dewatering or basin draining (e.g., pumped discharges, trench/ditch cuts for drainage) related to the permitted activity must be managed with appropriate BMPs, such that the discharge does not adversely affect the receiving water. The following conditions apply to dewatering activities:

    1) Dewatering is limited to un-contaminated stormwater, surface water, and groundwater that may collect on-site and those sources identified in Part II(A), if they are not a significant source of pollution. A separate permit must be obtained to discharge water from other sources such as hydrostatic testing of pipes, tanks, or other similar vessels; disinfection of potable water lines; pump testing of water wells; and the treatment of gasoline or diesel contaminated groundwater or surface water.

    2) The permittee(s) must operate the discharge to minimize the release of sediment and provide adequate BMPs where necessary to minimize erosion due to the discharge. Discharges must not lead to the deposition of sediment within stormwater conveyance systems or surface waters. Discharges must not cause or potentially cause a visible plume within a surface water body.

3) When dewatering, utilize structures or BMPs which allow for draw down to occur from the surface of the water, unless infeasible. If infeasible, documentation must be provided in the SWPPP. In addition, you must describe what BMP(s) will be used in its place.

4) In addition to the inspection requirements in Part III, dewatering activities shall be inspected daily. The inspection must include the dewatering site, areas where BMPs are being implemented and the discharge location. A record shall be maintained to document the inspections of the dewatering operation and actions taken to correct any problems that may be identified.

   a. Records shall contain at a minimum:

      i. Date and time of the inspection,
      ii. Inspector name,
      iii. Approximate volume of water discharged,
      iv. Findings of the inspection, including recommendations and schedule for corrective actions;
      v. Corrective actions taken (including dates, times, and party completing maintenance activities); and
      vi. Documentation that the SWPPP has been amended when changes are made to the dewatering activity in response to inspections.

5) Local authorities may require specific BMPs for discharges affecting their storm sewer system.

4. **Erosion and Sediment Controls**. Erosion and sediment controls and stabilization requirements must be implemented for each major phase of site activity (e.g., clearing, grading, building, and landscaping phases). A description of the erosion and sediment controls and site stabilization methods must be provided in accordance with Part II(C)(2) of this permit. Erosion and sediment controls, and site stabilization must conform to the requirements provided in Appendix 1. The description and implementation of controls shall address the following minimum components:

   a. The selection of erosion and sediment controls, and site stabilization shall consider the following:

      1. The expected amount, frequency, intensity, and duration of precipitation events;

      2. The nature of stormwater run-on and runoff from the site as well as changes during, and as a result of, construction activity. This includes changes to impervious surfaces, slopes, seasonal changes, and drainage features on-site;

      3. Channelized flow, must be handled in order to minimize erosion at outlets and to minimize impacts to downstream receiving waters;

      4. Soil types (wind and water erodibility, and settling time); and

      5. Seasonal conditions.

   b. Sediment basins, or an appropriate combination of equivalent sediment controls such as smaller sediment basins and/or sediment traps, silt fences, fiber logs, vegetative buffer strips, berms, etc., are required for all down slope boundaries of the disturbance area and for those side slope boundaries as may be appropriate for site conditions.

c. Temporary or permanent erosion protection and stabilization (such as cover crop planting or mulching) must be initiated immediately, as described in Appendix 1(A), for all exposed soil areas where activities have been completed or temporarily ceased.

d. All control measures must be properly selected, installed and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee must replace or modify the control for site situations. Corrective actions must be made prior to the next anticipated rainfall event of within 24 hours of discovery (whichever comes first) or as soon as field conditions allow. Documentation must be provided in the maintenance records if field conditions do not allow access along with a plan of action for performing maintenance activities.

   The permittee may deviate from the manufacturer's specifications and erosion and sediment control requirements in Appendix 1 if they provide justification for the deviation and document the rationale for the deviation in the SWPPP. Any deviation must provide equivalent erosion and sediment control.

e. If sediment escapes from the site, off-site accumulations of sediment must be removed in a manner and frequency sufficient to minimize off-site impacts as outlined in Appendix 1(B). The SWPPP must be modified to prevent further sediment deposition off-site.

f. Stormwater controls are expected to withstand and function properly during precipitation events of up to the 2-year, 24-hour storm event. Visible erosion and/or off-site sediment deposition from such storm events should be minimal. The 2-year, 24-hour rainfall event in North Dakota ranges from about 1.9 inches in the west to 2.3 inches in the east.

g. For projects that discharge stormwater which flows to a water body for which there is a TMDL allocation for sediment and/or parameters associated with sediment transport, the SWPPP must be consistent with the assumptions, allocations, and requirements in the approved TMDL. If a TMDL specifies certain BMPs or controls to meet a WLA applicable to the project's discharges, the BMPs or controls must be incorporated into the SWPPP. Information about TMDL allocations may be found at the following website: www.ndhealth.gov/WQ/SW/Z2_TMDL/default.htm.

5. **Stormwater Management**. The SWPPP must identify permanent practices incorporated into the project to control pollutants in stormwater discharges occurring after construction operations have been completed.

   a. Identify stormwater ponds; flow reduction methods; infiltration of runoff on-site; sequential systems which combine several practices or other post-construction stormwater management features.

   b. Identify velocity / energy dissipation devices placed at discharge locations and appropriate erosion protection for outfall channels and ditches.

   c. Maintenance for on-site stormwater management features is the responsibility of the permittee until the NOT is submitted or the feature is accepted by the party responsible for long term maintenance.

   d. The design, installation and use of stormwater management features must comply with applicable local, state or federal requirements.

6. **Maintenance**. All erosion and sediment control measures and other protective measures identified in the SWPPP must be maintained in effective operating condition. The SWPPP must indicate, as appropriate, the maintenance or clean out interval for sediment controls. If site inspections, required in Part III of this permit, identify BMPs that are not operating effectively, maintenance shall be arranged and accomplished in accordance to Appendix 1 or as soon as practicable.

7. **Inspections**. The SWPPP must provide for site inspections as outlined in Part III. The permittee shall ensure that personnel conducting site inspections are familiar with permit conditions and the proper installation and operation of control measures. Inspectors must be knowledgeable in their role of the SWPPP, as outlined in Part II(C)(3)(e) of this permit. The erosion and sediment control measures and stabilized areas identified in the SWPPP shall be observed to ensure they are operating correctly and in serviceable condition. Inspections shall include areas used for storage of materials, permanent stormwater control measures and vehicle maintenance areas. These areas shall be inspected for evidence of, or the potential for, pollutants entering a drainage system. If necessary, the plan shall be revised based on the observations and deficiencies noted during the inspection.

8. **SWPPP Review and Revisions**.

   a. The SWPPP shall be signed in accordance with the Signatory Requirements, Part IV(A)(6), and retained on-site for the duration of activity as outlined in Part III(B).

   b. The permittee shall make the SWPPP available upon request to the department, EPA, or, in the case of discharges to a municipal storm sewer system, the operator of the municipal system.

   c. The permittee shall amend the SWPPP whenever there is a change in design, construction, operation, maintenance, or BMPs. The SWPPP shall be amended if the plan is found to be ineffective in controlling pollutants present in stormwater. The SWPPP shall be amended as soon as practicable.

D. Local Requirements

All stormwater discharges must comply with the requirements, policies, or guidelines of municipalities and other local agencies as applicable to the construction site. Any discharges to a storm sewer, ditch or other water course under the jurisdiction of a municipality must comply with any specific conditions or BMPs required by the municipality or agency.

E. Final Stabilization

The permittee(s) must ensure final stabilization of the site. The permittee(s) should submit a NOT within 30 days after final stabilization has been achieved, or another owner/operator (permittee) has assumed control according to Part I(F) for all areas of the site that have not undergone final stabilization. Final stabilization can be achieved in one of the following ways.

1. All soil disturbing activities at the site have been completed and all soils must be stabilized by a uniform perennial vegetative cover with a density of 70 percent of the pre-existing cover over the entire pervious surface area, or other equivalent means necessary to prevent soil failure under erosive conditions and;

   a. All drainage ditches, constructed to drain water from the site after construction is complete, must be stabilized to preclude erosion;

b. All temporary erosion prevention and sediment control BMPs (such as silt fence) must be removed as part of the site final stabilization; and

c. The permittee(s) must remove all sediment from conveyances and temporary sedimentation basins that will be used as permanent water quality management basins. Sediment must be stabilized to prevent it from being washed into basins, conveyances or drainage ways discharging off-site or to surface waters. The cleanout of permanent basins must be sufficient to return the basin to design capacity.

2. For areas of the state where the average annual rainfall is less than 20 inches, all soil disturbing activities at the site have been completed and erosion control measures (e.g., degradable rolled erosion control product) and stabilization methods are selected, designed, and installed along with an appropriate seed base to provide erosion control for at least three years and achieve 70 percent of the pre-existing vegetative cover within three (3) years without active maintenance. Sites must meet the criteria outlined in items 1(a), (b), and (c) above.

3. Disturbed areas on land used for agricultural purposes that are restored to their pre-construction agricultural use are not subject to these final stabilization criteria. If the construction activity removed standing crop, the area must be restored in accordance with the landowner.

   Areas disturbed that were not previously used for agricultural activities, such as buffer strips immediately adjacent to waters of the state, and areas which are not being returned to their pre-disturbance use must meet the final stabilization criteria in (1) or (2) above.

4. For residential construction only, final stabilization may be achieved when soil is stabilized (see Appendix 1(A)(3)) and down gradient perimeter control for individual lots has been implemented and the residence has been transferred to the homeowner. Additionally, the permittee must distribute a “homeowner fact sheet” to the homeowner to inform the homeowner of the need for, and benefits of, final stabilization. The permittee also must demonstrate that the homeowner received the fact sheet.

III. SELF MONITORING AND REPORTING

A. Inspection and Maintenance Requirements

1. Inspections shall be performed by or under the direction of the permittee at least once every 14 calendar days and within 24 hours after any storm event of greater than 0.25 inches of rain per 24-hour period. Inspections are only required during normal working hours. The permittee shall use a rain gauge on-site or utilize the nearest National Weather Service precipitation gauge station. Rain gauge locations or stations must be representative of the site.

   a. “Within 24 hours after any storm event greater than 0.25 inches rain per 24-hour period” means that you are required to conduct an inspection within 24 hours once a storm event has produced 0.25 inches, even if the storm event is still continuing. If there is a storm event at your site that continues for multiple days, and each day of the storm produces 0.25 inches or more rain, you are required to conduct an inspection within 24 hours of the first day of the storm and within 24 hours after the end of the storm.

2. There may be times when a site inspection may not be practical at the specified time. Adverse climatic conditions, such as flooding, high winds, tornadoes, electrical storms, site access constraints, etc., may prohibit inspections. The permittee must include a description of why the inspection(s) could not be performed at the designated time in the next inspection record. If an inspection is delayed due to adverse weather conditions or rain events outside normal working hours, an inspection must be conducted during the next working day, or as conditions allow.

3. Some erosion and sediment control measures may require more frequent inspection based on location (e.g., sensitive areas or waters of the state) or as a result of recurring maintenance issues. Erosion or sediment control measures found in need of maintenance between inspections must be repaired or supplemented with appropriate measures as soon as practicable. Erosion and sediment control measures which require more frequent inspection based on location or as a result of recurring maintenance issues must be identified in the SWPPP.

4. All inspections conducted during construction must be recorded in writing and these records must be retained in accordance with Part III(B). Records of each inspection activity shall include:

    a. Date and time of inspections;

    b. Name of person(s) conducting inspections;

    c. Findings of inspections, including recommendations and schedule for corrective actions;

    d. Date and amount of all rainfall events greater than 1/4 inch (0.25 inches) in 24 hours; and

    e. Documentation that the SWPPP has been amended when changes are made to BMPs in response to inspections.

    f. All inspection reports shall be signed in accordance with Part IV(A)(6) of this permit.

5. Corrective actions (maintenance activities) performed during construction must be recorded in writing and these records must be retained in accordance with Part III(B). Records for maintenance activity shall include:

    a. Best Management Practice corrected;

    b. Date and time of corrective action;

    c. Name of person(s) performing corrective actions;

    d. Corrective actions taken; and

    e. Corrective actions/maintenance records shall be signed in accordance with Part IV(A)(6) of this permit.

6. Completed areas that have been stabilized but do not meet the 70 percent perennial vegetative cover criteria for final stabilization may be inspected once per month. Inspections may be suspended for parts of the construction site that meet final stabilization requirements of Part II(E) of this permit. The SWPPP must update to identify any areas which meet this condition.

7. Inspections may be suspended where earthwork has been suspended due to frozen ground conditions. The required inspections and maintenance must resume as soon as runoff occurs or the ground begins to thaw at the site. The permittee must record freeze/thaw and runoff dates as part of the inspection records.

B. Records Location

A copy of the completed and signed NOI, coverage letter from the department, SWPPP, site inspection records, and this general permit shall be kept at the site of the construction activity in a field office, trailer, shed, or in a vehicle that is on-site during normal working hours. If the site does not have a reasonable on-site location, then the documents must be retained at a readily available alternative location; preferably with the individual responsible for overseeing the implementation of the SWPPP. Electronic copies of records are acceptable if the records can be accessed on-site. If the site is inactive, then the documents may be stored at a local office. Permittees should avoid using personal electronic devices for storing electronic records.

IV. STANDARD CONDITIONS

A. COMPLIANCE RESPONSIBILITIES BP 2014.12.08

1. Duty to Comply
The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. Proper Operation and Maintenance
The permittee shall at all times maintain in good working order and operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to achieve compliance with the terms and conditions of this permit. If necessary to achieve compliance with the conditions of this permit, this shall include the operation and maintenance of backup or auxiliary systems.

3. Planned Changes
The department shall be given advance notice of any planned changes at the permitted facility or of an activity which may result in permit noncompliance. Any anticipated facility expansions, production increase, or process modifications which might result in new, different, or increased discharges of pollutants shall be reported to the department as soon as possible. Changes which may result in a facility being designated a "new source" as determined in 40 CFR 122.29(b) shall also be reported.

4. Duty to Provide Information
The permittee shall furnish to the department, within a reasonable time, any information which the department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the department, upon request, copies of records required to be kept by this permit. When a permittee becomes aware that it failed to submit any relevant facts or submitted incorrect information in a permit application or any report, it shall promptly submit such facts or information.

5. Records Retention
All records and information (including calibration and maintenance) required by this permit shall be kept for at least three years or longer if requested by the department or EPA.

6. Signatory Requirements
All applications, reports, or information submitted to the department shall be signed and certified.

All permit applications shall be signed by a responsible corporate officer, a general partner, or a principal executive officer or ranking elected official.

All reports required by the permit and other information requested by the department shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

a. The authorization is made in writing by a person described above and submitted to the department; and

b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility, such as the position of plant manager, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters.

If an authorization under 6. Signatory Requirements is no longer accurate for any reason, a new authorization satisfying the above requirements must be submitted to the department prior to or together with any reports, information, or applications to be signed by an authorized representative.

Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

7. Twenty-four Hour Notice of Noncompliance Reporting

1. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally as soon as possible, but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The following occurrences of noncompliance shall be included in the oral report to the department at 701.328.5210:

    a. Any lagoon cell overflow or any unanticipated bypass which exceeds any effluent limitation in the permit under 8. Bypass of Treatment Facilities;

    b. Any upset which exceeds any effluent limitation in the permit under 9. Upset Conditions; or

    c. Violation of any daily maximum effluent or instantaneous discharge limitation for any of the pollutants listed in the permit.

2. A written submission shall also be provided within five days of the time that the permittee became aware of the circumstances. The written submission shall contain:

    a. A description of the noncompliance and its cause;

    b. The period of noncompliance, including exact dates and times;

    c. The estimated time noncompliance is expected to continue if it has not been corrected; and

    d. Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

    Reports shall be submitted to the address in **Part I(D) Application (Notice of Intent) Process**. The department may waive the written report on a case by case basis if the oral report has been received within 24 hours by the department at 701.328.5210 as identified above.

    All other instances of noncompliance shall be reported no later than at the time of the next Discharge Monitoring Report submittal. The report shall include the four items listed in this subsection.

8. Bypass of Treatment Facilities

1. Bypass not exceeding limitations. The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to any of the following provisions in this section.

Bypass exceeding limitations-notification requirements.

a. Anticipated Bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten (10) days before the date of bypass.

b. Unanticipated Bypass. The permittee shall submit notice of an unanticipated bypass as required under 7. Twenty-four Hour Notice of Noncompliance Reporting.

2. Prohibition of Bypass. Bypass is prohibited, and the department may take enforcement action against a permittee for bypass, unless:

a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and

c. The permittee submitted notices as required under the 8(a). Anticipated Bypass subsection of this section.

The department may approve an anticipated bypass, after considering its adverse effects, if the department determines that it will meet the three (3) conditions listed above.

9. Upset Conditions

An upset constitutes an affirmative defense to an action brought for noncompliance with erosion and sediment or site stabilization methods if the requirements of the following paragraph are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

1. An upset occurred and the permittee can identify its cause(s);

2. The permitted facility was, at the time being, properly operated;

3. The permittee submitted notice of the upset as required under 7. Twenty-four Hour Notice of Noncompliance Reporting and

4. The permittee complied with any remedial measures required under 10. Duty to Mitigate.

In any enforcement proceeding, the permittee seeking to establish the occurrence of an upset has the burden of proof.

10. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment. The permittee, at the department's request, shall provide accelerated or additional monitoring as necessary to determine the nature and impact of any discharge.

11. Removed Materials

Collected screenings, grit, solids, sludges, or other pollutants removed in the course of treatment shall be buried or disposed of in such a manner to prevent any pollutant from entering any waters of the state or creating a health hazard.

12. Duty to Reapply

Any request to have this permit renewed should be made 15 days prior to its expiration date.

B. GENERAL REQUIREMENTS

1. Inspection and Entry

The permittee shall allow department and EPA representatives, at reasonable times and upon the presentation of credentials if requested, to enter the permittee's premises to inspect the construction activity and monitoring equipment, to sample any discharges, and to have access to and copy any records required to be kept by this permit.

2. Availability of Reports

Except for data determined to be confidential under 40 CFR Part 2, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the department and EPA. As required by the Act, permit applications, permits, and effluent data shall not be considered confidential.

3. Transfers

This permit is not transferable except upon the filing of a Transfer/Modification request (Part I(F)) by the new party. The current permit holder should inform the new controller, operator, or owner of the existence of this permit and also notify the Department of the possible change.

4. New Limitations or Prohibitions

The permittee shall comply with any effluent standards or prohibitions established under Section 306(a), Section 307(a), or Section 405 of the Act for any pollutant (toxic or conventional) present in the discharge or removed substances within the time identified in the regulations even if the permit has not yet been modified to incorporate the requirements.

5. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. This includes the establishment of limitations or prohibitions based on changes to Water Quality Standards, the development and approval of waste load allocation plans, the development or revision to water quality management plans, or the establishment of prohibitions or more stringent limitations for toxic or conventional pollutants and/or sewage sludges. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

6. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

7. State Laws

Nothing in this permit shall be construed to preclude the institution of legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation preserved under Section 510 of the Act.

8. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

9. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

10. Severability

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

V. DEFINITIONS Permit Specific BP 2009.02.05

"303(d) List" or "Section 303(d) List" means a list of North Dakota's water quality-limited waters needing total maximum daily loads or TMDLs developed to comply with section 303(d) of the Clean Water Act. A copy of the latest integrated report is available on the state's web site at: www.ndhealth.gov/WQ/SW/Z2_TMDL/Integrated_Reports/B_Integrated_Reports.htm.

"Act" means the Clean Water Act.

"Bankfull" means the channel is filled to the top of one or both of its banks.

"BMP" or "Best Management Practices" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment requirements, operating procedures and practices to control construction site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Bypass" means the intentional diversion of waste streams from any portion of a treatment facility.

"Common Plan of Development or Sale" means a contiguous area where multiple separate and distinct land disturbing activities may be taking place at different times, on different schedules, but under one proposed plan. One plan is broadly defined to include design, permit application, advertisement or physical demarcation indicating that land-disturbing activities may occur.

"Construction Activity" means construction activity as defined in 40 CFR part 122.26(b)(14)(x) and small construction activity as defined in 40 CFR part 122.26(b)(15). This includes a disturbance to the land that results in a change in topography, existing soil cover (both vegetative and non-vegetative), or the existing soil topography that may result in accelerated stormwater runoff, leading to soil erosion and movement of sediment into surface waters or drainage systems. Examples of construction activity may include clearing, grading, filling and excavating. Construction activity includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb one (1) acre or more. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

"Department" means the North Dakota Department of Health, Division of Water Quality.

"Energy Dissipation" means methods employed at pipe outlets to prevent erosion. Examples include, but are not limited to: concrete aprons, riprap, splash pads, and gabions that are designed to prevent erosion.

"Indian Country" means (1) All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and including rights-of-way running through the reservations; (2) All dependent Indian communities within the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and (3) All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-way running through the same.

"Infeasible" means not technologically possible or not economically practicable and achievable in light of best industry practices.

"Immediately" means as soon as practicable, but no later than the end of the next work day, following the day when the earth-disturbing activities have temporarily or permanently ceased.

“Large Construction Activity” means land disturbance of equal to or greater than five (5) acres. Large construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale, if the larger common plan will ultimately disturb equal to or greater that five acres.

“Normal Wetted Perimeter” means the area of a conveyance, such as a ditch, channel, or pipe that is in contact with water during flow events that are expected to occur once every year.

“Non-Stormwater Discharges” means discharges other than stormwater. The term includes both process and non-process sources. Process wastewater sources that require a separate NDPDES permit include, but are not limited to industrial processes, domestic facilities and cooling water. Non-stormwater sources that may be addressed in this permit include, but are not limited to: fire-fighting, fire hydrant flushing, potable water line flushing, equipment wash down without detergents or hazardous cleaning products, uncontaminated foundation drains, springs, surface water, lawn watering, chemical treatment of stormwater and air conditioning condensate.

“Operator” means the person (usually the general contractor) designated by the owner who has day to day operational control and/or the ability to modify project plans and specifications related to the SWPPP. The person must be knowledgeable in those areas of the permit for which the operator is responsible and must perform those responsibilities in a workmanlike manner.

“Owner” means the person or party possessing the title of the land on which the construction activities will occur; or if the construction activity is for a lease holder, the party or individual identified as the lease holder; or the contracting government agency responsible for the construction activity.

“Permanently Ceased” means clearing and excavation within any area of your construction site that will not include permanent structures has been completed.

“Permanent Cover” means final stabilization. Examples include grass, gravel, asphalt, and concrete.

"Severe Property Damage" means substantial physical damage to property, damage to best management practices which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in construction.

"Significant Materials" includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; hazardous substances designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with stormwater discharges.

"Significant Spills" includes, but is not limited to: releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the Clean Water Act (see 40 CFR 110.10 and CFR 117.21) or Section 102 of CERCLA (see 40 CFR 302.4).

“Small Construction Activity” means land disturbance of equal to or greater than one acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale, if the larger common plan will ultimately disturb equal to or greater than one and less than five acres

"Stabilized" means the exposed ground surface has been covered by appropriate materials such as mulch, staked sod, riprap, erosion control blanket, or other material that prevents erosion from occurring. Grass seeding alone is not stabilization. Snow cover and frozen ground conditions are not considered stabilized.

“Steep Slopes” means slopes which are fifteen (15) percent or greater in grade.

"Stormwater" means stormwater runoff, snow melt runoff, and surface runoff and drainage.

“Stormwater Associated with Industrial Activity” means stormwater runoff, snow melt runoff, or surface runoff and drainage from industrial activities as defined in 40 CFR 122.26(b)(14).

“Stormwater Associated with Small Construction Activity” means the discharge of stormwater from:

(i) Construction activities including clearing, grading, and excavating that result in land disturbance of equal to or greater than once acre and less than five acres. Small construction activity also includes the disturbance of less than one acre of total land area that is part of a larger common plan of development or sale if the larger common plan will ultimately disturb equal to or greater than one and less than five acres. Small construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility.

(ii) Any other construction activity designated by EPA or the department, based on the potential for contribution to a violation of a water quality standard or for significant contribution of pollutants to waters of the state.

“Temporarily Ceased” means clearing, grading, and excavation within any area of the site that will not include permanent structures, will not resume (i.e., the land will be idle) for a period of 14 or more calendar days, but such activities will resume in the future.

"Temporary Erosion Protection" means methods employed to prevent erosion. Examples of temporary cover include; mulch, straw, erosion control blanket, wood chips, tackifiers, and erosion netting.

"Upset" means an exceptional incident in which there is unintentional and temporary noncompliance with permit requirements because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed erosion and sediment controls or site stabilization methods, inadequate erosion and sediment controls or site stabilization methods, lack of preventive maintenance, or careless or improper operation.

“Waters of the State” means any and all surface waters that are contained in or flow in or through the state of North Dakota as defined in NDCC 61-28-02. This definition includes all water courses, even if they are usually dry.

“You” means the owner, operator or permittee as appropriate.

Appendix 1 – Erosion and Sediment Control Requirements

Requirements for designing, implementing and maintaining erosion and sediment controls.

A. Erosion and Sediment Control Practices

1. Sites using temporary (or permanent) sediment basins must meet the following requirements:

    a. Sediment basins shall be designed for a calculated volume of runoff from a 2-year, 24-hour storm per acre drained to the basin and provides not less than 1,800 cubic feet of sediment storage below the invert of the outlet pipe from each acre drained to the basin; or

    b. Basins shall be sized to provide 3,600 cubic feet of sediment storage below the invert of the outlet pipe per acre drained to the basin if calculations are not performed.

    c. Basin outlets must be designed to avoid short-circuiting and the discharge of floating debris. Basins must be designed with the ability to allow complete basin drawdown for maintenance activities. Basins must release the storage volume in at least 24 hours. Outlet structures must be designed to withdraw water from the surface, unless not practicable. If not practicable, rationale must be provided in the SWPPP. The basin must have a stabilized emergency overflow to prevent failure of pond integrity. Energy dissipation must be provided for the basin outlet.

2. Erosion, sediment, and stabilization practices shall be provided. Erosion, sediment and stabilization practices include such things as: silt fences, fiber logs, vegetative buffer strips, erosion control blankets, mulch, hydro-seeding combined with mulch or tackifiers, etc.

3. All exposed soil areas must be stabilized (see definitions). Stabilization must be initiated immediately where activities have been permanently or temporarily ceased on any portion of the site and will not resume for a period exceeding fourteen (14) calendar days. Stabilization must be completed as soon as practicable, but no later than fourteen (14) calendar days after the initiation of soil stabilization. Temporary stockpiles without significant silt, clay or organic components (e.g., clean aggregate stockpiles, demolition concrete stockpiles, sand stockpiles) are exempt from this requirement.

    a. For slopes with a grade of 3:1 or greater, stabilization must be initiated immediately once activities have been completed or temporarily ceased. Stabilization must be completed as soon as practicable, but no later than seven (7) calendar days after the initiation of soil stabilization.

4. Temporary soil stockpiles must have effective sediment controls, and cannot be placed in surface waters, including stormwater conveyances such as curb and gutter systems, or conduits and ditches.

5. The normal wetted perimeter of any temporary or permanent drainage ditch that drains water from a construction site, or diverts water around a site, must be stabilized at least 200 linear feet from the property edge, or from the point of discharge to any surface water. Stabilization shall be completed prior to connection with a surface water. Any remaining portion of the temporary or permanent drainage ditch must be stabilized within fourteen (14) calendar days for portions which construction activities have temporarily or permanently ceased.

6. If stabilization requirements cannot be met due to circumstances beyond the control of the permittee, the permittee may comply with following:

    a. If vegetative stabilization is to be used, immediately initiate, and within 14 calendars days complete, the installation of temporary non-vegetated stabilization; or

    b. Complete all methods of initiating stabilization as soon as conditions or circumstances allow.

If any conditions in parts a or b above are encountered, the permittee must document the circumstances which prevented you from meeting the stabilization requirements in the SWPPP of this paragraph and provide a schedule in the SWPPP which will be followed in order to meet the stabilization requirements.

Permittees are responsible for implementing winter stabilization methods during frozen ground conditions if the site was not stabilized prior to the ground freezing.

7. Stream diversions or any temporary or permanent drainage ditch or trench, which will have continuous flow, shall be stabilized with appropriate controls prior to connection with any surface water. The entire area (channel and bank) of the stream diversion or temporary or permanent drainage ditch, or trench, must be appropriately stabilized to bankfull height.

8. While working in or around surface waters, sediment and erosion controls must be used above the anticipated level of the surface water. Floating silt curtain does not satisfy the down slope and side slope boundary requirements in Part II(C)(4)(b) of this permit, unless the construction activity is on or below the elevation of the surface water. The floating silt curtain must be placed as close to shore as possible. Sediment control must be installed where exposed soils drain to the surface water immediately after construction activity along the waterline has been completed.

9. Pipe and culvert outlets must be provided with energy dissipation within 24 hours of connection to a surface water.

10. Splash pads and/or downspout extensions must be provided for roof drains to prevent erosion from roof runoff.

11. All storm drain inlets in the immediate vicinity of the construction site must be protected by appropriate BMPs during construction until all disturbed areas and stockpiles with the potential to discharge to the inlet have been stabilized. This includes storm drain inlets which may be affected by sediment tracked onto paved surfaces by vehicles or equipment.

12. Inlet protection devices are a last line of control – erosion and sediment control practices must be used on-site. Inlet protection devices must conform to local ordinances or regulations. In general, inlet protection devices need to provide for adequate drainage to prevent excessive roadway flooding. Inlet protection may be removed for a particular inlet if a specific concern (i.e., street flooding/freezing, snow removal) has been identified and documented in the SWPPP. In this situation, additional erosion and sediment control practices, or stabilization methods must be used to supplement the loss of the inlet protection device to prevent sediment from entering the storm sewer system.

13. Vegetated buffers must have a minimum width of 1 foot for every 5 feet of disturbed area that drains to the buffer. The width of the buffer shall have a slope of 5 percent or less and the area draining to the buffer shall have a slope of 6 percent or less. Concentrated flows should be minimized throughout the buffer.

    Buffers shall consist of dense grassy vegetation, 3 to 12 inches tall with uniform coverage over 90 percent of the buffer. Woody vegetation shall not be counted for the 90 percent coverage. No more than 10 percent of the overall buffer may be comprised of woody vegetation.

14. A 50 foot natural buffer or equivalent erosion and sediment controls must be provided when a project is within 50 feet of a surface water and stormwater flows to the surface water. If equivalent erosion and sediment controls are used, rationale for using equivalent controls must be provided in the SWPPP.

If working within 100 feet of a surface water listed as impaired for sediment, suspended solids or turbidity, a 100 foot natural buffer or equivalent sediment and erosion controls must be provided. If equivalent erosion and sediment controls are to be used, rationale for using equivalent controls must be provided in the SWPPP.

15. If the permittee(s) intend to use chemical treatment for sediment removal, they must be used in accordance with the manufacturer's specifications. Treatment chemicals must be selected appropriately for the anticipated soil particle size and characteristics of the stormwater (pH, turbidity, flow rate of stormwater flowing into the chemical treatment system, etc.). A description of the chemical treatment process must be included in the SWPPP.

    a. To ensure selection and management of chemicals minimize the potential for harmful effects in the discharge, the permittee shall provide a written request to the department for review and approval. Additional monitoring and reporting may be required as a condition for the approval to discharge.

       A request to discharge chemically treated water shall include all of the following information and be provided sixty (60) days prior to use:

       i. Material Safety Data Sheet/Safety Data Sheet (MSDS/SDS);
       ii. Proposed water additive discharge concentration;
       iii. Discharge frequency (i.e., number of hours per day and number of days per year);
       iv. Monitoring point for product discharge;
       v. Type of removal treatment, if any, that the water additive receives prior to discharge;
       vi. Product function (e.g., coagulant, flocculant, etc.);
       vii. A 48-hour LC_{50} or EC_{50} for a North American freshwater planktonic crustacean (*Ceriodaphnia* sp., *Daphnia* sp., or *Simocephalus* sp.); and
       viii. Results for a toxicity test for one other North American freshwater aquatic species (other than a planktonic crustacean).

    b. Discharges from the chemical treatment of stormwater must not cause a violation of the standards of quality for waters of the state (N.D.A.C. § 33-16-02.1). The discharge must meet the dewatering or basin draining requirements provided in Part II(C)(3)(g) of this permit.

16. Minimize the duration of exposed soils on steep slopes.

B. Maintenance Requirements for Erosion and Sediment Controls

1. All erosion prevention and sediment control BMPs must be inspected to ensure integrity and effectiveness. All nonfunctional BMPs must be repaired, replaced, maintained or supplemented with functional BMPs. If a nonfunctioning BMP is supplemented, the nonfunctional BMP shall be removed. Corrective actions must be made prior to the next anticipated rainfall event or within 24 hours of discovery (whichever comes first), or as soon as field conditions allow access. Documentation must be provided in the maintenance records if field conditions do not allow access along with a plan of action for performing maintenance activities.

   Permittee(s) must investigate and comply with the following inspection and maintenance requirements:

   a. All control devices similar to, and including, silt fence or fiber rolls must be repaired, replaced, maintained or supplemented when they become nonfunctional (torn from posts, visible tears, etc.). Collected sediment must be removed as it approaches 1/2 of the above ground capacity of the control device.

   b. Fiber rolls must be replaced when 1/2 of the original above ground height of the device when it was installed has been lost as a result of flattening or other damage.

c. Sedimentation basins must be drained and the sediment removed when the depth of sediment collected in the basin reaches 1/2 the storage volume. Drainage and removal must be completed within 72 hours of discovery, or as soon as field conditions allow access. Documentation must be provided in the maintenance records if field conditions do not allow access along with a plan of action for performing maintenance activities.

d. Maintenance and cleaning of inlet protection devices must be performed when sediment accumulates, the filter becomes clogged, and/or performance is compromised.

2. Surface waters, including drainage ditches and conveyance systems, must be inspected for evidence of sediment deposited by erosion. Permittees must remove all deltas and sediment deposits in surface waters, drainage ways, catch basins, and other drainage systems. Areas where sediment removal results in exposed soil must be stabilized. Removal and stabilization must take place immediately, but no more than, seven (7) calendar days after the discovery unless precluded by legal, regulatory or physical access constraints. Permittees shall use all reasonable efforts to obtain access. If precluded, removal and stabilization shall take place immediately, but no more than, seven (7) calendar days after obtaining access. Permittees are responsible for contacting all local, regional, state, and federal authorities, and receiving any applicable permits prior to conducting any work.

3. Vehicle tracking of sediment from the site must be minimized by BMPs. This may include having a designated egress with aggregate surfacing from the site or by designating off-site parking. Permittees are responsible for (or making the arrangements for) street sweeping and/or scraping if BMPs are not adequate to prevent sediment from being tracked onto the street from the site.

   Construction site egress locations must be inspected for evidence of sediment being tracked offsite by vehicles or equipment onto paved surfaces. Accumulations of tracked and deposited sediment must be removed from all off-site paved surfaces by the end of the work day, shift or if applicable, within a shorter time specified by local authorities or the department.

4. If sediment escapes the construction site, off-site accumulations of sediment must be removed in a manner and at a frequency sufficient to minimize off-site impacts (e.g., fugitive sediment in streets could be washed into storm sewers by the next rain event and/or pose a safety hazard to users of public streets).

5. Vegetative buffers must be inspected for proper distribution of flows, sediment accumulation and signs of rill formation. If a buffer becomes silt covered, contains rills, or is otherwise rendered ineffective, other control measures shall be implemented. Eroded areas shall be repaired and stabilized within 24 hours of discovery, or as soon as conditions allow access. Documentation must be provided in the maintenance records if field conditions do not allow access along with a plan of action for performing maintenance activities.

C. **Operational Controls**

1. Properly handle construction debris and waste materials.

   a. Debris and waste must be handled appropriately until disposal. Litter and debris shall be collected and stored to reduce the potential for wind and water to carry the materials off-site or leachate discharging from a site. Collected material shall be taken to the appropriate facility for disposal or recycling.

   b. Liquid or soluble materials including oil, fuel, paint and any other hazardous substances must be properly stored, to prevent spills, leaks or other discharges. Restricted access to storage areas must be provided to prevent vandalism. Storage and disposal of liquid or soluble material must be in compliance with applicable regulations.

2. Wash water containments must be cleaned out (solids and liquid) before 80 percent of storage capacity is attained.

3. Best management practices used in surface waters must be cleaned immediately upon removal from surface waters to prevent the transfer of aquatic nuisance species.

NOTICE OF COVERAGE LETTER

COPY OF NOTICE OF COVERAGE LETTER TO BE INSERTED

DELEGATION OF AUTHORITY LETTER

COPY OF DELEGATION OF AUTHORITY LETTER TO BE INSERTED

SWPPP AMENDMENT / REVISION LOG

SWPPP AMENDMENT / REVISIOM LOG

Date of Update / Amendment	General Description of Amendment	Page Numbers or Section(s) where Changes Made	Name of Author
3/4/2020		N/A	SWCA Environmental Consultants

APPENDIX B

Plant Layout and Equipment

Grading Plan and Details

Hydrology and Hydraulics Calculations

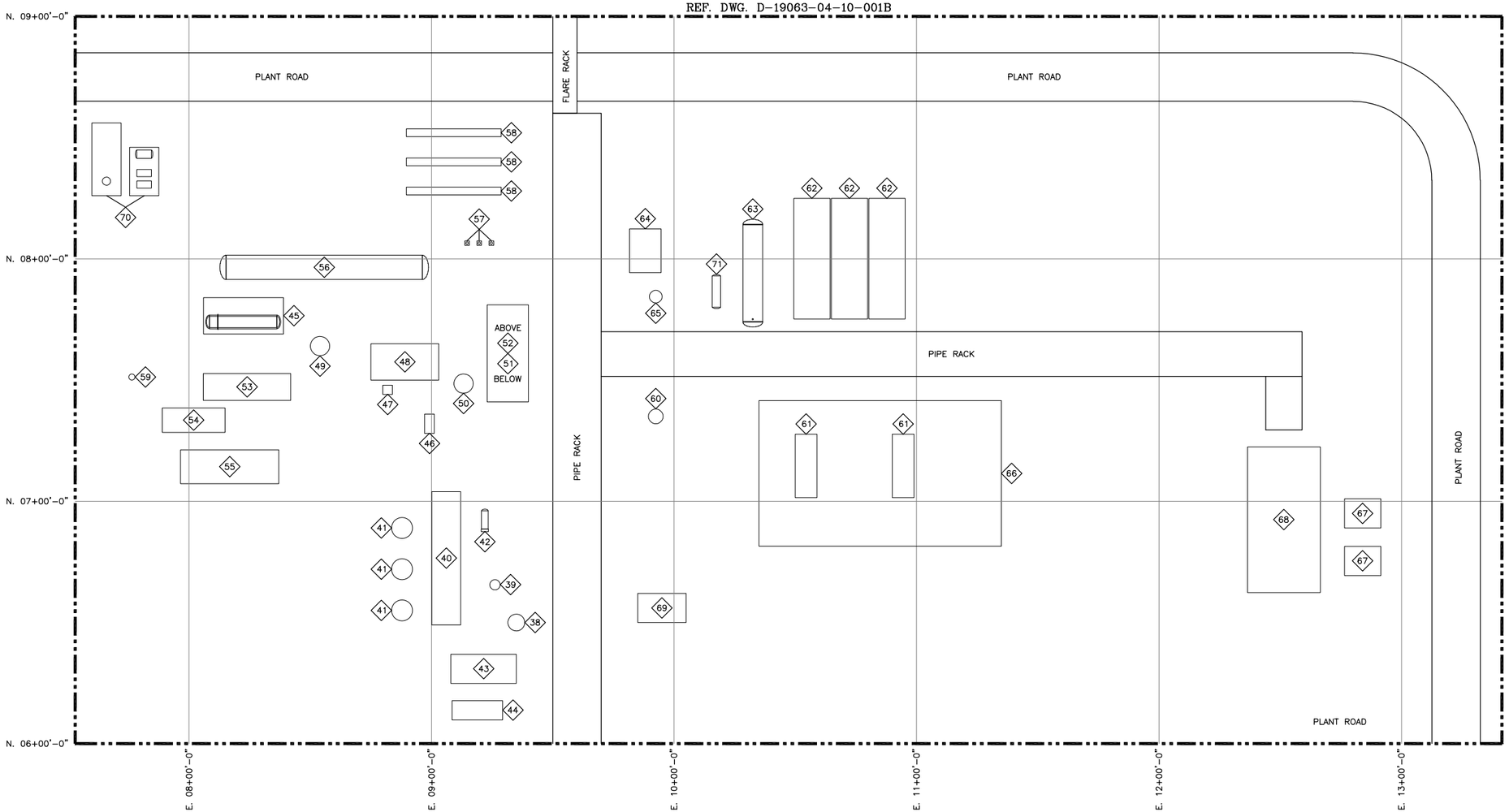
Plant Layout and Equipment

MARK	DESCRIPTION
38	DEHY INLET SCRUBBER
39	DEHY INLET COALESCING FILTER
40	DEHY VALVE SKID (402)
41	DEHYDRATOR
42	DEHYDRATOR DUST FILTER
43	REGEN GAS COMPRESSOR SKID (404)
44	REGEN GAS COOLER
45	REBOILER SKID (504)
46	GAS/GAS EXCHANGER
47	RSV SUBCOOLER HEAT EACHANGER
48	RSV VALVE SKID (508)

MARK	DESCRIPTION
49	DEMETHANIZER
50	COLD SEPARATOR
51	PROPANE SUBCOOLER SKID (502)
52	PROPANE CHILLER SKID (501)
53	EXPANDER VALVE SKID (507)
54	EXPANDER/COMPRESSOR
55	BOOSTER COMPRESSOR VALVE SKID (506)
56	NGL SURGE TANK
57	NGL BOOSTER PUMP
58	NGL PIPE LINE PUMP
59	CRYO AREA SUMP W/PUMP

MARK	DESCRIPTION
60	PROPANE COMP. SUCTION SCRUBBER
61	PROPANE COMPRESSOR
62	PROPANE CONDENSER
63	PROPANE ACCUMULATOR
64	PROPANE VALVE SKID (801)
65	PROPANE ECONOMIZER
66	PROPANE COMPRESSOR BUILDING
67	TRANSFORMER
68	PDC #2 BUILDING
69	G.C. BUILDING
70	TRIM REBOILER HOT OIL PACKAGE
71	PROPANE STORAGE TANK

REF. DWG. D-19063-04-10-001B



NO	DATE	REVISIONS	D/C	APP
B	2/3/20	REVISED PER CLIENT COMMENTS	JEH	RWD
A	1/24/20	ISSUED FOR BID	JEH	RWD

	NAME	DATE
DESIGN	JEH	12/19
DRAWN	JEH	1/20
CHK.		
Q. A.		
CAD FILE	D-19063-04-10-001	
PLOT DATE		
SCALE	1"=25'-0"	

	NAME	DATE
C/S		
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

NORTH PROCESS AREA
PLOT
PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-0095

REV.	DWG. No.
B	D-19063-04-10-001D

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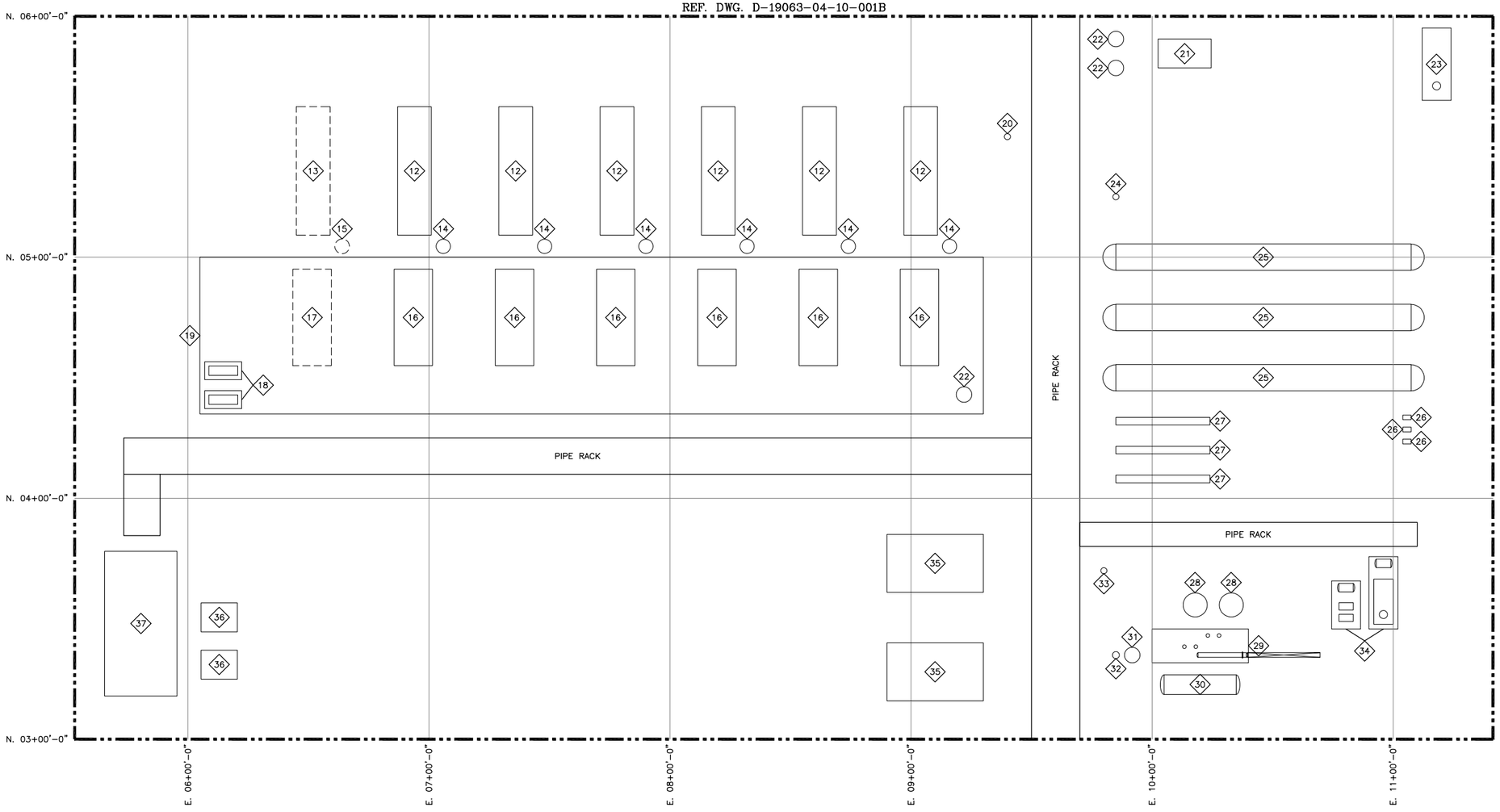
MARK	DESCRIPTION
12	RESIDUE COMPRESSOR COOLER
13	FUTURE RESIDUE COOLER
14	CONVERTER / SILENCER
15	FUTURE CONVERTER / SILENCER
16	RESIDUE COMPRESSOR
17	FUTURE RESIDUE COMPRESSOR
18	COMPRESSOR COOLANT TANK
19	RESIDUE COMPRESSOR BUILDING
20	RESIDUE COMPRESSOR AREA SUMP W/PUMP
21	INSTRUMENT AIR COMPRESSOR PACKAGE
22	AIR RECEIVERS
23	REGEN GAS HEATER
24	FUEL GAS SCRUBBER

MARK	DESCRIPTION
25	STABILIZER PRODUCT STORAGE TANK
26	STABILIZER PRODUCT BOOSTER PUMP
27	STABILIZER PRODUCT PIPELINE PUMP
28	STABILIZER SAYBOLT FILTER
29	STABILIZER SKID
30	STABILIZER THREE PHASE SEPARATOR
31	STABILIZER COLUMN/SURGE TANK
32	STABILIZER REBOILER
33	STABILIZER AREA SUMP W/PUMP
34	STABILIZER HOT OIL PACKAGE
35	STABILIZER OVERHEAD COMPRESSOR
36	TRANSFORMER
37	PDC #2 BUILDING

REF. DWG. D-19063-04-10-001B



NO	DATE	REVISIONS	D/C	APP.
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A	1/24/20	ISSUED FOR BID	JEH	RWD

	NAME	DATE
DESIGN	JEH	12/19
DRAWN	JEH	1/20
CHK.		
Q. A.		
CAD FILE	D-19063-04-10-001	
PLOT DATE		
SCALE	1"=25'-0"	

BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

SOUTH PROCESS AREA
PLOT
PLAN

BCCK ENGINEERING, INC.
BUSINESS CONFIDENTIAL
2500 N. Big Spring
Midland, Texas 79705
(432) 685-6085

REV.	DWG. No.
B	D-19063-04-10-001C

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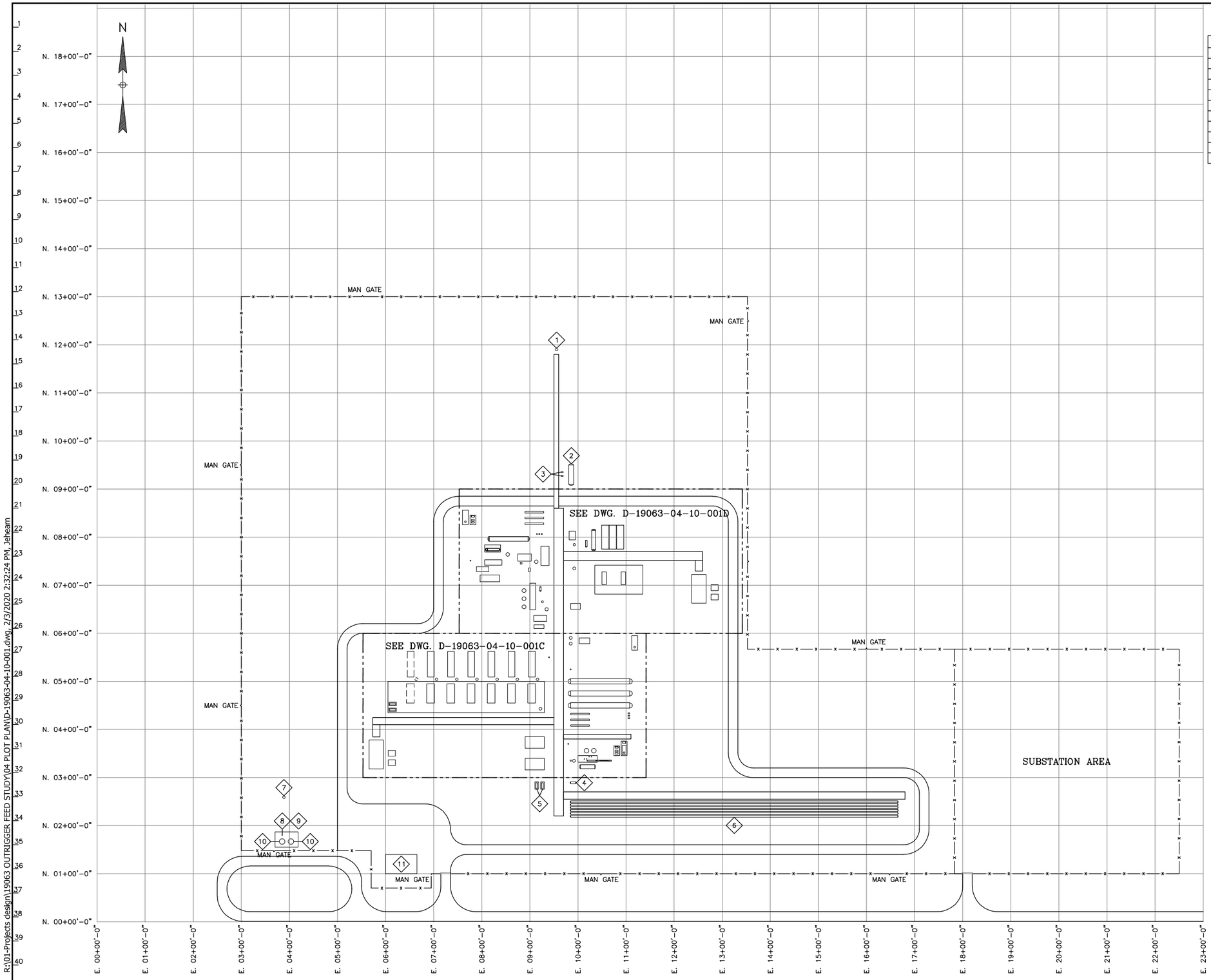

MARK	DESCRIPTION
1	FLARE STACK
2	FLARE K.O. DRUM
3	FLARE K.O. DRUM PUMP
4	CLOSED DRAIN FLASH TANK
5	STABILIZER COMPRESSOR L.O. TANKS
6	HARP SLUG CATCHER
7	TANK FARM FLARE
8	TANK FARM FLARE K.O.
9	TANK FARM FLARE K.O. PUMP
10	SLOP TANK
11	CCR/WAREHOUSE

NO	DATE	REVISIONS	D/C	APP.
			JEH	RWD
B	2/3/20	REVISED PER CLIENT COMMENTS	JEH	RWD
A	1/24/20	ISSUED FOR BID		JEH

	NAME	DATE
DESIGN	JEH	12/19
DRAWN	JEH	1/20
CHK.		
Q. A.		
CAD FILE	D-19063-04-10-001	
PLOT DATE		
SCALE	1"=100'-0"	

	NAME	DATE
C/S		
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

DWG TITLE
REFERENCE DWG
REF. DWG. NUMBER
DATE
NAME

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OVERALL PLOT PLAN

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OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

REV. B
DWG. No. D-19063-04-10-001B

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OE2 340

Grading Plan and Details Sheets

APPROXIMATE EARTHWORK VOLUMES
COMPARING FINISHED TO EXISTING SURFACES

LOCATION	AREA (SF)	CUT (CY)	FILL (CY)	NET (CY)	COMMENTS
PLANT SITE	1,548,504	165,947	192,212	26,265 FILL	INCLUDES 6" SURFACING MATERIAL
EMBANKMENT	10,500	–	2,388	2,388 FILL	EXCLUDES CUT FOR EMANKMENT KEY
COUNTY ROAD	65,600	NA	NA	NA	SURFACE SOUTH OF SITE IS UNAVAILABLE

REGISTERED PROFESSIONAL ENGINEER
CHRIS D PATTEN
PE-28413
DATE 2/11/20
NORTH DAKOTA

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chris.patten@matixcorp.com
(385) 226-5966

LEGEND
- EXISTING CONTOUR (2')
- EXISTING CONTOUR (10')
- PROPOSED CONTOUR (2')
- PROPOSED CONTOUR (10')
- PROPOSED DRAINAGE FLOWLINE
- PROPOSED FENCE
- ROAD ALIGNMENT

75 0 75 150
SCALE OF FEET

GRADING NOTES
1. COORDINATES GIVEN ON THIS DRAWING ARE PLANT COORDINATES BASED ON A SYSTEM WITH THE ORIGIN AT N 0+00 AND E 0+00. REFER TO PLOT PLAN.
2. BENCHMARK GIVEN ON THIS DRAWING IS BASED UPON THE NORTH DAKOTA STATE PLANE COORDINATE SYSTEM IN THE NAD83 DATUM, NORTH ZONE, IN U.S. SURVEY FEET.
3. PROPOSED GRADE ELEVATIONS ARE TOP OF FINISH GRADE CONSIDERING SURFACING MATERIAL.
4. CUT AND FILL SLOPES SHALL BE 3H:1V, UNLESS NOTED. NO SLOPE SHALL BE STEEPER THAN 2:1.
5. ROADWAYS, TRUCK LOADING AND PARKING AREAS SHALL BE CONSTRUCTED WITH PREPARED SUBGRADES AND ROAD BASE MATERIALS RECOMMENDED IN THE GEOTECHNICAL REPORT AND AS SHOWN IN THESE DRAWINGS.
6. SUBSTATION SHALL INCLUDE 12" ROAD BASE WITHIN FENCED AREA.
7. SURFACE SITE WITH 4" MINUS CLINKER (SCORIA) TO A DEPTH OF 6" MINIMUM WITHIN GRADED AREA. IN AREAS WHERE HEAVY EQUIPMENT IS ANTICIPATED, INSTALL A GEOSYNTHETIC FABRIC BETWEEN SUBGRADE AND SURFACING MATERIAL TO PREVENT RUTTING IN WET CONDITIONS. GEOSYNTHETIC SHALL BE MIRAFI RS580i OR EQUAL. INSTALL AS RECOMMENDED BY MANUFACTURER.
8. TOP SOIL MATERIAL SHALL BE PLACED ONTO CUT AND FILL SLOPES OR AREAS TO BE RESTORED TO PRECONSTRUCTION CONDITIONS. PLACE TO A DEPTH OF 6" WITH THE REMAINING TOP SOIL BEING EXPORTED TO A LOCATION OFFSITE. RESTORE SLOPES WITH NATURAL VEGETATION.
9. LINE CHANNEL WITH GEOTEXTILE OVERLAIN WITH 12" MINIMUM QUARRY SPALLS.
10. SMOOTH CORRUGATED POLYETHYLENE (SCPE) PIPE SHALL BE ADS N-12 (ASTM F2648) OR EQUAL
11. REINFORCED CONCRETE PIPE (RCP) SHALL BE IN ACCORDANCE WITH ASTM C76 AND C443.
12. EARTHWORK SPECIFICATIONS CONTAIN ADDITIONAL REQUIREMENTS.

EMBANKMENT NOTES
A. BASIN SLOPES, SURFACE, AND EMBANKMENT SHALL BE CONSTRUCTED AS INDICATED IN THESE DRAWINGS AND IN ACCORDANCE WITH GEOTECHNICAL RECOMMENDATIONS. CONSTRUCTION SHALL BE VISUALLY OBSERVED AND APPROVED BY A PROJECT REPRESENTATIVE.

END OF SPILLWAY CHANNEL MATCH EXIST GRADE
OUTFALL
SPILLWAY CHANNEL
TOP OF EMBANKMENT 2188.80. SEE NOTE A
SPILLWAY CREST 2187.80
CUTOFF BERM SEE DETAIL 2/002B
OUTLET CONTROL STRUCTURE
100 YR WATER SURFACE 2187.63
CHECK DAM SEE DETAIL 3/S002B
CHECK DAM SEE DETAIL 3/S002B
DRAINAGE SWALE SEE NOTE 9
MAINTENANCE ROAD SEE C/S002B, TYP
SUBSTATION
PARKING AREA
TRUCK LOADING AREA
PLANT ACCESS SEE B/S002B
SUBSTATION ACCESS SEE B/S002B
DRAINAGE DITCH SEE DETAIL 1/002B
COUNTY ROAD SEE A/S002B
FG 2236.06
FG 2239.59
15" SCPE CULVERT
INV IN: 2230.8
INV OUT: 2229.9
INV OUT: 2239.1
INV OUT: 2238.6
END FG 2242.00 STA: 30+50.00
GRADE BREAK 2242.00 STA: 27+66.16
FG 2241.77 STA: 25+75.00
DRAINAGE DITCH SEE DETAIL 1/002B
15" SCPE CULVERT INV IN: 2240.5
GRADE BREAK 2244.00 STA: 20+23.88
15" SCPE CULVERT INV IN: 2239.9
FG 2243.52 STA: 14+15.00
GRADE BREAK 2244.00 STA: 14+00.67
BEGIN FG 2232.93 STA: 10+00.00

NO	DATE	REVISIONS	D/C	APP
0	2/11/20	ISSUE FOR CONSTRUCTION		

	NAME	DATE
C/S	C. PATTEN	JAN 20
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

	NAME	DATE
DESIGN	C. PATTEN	JAN 20
DRAWN	A. NOBIS	JAN 20
CHK.		
Q. A.		

CAD FILE D:\19063-04-10-002.dwg
PLOT DATE 2/11/2020
SCALE 1" = 75'-0"

BUSINESS CONFIDENTIAL
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BCCK ENGINEERING, INC.

GRADING PLAN

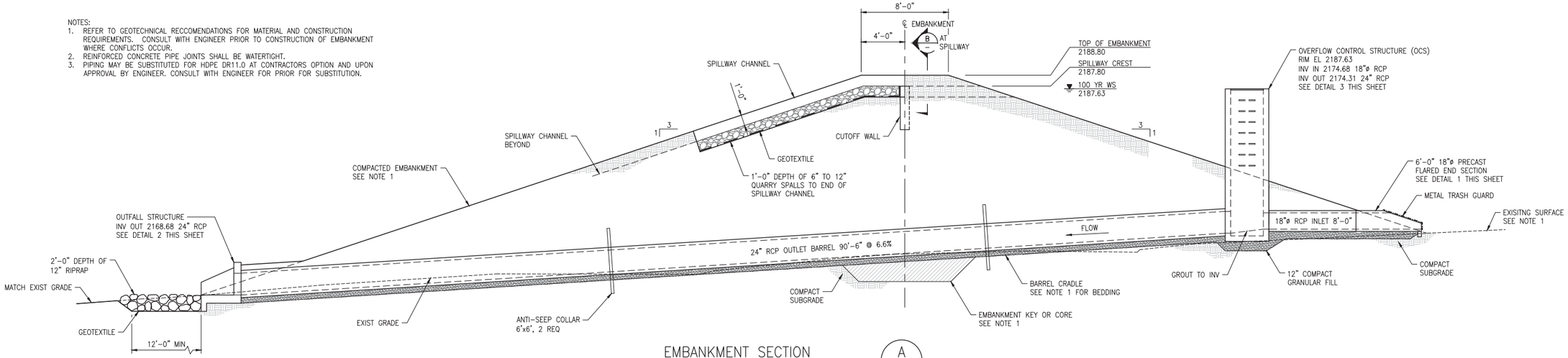
BCCK CONFIDENTIAL INFORMATION

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

REV.	DWG. No.
0	D-19063-04-10-002

OE2 342

NOTES:
1. REFER TO GEOTECHNICAL RECCOMENDATIONS FOR MATERIAL AND CONSTRUCTION REQUIREMENTS. CONSULT WITH ENGINEER PRIOR TO CONSTRUCTION OF EMBANKMENT WHERE CONFLICTS OCCUR.
2. REINFORCED CONCRETE PIPE JOINTS SHALL BE WATERTIGHT.
3. PIPING MAY BE SUBSTITUTED FOR HDPE DR11.0 AT CONTRACTORS OPTION AND UPON APPROVAL BY EINGINEER. CONSULT WITH ENGINEER FOR PRIOR FOR SUBSTITUTION.



EMBANKMENT SECTION — A
SCALE: NTS — SHT 002

NOTES:
1. ANTI-SEEP COLLAR SHALL BE 10" THICK BY 48" HIGH AND REINFORCED WITH #5@12" EACH WAY CENTERED IN WALL.

SPILLWAY SECTION — B
SCALE: NTS

NOTES:
1. PRECAST CONCRETE SHALL HAVE A 4,000 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
2. SECTION SHALL BE REINFORCED.
3. OPENINGS SHOWN INDICATE INSIDE DIAMETER (ID) OF NOMINAL PIPE SIZE.
4. SUPPLIER SHALL PROVIDE METAL TRASH RACK WITH SECTION.

PRECAST FLARED END DETAIL — 1
SCALE: 3/8"=1'-0"

NOTES:
1. PRECAST CONCRETE SHALL HAVE A 4,000 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
2. REINFORCEMENT SHALL BE #4 AT 12" SPACING EACH WAY.
3. OPENINGS SHOWN INDICATE INSIDE DIAMETER (ID) OF NOMINAL PIPE SIZE.
4. EXPOSED EDGES SHALL BE CHAMFERED ¾".

PRECAST OUTFALL DETAIL — 2
SCALE: 3/8"=1'-0"

NOTES:
1. PRECAST CONCRETE SHALL HAVE A 4,000 PSI MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS.
2. REINFORCEMENT SHALL BE #4 AT 12" SPACING EACH WAY.
3. OPENINGS SHOWN INDICATE INSIDE DIAMETER (ID) OF NOMINAL PIPE SIZE.

PRECAST OCS DETAIL — 3
SCALE: 3/8"=1'-0"

REGISTERED PROFESSIONAL ENGINEER
CHRIS D PATTEN
PE-28413
DATE 2/11/20
NORTH DAKOTA

Chris D. Patten
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NO	DATE	REVISIONS	D/C	APP
0	2/11/20	ISSUE FOR CONSTRUCTION		

	NAME	DATE
DESIGN	C PATTEN	JAN 20
DRAWN	A NOBIS	JAN 20
CHK.		
Q. A.		
C/S	C PATTEN	JAN 20
ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

CAD FILE D1963-04-10-002A.dwg
PLOT DATE 2/11/2020
SCALE AS NOTED

REFERENCED DWG TITLE
REF. DWG. NUMBER

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2500 N. Big Spring
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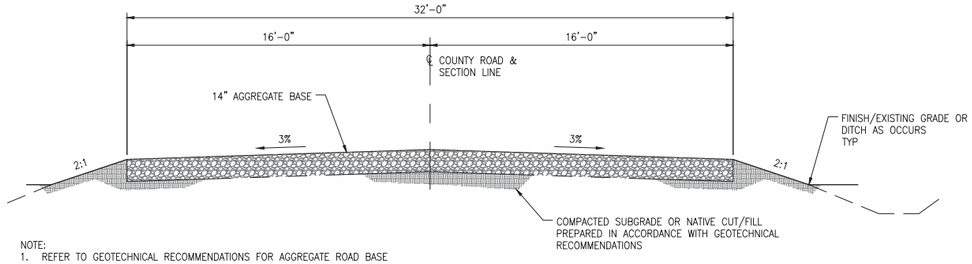
BCCK ENGINEERING, INC.

GRADING
SECTIONS AND DETAILS I

BCCK CONFIDENTIAL INFORMATION

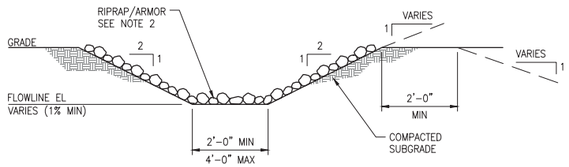
OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

REV. 0
DWG. No. D-19063-04-10-002A

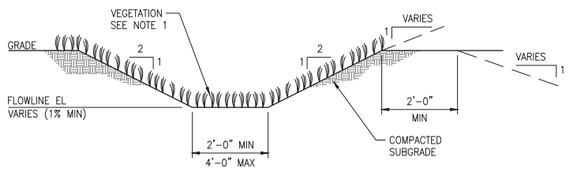


NOTE:
1. REFER TO GEOTECHNICAL RECOMMENDATIONS FOR AGGREGATE ROAD BASE MATERIAL REQUIREMENTS.
2. SEE DITCH DETAILS WHERE DITCH OCCURS PER GRADING AND DRAINAGE PLAN.

COUNTY ROAD SECTION — A
SCALE: NTS — SHT 002



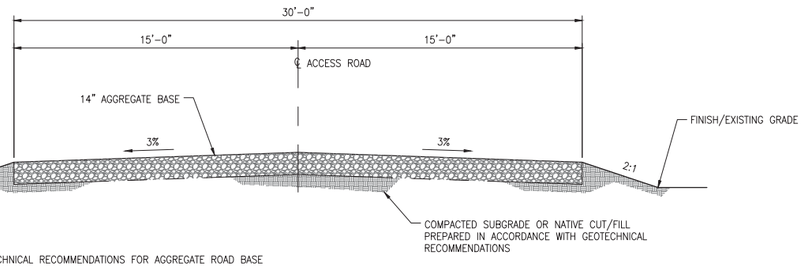
ARMORED DITCH



GRASS-LINED DITCH

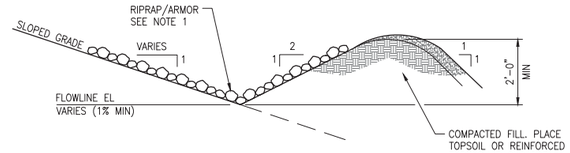
NOTES:
1. NATURAL OR RESTORED CHANNELS SHALL BE RESEEDED WITH NATIVE VEGETATION.
2. RIPRAP ARMOR SHALL BE 4" MINIMUM DIAMETER.

DITCH DETAILS — 1
SCALE: NTS — SHT 002



NOTE:
1. REFER TO GEOTECHNICAL RECOMMENDATIONS FOR AGGREGATE ROAD BASE MATERIAL REQUIREMENTS.

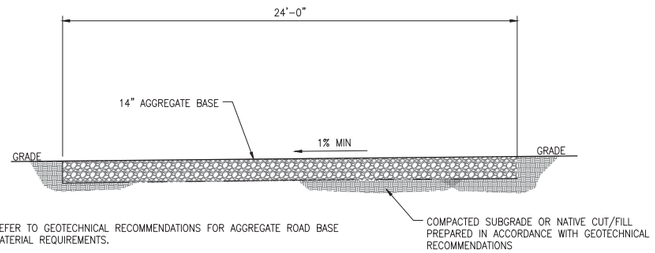
ACCESS ROAD SECTION — B
SCALE: NTS — SHT 002



ARMORED BERM

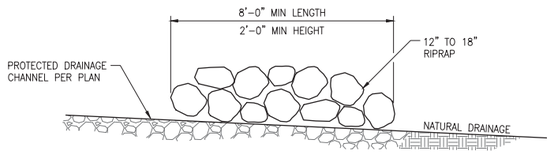
NOTES:
1. RIPRAP ARMOR SHALL BE 4" MINIMUM DIAMETER.

EARTHEN BERM — 2
SCALE: NTS — SHT 002



NOTE:
1. REFER TO GEOTECHNICAL RECOMMENDATIONS FOR AGGREGATE ROAD BASE MATERIAL REQUIREMENTS.

MAINTENANCE ROAD SECTION — C
SCALE: NTS — SHT 002



CHECK DAM — 3
SCALE: NTS — SHT 002

NO	DATE	REVISIONS	APP
0	2/11/20	ISSUE FOR CONSTRUCTION	D/C

	NAME	DATE
DESIGN	C PATTEN	JAN 20
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Q. A.		
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ELECT.		
INSTR.		
PROC.		
MECH.		
PIPING		
PROJ. MGR.		

CAD FILE: D1963-04-10-002B.dwg
PLOT DATE: 2/11/2020
SCALE: AS NOTED

REFERENCE DWG TITLE

REF. DWG. NUMBER

DATE

NAME

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BCCK ENGINEERING, INC.

GRADING
SECTIONS AND DETAILS II

OUTRIGGER ENERGY II, LLC.
SANDERSON PLANT
WILLIAMS COUNTY, NORTH DAKOTA

REGISTERED PROFESSIONAL ENGINEER
CHRIS D PATTEN
PE-28413
DATE 2/11/20
NORTH DAKOTA

Chris D. Patten
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chris.patten@matixcorp.com
(385) 226-5966

DWG. No. D-19063-04-10-002B
REV. 0

Hydrology and Hydraulics Calculations

Sanderson Plant Hydrology and Hydraulics Calculations

Williams County, North Dakota

Structural Calculations

February 2020

Directed by: Chris Patten, PE
Professional Engineer

Matix Corporation
2290 E 4500 S Ste 100
Salt Lake City, UT 84117
(385) 226-5966
www.matixcorp.com

OE2 346

INDEX OF REVISIONS			
Rev	**Description**	**Date**	**By**
A	Issued to Information	2/12/2020	C. Patten

PROJECT DESCRIPTION

The Sanderson Plant is located in Williams County, North Dakota at approximately 48°07'33.30" North and 104°02'27.73" West. From the provided project topography, the property slopes to the north at approximately 6% maximum slope. Google Earth indicates that the property is vegetated with various prairie grasses. From preliminary geotechnical boring logs, the soils would be classified as a Group C soil, which include clay loams and shallow sandy loam.

It is understood that the proposed graded pad will be surfaced with compacted Scoria rock. The side slopes of the pad will be compacted native soils. A detention pond will be designed in the existing channel to the west of the site and tributary flows on the south side of the adjacent county road will be routed around the completed site and therefore, will not be tributary to the finished storm drainage detention pond.

CONTENTS OF THIS REPORT

- Methodology Section with written explanation of the calculations
- NOAA Atlas storm intensities for the project location
- Hydraflow Express analysis of spillway channel

METHODOLOGY

The rational method was used to calculate the expected maximum surface drainage flows. The numbers used in the calculation are in the following table, with justification for the numbers below.

Pervious Areas		C	Longest Length of Basin (ft)	Average Slope (%)	k	Velocity (fps)	Calculated Travel Time (min)	Rounded Travel Time (min)	Intensity (in/hr)	Q' Runoff (cfs)
43.02	acres	0.35	2270	3.6%	4.5	0.86	44.09	60	2.35	**35.38**
									Peak Discharge (cfs/acre)	**0.82**

- Area was taken from AutoCAD and is the area tributary to the proposed the detention basin embankment, not including south of the county road.
- Runoff Coefficient C value is from Richard McCuen's *Hydrologic Analysis and Design* Table 7-9. This value (0.35) is for a Meadow Site, 2-6% slope for Soil Group C, 25+ year storm.
- Longest Length of Basin and Average Slope are from AutoCAD for computing the time of concentration using the Velocity Method.
- A k value of 4.5 is from Richard McCuen's *Hydrologic Analysis and Design* Table 3-14. This value (4.5) is for a trash fallow because a significant portion of the drainage will be concentrated and should be somewhere between rangeland (value of 1.3) and short grass pasture (value of 3.0) from the same table.

- The calculated travel time of 44.09 minutes was checked using the Watershed Lag Method. Using the same length and slope above, and a CN value of 71, the time of concentration calculates to be 41.91 minutes, which is similar to the Velocity method result.
- A rounded travel time of 60 minutes was used with a corresponding storm intensity of 2.35 inches per hour. The storm intensities were obtained from the NOAA Atlas for the project location. A storm intensity of 45 minutes could have been used, but in this case, a 60-minute storm intensity will actually yield a more conservative result since a 45-minute storm would yield a higher runoff rate and therefore, a smaller detention basin required volume.
- The peak discharge from the site is therefore 35.38 cfs and dividing by the project area, the result is 0.82 cfs/acre maximum historical discharge rate. The historical discharge rate will be the maximum outflow from the detention basin and was used in the detention basin sizing spreadsheet.

The detention basing was sized using the following spreadsheet:

Area and Weighted C Calculation

Description	Acres	C
Scoria finished surface	27.81	0.80
Native soil side slopes	3.76	0.44
Total Improved area	31.57	0.76
Total unimproved area	11.45	0.35
Total:	43.02	**0.65**

Storage requirements by duration (maximum volume is bolded)

Duration (min)	C_w	i (100 yr.)	Area (ac)	Q(cfs)	Vol. (cf)	Allowable Release (cf)	Storage (cf)	Storage (ac-ft)
5	0.65	9.79	43.02	273.76	82,127	10,582.9	71,544	1.64
10	0.65	7.17	43.02	200.49	120,297	21,165.8	99,131	2.28
15	0.65	5.83	43.02	163.02	146,722	31,748.8	114,973	2.64
30	0.65	3.84	43.02	107.38	193,280	63,497.5	**129,783**	2.98
60	0.65	2.35	43.02	65.71	236,567	126,995.0	109,572	2.52
120	0.65	1.39	43.02	38.87	279,854	253,990.1	25,864	0.59
180	0.65	1.00	43.02	27.85	300,792	380,985.1	-80,193	-1.84
360	0.65	0.56	43.02	15.66	338,240	761,970.2	-423,730	-9.73
720	0.65	0.31	43.02	8.67	374,480	1,523,940.5	-1,149,460	-26.39
1,440	0.65	0.17	43.02	4.75	410,721	3,047,881.0	-2,637,160	-60.54
						Allowable release (cfs/ac)		0.82

The maximum storage volume for the 100-year storm event is 129,783 cubic feet.

The orifice size in the proposed detention basin outlet structure has been calculated using the proposed maximum pond water height of 13 feet and is as follows:

Orifice Size	
C (sharp edge constant)	0.61
Q (release rate x area, cfs)	35.276
H (Depth of pond, ft)	13
A (Area of orifice, ft^2)	1.999
A (Area of orifice, in^2)	287.8
r (radius of orifice, in)	9.6
Diameter of Orifice (in)	**19.1**

$$A = \frac{Q}{C\sqrt{2gh}}$$

$$r = \sqrt{\frac{A}{\pi}}$$

The orifice may be designed to be a round hole of 19.0" diameter hole or a rectangle that equals 287.8 square inches.

The outgoing pipe from the detention pond outlet structure should be one pipe size larger than the calculated orifice. We therefore recommend a 24" diameter pipe.

It is our understanding that an emergency spillway will be constructed on the proposed pond embankment. We recommend that the spillway be large enough to carry the historical discharge flow from the site, should the pond outlet structure plug or otherwise malfunction. The spillway should be a trapezoidal shape with 6' bottom width and 2:1 side slopes. Using Hydraflow Express, a channel with these dimensions was modeled. Using a conservative mannings n value of 0.05, the historical discharge flow results in a 6" water depth in the channel and therefore, the spillway would maintain 12" freeboard if the channel total depth were 18". Results from the Hydralow analysis are included in this report.

NOAA Atlas 14, Volume 8, Version 2
Location name: Williston, North Dakota, USA*
Latitude: 48.1273°, Longitude: -104.0405°
Elevation: 2236.04 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**2.80** (2.17-3.64)	**3.37** (2.62-4.39)	**4.44** (3.43-5.80)	**5.45** (4.18-7.14)	**7.00** (5.28-9.73)	**8.34** (6.11-11.7)	**9.79** (6.94-14.1)	**11.4** (7.75-16.8)	**13.7** (8.96-20.8)	**15.6** (9.88-23.8)
10-min	**2.05** (1.59-2.66)	**2.47** (1.91-3.22)	**3.25** (2.51-4.24)	**3.98** (3.06-5.23)	**5.12** (3.86-7.13)	**6.10** (4.48-8.56)	**7.17** (5.08-10.3)	**8.35** (5.67-12.3)	**10.0** (6.56-15.2)	**11.4** (7.23-17.4)
15-min	**1.66** (1.29-2.16)	**2.01** (1.56-2.61)	**2.64** (2.04-3.45)	**3.24** (2.49-4.25)	**4.16** (3.14-5.80)	**4.96** (3.64-6.96)	**5.83** (4.13-8.39)	**6.78** (4.61-10.0)	**8.16** (5.33-12.4)	**9.29** (5.88-14.2)
30-min	**1.12** (0.866-1.45)	**1.34** (1.04-1.75)	**1.76** (1.36-2.30)	**2.16** (1.66-2.83)	**2.76** (2.08-3.84)	**3.28** (2.40-4.60)	**3.84** (2.72-5.53)	**4.46** (3.03-6.59)	**5.35** (3.50-8.12)	**6.08** (3.85-9.28)
60-min	**0.696** (0.540-0.905)	**0.836** (0.648-1.09)	**1.09** (0.844-1.43)	**1.33** (1.02-1.75)	**1.70** (1.28-2.36)	**2.01** (1.47-2.82)	**2.35** (1.66-3.38)	**2.72** (1.85-4.02)	**3.25** (2.12-4.93)	**3.69** (2.33-5.63)
2-hr	**0.418** (0.328-0.536)	**0.500** (0.392-0.644)	**0.652** (0.510-0.842)	**0.793** (0.616-1.03)	**1.01** (0.768-1.38)	**1.19** (0.882-1.65)	**1.39** (0.994-1.97)	**1.61** (1.10-2.34)	**1.91** (1.26-2.86)	**2.17** (1.39-3.26)
3-hr	**0.307** (0.242-0.392)	**0.367** (0.289-0.468)	**0.475** (0.374-0.608)	**0.575** (0.450-0.740)	**0.727** (0.557-0.987)	**0.857** (0.638-1.17)	**0.996** (0.717-1.40)	**1.15** (0.793-1.66)	**1.37** (0.907-2.02)	**1.54** (0.993-2.30)
6-hr	**0.183** (0.146-0.230)	**0.216** (0.173-0.273)	**0.276** (0.220-0.349)	**0.330** (0.262-0.420)	**0.413** (0.320-0.552)	**0.483** (0.364-0.652)	**0.558** (0.406-0.771)	**0.639** (0.446-0.908)	**0.755** (0.507-1.10)	**0.848** (0.553-1.25)
12-hr	**0.109** (0.088-0.135)	**0.127** (0.102-0.158)	**0.159** (0.128-0.198)	**0.188** (0.150-0.235)	**0.231** (0.181-0.304)	**0.267** (0.204-0.355)	**0.306** (0.225-0.417)	**0.348** (0.246-0.487)	**0.407** (0.276-0.585)	**0.455** (0.300-0.659)
24-hr	**0.064** (0.052-0.079)	**0.074** (0.061-0.091)	**0.092** (0.075-0.114)	**0.108** (0.088-0.134)	**0.132** (0.104-0.170)	**0.151** (0.116-0.197)	**0.171** (0.127-0.229)	**0.192** (0.137-0.264)	**0.222** (0.152-0.314)	**0.246** (0.164-0.351)
2-day	**0.037** (0.030-0.044)	**0.043** (0.035-0.052)	**0.053** (0.044-0.065)	**0.062** (0.051-0.076)	**0.075** (0.060-0.096)	**0.086** (0.067-0.110)	**0.096** (0.072-0.127)	**0.108** (0.078-0.145)	**0.123** (0.085-0.171)	**0.135** (0.091-0.190)
3-day	**0.026** (0.022-0.032)	**0.031** (0.026-0.037)	**0.039** (0.032-0.047)	**0.045** (0.037-0.055)	**0.054** (0.044-0.068)	**0.062** (0.048-0.079)	**0.069** (0.052-0.090)	**0.077** (0.056-0.103)	**0.088** (0.061-0.121)	**0.096** (0.065-0.134)
4-day	**0.021** (0.018-0.025)	**0.025** (0.021-0.030)	**0.031** (0.026-0.037)	**0.036** (0.030-0.043)	**0.043** (0.035-0.054)	**0.049** (0.038-0.062)	**0.055** (0.042-0.071)	**0.061** (0.044-0.081)	**0.069** (0.049-0.095)	**0.076** (0.052-0.105)
7-day	**0.014** (0.012-0.017)	**0.016** (0.014-0.019)	**0.020** (0.017-0.024)	**0.023** (0.020-0.028)	**0.028** (0.023-0.034)	**0.031** (0.025-0.039)	**0.035** (0.027-0.044)	**0.038** (0.028-0.051)	**0.044** (0.031-0.059)	**0.047** (0.033-0.065)
10-day	**0.011** (0.010-0.013)	**0.013** (0.011-0.015)	**0.016** (0.013-0.019)	**0.018** (0.015-0.021)	**0.021** (0.017-0.026)	**0.024** (0.019-0.030)	**0.027** (0.021-0.034)	**0.029** (0.022-0.038)	**0.033** (0.024-0.044)	**0.036** (0.025-0.049)
20-day	**0.007** (0.006-0.009)	**0.009** (0.007-0.010)	**0.010** (0.009-0.012)	**0.012** (0.010-0.014)	**0.014** (0.012-0.017)	**0.016** (0.013-0.019)	**0.017** (0.013-0.021)	**0.019** (0.014-0.024)	**0.021** (0.015-0.027)	**0.022** (0.016-0.030)
30-day	**0.006** (0.005-0.007)	**0.007** (0.006-0.008)	**0.008** (0.007-0.010)	**0.010** (0.008-0.011)	**0.011** (0.009-0.013)	**0.012** (0.010-0.015)	**0.014** (0.011-0.017)	**0.015** (0.011-0.019)	**0.016** (0.012-0.021)	**0.017** (0.012-0.023)
45-day	**0.005** (0.004-0.006)	**0.006** (0.005-0.006)	**0.007** (0.006-0.008)	**0.008** (0.007-0.009)	**0.009** (0.007-0.010)	**0.010** (0.008-0.012)	**0.011** (0.008-0.013)	**0.012** (0.009-0.015)	**0.013** (0.009-0.016)	**0.014** (0.010-0.018)
60-day	**0.004** (0.004-0.005)	**0.005** (0.004-0.005)	**0.006** (0.005-0.007)	**0.007** (0.006-0.008)	**0.008** (0.006-0.009)	**0.008** (0.007-0.010)	**0.009** (0.007-0.011)	**0.010** (0.007-0.012)	**0.011** (0.008-0.014)	**0.011** (0.008-0.015)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

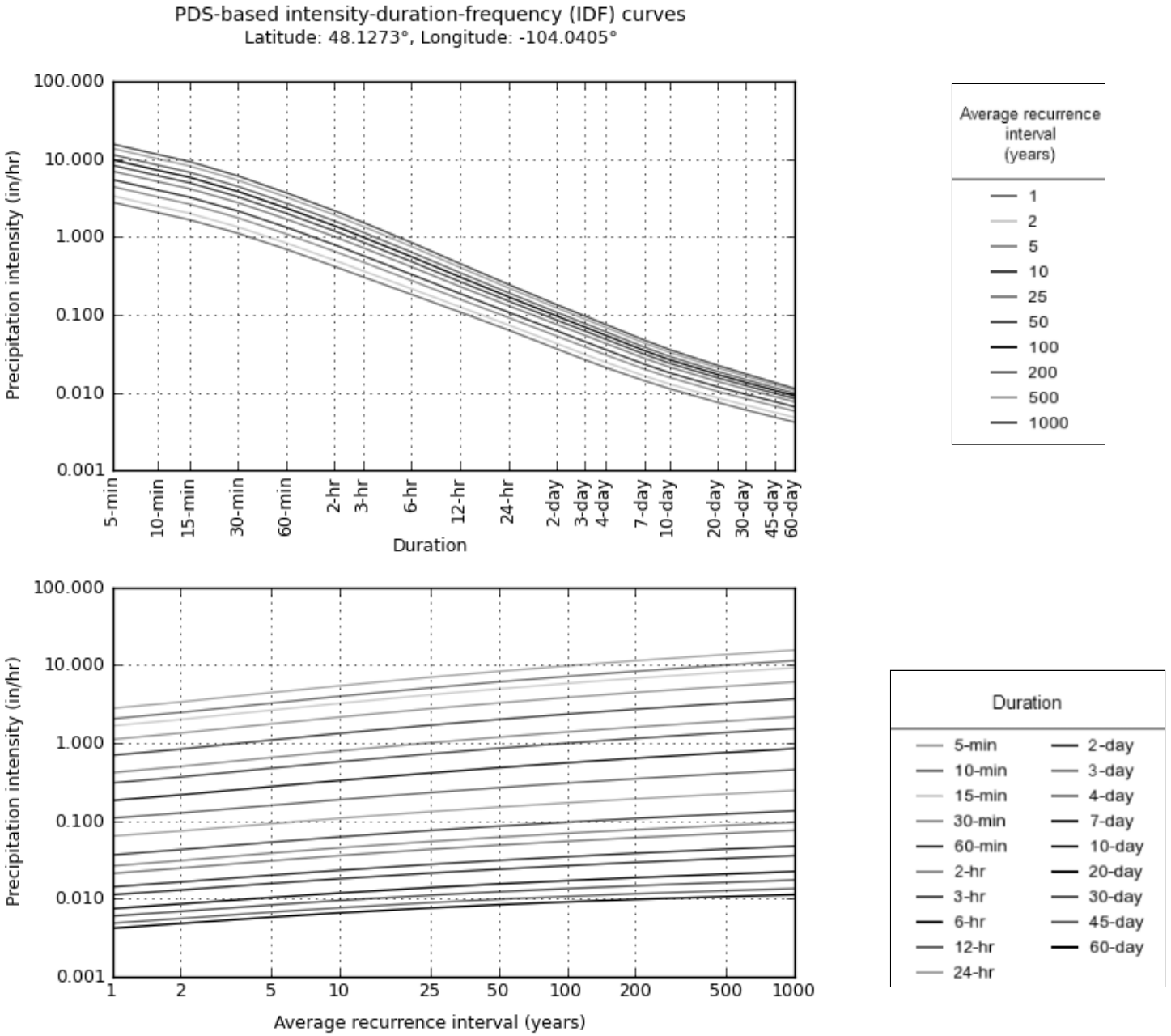
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

OE2 351



NOAA Atlas 14, Volume 8, Version 2

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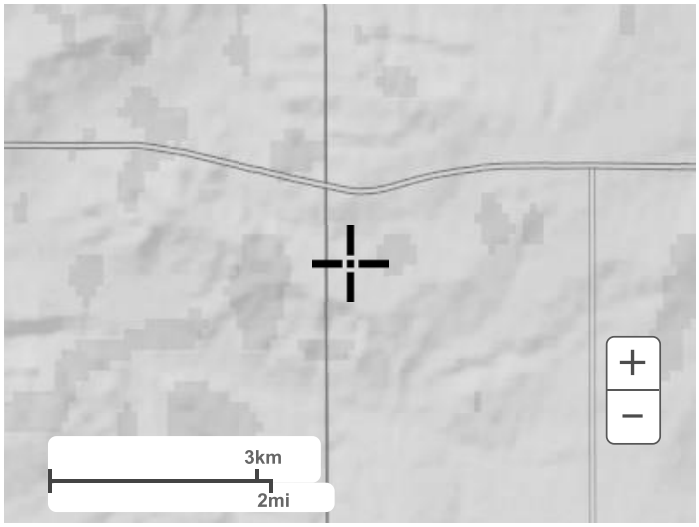
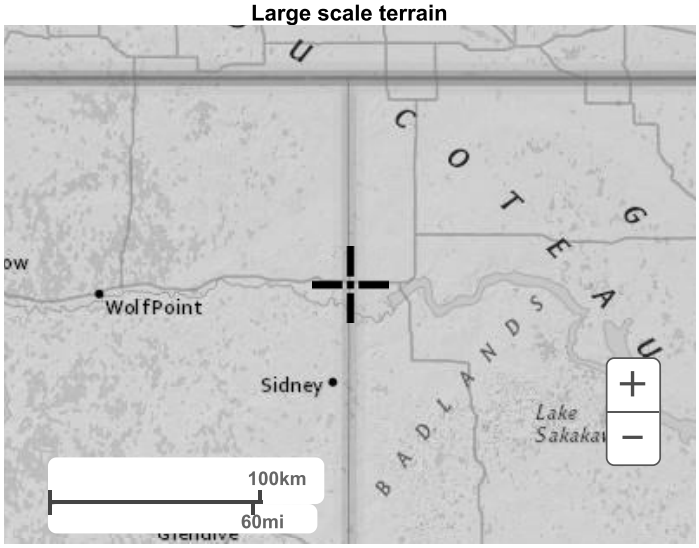
Back to Top

Maps & aerials

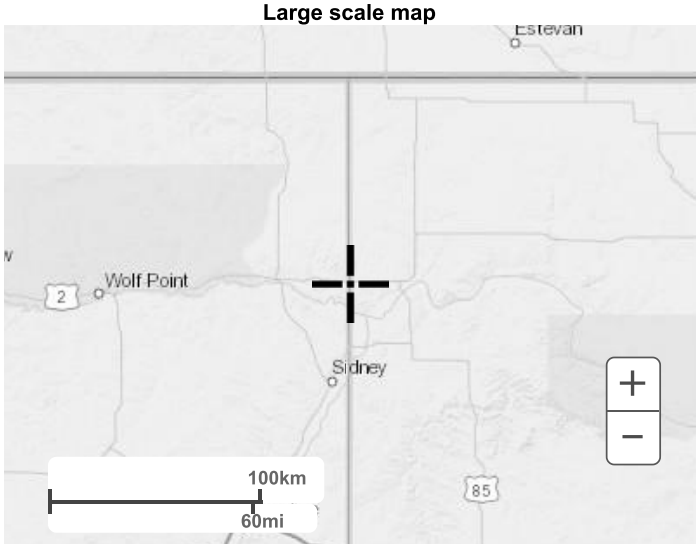
Small scale terrain



Large scale terrain

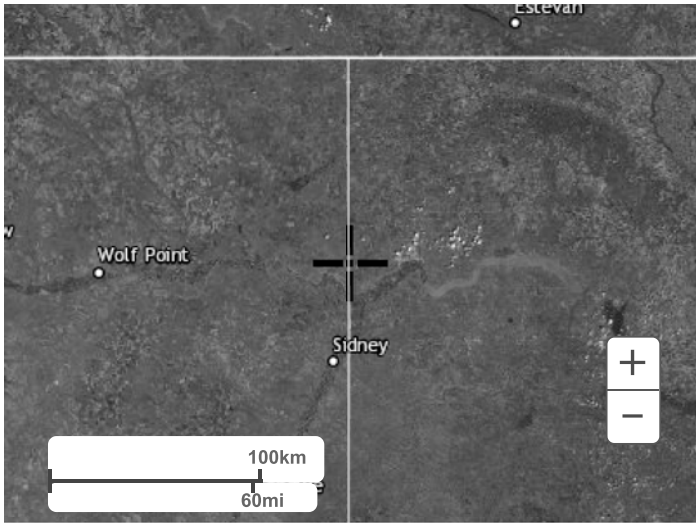


Large scale map



Large scale aerial

OE2 353



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Monday, Feb 10 2020

Spillway Channel

Trapezoidal

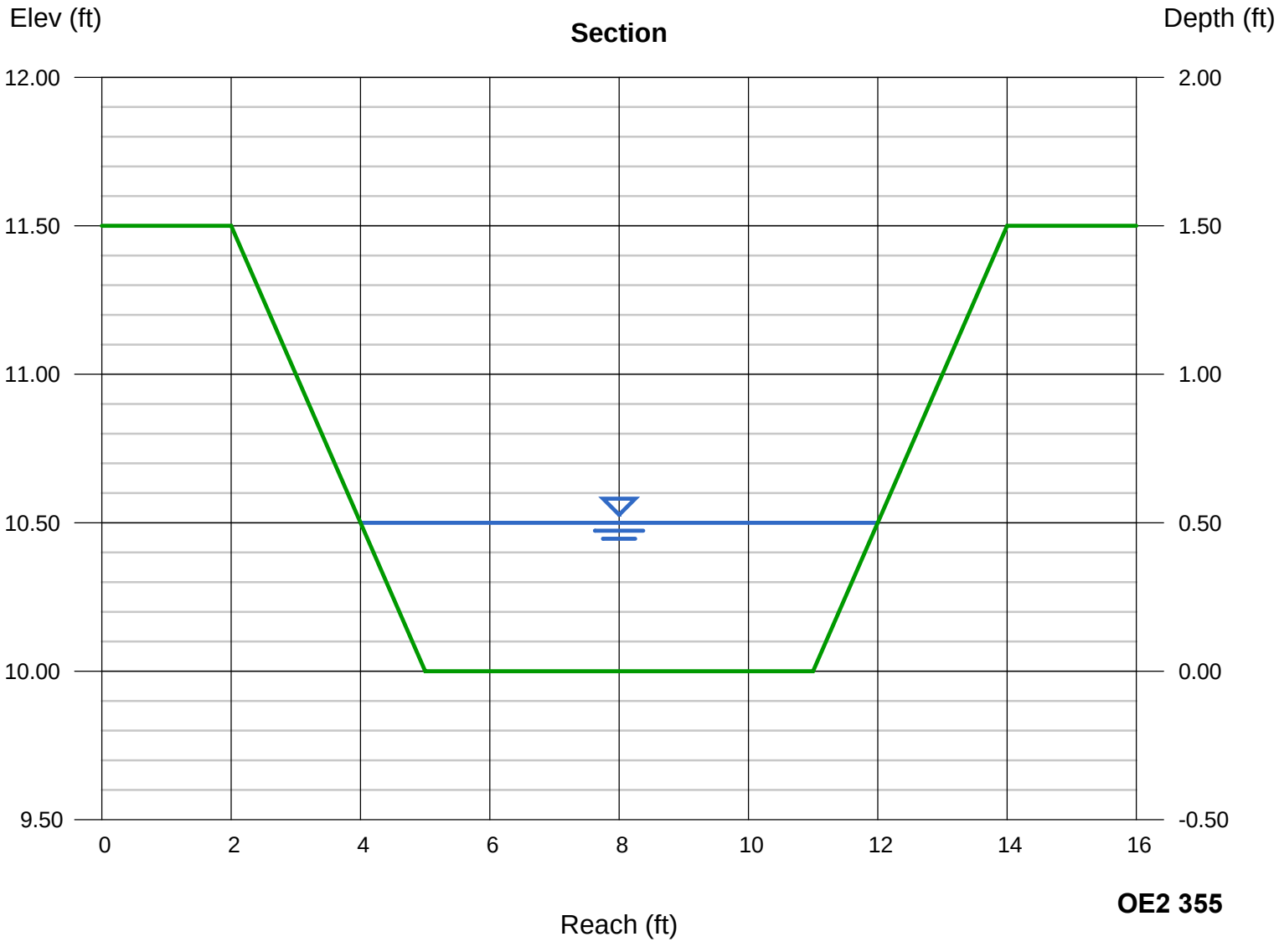
Bottom Width (ft)	= 6.00
Side Slopes (z:1)	= 2.00, 2.00
Total Depth (ft)	= 1.50
Invert Elev (ft)	= 10.00
Slope (%)	= 33.00
N-Value	= 0.050

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 0.50

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 33.77
Area (sqft)	= 3.50
Velocity (ft/s)	= 9.65
Wetted Perim (ft)	= 8.24
Crit Depth, Yc (ft)	= 0.90
Top Width (ft)	= 8.00
EGL (ft)	= 1.95



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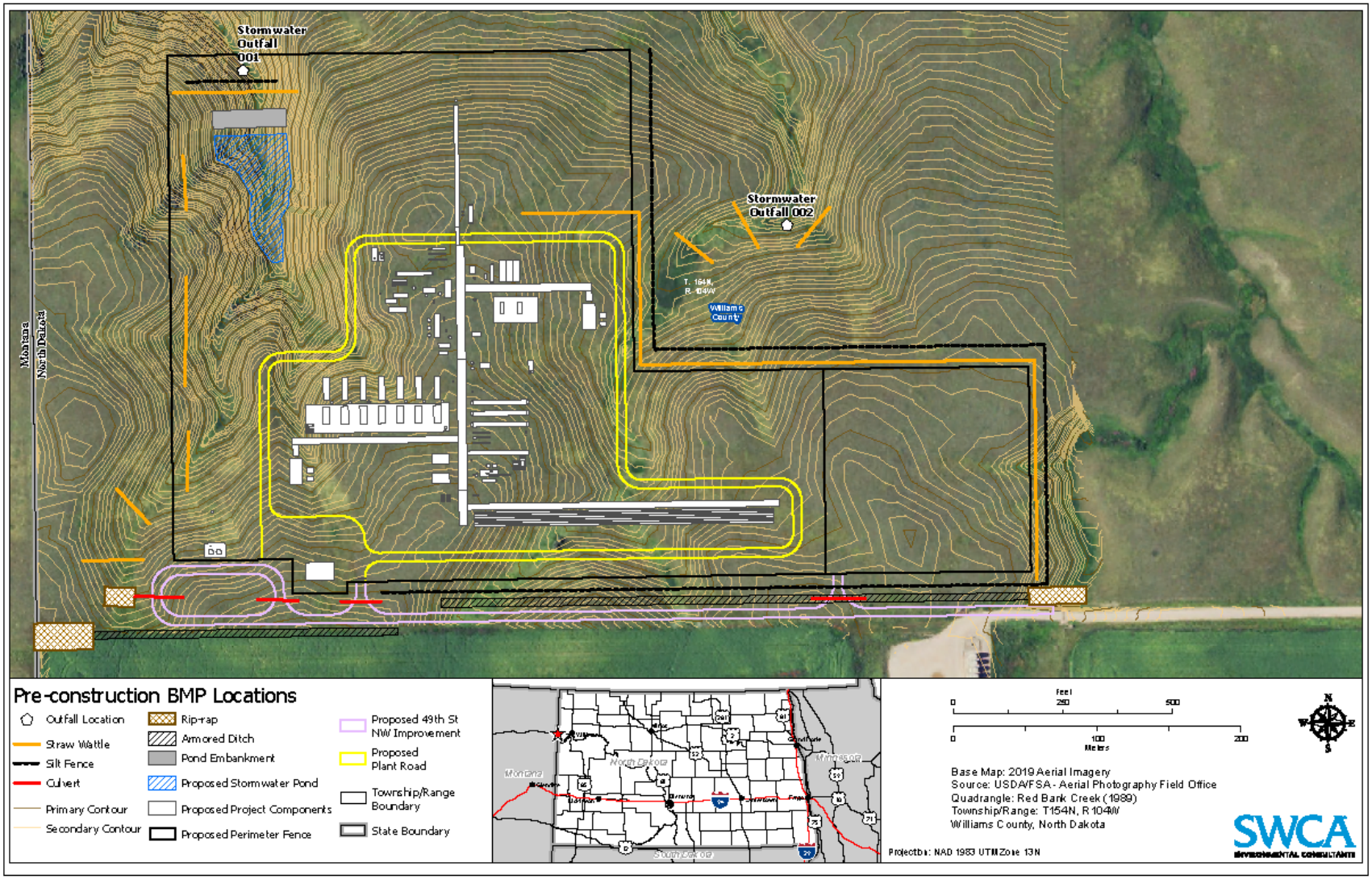
APPENDIX C

BMP Location Maps



Pre-construction BMP locations

APPENDIX D

BMP Details and Construction Specifications

TABLE OF CONTENTS

1 Berms

2 Diversion Ditches

3 Erosion Control Blankets

4 Grading Techniques

5 Mulching

6 Re-vegetation

7 Riprap

8 Silt Fence

9 Straw Bale Barriers

10 Trench Breaker

11 Water Bars

12 Vegetated Buffer

13 Wattles

14 Soil Retention Measures

15 Chemical Stabilization

16 Stabilized Construction Entrances/Exits

17 Dust Control

18 Street Sweeping and Vacuuming

1. Berms

Description

A berm is a ridge of compacted soil located at the top or base of a sloping disturbed area to contain or divert surface runoff. Berms may be constructed from either excavated topsoil or subsoil. The purpose of a berm is to control runoff velocity, divert onsite surface runoff to a sediment trapping device, and/or divert clean water away from disturbed areas.

Applicability

Berms are usually appropriate for drainage basins smaller than five acres, but with modifications they can be capable of servicing areas as large as ten acres. With regular maintenance, earthen berms have a useful life span of approximately 18 months. Berms are applicable for the following applications:

- At the perimeter of a well pad (particularly the outer edge) to ensure that runoff remains on the pad and is diverted to a well pad detention pond, if available.
- Along the outside shoulder of an insloped road to ensure that runoff from the roadway drains inward and to protect the fill slope from continual disturbances during road blading and maintaining. See Grading Techniques (GT).
- Upslope of cut or fill slopes to divert flows away from disturbed areas.
- Downslope of cut or fill slopes to divert onsite runoff to a stabilized outlet or sediment trapping device, although diversions are more commonly used for this application. See Diversion (D).

Limitations

- Berms may erode if not properly compacted and stabilized with vegetation or an erosion control blanket. Berms which are adjacent to concentrated flows will require erosion blanketing according to Erosion Control Blanket (ECB).
- If a berm crosses a vehicle roadway or entrance, its effectiveness can be reduced. Wherever possible, berms should be designed to avoid crossing vehicle pathways.

Design criteria

No formal design is required.

Construction Specifications

1. Prior to berm construction, remove all trees, brush, stumps and other objects in the path of the berm and till the base of the berm before laying the fill. Fill may consist of topsoil or subsoil excavated during the construction of nearby roads or well pads. If fill material is excavated adjacent to berm, following the specification for Diversion (D).
2. Construct the berm according to Figure 1 for the appropriate drainage area. For points where vehicles will cross the berm, the side slope should be no steeper than 3:1 and the mound may be constructed of gravel rather than soil. This will prolong the life of the berm and increase effectiveness at the point of vehicle crossing. For well pad perimeter installation the pad side of the berm should be sloped at 1.5:1 to help prevent vehicles from backing over the edge of the pad.
3. To remain effective, berms should be compacted with tracked equipment, if possible.
4. All berms shall have positive drainage to a stabilized outlet so that runoff does not collect in ponds on the upslope side of the berm, but instead flows along the berm until it reaches a stabilized outlet. Field location should be adjusted as needed. Stabilized outlet may be a well-vegetated area or a sediment control such as a silt fence or sediment trap where sediment can settle out of the runoff before being discharged to surface waters.
5. If the expected life span of the berm is greater than 15 days, it is strongly recommended that the berm be stabilized with vegetation or an erosion control blanket immediately after construction. Stabilization is required where concentrated flows are expected. See Table 1 for recommended stabilization methods for berms on various slopes.
6. Berms should be constructed and fully stabilized prior to commencement of major upslope land disturbance. This will maximize the effectiveness of the structure as a storm water control device.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Berms should be inspected for evidence of erosion or deterioration to ensure continued effectiveness. Berms should also be maintained at the original height. Any decrease in height due to settling or erosion, which impacts the effectiveness of the BMP, should be repaired immediately.

Removal

Berms should remain in place and in good condition until all upslope disturbed areas are permanently stabilized. There is no need to formally remove the berm on completion of stabilization until interim or final reclamation.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003.
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm>

New York State Department of Environmental Conservation, New York Guidelines for Urban Erosion and Sediment Control. New York. Fourth Edition, 1997. http://www.dec.state.ny.us/website/dow/toolbox/escstandards

Table 1: Temporary Berm Stabilization

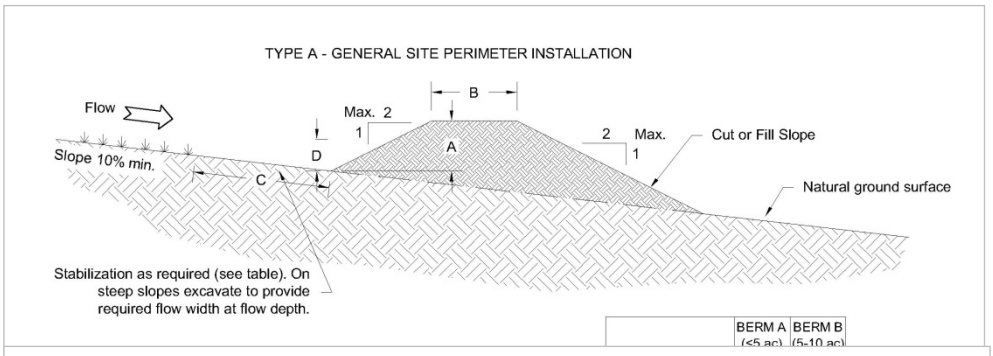
Type of Treatment	Channel Grade[1]	A (<5 Ac.)	B (5-10 Ac)
1	0.5-3.0%	Seed & Straw Mulch	Seed & Straw Mulch
2	3.0-5.0%	Seed & Straw Mulch	Seed and cover with erosion control blanket, or lined with 2-inch stone
3	5.0-8.0%	Seed and cover with erosion control blanket, or line with 2-inch stone	Line with 4 to 8-inch stone or rock[2]
4	8.0-20.0%	Line with 4 to 8-inch or stone or rock[2]	Engineering Design

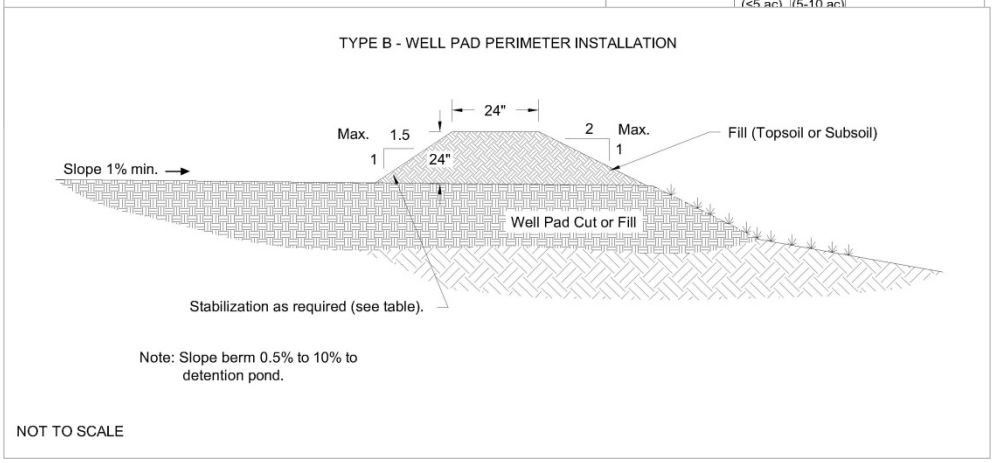
Notes:

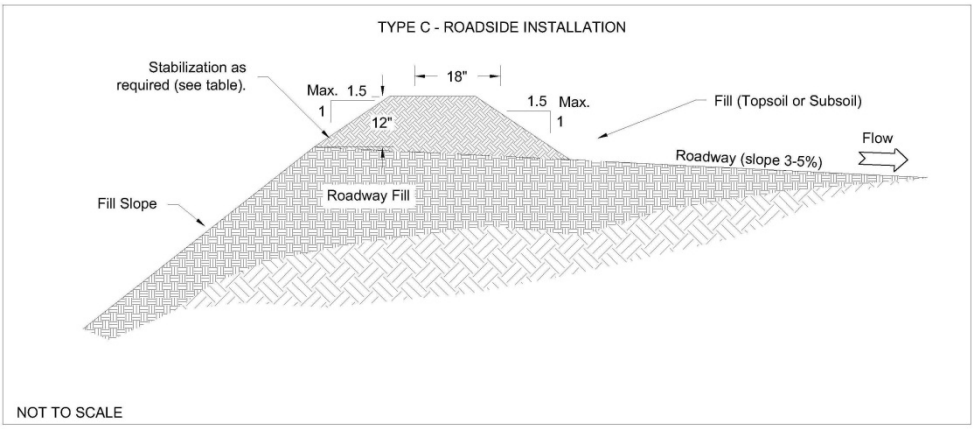
[1] In highly erodible soils, as defined by the local approving agency, refer to the next higher slope grade for type of stabilization.

[2] Site rock if available, shall be broken into the required size.

Figure 1: Berm Installation







2. Diversion Ditches

Definition

A diversion is a drainage way of parabolic or trapezoidal cross-section with a supporting ridge on the lower side that is constructed across the slope. The purpose of a diversion is to prevent off site storm runoff from entering a disturbed area, to prevent sediment laden storm runoff from leaving the construction site or disturbed area, to prevent flows from eroding slopes, and to direct sediment laden flows to a trapping device.

Applicability

Diversions may be designed for temporary or permanent use. The maximum drainage area for temporary, un-compacted diversions is two acres. For drainage areas larger than two acres but less than ten acres, the diversion should be compacted. For undisturbed drainage areas larger than ten acres, a permanent diversion may be designed to handle larger flows. Diversions may be used for the following applications:

Upslope of cut or fill slopes to convey or divert flows away from disturbed areas.

Down slope of cut or fill slopes to divert onsite runoff to a stabilized outlet or sediment trapping device.

At the outer edge of a well pad to ensure that runoff remains on the pad and is diverted to a well pad detention pond, if available.

Where runoff from higher areas has potential for causing erosion, or interfering with, or preventing the establishment of, vegetation on lower areas.

Where the length of slopes needs to be reduced so that soil loss will be kept to a minimum.

At the perimeter of a site or disturbed area.

Limitations

The area around the diversion channel that is disturbed by its construction must be stabilized (with vegetation or other erosion control) so that it is not subject to similar erosion as the steep slope the channel is built to protect.

To alleviate erosion capability, diversions must be directed into a stabilized outlet or well-vegetated area or to sediment trapping devices, where erosion sediment can settle out of the runoff before being discharged to surface waters.

Temporary diversions should be designed to avoid crossing vehicle pathways.

Diversions should be used with caution on soils subject to slippage.

Design criteria

For a temporary diversion (drainage area less than 10 acres), no formal design is necessary. For permanent diversions (drainage area larger than 10 acres) the following guidelines apply:

- Location

Diversion location shall be determined by considering outlet conditions, topography, land use, soil type, length of slope, and the development layout.

- Capacity

Peak rates of runoff values used in determining the capacity requirements shall be as outlined by TR-55, Urban Hydrology for Small Watersheds. The constructed diversion shall have capacity to carry, as a minimum, the peak discharge from a ten-year frequency rainfall event with freeboard of not less than 0.3 feet.

- Cross section

See Figure 2 for details. The diversion channel shall be parabolic or trapezoidal in shape, if possible. The diversion shall be designed to have stable side slopes. The side slopes shall not be steeper than 2:1 and shall be flat enough to ensure ease of maintenance of the diversion and its protective vegetative cover. The ridge shall have a minimum width of four feet at the design water elevation; a minimum of 0.3 feet freeboard and a reasonable settlement factor (10%) shall be provided.

- Velocity and grade

The permissible velocity for the specific soil type will determine the maximum grade. The maximum permissible velocity for sand and silt vegetated channels is 3 ft/sec, and 5 ft/sec for clay vegetated channels. Diversions are not usually applicable below high sediment producing areas unless structural measures, designed to prevent damaging accumulations of sediment in the channels, are installed with, or before, the diversions.

Construction Specifications

General

1. All trees, brush, stumps, obstructions, and other objectionable material shall be removed and disposed of so as not to interfere with the proper functioning of the diversion.
2. All diversions shall have uninterrupted positive grade to an outlet.
3. Each diversion must have an adequate outlet where outflow will not cause damage. Diverted runoff from a disturbed area shall be conveyed to a sediment trapping device. Diverted runoff from an undisturbed area shall outlet to a sediment trapping device or into an undisturbed stabilized area at non-erosive velocities. Vegetated outlets shall be installed before diversion construction, if needed, to ensure establishment of vegetative cover in the outlet channel.

Temporary diversion (drainage area <10 acres)

See Figure 2.

1. The diversion shall be excavated or shaped to line, grade, and cross section as required to meet the specified criteria. The diversion does not need to be compacted if the contributing drainage area is less than 2 acres.
2. Stabilization with vegetation is not required as long as sediment traps (see Sediment Trap [ST]) or other sediment control devices are provided.

Permanent diversion (drainage area >10 acres)

See Figure 2.

1. The diversion shall be excavated or shaped to line, grade, and cross section as required to meet the criteria specified herein, and be free of bank projections or other irregularities which will impede normal flow.

2. Parabolic and triangular-shaped, grass-lined channels should not have a top width of more than 30 feet. Trapezoidal, grass-lined channels may not have a bottom width of more than 15 feet unless there are multiple or divided waterways, they have a riprap center, or other methods of controlling the meandering of low flows are provided.
3. If grass-lined channels have a base flow, a stone center or subsurface drain or another method for managing the base flow must be provided.
4. Fills shall be compacted as needed to prevent unequal settlement that would cause damage in the complete diversion.
5. All earth removed and not needed in construction shall be spread or disposed of on the well pad side of the diversion so that it will not interfere with the functioning of the diversion.
6. Immediately after the ridge and channel are constructed, they must be seeded or hydro-seeded and mulched according to Re-vegetation (RV) and Mulching (M) along with any disturbed areas that drain into the diversion.
    a. For design velocities less than 3.5 ft/sec, seeding and mulching may be used for establishment of the vegetation. It is recommended that, when conditions permit, temporary diversions or other means should be used to prevent water from entering the diversion during the establishment of the vegetation.
    b. For design velocities or more than 3.5 ft/sec, the diversion shall be stabilized with seeding protected by Jute or Excelsior matting, or with seeding and mulching including temporary diversion of the water until the vegetation is established.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Channels should be cleared of sediment; repairs made when necessary, and seeded areas reseeded if a vegetative cover is not established. Maintain diversion capacity, ridge height, and outlet elevations especially if high sediment yielding areas are in the drainage area above the diversion. Establish necessary cleanout requirements. Redistribute sediment as necessary to maintain the capacity of the diversion.

Removal

Temporary and un-compacted diversions shall remain in place only until the disturbed areas are permanently stabilized. Permanent diversions shall remain in place until final reclamation.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003.
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm>

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United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Field Office Technical Guide. 2002.
<www.nrcs.usda.gov/technical/efotg>

Figure 2: Temporary Diversion Installation

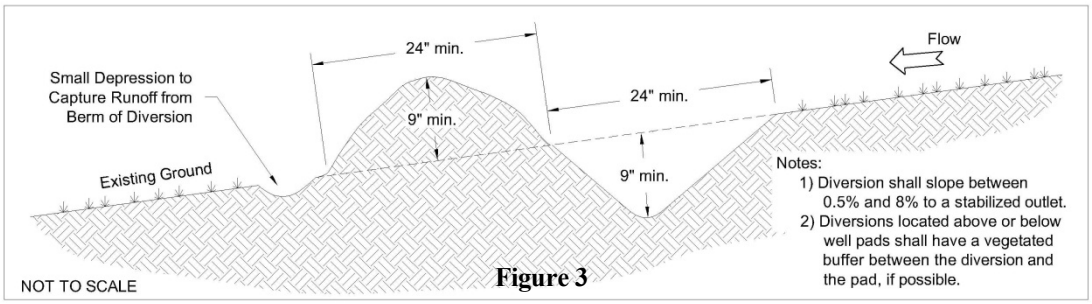
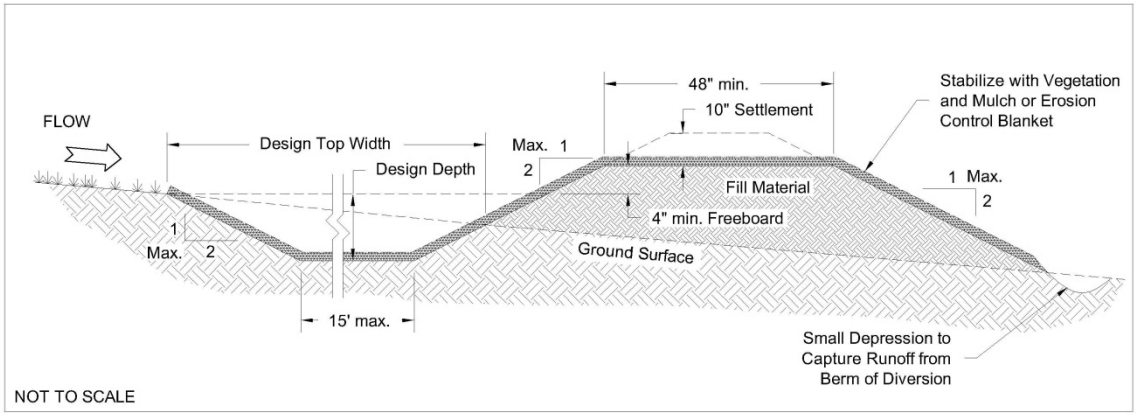


Figure 3

Permanent Diversion Installation



3. Erosion Control Blankets

Description

Erosion control blankets are porous fabrics and are manufactured by weaving or bonding fibers made from organic or synthetic materials. Erosion control blankets are installed on steep slopes, over berms, or in channels to prevent erosion until final vegetation is established. However, blankets can also be used as separators or to aid in plant growth by holding seeds, fertilizers, and topsoil in place.

Applicability

Erosion control blankets may be used in the following applications:

- To control erosion on steep slopes and to promote the establishment of vegetation.
- To stabilize channels against erosion from concentrated flows.
- To protect berms and diversions prior to the establishment of vegetation.
- To protect exposed soils immediately and temporarily, such as when active piles of soil are left overnight.
- As a separator between riprap and soil to prevent soil from being eroded from beneath the riprap and to maintain the riprap's base.
- May be used on slopes as steep as 1:1.
-

Limitations

- Blankets used on slopes should be biodegradable, or photodegradable, non-toxic to vegetation or germination of seed, and non-toxic or injurious to humans.
- Should not be used on slopes where vegetation is already established.
- Some blankets might promote increased runoff and might blow away if not firmly anchored.
- If the fabric is not properly selected, designed, or installed, the effectiveness may be reduced drastically. Manufacturer’s specifications should be followed.

Design criteria

There are many types of erosion control blankets available. Therefore, the selected fabric should match its purpose. Effective netting and matting require firm, continuous contact between the materials and the soil. If there is no contact, the material will not hold the soil, and erosion will occur underneath the material. Fabric should be purchased at an appropriate with to cover the whole width of the channel, if possible. Table 2 indicates some recommended criteria for the selection of erosion control blankets.

Construction specifications

1. Smooth soil prior to installation and apply seed prior to fabric installation for stabilization of construction sites.
2. Select the appropriate fabric type. North American Green products are listed in Table 2. However, other products may also be used. Site specifics shall dictate blanket selection and use.
3. Select the appropriate seed mix according to the specification in Revegetation (RV).
4. Installation of the blankets shall be in accordance with the manufacturer's recommendations and according to Figure 4. For blankets being placed in channels, the fabric should be rolled out parallel to the channel if the width is sufficient to cover the entire width of the channel. The fabric needs to be in continuous contact with exposed soil.
5. Pins or staples shall be made of wire 0.162 inch or larger in diameter. "U" shaped staples shall have legs 8" long, and a 1" crown. "T" shaped pins shall have a minimum length of 8". The bar of the "T" shall be at least 4" long. Triangular survey stakes can also be used.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Inspections should determine if cracks, tears, or breaches have formed in the fabric. If the effectiveness of the BMP has been reduced, the fabric should be repaired or replaced immediately. Re-anchor loosened matting and replace missing matting and staples as required. It is necessary to maintain contact between the ground and the blanket at all times. Trapped sediment should be removed after each storm event.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

Horizon Environmental Services, Inc, Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites. April 2004.

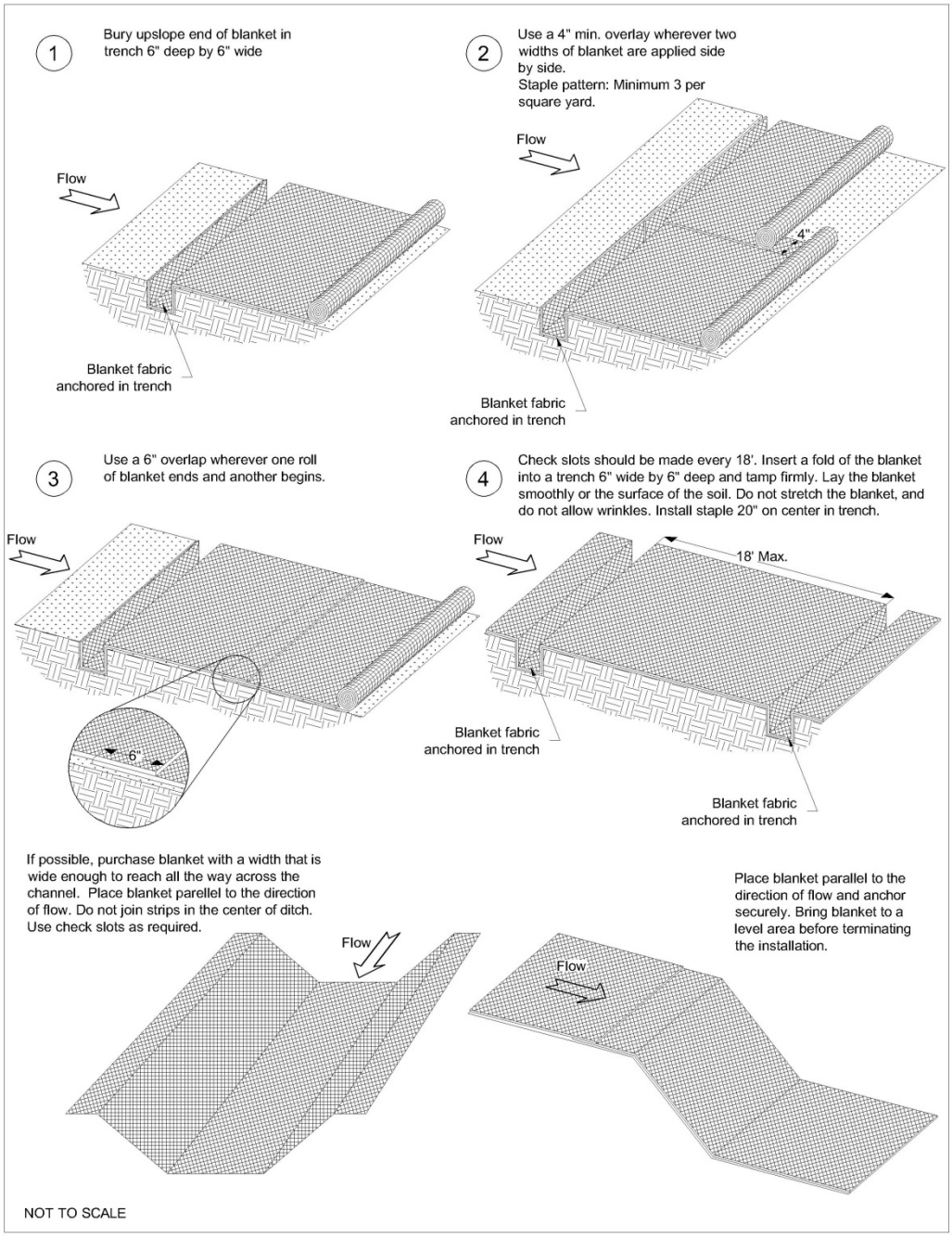
Keller, Gordon, and James Sherar, Low-Volume Roads Engineering, Best Management Practices Field Guide. United States Department of Agriculture (USDA), Forest Service, US Agency of International Development (USAID), 2005. http://www.blm.gov/bmp/field%20guide.htm

North American Green, 2004. <http://www.nagreen.com>

Table 2: Suggested Blanket Types

Description (North American Green Product #)	Longevity	Applications	Max. Flow Velocity (feet/sec.)
Single Net Straw Blanket (S75)	12 months	4:1 - 3:1 Slopes Low Flow Channels	5
Rapid Degrading Net (DS75)	45 - 60 Days		
Double Net Straw Blanket (S150)	12 months	3:1 - 2:1 Slopes Moderate Flow Channels	6
Rapid Degrading Nets (DS150)	45 - 60 Days		
Double Net Blanket 70% Straw/30% Coconut (SC150)	24 months	2:1 - 1:1 Slopes Medium Flow Channels	8
Double Net Blanket 100% Coconut (C125)	36 months	1:1 & Greater Slopes High Flow Channels	10
Double Net Blanket Polypropylene Fiber (P300)		1:1 Slopes Extended Flow Areas High Flow Channels	9 (unveg.) 16 (veg.)
Organic Net (S75BN)	12 months	4:1 - 3:1 Slopes Low Flow Channels	5
Organic Net (S150BN)	12 months	3:1 - 2:1 Slopes Moderate Flow Channels	6
Organic Net (SC150BN)	18 months	2:1 - 1:1 Slopes Medium Flow Channels	8
Organic Net (C125BN)	24 months	1:1 & Greater Slopes High Flow Channels	10

Figure 4: Erosion Control Blanket Installation


1
Bury upslope end of blanket in trench 6" deep by 6" wide
Flow
Blanket fabric anchored in trench
2
Use a 4" min. overlay wherever two widths of blanket are applied side by side.
Staple pattern: Minimum 3 per square yard.
Flow
4"
Blanket fabric anchored in trench
3
Use a 6" overlap wherever one roll of blanket ends and another begins.
Flow
6"
4
Check slots should be made every 18'. Insert a fold of the blanket into a trench 6" wide by 6" deep and tamp firmly. Lay the blanket smoothly or the surface of the soil. Do not stretch the blanket, and do not allow wrinkles. Install staple 20" on center in trench.
Flow
18' Max.
Blanket fabric anchored in trench
Blanket fabric anchored in trench
If possible, purchase blanket with a width that is wide enough to reach all the way across the channel. Place blanket parellel to the direction of flow. Do not join strips in the center of ditch. Use check slots as required.
Flow
Place blanket parallel to the direction of flow and anchor securely. Bring blanket to a level area before terminating the installation.
Flow
NOT TO SCALE

4. Grading Techniques

Description

Grading involves reshaping the ground surface to planned grades as determined by an engineering survey, evaluation, and layout. Grading provides more suitable topography for well pads and pipelines and helps to control surface runoff, soil erosion, and sedimentation during and after construction in these areas. This BMP shall include the following:

- Proper cut and fill techniques to ensure road and well pads remains stable over time.
- Road crowning or sloping to properly route runoff off the roadway.
- Surfacing with gravel to avoid mud, rutting, and large quantities of sediment that will wash away during storms.
- Surface roughening to reduce runoff velocity and erosion, trap sediment, and prepare the soil for seeding and planting.

Applicability

- This BMP is applicable to the construction and maintenance of any road or well pad, but particularly those located on steep topography or easily erodible soils.
- Gravel surfacing is applicable to all roads or pads with "soft" sections, steep grades, highly erosive soils, or where all-weather access is needed. Gravel may be used as "fill" material in ruts or as a full structural section over the entire road or pad.
- Soil roughening is most effective for areas of one acre or less, and works well for any slope (but particularly fill slopes greater than 3:1), areas with highly erodible soils, and for soils that are frequently disturbed.

Limitations

- Improper cut and fill slopes that disrupt natural storm water patterns might lead to poor drainage, high runoff velocities, and increased peak flows during storm events.
- Rutting and wash boarding may develop if surface gravel is not designed properly or if road is not sloped.
- Flat-blading to maintain the roadway must be done properly to avoid changes in gravel thickness, road slope, and road grade.
- Soil roughening is not appropriate for rocky slopes, and is likely to be ineffective in for anything more than a gentle or shallow depth rain. If roughening is washed away in a heavy storm, the surface will have to be re-roughened and new seed planted.

Design criteria

- Grading plan

A grading plan should be prepared that establishes the extent to which the road or pad will be graded, how drainage patterns will be directed, and how runoff velocities will affect receiving waters. The grading plan also includes information regarding when earthwork will start and stop, establishes the degree and length of finished slopes, and dictates where and how excess material will be disposed of (or where borrow materials will be obtained if needed). Practices must be developed for erosion control, slope stabilization, and safe disposal of runoff water and drainage, such as ditches and culverts, grade stabilization structures, retaining walls, and surface drains. Berms, roadside ditches, and other storm water practices that require excavation and filling also should be incorporated into the grading plan.

Land grading should be based upon pad and pipeline layouts that fit and utilize existing topography and desirable natural surroundings to avoid extreme grade modifications. Clearing and grading should only occur at those areas necessary for pad activities and equipment traffic. Maintaining undisturbed temporary or permanent buffer zones in the grading operation provides a low-cost sediment control measure that will help reduce runoff and off-site sedimentation.

- Slope failures

Landslides and failed cuts and fills can be a major source of sediment, they can close the road or require major repairs, and they can greatly increase maintenance costs. Slope failures, or landslides, typically occur where a slope is over-steep, where fill material is not compacted, or where cuts in natural soils encounter groundwater or zones of weak material. Good road location can often avoid landslide areas and reduce slope failures. When failures do occur, the slide area should be stabilized by removing the slide material, flattening the slope, adding drainage, or using structures, as discussed below. Designs are typically site specific and may require input from geotechnical engineers and engineering geologists. Failures that occur typically impact road operations and can be costly to repair. Failures near streams and channel crossings have an added risk of impact to water quality.

- Road slope

See Figure 5. All roads should be designed with one of the following three slope types:

Outsloped roads minimize the concentration of water and minimize road width by avoiding the need for an inside ditch, but may require roadway surface and fill slope stabilization. Outsloped roads with clay rich, slippery road surface materials often require surface stabilization with gravel or limited use during rainy periods to assure traffic safety. On road grades over 10 to 12 percent and on steep hill slope areas, outsloped roads are difficult to drain and can feel unsafe.

Insloped roads are the best method to control surface water. However, insloped roads also concentrate water and require a system of ditches and turnouts or cross-draining culverts.

Crowned roads are appropriate for higher standard, two lane roads on gentle grades. They may or may not require roadside ditches, turnouts, and/or cross-drains. It is difficult to create and maintain a crown on a narrow road, so generally insloped or outsloped road drainage is more effective.

Construction Specifications

Cut and fill slopes

1. All applicable perimeter erosion and sediment control practices and measures (berms, diversions, wattles, etc.) shall be constructed prior to any grading activities, and maintained in accordance with this BMP and the SWMP. Perimeter controls should remain in place until all graded or disturbed areas, including slopes, are adequately stabilized.
2. All areas to be disturbed (both cut and fill) shall be cleared, grubbed, and stripped of topsoil to remove trees, vegetation, roots, or other objectionable material.
3. Fill material shall be free of brush, logs, stumps, roots, or other objectionable materials that would interfere with, or prevent, construction of satisfactory fills. This material can be set aside and later used at the toe of fill slopes as filter berms. Frozen material shall not be placed in the fill nor shall the fill material be placed on a frozen foundation.
4. Table 5 presents a range of commonly used cut and fill slope ratios appropriate for the soil and rock types described. Figures 6 and 7 present typical cut slope and fill slope design options for varying slope and site conditions. Vertical cut slopes should not be used unless the cut is in rock or very well cemented soil. Ideally, both cut and fill slopes should be constructed with a 2:1 or flatter slope to promote growth of vegetation, but cut slopes in dense, sterile soils or rocky material are often difficult to vegetate.
5. All fills shall be compacted as required to reduce erosion, slippage, settlement, subsidence, or other related problems.
6. Topsoil required for the establishment of vegetation shall be stockpiled in the amount necessary to complete finished grading of all exposed areas. Areas that are to be topsoiled shall be scarified to a minimum depth of four inches prior to placement of topsoil.
7. All graded cut and fill areas shall be stabilized, either structurally or vegetatively, immediately following finished grading. Some common slope stabilization options appropriate for roads include hydroseeding, hydromulching, erosion control blankets, riprap, and retaining walls.

Road slope

1. See Figure 5, Figure 6, and Figure 7. Compact soil or road base material to direct runoff.
2. If crowning a road, runoff is directed to both sides of the road requiring two roadside ditches, unless runoff will drain directly to well-stabilized areas.
3. If using an inslope design, runoff is directed toward the hillside and requires a roadside ditch with periodic turnouts or cross drain culvert installation.
4. If using an outslope design, ensure a moderate road slope with dense vegetative cover.

Surface gravel

1. Gradation of gravel should be according to Figure 8. This figure shows the typical gradation ranges of aggregates used in road construction, how the materials, ranging from coarse to fine, best perform for a road, and the approximate limitations to the desirable gradation ranges. Ideally, aggregate surfacing material is (1) hard, durable, and crushed or screened to a minus 2 inch size; (2) well graded to achieve maximum density; (3) contains 5-15% clayey binder to prevent raveling; and (4) has a Plasticity Index of 2 to 10.
2. Gravel should be placed to a thickness of at least twice the diameter of the largest stone with a minimum thickness of four inches. Over very weak soils gravel thickness can be reduced with the use of geotextile or geogrid subgrade reinforcement. Also, geotextile

layers are useful over soft soils to separate the gravel from the soil, keep it uncontaminated, and extend the useful life of the gravel.

3. Compact the aggregate during construction and maintenance to achieve a dense, smooth road surface and thus reduce the amount of water that can soak into the road.
4. "Spot" stabilize local wet areas and soft areas with four to six inches of coarse rocky material. Add more rock as needed.
5. Blend coarse aggregate and fine clay-rich soil (when available) to produce a desirable composite roadway material that is coarse yet well-graded with 5-15 % fines for binder.
6.

Surface roughening

1. To slow erosion, surface roughening (by either corrugating or tracking) should be done as soon as possible after grading activities have ceased (temporarily or permanently) in an area. All cut and fill slopes should be roughened wherever possible. Do not blade or scrape the final fill slope face. Excessive compacting of the soil surface should be avoided during roughening, and areas should be seeded as quickly as possible after roughening is complete. Compact the aggregate during construction and maintenance to achieve a dense, smooth road surface and thus reduce the amount of water that can soak into the road.
2. Corrugating (Figure 9) uses machinery to create a series of ridges and depressions that run across the slope on the contour. Groove using any appropriate implement that can be safely operated on the slope, such as disks, tillers, spring harrows, or the teeth of a front-end loader bucket. Do not make the grooves less than 3 inches deep or more than 15 inches apart.
3. Tracking (Figure 10) is the most common method of soil roughening and is sometimes used as a method to hold down mulch. However, tracking is generally not as effective as corrugating. Tracking should be used primarily in sandy soils to avoid undue compaction of the soil surface. Operate tracked machinery up and down the slope to leave horizontal depressions in the soil. Do not back-blade during the final grading operation.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Inspect cut and fill slopes for rills or other indications of erosion. Maintain all crowns, outslopes, inslopes, and surface gravel.

The road surface and shoulders should be periodically smoothed and reshaped with a grader blade (flat-blading). This should be done when the gravel is moist. Maintain the proper road slope and grade while flat-blading. Also be sure to avoid plugging roadside ditches or altering adjacent drainage structures, as this may cause them to not function properly. Flat-blading may also cause road gravel to be pushed off the main roadway and onto the shoulders. To avoid this blade toward the center of the road.

Roughening might need to be repeated after storm events. Inspections of roughened slopes will indicate where additional erosion and sediment control measures are needed. If rills appear, they should be filled, graded again, and reseeded as soon as possible. Proper dust control methods should be used.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

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New York State Department of Environmental Conservation, New York Guidelines for Urban Erosion and Sediment Control. New York. Fourth Edition, 1997. http://www.dec.state.ny.us/website/dow/toolbox/escstandards

United States Department of the Interior and United States Department of Agriculture. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development "Gold Book". BLM/WO/ST-06/021+3071. Bureau of Land Management (BLM). Denver, Colorado. Fourth Edition, 2006.

Table 3: Stable Slope Ratios for Various Conditions

Soil/Rock Condition	Slope Ratio (Hor:Vert)
Most rock	¼:1 to ½:1
Very well cemented soils	¼:1 to ½:1
Most in-place soils	¾:1 to 1:1
Very fractured rock	1:1 to 1 ½: 1
Loose coarse granular soils	1 ½: 1
Heavy clay soils	2:1 to 3:1
Soft clay rich zones or wet seepage areas	2:1 to 3:1
Fills of most soils	1 ½:1 to 2:1
Fills of hard, angular rock	1 1/3 :1
Low cuts and fills (<10 ft high)	2:1 or flatter (for revegetation)

Figure 5: Typical Road Surface Drainage Options

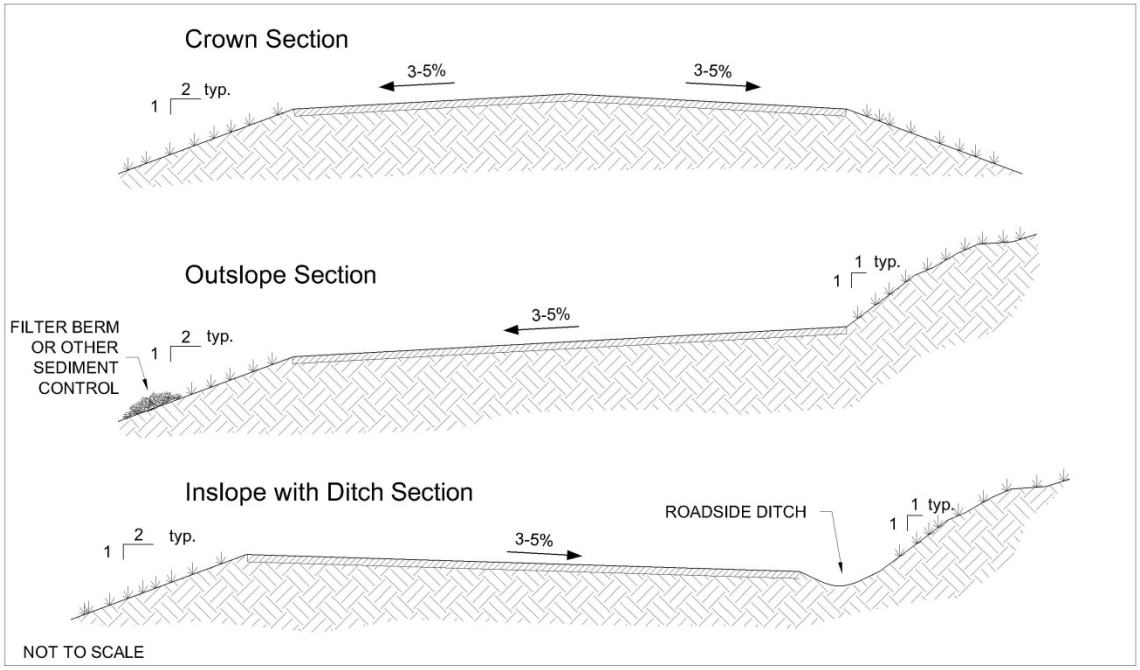


Figure 6: Cut Slope Design Options

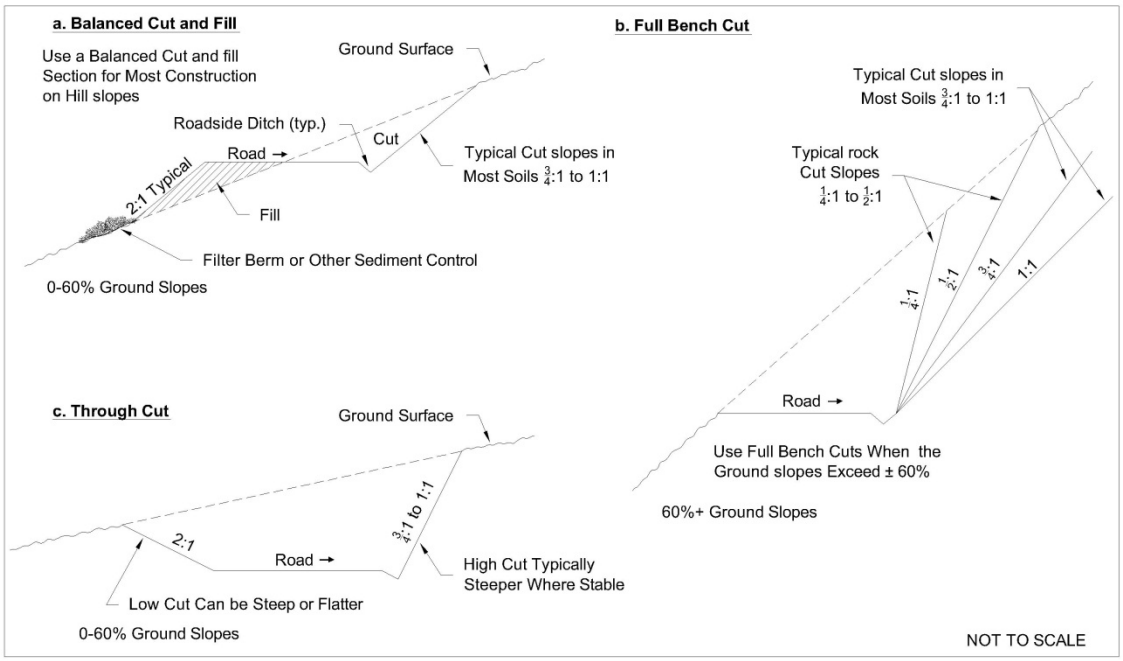


Figure 7: Fill Slope Design Options

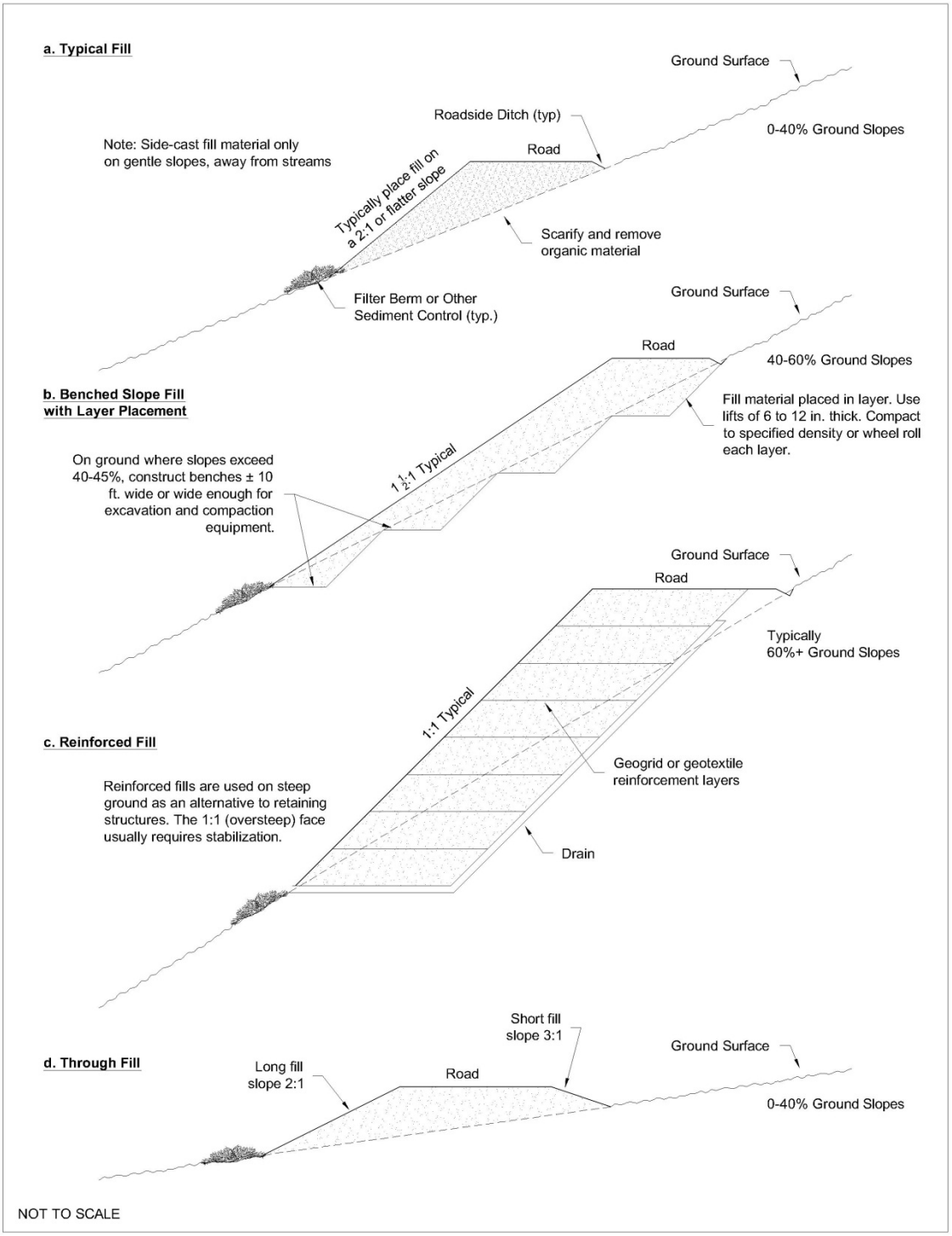
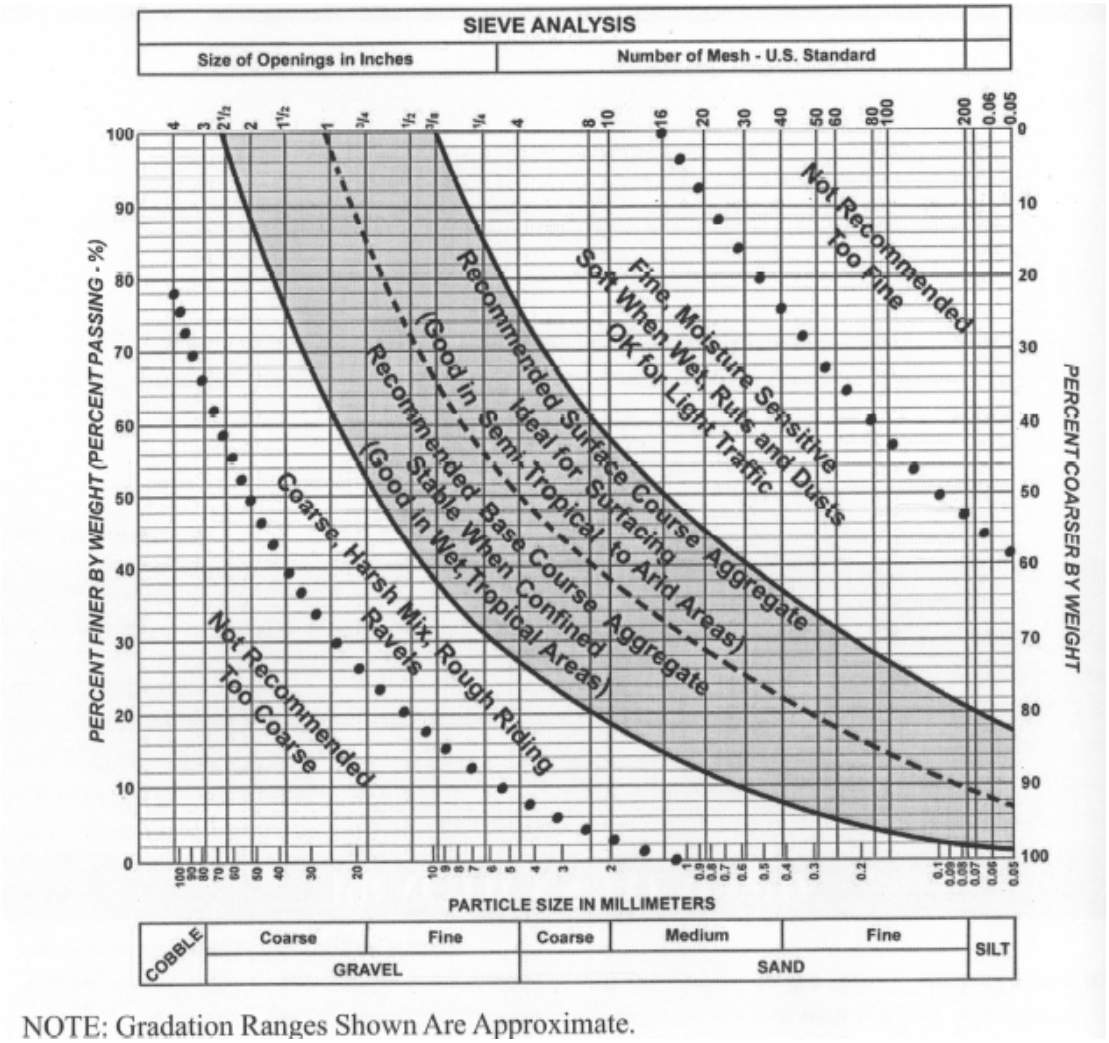


Figure 8: Gradation and Performance of Roadway Surfacing Materials



NOTE: Gradation Ranges Shown Are Approximate.

Figure 9: Corrugating

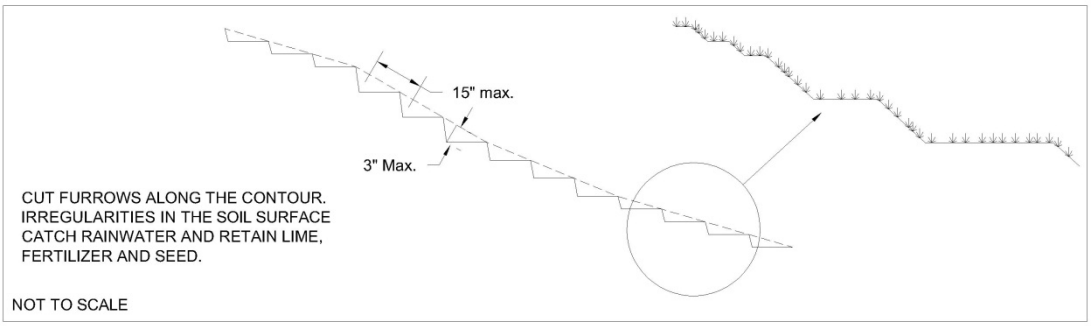
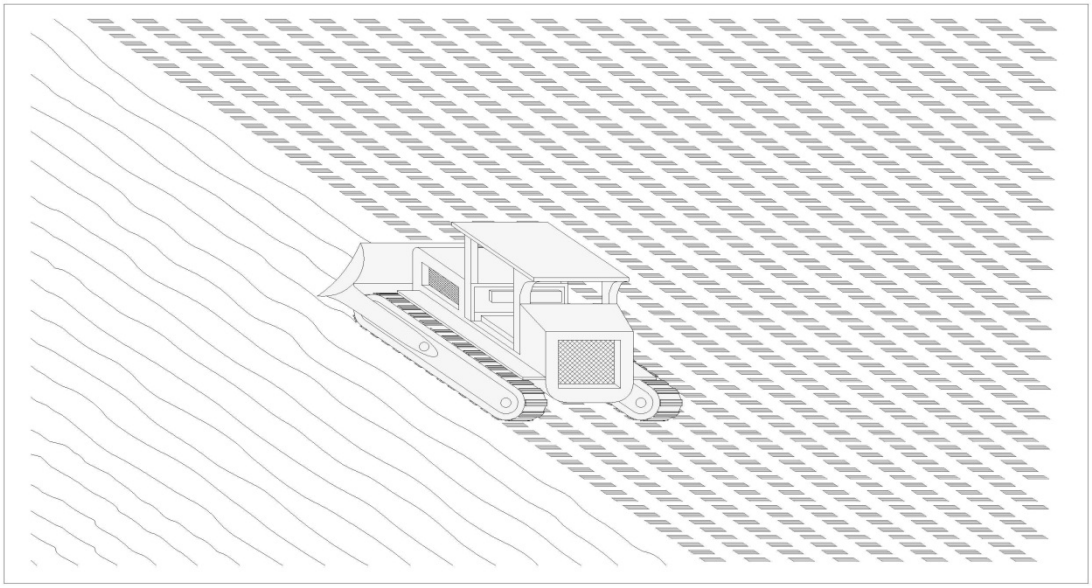


Figure 10: Tracking



5. Mulching

Description

Mulching is a temporary erosion control practice in which materials such as grass, hay, wood chips, wood fibers, straw, or gravel are placed on exposed or recently planted soil surfaces. Mulching stabilizes soils by minimizing rainfall impact and reducing storm water runoff velocity. When used in combination with seeding or planting, mulching can aid plant growth by holding seeds, fertilizers, and topsoil in place, preventing birds from eating seeds, retaining moisture, and insulating plant roots against extreme temperatures.

Mulch mattings are materials such as jute or other wood fibers that are formed into sheets and are more stable than loose mulch. Jute and other wood fibers, plastic, paper, or cotton can be used individually or combined into mats to hold mulch to the ground. Netting can be used to stabilize soils while plants are growing, although netting does not retain moisture or insulate against extreme temperatures. Mulch binders consist of asphalt or synthetic materials that are sometimes used instead of netting to bind loose mulches.

Hydraulic mulching is a temporary erosion control practice in which materials such as grass, hay, wood chips, wood fibers, straw, or gravel are hydraulically applied to exposed or recently planted soil surfaces. Hydraulic application of mulch (as well as seed) can be done quickly and efficiently with the correct equipment and ingredients.

Applicability

Mulching is often used in areas where temporary seeding cannot be used because of environmental constraints. On steep slopes and critical areas such as waterways, mulch matting is used with netting or anchoring to hold it in place. Mulches can be used on seeded and planted areas where slopes are steeper than 2:1 or where sensitive seedlings require insulation from extreme temperatures or moisture retention. Hydraulic mulching is often used in steep areas where regular mulching is difficult because of environmental constraints. Hydraulic mulches can be used on seeded and planted areas where slopes are as steep as 1:1. Mulch is most effective when used on an area less than two acres in size and can last for one to two years.

Limitations

Mulching, matting, and netting might delay seed germination because the cover changes soil surface temperatures.

The mulches themselves are subject to erosion and may be washed away in a large storm.

Maintenance is necessary to ensure that mulches provide effective erosion control.

Hydraulic application of mulch must be done when no rainfall is expected, preferably within a 24-hour time period.

Design criteria

No formal design is required.

Construction Specifications

1. Site preparation:
   a. Prior to mulching, install the necessary temporary or permanent erosion control practices and drainage systems within or adjacent to the area to be mulched.
   b. Slope, grade, and smooth the site to fit needs of selected mulch products.
   c. Remove all undesirable stones and other debris to meet the needs of the anticipated land use and maintenance required.
2. Mulching & anchoring for relatively flat slopes:
   a. Select the appropriate mulch and application rate that will best meet the need and availability of material. When possible, organic mulches should be used for erosion control and plant material establishment. See Table 4a for suggested materials and application rates. Other materials include hydraulic mulch products with 100-percent post-consumer paper content and yard trimming composts. All materials should be free of seed.
   b. Apply mulch after soil amendments and planting is accomplished or simultaneously if hydroseeding is used. See Table 4b for installation guidelines.
   c. Use a mulch crimper to apply and anchor mulch. Crimper should have approximately 6-inch cleats with perpendicular, dull, disc blades. If a crimper is unavailable the Contractor shall apply mulch and anchor it to the soil using one of the methods described in Table 4b. The mulch should be anchored the same day as mulch application. Materials that are heavy enough to stay in place (for example, bark or wood chips on flat slopes) do not need anchoring. Mulches may or may not require a binder, netting, or tacking. Mulch binders should be applied at rates recommended by the manufacturer. Effective use of netting and matting material requires firm, continuous contact between the materials and the soil.
3. Hydraulic mulching for steeper slopes:
   a. The mulch shall be a hydraulically-applied, flexible erosion control blanket composed of long strand, thermally refined wood fibers, crimped, interlocking fibers, and performance enhancing additives. The hydraulic mulch shall require no curing time period and upon application shall form an intimate bond with the soil surface to create a continuous, porous, absorbent and erosion resistant blanket that allows for rapid germination and accelerated plant growth.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Areas should be identified where mulch has loosened or been removed. Such areas should be reseeded (if necessary) and the mulch cover replaced. If washout, breakage, or erosion occurs, surfaces should be repaired, reseeded, and re-mulched, and new netting should be installed. Inspections should be continued until vegetation is firmly established.

Removal

Anchor netting and any other artificial mulch material should be removed when protection is no longer needed and disposed of in a landfill.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

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United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), Field Office Technical Guide. 2002. www.nrcs.usda.gov/technical/efotg

Table 4a: Typical Mulching Materials and Application Rates

Material	Rate per Acre	Requirements	Notes
Organic Mulches			
Straw	1 - 2 tons	Dry, unchopped, unweathered; certified weed free.	Spread by hand or machine; must be tacked or tied down.
Wood fiber or wood cellulose	½ - 1 ton		Use with hydroseeder; may be used to tack straw. Do not use in hot, dry weather.
Wood chips	5 - 6 tons	Air dry. Add fertilizer N, 12 lb/ton.	Apply with blower, chip handler, or by hand. Not for fine turf areas.
Bark	35 yd^3	Air dry, shredded, or hammermilled, or chips	Apply with mulch blower, chip handler, or by hand. Do not use asphalt tack.
Nets and Mats			
Jute net	Cover area	Heavy, uniform; woven of single jute yarn. Used with organic mulch.	Withstands water flow.
Excelsior (wood fiber) mat	Cover area		

Table 4b: Mulch Anchoring Guide

Anchoring Method or Material	Kind of Mulch to be Anchored	How to Apply
1. Mulch netting	Hay or straw	Staple the light-weight paper, jute, wood fiber, or plastic nettings to soil surface according to manufacturer's recommendations. Should be biodegradable. Most products are not suitable for foot traffic.
2. Wood cellulose fiber	Hay or straw	Apply hydroseeder immediately after mulching. Use 500 lbs. Wood fiber per acre. Some products contain an adhesive material, possibly advantageous.
3. Mulch anchoring tool/Crimper	Hay or straw	Apply mulch and pull a mulch anchoring tool (blunt, straight discs) over mulch as near to the contour as possible. Mulch material should be "tucked" into soil surface about 3".
4. Chemical	Hay or straw	Apply Terra Tack AR 120 lbs./ac. In 480 gal. of water (#156/ac.) or Aerospray 70 (60 gal/ac.) according to manufacturer's instructions. Avoid application during rain. A 24-hour curing period and a soil temperature higher than 45 deg. Fahrenheit are required.

6. Re-vegetation

Description

Re-vegetation involves planting seed to establish a vegetative cover on disturbed areas. Re-vegetation reduces erosion and sedimentation by stabilizing disturbed areas in a manner that is economical, adaptable to site conditions, and allows selection of the most appropriate plant materials. Re-vegetation also:

- Absorbs the impact of raindrops
- Reduces the velocity of runoff
- Reduces runoff volumes by increasing water percolation into the soil
- Binds soil with roots
- Protects soil from wind
- Improves wildlife habitat
- Enhances natural beauty

Applicability

Re-vegetation is most effective on slopes no steeper than 2:1 and may be used in areas where exposed soil surfaces are not to be re-graded for periods longer than 30 days. Such areas include denuded areas, soil stockpiles, berms, temporary road banks, etc.

Limitations

The effectiveness of re-vegetation can be limited due to the following:

- High erosion potential during establishment.
- The need for stable soil temperature and soil moisture content during germination and early growth.
- The need to reseed areas that fail to establish.

Proper seedbed preparation and the use of quality seed are important in this practice. Failure to carefully follow sound agronomic recommendations will often result in an inadequate stand of vegetation that provides little or no erosion control.

Seeding does not immediately stabilize soils. Prior to seeding, install necessary erosion and sediment control practices such as diversions, straw bales, and basins until vegetation is established.

Design criteria

1. Successful plant establishment can be maximized with proper planning; consideration of soil characteristics; selection of plant materials that are suitable for the site; adequate seedbed preparation, liming, and fertilization; timely planting; and regular maintenance.
2. Coordinate installation of seeding materials during normal planting seasons for each type of seed material required.
3. Seeding in areas that are non-irrigated or not provided with sprinkling or watering systems shall be restricted according to the following schedule:
    a. Below 6000' elevation: Spring seeding shall occur between spring thaw and July 1st. Fall seeding shall occur from September 1st until consistent ground freeze.
    b. 6000' to 7000' elevation: Spring seeding shall occur between spring thaw and July 1st. Fall seeding shall occur from August 15th until consistent ground freeze.
    c. 7000' to 8000' elevation: Spring seeding shall occur between spring thaw and July 15th. Fall seeding shall occur from August 1st until consistent ground freeze.
    d. Above 8000' elevation: Seeding shall occur from spring thaw until consistent ground freeze.
    e. Spring thaw shall be defined as the earliest date in a calendar year in which seed can be buried ½ inch into the topsoil thru normal drill seeding methods.
    f. Consistent ground freeze shall be defined as that time during fall months in which the topsoil, due to freeze conditions, prevents burying seed ½ inch thru normal drill seeding operations.
4. An evaluation should be conducted to determine if lime is necessary for temporary seeding. In most soils, it takes up to six months for a pH adjustment to occur following the application of lime. Therefore, it may be difficult to justify the cost of liming a temporary site, especially when the soil will later be moved and re-graded.

Construction specifications

1. Seeding does not immediately stabilize soils. Prior to seeding, install necessary erosion and sediment control practices such as diversions and sediment basins until vegetation is established.
2. To control erosion on bare soil surfaces, plants must be able to germinate and grow. Seedbed preparation is essential. Lime and fertilizer may be incorporated into the top two to four inches of the soil, if possible.
3. Surface Roughening: If the area has been recently loosened or disturbed, no further roughening is required. When the area is compacted, crusted, or hardened, the soil surface shall be loosened by disking, raking, harrowing, or other acceptable means.
4. The appropriate seed shall be evenly applied with a broadcast seeder, drill, cultipacker seeder or hydroseeder. Small grains shall be planted no more than 1.5 inches deep. Small seeds, such as Kentucky Bluegrass, should be planted no more than 0.25 inches deep. Other Grasses and Legumes should be planted from 0.25 inch to 0.5 inches deep.
5. Seedings made in fall for winter cover and during hot and dry summer months shall be mulched according to Mulching (M). Temporary seedings made under favorable soil and site conditions during optimum spring and fall seeding dates may not require mulch.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Vegetation is considered established when a density of at least 70 percent of pre-disturbance levels has been reached. Seeded areas should be inspected for failure and any necessary repairs and re-seedings should be made within the same season, if possible.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

Horizon Environmental Services, Inc, Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites. April 2004.

Keller, Gordon, and James Sherar, Low-Volume Roads Engineering, Best Management Practices Field Guide. United States Department of Agriculture (USDA), Forest Service, US Agency of International Development (USAID), 2005. http://www.blm.gov/bmp/field%20guide.htm

United States Army Corps of Engineers (USACE), Engineering and Design - Handbook for the Preparation of Storm Water Pollution Prevention Plans for Construction Activities. February 1997. http://www.usace.army.mil/inet/usace-docs/eng-pamphlets/ep1110-1-16/

7. Riprap

Description

Riprap is a permanent, erosion-resistant layer made of stones or boulders. It is intended to stabilize areas subject to erosion and protect against scour of the soil caused by concentrated, high velocity flows.

Applicability

Riprap can be used for areas subject to erosion or weathering, particularly where conditions prohibit the establishment of re-vegetation or where flow velocities exceed 5 ft/sec. Riprap may be used in the following applications:

Cut-and-fill slopes

Channel side slopes and/or bottoms

Inlets and outlets to sediment traps

Roadside ditches

Limitations

Riprap is limited by steepness of slope, because slopes greater than 1.5:1 have potential riprap loss due to erosion and sliding. When working within flowing streams, measures should be taken to prevent excessive turbidity and erosion during construction. Bypassing base flows or temporarily blocking base flows are two possible methods.

Design criteria

Gradation

A well-graded mixture of rock sizes should be used instead of one uniform size (with the exception of dry stacking boulders). 50% by weight should be larger than the specified design size. The diameter of the largest stone size in such a mixture should be 1.5 times the d50 size with smaller sizes graded down to one inch. When dry stacking up a slope, boulders may be uniform in size or may get gradually smaller as the boulders are placed up the slope.

Quality

Riprap must be durable so that freeze/thaw cycles do not decompose it in a short time. They should be angular and not subject to breaking down when exposed to water or weathering. The specific gravity should be at least 2.5.

Size

The sizes of stones used for riprap protection are determined by purpose and specific site conditions:

1. Slope Stabilization. Riprap stone for slope stabilization not subject to flowing water should be sized for the proposed grade. The gradient of the slope to be stabilized should be less than the natural angle of repose of the stone selected. Angles of repose of riprap stones may be estimated from Figure 11. Riprap used for surface stabilization of slopes does not add significant resistance to sliding or slope failure and should not be considered a retaining wall. Slopes approaching 1.5:1 may require special stability analysis. The inherent stability of the soil must be satisfactory before riprap is used for surface stabilization.
2. Stream bank Protection. If the shear stress is estimated, riprap stone for stream bank protection can be selected from the gradations in Table 5, below. The shear stress can be estimated from the depth of flow and the channel slope (see note for Table 5). The riprap should extend two feet below the channel bottom and be keyed into the bank both at the upstream end and downstream end of the proposed work or reach.

Filter material

Filter material is sometimes used between riprap and the underlying soil surface to prevent soil from moving through the riprap. Filter cloth material or a layer of sand and/or gravel is usually used for the filter.

The design of a sand/gravel filter blanket is based on the ratio of particle size in the overlying filler material to that of the base material in accordance with the criteria below. Multiple layers (each a minimum of 6 inches thick) may be designed to affect a proper filter if necessary. A sand/gravel filter blanket should have the following relationship for a stable design:

$$\frac{\text{d15 filter}}{\text{d85 base}} \leq 5$$

$$5 < \frac{\text{d15 filter}}{\text{d50 base}} \leq 40$$

$$\frac{\text{d50 filter}}{\text{d50 base}} \leq 40$$

The design of a synthetic filter fabric, which may be used with or in place of gravel filters, is based upon the following particle size relationships:

1. Filter fabric covering a base containing 50% or less by weight of fine particles (#200 sieve size):
   a. d85 base (mm)

      $$\frac{\text{EOS*filter fabric (mm)}}{} > 1$$

   b. total open area of filter fabric should not exceed 36 %
2. Filter fabric covering other soils:
   a. EOS is no larger than 0.21 mm (#70 sieve size)
   b. total open area of filter fabric should not exceed 10%

*EOS - Equivalent opening size compared to a U.S. standard sieve size

No filter fabric should have less than 4% open area or an EOS less than U.S. Standard Sieve #100 (0.15 mm). The permeability of the fabric must be greater than that of the soil. The fabric may be made of woven or non-woven monofilament yarns and should meet the following minimum requirements:

Thickness 20-60 mils

Grab strength 90-120 lbs
Conform to ASTM D-1682 or ASTM D-177

Construction Specifications

See Figure 13 for dry stacking boulders. See Sediment Trap for a detail of a riprap lined channel leading into a sediment trap.

1. Subgrade Preparation. Prepare the subgrade for riprap to the required lines and grades shown on the plans. Compact any fill required in the subgrade to a density approximating that of the undisturbed material or overfill depressions with riprap. Remove brush, trees, stumps, and other objectionable material. Cut the subgrade sufficiently deep so that the finished grade of the riprap will be at the elevation of the surrounding area. Channels should be excavated sufficiently to allow placement of the riprap in a manner such that the finished inside dimensions and grade of the riprap meet design specifications.
2. Sand/gravel filter blanket. If using a granular filter, spread filter stone in a uniform layer to the specified depth. Where more than one layer of filter material is used, spread the layers with minimal mixing.
3. Synthetic filter fabric. If using a filter fabric, place the cloth directly on the prepared foundation. Where large stones are to be placed, a 4-inch layer of fine sand or gravel is recommended to protect the filter cloth. Filter fabric is not recommended as a filter on slopes steeper than 2 horizontal to 1 vertical.
4. Stone placement. Place riprap so that it forms dense, well-graded mass of stone with a minimum of voids. The desired distribution of stones throughout the mass may be obtained by selective loading at the quarry and controlled dumping during final placement. Place riprap to its full thickness in one operation. Do not place riprap by dumping through chutes or other methods that cause segregation of stone sizes. If a filter is used, be careful not to dislodge the underlying base filter or damage the filter cloth when placing the stones. If damage occurs, remove the riprap and repair filter.
5. The toe of the riprap should be keyed into a stable foundation at its base as shown in Figure 12 if required for slope stabilization and stream bank protection. The finished slope should be free of pockets of small stone or clusters of large stones. Hand placing may be necessary to achieve proper distribution of stone sizes to produce a relatively smooth, uniform surface. The finished grade of the riprap should blend with the surrounding area.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). If riprap has been damaged or dislodged, repairs should be made to prevent a progressive failure. If repairs are needed repeatedly at one location, the site should be evaluated to determine if the original design conditions have changed. Channel obstructions such as trees and sediment bars can change flow patterns and cause erosive forces that may damage riprap. Control of weed and brush growth may be needed in some locations.

Removal

Riprap is generally not removed.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

New York State Department of Environmental Conservation, New York Guidelines for Urban Erosion and Sediment Control. New York. Fourth Edition, 1997. http://www.dec.state.ny.us/website/dow/toolbox/escstandards

Table 5: Riprap Gradations

Unit shear stress (Ib/ft^2)	D_{50}	d_{max}	Minimum blanket thickness (inches)
0.67	2	4	6
2	6	9	14
3	9	14	20
4	12	18	27
5	15	22	32
6	18	27	32
7.8	21	32	38
8	24	36	43

Unit shear stress calculated as T=y*d*s where:

T = shear stress in lb/ft^2

y = unit weight of water, 62.4 lb/ft^3

d = flow depth in ft

s = channel gradient in ft/ft

Figure 11: Angles of Repose of Riprap Stones

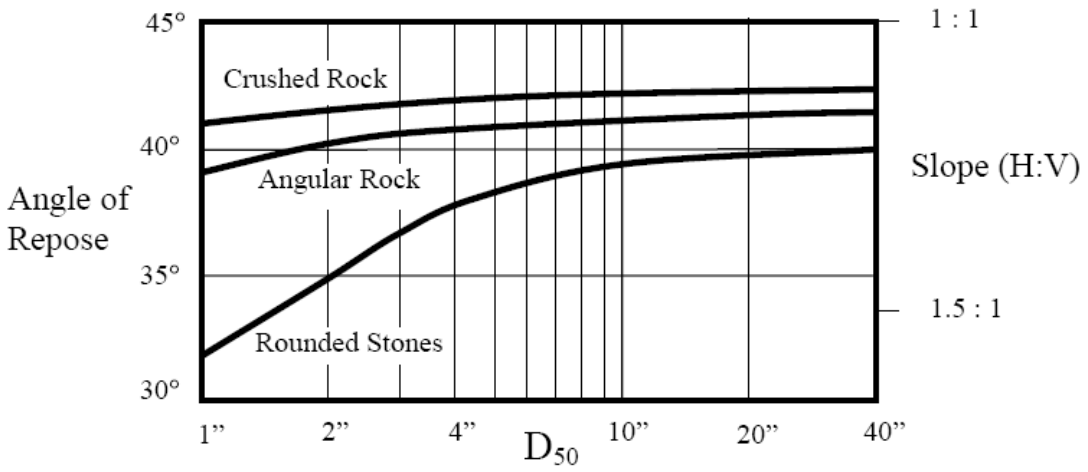


Figure 12: Typical Riprap Slope Protection Detail

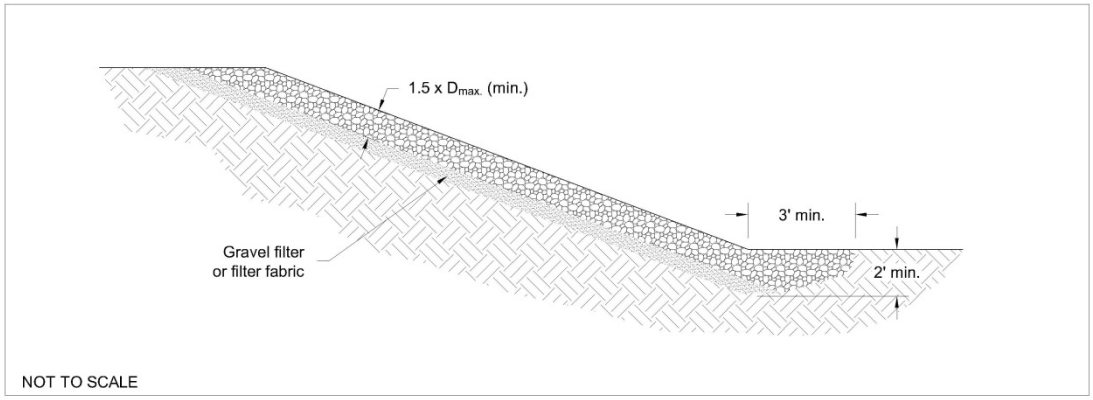
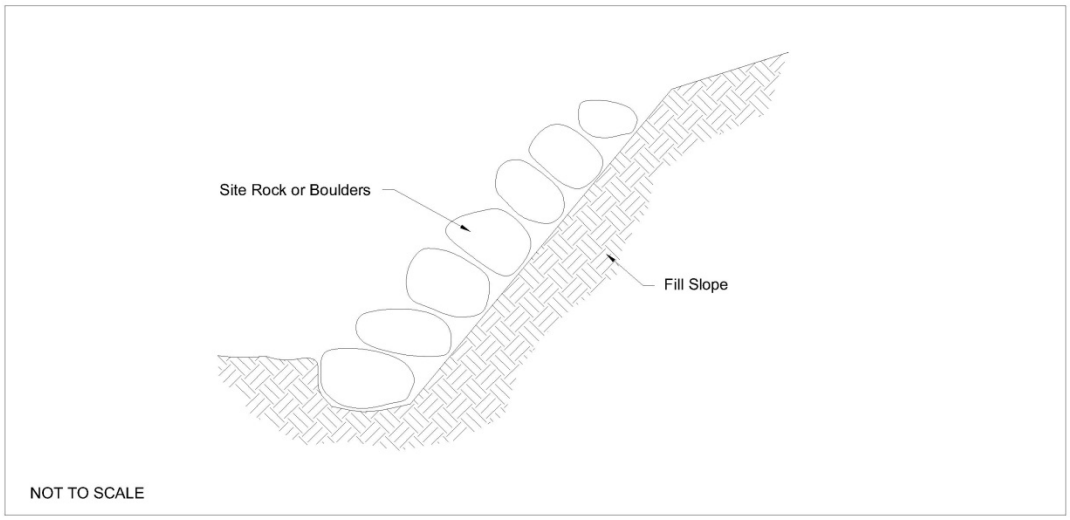


Figure 13: Typical Boulder Drystack Detail



8. Silt Fence

Description

Silt fences are used as temporary perimeter controls around sites where there will be soil disturbance due to construction activities. They consist of a length of filter fabric stretched between anchoring posts spaced at regular intervals along the site perimeter.

Applicability

Silt fences are generally applicable to construction sites with relatively small drainage areas. They are appropriate in areas where runoff will be occurring as low-level shallow flow, not exceeding 0.5 cubic feet per second. The drainage area for silt fences generally should not exceed 0.25 acre per 100-foot fence length. Slope length above the fence should not exceed 100 feet. Silt fence may be used as temporary slope breakers to reduce runoff velocity.

Limitations

Silt fences should not be installed along areas where rocks or other hard surfaces will prevent uniform anchoring of fence posts and entrenching of the filter fabric. This will greatly reduce the effectiveness of silt fencing and can create runoff channels leading off site.

Silt fences are not suitable for areas where large amounts of concentrated runoff are likely.

Open areas where wind velocity is high may present a maintenance challenge, as high winds may accelerate deterioration of the filter fabric.

Silt fences should not be installed across streams, ditches, or waterways.

When the pores of the fence fabric become clogged with sediment, pools of water are likely to form on the uphill side of fence. Siting and design of the silt fence should account for this and care should be taken to avoid unnecessary diversion of stormwater from these pools that might cause further erosion damage.

Design criteria

The fence should be designed to withstand the runoff from a 2-year, 24-hour storm event.

Construction specifications

1. Erect silt fence according to Figure 14.
2. If standard strength fabric is used in combination with wire mesh, the support posts should be spaced no more than 10 feet apart. If extra-strength fabric is used without wire mesh reinforcement, the support posts should be spaced no more than 6 feet apart.

3. Stakes used to anchor the filter fabric should be either wooden or metal. Wooden stakes should be at least 3 feet long and have a minimum diameter of 2 inches if a hardwood such as oak is used. Softer woods such as pine should be at least 4 inches in diameter. When using metal post in place of wooden stakes, they should have a minimum weight of 1.00 to 1.33 lb/linear foot. If metal posts are used, attachment points are needed for fastening the filter fabric using wire ties. The height of the fence posts should be between 16 and 34 inches above the original ground surface.
4. Material for silt fences should be a pervious sheet of synthetic fabric such as polypropylene, nylon, polyester, or polyethylene yarn, chosen based on minimum synthetic fabric requirements, as shown in the following table:

Physical Property	Requirements
Filtering Efficiency	75 – 85% (minimum): highly dependent on local conditions
Tensile Strength at 20% (maximum) Elongation	Standard Strength: 30 lbs/linear inch (minimum) Extra Strength: 50 lbs/linear inch (minimum)
Ultraviolet Radiation	90% (minimum)
Slurry Flow Rate	0.3 gal/ft^2/min (minimum)

5. Use a continuous roll of fabric to eliminate unwanted gaps in the fence. If a continuous roll of fabric is not available, the fabric should overlap from both directions only at stakes or posts with a minimum overlap of 6 inches.
6. Extend silt fence across grade and upslope for a short distance.
7. Compact backfill at base of fabric.
8. A trench should be excavated to bury the bottom of the fabric fence at least 6 inches below the ground surface. This will help prevent gaps from forming near the ground surface that would render the fencing useless as a sediment barrier
9. If using silt fence as temporary slope breakers to reduce runoff velocity, space according to the following table:

Slope (%)	Spacing (feet)
5 – 15	300
>15 – 30	200
>30	100

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan. Inspect silt fences to ensure that they are intact and that there are no gaps at the fence-ground interface or tears along the length of the fence. If gaps or tears which impact the effectiveness of the BMP are found, they should be repaired or the fabric should be replaced immediately. Accumulated sediments should be removed from the fence base when the sediment reaches one-third to one-half the height of the fence. Sediment removal should occur more frequently if accumulated sediment is creating noticeable strain on the fabric and there is the possibility of the fence failing from a sudden storm event.

Removal

Remove silt fences and all accumulated sediment after uphill drainage areas are stabilized by vegetation or other means.

References

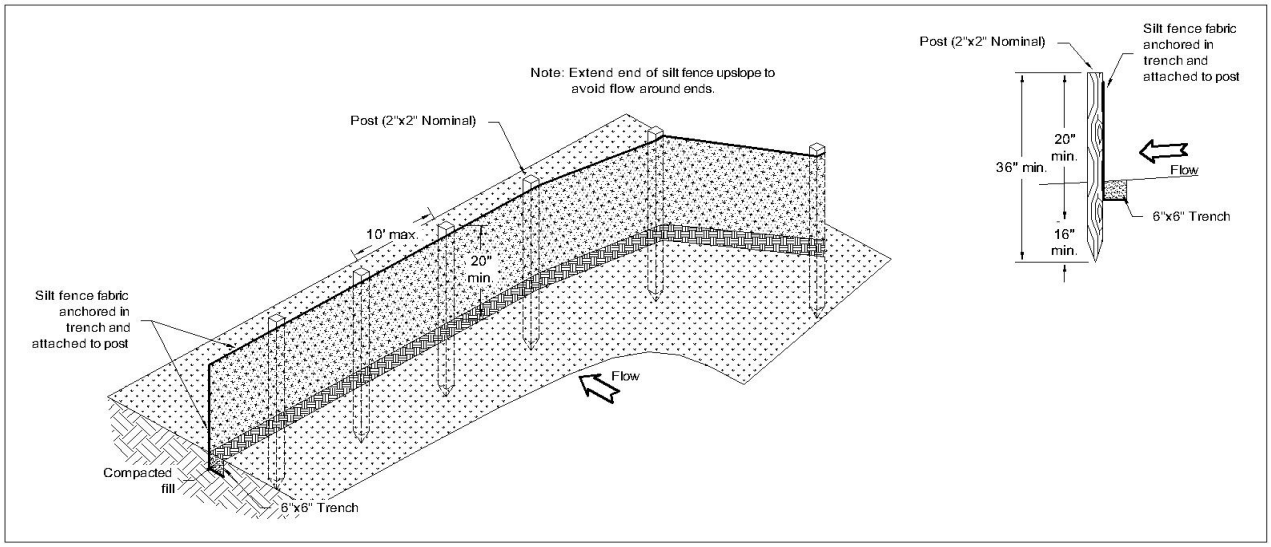
Colorado Department of Transportation (CDOT), Erosion Control and Stormwater Quality Guide. 2002.
http://www.dot.state.co.us/environmental/envWaterQual/wqms4.asp

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm

Horizon Environmental Services, Inc, Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites. April 2004.

Keller, Gordon, and James Sherar, Low-Volume Roads Engineering, Best Management Practices Field Guide. United States Department of Agriculture (USDA), Forest Service, US Agency of International Development (USAID), 2005. http://www.blm.gov/bmp/field%20guide.htm

Figure 14: Silt Fence Installation



9. Straw Bale Barrier

Description

A straw bale barrier is a series of entrenched and staked straw bales placed on a level contour to intercept sheet flows. The barrier reduces runoff velocity and filters sediment laden runoff from small drainage areas of disturbed soil. The barrier may also be used to protect against erosion. Straw bale barriers have an estimated design life of three (3) months.

Applicability

Straw bale barriers may be used below disturbed areas subject to sheet and rill erosion where the length of slope above the straw bale barrier does not exceed the following limits:

Constructed Slope	Percent Slope	Slope Length (ft)
2:1	50%	25’
3:1	33%	50’
4:1	25%	75’

Straw bales may be used in the following applications:

- Below the toe of erodible slopes or other small cleared areas
- At the top of slopes to divert runoff away from disturbed slopes
- As sediment traps at outlets to culverts, ditches, turnouts, etc.
- Along the perimeter of a site
- Around temporary stockpiles and spoil areas
- Along streams and channels for both erosion and sediment control
- As check dams across mildly sloped swales or construction roads
-

Limitations

For short-term use only
For use below small drainage areas less than 2 acres
Decomposes over time
May be consumed by livestock
Straw bales must be certified weed free to avoid invasive weeds that may develop and should not be used in areas where weeds are a concern.
Removal of anchor stakes will be necessary after stabilization is complete

Not recommended for concentrated flow, live streams, or swales where there is the possibility of a washout

Design criteria

No formal design is required.

Construction specifications

See Figure 15 for installation details.

1. Bales shall be placed in a single row on a level contour with ends of adjacent bales tightly abutting one another. Bales shall be certified weed free.
2. Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
3. All bales shall be either wire-bound or string-tied. Straw bales shall be installed so that bindings are oriented around the sides rather than along the tops and bottoms of the bales in order to prevent deterioration of the bindings.
4. A trench shall be excavated the width of a bale and the length of the proposed barrier to a minimum depth of 4 inches. Stake the bales with minimum 2" x 2" x 36" wood stakes or standard "T" or "U" steel posts (minimum weight of 1.33 pounds per linear foot).
5. After the bales are staked and chinked (gaps filled by wedging), the excavated soil shall be backfilled against the barrier. Backfill soil shall conform to the ground level on the downhill side and shall be built up to 4 inches against the uphill side of the barrier.
6. Each bale shall be securely anchored by at least two stakes driven through the bale. The first stake or steel post in each bale shall be driven toward the previously laid bale to force the bales together. Stakes or steel pickets shall be driven a minimum 12 inches deep into the ground to securely anchor the bales.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm water Management Plan. Close attention should be paid to the repair of damaged or rotting bales, end runs and undercutting beneath bales. Necessary repairs to barriers or replacement of bales should be accomplished promptly. Sediment deposits should be removed when the level of deposition reaches approximately one-half the height of the barrier.

Removal

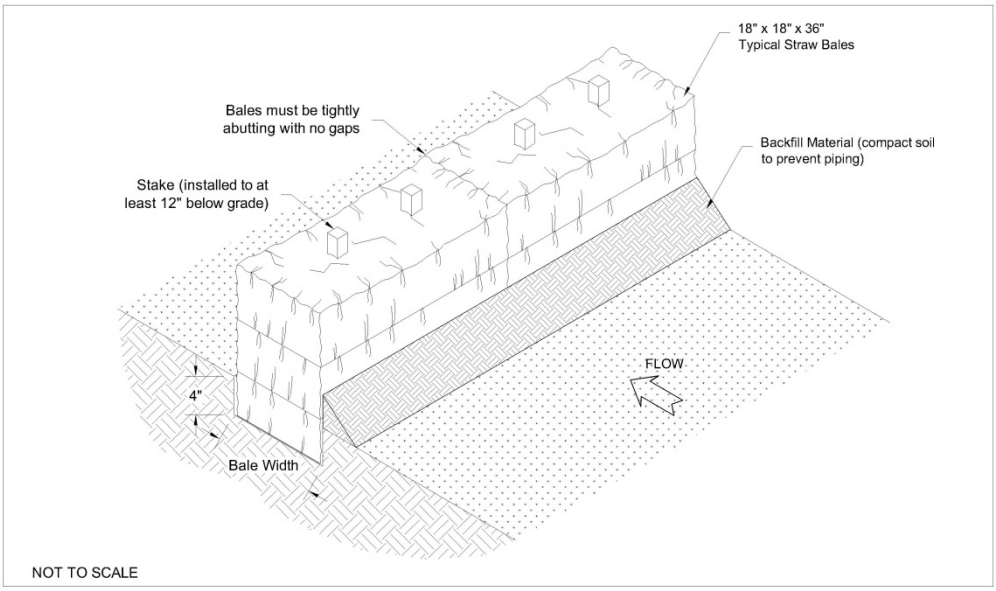
Straw bale barriers may be removed when they have served their usefulness or may remain in place to decompose over time. Straw bales should not be removed, however, until the upslope areas have been permanently stabilized. Any sediment deposits remaining in place after the straw bale barrier is no longer required should be dressed to conform to the existing grade, prepared and seeded.

References

Colorado Department of Transportation (CDOT), Erosion Control and Storm water Quality Guide. 2002. <http://www.dot.state.co.us/environmental/envWaterQual/wqms4.asp>

Horizon Environmental Services, Inc, Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites. April 2004.

Figure 15: Straw Bale Installation


18" x 18" x 36"
Typical Straw Bales
Bales must be tightly
abutting with no gaps
Backfill Material (compact soil
to prevent piping)
Stake (installed to at
least 12" below grade)
FLOW
4"
Bale Width
NOT TO SCALE

10. Trench Breakers

Description

Trench breakers, also known as trench plugs, are used to slow the flow of subsurface water along a pipeline trench. Trench breakers may be constructed of materials such as sand bags or polyurethane foam.

Applicability

Trench breakers may be used in the following applications:

On steep slopes
Above wetlands
At waterbody crossings
At road crossings

Design criteria

No formal design is required.

Construction specifications

1. Trench breakers should be installed both before and after the lowering-in of pipeline.
2. An engineer or similarly qualified professional shall determine the need for and spacing of trench breakers. Otherwise, spacing shall be according to the following table:

Slope (%)	Spacing (feet)
5 – 15	300
15 – 30	200
>30	100

3. At a minimum, install a trench breaker at the base of slopes greater than 5 percent where the base of the slope is less than 50 feet from a waterbody or wetland and where needed to avoid draining a waterbody or wetland.
4. Trench breakers should be installed to the top of the excavated trench line.
5.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan. Repair any damaged areas.

References

Federal Energy Regulatory Commission (FERC), Upland Erosion Control, Revegetation, and Maintenance Plan. January 2003.

11. Water Bars

Description

A water bar is an earthen ridge, or ridge and channel, constructed diagonally across a sloping road, trail, or disturbed area that is subject to erosion. Water bars are normally used for drainage and erosion protection of buried pipelines or closed, blocked, or infrequently used roads to limit the accumulation of erosive volumes of water by diverting surface runoff at pre-designed intervals.

Applicability

Water bars are applicable where runoff protection is needed to prevent erosion on sloping access right-of-ways or long, narrow sloping areas generally less than 100 feet in width. This is a practice that is often used on buried pipelines, limited-use roads, trails, and firebreaks. It is an excellent method of retiring roads and trails as well as abandoned roads where surface water runoff may cause erosion of exposed mineral soil.

Limitations

Not for use on concentrated flows

May cause concentrated flows from sheet flow

- Requires vegetative cover or other filter at discharge point
-

Design criteria

No formal design is required.

Construction specifications

See Figure 13.

1. Clear the base for the ridge before placing fill.
2. Install the water bar across the right-of-way according to Figure 13 as soon as the base is cleared and graded. The off-slope drainage should be 2 to 5 percent.
3. Use a trackhoe or bulldozer to compact the ridge to the design cross section.
4. Vehicle crossings shall be stabilized with gravel. Exposed areas shall be immediately seeded and mulched.
5. Extend the water bar inlet and outlet 1 foot or more beyond the edge of the right-of-way or disturbed area to keep the diverted water from re-entering the area.
6. Space the water bars according to Table 9.
7. Locate the outlet on an undisturbed area. Field spacing shall be adjusted to use the most stable outlet areas. Outlet protection will be provided when natural areas are not adequate.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan. Inspect water bars for erosion damage and sediment. Check outlet areas and make repairs as needed to restore operation.

Water Bar Removal

If water bars are used on a closed or blocked road, they should be removed prior to re-opening of the road. Water bars on infrequently used roads or other disturbed areas may remain in place as long as necessary.

References

Horizon Environmental Services, Inc, Guidance Document Reasonable and Prudent Practices for Stabilization (RAPPS) of Oil and Gas Construction Sites. April 2004.

Keller, Gordon, and James Sherar, Low-Volume Roads Engineering, Best Management Practices Field Guide. United States Department of Agriculture (USDA), Forest Service, US Agency of International Development (USAID), 2005. <http://www.blm.gov/bmp/field%20guide.htm>

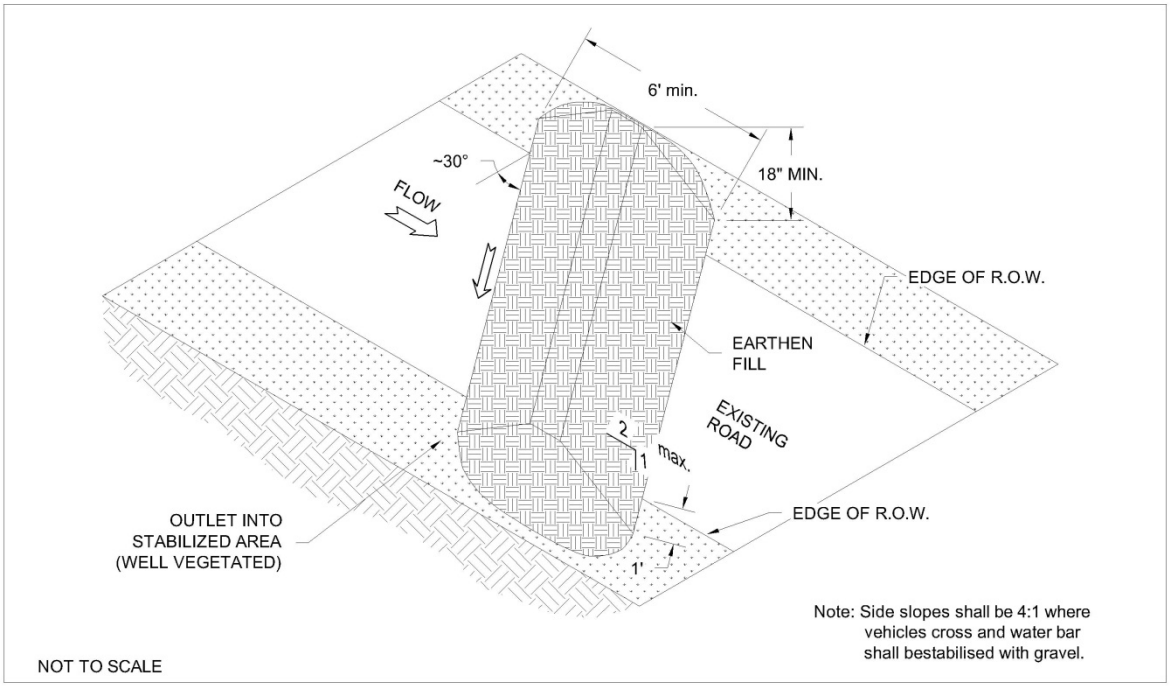
Maine Department of Conservation, Best Management Practices for Forestry: Protecting Maine's Water Quality. Maine Forest Service, Forest Policy and Management Division. Augusta, Maine. 2004. <http://www.state.me.us/doc/mfs/pubs/pdf/bmp_manual/bmp_manual.pdf>

Table 16: Water Bar Spacing

Road/Trail Grade (%)	Low to Non-Erosive Soils (1)	Erosive Soils (2)
0 - 5	245'	130'
6 – 10	200'	100'
11 - 15	150'	65'
16 - 20	115'	50'
21 - 30	100'	40'
31+	50'	30'

[1]Low Erosion Soils = Coarse Rocky Soils, Gravel, and Some Clay
[2]High Erosion Soils = Fine, Friable Soils, Silt, Fine Sands

Figure 17: Water Bar Installation



12. Vegetated Buffer

Description

Vegetated buffers (also known as vegetated filter strips) are areas of either natural or established vegetation that are maintained to protect the water quality of neighboring areas. Buffers reduce the velocity of storm water runoff, provide an area for the runoff to permeate the soil, contribute to groundwater recharge, and act as filters to catch sediment. The reduction in velocity also helps to prevent soil erosion.

The use of existing natural vegetation is preferred over newly established vegetation for the following reasons:

Can process higher quantities of storm water runoff than newly seeded areas.

Does not require time to establish.

Has a higher filtering capacity than newly planted vegetation because aboveground and root structures are typically denser.

Reduces storm water runoff by intercepting rainfall, promoting infiltration, and lowering the water table through transpiration.

- Provides a fully developed habitat for wildlife.
-

Applicability

Vegetated buffers can be used in any area that is able to support vegetation but they are most effective and beneficial on floodplains, near wetlands, along streambanks, and as stabilized outlets to runoff controls such as diversions, water bars, or culverts. Buffers are also effective in separating land use areas that are not compatible and in protecting wetlands or water bodies by displacing activities that might be potential sources of non-point source pollution.

Limitations

Vegetated buffers require plant growth before they can be effective, and land on which to plant the vegetation must be available.

- Although vegetated buffers help to protect water quality, they usually do not effectively counteract concentrated storm water flows to neighboring or downstream wetlands.

Design criteria

No formal design is required.

Construction specifications

1. Buffer widths should be determined after careful consideration of slope, vegetation, soils, depth to impermeable layers, runoff sediment characteristics, type and quantity of storm water pollutants, and annual rainfall. Buffer widths should increase as slope increases.
2. Zones of vegetation (native vegetation in particular), including grasses, deciduous and evergreen shrubs, and understory and overstory trees, should be intermixed.
3. Fertilizing seeded or planted ground may enhance growth (and improve its effectiveness as a buffer).
4. When using naturally vegetated areas, vegetation should be marked for preservation before clearing activities begin. Barriers may be used to prevent the approach of equipment within protected areas.
5. Direct sediment-laden water onto the naturally vegetated or stabilized planted ground.
6. Do not place any equipment, construction debris, or extra soil in the buffer area.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan. Keeping vegetation healthy in a recently established buffer requires routine maintenance, which (depending on species, soil types, and climatic conditions) may include weed control, fertilizing, liming, and irrigating. Once established or if using a naturally vegetated area, buffers do not require much maintenance beyond repairing or replacing damaged vegetation. Inspections should focus on encroachment, gully erosion, density of vegetation, evidence of concentrated flows through the areas, and any damage from foot or vehicular traffic. If there is more than 6 inches of sediment in one place, it should be removed.

Removal

During final site cleanup, any barriers placed around preserved natural areas should be removed.

References

Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES). Construction Site Storm Water Runoff Control. Washington, D.C., February, 2003. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/con_site.cfm>

13. Wattles

Description

A wattle (also called a fiber roll) consists of straw, flax, or other similar materials bound into a tight tubular roll. When wattles are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Applicability

Wattles may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- At the overflow locations of sediment traps
- As check dams in unlined ditches
- Around temporary stockpiles

Limitations

- Wattles are not effective unless trenched.
- Wattles at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20-in. diameter or installations achieving the same protection (i.e. stacked smaller diameter wattles, etc.).
- Difficult to move once saturated.
- If not properly staked and trenched in, wattles could be transported by high flows.
- Wattles have a very limited sediment capture zone.
- Wattles should not be used on slopes subject to creep, slumping, or landslide.
- Wattles should not be used where periodic road or surface maintenance activities are expected.

Design criteria

No formal design is required.

Construction Specifications

Wattles should be either prefabricated rolls or rolled tubes of erosion control blanket. (If using an erosion control blanket, roll the length of erosion control blanket into a tube of minimum 8 in. diameter and bind roll at each end and every 4 ft along length of roll with jute-type twine.)
See Figure W-1 for wattles used to control erosion along slopes.

1. Locate wattles on level contours spaced as follows:
    a. Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
    b. Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
    c. Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
2. Turn the ends of the wattles up slope to prevent runoff from going around the roll.
3. Stake wattles into a 2 to 4 in. deep trench with a width equal to the diameter of the wattle. Drive stakes at the end of each wattle and spaced 4 ft maximum on center.
4. If more than one wattle is placed in a row, the rolls should be overlapped, not abutted.

Maintenance considerations

The frequency of inspections should be in accordance with the Storm Water Management Plan (SWMP). Repair or replace split, torn, unraveling, or slumping rolls. If the wattle is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates must be periodically removed in order to maintain wattle effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the wattle and the adjacent ground surface.

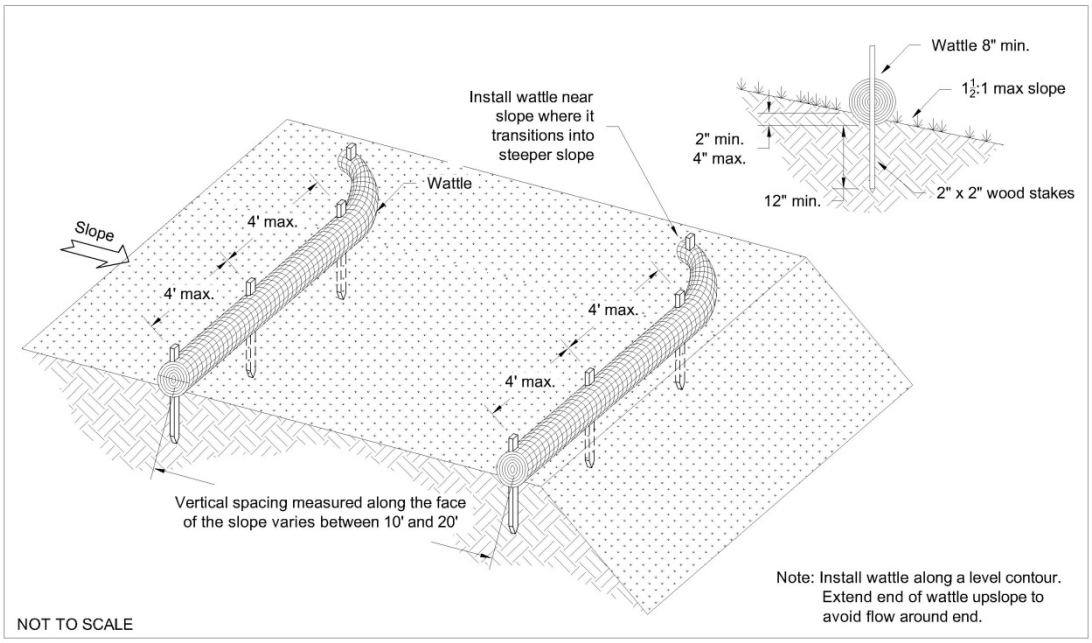
Removal

Wattles are typically left in place. If wattles are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

References

California Stormwater Quality Association, Stormwater Best Management Practice (BMP) Handbook – Construction. January, 2003.
<http://www.cabmphandbooks.com/Construction.asp>

Figure 18: Wattle Installation



14. Soil Retention Measures

BMP Objectives
- Erosion control
- Wind erosion control
- Soil stabilization
- Worker protection

Potential Alternatives
- Mulching
- Temporary seeding
- Geotextiles

Definition and Purpose

Soil retention measures are structures or practices used to hold soil in place or to keep it contained within a site boundary. The two main methods of soil retention that will be examined in this fact sheet are structural methods (mainly retaining walls,) and soil binders. Retaining walls are methods of erosion control and also a method of protecting workers from falling or sliding dirt during a construction project. Soil binders consist of applying and maintaining polymeric or lignin sulfonate soil stabilizers or emulsions. They are materials temporarily applied to a soil surface to prevent water and wind erosion during the duration of construction.

Applicability

Reinforced soil-retaining structures such as retaining walls and grading should be used when sites have very steep slopes or loose, highly erodible soils that cause other methods, such as chemical or vegetative stabilization or regarding, to be ineffective. The preconstruction drainage pattern should be maintained to the extent possible.

Soil binders are applied to disturbed areas requiring short-term protection. Because soil binders can often be incorporated into the earth work, they may be a good choice for areas where grading activities will soon resume. Soil binders are also very suitable for use on stockpiles.

Limitations

Structural methods

- Soil retention structures must be designed to handle expected loads.
- Heavy rains or mass wasting may damage or destroy these structures and result in sediment inputs to waterbodies.

Soil binders

- Soil binders are temporary in nature and may need reapplication.
- Soil binders require a minimum curing time as prescribed by the manufacturer, which may be 24 hours or longer until fully effective.
- Soil binders will generally experience spot failures during heavy rainfall events. If runoff penetrates the soil at the top of a slope treated with a soil binder, it is likely that the runoff will undercut the stabilized soil layer and discharge at a point further down slope.
- They do not hold up to pedestrian or vehicular traffic across treated areas.
- Soil surfaces made primarily of silt and clay may not be penetrated by soil binders, particularly when compacted.
- If low temperatures occur within 24 hours of application, soil binders may not cure.
- The water quality impacts of soil binders are relatively unknown and some may have water quality impacts due to their chemical impacts.

Siting and Implementation Guidelines

Structural methods

- To ensure safety of the retaining structure, it should be designed by a qualified engineer who understands all of the design considerations, such as the nature of the soil, location of the ground water table, and the expected loads.
- Take care to ensure that the hydraulic pressure does not build up behind the retaining structure and cause failure.
- Examples of the reinforcing soil retaining structures include:
- *Skeleton sheeting*. This is an inexpensive soil bracing system that requires soil to be cohesive and consists of construction grade lumber being used to support the excavated face of a slope.
- *Continuous sheeting*. This method involves using a material that covers the entire slope continuously, with struts and boards placed along the slope to support the slope face- steel, concrete, or wood are the appropriate materials. An example of a continuous sheeting retaining wall is shown in Figure 1.

Figure 1

- *Permanent retaining walls*. Walls of concrete masonry or wood (usually railroad ties) that are left in place after construction is complete in order to provide continued support of the slope. An example of a permanent retaining wall is shown in Figure 2.

Figure 2

Soil binders

- Soil type will dictate which soil binder is appropriate to use.
- A soil binder must be environmentally benign, easy to apply, easy to maintain, economical, and shall not stain paved or painted surfaces.

- Avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation.

Selecting a soil binder

- Properties of common soil binders used for erosion control are provided on Table 1. This should be used to select an appropriate binder.

Table 1: Properties of Soil Binders for Erosion Control

Evaluation Criteria	Binder Type			
	Plant Material Based (Short Lived)	Plant Material Based (Long Lived)	Polymeric Emulsion Blends	Cementitious-Based Binders
Relative Cost	Low	Low	Low	Low
Resistance to Leaching	High	High	Low to Moderate	Moderate
Resistance to Abrasion	Moderate	Low	Moderate to High	Moderate to High
Longevity	Short to Medium	Medium	Medium to Long	Medium
Minimum Curing Time Before Rain	9 to 18 hours	19 to 24 hours	0 to 24 hours	4 to 8 hours
Compatibility with Existing Vegetation	Good	Poor	Poor	Poor
Mode of Degradation	Biodegradable	Biodegradable	Photodegradable/ Chemically Degradable	Photodegradable/ Chemically Degradable
Labor Intensive	No	No	No	No
Specialized Application Equipment	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher	Water Truck or Hydraulic Mulcher
Liquid/Powder	Powder	Liquid	Liquid/Powder	Powder
Surface Crusting	Yes, but dissolves on rewetting	Yes	Yes, but dissolves on rewetting	Yes
Clean Up	Water	Water	Water	Water
Erosion Control Application Rate	Varies	Varies	Varies	4,000 to 12,000 lbs/acre

- *Soil types and surface materials*- Fines and moisture content are key properties of surface materials. Consider a soil binder's ability to penetrate, likelihood of leaching, and ability to form a surface crust on the surface materials.
- *Frequency of application*- The frequency of application can be affected by subgrade conditions, surface type, climate, and maintenance schedule. Frequent applications could lead to high costs. Application frequency may be minimized if the soil binder has good penetration, low evaporation, and good longevity.
- Examples of plant material based (short lived) binders are Guar, Psyllium, and Starch.
- Examples of plant material based (long lived) binders are Pitch and Rosin Emulsion.
- Examples of Polymeric Emulsion Blend Binders are Acrylic Copolymers, Liquid Polymers of Methacrylates and Acrylates, Copolymers of Sodium Acrylates and Acrylamides, Poly-Acrylamide and Copolymer of Acrylamide, and Hydro-Colloid Polymers.

The main Cementitious-based binder is Gypsum.

- Applying Soil Binders

  - Follow manufacturer's written recommendations for application rates, pre-wetting of application area, and cleaning of equipment after use.
  - Prior to application, roughen embankment and fill areas.
  - Consider the drying time for the selected soil binder and apply with sufficient time before anticipated rainfall.

Maintenance

Structural methods

- Inspect structures periodically, particularly after rainstorms.
- Repair any damage immediately, prior to any reinstallation of the materials.

Soil binders

- Inspect high traffic areas on a daily basis and lower traffic areas on a weekly basis.
- Reapply the selected soil binder as needed for proper maintenance.

Cost

Structural methods

These structures can be expensive because they require a professional engineer to develop a design (estimate to be 25 to 30 percent of construction costs.) Capital costs include mobilization, grading, grooving, tracking and compacting fill, and installing the structures.

Soil binders

Table 2: Approximate Costs for Soil Binders

Soil Binder	Cost per Acre
Plant-Material Based (Short Lived) Binders	$400
Plant-Material Based (Long Lived) Binders	$1,200
Polymeric Emulsion Blend Binders	$400
Cementitious-Based Binders	$800

Effectiveness

If properly designed and installed, these methods can effectively prevent erosion and mass wasting in areas with steep slopes and erodible soils.

Sources

- Picture Source: U.S. Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES), "Construction Site Storm Water Runoff Control: Soil Retention", http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_32.cfm
- Figure 1 Source: Access Downtown Website. Bellevue, Washington. July 26, 2002 Photo. http://www.accessdowntown.com/Project%20Pages/Current%20NE%208th%20pics/NE8thphotos.htm
- Figure 2 Source: Leah Blevins, 07/02/2004.
- *California Stormwater Quality Association Stormwater Best Management Practice Handbook Construction*, "Soil Binders Fact-sheet",1993. www.cabmphandbooks.com/construction.asp
- National Pollutant Discharge Elimination System (NPDES) website, "Construction Site Storm Water Runoff Control: Soil Retention." http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_32.cfm
- *Erosion and Sediment Control Best Management Practices: Field Manual,* Montana Department of Transportation, "Soil Binder Fact Sheet", 2003. www.mdt.state.mt.us/research/projects/env/erosion.shtml

15. Chemical Stabilization

BMP Objectives

- Reduce erosion
- Improve settling of suspended sediment
- Soil stabilization
- Wind erosion control
- Dust control

Potential Alternatives

- Temporary seeding
- Mulching
- Sod stabilization measures
- Soil retention measures
- Geotextiles

Definition and Purpose

Chemical stabilizers provide temporary soil stabilization to disturbed soils. Also known as soil binders or soil palliatives, materials made of vinyl, asphalt, or rubber ore sprayed onto the surface of exposed soils to hold the soil in place and protect against erosion from runoff and wind.

Applicability

Chemical stabilization can be used in areas where other stabilization methods such as seeding and vegetation are not effective because of environmental constraints. They can be used on:

- Rough graded soils that will be inactive for a period of time,
- Final graded soils before application of final stabilization,
- Temporary haul roads prior to placement of crushed rock surfacing,
- Compacted soil road base,
- Construction staging, materials storage, and layout areas,
- Soil stockpiles, and
- Areas that will be mulched.

They can also be applied to stormwater as it enters sediment basins. This will cause soil particles to bind together and settle within the pond.

Chemical stabilization should be used in combination with other BMPs, such as vegetative or perimeter controls.

Limitations

- Chemical stabilizers can create impervious surfaces where water cannot infiltrate, increasing the rate of storm water runoff.
- Overuse of these stabilizers may adversely affect water quality.
- Chemical stabilization is usually more expensive than vegetative practices.
- Experience with chemical stabilizers is much more limited than with vegetative BMPs.
- Chemical stabilizers shall not be applied directly to water, or a slope flowing directly into a water body without passing through a sediment trap or basin.
- These stabilizers are usually more expensive than vegetative practices.

Siting and Implementation Guidelines

- Chemical stabilizers are available in emulsions, powders, and gel bars or logs.
- The application rates and procedures recommended by the manufacturer of a chemical stabilization product should be followed as closely as possible to prevent the product from forming ponds and to avoid creating impervious areas where storm water cannot infiltrate.
- Chemical stabilizers should be used in conjunction with, not in place of other BMPs.
- Stormwater runoff from chemically stabilized soil should pass through a sediment control BMP prior to discharging to surface waters.
- The use of silt fences should be maximized in chemically stabilized areas.

Maintenance

- Chemically stabilized areas should be regularly inspected for signs of erosion. Stabilizers should be reapplied if necessary.
- Stabilizers should be reapplied on actively worked areas after a 48-hour period.
- If chemically stabilized soil is left undisturbed a reapplication may be necessary after two months.
- More applications may be needed for steep slopes, silty and clayey soils, long grades and high precipitation areas.

Cost

Polyacrylamide, one of the more common soil palliatives, costs between $4.00 and $35.00 per pound; a pound can stabilize approximately one acre of land.

Effectiveness

Effectiveness ranges from 70 to 90 percent, varying by the type of chemical stabilization method used. Effectiveness of each individual stabilizer type depends on soil type, application method, and individual chemical characteristics of the polymer.

Sources

- Picture Source: U.S. Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES), "Construction Site Storm Water Runoff Control: Chemical Stabilization", http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_42.cfm
- *California Stormwater Quality Association Stormwater Best Management Practice Handbook Construction*, "Polyacrylamide Fact-sheet", 1993. www.cabmphandbooks.com/construction.asp
- U.S. Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES) website, "Construction Site Storm Water Runoff Control: Chemical Stabilization" http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_42.cfm
- *Storm Water Management For Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices, Chapter Four.* U.S. Environmental Protection Agency. "Chemical Stabilization Fact-sheet", 1992. www.epa.gov/npdes/pubs/chap04_inguide.pdf
- *Tennessee Erosion and Sediment Control Handbook*, Tennessee Department of Environment and Conservation. "Polyacrylemide Fact-Sheet", 2002. www.state.tn.us/environment/wpc/sed_ero_controlhandbook/

16. Stabilized Construction Entrances/Exits

BMP Objectives
- Erosion control
- Sediment control
- Tracking control

Potential Alternatives
- None

Definition and Purpose

Stabilizing a construction entrance consists of a stone-stabilized pad located at any point where traffic will be leaving a construction site to a public roadway. Installing a pad of gravel over filter cloth where construction traffic leaves a site causes mud and sediment to be removed from the vehicle's wheels when it drives over the gravel pad, and offsite transport of soil is reduced. The filter fabric separates the gravel from the soil below, preventing the gravel from being ground into the soil.

In addition to the gravel, it is also wise to establish a vehicle washing station at the site entrance. Runoff from this washing station should be diverted into a sediment trap and disposed of properly.

Applicability

Construction entrance/exit stabilization is applicable at any location where construction traffic leaves or enters an existing paved road. This is a very useful public relations tool, as the entrance/exit is the most publicly visible aspect of many construction sites. Entrance stabilization can improve the appearance to passersby and improves public perception.

This practice is also useful on sites adjacent to water bodies, and where surrounding soils are poor.

Limitations

- Despite the stabilization mechanisms, some soil may still be deposited from construction vehicles onto paved surfaces, necessitating sweeping of the paved area.
- If using a wash station, a reliable water source must be made available.
- Entrances/exits require periodic top dressing with additional stones.
- Entrances/exits should be constructed on level ground only.

Siting and Implementation Guidelines

- Figure 1 on the Diagrams page shows a typical construction exit.
- Entrances should be stabilized before the construction begins.
- Make the entrances long and wide enough that the largest vehicle to enter the site will fit in the entrance with room to spare.
- If it is expected to be a high-traffic entrance it should be wide enough for the passage of two vehicles at the same time with room to spare.
- If a site entrance leads to a paved road, the end of the entrance should be "flared" (made wider as in the shape of a funnel) so that long vehicles do not leave the stabilized area when turning onto or off of the paved roadway.
- Stones and gravel used in stabilization should be large enough that they are not carried away on construction traffic. They should also not be sharp-edged stones because of the risk of punctured vehicle tires.
- Install the gravel at a depth of at least 6 inches the entire length and width of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit the speed of entering vehicles to control dust.
- Properly grade each construction entrance to prevent runoff from leaving the site.

Maintenance

- Inspect and maintain entrances until construction site has been fully stabilized.
- Periodically add stone and gravel to the entrance to maintain effectiveness.
- Sweep errant soil immediately for proper disposal.
- Periodically remove the sediment from traps.
- Keep all temporary roadway ditches clear.
- Remove gravel and filter fabric at the end of construction.

Cost

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with the addition of a washing rack and sediment trap. With the wash rack, costs range from $1,200 to $6,000, averaging $3,600 per entrance.

Effectiveness

This method is effective only if it is carried out on all entrances. Otherwise the sediment saved at one entrance exits another. Effectiveness is optimized when a wash station is installed and used.

Sources

- Picture source: U.S. Environmental Protection Agency, National Pollutant Discharge Elimination System (NPDES), "Construction Site Storm Water Runoff Control: Construction Entrances", http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_7.cfm
- Figures 1 Source: *Tennessee Erosion and Sediment Control Handbook*, Tennessee Department of Environment and Conservation. "Construction Exit Fact-Sheet", 2002. www.state.tn.us/environment/wpc/sed_ero_controlhandbook/
- *California Stormwater Quality Association Stormwater Best Management Practice Handbook Construction*, "Stabilized Construction Entrance/Exit Fact-sheet",1993. www.cabmphandbooks.com/construction.asp
- National Pollutant Discharge Elimination System (NPDES) website, "Construction Site Storm Water Runoff Control: Construction Entrances." http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_7.cfm
- *Tennessee Erosion and Sediment Control Handbook*, Tennessee Department of Environment and Conservation. "Construction Exit Fact-Sheet", 2002. www.state.tn.us/environment/wpc/sed_ero_controlhandbook/

Diagrams

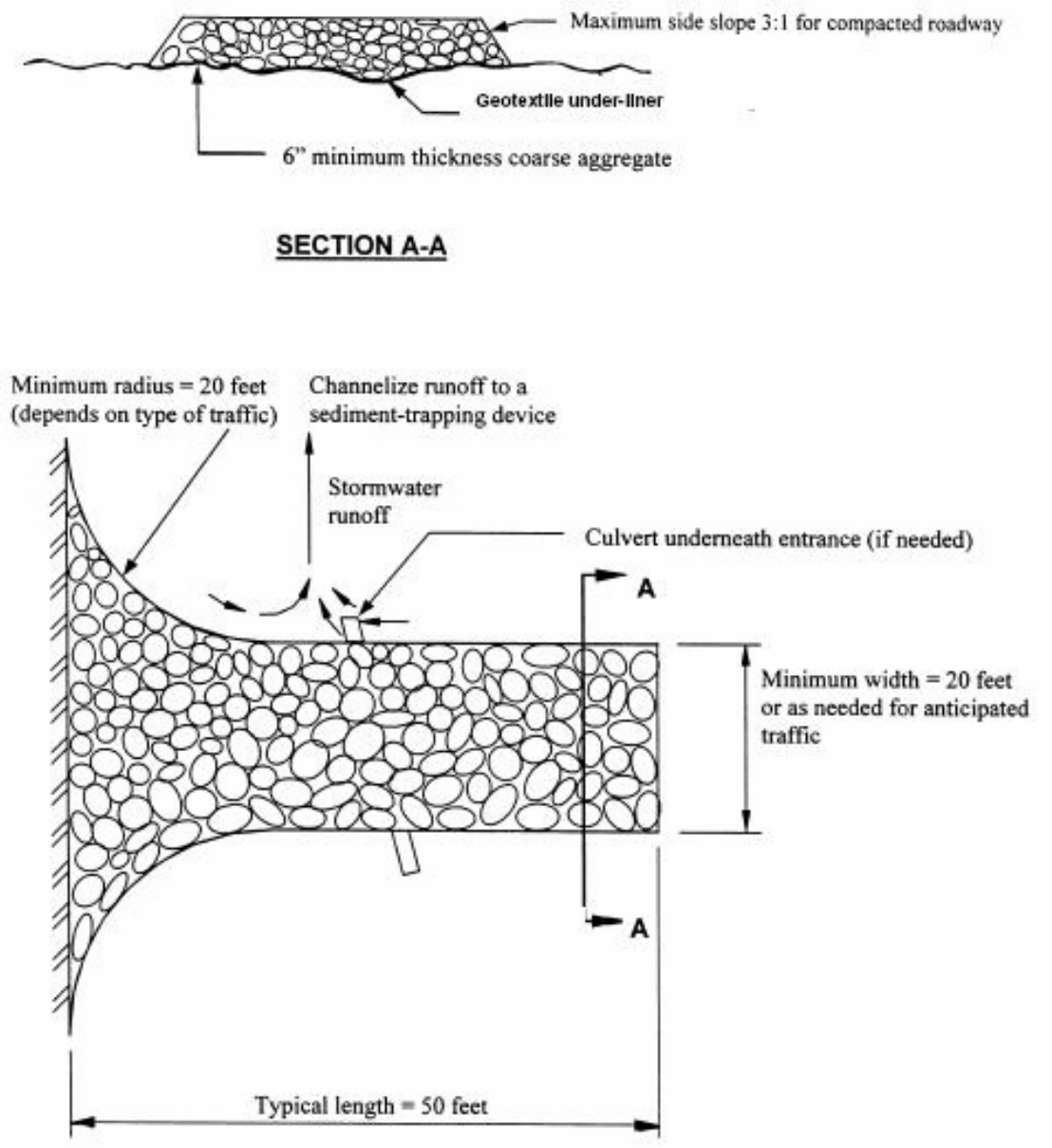


Figure 1: Stabilized Construction Exit

17. Dust Control

BMP Objectives
- Sediment control
- Wind erosion control

Potential Alternatives
- None

Definition and Purpose

Dust control or wind erosion control consists of applying dust suppressants as necessary to prevent soil erosion. Construction sites are good candidates for dust control measures because land disturbance from clearing and excavation generates a large amount of soil disturbance and open space for wind to pick up dust particles. The two main threats from dust are: 1) sediment and water pollution from dust carried off-site, and 2) respiratory health problems and inhospitable working environment due to blowing dust problems. In accordance with City of Casper Ordinance, watering of construction areas shall not constitute an approved BMP for erosion and sediment control. Chemical stabilizers shall be used for sediment and erosion control.

Applicability

These controls should be considered for any exposed soils that may be eroded by the wind. Earthmoving activities are the major source of dust, but any traffic can contribute. They are also useful for soil storage piles and areas with unstabilized areas.

Limitations

- Some types must be reapplied or replenished regularly. If evaporation is high, water reapplication may need to be nearly constant.
- The spray of water may cause increased offsite tracking of mud.
- These methods are not as effective as other controls, such as seeding and mulching.
- Effectiveness depends on soil, temperature, humidity, wind velocity, and wind

direction.
- Over watering may cause erosion.

Siting and Implementation Guidelines

- The amount of soil exposed will dictate the quantity of dust generation and transport.
- If land must be disturbed, use additional erosion and stabilization methods
- Table 1 shows a list of dust control options, and where they can be effectively utilized. See other Fact Sheets for more information.

Table 1: Appropriate Site Conditions for Dust Control Practices

Site Conditions	Practices								
	Permanent Vegetation	Mulch	Watering	Chemical Suppression	Gravel or Asphalt	Silt Fence	Construction Entrance	Truck Covers	Minimize Disturbed Area
Not Subject to Traffic	X	X	X	X	X				X
Subject to Traffic			X	X	X		X		X
Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavating			X	X		X			X
Truck Traffic on Unpaved Roads			X	X	X		X	X	
Mud/Dirt Carry Out					X		X		

Maintenance

- For maintenance of various methods, see other Fact Sheets.
- Monitor BMPs for effectiveness.

Cost

A manufacturer of a chemical stabilizer estimated the cost to be $1,089 per acre for application to road surfaces, but the costs could vary widely. Also, aggregate costs could be much higher because of the necessity of frequent application.

Effectiveness

The methods have varying levels of effectiveness, and most can be found on their individual fact sheets. Chemical soil treatments effectiveness ranges from 70 to 90 percent. Water spraying is also effective in the short time until it dries.

Sources

- Picture Source: Soltac, Applications Methods website, www.soiltac.com/Application_Methods.html
- *California Stormwater Quality Association Stormwater Best Management Practice Handbook Construction*, "Wind Erosion Control Fact-sheet",1993. www.cabmphandbooks.com/construction.asp
- *Erosion and Sediment Control Best Management Practices: Field Manual,* Montana Department of Transportation, "Wind Erosion Control Fact Sheet", 2003. www.mdt.state.mt.us/research/projects/env/erosion.shtml
- National Pollutant Discharge Elimination System (NPDES) website, "Construction Site Storm Water Runoff Control: Dust Control." http://cfpub.epa.gov/npdes/stormwater/menuofbmps/site_11.cfm
- *Storm Water Management For Industrial Activities, Developing Pollution Prevention Plans and Best Management Practices, Chapter Four.* U.S. Environmental Protection Agency. "Dust Control (Land Disturbance and Demolition Areas Fact- sheet", 1992. www.epa.gov/npdes/pubs/chap04_inguide.pdf
- *Casper Wyoming Municipal Code*. Chapter 12.20.065, "Erosion and Sediment Control- Plan Requirements." http://municipalcodes.lexisnexis.com/codes/casper/

18. Street Sweeping and Vacuuming

BMP Objectives
- Sediment control
- Tracking control
- Soil stabilization

Potential Alternatives
- None

Definition and Purpose

Street sweeping is a practice used to remove soil and other sediments from streets and roadways in order to prevent them from entering storm drains and receiving. Self-propelled and walk behind equipment are used in the sweeping and vacuuming process.

Applicability

It is appropriate to sweep the streets anywhere where sediment is tracked onto public or private paved streets, typically at the area of construction entrance/exit.

Limitations

- Sweeping is not very effective when the sediment is wet, or when it is caked on.
- Do not used kick brooms or sweeper attachments.
- Visible sediment must be swept on a daily basis.

Siting and Implementation Guidelines

- Control the number of entrances/exits so that sweeping will be necessary in fewer places.
- Sweep sediment on a daily basis.
- Do not use kick brooms or sweeper attachments, as dirt will only be spread, not removed.

- If there is no trash or debris, consider incorporating the removed sediment back into the project.

Maintenance

- Inspect access points at least daily to sweep up sediment.
- Do not sweep up any unknown substances.
- Adjust brooms frequently, maximizing the sweeping operations.

Cost

Rental rates vary depending on the size of the sweeper. Rates range from $58/hour to
$88/hour, plus operator costs.

Effectiveness

If used at an appropriately frequent rate, sweepers can remove any sediment on paved ground.

Sources

- Picture Source: City of Berkeley, California Public Works Department, "Residential Street Sweeping Program" http://www.ci.berkeley.ca.us/pw/swm/stsweep.html
- *California Stormwater Quality Association Stormwater Best Management Practice Handbook Construction*, "Street Sweeping and Vacuuming Fact-sheet", 1993. www.cabmphandbooks.com/construction.asp
- *Erosion and Sediment Control Best Management Practices: Field Manual,* Montana Department of Transportation, "Street Sweeping and Vacuuming Fact Sheet", 2003. www.mdt.state.mt.us/research/projects/env/erosion.shtml

APPENDIX E

SWPPP TRAINING LOG

Stormwater Pollution Prevention Plan Training Log

Bill Sanderson Gas Plant Project

Date:_____

Trainer:_____

Topics Covered:

- □ Storm Water Regulations
- □ Purpose of the Storm Water Permit
- □ Requirements of the Storm Water Permit
- □ Components of the SWPPP
- □ Good Housekeeping Procedures
- □ Best Management Practices
- □ Inspections
- □ Record Keeping/Reporting
- □ Storm Water Discharges
- □ Non-Storm Water Discharges
- □ Changes to the SWPPP
- □ Other: _____

	Printed Name	Company	Signature	Date
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

APPENDIX F

Stormwater Inspection and Corrective Action Form

Inspection and Corrective Action Form

Project name: _____

Date of inspection: _____

Inspector: _____

This inspection is a:

- ☐ 14-day inspection (active const.)
- ☐ Monthly inspection (site inactive)
- ☐ Rain event inspection (must inspect w/in 24 hours of event)

BEST MANAGEMENT PRACTICES (BMPs)

Erosion and Sediment Controls:

Silt fence, straw roll (wattle), and rock check dams:

- ☐ Silt fence, straw roll, and rock check dams are in good condition.
- ☐ Silt fence, straw roll, and rock check dams need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

Storm water diversion trenches and ditch relief culverts:

- ☐ Diversion trenches and ditch relief culverts are in good condition.
- ☐ Diversion trenches and ditch relief culverts need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

Slope barriers:

☐ Slope barriers are in good condition.

☐ Slope barriers need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

Mulched areas:

☐ Mulched areas are in good condition.

☐ Mulched areas need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

Water bars:

☐ Water bars are in good condition.

☐ Water bars need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

Diversion trenches:

☐ Diversion dips are in good condition.

☐ Diversion dips need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

Other BMPs:

Types: _____

Locations: _____

☐ BMPs are in good condition.

☐ BMPs need the following repairs, maintenance, changes (note needed activity and location):

_____

_____

_____

_____

_____

OPERATIONAL CONTROLS

Dust control measures being implemented?	☐ Yes	☐ No	☐ N/A
Trash is being contained and hauled off site?	☐ Yes	☐ No	☐ N/A
Fuel storage area(s) in conformance with site SPCC?	☐ Yes	☐ No	☐ N/A
Sanitary facilities properly located and secured?	☐ Yes	☐ No	☐ N/A
Site egress locations free of vehicle-tracked sediment	☐ Yes	☐ No	☐ N/A
Materials storage areas protected from run-on/runoff?	☐ Yes	☐ No	☐ N/A

Note any deficiencies and repairs needed for these BMPs.

_____

_____

_____

Briefly describe any repairs or changes to the SWPPP implemented as a result of this inspection.

_____

_____

_____

_____

_____

☐ Check here if the facility *is in compliance* with the site SWPPP and the general storm water permit.

Certification: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____

Printed Name of Person Signing Title

_____ _____ _____

Signature Date Telephone

APPENDIX G

Completed Stormwater Inspection/Corrective Action Forms

GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS

March 27, 2020

State Historical Society of North Dakota
Archeology & Historic Preservation Division
North Dakota Heritage Center
612 East Boulevard Avenue
Bismarck, North Dakota 58505

SUBJECT: Class III CRI and Limited Testing at the Proposed OE2 North LLC, Bill Sanderson Gas Processing Plant

To Whom it May Concern,
Enclosed, please find one digital and hard copy version of the Class III Cultural Resource Investigation and Evaluative Testing report and associated ESRI ArcMap shapefiles.

OE2 North, LLC (OE2) contracted Grouse Mountain Environmental Consultants, LLC (GMEC) to conduct a Class I desktop analysis, a Class III cultural resource investigation, evaluative subsurface testing, and prepare a report for the proposed Bill Sanderson Gas Processing Plant (Gas Plant) project.

Although the project is a fee action that has not been covered by previous inventory, a Class III cultural resource survey was requested by OE2 and the State Historical Society of North Dakota (SHSND). An intensive Class III cultural resource survey covering the Gas Plant footprint and associated access was conducted on March 5 and 6, 2020 covering a total of 58-block acres. Evaluative testing consisted of six shovel probes excavated within, and adjacent to, the Gas Plant project area and was conducted on March 12 and 13, 2020.

During the 2020 investigation, GMEC did not newly recorded any historic or prehistoric sites or isolated resources/finds within the direct Area of Potential Effect (APE). No previously recorded sites or isolated resources were identified within the direct APE. Based on the results of previous inventories and the current survey and testing effort, GMEC recommends a finding of No Historic Properties Effected, and for the proposed project to proceed as planned.

Please contact Becca Mashak at 307-684-2112 or rmashak@gmecwy.com with any questions regarding the proposed Project.

Sincerely,

Rebecca L. Mashak
Grouse Mountain
Environmental Consultants (GMEC)
Lead Archaeologist
rmashak@gmecwy.com
O: 307-684-2112
M: 307-760-2643

Enclosures:
1) *A Class III Cultural Resource Investigation and Evaluative Testing: OE2 Bill Sanderson Gas Processing Plant*
2) *ESRI ArcMap Shapefiles*

April 3, 2020

Rebecca L. Mashak
Grouse Mountain Environmental Consultants
760 West Fetterman St.
Bismarck, ND 58501

ND SHPO Ref.: 20-0219 PU-20-82 OE2 North LLC Bill Sanderson Gas Processing Plant in portions of [T154N R104W Section 27] in Williams County, North Dakota

Dear Ms. Mashak,

We reviewed ND SHPO Ref.: 20-0219 "A Class III Cultural Resource Investigation and Evaluative Testing: OE2 Bill Sanderson Gas Processing Plant" in portions of [T154N R104W Section 27] in Williams County, North Dakota and find this Grouse Mountain Environmental Consultants report by Rebecca L. Mashak acceptable. We concur with a determination of "No Historic Properties Affected" for this project provided it takes place in the location and in the manner described in the documentation.

Thank you for the opportunity to review this project. Please include the ND SHPO Reference number listed above in further correspondence for this specific project. If you have any questions please contact Lorna Meidinger, Historic Preservation Specialist at (701) 328-2089 or lbmeidinger@nd.gov

Sincerely,

for Claudia J. Berg
State Historic Preservation Officer
(North Dakota)

20-0219

GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS

April 6, 2020

Trent Taylor
OE2 North LLC
1200 Seventeenth Street, Suite 900W
Denver, CO 80202

RE: Bill Sanderson Gas Processing Plant Vegetation Inventory Summary – 2020 Update

Trent Taylor,

Grouse Mountain Environmental Consultants (Grouse Mountain) would like to report on results from a vegetation inventory conducted for OE2 North LLC's (OE2) Bill Sanderson Gas Processing Plant (Plant) project located within section 27 T154N-R104W in Williams County, North Dakota. OE2 has submitted an application to the North Dakota Public Service Commission (PSC) for siting of a facility for gas processing and compression equipment. OE2 contracted Grouse Mountain to conduct a vegetation inventory of trees, saplings, shrubs, and noxious weeds within the project area on March 5th and 6th, 2020.

Due to the vegetation inventory being conducted in early March, the results presented here may not represent all plant species present during the growing season. Specifically, Grouse Mountain was only able to identify those species of senesced grasses/forbs and/or dormant shrubs with features still intact enough for accurate identification. Please see summary findings for the proposed Bill Sanderson Gas Processing Plant below.

TREES, SAPLINGS, AND SHRUBS

Within the proposed Plant boundary, silver buffaloberry (*Shepherdia argentea*) and western snowberry (*Symphoricarpos occidentalis*) are prevalent within both the western and eastern drainages. Minimal Rocky Mountain juniper (*Juniperus scopulorum*), common juniper (*Juniperus communis*), and Saskatoon serviceberry (*Amelanchier alnifolia*) were found on the drainage slopes within the northwest corner of the project boundary. The Saskatoon serviceberry, Rocky Mountain juniper, and common juniper are located outside of the proposed construction footprint and near the fence line; these plants will not be disturbed during construction of the Plant.

Grouse Mountain identified silver buffaloberry with stems >1-inch diameter at breast height (DBH). These shrubs often grow close together to form thickets where accurate stem counts are difficult to conduct (Attachment B, Photos 1-3). Within the proposed Plant footprint, only one thicket of buffaloberry was identified within the southcentral portion of the Plant footprint (Attachment A). Grouse Mountain estimated

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760 W. Fetterman St.
Buffalo, WY 82834
grousemtnconsultants.com

three (3) buffaloberry bushes with stems >1-inch DBH within this thicket which was delineated as 0.01 acres (Attachment A and B, Photo 1).

Grouse Mountain identified western snowberry within the Plant footprint (Table 1, Attachment A). However, this shrub is growing primarily as single-stemmed shoots in colonies along the drainages where stems are <1-inch DBH (Attachment B, Photos 4-5). These colonies spread through underground rhizomes and can cause the transition of native grasslands into shrublands when not controlled.

NOXIOUS WEEDS

Fourteen (14) species of noxious weeds are present within Williams County, ND; thirteen (13) are declared by the State of North Dakota and one (1) was added by the Williams county Weed Board. No noxious weeds were identified in the upland areas of the site, and Canada thistle (*Cirsium arvense*) was the only noxious weed identified in the drainages within the plant footprint. This weed grew sparsely throughout the drainages and was primarily identified as individual plants or in populations comprised of less than 5 individual plants.

See Attachment C for a complete plant list from the surveyed area. Some plants were not able to be identified in their current condition with surveys being conducted outside of the growing season.

Please let us know if you have any questions or concerns or would like to request additional information regarding the field surveys.

Thank you,

Katie Taylor

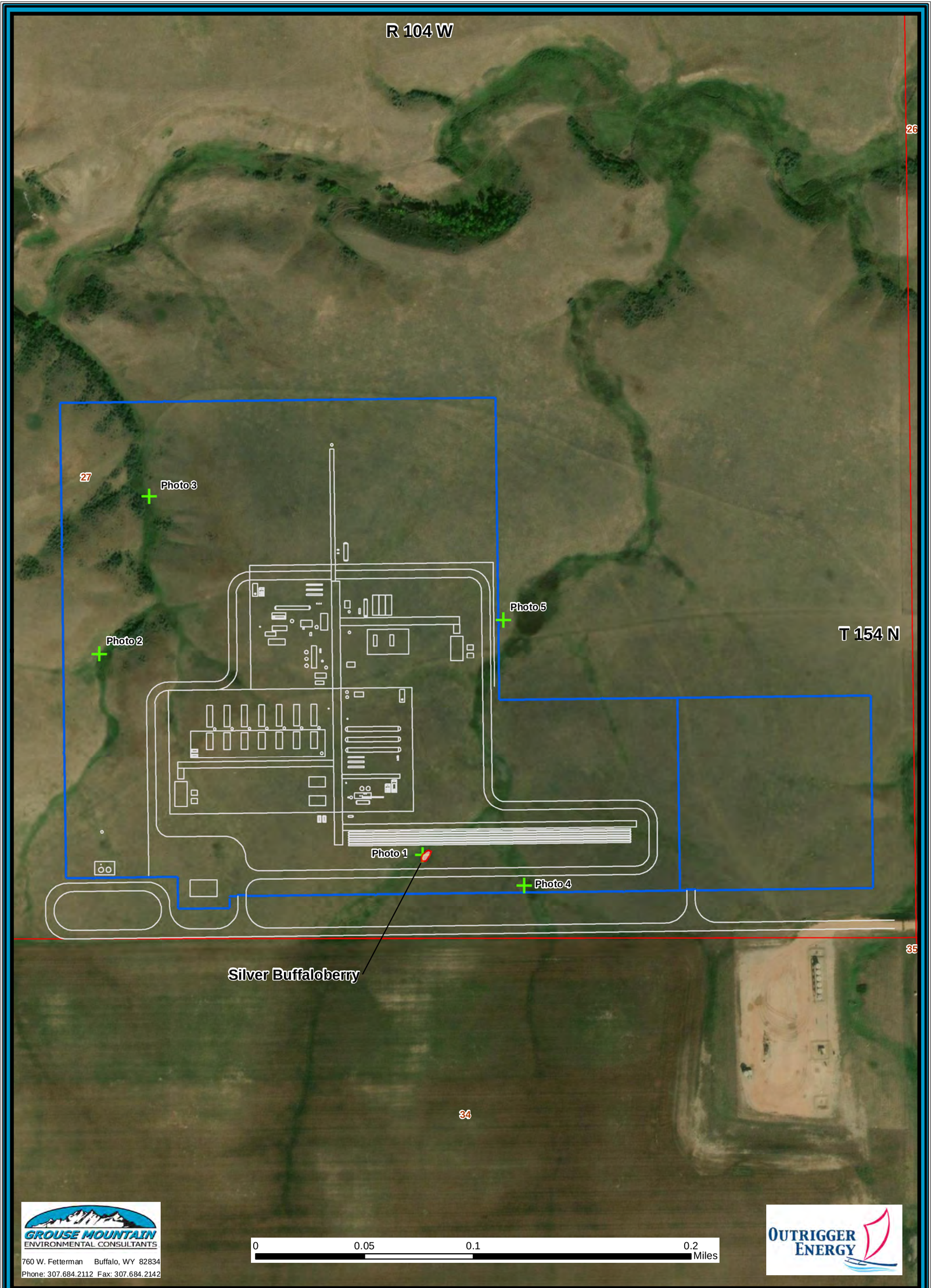
Project Manager/Lead Wildlife Biologist
Grouse Mountain Environmental Consultants
Office: 307-684-2112
Cell: 360-521-0442
ktaylor@gmecwy.com

Kirstie Lawson

Wildlife Biologist
Grouse Mountain Environmental Consultants
Office: 307-684-21
Cell: 406-544-6902
klawson@gmecwy.com

ATTACHMENT A
FIGURES

Figure 1. OE2 North LLC: Bill Sanderson Gas Processing Plant Vegetation Inventory Report Map



GROUSE MOUNTAIN
ENVIRONMENTAL CONSULTANTS
760 W. Fetterman Buffalo, WY 82834
Phone: 307.684.2112 Fax: 307.684.2142

OUTRIGGER ENERGY

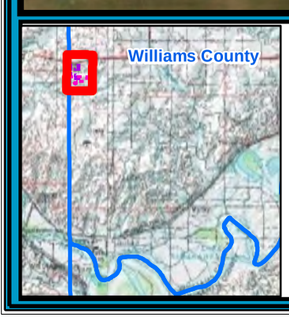


Figure 1. OE2 North LLC: Bill Sanderson Gas Proccessing Plant
Vegetation Inventory Report Map

- Plant Boundary - Fence Line
- Plant Site Features
- Shrub Boundaries
- Report Photo Points

Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Scale: 1:2,562
Date: 4/6/2020
Created by: klawson
File Name:
OUT-004_Vegetation_Map_040320

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W E
S

OE2 442

Attachment B
Tree, Sapling, and Shrub Photographs

Photo 1. Silver buffaloberry thicket in the southern part of the Bill Sanderson Gas Processing Plant footprint.

Photo 2. Edge of a silver buffaloberry thicket in the western drainage within the Bill Sanderson Gas Processing Plant project boundary; outside of the proposed Plant footprint.

Photo 3. Various growth forms of silver buffaloberry within the northwest corner of the Bill Sanderson Gas Processing Plant project boundary; outside of the proposed Plant footprint.

Photo 4. Patch of western snowberry within the Bill Sanderson Gas Processing Plant footprint.

Photo 5. Large patch of western snowberry located just outside the Bill Sanderson Gas Processing Plant project boundary.

Attachment C
Bill Sanderson Gas Processing Plant Inventory List

Common Name	Scientific Name	Indicator Status	Comment(s)
Within Drainages:			
Western snowberry	*Symphoricarpos occidentalis*	UPL	
Crested wheatgrass	*Agropyron cristatum*	UPL	
Silver buffaloberry	*Shepherdia argentea*	UPL	
Tufted hair grass	*Deschampsia caespitosa*	FACW	
Big bluestem	*Andropogon gerardii*	FACU	
Prairie sandreed	*Calmovilfa longifolia*	UPL	
Common Yarrow	*Achillea millefl ium*	UPL	
Tall hedgemustard	*Sisymbrium altissimum*	FACU	
Rose	*Rosa* spp.	FACU	
Green needlegrass	*Nassella viridula*	UPL	
Coneflower	*Echinecea* or *Rudbeckia* spp.	Unknown	Unable to identify to species at this time.
Unknown Sedge	*Carex* spp.	Unknown	Possibly threadleaf sedge, but unable to identify at this time.
Canada thistle	*Cirsium arvense*	FACU	Noxious weed
Rocky Mountain juniper	*Juniperus Scopulorum*	UPL	
Common juniper	*Juniperus communis*	UPL	
Saskatoon serviceberry	*Amelanchier alnifolia*	FACU	
Burdock	*Arctium* spp.	Unknown	
Cudweed sagewort	*Artemisia ludoviciana*	UPL	
Poa	*Poa* spp.	Unknown	Unable to identify to species at this time.
Western wheatgrass	*Pascopyrum smithii*	FACU	
Tarragon/Green sagewort	*Artemisia dracunculus*	UPL	
Within Upland:			
Little bluestem		FACU	
Coneflower	*Echinecea* or *Rudbeckia* spp.	Unknown	Unable to identify to species at this time.
Blue grama	*Bouteloua gracilis*	UPL	
Crested wheatgrass	*Agropyron cristatum*	UPL	
Prairie sandreed	*Calmovilfa longifolia*	UPL	
Prairie sagewort	*Artemisia frigida*	UPL	
Common yarrow	*Achillea millefl ium*	UPL	
Prairie sandreed	*Calmovilfa longifolia*	UPL	
Cudweed sagewort	*Artemisia ludoviciana*	UPL	
Purple threeawn	*Aristida purpurea*	UPL	
Buckwheat	*Eriogonum* spp.	UPL	
Candle anemone	*Anemone cylindrica*	UPL	
Tarragon/Green sagewort	*Artemisia dracunculus*	UPL	

Bill Sanderson Gas Processing Plant Project
Waters of the U.S.
Updated Field Assessment and Offsite Assessment Report

Prepared For:

OE2 North LLC
1200 Seventeenth Street, suite 900
Denver, CO 80202

Prepared by:

Katie Taylor
Wildlife Biologist
Grouse Mountain Environmental Consultants
760 West Fetterman
Buffalo, WY 82834
307-684-2112
ktaylor@gmecwy.com

April 7, 2020

TABLE OF CONTENTS

1.0 INTRODUCTION **4**

1.1 Project Description **4**

1.2 Jurisdictional Waters and Wetlands **4**

2.0 ENVIRONMENTAL SETTING **4**

3.0 METHODS AND RESULTS **5**

3.1 Jurisdictional Waters and Wetlands **5**

3.1.1 Methods **5**

3.1.2 Results **6**

4.0 SUMMARY AND RECOMMENDATIONS **8**

4.1 Jurisdictional Waters and Wetlands **8**

5.0 References **9**

6.0 Qualifications **11**

TABLES

Table 1. Hydrologic Unit Codes (HUC) for Bill Sanderson Location 5

Table 2. Bill Sanderson Gas Processing Plant - Antecedent Precipitation 6

Table 3. Bill Sanderson Gas Processing Plant - Offsite Assessment Results 7

FIGURES

Figure 1. OE2: Bill Sanderson Gas Processing Plant Wetland Assessment Report Map 12

APPENDICES

Appendix A. Bill Sanderson Gas Processing Plant Field Survey Plant List 13

Appendix B. Bill Sanderson Field Survey Drainage Photographs 14

1.0 INTRODUCTION

1.1 Project Description

OE2 North LLC (OE2) is planning to develop the Bill Sanderson Gas Processing Plant Project (Bill Sanderson) facilities pad on private surface in Williams County, North Dakota. The Bill Sanderson project will be located in section 27 T154N-R104W and will include gas processing and compression equipment. OE2 contracted Grouse Mountain Environmental Consultants (Grouse Mountain) to conduct desktop analyses for wildlife, cultural, and Waters of the United States (WOTUS) natural resources potentially impacted by the construction of the Bill Sanderson facility. Grouse Mountain previously submitted a resource desktop analysis summary report to Trent Taylor on January 31, 2020 (GMEC 2020a) and an offsite wetland assessment report on February 17, 2020 (GMEC 2020b). Preliminary findings were outlined where two (2) unknown tributaries within section 27 were identified as a potential jurisdictional concern. As construction is anticipated to occur prior to the growing season, not allowing for an official wetland delineation to be conducted, OE2 contracted Grouse Mountain to conduct an offsite wetland assessment using long-term aerial imagery, hydric soils information, and other hydrologic data to draw inference on jurisdictional water boundaries. Grouse Mountain conducted the initial on-site field assessment on January 29, 2020 to supplement findings from the offsite wetland assessment. On March 5 and 26, 2020, Grouse Mountain conducted follow-up field assessments to further supplement the findings of the offsite wetland assessment.

1.2 Jurisdictional Waters and Wetlands

Under section 404 of the Clean Water Act (CWA) of 1972, the U.S. Army Corps of Engineers (USACE) may issue permits for the discharge of dredge or fill material into WOTUS (Clean Water Act 2002). Following the repeal of the 2015 rule in October 2019, the Department of the Army and the Environmental Protection Agency finalized the Navigable Waters Protection Rule (Final Rule). The Final Rule was intended to clarify the pre-2015 regulatory language and definition of WOTUS. The Final Rule is expected to take effect 60 days following the publication in the federal registry; publication in the federal registry has not yet occurred. Until then, the pre-2015 definition of WOTUS will still be in effect (40 CFR 230.3). In 2017, under section 404 of the CWA, the USACE issued general permits authorizing activities resulting in minimal impacts to WOTUS, known as Nationwide Permits (NWP). NWP 12 or NWP 39 may apply to this project given determination by USACE. General conditions still apply and a preconstruction notification (PCN) may be required (USACE 2017). Additionally, a 401 certification is required by the North Dakota Department of Health (NDDoH) for all NWP permits. Please see USACE (2017) and the NDDoH website for detailed guidelines regarding NWPs and section 401 certification.

2.0 ENVIRONMENTAL SETTING

The Bill Sanderson facility is approximately 15 miles west of Williston, North Dakota and located along the North Dakota-Montana border. The local climate can be characterized by long cold winters and short hot summers. Average temperatures range from 1.7 °F to 21.3 °F in January and from 57.0 °F to 85.4 °F in July. Mean annual precipitation is 14.17 inches (WRCC 2016). Elevation of the project area ranges from 2,180 to 2,270 feet. The project area is dominated by loamy ecosites with minor components of limy and limy steep ecosites. Many other ecosites occur within the project area, but at very low occurrences. Horse Tied Creek lies 0.8 mile south of the project area. The majority of the project area falls within the Lower

Little Muddy Creek (HUC-12 [100600050704]) subwatershed of the Missouri-Poplar basin (HUC-6[100600]; Table 1). Livestock grazing and mineral development are the predominant land uses in the area.

Table 1. Hydrologic Unit Codes (HUC) for Bill Sanderson Location

Project Name	Basin (HUC-6)	Subbasin (HUC-8)	Watershed (HUC-10)	Subwatershed (HUC-12)
Bill Sanderson Gas Processing Plant	Missouri-Poplar (100600)	Charlie-Little Muddy (10060005	Little Muddy Creek (1006000507)	Lower Little Muddy Creek (100600050704)

3.0 METHODS AND RESULTS

3.1 Jurisdictional Waters and Wetlands

3.1.1 Methods

Prior to conducting field surveys, Grouse Mountain conducted an offsite wetland and hydrology assessment using spatial layers from applicable state and federal agencies. Hydrologic watershed data was acquired from the U.S. Geological Survey (USGS) Watershed Boundary Dataset (WBD). Wetland data was obtained from the USFWS National Wetlands Inventory (NWI; USFWS 2012b). Spatial data for rivers, streams, and tributaries were acquired from the USGS National Hydrologic Dataset (NHD). Soils data was acquired from the Natural Resources Conservation Service (NRCS) Web Soils Survey (WSS; SSS-NRCS-USDA 2020). NHD in combination with the WBD and NWI were overlaid with the provided parcel boundary and additional survey area in ArcGIS to assess potential areas of jurisdictional concern. However, as these datasets are based on aerial or satellite imagery and infrequently updated, they may not accurately represent resources on the ground. Grouse Mountain used the North Dakota NRCS's *State Guidance for Wetland Determinations Including State Offsite Methods* (NRCS 2017) and Minnesota's USACE *Guidance for Offsite Hydrology/Wetland Determinations* (USACE 2016) to delineate wetlands within these areas of concern. Imagery used for offsite assessments was acquired from the National Agriculture Imagery Program (NAIP) and representative of 2009-2010, 2012, and 2014-2019. WSS data was overlaid on these images to assess hydric soils. In areas where hydric soils were present, sample areas were delineated based on changes to vegetation greenness or inundation during years of normal climatic conditions. Grouse Mountain calculated the climatic conditions for the three (3) months prior to the month the imagery was taken for each year according to the procedure outlined in the NRCS *Hydrology Tools for Wetland Determination* (NRCS 1997) and using the NRCS WETS monthly precipitation data. Grouse Mountain determined wetland status of sample units by comparing hydric soils, whether the area had previously been classified as a wetland, and the percentage of images across years that had indicators of wetland hydrology (i.e. greener color tones in vegetation).

To supplement the offsite determination, Grouse Mountain conducted a field assessment on January 29, 2020. Due to the time of year and snow cover present, wetland delineation in accordance with the Great Plains Regional Supplement to the Corp of Engineers Wetland Delineation Manual protocols to assess jurisdictional boundaries (USACE 2010) and assessment of OHWM/bed and bank features were not possible in the field. However, Grouse Mountain biologists were able to identify major vegetation along the drainages and overall topography to assist in offsite assessments. Later, Grouse Mountain conducted

follow-up field assessments on March 5 and 26, 2020 to assess OHWM and re-assess the potential wetland within the project footprint to the best extent possible prior to the growing season. Extensive photographs were taken to document the drainages within the footprint (Appendices A and B).

3.1.2 Results

During the initial desktop analysis (GMEC 2020a), NWI-designated wetlands were identified within the northern half of the parcel boundary (Lot 3 and NESE, Section 27, T154N-R104W). These wetlands are classified as intermittent riverine wetlands and are associated with an intermittent tributary of Little Muddy Creek. Additionally, one (1) NWI wetland extends into the additional survey area to the south (NWNW Section 35, T154N-R104W). No NWI or NHD data was present within the southern portion of the parcel boundary in Section 27; however, two (2) distinct channels running south to north are visible on aerial imagery (Section 27, T154N-R104W). These channels will be referred to throughout as the western drainage (Lots 3 and 4, Section 27, T154N-R104W) and the eastern drainage (NESE and SESE, Section 27, T154N-R104W). Although these drainages are not identified within the NHD or NWI datasets, spatial data shows evidence of a high water table and potential water pooling.

Table 2. Bill Sanderson Gas Processing Plant - Antecedent Precipitation

Imagery	Imagery Date[1]	Climatic Condition
2019 NAIP	7/25/2019	Normal
2018 NAIP	July 15 – Oct. 23, 2018	Normal
2017 NAIP	10/4/2017	Wet
2016 NAIP	7/25/2016	Normal
2015 NAIP	9/14/2015	Normal
2014 NAIP	8/19/2014	Dry
2012 NAIP	6/27/2012	Wet
2010 NAIP	6/29/2010	Normal
2009 NAIP	June – Sept. 2009	Normal

[1]For years where no imagery date was found, climatic conditions were calculated for all possible three-month prior time periods. All calculations gave the same result, so the data was included.

Analysis of antecedent precipitation for each year of NAIP imagery showed six (6) years of normal climatic conditions, two (2) years that were wetter than normal, and one (1) year that was drier than normal (Table 2). According to WSS data, hydric soils were not present within the corresponding Map Unit for the western drainage within the southern portion of the parcel boundary (Lots 3 and 4, Section 27, T154N-R104W). The ground assessment of the drainage in question indicated steep slopes were present along the extent of the reach and would likely not allow for significant water accumulation and associated wetland formation before draining directly into the intermittent drainage downstream. Additionally, the majority of vegetation present within the drainage was woody upland vegetation visible above the snow cover, a strong indication that no wetlands were associated with this drainage. As such, an offsite wetland assessment was not conducted for the western most drainage of concern.

WSS data identified the Map Unit encompassing the eastern drainage as having potential for hydric soils. Grouse Mountain identified sixteen (16) sampling units using wetland indicators on aerial imagery during

years of normal circumstances (Table 3; Figure 1). During initial analysis, four (4) units were determined not to be wetlands, as they showed indications of wet signatures in less than half of the images from "normal" years (Sampling Units 12 and 14-16; Table 3). Ground surveys conducted in January indicated that the wet signatures in eleven (11) units were an artefact of patches of western snowberry (*Symphoricarpos occidentalis*; an upland shrub) producing deep color tone differences in the imagery (Sampling Units 1-11; Table 3). Based on the vegetation that was identified during this onsite field assessment, it is likely that western snowberry and other upland plants comprise the majority of the vegetative cover within this eastern drainage (Appendix A), eliminating the potential for classification as wetland sites. However, at one (1) of these sites (Sampling Unit 9), the snowberry was located on the edge of a potential depression with facultative vegetation (*Rosa* spp., *Deschampsia caespitosa*) present. One (1) other site lacked western snowberry but still showed indicators of wet signatures in >80% of the imagery from "normal" years (Sampling Unit 13). The same facultative plants were identified in this sampling unit, suggesting some level of water tolerance. Based on this analysis, fourteen (14) sampling units have been classified as not a wetland and two (2) units (Sampling Units 9 and 13) have been classified as "unknown" features due to the presence of facultative vegetation.

Table 3. Bill Sanderson Gas Processing Plant - Offsite Assessment Results

Sampling Unit	Hydric Soils Present	Identified NWI	% Wet Signatures	Key Vegetative Characteristics	Wetland?
1	Possible	No	100	Snowberry	No
2	Possible	No	83.3	Snowberry	No
3	Possible	No	66.6	Snowberry	No
4	Possible	No	100	Snowberry	No
5	Possible	No	100	Snowberry	No
6	Possible	No	50	Snowberry, *Deschampsia*	No
7	Possible	No	100	Snowberry	No
8	Possible	No	100	Snowberry	No
9	Possible	No	100	Snowberry, *Deschampsia*	Unknown
10	Possible	No	66.6	Snowberry	No
11	Possible	No	83.3	Snowberry	No
12	Possible	No	0		No
13	Possible	No	83.3	*Deschampsia*	Unknown
14	Possible	No	33.3		No
15	Possible	No	33.3		No
16	Possible	No	33.3		No

Follow-up field assessments conducted in March provided more favorable field conditions for further assessing the hydrology of these drainages. During the field survey on March 5, 2020, snow cover was minimal and frozen water was observed running downstream in both the eastern and western drainages. The majority of this frozen water had receded by the time field surveys were conducted on March 26, 2020. Grouse Mountain biologists did not observe any characteristics of OHWM along either the eastern or western drainage within the facilities footprint. There were small pools of frozen water still present within depressions along the eastern drainage outside of the footprint; however, OHWM, characteristic of hydrologic connectivity, was not identified between these depressions. Additionally, relics of upland vegetation appeared to be dominant throughout the drainage.

During surveys on March 26, 2020, Grouse Mountain biologists further assessed the Unit 9 potential wetland. While frozen water was still present at this site, the water line had receded and relics of upland vegetation was more visible. Grouse Mountain biologists re-delineated an unofficial boundary, using standing water as the guide for the potential wetland boundary. The overall size of the Unit 9 potential wetland was reduced significantly from what was first identified within the offsite assessment. The potential wetland is now less than 0.006 acres (262 sq. ft.).

4.0 SUMMARY AND RECOMMENDATIONS

4.1 Jurisdictional Waters and Wetlands

Offsite assessments were conducted by Grouse Mountain using available spatial data and supplemental data retrieved during an onsite field assessment conducted outside of the growing season. Data not otherwise specified within the outlined methods above may not have been made available to GMEC and, thus, not considered in the overall evaluation of WOTUS presented in this report. Results and recommendations outlined within this report are provided based on Grouse Mountain's best assessment of hydrologic resources from aerial imagery and onsite field visits; however, field conditions did not allow for all wetland indicators to be assessed. Further, determination of jurisdictional waters are subject to the USACE.

The western drainage (Lots 3 and 4, Section 27, T154N-R104W) is characterized by steep slopes and woody upland vegetation, likely not allowing for significant water accumulation and wetland formation before reaching the intermittent drainage downstream. WSS data shows no hydric soils present in this drainage, so an offsite assessment was not conducted. Based on offsite analysis of the eastern drainage (NESE and SESE, Section 27, T154N-R104W), several sampling units showed consistent soil saturation, indicated by an increase in the greenness of vegetation across all years of NAIP imagery. However, field surveys indicated that much of this increased greenness is likely due to the presence of western snowberry, an upland shrub. Some remnants of wetland vegetation were identified beneath the snow in certain areas, though it did not appear to make up a dominant proportion of vegetation. Specifically, fourteen (14) of the sampling units within the eastern drainage were characterized by a predominance of snowberry and classified as not a wetland. Two (2) of the total sampling units were classified as wetland status "unknown" due to consistent wetland signatures present in over half of the imagery years assessed as well as a high prevalence of facultative vegetation and lack of upland shrubs; one (1) of these units falls within the project boundary (Unit 9). Follow-up field assessments indicated that no characteristics of OHWM were present within the project footprint nor immediately downstream from Unit 9. Further assessment of Unit 9 showed continuously receding water levels and an increase in visible relic upland vegetation. However, field conditions did not allow for an official wetland delineation to be conducted.

For all potential jurisdictional waters, Grouse Mountain suggests avoidance where possible. If avoidance is not possible, minimization of the area being impacted and coordination with USACE is recommended. Where possible, additional field visits to conduct official wetland delineations at potential wetland sites during the growing season are highly recommended.

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6.0 Qualifications

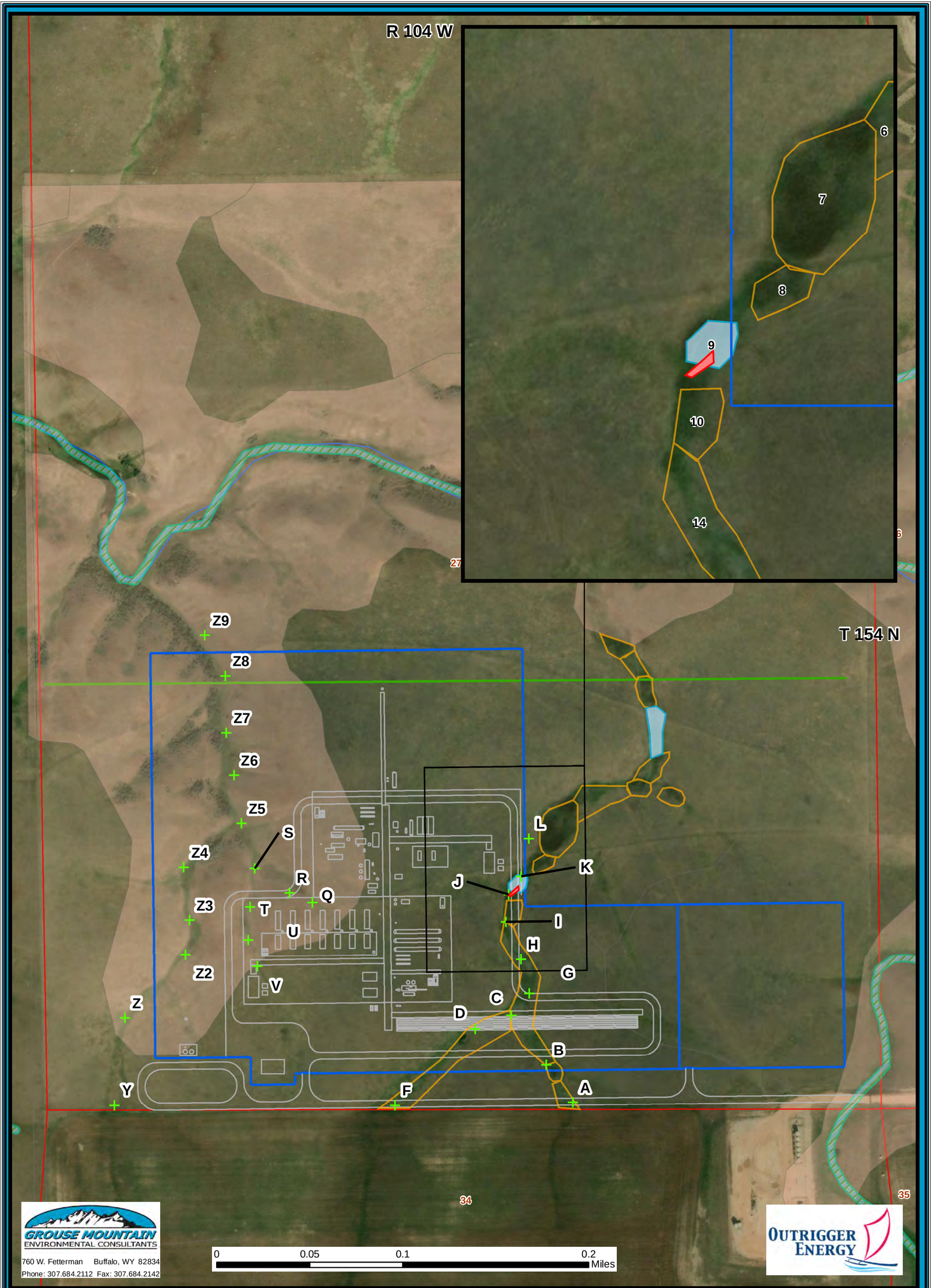
Katie Taylor holds a B.S. degree in Biology (2009) from Seattle Pacific University and a M.S. degree in Rangeland Ecology (2014) from the University of Wyoming. She is currently Lead Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Ms. Taylor has 9 years of experience working in the wildlife field. Her direct work experience includes applied field work and research for universities, private industry, and federal and state agencies. Ms. Taylor has worked on research projects involving raptors, grouse species, songbirds, wolves, and various species of ungulates throughout the continental U.S. More specifically, she has 5 years of experience conducting surveys in accordance with BLM wildlife survey protocols for nesting raptors, sage-grouse and sharp-tailed grouse leks, mountain plover, and other sensitive species in Wyoming. In addition, Ms. Taylor has experience in wildlife data management and GIS support for the Bureau of Land Management – Buffalo Field Office. Ms. Taylor has also completed wetland delineation training and has experience with wetland determinations and working with the USACE for hydrology determinations.

Kirstie Lawson holds a B.S. degree in Wildlife Biology (2012) from the University of Montana and a M. S. degree in Biology (2018) from the University of British Columbia Okanagan. She is currently a Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Ms. Lawson has over 6 years of experience working in the wildlife field. With a focus on grouse research, Ms. Lawson's background also includes conducting research and surveys for mesocarnivores, songbirds, and raptors in the U.S. and Canada. Her previous work has required interacting with various stakeholders, including private landowners, government agencies, and industry.

Gregory Shedd holds a B.S. in Wildlife Biology (2002) from Unity College. He is currently a Wildlife Biologist with Grouse Mountain Environmental Consultants based in Buffalo, Wyoming. Mr. Shedd has over 15 years of combined experience in the wildlife field. His primary experience is private consulting in Wyoming and surrounding states performing surveys, monitoring and applied research for various stakeholders including private landowners, government agencies, and industry. Mr. Shedd has completed wetland delineation training and has conducted wetland determinations for over 10 years.

FIGURES

Figure 1. OE2: Bill Sanderson Gas Processing Plant Wetland Assessment Report Map



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OUTRIGGER ENERGY

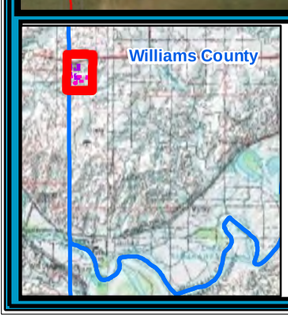

Figure 1. OE2 North LLC: Bill Sanderson Gas Proccessing Plant
Wetland Assessment Report Map

- Plant Boundary (fence line)
- Plant Site Features
- Northern Extent
- Report Photo Points

Offsite Assessment
- Unknown
- Not Wetland
- Updated Unit 9 Boundary
- National Wetlands Inventory Wetland

Soils
- Not Hydric
- 0-5% Hydric
- Intermittent Stream

Coordinate System: NAD 1983 UTM Zone 13N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Scale: 1:3,000
Date: 4/7/2020
Created by: klawson
File Name: OUT-004_WetlandDelineation_Map_040720

OE2 460

APPENDICES

Appendix A. Bill Sanderson Gas Processing Plant Field Survey Plant List

Common Name	Scientific Name	Indicator Status	Comment(s)
Western snowberry	*Symphoricarpos occidentalis*	UPL	
Crested wheatgrass	*Agropyron cristatum*	UPL	
Silver buffaloberry	*Shepherdia argentea*	UPL	
Tufted hair grass	*Deschampsia caespitosa*	FACW	
Big bluestem	*Andropogon gerardii*	FACU	
Prairie sandreed	*Calmovilfa longifolia*	UPL	
Common Yarrow	*Achillea milleflium*	UPL	
Tall hedgemustard	*Sisymbrium altissimum*	FACU	
Stiff goldenrod	*Oligoneuron rigidum*	FACU	
Spotted Knapweed	Cenaurea stoebe	UPL	
Rose	*Rosa* spp.	FACU	
Needlegrass	*Nassella* spp.	UPL	
Coneflower	*Echinecea* or *Rudbeckia* spp.	Unknown	Unable to identify to species at this time.
Unknown Sedge	*Carex* spp.	Unknown	Possibly threadleaf sedge, but unable to identify at this time.

Appendix B.

Bill Sanderson Field Survey Drainage Photographs

Photo 1. Overview of eastern drainage within the facilities footprint taken from Photo Point A, facing northwest. Picture taken on March 26, 2020.

Photo 2. Overview of eastern drainage within the facilities footprint taken from Photo Point A, facing south. Picture taken on March 26, 2020.

Photo 3. Overview of eastern drainage within the facilities footprint taken from Photo Point B, facing northwest. Picture taken on March 26, 2020.

Photo 4. Overview of eastern drainage within the facilities footprint taken from Photo Point B, facing southeast. Picture taken on March 26, 2020.

Photo 5. Overview of eastern drainage within the facilities footprint taken from Photo Point C, facing north. Picture taken on March 26, 2020.

Photo 6. Overview of eastern drainage within the facilities footprint taken from Photo Point C, facing southeast. Picture taken on March 26, 2020.

Photo 7. Overview of eastern drainage within the facilities footprint taken from Photo Point D, facing north. Picture taken on March 26, 2020.

Photo 8. Overview of eastern drainage within the facilities footprint taken from Photo Point D, facing southwest. Picture taken on March 26, 2020.

Photo 9. Overview of eastern drainage within the facilities footprint taken from Photo Point F, facing north. Picture taken on March 26, 2020.

Photo 10. Overview of eastern drainage within the facilities footprint taken from Photo Point F, facing south. Picture taken on March 26, 2020.

Photo 11. Overview of eastern drainage within the facilities footprint taken from Photo Point G, facing north. Picture taken on March 26, 2020.

Photo 12. Overview of eastern drainage within the facilities footprint taken from Photo Point G, facing southwest. Picture taken on March 26, 2020.

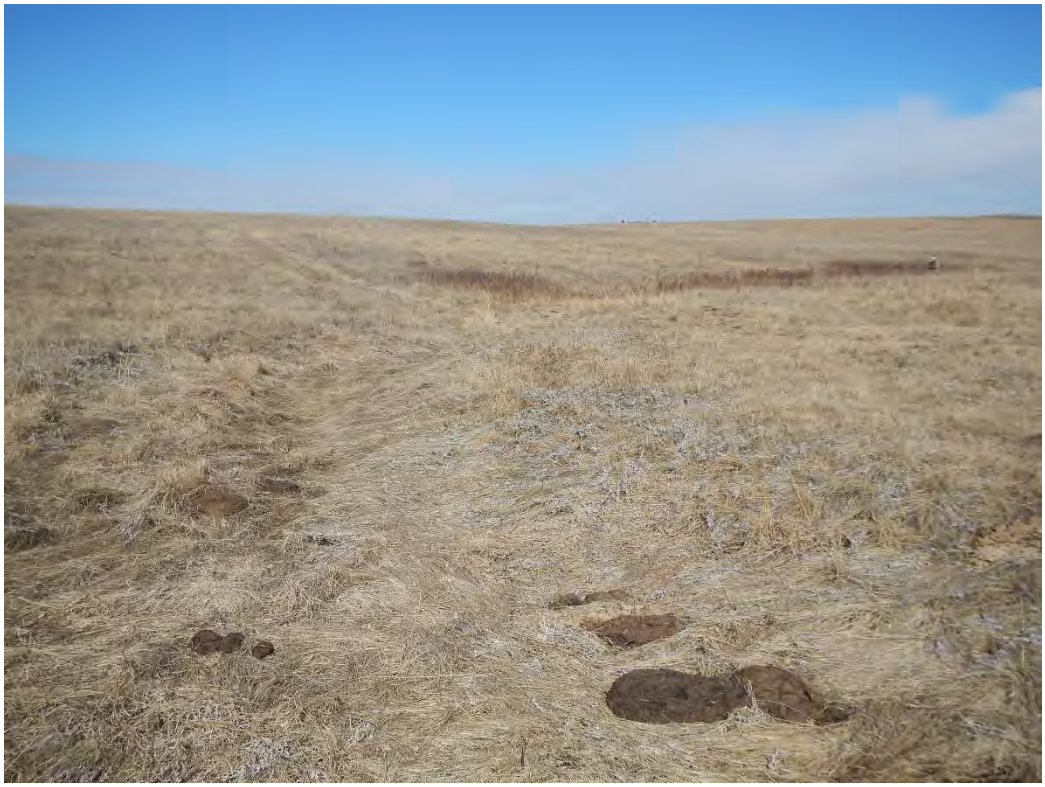

Photo 13. Overview of eastern drainage within the facilities footprint taken from Photo Point H, facing northwest. Picture taken on March 26, 2020.

Photo 14. Overview of eastern drainage within the facilities footprint taken from Photo Point H, facing south. Picture taken on March 26, 2020.

Photo 15. Overview of eastern drainage within the facilities footprint taken from Photo Point I, facing north. Picture taken on March 26, 2020.

Photo 16. Overview of eastern drainage within the facilities footprint taken from Photo Point I, facing south. Picture taken on March 26, 2020.

Photo 17. Overview of eastern drainage and Unit 9 "potential wetland" within the facilities footprint taken from Photo Point J, facing north. Picture taken on March 26, 2020.

Photo 18. Overview of eastern drainage within the facilities footprint taken from Photo Point J, facing south. Picture taken on March 26, 2020.

Photo 19. Overview of eastern drainage within the facilities footprint taken from Photo Point K, facing north. Picture taken on March 26, 2020.

Photo 20. Overview of eastern drainage within the facilities footprint taken from Photo Point K, facing south. Picture taken on March 26, 2020.

Photo 21. Overview of eastern drainage just outside of the facilities footprint taken from Photo Point L, facing northeast. Picture taken on March 26, 2020.

Photo 22. Overview of eastern drainage within the facilities footprint taken from Photo Point L, facing southeast. Picture taken on March 26, 2020.

Photo 23. Overview of western drainage within the facilities footprint taken from Photo Point Q, facing northwest. Picture taken on March 26, 2020.

Photo 24. Overview of western drainage within the facilities footprint taken from Photo Point R, facing northwest. Picture taken on March 26, 2020.

Photo 25. Overview of western drainage within the facilities footprint taken from Photo Point S, facing north. Picture taken on March 26, 2020.

Photo 26. Overview of western drainage within the facilities footprint taken from Photo Point S, facing southeast. Picture taken on March 26, 2020.

Photo 27. Overview of western drainage within the facilities footprint taken from Photo Point T, facing north. Picture taken on March 26, 2020.

Photo 28. Overview of western drainage within the facilities footprint taken from Photo Point T, facing southwest. Picture taken on March 26, 2020.

Photo 29. Overview of western drainage within the facilities footprint taken from Photo Point U, facing north. Picture taken on March 26, 2020.

Photo 30. Overview of western drainage within the facilities footprint taken from Photo Point U, facing south. Picture taken on March 26, 2020.

Photo 31. Overview of western drainage within the facilities footprint taken from Photo Point V, facing north. Picture taken on March 26, 2020.

Photo 32. Overview of western drainage within the facilities footprint taken from Photo Point V, facing south. Picture taken on March 26, 2020.

Photo 33. Overview of western drainage that leads into the project boundary (fence line) taken from Photo Point Y, facing north. Picture taken on March 26, 2020.

Photo 34. Overview of western drainage that leads into the project boundary (fence line) taken from Photo Point Y, facing south. Picture taken on March 26, 2020.

Photo 35. Overview of western drainage that leads into the project boundary (fence line) taken from Photo Point Z, facing north. Picture taken on March 26, 2020.

Photo 36. Overview of western drainage that leads into the project boundary (fence line) taken from Photo Point Z, facing south. Picture taken on March 26, 2020.

Photo 37. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z2, facing north. Picture taken on March 26, 2020.

Photo 38. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z2, facing southwest. Picture taken on March 26, 2020.

Photo 39. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z3, facing north. Picture taken on March 26, 2020.

Photo 40. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z3, facing south. Picture taken on March 26, 2020.

Photo 41. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z4, facing northeast. Picture taken on March 26, 2020.

Photo 42. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z4, facing south. Picture taken on March 26, 2020.

Photo 43. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z5, facing northwest. Picture taken on March 26, 2020.

Photo 44. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z5, facing south. Picture taken on March 26, 2020.

Photo 45. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z6, facing north. Picture taken on March 26, 2020.

Photo 46. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z6, facing southwest. Picture taken on March 26, 2020.

Photo 47. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z7, facing north. Picture taken on March 26, 2020.

Photo 48. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z7, facing south. Picture taken on March 26, 2020.

Photo 49. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z8, facing northwest. Picture taken on March 26, 2020.

Photo 50. Overview of western drainage within the project boundary (fence line) taken from Photo Point Z8, facing southwest. Picture taken on March 26, 2020.

Photo 51. Overview of western drainage just outside of the project boundary (fence line) taken from Photo Point Z9, facing northwest. Picture taken on March 26, 2020.

Photo 52. Overview of western drainage just outside of the project boundary (fence line) taken from Photo Point Z9, facing south. Picture taken on March 26, 2020.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF NORTH DAKOTA

OE2 North LLC
B. Sanderson Gas Processing Plant – Williams County

Case No. PU-20-082
OAH File No. 20200088

CERTIFICATE OF SERVICE

I, the undersigned, hereby certify that a true and correct copy of the Letter to Mr. Steve Kahl, at the North Dakota Public Service Commission forwarding the following documents:

1. Stormwater Pollution Prevention Plan;
2. Letter to SHPO dated March 27, 2020;
3. SHPO Response Letter dated April 3, 2020;
4. Updated Plant Vegetation Inventory Summary; and
5. Updated Wetland Delineation Report

for filing in the above-referenced case were, on April 9th, 2020, served by placing the same in the United States mail, postage prepaid, properly addressed to the following:

Timothy J. Dawson
ND Office of Administrative Hearings
2911 N 14th Street
Bismarck, ND 58503

Mitchell D. Armstrong
Brian Schmidt
P.O. Box 460
Bismarck, ND 58502-0460

DATED this 9th day of April, 2020.

FREDRIKSON & BYRON P.A.

By: _____
Lawrence Bender, ND Bar #03908
1133 College Drive, Suite 1000
Bismarck, ND 58501-1215
701.221.8700
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Counsel for OE2 North LLC