DENBURY GREEN PIPELINE-MONTANA, LLC'S CONSOLIDATED APPLICATION FOR A CERTIFICATE OF CORRIDOR COMPATIBILITY AND ROUTE PERMIT, AND WAIVER APPLICATION CASE NO. PU-19-__

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SUBMITTED TO

North Dakota Public Service Commission
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CONTENTS

Checklist for Combined Corridor Compatibility and Route Permit Application vi

1 Introduction 1

2 Facility Type 1

3 Location 4

3.1 Project Study Area 4

3.2 Preferred Location of Project Corridor and Route 4

4 Purpose and Need of the Facility 5

5 Product 5

5.1 Type of Product to be Transmitted 5

5.2 Source of Product 5

5.3 Final Destination of Product 6

6 Technology to be Deployed 6

7 Estimated Total Cost for Construction 6

8 Schedule 6

8.1 Obtaining Certificate of Corridor Compatibility 6

8.2 Obtaining Route Permit 7

8.3 Completing Right-of-Way Acquisition 7

8.4 Starting Construction 7

8.5 Completing Construction 7

8.6 Testing Operations 7

8.7 Commencing Operations 7

9 Facility Size and Design 7

9.1 Pipeline 7

9.1.1 Width of Right-of-Way 7

9.1.2 Length of Facility 8

9.1.3 Pipe Size 8

9.1.4 Maximum Design Operating Pressure and Temperature 8

9.2 Aboveground Facilities 8

9.2.1 General Location of New Associated Facilities 8

9.2.2 Estimated Distance between Surface Structures 8

9.2.3 Maximum Design Flow Rate for Pipeline Facilities 8

9.2.4 Number and Location for Compressor and/or Pumping Stations 9

10 Easement Acquisition 9

10.1 Informing Landowners of Easement Acquisition 9

10.2 Compensation for Easement 9

11 Right-of-Way Preparation, Construction, and Reclamation Procedures 10

11.1 Description of Right-of-Way Preparation and Construction 10

11.1.1 Clearing and Grading 10

11.1.2 Pipe Stringing, Bending, and Welding 11

11.1.3 Trenching 11

11.1.4 Pipeline Installation and Trench Backfilling 11

11.2 Special Construction Techniques 12
11.2.1 Conventional Boring Construction 12
11.2.2 Waterbody and Wetland Crossings 12
11.3 Restoration Procedures 13
12 Operation and Maintenance 13
13 Alternatives Considered 13
13.1 Project Alternatives 13
13.1.1 No Action 13
13.1.2 Other Pipelines and Carbon Dioxide Sources 14
13.1.3 Trucking 14
13.1.4 Rail 14
13.1.5 Route Alternatives 14
14 Environmental Studies 14
14.1 Cultural Resource Inventory 14
14.2 Wetland and Waterbody Inventory 16
14.3 Habitat Assessment 17
14.3.1 Tree/Sapling/Shrub Inventory 17
14.3.2 Wildlife 17
14.3.3 Migratory Bird Treaty Act 18
14.3.4 Bald and Golden Eagle Protection Act Consultation 18
14.4 Paleontological Resources 19
15 Consultation 20
15.1 North Dakota State Historic Preservation Office 20
15.2 U.S. Fish and Wildlife Service 20
15.3 North Dakota State Water Commission 20
15.4 North Dakota Game and Fish Department 21
15.5 North Dakota Department of Transportation 21
16 Identification of Potential Permits/Approvals 21
17 Siting Criteria 22
17.1 Exclusion Areas 22
17.1.1 Designated or Registered National Parks, Memorial Parks, Historic Sites and Landmarks, Natural Landmarks, Monuments, and Wilderness Areas 23
17.1.2 Designated or Registered State Parks, Historic Sites, Monuments, Historical Markers, Archaeological Sites, and Natural Preserves 23
17.1.3 County Parks and Recreational Areas, Municipal Parks, and Parks Owned or Administered by Other Governmental Subdivisions 23
17.1.4 Areas Critical to the Life Stages of Threatened or Endangered Animal or Plant Species 23
17.1.5 Areas Where Animal or Plant Species that are Unique or Rare to This State Would be Irreversibly Damaged 23
17.1.6 Areas within 1,200 Feet of the Geographic Center of an Intercontinental Ballistic Missile Launch or Launch Control Facility 24
17.1.7 Areas within 30 Feet on Either Side of a Direct Line between Intercontinental Ballistic Missile Launch or Launch Control Facility 24
17.2 Avoidance Areas 24
17.2.1 Scenic or Recreational Rivers; Wildlife Refuges; and Grasslands 25

17.2.2 Designated or Registered State Wild, Scenic, or Recreational Rivers; Game Refuges; Game Management Areas; Management Areas; Forests; Forest Management Lands; and Grasslands 25
17.2.3 Historical Resources Not Specifically Designated as Exclusion or Avoidance Areas 25
17.2.4 Areas that are Geologically Unstable 25
17.2.5 Within 500 Feet of a Residence, School, or Place of Business 25
17.2.6 Reservoirs and Municipal Water Supplies 25
17.2.7 Water Sources for Organized Rural Water Districts 25
17.2.8 Areas of Recreational Significance that are not Designated as Exclusion Areas 25
17.3 Selection Criteria 26
17.3.1 Agricultural Production 26
17.3.2 Family Farms and Ranches 26
17.3.3 Land Economically Suitable for Irrigation 26
17.3.4 Surface Drainage Patterns and Groundwater Flow Patterns 26
17.3.5 Sound Sensitive Land Uses 27
17.3.6 Visual Effect on Adjacent Areas 27
17.3.7 Extractive and Storage Resources 28
17.3.8 Wetlands, Woodlands, and Wooded Areas 28
17.3.9 Radio and Television Reception and Other Communication or Electronic Facilities 28
17.3.10 Human Health and Safety 28
17.3.11 Animal Health and Safety 29
17.3.12 Plant Life 29
17.4 Policy Criteria 29
17.4.1 Location and Design 29
17.4.2 Training and Use of In-State Labor 29
17.4.3 Economies of Construction and Operation 29
17.4.4 Use of Citizen Coordinating Committees 29
17.4.5 Commitment of a Portion of Transmitted Product for Use in State 30
17.4.6 Labor Relations 30
17.4.7 Coordination of Facilities 30
17.4.8 Monitoring Impacts 30
17.4.9 Using Existing and Proposed Rights-of-Way and Corridors 30
17.4.10 Other Existing or Proposed Transmission Facilities 31

18 Evaluation of NDCC Section 49-22.1-09 Factors 31

18.1 Effects on Public Health, Welfare, Natural Resources, and the Environment 31
18.2 Transmission Technologies and Systems Designed to Minimize Adverse Environmental Effects 31
18.3 Potential for Beneficial Uses of Waste Energy from a Proposed Energy Conversion Facility 31
18.4 Unavoidable Adverse Direct and Indirect Environmental Effects 31
18.5 Corridor or Route Alternatives Developed During the Hearing that Minimize Adverse Effects 32
18.6 Irreversible and Irretrievable Commitments of Natural Resources if Designated 32
18.7 Direct and Indirect Economic Impacts of the Facility 32
18.8 Existing Plans for Other Developments (State, Local, and Private) in the Vicinity of the Project 32
18.9 Effects of the Proposed Route on Existing Scenic Areas, Historic Sites and Structures, and Cultural Resources 32

18.10 Effects of the Proposed Route on Areas Which are Unique Because of Biological Wealth or Rare and Endangered Species Habitats 33
18.11 Problems Raised by Federal Agencies, other State Agencies, and Local Entities 33
19 Other Factors Considered 33
19.1 Design Construction Limitations 33
19.2 Economic Considerations 33
19.3 Present and Future Natural Resource Development 34
20 Applicant's Mitigation Measures and Policies and Commitments to Limit Environmental Impact 34
21 Qualifications of Preparers 35
22 Literature Cited 37

APPENDICES

Appendix A Project Overview Maps, Pipeline Schematics, ROW Details, and Engineering Drawings
Appendix B Environmental Mitigation Plan
Appendix C Cultural Resources Reports and Unanticipated Discovery Plan
Appendix D Natural Resources Report
Appendix E Paleontological Resources Report
Appendix F Agency Correspondence/Consultation

FIGURES

Figure 1. Overview of Denbury CO_2 Pipeline Project route. 2
Figure 2. Denbury CO_2 Pipeline Study Area. 3

TABLES

Table 1. Distance between Surface Structures 8
Table 2. Potential Permits/Approvals 21
Table 3. Exclusion Areas Summary 22
Table 4. Avoidance Areas Summary 24
Table 5. Farmland in Study Area 26

ACRONYMS AND ABBREVIATIONS

BMP	best management practice
Denbury	Denbury Green Pipeline-Montana, LLC
CCA	Cedar Creek Anticline
CFR	Code of Federal Regulations
CHSU	Cedar Hills South Unit
CO_2	carbon dioxide
Commission	North Dakota Public Service Commission
Consolidated Application	Consolidated Certificate of Corridor Compatibility and Route Permit Application
EMP	Environmental Mitigation Plan
EOR	Enhanced Oil Recovery
HDD	horizontal directional drilling
NDAC	North Dakota Administrative Code
NDCC	North Dakota Century Code
NDDOT	North Dakota Department of Transportation
NDSWC	North Dakota State Water Commission
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
PFYC	Potential Fossil Yield Classification
PHMSA	Pipeline Hazardous Materials Safety Administration
Project	CHSU Lateral Pipeline Project
ROW	right-of-way
SHPO	State Historic Preservation Office
Study Area	1-mile-wide corridor between the connection point of Denbury's CCA Pipeline in Montana to the terminus of the pipeline in North Dakota
SWCA	SWCA Environmental Consultants
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation

CHECKLIST FOR COMBINED CORRIDOR COMPATIBILITY AND ROUTE PERMIT APPLICATION

Authority	Description	Section(s)
Chapter 49-22 CENTURY CODE – Title 49		
49-22.1-06	Application for a Certificate for a Corridor (CC)	
1.a.	Description of size and type of facility	2.0, 9.0
1.b.	Summary of any studies of environmental impacts	14.0
1.c.	Need for the facility	4.0
1.d.	Site for energy conversion facility	N/A
1.e.	Preferred transmission (pipeline) corridor	3.2
1.f.	Analysis of merits and detriments of facility location	1.0, 4.4, 12.0
1.g.	Mitigating measures	21.0
1.h.	Corridor evaluation pursuant to 49-22.1-06 and 49-22.1-09	17.0
49-22-08.1	Application for Route Permit (RP)	
1.a.	Description of size and type of facility	2.0, 9.0
1.b.	Description of the location	3.0
1.c.	Route evaluation relative to 49-22.1-07 and 49-22.1-09	17.0, 18.0, 19.0
1.d.	Mitigating measures	20.0
1.e.	Right-of-way preparation, construction, and reclamation	11.0
1.f.	Statement identifying how: 1) landowners informed of right-of-way acquisition; and 2) how landowners will be compensated	10.0
1.g.	Other relevant information	19.0
49-22.1-09	Factors to be considered in evaluating corridor and route applications	18.0
1	Research and investigation into effects of the project on public health, welfare, natural resources, and the environment	18.1
2	Effects of transmission technology and design to minimize adverse effects	18.2
3	Potential beneficial uses of waste energy from energy conversion facility	18.3
4	Unavoidable adverse direct and indirect environmental effects	18.4
5	Corridor or route alternatives developed during the hearing which minimize adverse effects	18.5
6	Irreversible and irretrievable commitments of natural resources if designated	18.6
7	Direct and indirect economic impacts of the facility	18.7
8	Existing plans for other developments at or in the vicinity	18.8
9	Effect of project on scenic areas, historic sites and structures, paleontological and archaeological sites	18.9
10	Effect of route on unique biological areas	18.10
11	Problems raised by federal, state, or local entities	18.11
ADMINISTRATIVE CODE – ARTICLE 69-06		
69-06-05-01	Application for a Transmission Facility Permit (CC)	
2.a.(1)	Type of facility proposed	2.0
2.a.(2)	Purpose of facility	4.0
2.a.(3)	Technology to be deployed	6.0
2.a.(4)	Type of product to be transmitted	5.1
2.a.(5)	Source of product being transmitted	5.2
2.a.(6)	Final destination of product being transmitted	5.3

Authority	Description	Section(s)
2.a.(7)	Size and design detail and any alternative size and design	9.0
2.a.(7)(a)	The width of right-of-way	9.1.1
2.a.(7)(b)	The approximate length of facility	9.1.2
2.a.(7)(c)	The estimated span length for electric facilities	N/A
2.a.(7)(d)	The anticipated type of structure for electric facilities	N/A
2.a.(7)(e)	The voltage for electric facilities	N/A
2.a.(7)(f)	The requirement for and general location of any associated facilities	9.2.1
2.a.(7)(g)	The estimated distance between pipeline surface structures	9.2.2
2.a.(7)(h)	The pipe size	9.1.3
2.a.(7)(i)	The maximum design for pipeline operating pressure and temperature	9.1.4
2.a.(7)(j)	The maximum design pipeline flow rate	9.2.3
2.a.(7)(k)	The number and general location of compressor or pumping stations	9.2.4
2.b.	Time schedule	8.0
2.b.(1)	Obtaining the certificate of corridor compatibility	8.1
2.b.(2)	Obtaining route permit	8.2
2.b.(3)	Completing right-of-way acquisition	8.3
2.b.(4)	Starting construction	8.4
2.b.(5)	Completing construction	8.5
2.b.(6)	Testing operations	8.6
2.b.(7)	Commencing operations	8.7
2.c.	A copy of each evaluative study or assessment of environmental impact of the proposed facility submitted to the agencies listed in Section 69-06-01-05 and each response received	Appendix F
2.d.	Need for facility	4.0
2.e.	Description of alternatives	13.0
2.f	Corridor width	3.1, 9.1
2.g.	Study area to enable the Commission to evaluate the factors in the Century Code Section 49-22.1-09	3.0, 17.0
2.h.	Discussion of factors in Century Code 49-22.1-09 to air Commission's evaluation	18.0
2.i.	A discussion of the applicant's policies and commitments to limit the environmental impact of its facilities, including copies of board resolutions and management directives	20.0
2.j.	Map of criteria that led to route location	Appendix A
2.k.	Discuss relative value of each criteria and how the location was selected; how operation will affect criteria	17.0
2.l.	Mitigating measures	20.0
2.m.	Qualifications of each person involved in location study	21.0
2.n.	Map identifying criteria that led to the route location and new facilities	Appendix A
2.o.	8½ × 11 black and white map suitable for newspaper publication	Separate
2.p.	Discussion of present and future natural resource development in the area	17.3.7
2.q.	Maps and GIS data meeting PSC requirements	Appendix A
69-06-06-01	Application for Waiver of Procedures and Time Schedule	
69-06-08-02	Transmission Facility Corridor and Route Criteria	
1	Exclusion areas	17.1
1.a.	Designated or registered national: parks, sites, landmarks, monuments, wilderness	17.1.1

Authority	Description	Section(s)
1.b.	Designated or registered state: parks, sites, monuments, archeological sites, natural preserves	17.1.2
1.c.	County parks and recreational areas, municipal parks, parks owned or administered by other governmental subdivisions	17.1.3
1.d.	Areas of critical habitat	17.1.4
1.e.	Areas where unique or rare species would be irreversibly damaged	17.1.5
1.f.	Area within 1,200 feet of ICBM facility	17.1.6
1.g.	Areas within 30 feet of direct line of ICBM launch facilities	17.1.7
2	Avoidance areas	17.2
2.a	Designated or registered national: historic districts; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; grasslands	17.2.1
2.b.	Designated or registered state: wild, scenic, or recreational rivers; game refuges; game management areas; forest management lands; grasslands	17.2.2
2.c	Historical resources which are not specifically designated as exclusion or avoidance areas	17.2.3
2.d.	Areas which are geologically unstable	17.2.4
2.e.	Within 500 feet of a residence, school, or place of business	17.2.5
2.f.	Reservoirs and municipal water supplies	17.2.6
2.g.	Water sources for organized rural water districts	17.2.7
2.h.	Irrigated land (does not apply to underground transmission facility)	N/A
2.i.	Area of recreational significance but not designated exclusion areas	17.2.8
3	Selection criteria. Impact on:	17.3
3.a.(1)	Agricultural production	17.3.1
3.a.(2)	Family farms and ranches	17.3.2
3.a.(3)	Land economically suitable for irrigation	17.3.3
3.a.(4)	Surface drainage patterns and groundwater flow patterns	17.3.4
3.b.(1)	Sound sensitive land uses	17.3.5
3.b.(2)	Visual effect on adjacent area	17.3.6
3.b.(3)	Extractive and storage resources	17.3.7
3.b.(4)	Wetlands, woodlands, and wooded areas	17.3.8
3.b.(5)	Radio and TV reception and other communication or electronic facilities	17.3.9
3.b.(6)	Human health and safety	17.3.10
3.b.(7)	Animal health and safety	17.3.11
3.b.(8)	Plant life	17.3.12
4	Policy criteria	17.4
4.a.	Location and design	17.4.1
4.b.	Training and utilization of instate labor	17.4.2
4.c.	Economies of construction and operation	17.4.3
4.d.	Use of citizen coordinating committees	17.4.4
4.e.	Commitment of portion of transmitted product for use in state	17.4.5
4.f.	Labor relations	17.4.6
4.g.	Coordination of facilities	17.4.7
4.h.	Monitoring of impacts	17.4.8
4.i.	Using existing or proposed rights-of-way and corridors	17.4.9
4.j	Using existing or proposed transmission facilities	17.4.10

1 INTRODUCTION

Denbury Green Pipeline-Montana, LLC (Denbury) proposes to construct the Cedar Hills South Unit (CHSU) Lateral Pipeline project (Project) that will consist of a 12-inch inside diameter, approximately 17.77-mile-long welded steel pipeline to transport carbon dioxide (CO_2) from a pipeline source in Fallon County, Montana, to Denbury's CHSU oil production facilities in Bowman County, North Dakota. Approximately 8.54 miles of the pipeline will be in Fallon County, Montana, and the remaining 9.23 miles will be in Slope and Bowman Counties, North Dakota (Figures 1 and 2).

The Project will provide for tertiary oil recovery from Denbury's production wells through injection of CO_2 into the oil reservoir which will result in increased extraction and utilization of crude oil resources in CHSU.

Denbury is submitting this Consolidated Certificate of Corridor Compatibility and Route Permit Application (Consolidated Application) to the North Dakota Public Service Commission (Commission) requesting a Certificate of Corridor Compatibility and Route Permit for construction of the North Dakota portion of the Project. In addition, Denbury is also submitting the enclosed Application for a Waiver or Reduction of Procedures and Time Schedules.

This Consolidated Application supports Denbury's request for a Certificate of Corridor Compatibility and Route Permit and complies with Chapter 49-22.1 of the North Dakota Century Code (NDCC) and Chapters 69-06-05 and 69-06-08 of the North Dakota Administrative Code (NDAC).

2 FACILITY TYPE

The proposed Project is composed of one underground pipeline and associated facilities for the transport of CO_2 from Fallon County, Montana, to CHSU in Bowman County, North Dakota, for use in Enhanced Oil Recovery (EOR) operations. The North Dakota segment of the pipeline will be approximately 9.23 miles in length, composed of 2.29 miles in Slope County and 6.94 miles in Bowman County.

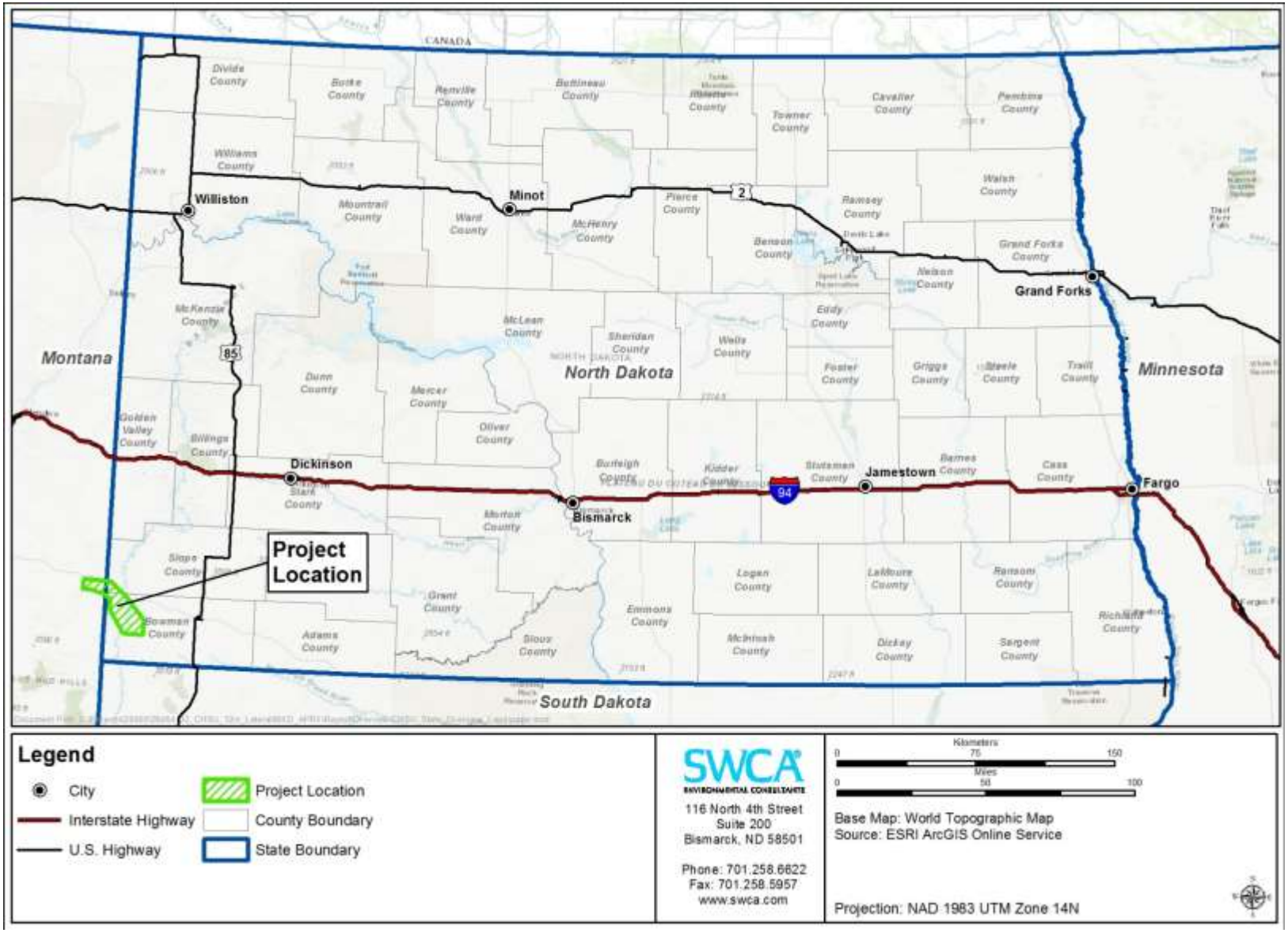


Figure 1. Overview of Denbury CO_2 Pipeline Project route.

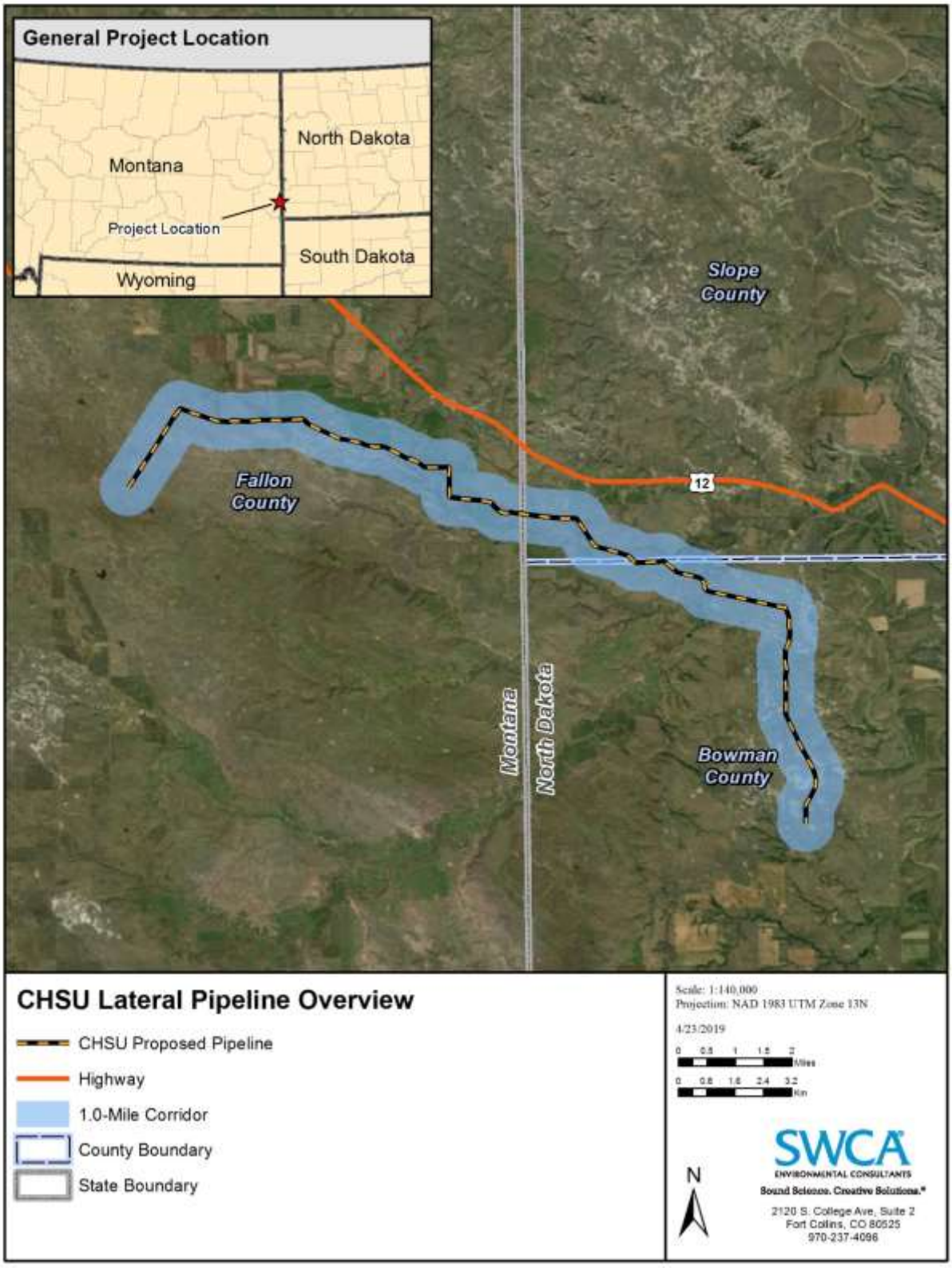


Figure 2. Denbury CO_2 Pipeline Study Area.

3 LOCATION

3.1 Project Study Area

Denbury defined its Study Area as a 1.0-mile-wide corridor (0.5 mile on either side of the proposed centerline) between the connection point with Denbury's Cedar Creek Anticline (CCA) Pipeline in Fallon County, Montana to the terminus of the pipeline in CHSU in Bowman County, North Dakota.

3.2 Preferred Location of Project Corridor and Route

Denbury is seeking approval of a corridor that will align with the survey corridor used for conducting environmental field surveys. The survey corridor is primarily 200 feet wide (centered on the proposed alignment), but also includes temporary workspace areas extending beyond the edge of the 200-foot-wide corridor (the Corridor). The pipeline enters Slope County in the NE¼NW¼ of Section 31, Township (T) 133 North (N), Range (R) 106 West (W) and terminates in Bowman County in the NE¼SW¼ of Section 33, T132N, R106W. The location and width of the proposed Corridor are illustrated on the aerial maps in Appendix A, as is the location of the proposed route (Route) within the proposed Corridor.

Denbury's proposed Corridor and Route are the result of a thorough site analysis, and coordination with Denbury, landowners, local officials, agencies, and existing infrastructure owners. Denbury obtained and analyzed public and proprietary information to identify sensitive areas and features within the Study Area, such as exclusion and avoidance areas, populated areas, wetlands, waterbodies, natural resources, areas of cultural significance, and public lands. In addition, Denbury considered existing rights-of-way (ROWs) (e.g., pipelines and roads) to maximize co-location with other infrastructure, where appropriate. Denbury also sought input from affected landowners, agencies, local governments, and other infrastructure owners, and refined the Corridor and Route based on input received. Denbury completed civil and environmental field surveys and additional constructability reviews to further refine its Route. Ultimately, the Corridor and Route presented in this Combined Application were selected to meet Project needs, comply with the Commission's siting criteria, and minimize impacts to landowners, the environment, and existing infrastructure.

Additional discussion of the factors considered in selecting the Corridor and the Route is provided in Sections 13.0, 17.0, and 18.0 of this Consolidated Application.

4 PURPOSE AND NEED OF THE FACILITY

Information from the U.S. Department of Energy (2018) indicates that crude oil development and production in oil reservoirs can include three distinct phases: primary, secondary, and tertiary (or enhanced) recovery, as summarized below.

- Primary recovery relies on the natural reservoir pressure to drive the oil into the wellbore, which is combined with artificial lift (e.g., pumps) to bring the oil to the surface. Typically, primary recovery only extracts about 10% of the oil in place in the reservoir.

- Secondary recovery generally extends an oilfield's productive life by injecting water or gas into the reservoir to displace the oil and drive it to the production wellbore. This technique generally results in a total recovery of 20% to 40% of the original oil in the reservoir.

- Tertiary or EOR techniques may ultimately result in the total recovery of 30% to 60% or more of the original oil in place in the reservoir. The three main categories of EOR that have demonstrated success are thermal recovery through the injection of heat (e.g., steam), gas injection (e.g., natural gas, nitrogen, or carbon dioxide), and chemical injection. For the gas injection method, CO_2 is the most common type of gas used.

Denbury operates multiple oil and gas production wells in the Cedar Hills Oil Field and most of the wells are developed in the Red River B and South Red River B Pools. Oil production has been active in the field since the late 1990s. As oil production from individual wells has declined, Denbury has increasingly used water injection as a secondary recovery method to increase extraction of the resource from those formations. With construction of the Project, Denbury will have readily available CO_2 for use in EOR via their existing wells in CHSU.

The Project will also provide direct benefits to local communities through temporary construction employment and additional property tax revenue. Additional indirect benefits will result from Project-related purchases of local goods and services, such as the purchase of local gravel for access roads, and purchase of fuel, food/restaurant and lodging by Project construction and operations personnel.

A map showing the route of the proposed Denbury CHSU Lateral Pipeline is provided in Appendix A.

5 PRODUCT

5.1 Type of Product to be Transmitted

The Project will transmit liquid (supercritical fluid) CO_2.

5.2 Source of Product

The CO_2 will come from the Exxon Mobil Shute Creek Gas Plant in LaBarge, Wyoming, and the Conoco Phillips Lost Cabin Gas Plant in Lysite, Wyoming, and be transported to Denbury's Bell Creek EOR Development in Powder River County, Montana, via the Greencore CO_2 Pipeline. From the Bell Creek EOR Development, the CO_2 will be transported north and east through Carter County, Montana, via Denbury's CCA CO_2 Pipeline to Denbury's EOR Development Field in Fallon County, Montana. The Project will connect to the CCA CO_2 Pipeline at a point approximately 6.3 miles southeast of Baker,

Montana, and traverse in an easterly direction until it enters North Dakota in the southwestern corner of Slope County, North Dakota (see Figure 1).

5.3 Final Destination of Product

The Project terminus will be the Receiving Facility situated at Denbury's Miller Production Tank Battery EOR Development Site, located in the NE¼SW¼ of Section 33, T132N, R106W in Bowman County, North Dakota. From that location, the CO_2 will be distributed via injection lines to individual oil production wells for EOR purposes. The distribution flow line will be a re-purposed existing gathering pipeline, while the individual injection lines will utilize existing lines that are currently used for Denbury's water flood operations in the CHSU.

6 TECHNOLOGY TO BE DEPLOYED

The Project will be designed, constructed, maintained, inspected, and operated to meet or exceed the U.S. Department of Transportation (USDOT), Pipeline Hazardous Materials Safety Administration (PHMSA) regulations, and in accordance with industry standards and company policies. Technologies used to satisfy these requirements and standards include the following.

- Use of an external protective coating and cathodic protection to prevent external pipeline corrosion.
- Regular internal pipeline inspections using in-line inspection tools to detect internal anomalies, including corrosion or denting.
- Regular aerial and foot patrols of the permanent ROW.
- Installation of a monitoring and alarm system that continuously monitors the flow and pressure of the system via Denbury's Pipeline Control Center that triggers alarms for anything outside normal operating conditions.

Construction and installation of the pipeline will use different techniques to avoid or minimize impacts to sensitive areas and identified road and ditch crossings, such as trenchless construction methods (e.g., borings). These techniques are discussed further in Section 11.0.

7 ESTIMATED TOTAL COST FOR CONSTRUCTION

The estimated total cost for construction in North Dakota is $9.2 million.

8 SCHEDULE

8.1 Obtaining Certificate of Corridor Compatibility

Denbury requests a Certificate of Corridor Compatibility and Route Permit from the Commission in September 2019.

8.2 Obtaining Route Permit

Denbury requests a Certificate of Corridor Compatibility and Route Permit from the Commission in September 2019.

8.3 Completing Right-of-Way Acquisition

Denbury initiated ROW acquisition in June 2018 and will complete ROW acquisition in June 2019.

8.4 Starting Construction

Construction of the Project is scheduled to begin June 1, 2020.

8.5 Completing Construction

Denbury expects to complete construction of the Project by December 1, 2020.

8.6 Testing Operations

Denbury expects to conduct hydrostatic testing of the pipeline and associated site facilities no later than February 1, 2021, prior to placing the pipeline in service on February 15, 2021. Once the pipeline is placed into service, an internal inspection tool will be run to establish a baseline assessment of the pipeline.

8.7 Commencing Operations

The Project is anticipated to be operational no later than February 15, 2021.

9 FACILITY SIZE AND DESIGN

The following provides a description of the Project design, including the pipeline infrastructure and aboveground facilities.

9.1 Pipeline

9.1.1 *Width of Right-of-Way*

In general, the Project will be installed using a 75-foot-wide construction ROW, consisting of a 50-foot-wide permanent easement and a 25-foot-wide temporary construction ROW. Refer to the Topsoil Salvage Trench and Spoil Side schematic in Appendix A for an overview of the typical proposed Project construction ROW. Additional temporary workspaces will be required to accommodate boring crossings at existing features, such as roads, and at other locations as shown on the Project ROW map in Appendix A. The Project will also require construction of permanent access driveways and/or may require upgrading of existing private roads for operations and maintenance use.

9.1.2 *Length of Facility*

The Denbury CHSU Lateral Pipeline route in North Dakota is approximately 9.23 miles in length, composed of approximately 2.29 miles in Slope County and 6.94 miles in Bowman County.

9.1.3 *Pipe Size*

The Project will require installation of a 12-inch inside diameter (12.75-inch outside diameter) welded steel pipeline with a nominal wall thickness of 0.469 inch that will be increased 0.562 inch for specific locations, such as horizontal directional drilling (HDD) bores and stream, wetland, and road crossings. The pipe material will be 12.75-inch outside diameter, 0.469 WT, Gr X70, API 5L, FBE coated and 12.75-inch outside diameter, 0.562 WT, Gr X70, API 5L, FBE/ARO coated.

9.1.4 *Maximum Design Operating Pressure and Temperature*

The maximum operating pressure for the Denbury CHSU Lateral Pipeline will be 3,702 pounds per square inch gauge, with a maximum operating temperature of 100 degrees Fahrenheit.

9.2 Aboveground Facilities

9.2.1 *General Location of New Associated Facilities*

The proposed termination point of the CHSU Lateral Pipeline will be Denbury's Miller Production Tank Battery, situated on an approximate 5-acre parcel of land in the NE¼SW¼ of Section 33, T132N, R106W, located an estimated 6.11 miles south of Marmarth, North Dakota. The Receiving Facility will include metering stations, block valves, PIG launchers/receivers, and associated equipment. See Appendix A for a map showing the Receiving Station layout and pipeline equipment and connections.

Block valves at the tie-in point with the CCA CO_2 Pipeline and at the Receiving Facility will be equipped with pneumatic controllers and will have emergency shutdown capability if over pressuring of the pipeline or a loss of pressure in the pipeline is detected.

9.2.2 *Estimated Distance between Surface Structures*

One pump station will be required at the beginning of the pipeline in Montana and the only pipeline surface facilities will consist of block valves. The estimated distances between the CHSU Lateral Pipeline surface facilities are summarized in Table 1. Pipeline markers will also be placed at designated locations along the Route (e.g., public road crossings) as required by local, state, and federal regulations.

Table 1. Distance between Surface Structures

From	To	Approximate Mileage
CHSU Pump Station	Block Valve at Miller Meter Station	17.77 miles

9.2.3 *Maximum Design Flow Rate for Pipeline Facilities*

The maximum design flow rate for the Denbury CHSU Lateral Pipeline is 180 million standard cubic feet per day.

9.2.4 *Number and Location for Compressor and/or Pumping Stations*

No compressor/pumping stations for the Project will be in North Dakota. The Receiving Facility will have a metering station and block valve and will be co-located with the Miller Production Tank Battery in the NE¼SW¼ of Section 33, T132N, R106W, an estimated 6.11 miles south of Marmarth, North Dakota.

10 EASEMENT ACQUISITION

10.1 Informing Landowners of Easement Acquisition

Upon identifying the preliminary route, Denbury used publicly available information to identify landowners along the proposed route. Denbury contacted landowners via telephone to introduce the Project and discuss the easement acquisition process. Denbury sent introductory letters providing Project and land agent contact information to any landowners who could not be reached by telephone. During in-person meetings with landowners, the Denbury land agent presented proposed route maps for landowner review and input. Denbury used landowner input for route planning purposes, and when practicable, adjusted the proposed route to accommodate landowner concerns. When landowners were located out of state, Denbury provided Project information via telephone and mail. Denbury has obtained final easement and right-of-way agreements from all landowners along the Route and received all necessary permissions to complete the survey of the Route. Denbury currently owns/leases the Miller Production Tank Battery where the Receiving Station will be located.

10.2 Compensation for Easement

Landowners will be compensated for Project-required interests at or above their fair market values. Compensatory offers for easements and fee acquisitions have been based on careful analysis of comparable property values. All offers have been presented to landowners in writing with appropriate legal descriptions and depictions identifying the parameters and location of the permanent pipeline ROW easement and temporary construction easements. Denbury's land agent is trained and tasked to negotiate respectfully and in good faith with all landowners and governing entities. Denbury stresses to its land agent its preference for all negotiations, when possible, to be conducted with each landowner in person and as often as necessary to reach a mutually beneficial agreement.

Denbury will compensate landowners for permanent easement rights, temporary workspace use, access road use, and incidental damages that may occur. Denbury uses a formula for compensation relating to incidental damages incurred as a result of its pipeline construction activity, such as loss of marketable trees or crop losses. Anticipated damages, such as crop loss, will be calculated and included in the original compensation amount. If additional damage claims are made later, Denbury will address the claims as they arise.

11 RIGHT-OF-WAY PREPARATION, CONSTRUCTION, AND RECLAMATION PROCEDURES

11.1 Description of Right-of-Way Preparation and Construction

The proposed Project will be designed, constructed, tested, operated, and maintained in accordance with applicable requirements under the USDOT regulations in Title 49 Code of Federal Regulations (CFR) Part 195, U.S. Department of Labor regulations, Occupation Safety and Health Administration requirements, and other applicable federal and state regulations. Among other design standards, 49 CFR Part 195 specifies pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welding and operations personnel.

Prior to the start of construction, a pre-construction safety and environmental orientation will be held with all contractors and personnel involved in the Project. The orientation will review safety compliance; incident reporting; protocols for determining, correcting, and documenting safety non-compliance; and expectations for compliance enforcement. All construction personnel will be briefed and trained on all construction and environmental requirements, including laws, rules, and regulations applicable to the work. Denbury will have a qualified and experienced environmental inspector and safety representative on-site throughout construction.

Construction will typically take place during daylight hours. Spill prevention measures will be in place to maintain construction personnel safety and to protect the environment.

The standard pipeline construction process includes clearing and grading the ROW; pipe stringing, bending, and welding; trenching; lowering the pipeline; padding and backfilling; hydrostatic testing; and ROW cleanup and restoration (see Pipeline Construction Sequence schematic drawing in Appendix A). Each of these activities is discussed in more detail below.

11.1.1 *Clearing and Grading*

Once the limits of the approved work area (the construction ROW and temporary workspaces), pipeline centerline, access roads, aboveground facilities, and sensitive areas (e.g., wetland and waterbody boundaries) have been staked and flagged, the construction area will be cleared and graded. Prior to removal, trees and shrubs will be inventoried in accordance with the Commission's Tree and Shrub Mitigation Specifications. The ROW will be graded to provide a relatively level surface that is wide enough to allow for the passage of heavy construction equipment.

To prevent soil mixing, topsoil will be removed and segregated from the underlying subsoil. Topsoil will be removed from the entire ROW for the entire length of the pipeline and stored along the edge of the construction ROW.

After pipeline installation is complete, the subsoil will be replaced in the pipeline trench and the adjacent areas restored to the land's natural contours. Then the topsoil will be replaced in the locations from which it was originally removed. Construction activities will be suspended during abnormally wet conditions to prevent excessive rutting or mixing of topsoil with subsurface soils. Refer to the Pipeline Construction Sequence and Topsoil Salvage Trench and Spoil Side schematic drawings in Appendix A for additional detail.

Fences and gates will be constructed during the clearing and grading operations to allow continuous use of pastures, grazing units, and livestock facilities. Best management practices (BMPs) such as silt fences will be installed along the ROW adjacent to wetlands and waterbodies to prevent sediment from entering these areas. Temporary erosion controls will be installed after initial disturbance of soils, where necessary, to minimize erosion. Erosion-control BMPs will be monitored by the environmental inspector and maintained by the construction contractor throughout construction.

11.1.2 *Pipe Stringing, Bending, and Welding*

Pipe will be either stored at storage yards or transported directly to the pipeline ROW. Following trenching, pipe will be strung along the ROW. A stringing crew using special trailers will move the pipe along the ROW. Pipe lengths are typically 40 to 80 feet long.

A pipe-bending machine will be used for making slight bends in the pipe to accommodate variations in the pipeline route or to conform to the topography. Using a series of clamps and hydraulic pressure, the bending machine is used to make a smooth, controlled bend in the pipe. Bending will be in accordance with federal standards to ensure integrity of the bend. Pipe used for sharp bends is bent at the mill or will be forged pipeline fittings. The pipe will be pre-coated with a fusion-bonded epoxy external coating to provide corrosion protection.

The welding process joins the sections of pipe into one continuous length. All welders will be required to pass an approved qualification test; the test will use Project-specific weld procedures developed in accordance with federally adopted welding standards. All field welds will be nondestructively tested to ensure structural integrity and compliance with USDOT regulations. Once welds are approved, the joints will be externally coated, and the entire pipeline will be visually and electronically inspected for coating defects, scratches, or other damage. Any damage or defects will be repaired before lowering the pipe into the trench.

11.1.3 *Trenching*

Trenches will be excavated using a wheel trencher, backhoe or track hoe to a depth sufficient to provide the minimum cover required by federal, state, and local governments, as well as landowner requirements. If areas of solid rock are encountered, special excavation equipment and/or techniques will be used, such as backhoe-mounted pneumatic chisels.

The amount of open trench permitted at any time during the Project will be dependent on the stability of the trench and weather conditions. In areas where livestock is confined or in cultivated fields, temporary fences, gates, and/or bridges will be installed to provide appropriate restriction or safe access across the open trench.

11.1.4 *Pipeline Installation and Trench Backfilling*

Several side-boom tractors, or track hoes, will simultaneously lift the welded sections of pipe and lower them into the trench. Non-metallic slings will be used to protect the pipe and coating as it is raised and lowered into position. Sand bags or foam blocks will be placed at the bottom of the trench prior to laying the pipe in rocky areas to protect the pipe and coating from damage.

As necessary, trench breakers will be installed adjacent to wetlands and in steep topography to eliminate water migration along the trench. When required, the trench will be dewatered prior to lowering in the pipe. Dewatering effluent will pass through sediment filters such as hay bale structures and/or filter bags to ensure compliance with applicable water quality requirements.

Once the pipe is installed, the trench will be backfilled. Soil will be returned to the trench in the reverse order of excavation. Subsoil will be returned to the trench first, followed by the topsoil. The trench line will be compacted with a wheeled-roller or other suitable construction equipment if needed. If the excavated material contains rocks that could damage the pipe and/or coating, a rock shield will be used to protect the pipe. Topsoil will not be used for padding.

11.2 Special Construction Techniques

11.2.1 *Conventional Boring Construction*

Conventional boring is a trenchless technique for installing pipelines or other linear utilities to avoid or minimize surface disruptions and typically consists of two types.

1. Auger Method – a dry rotating auger driven through a steel casing that is jacked in as the auger advances. Boring machine is usually placed in a pit on-grade with the bore profile and exits into an exit or bell pit. This method is widely used for road crossings up to 60 inches in diameter and is the most cost-effective crossing method in many areas and soil conditions.

2. Wet Boring/Guided Boring – the boring machine uses a pressurized jet of water or drilling fluid through hollow bore rods to excavate the bore. A cutting drill head or dry percussive drill head can also be used with this method. The bore head can be angled and steered by rotating the bore rod. A locating sonde (transmitter) may be placed behind the bore head for guidance and the bore hole can be enlarged by pulling back a reamer. This method is often used for smaller-diameter, shorter installations.

Regardless of the method used to complete the bore, prior to drilling the bore, pipe sections are welded together to fabricate a pipeline segment of sufficient length for the bore. Generally, the pipe is laid out and welded on the exit side of the bore. After welding the pipe sections together and performing non-destructive weld testing (e.g., radioactive photography), the pipeline segment for the bore is hydrostatically pressure tested prior to installation. Once the bore hole has been enlarged and is stable, the welded pipeline segment is pulled through the hole, usually from the bell pit to the entry pit.

Refer to the Typical Conventional Bore Road Crossing schematic drawings in Appendix A.

11.2.2 *Waterbody and Wetland Crossings*

"Waterbody" includes any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies, such as ponds and lakes. As noted in the *Natural Resources and Wetland Delineation Report for the Denbury CHSU Lateral CO_2 Pipeline Project* (SWCA Environmental Consultants [SWCA] 2018) and discussed in Section 14.2, wetlands and waterbodies were identified and delineated in the pipeline ROW. If these features are considered jurisdictional, the crossings will be in compliance with the requirements of the USACE Nationwide Permit 12, which could entail trenching or boring, as shown in the Typical Wetland Crossing schematic and Typical HDD Boring Schematic drawings in Appendix A.

The proposed Project stormwater pollution prevention plan will specify measures based on BMPs that will address erosion control, equipment refueling, temporary bridge crossings, construction timing and methods, and restoration. Temporary workspaces are typically required on each side of a wetland crossing to stage construction, fabricate the pipeline, and store materials. Temporary workspaces will be located within the ROW at upland areas a minimum of 50 feet from the edge of the wetland. Sediment barriers, such as a silt fence, will be installed to prevent spoil and sediment-laden water from entering the wetland.

11.3 Restoration Procedures

Once construction is complete, the pipeline ROW and temporary workspaces will be restored to their prior contour and condition to the extent practicable, except that trees and shrubs will be regularly removed from the ROW to facilitate Project inspection and maintenance. All timber riprap, timber mats, and prefabricated equipment mats and other construction debris will be removed. Topsoil will be replaced, and approximate original contours restored. Wetland edges will be stabilized, and permanent erosion-control measures will be installed as directed by the environmental inspector. Disturbed areas will be revegetated using seeding requirements specified by the Natural Resources Conservation Service or as required by the landowner with the exception of cultivated lands. Specific restoration measures are described in the Environmental Mitigation Plan (EMP), which is provided in Appendix B.

12 OPERATION AND MAINTENANCE

During Project operation, pipeline pressure, temperature, and flow rate data will be monitored from Denbury's Pipeline Control Center in Denbury's Corporate Office in Plano, Texas. The Control Center will provide continuous monitoring of pipeline operations data 24 hours a day, 7 days a week. Where changes in the data occur that indicate a potential issue with the pipeline or facilities, alarms will be triggered, notifying Denbury of the potential issue. Denbury will develop a Pipeline Integrity Management Plan that complies with applicable federal regulations (49 CFR 195.400) and outlines preventive maintenance, inspection, line patrol, leak detection systems, and other pipeline integrity procedures to be implemented to ensure the safe operation of the Project.

In the event of an emergency, Denbury will implement emergency response measures to address the situation. Denbury contracts with an experienced emergency response service provider, whose experience includes implementing emergency response protocols for releases impacting surface waters, wetlands, or other environmentally sensitive areas. Further, as required by 49 CFR 194, Denbury is preparing an Emergency Response Plan that will outline specific protocols to be implemented in the event of a pipeline release or other emergency.

During operations, Denbury will use the permanent ROW easements to conduct inspections and perform maintenance activities. Maintenance activities will include making any necessary pipeline and facility repairs and removing any vegetation on the ROW that impacts the safe and reliable inspection and operation of the pipeline. Inspections and maintenance will be performed in compliance with applicable USDOT regulations.

13 ALTERNATIVES CONSIDERED

13.1 Project Alternatives

13.1.1 *No Action*

Under the No Action Alternative, the Project would not be constructed. Without the Project, valuable oil resources would not be extracted and used, thereby reducing efficient use of the resource and thus, the purpose and need of the Project would not be fulfilled. For these reasons, No Action is not an alternative to the Project.

13.1.2 *Other Pipelines and Carbon Dioxide Sources*

No existing or planned CO_2 pipelines or sources are available to provide the means for EOR operations for Denbury's CHSU assets. As such, the lack of potential pipelines and CO_2 sources will not meet the purpose and need of this Project.

13.1.3 *Trucking*

Due to the distances between the CO_2 source, the volume of CO_2 to be transported, operational inefficiencies, and potential environmental impacts associated with vehicle accidents, trucking CO_2 to Denbury's Cedar Hills Oil Field facilities is not a viable alternative.

13.1.4 *Rail*

Due to logistical constraints, the collection and transport of CO_2 by rail from the Carbon Creek EOR Development to Denbury's Cedar Hills Oil Field facilities is not a viable alternative.

13.1.5 *Route Alternatives*

The overall objective of the Project is to safely and reliably transport CO_2 from Denbury's CCA EOR Development in Fallon County, Montana, to Denbury's CHSU well in Bowman County, North Dakota. Factors considered in selecting the Route include the following.

- Meeting the Project's geographic requirements.
- Complying with Commission siting criteria, including exclusion area, avoidance area, selection, and policy criteria.
- Co-locating with existing infrastructure where possible.
- Avoiding and minimizing potential impacts to existing infrastructure, landowners, and environmentally sensitive areas.
- Using constructability and operational efficiencies.
- Minimizing safety concerns.
- Ensuring the ability to acquire ROW from landowners.

During route development, Denbury attempted to locate the Project adjacent to or within existing pipeline ROWs and/or parallel to existing infrastructure (e.g., roads, electrical power lines), to the extent practicable.

14 ENVIRONMENTAL STUDIES

14.1 Cultural Resource Inventory

As part of the initial phase of investigation, a Class I literature search of archaeological and historical literature and records for the 1.0-mile-wide Study Area was conducted on October 4, 2018. The background search included a review of files maintained at the State Historical Society of North Dakota,

as well as historical survey plats for 0.5 mile on either side of the centerline of the proposed pipeline. Based on the Class I results, 37 previous cultural resource inventories and investigations were conducted in the 1-mile Study Area between 1980 and 2017. The inventories were conducted for oil and gas development of the area, including access roads and pipelines; transportation projects; power projects; communication projects; water-related projects; and a historic architectural survey. None of these projects covered a substantial portion of the current Project area.

Results of the background search identified 16 previously recorded cultural resources within the 1-mile Study Area. Of the 16 cultural resources, six are historic and consist of one cable car with trestles (ferry), three farmsteads, one site lead, and one unknown site type. The remaining 10 sites are prehistoric and consist of six material concentrations and four isolates. Three of the sites—the site lead (32SLX0018), the ferry (32BO00950), and a material concentration (32SL00110)—remain unevaluated regarding their eligibility for inclusion in the National Register of Historic Places (NRHP). In addition, 32BO00245 was originally shown as not eligible in SWCA's background search; however, since that time, the current status of the site is left unevaluated based on recent work conducted near the same time as SWCA's investigations. The remaining 12 resources are recommended not eligible for inclusion in the NRHP. None of the sites within the 1-mile Study Area are eligible for the NRHP or are known to have tribal significance and therefore indirect effects of the Project were not considered.

SWCA conducted a Class III inventory of the Project area on December 18 and 19, 2018, in accordance with the North Dakota State Historic Preservation Office (SHPO) standards. The pedestrian survey of the Corridor encompassed 245.5 linear acres for the proposed pipeline. During the inventory, SWCA personnel recorded one newly identified site (32SL0406; a historic farmstead site) and one isolated find (32BOX0461). Site 32BO00245 is a sparse lithic scatter that is mapped within the project area, but no updates to that site were conducted during the survey. The locations of the resources are illustrated in the maps provided in Appendix A, and copies of the North Dakota site forms are provided in Appendix B of the Cultural Resources Report (Varah 2019). The Class I and Class III Cultural Resource Inventory Report, including the Unanticipated Discoveries Plan and SHPO concurrence letter, is included as Appendix D.

Site 32SL0406 is recommended not eligible for inclusion in the NRHP. Isolated finds, such as 32BOX0461, are considered to lack the historic integrity necessary to be considered eligible for the NRHP. Therefore, no further work is recommended for these resources and the proposed development would affect no known historic properties. SWCA recommended that the Project be granted a determination of *No Historic Properties Affected* and clearance to proceed as planned.

In the cultural resources report submitted to the North Dakota State Historic Preservation Office (SHPO) on March 19, 2019, and a subsequent revision dated March 26, 2019, SWCA recommended that a determination of *No Significant Sites Affected* be granted for the Project. The SHPO concurred with this determination, in a letter dated March 28, 2019, provided that the Project avoids site 32BO00245 (see Appendix D.

Because site 32BO00245 is listed as unevaluated and is located within the pipeline ROW, SWCA recommended that its location be avoided during pipeline construction. In discussions with SHPO, SWCA proposed two avoidance measures (e.g., neck down the ROW to one travel lane and HDD bore underneath the site) that could be taken to prevent impacting the site during pipeline construction. SHPO requested additional investigation to further assess the significance of site 32BO00245. This site investigation is currently in progress and should be completed by mid-August 2019. The findings of the additional evaluation will be documented in a report to SHPO upon completion of the field activities, along with recommended avoidance methods. A copy of the evaluation report and SHPO's decision regarding site 32BO00245 will be submitted as part of this application when completed.

14.2 Wetland and Waterbody Inventory

Prior to conducting field surveys, SWCA reviewed applicable National Wetlands Inventory (NWI) data, National Hydrography Dataset flowline data, the threatened and endangered species list for Bowman and Slope Counties, as well as preliminary National Weather Service climatic data. NWI mapping for the region indicated the presence of wetlands within the Study Area. The results of the desktop analysis and field survey are presented in the Natural Resources Report (McCarty & Fuller 2019), presented as Appendix D to this application.

SWCA conducted field surveys of a 200-foot-wide corridor on October 11 and 12, 2018, to determine the potential presence and extent of wetlands and waterbodies, including those that are likely jurisdictional waters of the U.S. according to the U.S. Army Corps of Engineers (USACE) regulatory program. Wetland delineations were based on the principles and guidelines provided in the *Corps of Engineers Wetlands Determination Manual* (Manual) (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Determination Manual: Great Plains Region Version 2.0* (Supplement) (USACE 2010). According to the Manual, an area is a wetland if three specific wetland indicators—hydrophytic vegetation, wetland hydrology, and hydric soils—are present, with certain exceptions. All wetlands and waterbodies geographically referenced within the Study Area during field survey are depicted on the site layout maps in Appendix A. Wetland delineation data forms are provided in Appendix C of the Natural Resources Report.

SWCA recorded five palustrine emergent wetlands within the 200-foot-wide survey corridor, totaling approximately 0.42 acre. Four of these are seasonal wetlands found within uncultivated fields, while the fifth wetland is associated with a National Hydrography Dataset flowline that is an unnamed tributary to Corral Creek and may be jurisdictional, although the USACE has the final authority to determine jurisdictional status.

SWCA identified and delineated five waterbodies (streams) within the survey corridor by the presence of an ordinary high water mark (OHWM), if present, in accordance with USACE guidance (USACE 2008). Common identifiable indicators of an OHWM include physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas. The OHWM typically represents the potential limits of USACE jurisdiction, unless there is a wetland adjacent to the waterbody (USACE 2008). Please note that the USACE has full discretion in determining the jurisdictional status of referenced wetlands and waterbodies .Four of the waterbodies were ephemeral streams, while the fifth waterbody was Little Beaver Creek, a perennial stream. It appears that Little Beaver Creek was straightened for protection of residential and cropland areas that are located outside of the survey corridor. Little Beaver Creek will be crossed using the HDD construction method.

Concurrently with the wetland determinations, SWCA conducted a cursory threatened and endangered species survey and habitat assessment; a tree, sapling, and shrub enumeration survey; and a noxious weed survey. Site layout maps of the survey area and natural resource features identified during the field surveys are provided in Appendix A.

14.3 Habitat Assessment

14.3.1 *Tree/Sapling/Shrub Inventory*

SWCA used aerial imagery and LANDFIRE to analyze the Study Area for land use and woody vegetation. Less than 1% of the Study Area contains woody vegetation.

SWCA conducted field surveys of the Corridor on October 11 and 12, 2018, to confirm the presence or absence of woody vegetation; 18 tree and shrubland areas were geographically referenced within the survey corridor. The Commission requires 2:1 mitigation for all shrubs and all trees that are 1-inch-diameter at breast height (DBH) or greater that will be impacted during the construction of the Project. Based on the 161 trees and shrubs identified within the proposed disturbance area, SWCA estimates approximately 322 2-year-old sapling individuals would need to be replanted in order to fulfill the 2:1 mitigation requirement. Refer to Appendix D, Natural Resources Report, for additional information on these features and mapped locations.

14.3.2 *Wildlife*

Three wildlife species listed as threatened or endangered under the Endangered Species Act have potential to occur in Slope and Bowman Counties (U.S. Fish and Wildlife Service 2019). The listed endangered species include the gray wolf (*Canis lupus*) and whooping crane (*Grus americana*). The Northern long-eared bat (*Myotis septentrionalis*) is the listed threatened species.

SWCA conducted a threatened and endangered species suitable habitat survey concurrently with the wetland determinations. SWCA did not observe any primary (i.e., actual sighting) or secondary (i.e., tracks, scat, feather, or fur) indication of the presence of threatened or endangered species. However, the lack of discovery of threatened or endangered species does not signify their non-existence within the area, but only that no primary or secondary indications of these species were recorded. Refer to Appendix D, Natural Resources Report, for additional information on these species.

14.3.2.1 GRAY WOLF

Although gray wolves have been observed in the region, no packs are known to have become established in North Dakota, and most of the observed individuals are likely dispersing from Minnesota and Canada. Due to the highly mobile nature of the gray wolf, individuals may be found in the Study Area. Because wolves require large areas of relatively undisturbed habitat with low human activity, development of existing infrastructure could be a potential stressor and result in wolves avoiding these areas of disturbance. Nonetheless, there are no established wolf packs or known reports of occurrence in the Study Area, so any stressors due to the Project are not likely to affect gray wolves.

14.3.2.2 WHOOPING CRANE

It is well-documented that migrating whooping cranes use habitats in the vicinity of the Project for roosting and feeding and suitable whooping crane foraging habitat (i.e., cultivated cropland and wetlands) was observed within the survey corridor; however, high levels of disturbance near the Project from existing roads, agriculture production, oil and gas activity, etc., minimize the likelihood for cranes to use the area within or near the pipeline corridor. The nearest verified sighting of a whooping crane occurred in 2006 when one adult was located 13.31 miles to the west of the Study Area (U.S. Fish and Wildlife Service 2013).

The whooping crane is not expected to be impacted by the proposed Project.

14.3.2.3 NORTHERN LONG-EARED BAT

This medium-sized bat ranges across the eastern and north-central United States and all of the Canadian provinces. Throughout most of this species' range, populations are patchily distributed. They emerge at dusk to fly through the understory of forested hillsides and ridges, feeding on moths, flies, leafhoppers, caddisflies, and beetles. Most records of northern long-eared bats are from winter hibernacula surveys, with more than 780 hibernacula identified within the United States. No known hibernacula are in North Dakota, due to either no suitable hibernacula present or a lack of survey effort. Due to the small amount of woody vegetation and lack of other suitable habitat along the pipeline route, the northern long-eared bat is not expected to be impacted by the Project.

14.3.2.4 GREATER SAGE-GROUSE

The greater sage-grouse (*Centrocercus urophasianus*) is a North Dakota Level I species of conservation priority and is in danger of being extirpated in North Dakota due to loss and fragmentation of native sagebrush habitats. The Project is located within greater sage-grouse primary range. There are no sage-grouse leks located within 2 miles of the Project; the closest lek to the Project is approximately 2.2 miles to the south (J.L. Kollar, North Dakota Game and Fish Department, personal email communication, March 29, 2019).

Suitable sagebrush habitat for sage-grouse is present along the pipeline ROW and Denbury will follow recommendations from the North Dakota Game and Fish Department to minimize impacts and reclaim these areas.

14.3.3 *Migratory Bird Treaty Act*

Suitable habitat for migratory birds exists in the Study Area, and field surveys confirmed the presence of suitable habitat along the survey corridor. Specifically, grassland nesting birds have the potential to occur and nest in the corridor, especially during the migratory bird breeding season between February 1 and July 15. Suitable woodland nesting habitat occurs along the route, but it is minimal. To avoid or minimize potential impacts of the proposed Project on migratory birds, Denbury will use standard construction practices associated with migratory birds, such as limiting construction outside the breeding season, mowing or clearing vegetation from the ROW prior to the breeding season, and conducting migratory bird nesting surveys along the ROW within one week of the start of construction. As such, migratory birds are not expected to be impacted by the proposed Project. Refer to Appendix D, Natural Resources Report, for additional information on migratory birds.

14.3.4 *Bald and Golden Eagle Protection Act Consultation*

The bald eagle (*Haliaeetus leucocephalus*) feeds on fish and carrion and typically roosts in large trees near a water source. Bald eagle nesting habitat typically consists of any mature stands of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes, or any significant body of water. Bald eagles in eastern North Dakota are usually observed along the Red River and Sheyenne River. The nearest known bald eagle nest is located approximately 10.46 miles to the east of the Study Area (North Dakota Game and Fish Department 2015). Bald eagles may migrate through the Study Area; however, no bald eagles or nests were observed during the field surveys.

The golden eagle (*Aquila chrysaetos*) prefers habitat characterized by open prairie, plains, and forested areas. Usually, golden eagles in North Dakota can be found in proximity to badland cliffs, which provide suitable nesting habitat. Golden eagles may occur within or near the Study Area; however, no golden

eagles or nests were observed during the field surveys. The closest known golden eagle nest is approximately 21.1 miles east of the Study Area.

Due to the lack of occupied bald and golden eagle nests in the survey corridor and lack of suitable habitat within the Project area, bald and golden eagles are not expected to be impacted by the Project.

Refer to Appendix D, Natural Resources Report, for additional information on these species.

14.4 Paleontological Resources

The proposed pipeline route traverses geologic formations that have the potential to contain significant fossil records. The Potential Fossil Yield Classification (PFYC) system ranks geologic units from Class 1 to Class 5, based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher-class number indicating a higher potential (Bureau of Land Management 2016). The pipeline route crosses geologic units with PFYC ratings of 2 (alluvium), to 3 and 4 (Pierre Shale and Fox Hills Formation), to 5 (Hell Creek Formation).

The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered nonrenewable resources because the organisms they represent no longer exist, and such resources, if destroyed, cannot be replaced. Paleontological resources are important scientific and educational resources that paleontologists use to study taphonomic processes. Paleontologists also use the morphologic information that fossils provide to reconstruct the phylogenetic relationships of extinct and extant organisms; study evolution, extinction, and speciation patterns; reconstruct ancient environments and paleobiogeographic relationships; and provide relative geologic dates through biochronology and biostratigraphy.

SWCA conducted background research to determine the paleontological sensitivity of the geologic units within the analysis area and completed a paleontological field survey to identify survey exposures of potentially sensitive geologic units for surface fossils. SWCA then used that information and the PFYC ranking of the underlying geologic unit to evaluate the paleontological sensitivity of the Project and assess the potential for construction to disturb known and unknown paleontological resources.

Based on the results of the background research and review of aerial imagery, SWCA designed the paleontological field survey to determine the surface presence of previously unknown significant vertebrate fossils and/or noteworthy invertebrate, plant, or trace fossils and to evaluate potential adverse impacts to subsurface paleontological resources during construction. The field survey concentrated on exposures of geologic units with high to very high paleontological potential (PFYC Class 4 and Class 5).

As discussed in the Paleontological Resources Report (Appendix E), the field survey of a 200-foot wide corridor was completed on December 19 and 20, 2018. The paleontological analysis area totaled 224 acres, with approximately 32% of the analysis area cleared using visual checks during the survey. Nearly 50% of the analysis area received a pedestrian survey, whereas approximately 18% of the analysis area was cleared using aerial images before the field survey.

SWCA prepared fossil locality forms, maps, and photographic pages for one fossil locality newly recorded during the field survey based on gross lithology, preservation, and/or the fossil taxa documented at the new locality, which is in the Hell Creek Formation on private land.

SWCA's lead paleontologist determined the fossils exposed at the newly recorded locality to be non-significant; the fossils do not meet the standard significance criteria. The newly recorded fossil locality is limited to small isolated incomplete and mostly unidentified fossils, which are common in their respective

areas, as indicated by the results of the previously recorded locality search, literature review, and previous Project surveys; however, the fossil concentration and/or distribution at the newly recorded location suggests that ground disturbance may reveal additional fossils. For more information on the paleontological resource evaluation, see the report entitled *Paleontological Survey Report for the Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota*, included as Appendix E.

15 CONSULTATION

On December 3, 2018, SWCA, on behalf of Denbury, sent letters to various agencies and officials, including those identified in NDAC Section 69-06-01-05, providing information regarding the Project and requesting input. The responses received to-date are summarized below. Please refer to Appendix G Agency Correspondence/Consultation, for copies of the consultation letters sent and the agency responses received, as summarized below.

15.1 North Dakota State Historic Preservation Office

In a letter dated December 6, 2018, the SHPO recommended a Class I (inventory) and Class III (pedestrian) survey of the Project with specific recommendations that the proposed Project avoid significant cultural resources or sites eligible for the NRHP, especially in areas with high densities or previously identified sites.

SWCA completed a Class I background search of files maintained at the State Historical Society of North Dakota and historic survey plats for the Study Area on October 4, 2018 and completed a Class III cultural resource inventory on December 19 and 20, 2018. The results of these investigations are discussed in Section 14.1. In the cultural resources report submitted to the SHPO on March 19, 2019, and revised on March 26, 2019, SWCA recommended that a determination of *No Significant Sites Affected* be issued for the Project. The SHPO concurred with the recommended determination in the revised report in a letter dated March 28, 2019 (see Appendix G).

SWCA completed an Unanticipated Discovery Plan and submitted it to SHPO on March 19, 2019, as well. SHPO concurred with the plan in a letter dated March 28, 2019 (Appendix G).

15.2 U.S. Fish and Wildlife Service

In a letter dated December 18, 2018, the U.S. Fish and Wildlife Service provided environmental comments and recommendations regarding threatened and endangered species in the Project area.

15.3 North Dakota State Water Commission

In a letter dated December 21, 2018, the North Dakota State Water Commission (NDSWC) stated that no permits relative to the National Flood Insurance Program are required. They indicate that a conditional or temporary permit for water appropriation may be required, if surface water or groundwater will be diverted for industrial use, such as water use for construction or long-term operation of the Project.

The NDSWC noted that it is the responsibility of the Project sponsor to ensure that local, state, and federal agencies are contacted for any required approvals, permits, and easements, and that all waste materials are disposed of properly and not placed in identified floodway areas. The NDSWC stated that no sole-source aquifers have been designated in North Dakota.

The Project is not anticipated to impact gaging stations or water wells. No waste materials will be placed in identified floodway areas, and all waste materials will be properly disposed of in accordance with measures outlined in Denbury's EMP (see Appendix B).

15.4 North Dakota Game and Fish Department

In a letter dated January 10, 2019, the North Dakota Game and Fish Department provided the following responses/concerns.

- Expressed that a primary concern with pipeline projects is the possible disturbance of native prairie and wooded draws from construction of the pipeline and access roads, and requested that work within these areas be avoided to the extent possible, every effort be made to prevent destruction of woody vegetation, and disturbed areas be reclaimed to pre-Project conditions.
- Indicated that the pipeline is located within the primary range of greater sage-grouse in North Dakota, provided recommendations to minimize potential impacts, and provided contact information to learn more details about this species.
- Provided information on wetlands within the proposed Project corridor and steps to be taken to protect any wetlands that cannot be avoided.
- Requested that the HDD method be used to cross Little Beaver Creek, a classified fishery. If using the HDD method is not feasible, provided recommendations to minimize impacts to this waterbody.
- Recommended that aerial surveys be conducted for raptor nests before construction begins and that a 5-mile construction buffer be implemented around active eagle nest sites.

15.5 North Dakota Department of Transportation

In a letter dated January 14, 2019, the North Dakota Department of Transportation (NDDOT) stated that the proposed pipeline project should have no adverse effect on NDDOT highways. The NDDOT also stated that if any Project work needs to be done on a NDDOT highway ROW, appropriate permits and risk management documents will need to be obtained from the NDDOT District Engineer, Rob Rayhorn at 701-227-6510.

16 IDENTIFICATION OF POTENTIAL PERMITS/APPROVALS

A permitting matrix was created showing potential federal, state, and local permits that may be needed prior to construction of the Project, as summarized in Table 2.

Table 2. Potential Permits/Approvals

Agency	Permit/Approval	Status
Federal		
U.S. Army Corps of Engineers	Section 404 permit for dredge/fill in jurisdictional wetlands	Project will qualify for Nationwide Permit 12.

Agency	Permit/Approval	Status
U.S. Fish and Wildlife Service	Consultation and review of the proposed Project regarding impact to federally threatened and endangered species, migratory birds, and bald and golden eagles	Consultation requested and received.
State		
North Dakota Public Service Commission	Certificate of Corridor Compatibility and Route Permit	Application pending.
North Dakota Department of Environmental Quality, Water Quality Division	National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity	Submit Notice of Intent at least 7 days prior to construction and develop/implement Stormwater Pollution Prevention Plan.
	NPDES General Permit for Temporary Dewatering/Hydrostatic Testing	Submit Notice of Intent at least 30 days prior to discharge date.
North Dakota State Historic Preservation Office (SHPO)	Cultural and historic resources consultation and review. Unanticipated Discovery Plan (UDP) for discovery of human/historic remains.	Class I inventory and Class III pedestrian survey completed for the Corridor and SHPO concurrence was received. UDP submitted to SHPO for review/approval and concurrence was received.
Slope County	Conditional Use Permit (CUP); Section Line Crossing Permit; Road Crossing Permit	CUP application submitted and approval received from Zoning Board and County Commissioner.
Bowman County	Utility Permit for the pipeline; County Road Crossing Permit; Section Line Crossing Permit.	To be obtained prior to Project construction.
Private		
BNSF Railroad	Railroad Crossing Permit	To be obtained prior to Project construction.

17 SITING CRITERIA

17.1 Exclusion Areas

In accordance with NDAC § 69-06-08-02(1), certain geographical areas shall be excluded from consideration for a transmission facility route. A buffer zone of a reasonable width to protect the integrity of the area must be included. Exclusion areas may be located within a corridor, but at no given point may such an area or areas encompass more than 50% of the corridor unless there is no reasonable alternative. A summary of exclusion areas in relation to the Corridor and Route is provided in Table 3.

Table 3. Exclusion Areas Summary

Feature	Within Corridor (Y/N)	Route Crosses (Y/N)	Description	Section Addressed
Designated or registered national parks, memorial parks, historic sites and landmarks, natural landmarks, monuments, and wilderness areas.	N	N	N/A	17.1.1
Designated or registered state parks, historic sites, monuments, historical markers, archaeological sites, and natural preserves.	N	N	N/A	17.1.2
County parks and recreational areas, municipal parks, and parks owned or administered by other governmental subdivisions.	N	N	N/A	17.1.3

Feature	Within Corridor (Y/N)	Route Crosses (Y/N)	Description	Section Addressed
Areas critical to the life stages of threatened or endangered animal or plant species.	N	N	N/A	17.1.4
Areas where animal or plant species that are unique or rare to this state would be irreversibly damaged.	N	N	N/A	17.1.5
Areas within 1,200 feet of the geographic center of an intercontinental ballistic missile (ICBM) launch or launch control facility.	N	N	N/A	17.1.6
Areas within 30 feet on either side of a direct line between an ICBM launch or launch control facility.	N	N	N/A	17.1.7

17.1.1 *Designated or Registered National Parks, Memorial Parks, Historic Sites and Landmarks, Natural Landmarks, Monuments, and Wilderness Areas*

No designated or registered national parks, memorial parks, historic sites and landmarks, natural landmarks, monuments, and wilderness areas would be crossed by the Corridor or Route. See also Section 14.1 of this Consolidated Application.

17.1.2 *Designated or Registered State Parks, Historic Sites, Monuments, Historical Markers, Archaeological Sites, and Natural Preserves*

No designated or registered state parks, historic sites, monuments, historical markers, archaeological sites, and natural preserves would be crossed by the Corridor or Route. See also Section 14.1 of this Consolidated Application.

17.1.3 *County Parks and Recreational Areas, Municipal Parks, and Parks Owned or Administered by Other Governmental Subdivisions*

The Corridor and Route do not cross any county parks and recreational areas, municipal parks, or parks owned or administered by other governmental subdivisions.

17.1.4 *Areas Critical to the Life Stages of Threatened or Endangered Animal or Plant Species*

The Corridor and Route do not cross any areas critical to the life stages of threatened or endangered animal or plant species.

17.1.5 *Areas Where Animal or Plant Species that are Unique or Rare to This State Would be Irreversibly Damaged*

The Corridor and Route do not cross any areas where animal or plant species that are unique or rare to this state would be irreversibly damaged by the Project.

17.1.6 *Areas within 1,200 Feet of the Geographic Center of an Intercontinental Ballistic Missile Launch or Launch Control Facility*

The Corridor and Route are not located within 1,200 feet of the geographic center of an intercontinental ballistic missile launch or launch control facility.

17.1.7 *Areas within 30 Feet on Either Side of a Direct Line between Intercontinental Ballistic Missile Launch or Launch Control Facility*

The Project Corridor and Route do not cross areas within 30 feet on either side of a direct line between an intercontinental ballistic missile launch or launch control facility.

17.2 Avoidance Areas

In accordance with NDAC § 69-06-08-02(2), certain geographical areas may not be considered in the routing of a transmission facility unless the applicant shows that, under the circumstances, there is no reasonable alternative. In determining whether an avoidance area should be designated for a facility, the Commission may consider, among other things, the proposed management of adverse impacts; the orderly siting of facilities; system reliability and integrity; the efficient use of resources; and alternative routes. In addition, a buffer zone of a reasonable width to protect the integrity of the area must be included, unless a distance is specified in the criteria. Avoidance areas may be located within a corridor, but at no given point may such an area or areas encompass more than 50% of the corridor unless there is no reasonable alternative. A summary of avoidance areas in relation to the Corridor and Route is provided in Table 4.

Table 4. Avoidance Areas Summary

Feature	Within Corridor (Y/N)	Route Crosses (Y/N)	Description	Section Addressed
Designated or registered national historic districts; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; and grasslands.	N	N	N/A	17.2.1
Designated or registered state wild, scenic, or recreational rivers; game refuges; game management areas; management areas; forests; forest management lands; and grasslands.	N	N	N/A	17.2.2
Historical resources which are not specifically designated as exclusion or avoidance areas.	N	N	N/A	17.2.3
Areas which are geologically unstable.	N	N	N/A	17.2.4
Within 500 feet of a residence, school, or place of business.	N	N	N/A	17.2.5
Reservoirs and municipal water supplies.	N	N	N/A	17.2.6
Water sources for organized rural water districts.	N	N	N/A	17.2.7
Areas of recreational significance which are not designated as exclusion areas.	N	N	N/A	17.2.8

17.2.1 Scenic or Recreational Rivers; Wildlife Refuges; and Grasslands

No designated or registered national historic districts; wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; or grasslands are crossed by the Corridor and Route.

17.2.2 Designated or Registered State Wild, Scenic, or Recreational Rivers; Game Refuges; Game Management Areas; Management Areas; Forests; Forest Management Lands; and Grasslands

The Corridor and Route do not cross any designated or registered state, wild, scenic, or recreational rivers; game refuges, game management areas; management areas; forests; forest management lands; or grasslands.

17.2.3 Historical Resources Not Specifically Designated as Exclusion or Avoidance Areas

No historical resources not specifically designated as exclusion or avoidance areas are within the proposed Corridor or crossed by the Route.

17.2.4 Areas that are Geologically Unstable

The Corridor and Route do not cross geologically unstable areas.

17.2.5 Within 500 Feet of a Residence, School, or Place of Business

The Corridor and Route are not located within 500 feet of a residence, school, or place of business.

17.2.6 Reservoirs and Municipal Water Supplies

No reservoirs and municipal water supplies were identified in the Corridor or Route.

17.2.7 Water Sources for Organized Rural Water Districts

No water sources for organized rural water districts are present in the Corridor or Route.

17.2.8 Areas of Recreational Significance that are not Designated as Exclusion Areas

No areas of recreational significance that are not designated as exclusion areas are crossed by the Project Corridor and Route.

17.3 Selection Criteria

17.3.1 *Agricultural Production*

The Project route crosses vacant and range land, with the predominant land use comprised of livestock grazing, hay production, and oil and gas development. Construction of the Project would temporarily impact approximately 10.3 acres of farmland of statewide importance, approximately 149.8 acres of not-prime farmland, and approximately 8.2 acres of undetermined farmland classification, for a total of 168.2 acres (Table 5). Once construction is complete, the ROW may return to its prior agricultural use. As such, impacts to agricultural production along the Route will be minimal and temporary.

Table 5. Farmland in Study Area

Farmland Classification	Area in Survey Corridor		Area in ROW	
	Acres	%	Acres	%
Farmland of Statewide Importance	20.5	6.1	10.3	6.1
Not Prime Farmland	299.6	89.1	149.8	89.1
Other[1]	16.3	4.8	8.2	4.8
Total	**336.4**	**100.0**	**168.2**	**100.0**

Notes:

[1]Other = Pooled soil map units that individually comprise less than 1.0% of Total Area.

17.3.2 *Family Farms and Ranches*

A total of 6 family farms and 5 commercial farms or ranches are crossed by the Project route. Construction impacts to family farms and ranches will be short term and minor, with the primary impact being the use of the land within the work area during construction activities as well as potentially diminished yields following construction. Denbury will implement mitigation measures to minimize potential impacts to family farms and ranches, as outlined in the EMP (Appendix B).

No long-term or permanent impacts are expected to family farms and ranches. Post-construction restoration will return the ROW to pre-construction contours, and farming or ranching operations will continue over the operational ROW. Denbury has acquired and will compensate landowners for easements for the Project.

17.3.3 *Land Economically Suitable for Irrigation*

Denbury has not identified any center-pivot irrigation within the Project Corridor or Route, or any land that is planned to be irrigated. Thus, the Project is not anticipated to impact irrigated land or any irrigation systems. In the event that irrigation systems are encountered, Denbury will compensate the owner(s) and/or repair any damages to the systems that may result from Project construction activities.

17.3.4 *Surface Drainage Patterns and Groundwater Flow Patterns*

17.3.4.1 SURFACE DRAINAGE

Surface drainage patterns will not be altered by construction of the pipeline. Swales, ditches, and other natural drains will be restored to approximate pre-construction contours after construction is complete.

The pipeline will be installed at a depth that will not interfere with flow or future maintenance efforts by landowners.

17.3.4.2 GROUNDWATER FLOW PATTERNS

The pipeline route through Slope and Bowman Counties is underlain by the Cretaceous age Pierre Shale, Fox Hills Formation, and Hell Creek Formation. The Pierre Shale consists of a light to dark gray, generally non-calcareous, fissile to blocky shale, while the Fox Hills consists of a yellowish brown to gray sequence of mudstones, siltstones, and poorly cemented sandstones. Most of the route in Bowman County is underlain by the Hell Creek Formation, which consists of a sequence of sandstone, siltstone, claystone, and mudstone with discontinuous beds of lignite.

Regional groundwater flow directions are to the east and northeast toward the Little Missouri River. Local groundwater flow directions along the northern portion of the Route are toward Lower Little Beaver Creek, while the local groundwater flow along the western end of the Route is to the east toward Horse Creek and the Little Missouri River.

Any construction impacts that may occur to local groundwater flow will be highly localized and temporary in nature. No permanent impacts to groundwater flow are expected as a result of the Project.

17.3.5 *Sound Sensitive Land Uses*

The proposed Project is located in a rural area that is sparsely populated, but with numerous existing oil and gas production locations and facilities. Sound intensity is measured by the decibel; the A-weighted scale is used in most noise ordinances and standards and approximates the range of human hearing by filtering out lower frequency noises, which are not as damaging as higher frequency noises. In rural areas, background noise is generally at levels of 40 to 50 A-weighted decibel (McCain and Associates, Inc. 2011). Due to the surrounding oil and gas development activities, the background noise level may be higher than this range.

Construction-related activities are expected to be short-term and during the daytime; therefore, impacts to area residents will be minimal. During operations, noise impacts will be primarily vehicles used to transport maintenance personnel at the ROW and aboveground facilities. Denbury and its contractors will comply with all state and local noise requirements during construction and operation of the Project.

17.3.6 *Visual Effect on Adjacent Areas*

Impacts to visual resources as a result of Project development are assessed by the degree of modification to the existing landscape and sensitivity of the viewer. Changes to the line, form, and character of the existing landscape can result in a level of contrast that will attract the attention of those in the area. The number of viewers, their activities, and the extent their activities are related to the visual quality of the area and determine the level of viewer sensitivity.

The Project is located in a rural area that is sparsely populated and is primarily used for agriculture and existing oil and gas development. Viewers of the landscape will be limited to area residents and travelers along local roadways. Based on the number of viewers and the duration of their views, viewer sensitivity is considered low.

With the exception of aboveground facilities, the pipeline will be buried. During construction, vegetation will be removed, temporarily resulting in distinct contrasting lines within the landscape. However, once vegetation is re-established within the construction ROW, visual impacts will be limited to aboveground

facilities. Painting these facilities with colors that blend with the surrounding landscape will reduce the visual contrast.

17.3.7 *Extractive and Storage Resources*

Active extractive resources occur within the Study Area and consist of oil and gas production associated with the Williston Basin, which covers much of the western and central portions of the state (North Dakota Department of Mineral Resources 2019a). The Project is planned to not interfere or otherwise impact access to, or the operations of, existing oil and gas production. No mineable coal, geothermal or uranium resources, or sand or gravel deposits are located in the Study Area (North Dakota Department of Mineral Resources 2019b). The nearest clay deposit suitable for lightweight aggregate is located over 5 miles from the Study Area (North Dakota Department of Mineral Resources 2019b). Therefore, construction and operation of the proposed Project will not impact access to, or the operations of, mineral resource extraction.

17.3.8 *Wetlands, Woodlands, and Wooded Areas*

A desktop review was completed of the Study Area and included the review of aerial imagery, NWI data, and LANDFIRE dataset to identify any wetlands, woodlands, and wooded areas with the Study Area. Field surveys conducted on December 18 and 19, 2018, identified these areas within the Corridor. Please refer to Sections 14.2 and 14.3 for further discussion on the results of the desktop analysis and field surveys with respect to these resources.

SWCA counted a total of 161 tree, sapling, and shrub individuals that may be impacted by pipeline construction activities. Therefore, approximately 322 2-year-old saplings may need to be replanted to fulfill the Commission's 2:1 mitigation requirement.

17.3.9 *Radio and Television Reception and Other Communication or Electronic Facilities*

No radio and television reception and/or other communications and electronic facilities are located within the Corridor or Route. Denbury does not anticipate the Project will impact radio and television reception and/or other communications and electronic facilities.

17.3.10 *Human Health and Safety*

Construction of the proposed Project could generate a possible risk to local citizens' public safety from increased traffic along rural roadways. Increased truck traffic and transport of heavy equipment will be temporary during construction. Denbury will obtain requisite county oversize and overweight permits, as required, for the transport of equipment and materials on county and state highways. If required, pilot vehicles will be utilized to escort oversize and overweight vehicles while travel on public roadways.

Transport of petroleum products by pipeline involves some risk in the event of an accident and the release of the product. A release of CO_2 during pipeline operations could impact soil and groundwater resources if the leak is not properly contained and remediated. To minimize this risk, the Denbury CHSU Lateral Pipeline will be remotely monitored using Denbury's Pipeline Control Center 24 hours a day, 7 days a week. In addition, routine pedestrian and aerial patrols will be conducted, as will internal inspections using in-line inspection tools. During operations, Denbury will comply with the safety measures set forth in 49 CFR Part 195, as required by PHMSA.

To minimize potential impacts during operation, an Emergency Response Plan will be developed in conjunction with local authorities and first responders that details site-specific response plans, emergency equipment availability and location, and emergency contacts. In addition to the Emergency Response Plan, a Pipeline Integrity Management Plan will be developed to outline pipeline integrity management procedures to be implemented during operation.

17.3.11 *Animal Health and Safety*

No threatened or endangered species were observed in the Study Area. Wildlife species currently inhabiting the Corridor are common and likely will not be permanently displaced by the proposed Project. Temporary disturbance will occur during construction of the proposed Project; however, no direct, long-term impacts to wildlife are anticipated from the Project.

17.3.12 *Plant Life*

Plants species currently inhabiting the Corridor are common. Impacts to plant species in the Study Area from the Project are anticipated to be primarily temporary and minimal.

17.4 Policy Criteria

17.4.1 *Location and Design*

Denbury selected the Corridor and Route based on several factors, including environmental, engineering, and constructability considerations.

Denbury worked with landowners and consulted with local, state, and federal agencies to identify siting constraints and inform the siting of the proposed Corridor and Route. Field surveys, including those assessing natural and cultural resources, provided supplemental information to assist in refining the siting process to avoid or minimize impacts to sensitive resources.

17.4.2 *Training and Use of In-State Labor*

Denbury expects to employ approximately 60 to 70 workers during peak Project construction. Local, in-state labor will be used to the extent practicable; however, if specialized skilled workers (e.g., licensed welders) are not available for hire within the state, Denbury may need to employ workers from out-of-state.

17.4.3 *Economies of Construction and Operation*

Direct and indirect economic benefits to the state of North Dakota resulting from construction of the proposed Project are discussed in Sections 17.4.2 and 18.7. Once the Project is constructed and online, Denbury expects annual maintenance and operation costs to be minimal.

17.4.4 *Use of Citizen Coordinating Committees*

Denbury contacted and worked closely with county agencies and personnel, utility companies, and others throughout development of the proposed Project. Other than one-on-one communication with landowners, no formal Citizen Coordinating Committees were used for communications and outreach to the public or jurisdictional entities.

17.4.5 Commitment of a Portion of Transmitted Product for Use in State

The CO_2 transported by the Project will be used exclusively for EOR operations within the Cedar Hills Oil Field thereby increasing the extraction and use of that resource for both in-state and out-of-state consumers.

17.4.6 Labor Relations

Denbury maintains a positive relationship with its employees, contractors, and the public, and is committed to a safe working environment. Denbury is an Equal Opportunity Employer and expects to use local personnel for construction of the proposed Project, to the extent practicable.

17.4.7 Coordination of Facilities

Denbury performed a centerline survey of the Route and, based on that survey, Denbury identified all third-party entities/utilities that will be encountered (e.g., petroleum, water, electric, highways). Denbury then contacted each entity to obtain its respective crossing and encroachment guidelines and requirements and negotiated surface use agreements with landowners along the proposed Route. Denbury has incorporated these requirements into the Project design and will work closely with each entity during construction and future operation and maintenance to ensure the safe construction and operation of the Project around these adjacent utilities/entities. Refer to the Typical Foreign Pipeline Crossing schematic in Appendix A for more information.

17.4.8 Monitoring Impacts

Denbury is committed to the protection of the environment as well as public and employee safety. The proposed Project will be constructed and maintained in accordance with industry and government requirements and will meet or exceed all applicable federal, state, and local environmental laws, regulations, and standards, including those regulations stipulated by PHMSA. An EMP has been developed specifically for this Project (see Appendix B).

In addition, Denbury will provide construction oversight to confirm contractor compliance with mitigation measures, landowner agreements, and applicable permits. Denbury will have third-party inspectors who are knowledgeable of the environmental mitigation requirements for the Project. The inspectors will have the authority to stop construction activities and order corrective mitigation and will maintain appropriate compliance documents.

During Project operation, Denbury will conduct regular aerial and foot patrols of the ROW to identify issues of concern, including operational issues and ROW encroachment. In addition, Denbury's Pipeline Control Center will continuously monitor pressure, temperature, and product flow 24 hours a day, 7 days a week, with information transmitted to Denbury's Corporate Office located in Plano, Texas, which will promptly respond to any anomalies. Denbury will monitor landowner and community concerns throughout Project operations and respond appropriately.

17.4.9 Using Existing and Proposed Rights-of-Way and Corridors

Denbury's proposed Route was sited to co-locate with existing utility corridors, roads, and other existing linear features to the extent practical. Approximately 0.46 mile of the proposed alignment is adjacent to an existing pipeline in the NE¼SW¼ and SE¼SW¼ of Section 32, T132N, R106W. In some instances,

the proposed ROW does not follow property boundaries due to landowner preferences or by mutual agreement with the landowners.

17.4.10 *Other Existing or Proposed Transmission Facilities*

There are no other existing or proposed transmission facilities associated with this Project and thus, this section is not applicable.

18 EVALUATION OF NDCC SECTION 49-22.1-09 FACTORS

In selecting the proposed Corridor and Route for the Project, Denbury evaluated the factors set forth in NDCC Section 49-22.1-09. A discussion of each factor is provided below.

18.1 Effects on Public Health, Welfare, Natural Resources, and the Environment

Please see Sections 13.0, 14.0, 17.0, and 18.0 of this Consolidated Application for a discussion of available research and investigations relating to the effects of the location, construction, and operation of the proposed Project on public health and welfare, natural resources, and the environment. As discussed further in those sections, the Project is not anticipated to have any significant or long-term negative impacts on public health and welfare, natural resources, or the environment.

18.2 Transmission Technologies and Systems Designed to Minimize Adverse Environmental Effects

The Project design is consistent with existing pipeline technologies. Mitigation measures have been or will be used to avoid or minimize any potential impacts to sensitive resources, including use of trenchless construction (bores) at road crossings or due to constructability concerns. In addition, throughout construction, BMPs will be implemented to reduce any potential impacts to resources from ROW clearing, grading, trenching, and pipe and facility installation. Once constructed, the Project will be monitored remotely via Denbury's Pipeline Control Center 24 hours a day, 7 days a week.

18.3 Potential for Beneficial Uses of Waste Energy from a Proposed Energy Conversion Facility

The Project does not include any energy conversion facilities; therefore, the potential for beneficial uses of waste energy from a proposed energy conversion facility does not apply.

18.4 Unavoidable Adverse Direct and Indirect Environmental Effects

With the exception of aboveground facilities, unavoidable adverse direct and indirect environmental impacts from the Project will be temporary and minimized through the use of mitigation measures and BMPs. Permanent environmental impacts will be limited to surface valve locations and the Receiving Station. See Sections 12.0, 13.0, 16.0, and 17.0 for further discussion of the Project's potential direct and indirect environmental effects, as well as planned mitigation measures.

18.5 Corridor or Route Alternatives Developed During the Hearing that Minimize Adverse Effects

A description of the route selection process is presented in Section 13.0. Denbury analyzed alternatives during selection of its proposed Corridor and Route by one-on-one landowner discussions, and incorporated route deviations proposed by landowners and others in its Route to the extent practicable. As a result, Denbury has identified a Project Corridor and Route that meet the needs of the Project, as well as the Commission's siting criteria, while minimizing potential impacts to landowners, existing infrastructure, and the environment.

If other corridor or route alternatives are developed during the Commission's hearing process, Denbury will analyze those alternatives, as necessary.

18.6 Irreversible and Irretrievable Commitments of Natural Resources if Designated

Irreversible or irretrievable commitments of natural resources include steel for the pipelines and ancillary facilities; gravel for improvements to access roads, if required; and petroleum products to power construction equipment, the Receiving Station, and other pipeline facilities. The Project will convert approximately 5 acres to industrial use at the Receiving Station location.

18.7 Direct and Indirect Economic Impacts of the Facility

Direct and indirect economic impacts from Project construction include short-term employment opportunities during construction, increased local revenue for Project-related expenditures, and increased local and state tax revenues. Local property taxes will be realized on an annual basis during the Project's operational phase. Project-related local expenditures during the construction, for example, will include lodging and food, fuel, and construction materials and equipment.

18.8 Existing Plans for Other Developments (State, Local, and Private) in the Vicinity of the Project

Denbury has been in consultation with federal, state, and local governments, landowners, existing infrastructure owners, and water districts, and Denbury has not identified any potential conflicts with existing or planned developments. Denbury will obtain all necessary permits and approvals for the Project from federal, state, and local governments and agencies, and will comply with applicable local land use requirements.

18.9 Effects of the Proposed Route on Existing Scenic Areas, Historic Sites and Structures, and Cultural Resources

The Project avoids all known scenic areas, historic sites and structures, and cultural resources; therefore, the Project is not anticipated to impact these resources. For further discussion, please see Sections 13.0, 14.0, 17.0, and 18.0 of this Consolidated Application.

18.10 Effects of the Proposed Route on Areas Which are Unique Because of Biological Wealth or Rare and Endangered Species Habitats

Although suitable nesting and foraging habitat and migratory birds are present in the Study Area, the Project location is such that the likelihood of migratory birds being impacted by the Project is extremely low. No other potential areas that are unique because of biological wealth or because they are habitats for rare and endangered species are located within the Corridor or crossed by the Route and thus, the Project is not anticipated to impact these resources. For further discussion, please see Sections 13.0, 14.0, 17.0, and 18.0 of this Consolidated Application.

18.11 Problems Raised by Federal Agencies, other State Agencies, and Local Entities

A summary of consultations, notifications, and agency responses are provided in Section 15.0; copies of correspondence are provided in Appendix F. Consultation is ongoing and Denbury will respond to and address concerns if raised.

19 OTHER FACTORS CONSIDERED

19.1 Design Construction Limitations

Specific factors taken into account in the selection of the Corridor and Route, including design and construction limitations, are identified in Sections 3.0 and 13.0 and discussed throughout this Consolidated Application. In particular, road crossings (bore) and wetland crossings (trenching/bores) will require special construction techniques, which have been incorporated into the proposed Project design (see Section 11.2).

The Project will be designed, constructed, and operated in accordance with USDOT regulations governing the transportation of hazardous liquids by pipeline, which are set forth in 49 CFR Part 195.

19.2 Economic Considerations

In selecting the Corridor and Route, one of many factors Denbury considered was facilitating construction of the Project in the most economical and efficient manner. However, Corridor and Route selection required balancing of a number of factors, as discussed specifically in Sections 3.2 and 13.0 of this Consolidated Application.

Other economic considerations associated with the Project include the positive direct and indirect economic benefits that the Project will provide within and beyond North Dakota. As discussed in Sections 17.4.2 and 18.7 of this Consolidated Application, the Project will provide short-term employment of workers during construction, increased revenues from local expenditures, and increased tax revenues.

19.3 Present and Future Natural Resource Development

As discussed in Section 17.1.1, there are no national parks, national memorial parks, national historic sites or landmarks, national wilderness areas, or national monuments located within the Corridor and Route. Similarly, there are no designated or registered state parks, sites, monuments, or nature preserves along the Route. There are also no county parks, municipal parks, or parks owned or administered by other governmental subdivisions along the Project Route.

In addition, as discussed in Section 17.2.1, there are no wildlife areas; wild, scenic, or recreational rivers; wildlife refuges; or grasslands within the Corridor or Route. Also, no designated or registered state wild or recreational rivers, game refuges, game management and management areas, forests, forest management lands, or grasslands will be crossed by the Corridor or Route.

The Project will cross range land and land used for agricultural crop production. Once construction is complete, the ROW will be restored to its prior use. Further, as discussed in Sections 17.3.7 and 17.4.7, Denbury will continue to work closely with existing infrastructure owners to safely construct and operate the Project and to minimize the potential for impacts to existing facilities. Thus, impacts along the Route are anticipated to be primarily temporary and minimal.

20 APPLICANT'S MITIGATION MEASURES AND POLICIES AND COMMITMENTS TO LIMIT ENVIRONMENTAL IMPACT

Denbury is committed to avoiding, minimizing, and mitigating the environmental impacts of the Project. The Project has been designed and routed with these commitments in mind. The Project will be constructed and operated to meet or exceed federal, state, local, and industry safety, environmental, and operational standards.

In addition to the mitigation measures discussed throughout this Consolidated Application, Denbury has developed an EMP, presented as Appendix B, which outlines general construction-related mitigation measures to minimize impacts to natural and cultural resources from Project development. These measures meet or exceed applicable industry standards and regulatory requirements. Specifically, the EMP provides a detailed description of the mitigation measures that will be implemented during Project construction, including the following.

- General mitigation measures
- Spill prevention
- Temporary erosion and sediment control
- Highway, road, and railroad crossings
- Uplands
- Wetland crossings
- Hydrostatic testing

Denbury is also developing specific plans for the Project, including a Stormwater Pollution Prevention Plan and a Frac-Out Contingency Plan.

21 QUALIFICATIONS OF PREPARERS

Mr. Jim Dawson
Senior Project Manager
SWCA Environmental Consultants, 116 North 4th Street, Bismarck, North Dakota 57732

Mr. Dawson is a senior environmental specialist/project manager who provides regulatory compliance consulting services for oil and gas operations, including environmental site assessments and due diligence activities; stormwater permitting and inspections; preparation of Spill Prevention, Contingency and Countermeasure Plans, Facility Response Plans, and Pipeline Spill Response Plans; spill investigation, assessment, and cleanup services; and investigation and cleanup/remediation of reserve pits and legacy contamination sites.

Mr. Dawson is a Professional Geologist and Certified Hazardous Materials Manager with extensive field, regulatory, managerial, and consulting experience throughout the United States with diverse project experience, including contaminated soil and groundwater investigation, monitoring, and remediation; environmental site assessments and due diligence activities; solid and hazardous waste management; environmental regulatory permitting and compliance assistance; groundwater resources studies; and unexploded ordnance detection, discrimination, and remediation technologies.

Mr. Rusty Shaw
Environmental Compliance Manager
Denbury Resources, Inc., 5320 Legacy Drive, Plano, Texas 75024

Mr. Shaw received a Bachelor of Science in Biology from Millsaps College in December 1999. Mr. Shaw is a Registered Environmental Manager (REM).

Mr. Shaw started his career at Grand Gulf Nuclear Power Station in Port Gibson, MS in February 2001. Mr Shaw held various positions at Grand Gulf to include Chemistry Technician, Environmental Specialist, and HP/Chemistry Specialist before resigning and joining Denbury Resources in April 2008.

Mr. Shaw started his career with Denbury Resources as a HSE Coordinator until May 2010 when he accepted a role as HSE Compliance Manager. Mr. Shaw is currently the Environmental Compliance Manager at Denbury Resources in Plano, TX.

As Environmental Compliance Manager, Mr. Shaw manages all aspects of HSE permitting, compliance, and reporting including air, water, waste, wetland permits, and NEPA compliance and reporting for all oil & gas operations including CO2 Pipeline infrastructure.

Mr. Wade Mann
Partner
Crowley Fleck, PLLP, 100 W Broadway, Suite 250, Bismarck, ND 58501

Wade Mann is a Partner in the firm's Bismarck office. He is part of the Energy, Environment and Natural Resources group and focuses his practice primarily on energy and natural resources related litigation and

regulatory work. He represents clients before the North Dakota Industrial Commission and North Dakota Public Service Commission as well as in state and federal courts. Wade is back with the firm after recently completing a gubernatorial appointment as the Director of the North Dakota Office of Administrative Hearings where he served as an administrative law judge in addition to heading the agency.

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APPENDIX A

Project Overview Maps, Pipeline Schematics, ROW Details, and Engineering Drawings

APPENDIX B

Environmental Mitigation Plan

APPENDIX C

Cultural Resources Report and Unanticipated Discovery Plan

APPENDIX D

Natural Resources Report

APPENDIX E

Paleontological Resources Report

APPENDIX F

Agency Correspondence/Consultation

APPENDIX A

Project Overview Maps

Survey Corridor Maps

Pipeline Schematics

ROW Details

PROJECT OVERVIEW MAPS



Legend

- City
- Interstate Highway
- U.S. Highway
- Project Location
- County Boundary
- State Boundary

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Fax: 701.258.5957
www.swca.com

Kilometers
0 75 150
Miles
0 50 100

Base Map: World Topographic Map
Source: ESRI ArcGIS Online Service

Projection: NAD 1983 UTM Zone 14N



CSHU Lateral Pipeline Overview

- CHSU Proposed Pipeline
- 1.2-mile Corridor
- County Boundary

Scale: 1:134,400
Projection: NAD 1983 UTM Zone 13N
12/3/2018

0 1 2 3 Miles

0 1 2 3 4 Km

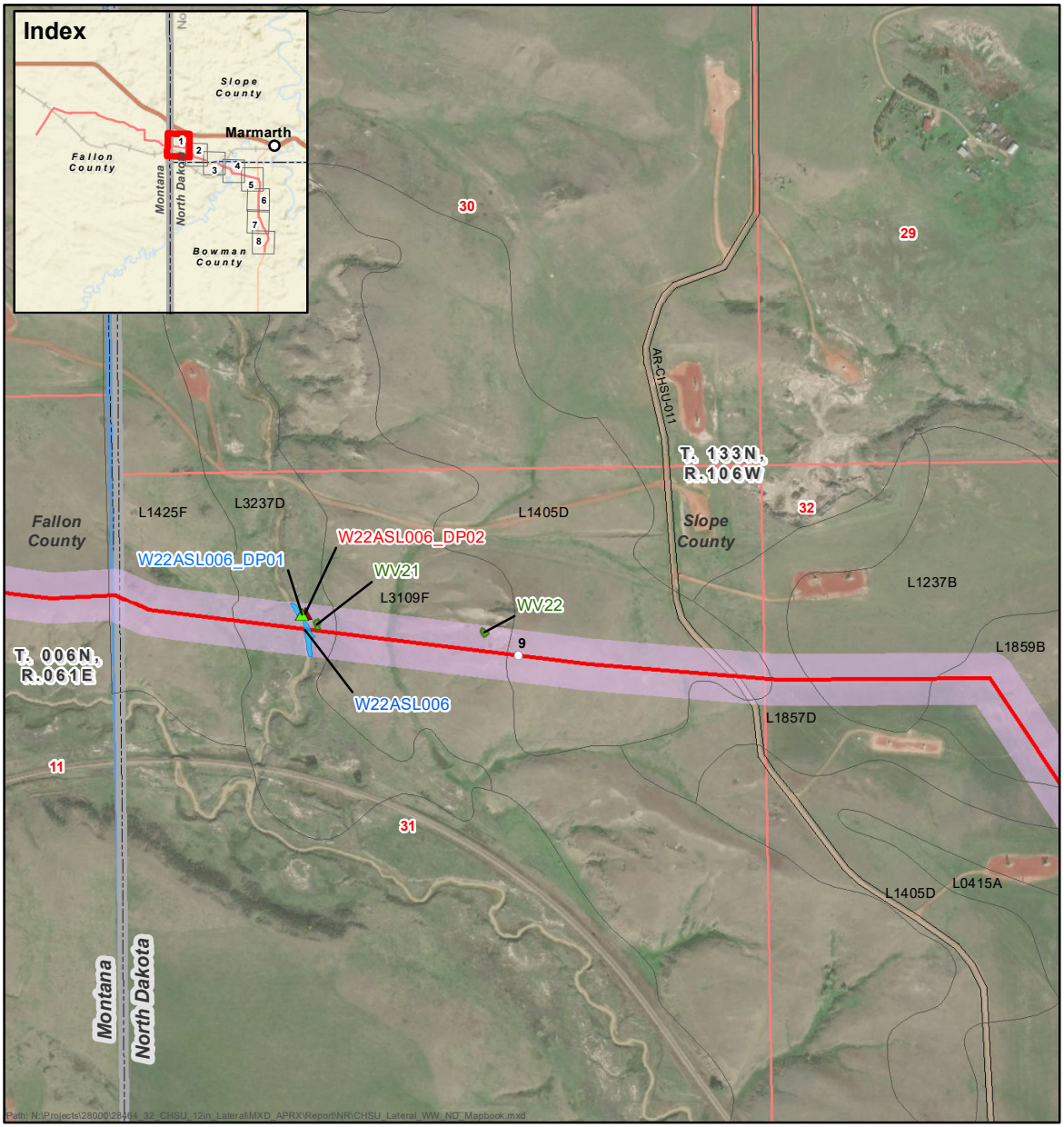
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SURVEY CORRIDOR MAPS

Natural Resources Survey Corridor Maps

Hydrid NR, CR, and Paleo Survey Corridor Maps



CHSU Pipeline

- Milepost
- Upland Data Point
- Wetland Data Point
- Proposed Pipeline

Access Road

- Improved

- Survey Area
- Wetland Boundary
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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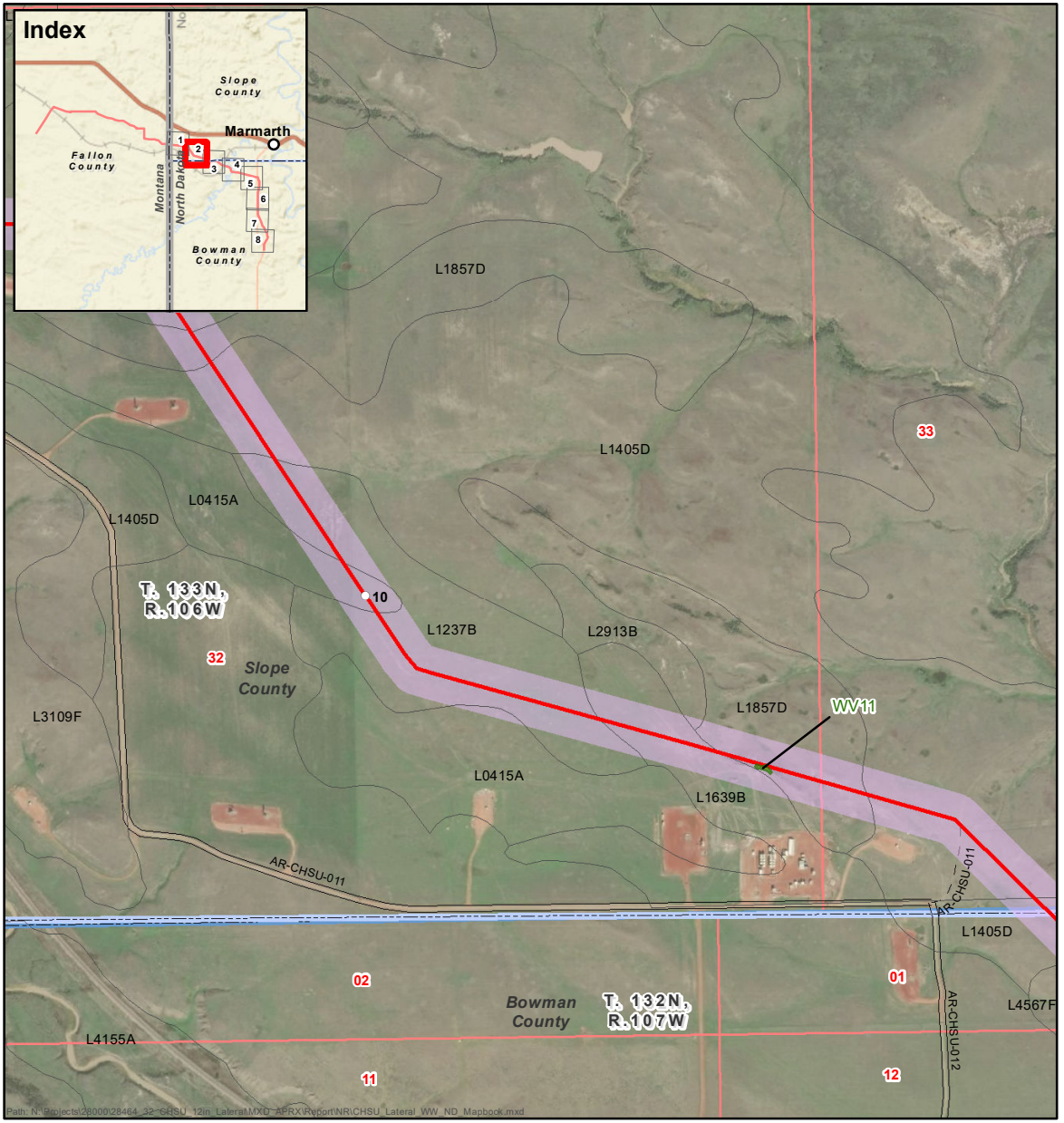
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CHSU Pipeline

- Milepost
- Proposed Pipeline

Access Road

- Improved
- Unimproved

- Survey Area
- Woody Vegetation
- Soil Boundary
- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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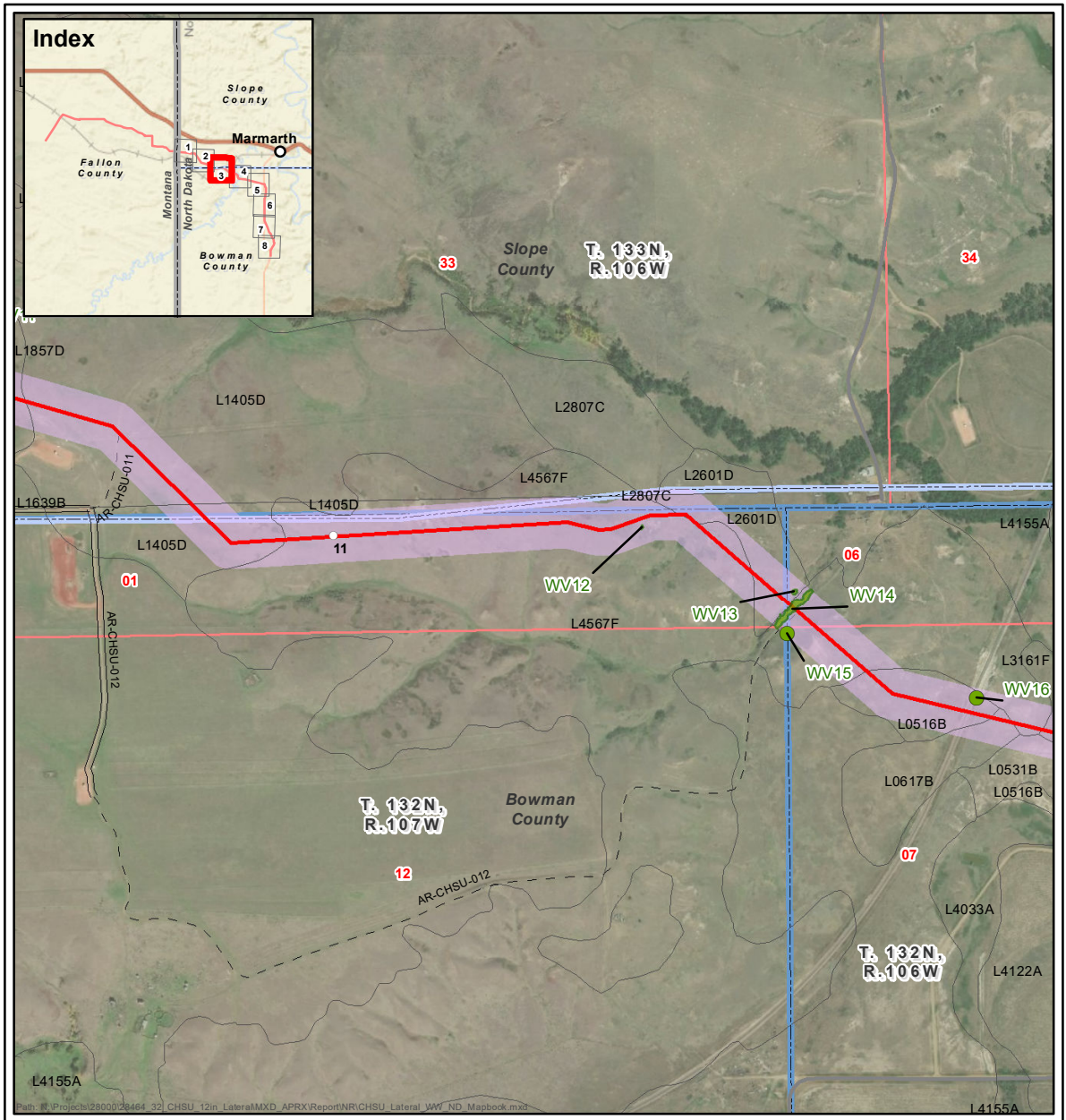
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CHSU Pipeline

- Milepost
- Woody Vegetation
- Proposed Pipeline

Access Road

- Improved
- Unimproved
- Existing Road

- Survey Area
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
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- County Boundary
- State Boundary

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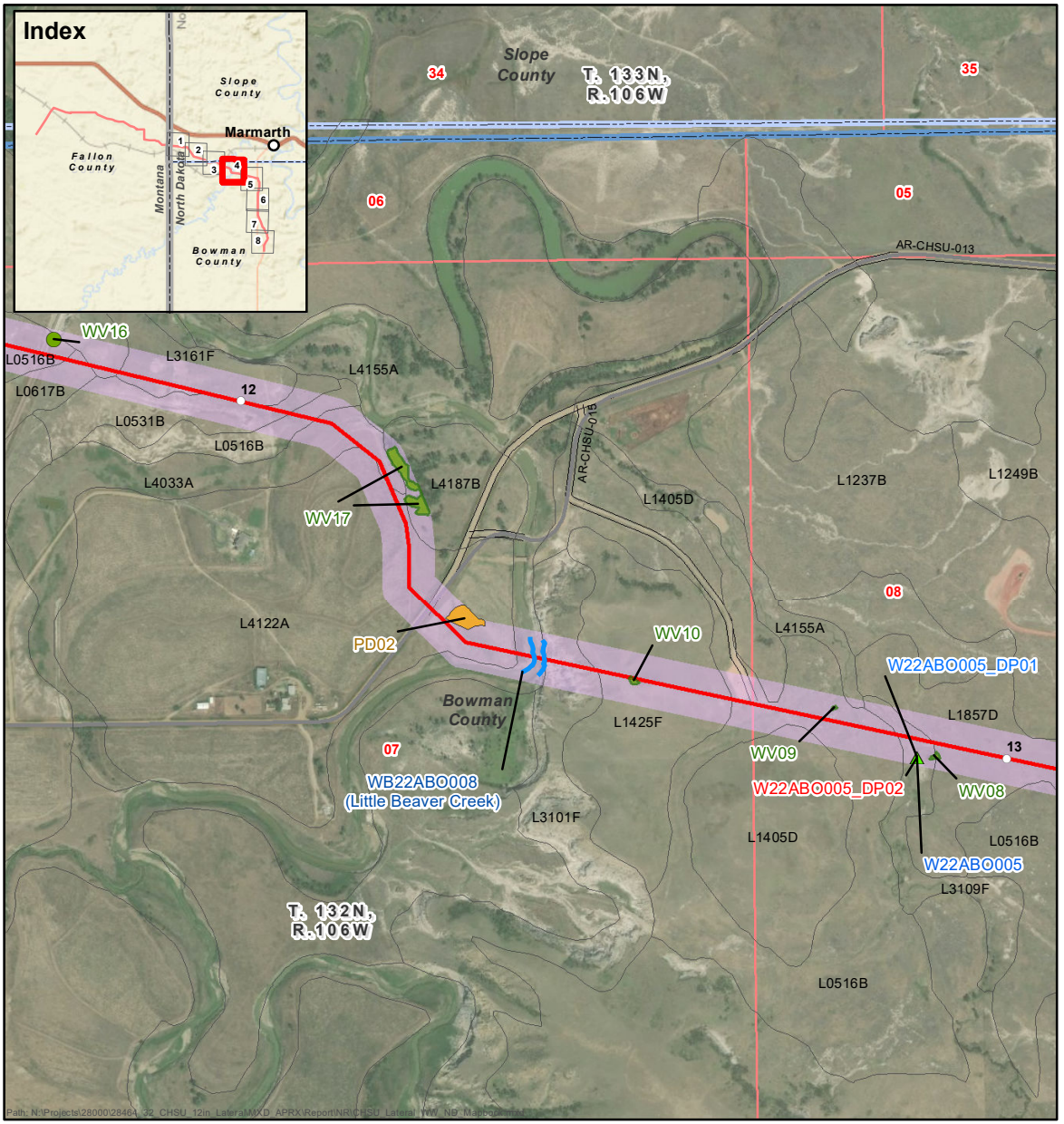
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CHSU Pipeline

- Milepost
- Upland Data Point
- Wetland Data Point
- Woody Vegetation
- Proposed Pipeline
- Waterbody (OHWM)

Access Road

- Improved
- Existing Road

- Survey Area
- Prairie Dog Colony
- Wetland Boundary
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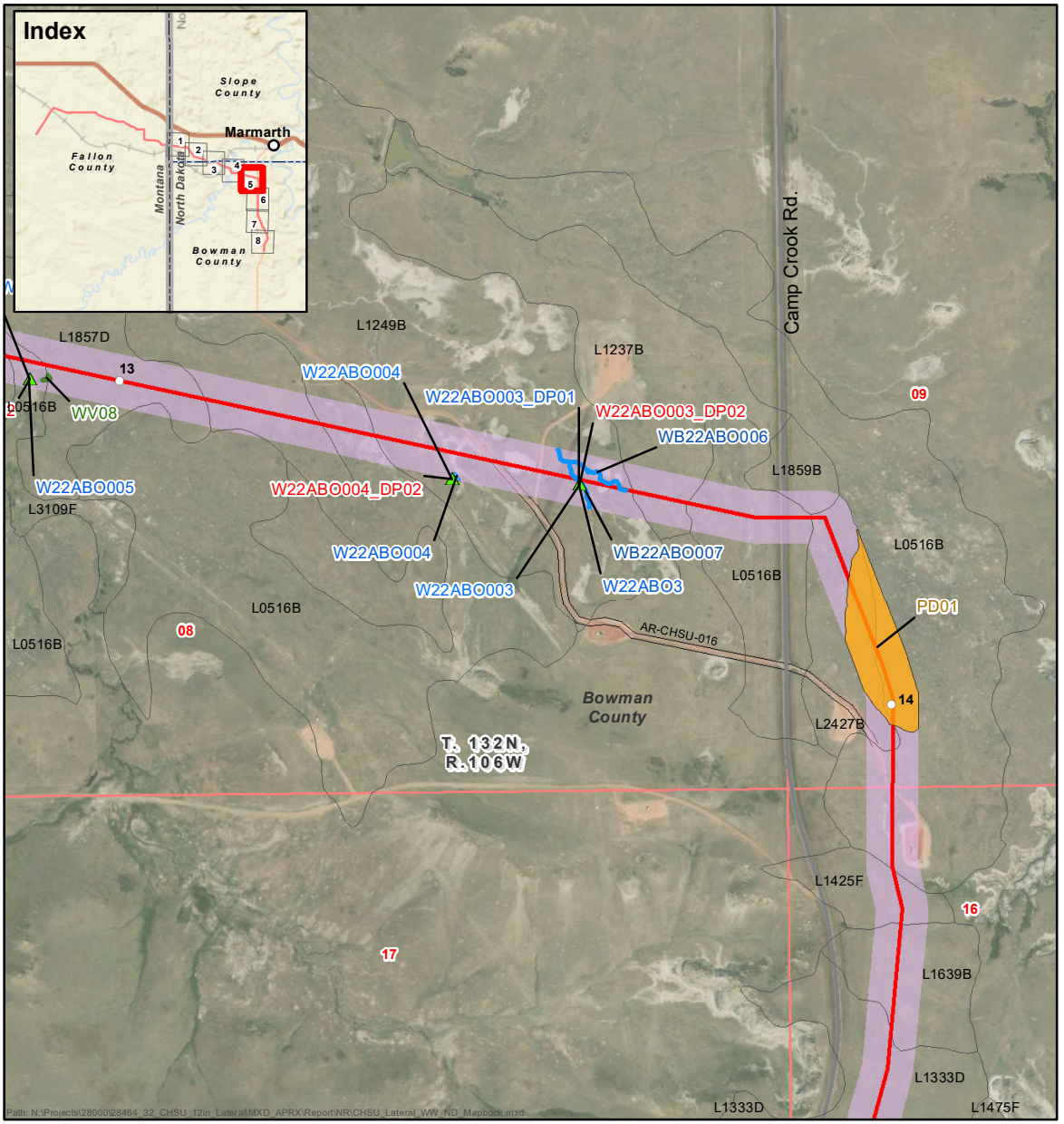
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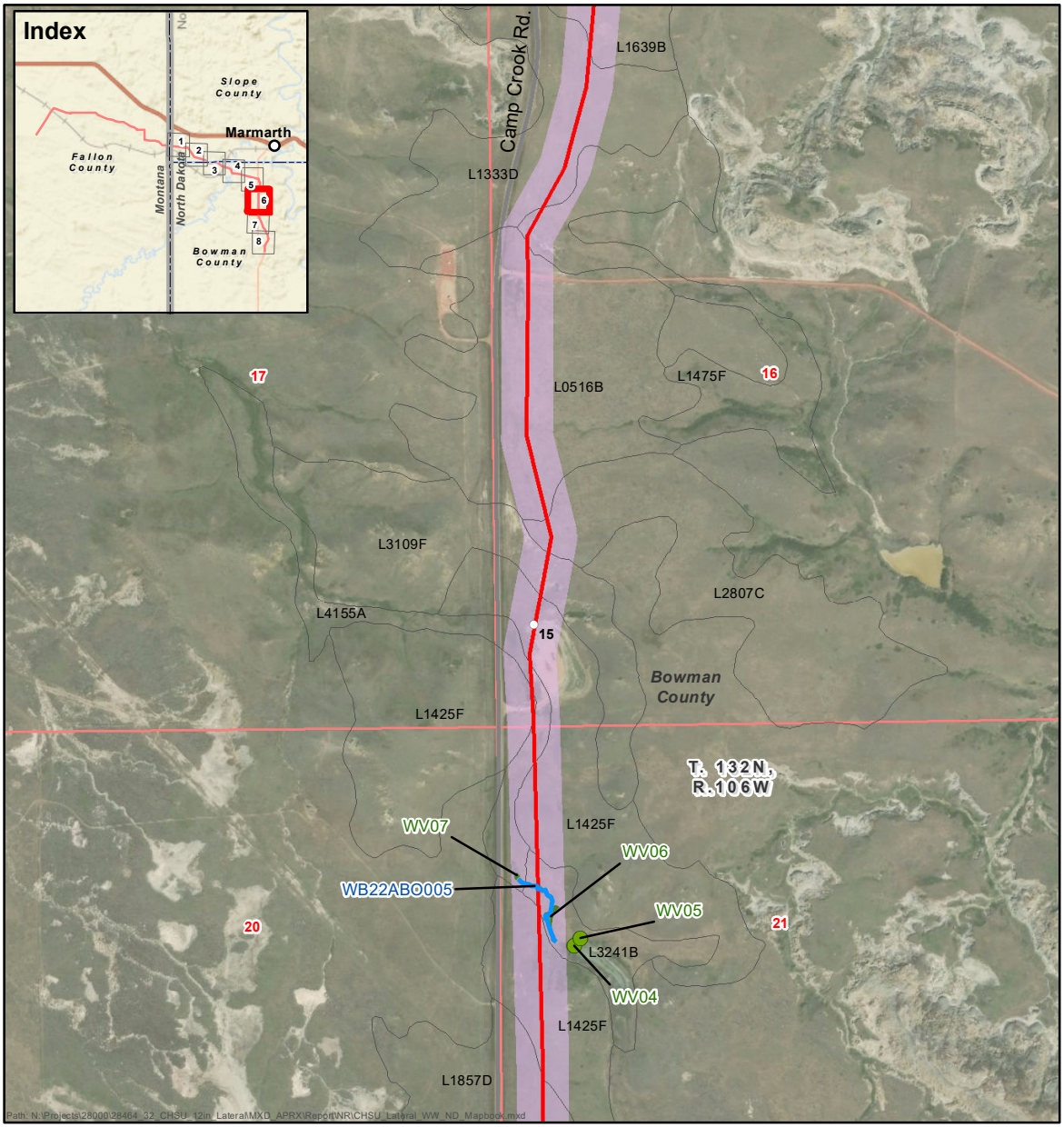
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CHSU Pipeline

- Milepost
- Woody Vegetation
- Proposed Pipeline
- Waterbody (OHWM)
- Existing Road
- Survey Area
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- Soil Boundary
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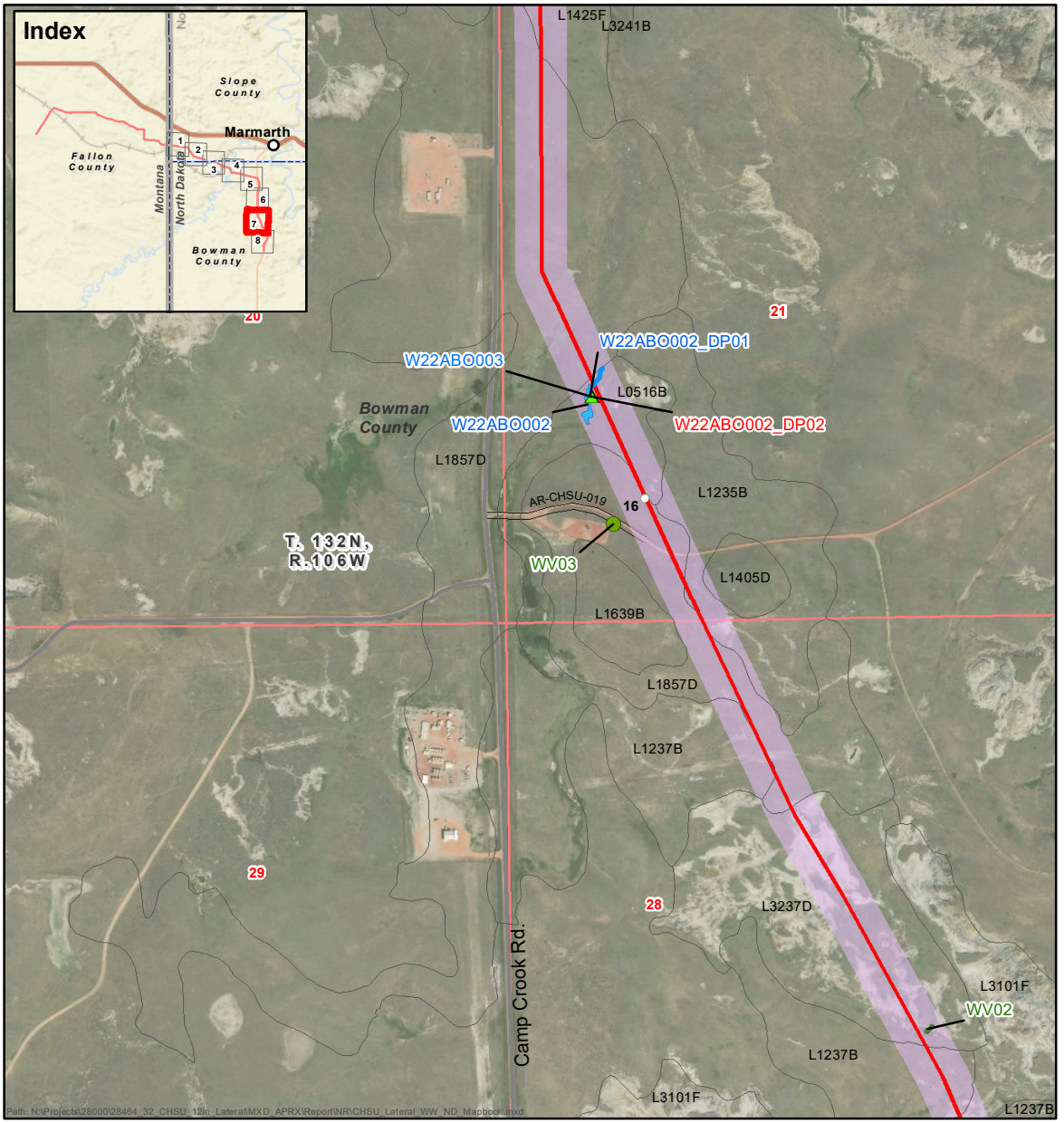
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CHSU Pipeline

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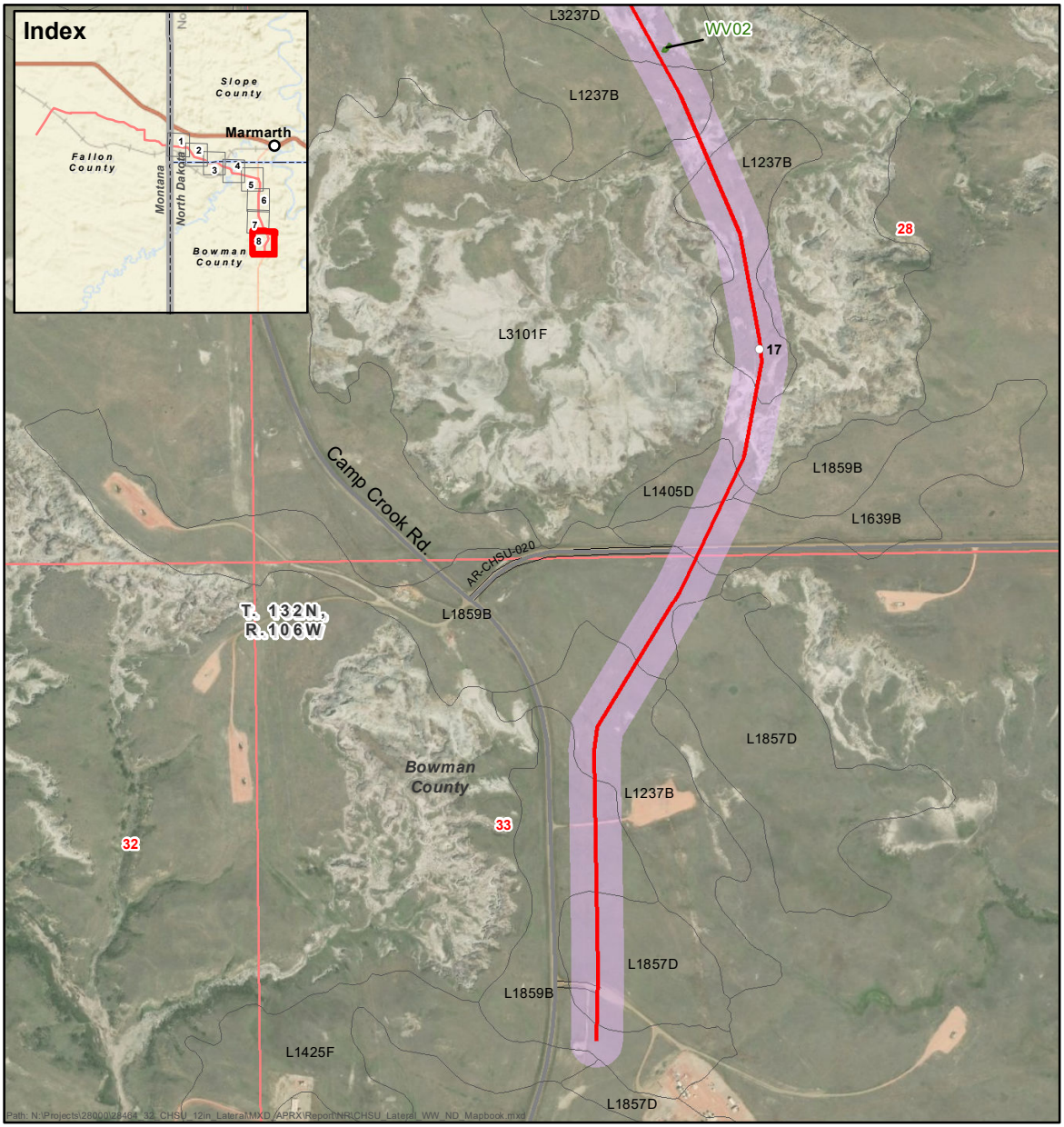
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CHSU Pipeline

- Milepost
- Proposed Pipeline

Access Road

- Improved
- Existing Road

- Survey Area
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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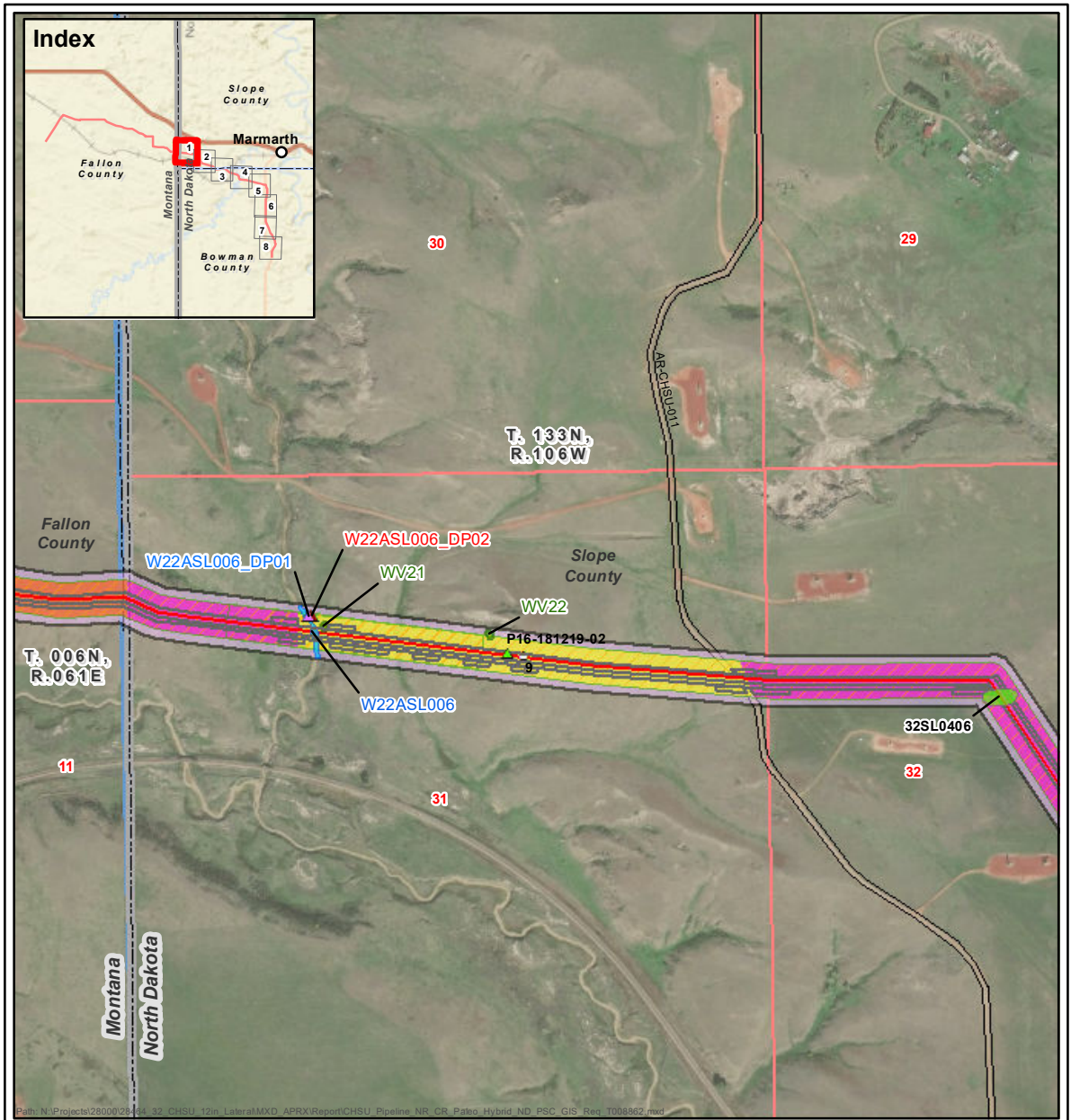
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CHSU Pipeline

- Photo Point - Paleontological
- Milepost
- Upland Data Point
- Wetland Data Point
- Proposed Pipeline

Access Road

- Improved
- ROW Disturbance Area
- Site Boundary - Ineligible

- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review
- Aerial Photo Review

Biological Polygon

- Wetland Boundary
- Woody Vegetation

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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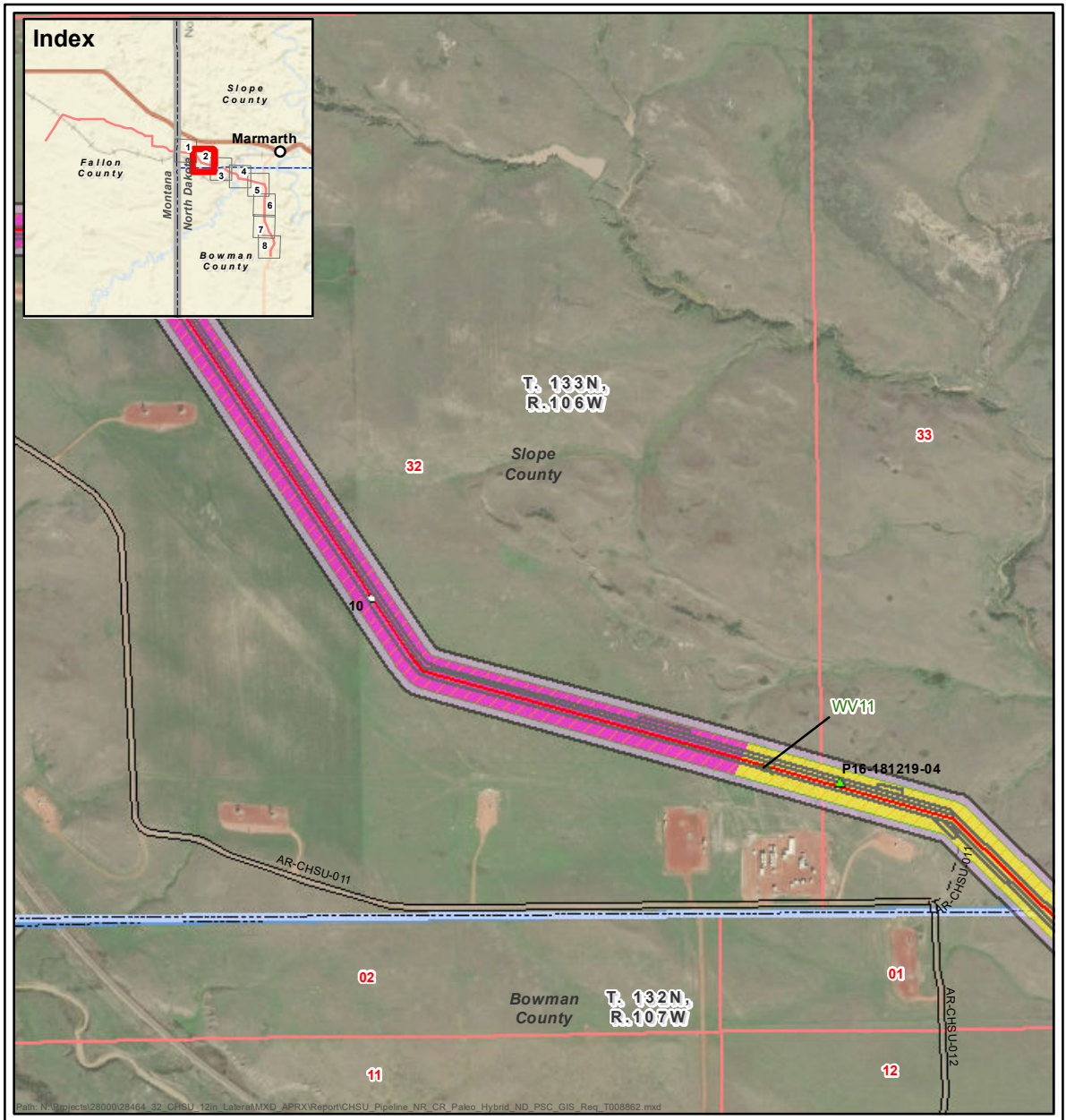
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CHSU Pipeline

- Photo Point - Paleontological
- Milepost
- Proposed Pipeline

Access Road

- Improved
- Unimproved
- ROW Disturbance Area
- Site Boundary - Ineligible
- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review

Biological Polygon

- Woody Vegetation
- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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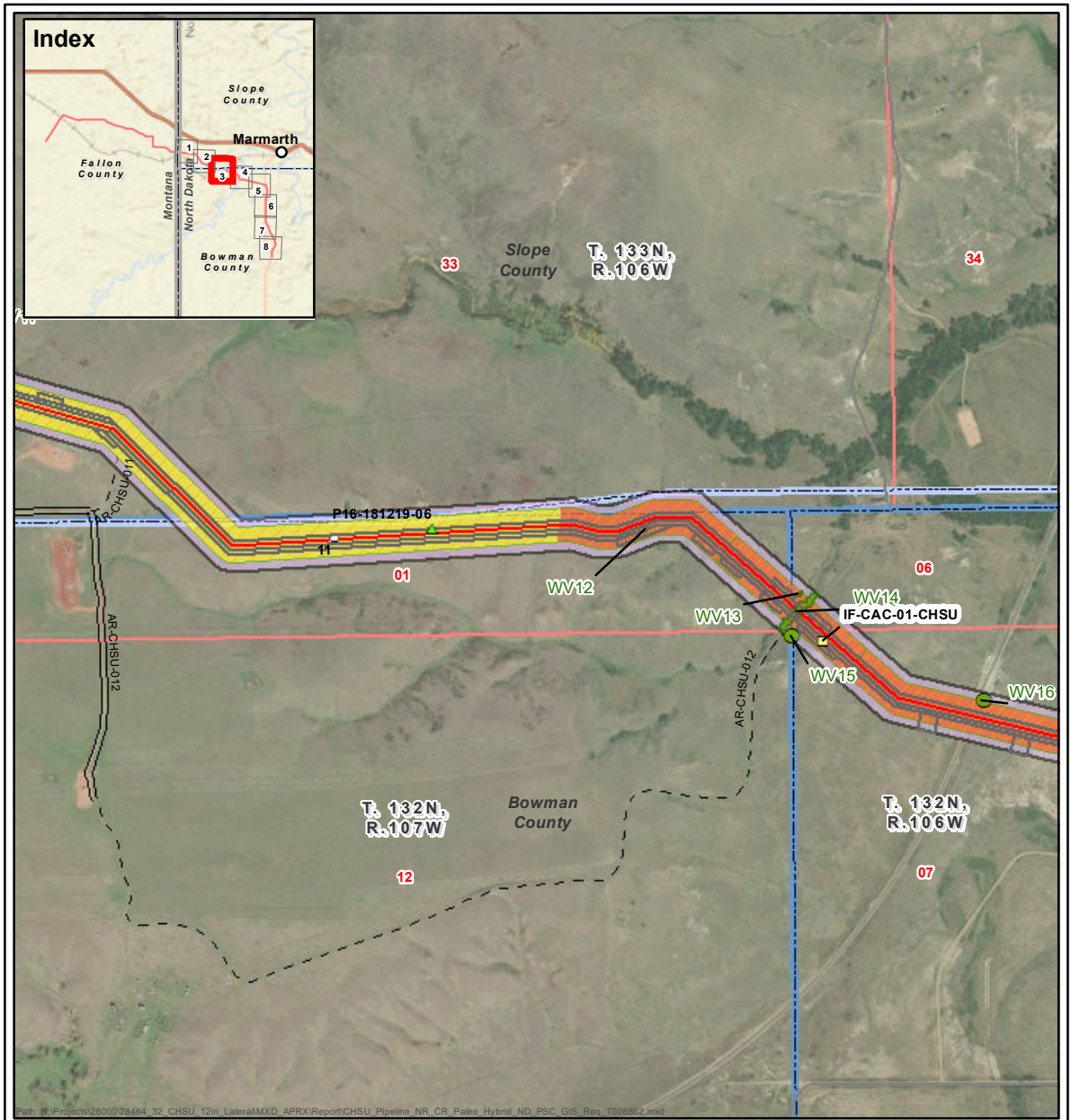
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CHSU Pipeline

- Isolated Resource
- Photo Point - Paleontological
- Milepost
- Woody Vegetation
- Proposed Pipeline
- Existing Road

Access Road

- Improved
- Unimproved
- ROW Disturbance Area

- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Aerial Photo Review

Biological Polygon

- Woody Vegetation

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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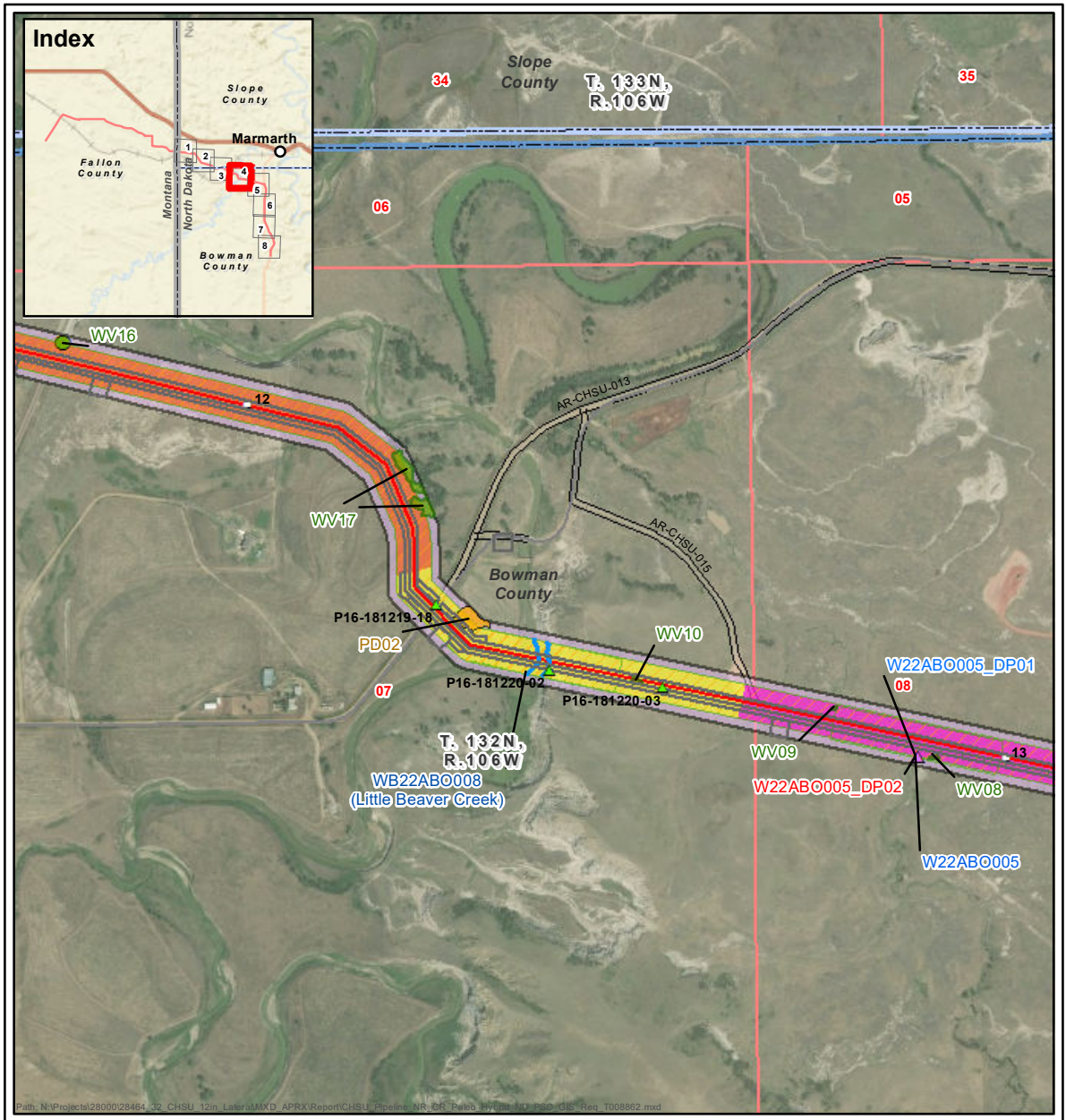
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CHSU Pipeline

- Photo Point - Paleontological
- Milepost
- Upland Data Point
- Wetland Data Point
- Woody Vegetation
- Waterbody (OHWM)
- Proposed Pipeline
- Existing Road

Access Road

- Improved
- ROW Disturbance Area

- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review
- Aerial Photo Review

Biological Polygon

- Prairie Dog Colony
- Wetland Boundary
- Woody Vegetation

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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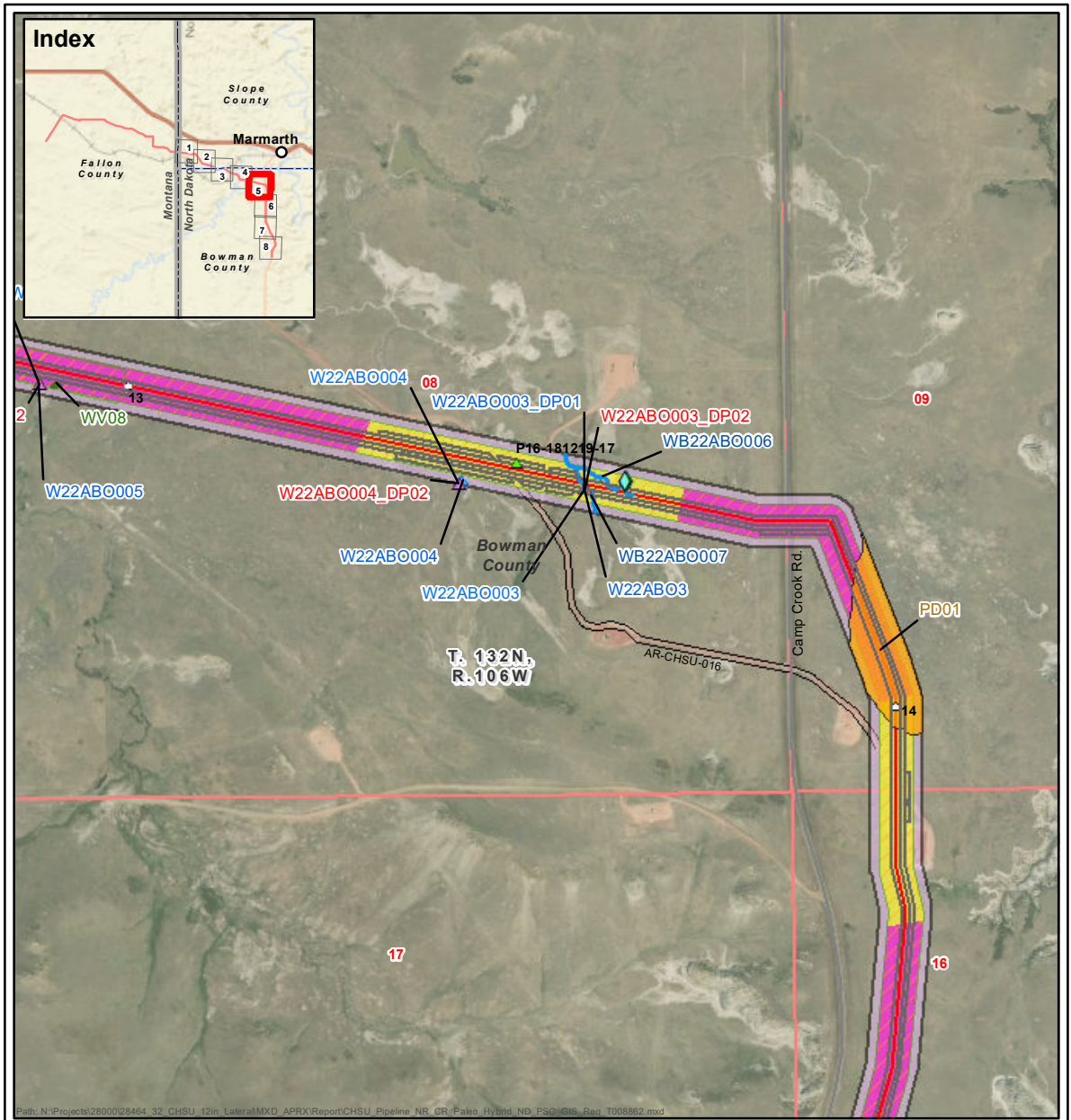
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Date: 3/15/2019



CHSU Pipeline

- Fossil Point - Paleontological
- Photo Point - Paleontological
- Milepost
- Upland Data Point
- Wetland Data Point
- Waterbody (OHWM)
- Proposed Pipeline
- Existing Road

Access Road

- Improved
- ROW Disturbance Area

- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review

Biological Polygon

- Prairie Dog Colony
- Wetland Boundary
- Woody Vegetation

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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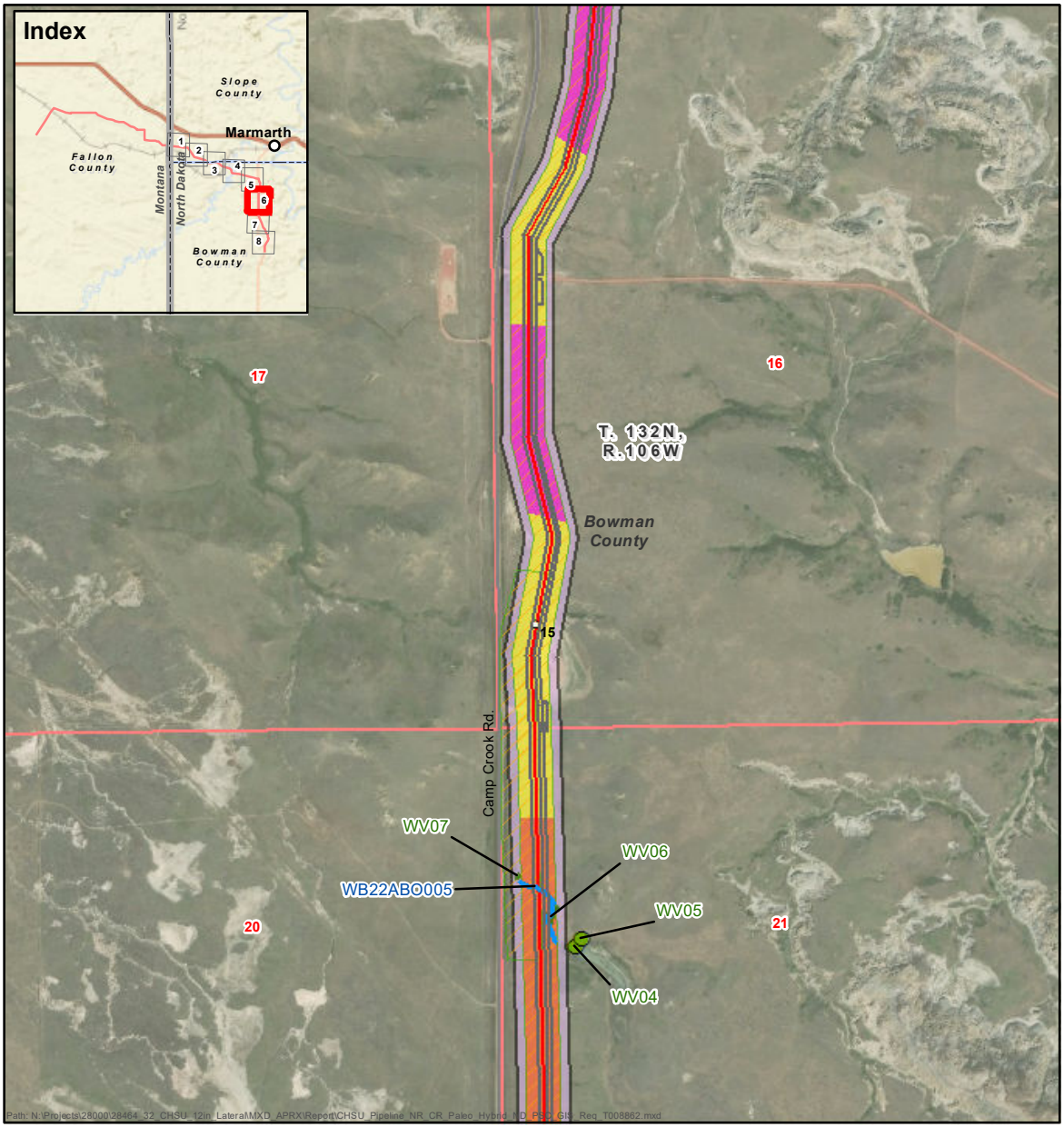
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Date: 3/15/2019



CHSU Pipeline

- Milepost
- Woody Vegetation
- Waterbody (OHWM)
- Proposed Pipeline
- Existing Road
- ROW Disturbance Area
- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review
- Aerial Photo Review

Biological Polygon

- Woody Vegetation
- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

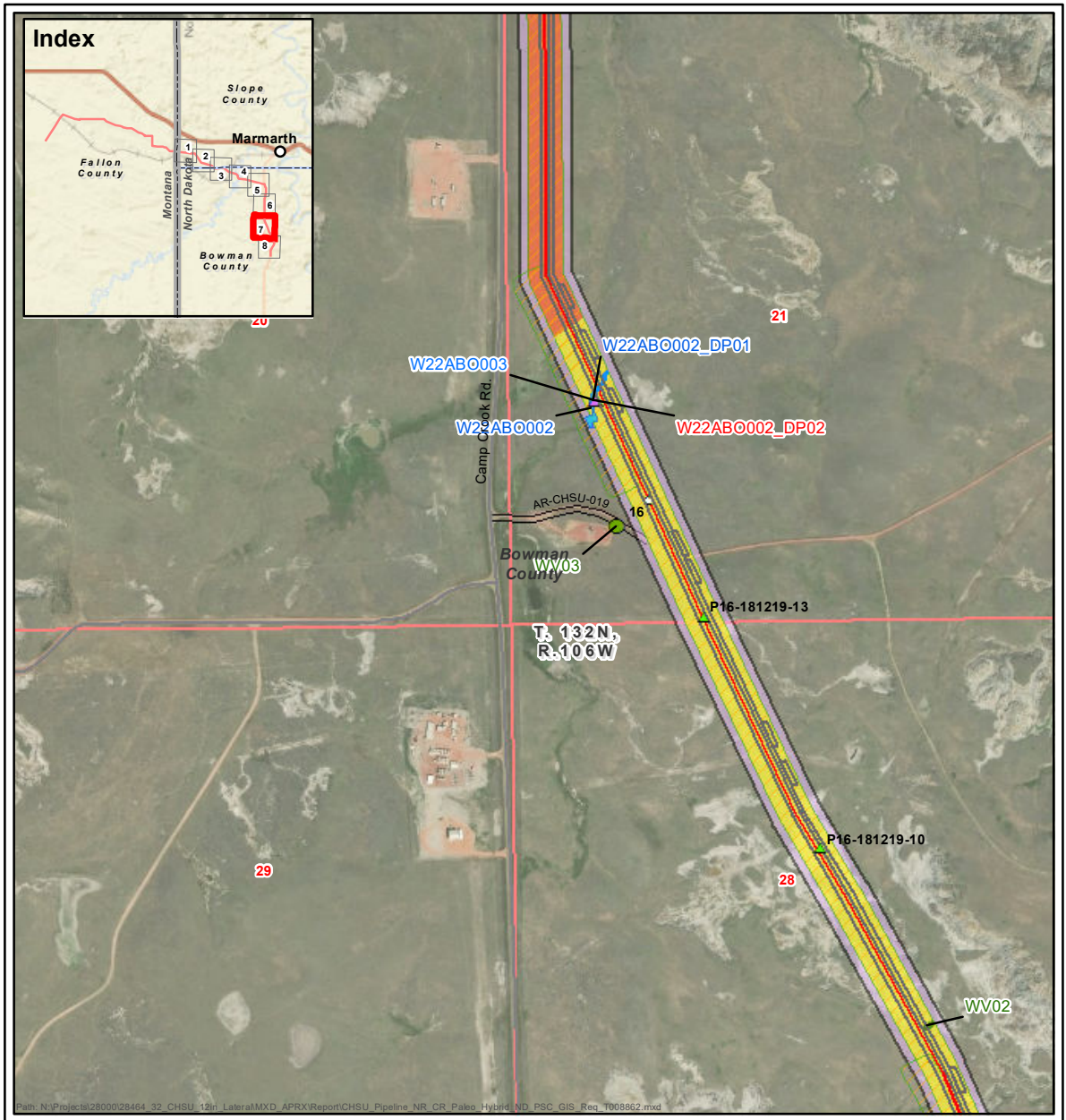
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Scale: 1:12,000
Projection: NAD 1983 UTM Zone 13N
Basemap: World Imagery (ESRI Basemaps)

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Phone: 970.237.4096
www.swca.com

Date: 3/15/2019



CHSU Pipeline

- Photo Point - Paleontological
- Milepost
- Upland Data Point
- Wetland Data Point
- Woody Vegetation
- Waterbody (OHWM)
- Proposed Pipeline
- Existing Road

Access Road

- Improved
- ROW Disturbance Area

- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Aerial Photo Review

Biological Polygon

- Wetland Boundary
- Woody Vegetation

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

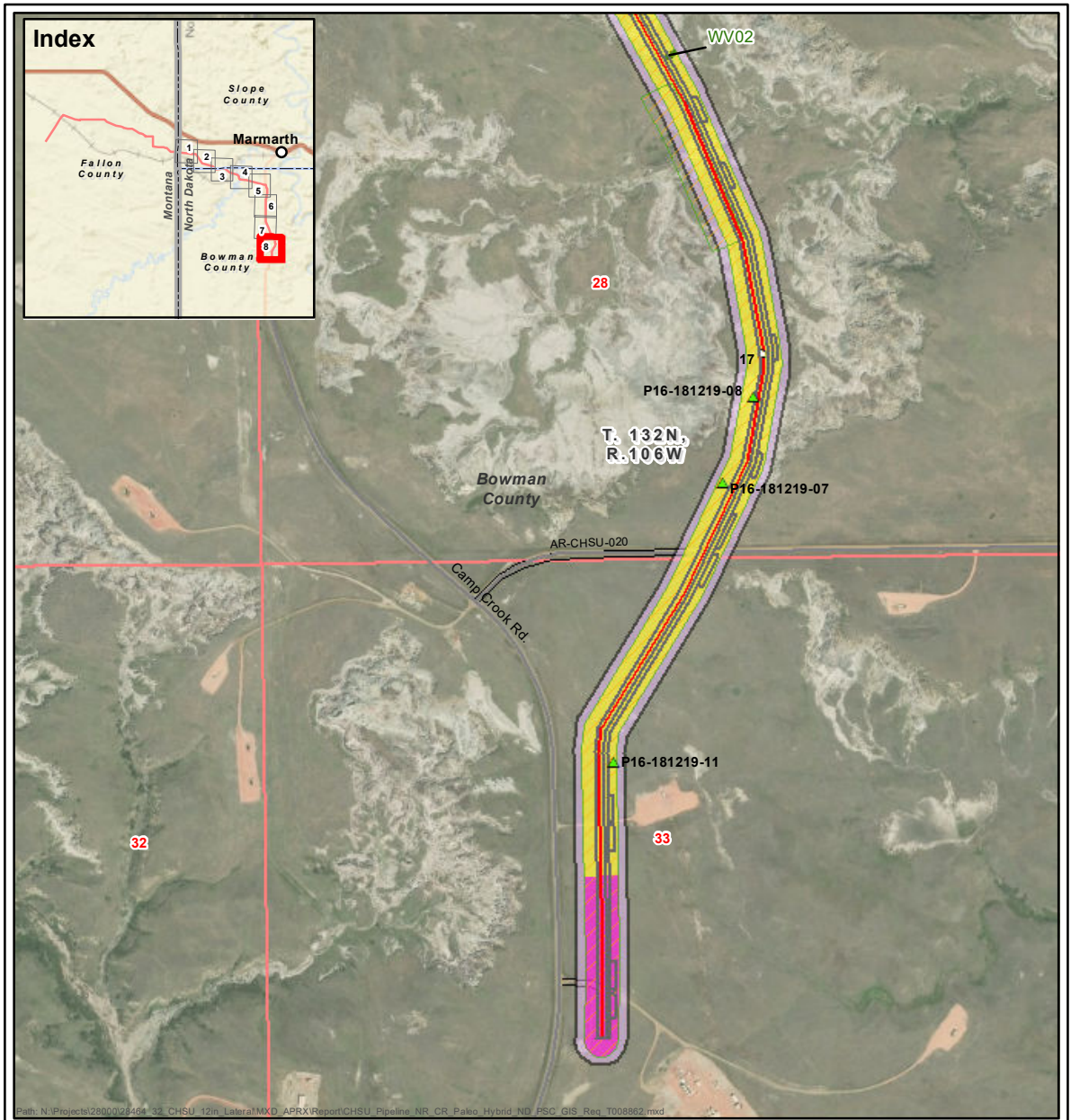
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CHSU Pipeline

- Photo Point - Paleontological
- Milepost
- Proposed Pipeline
- Existing Road

Access Road

- Improved
- ROW Disturbance Area
- Survey Area - Biological
- Survey Area - Cultural

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review

Biological Polygon

- Woody Vegetation
- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

0 100 200 300 400 500 Meters

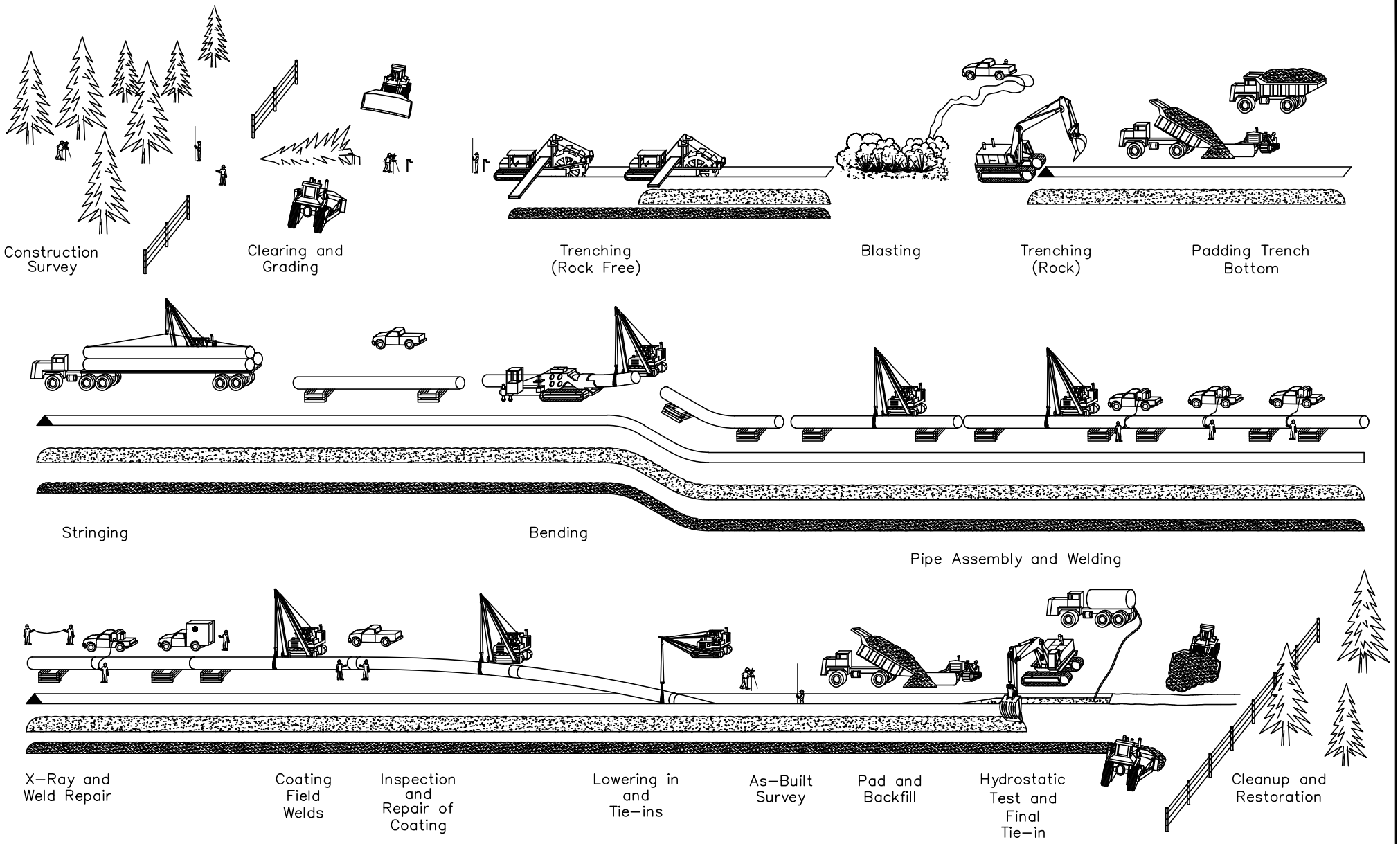
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PIPELINE SCHEMATICS



REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

REVISIONS

Denbury

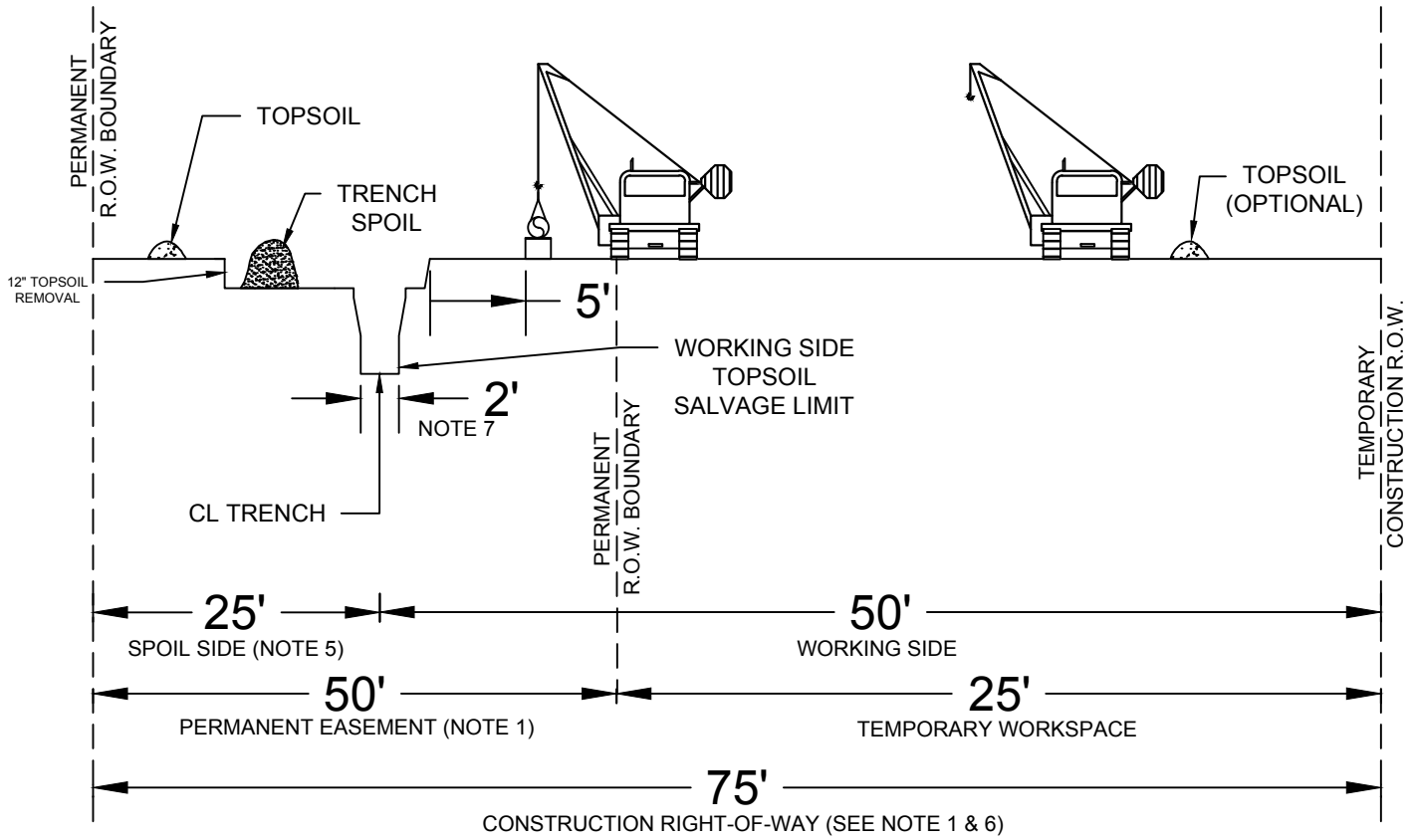
Carbon Dioxide Transmission Pipeline

PIPELINE CONSTRUCTION SEQUENCE

CASS COUNTY NORTH DAKOTA

DATE:	PLOT DATE:	DRAWN BY:	LOC. NO:	DRAWING NUMBER:	SHEET NO:	REV:

CONSTRUCTION RIGHT-OF-WAY TYPICAL

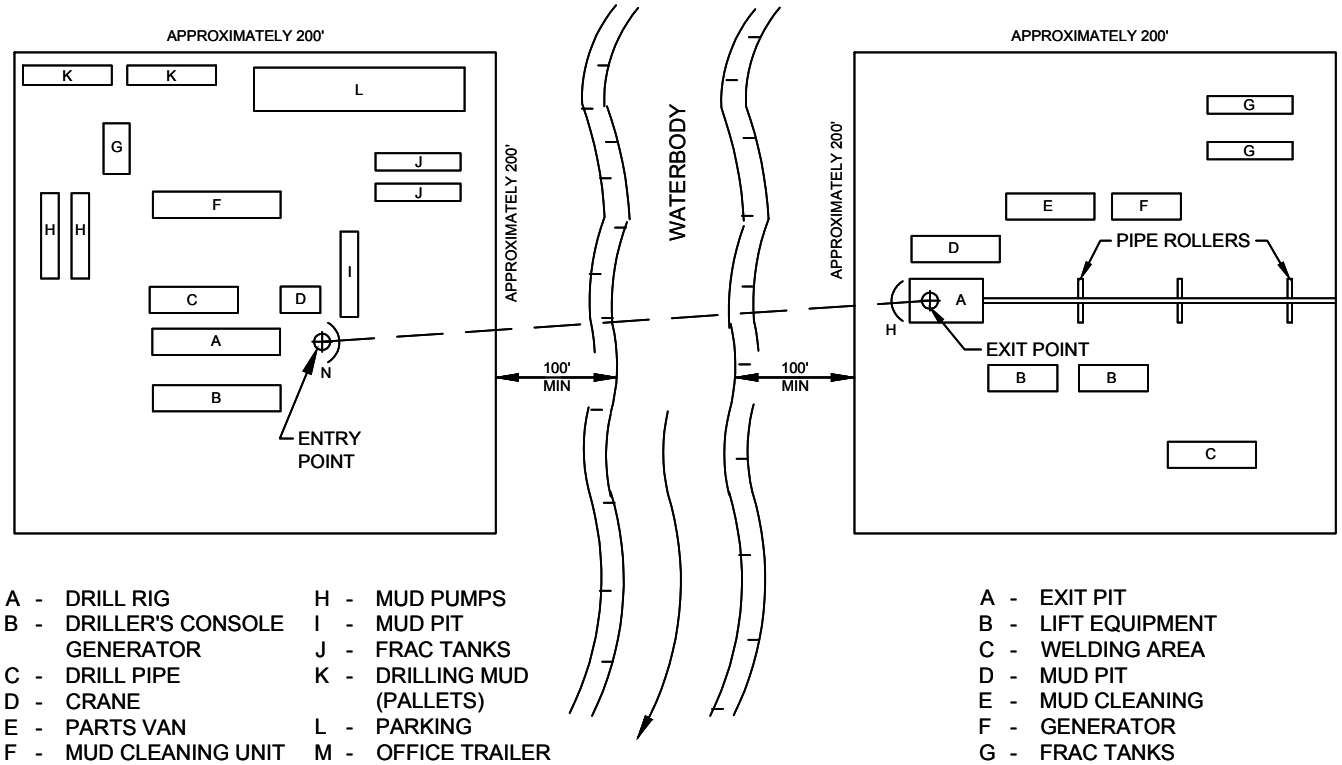


PROFILE
NOT TO SCALE

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 75' WIDE CONSISTING OF 50' OF PERMANENT EASEMENT AND 25' OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL, RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED. CERTAIN SITUATIONS MAY REQUIRE A NARROWER WIDTH.
2. THIS DRAWING REFLECTS "TRENCH AND SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE. SALVAGE TOPSOIL OVER TRENCH AND UNDER THE SPOIL PILE AT LOCATION IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS, OR AS DIRECTED BY THE COMPANY INSPECTOR. DEPTH OF TOPSOIL STRIPPING IS NOT TO EXCEED 12".
3. STOCKPILE TOPSOIL AS SHOW OR IN ANY CONFIGURATION APPROVED BY THE COMPANY INSPECTOR. KEEP TOPSOIL AND SPOIL PILES CLEAN OF ALL CONSTRUCTION DEBRIS. MAINTAIN A MINIMUM OF 12" OF SEPARATION BETWEEN TOPSOIL AND TRENCH SPOIL PILES. ENSURE THAT TOPSOIL AND TRENCH SPOIL DO NOT MIX.
4. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH UPLAND SOILS INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL AND SPOILS PILES.
5. THE OFFSET FROM EXISTING PIPELINE, WHERE APPLICABLE, WILL BE 25', BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.
6. TEMPORARILY SUSPEND TOPSOIL HANDLING OPERATION DURING EXCESSIVELY WINDY CONDITIONS UNTIL MITIGATIVE MEASURES TO MINIMIZE WIND EROSION CAN BE IMPLEMENTED.
7. BOTTOM OF TRENCH WIDTH WILL BE AN AVERAGE OF 2' (TYPICAL). HOWEVER, UNDER CERTAIN CIRCUMSTANCES, THE TRENCH MAY BE A MAXIMUM OF 10' WIDE.
8. TOPSOIL AND TRENCH SPOIL RELATIVE POSITIONS CAN, AS DIRECTED BY THE COMPANY INSPECTOR, BE REVERSED.

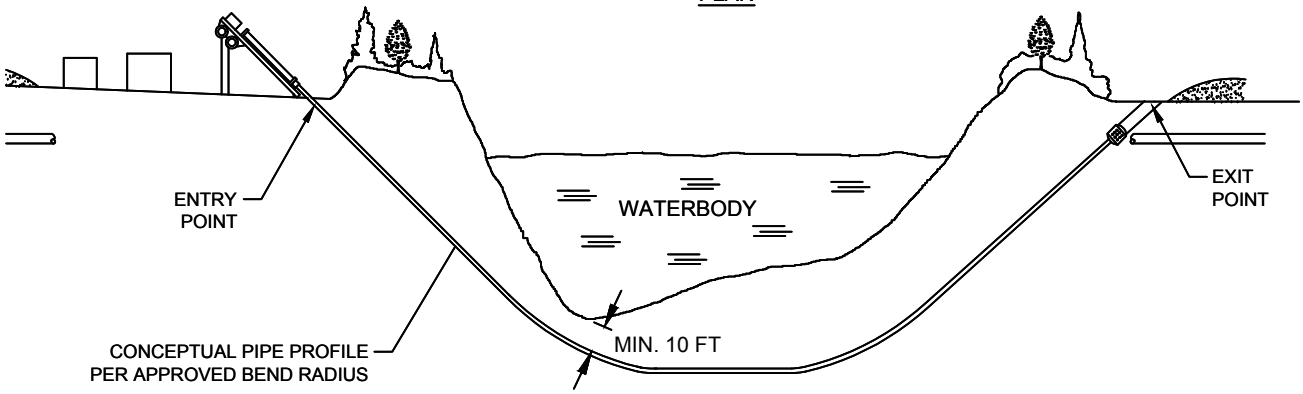
SWCA ENVIRONMENTAL CONSULTANTS



A - DRILL RIG
B - DRILLER'S CONSOLE GENERATOR
C - DRILL PIPE
D - CRANE
E - PARTS VAN
F - MUD CLEANING UNIT
G - MUD MIXING TANK
H - MUD PUMPS
I - MUD PIT
J - FRAC TANKS
K - DRILLING MUD (PALLETS)
L - PARKING
M - OFFICE TRAILER
N - CONTAINMENT BERM

A - EXIT PIT
B - LIFT EQUIPMENT
C - WELDING AREA
D - MUD PIT
E - MUD CLEANING
F - GENERATOR
G - FRAC TANKS
H - CONTAINMENT BERM

PLAN



PROFILE

NOTES:

1. SET UP DRILLING EQUIPMENT A MINIMUM OF 300 FEET FROM THE EDGE OF THE WATERCOURSE. DO NOT CLEAR OR GRADE WITHIN THE 100 FOOT ZONE.
2. ENSURE THAT ONLY BENTONITE BASED DRILLING MUD IS USED. DO NOT ALLOW THE USE OF ANY ADDITIVES TO THE DRILLING MUD WITHOUT THE APPROVAL OF COMPANY'S INSPECTOR.
3. INSTALL SUITABLE DRILLING MUD TANKS OR SUMPS TO PREVENT CONTAMINATION OF WATERCOURSE.
4. INSTALL BERMS DOWNSLOPE FROM THE DRILL ENTRY AND ANTICIPATED EXIT POINTS TO CONTAIN ANY RELEASE OF DRILLING MUD.
5. DISPOSE OF DRILLING MUD IN ACCORDANCE WITH THE APPROPRIATE REGULATORY AUTHORITY REQUIREMENTS.

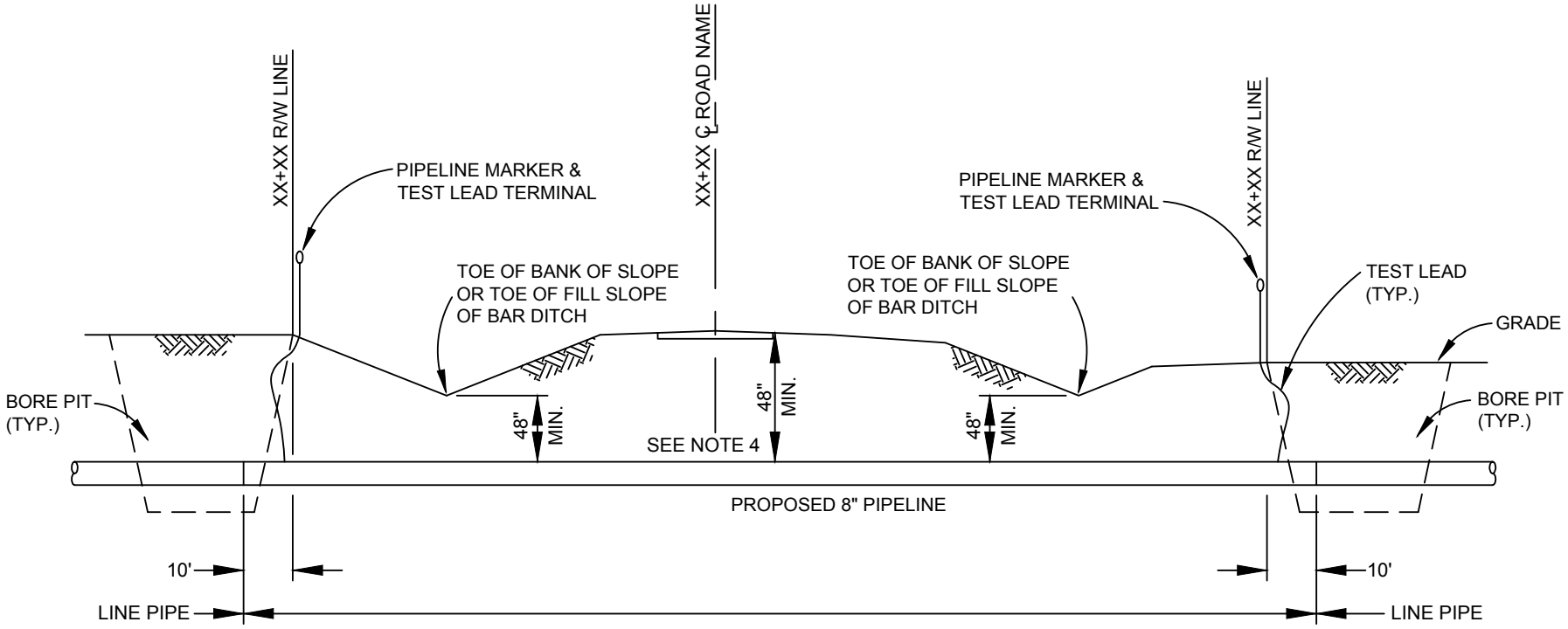
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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.
A	04/17/15	KBW	ISSUED FOR PERMIT	DK	JN

REVISIONS

TYPICAL WATERBODY CROSSING
HORIZONTAL DIRECTIONAL DRILLING

DATE:	PLOT DATE:	DRAWN BY:	LOC. NO:	DRAWING NUMBER:	SHEET NO:	REV:
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IMPROVED UNCASED ROAD - CROSSING BORING METHOD

NOTES:

1. DESIGN FACTOR: IN ACCORDANCE WITH ALIGNMENT SHEETS
2. 100% X-RAY INSPECT ALL WELDS ON CARRIER PIPE IN ACCORDANCE WITH API STANDARD 1104 AND CONTRACT DOCUMENTS.
3. CONTRACTOR TO SLICK BORE CARRIER PIPE WITH A PROCEDURE SUBMITTED BY CONTRACTOR AND APPROVED BY THE COMPANY.
4. MINIMUM DEPTH OF COVER UNDER ROAD TO TOP OF PIPE SHALL BE 4'-0" OR SHALL CONFORM TO THE ROAD CROSSING PERMIT, WHICHEVER IS GREATER. ROAD CROSSING PIPE TO EXTEND 10' BEYOND ON EITHER SIDE OF DESIGNATED ROAD RIGHT-OF-WAY.
5. CATHODIC TEST STATION TO BE INSTALLED (IF REQUIRED), SEE CST-P-1085-B030.
6. PIPELINE MARKER TO BE INSTALLED PER DRAWING STD-P-0100-A200 AND STD-P-0100-A205.
7. PIPELINE MARKER & TEST STATIONS TO BE INSTALLED ON ROW LINE NEXT TO FENCE IF POSSIBLE.
8. CARRIER PIPE IS TO BE COATED WITH APPROVED EXTERNAL PROTECTIVE COATING, SEE ENGINEERING SECTION #M8380.
9. CROSSING TO BE AS NEAR TO 90° TO THE CENTERLINE OF ROADWAY AS PRACTICAL.
10. CONTRACTOR TO COMPLY TO THE SPECIFICATION REQUIREMENTS.

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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

REVISIONS

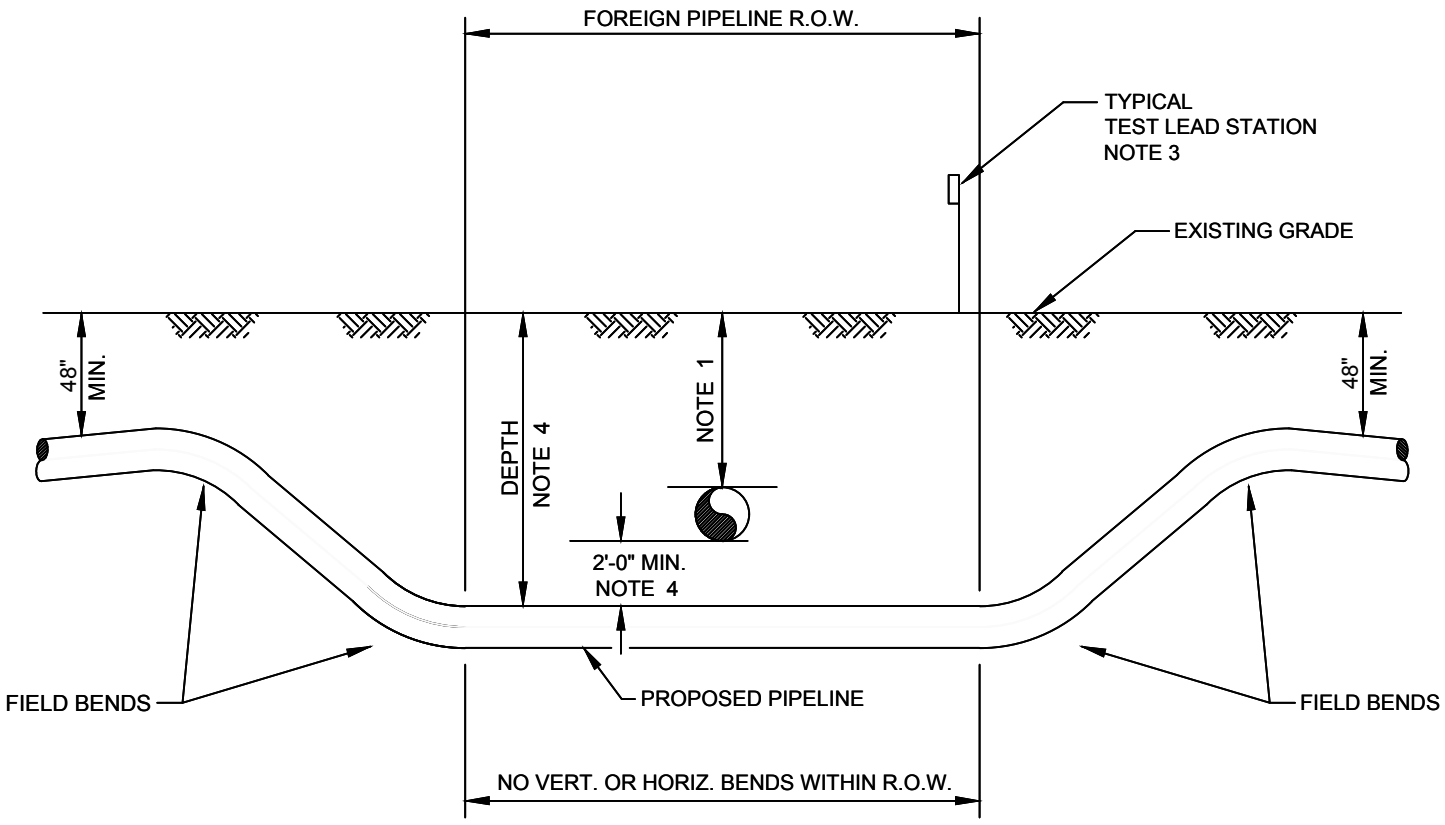
Denbury

Carbon Dioxide Transmission Pipeline

BORED ROAD CROSSING

CASS COUNTY NORTH DAKOTA

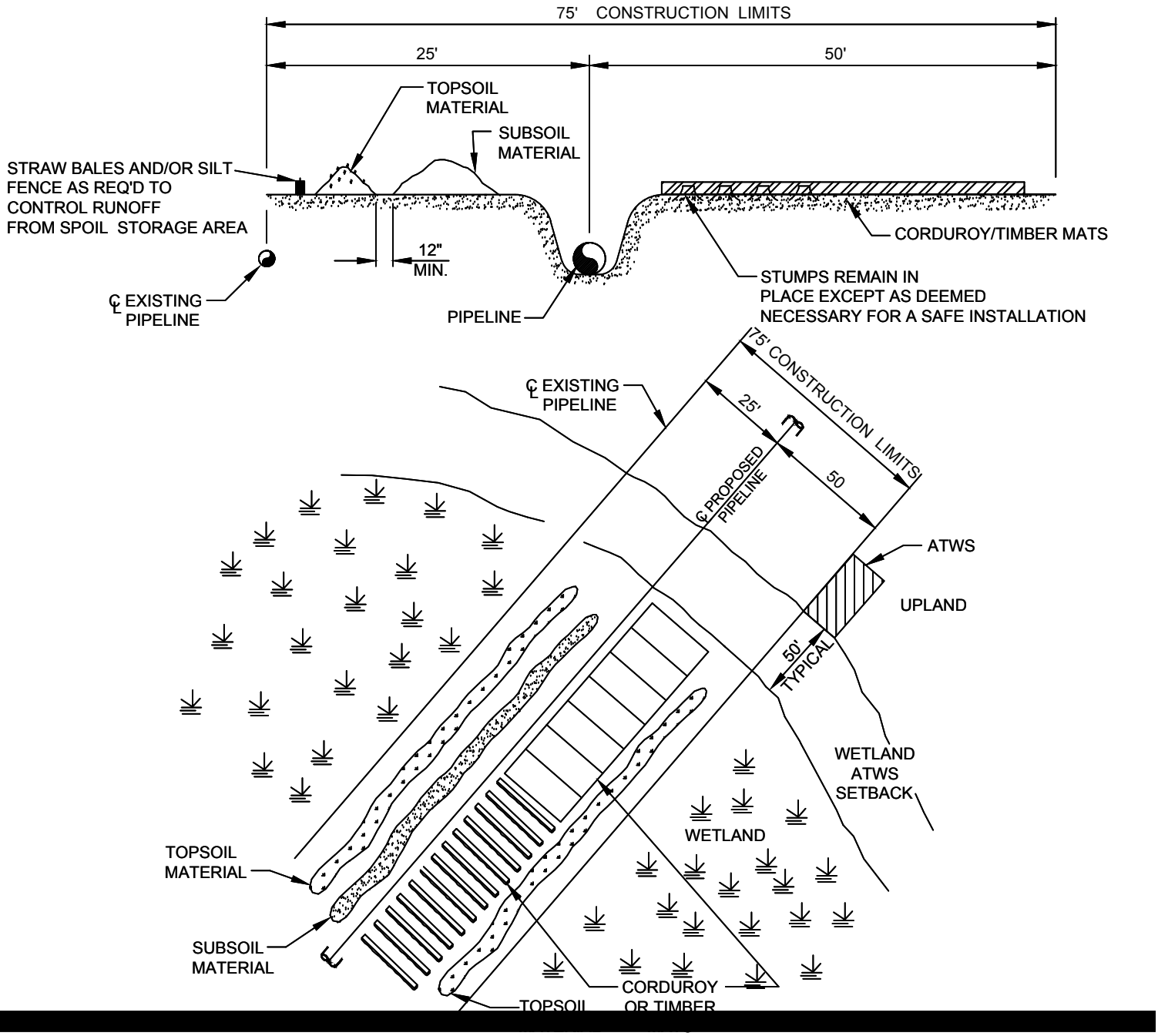
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CROSS SECTION OF FOREIGN P/L R.O.W.

NOTES:

1. FOREIGN PIPELINE LOCATIONS & DEPTHS TO BE DETERMINED BY ELECTRONIC MEANS IN ADVANCE OF PIPELINE CONSTRUCTION AND CONFIRMED BY CAREFULLY EXPOSING BY HAND DIGGING WITHIN 24" IN ANY DIRECTION FROM THE PIPELINE.
2. OWNER OF FOREIGN PIPELINE(S) SHALL BE NOTIFIED A MINIMUM OF 48 HOURS IN ADVANCE OF EXCAVATION OF CROSSING.
3. TEST LEAD STATION TO BE INSTALLED WHERE PRACTICAL AT THE NEAREST FENCE, HEDGE ROW OR FIELD EDGE, AND WHERE READILY ACCESSIBLE. INSTALL COMPANY-SUPPLIED PERMANENT REFERENCE CELL AND EXTEND CELL LEAD TO TEST LEAD STATION.
4. DEPTH OF PIPELINE INCLUDING 2'-0" MIN. CLEARANCE SHALL BE MAINTAINED FOR ALL FULL ANGULAR WIDTH OF FOREIGN PIPELINE R.O.W.
5. PROPOSED PIPELINE MAY CROSS ABOVE THE FOREIGN PIPELINE(S) ONLY WHERE REQUESTED BY OR APPROVED BY FOREIGN OWNER IN WRITING.



NOTES:

1. SEGREGATE TOPSOIL FROM THE AREA DISTURBED BY TRENCHING, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED OR FROZEN.
2. RE-SEED WITH ANNUAL RYEGRASS @ 40 LBS/ACRE (NOT TO EXCEED 48 LBS/ACRE) IN ALL AREAS WITHOUT STANDING WATER UNLESS ALTERNATIVES HAVE BEEN APPROVED BY MANAGING AGENCY.
3. NO FERTILIZER OR LIME SHALL BE USED.
4. INSTALL TRENCH PLUGS & WATERBAR ON BOTH SIDES OF WETLAND IF THE HYDROLOGICAL CONDITIONS WOULD DRAIN THE WETLAND.
5. DO NOT USE LIQUID MULCH BINDERS WITHIN 100' OF WETLANDS OR WATERBODIES.
6. IT IS ACCEPTABLE FOR E&S BMPS TO BE TEMPORARILY REMOVED FROM EQUIPMENT CROSSING PATHWAYS DURING PERIODS OF ACTIVE CONSTRUCTION IF THESE CONTROLS WILL BE PROPERLY REINSTALLED AT THE END OF EACH WORK DAY.
7. WETLAND MATS WILL BE PERMANENTLY REMOVED AFTER CLEAN UP/RESTORATION
8. MATS WILL BE 12' WIDE AND LENGTH IS DEPENDENT ON THE WETLAND CROSSING LENGTH FROM START TO END.

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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

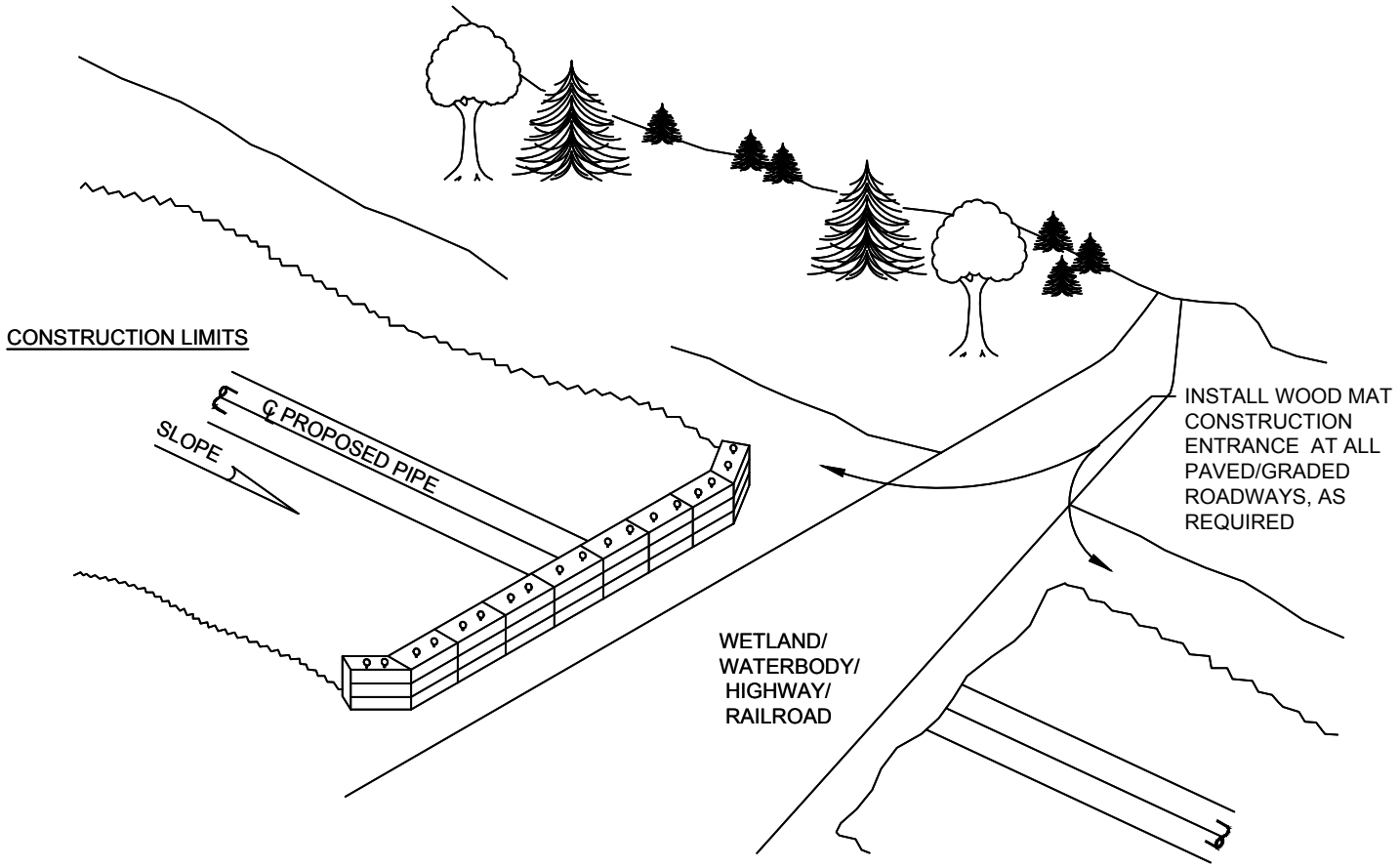
REVISIONS

Denbury

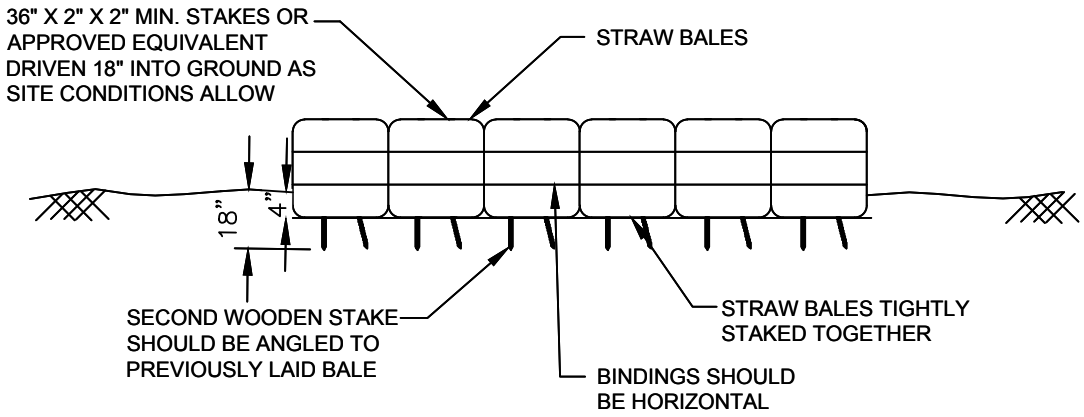
Carbon Dioxide Transmission Pipeline

TYPICAL WETLAND CONSTRUCTION

DATE: | PLOT DATE: | DRAWN BY: | LOC. NO: | DRAWING NUMBER: | SHEET NO: | REV:



FRONT VIEW



NOTES:

1. STRAW BALES TO BE EMBEDDED 4" MIN. INTO GROUND AS SITE CONDITIONS ALLOW.
2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE ABOVE GROUNDS HEIGHT OF THE BARRIER.
3. STRAW BALES REMOVED FOR ACCESS PURPOSES DURING THE DAY MUST BE REINSTALLED AFTER THE CONSTRUCTION ACTIVITY HAS PASSED THROUGH OR BY THE END OF THE DAY.
4. STRAW BALES SHOULD NOT BE USED FOR PROJECTS LASTING MORE THAN 3 MONTHS.
5. STAKES TO BE DRIVEN FLUSH WITH THE TOP OF THE BALE. BOTH ENDS OF THE BARRIER TO BE EXTENDED AT LEAST 8' UP SLOPE AT 45 DEGREES TO MAIN BARRIER ALIGNMENT.
6. STRAW BALE BARRIERS THAT ARE UNDERMINED OR TOPPED SHALL BE REPLACED WITH A ROCK FILTER OUTLET.
7. BALES WILL BE REMOVED WHEN PERMANENT STABILAZATION IS ACHIEVED.
8. COMPACTED BACKFILL WILL BE PLACED ON DISTURBED SIDE.

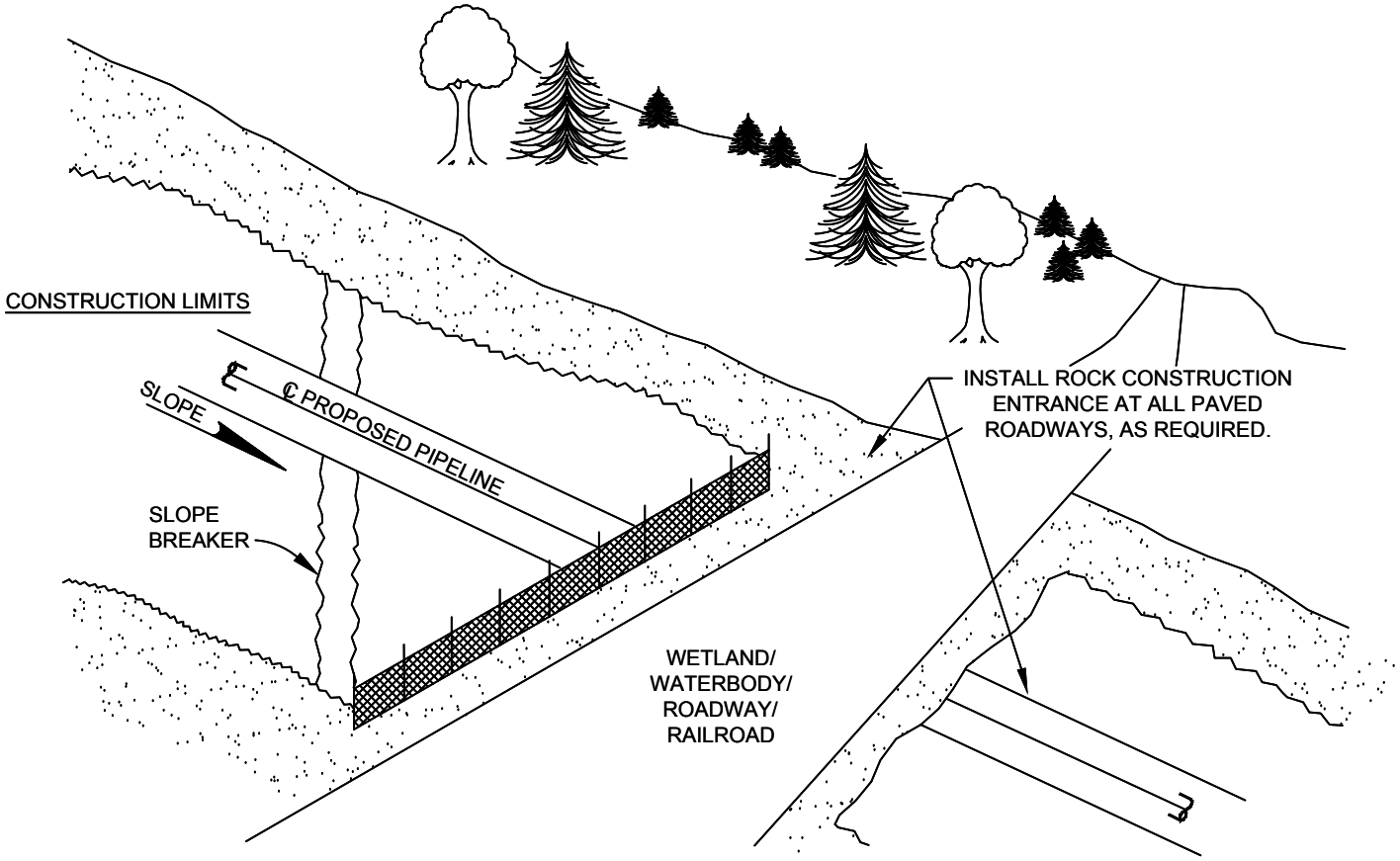
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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

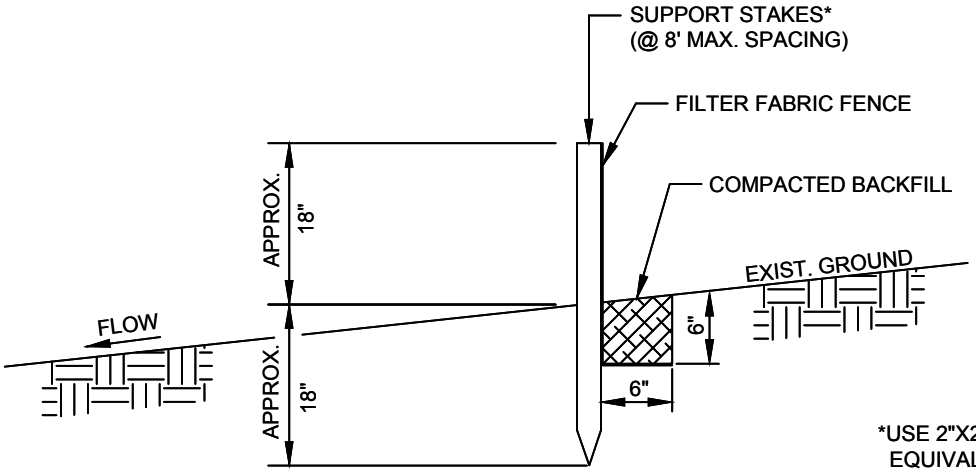
REVISIONS

TYPICAL STRAW BALE INSTALLATION

DATE: | PLOT DATE: | DRAWN BY: | LOC. NO: | DRAWING NUMBER: | SHEET NO: | REV:



NOTES:



*USE 2"X2" WOOD OR EQUIVALENT STEEL STAKES

PERMANENT STABILIZATION IS DEFINED AS MINIMUM, UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION.

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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

REVISIONS

TYPICAL STANDARD
18" SILT FENCE INSTALLATION
(SHEET 1 OF 2)

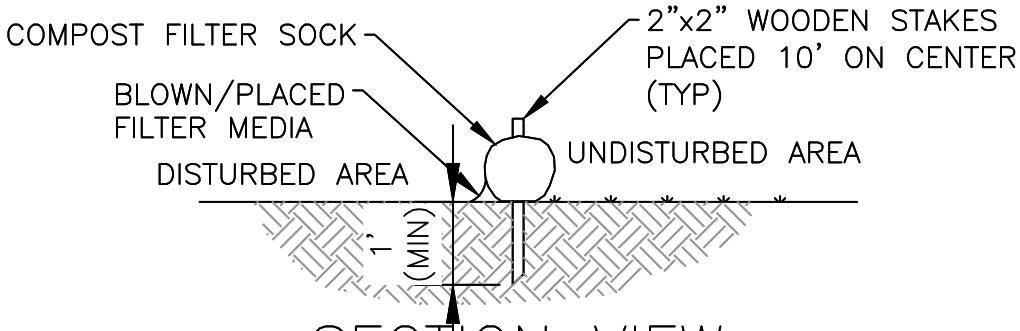
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NOTES:

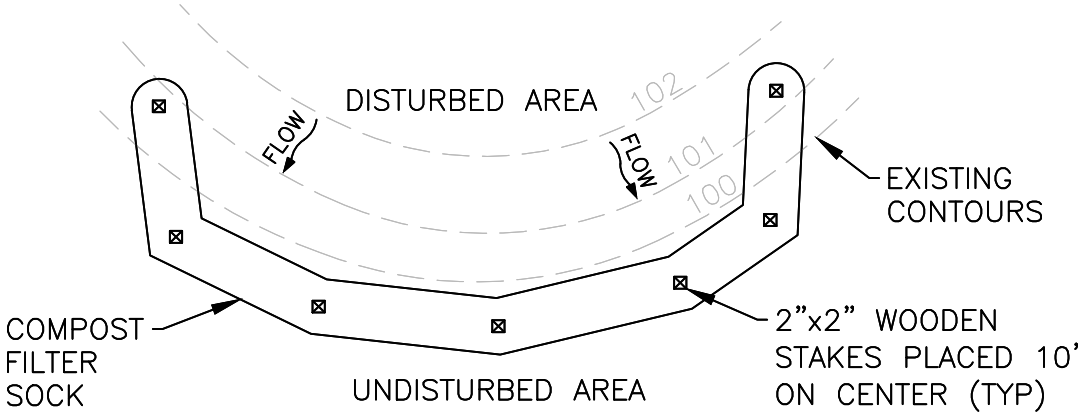
1. SILT FENCE MUST BE LEFT IN PLACE UNTIL PERMANENT STABILIZATION.
2. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE.
3. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
4. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET.
5. AT A MINIMUM, THE FABRIC SHOULD HAVE THE FOLLOWING PROPERTIES:

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (lb)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (lb)	200	ASTM D3786
TRAPEZOIDAL TEAR STRENGTH (lb)	50	
PUNCTURE STRENGTH (lb)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (gal/min/sf)	0.3	
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

6. SILT FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER WILL BE EXTENDED 8' UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.



SECTION VIEW



PLAN VIEW

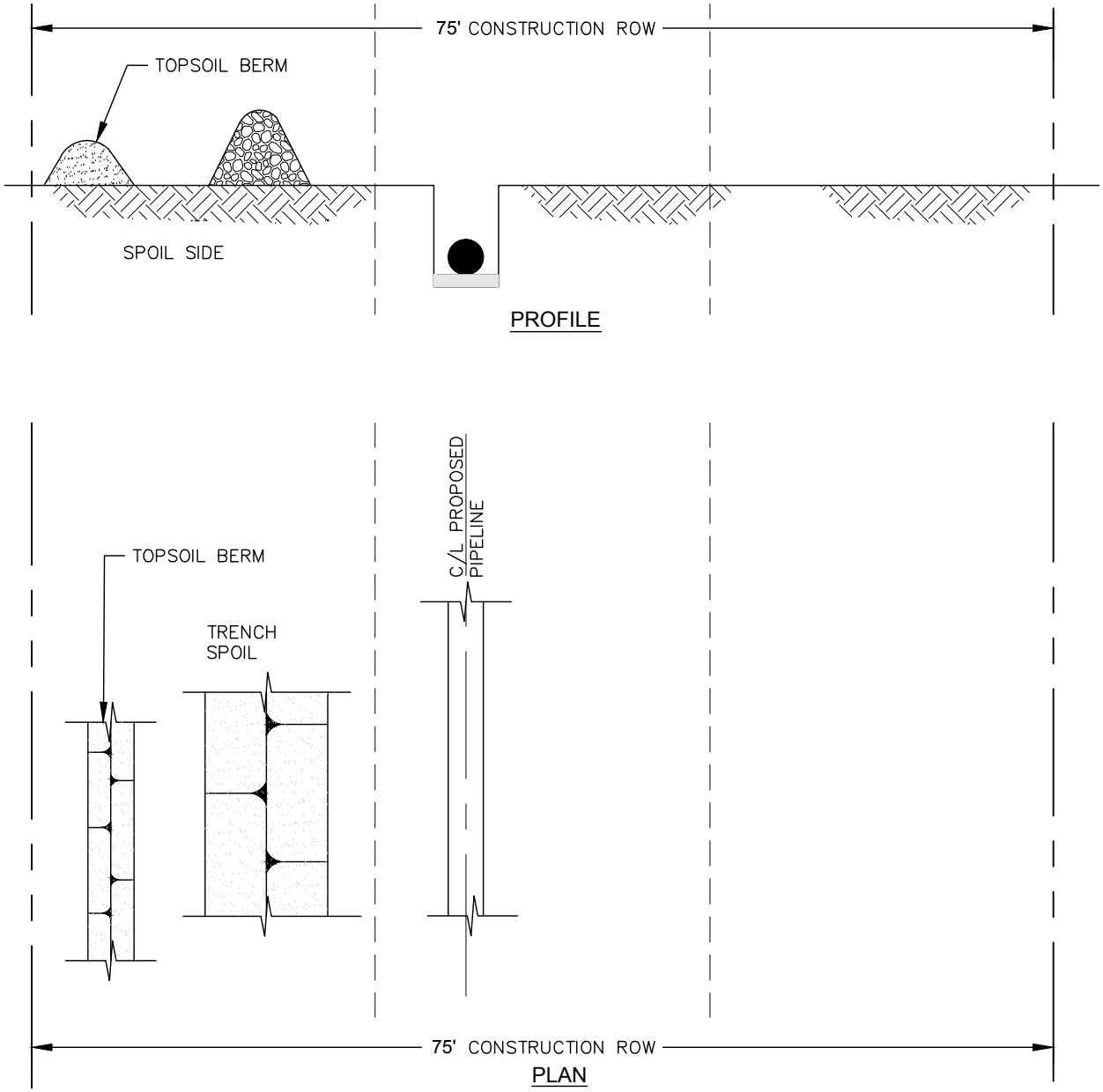
NOTES:

1. SOCK FABRIC AND COMPOST MATERIAL SHALL MEET ALL STATE STANDARDS.
2. COMPOST FILTER SOCK SHALL BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER SHALL BE EXTENDED AT LEAST 8 FEET UP SLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT. MAXIMUM SLOPE LENGTH ABOVE ANY BARRIER SHALL NOT EXCEED THAT SPECIFIED FOR THE SIZE OF THE SOCK AND THE SLOPE OF ITS TRIBUTARY AREA.
3. TRAFFIC SHALL NOT BE PERMITTED TO CROSS COMPOST FILTER SOCKS.
4. ACCUMULATED SEDIMENT SHALL BE REMOVED WHEN IT REACHES 1/2 THE ABOVE GROUND HEIGHT OF THE BARRIER AND DISPOSED IN THE MANNER DESCRIBED ELSEWHERE IN THE PLAN.
5. COMPOST FILTER SOCKS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT. DAMAGED SOCKS SHALL BE REPAIRED ACCORDING TO MANUFACTURER'S SPECIFICATIONS OR REPLACED WITHIN 24 HOURS OF INSPECTION.
6. BIO-DEGRADEABLE COMPOST FILTER SOCKS SHALL BE REPLACED AFTER 6 MONTHS; PHOTO-DEGRADEABLE SOCKS AFTER 1 YEARS. POLYPROPYLENE SOCKS SHALL BE REPLACED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
7. UPON STABILIZATION OF THE AREA TRIBUTARY TO THE SOCK, STAKES SHALL BE REMOVED. THE SOCK MAY BE LEFT IN PLACE AND VEGETATED OR REMOVED. IN THE LATTER CASE, THE MESH SHALL BE CUT OPEN AND THE MULCH SPREAD AS SOIL SUPPLEMENT.

COMPOST FILTER SOCK DETAIL

SCALE: NOT TO SCALE

ROW DETAILS



TYPICAL ROW–PLAN & PROFILE NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING AND CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

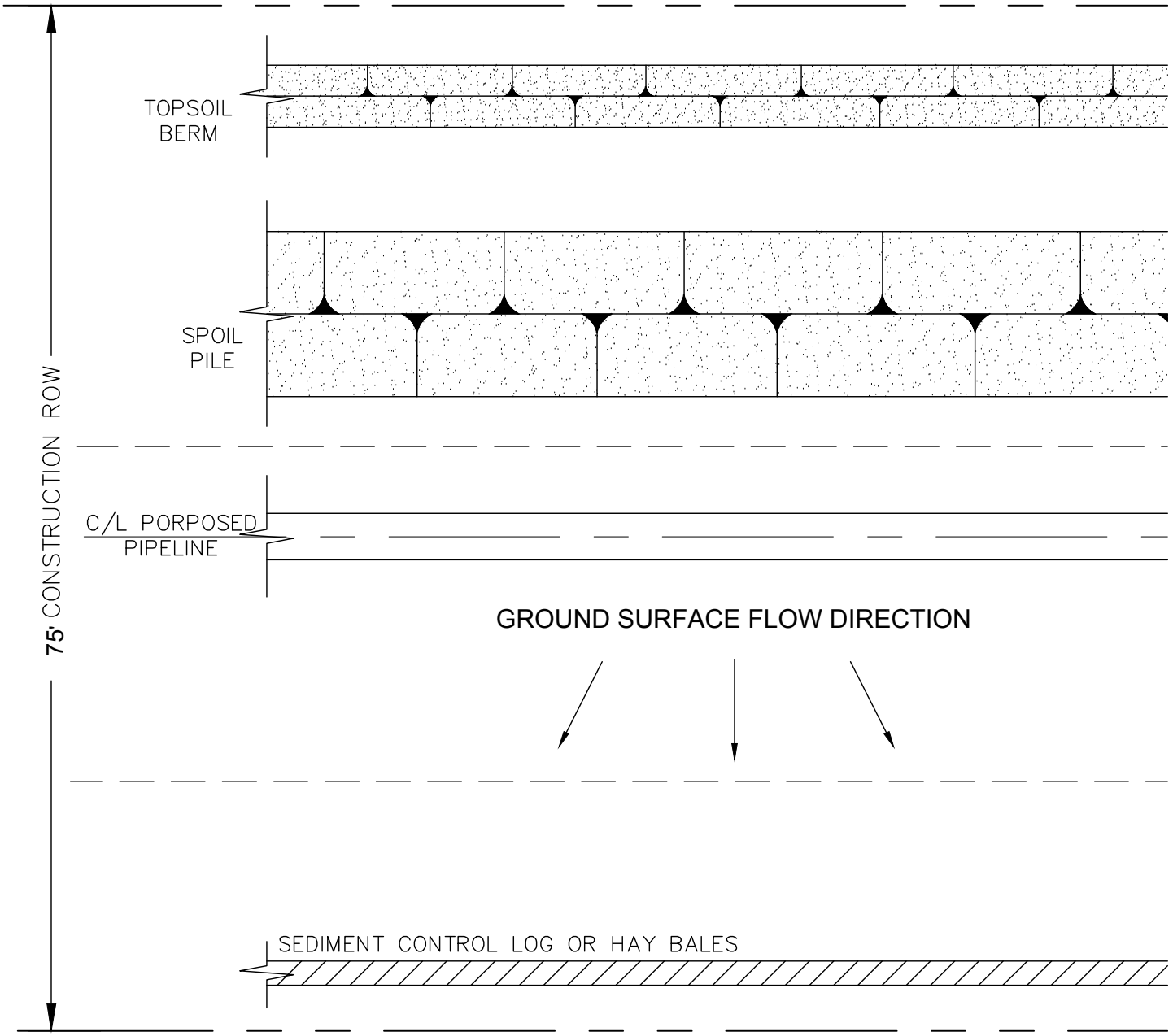
2. STOCKPILES SHOULD BE PLACED UP–GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

NOT TO SCALE

PROJECT NO:	TYPICAL ROW-PLAN & PROFILE VIEW	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				1 OF 6
DATE:				



TYPICAL ROW–PLAN & PROFILE NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING AND CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
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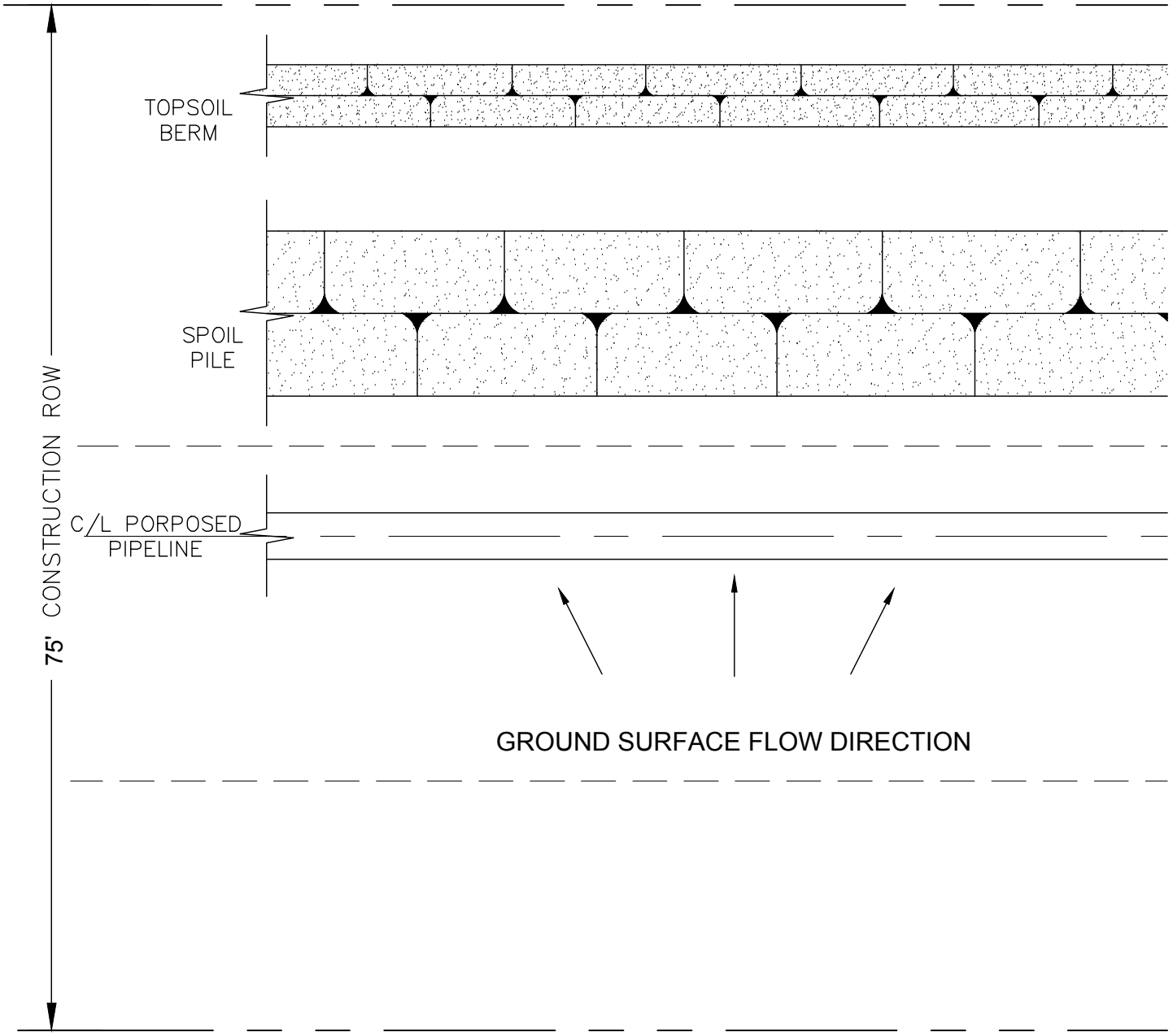
3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

NOTE:
TYPICAL BMP DETAIL FOR USE WHEN GROUND SURFACE FLOW DIRECTION IS DOWN–GRADIENT FROM PIPELINE TRENCH AND SOIL STOCKPILES

NOT TO SCALE

PROJECT NO:	TYPICAL BMP DURING CONSTRUCTION	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				2 OF 6
DATE:				



TYPICAL ROW–PLAN & PROFILE NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING AND CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

2. STOCKPILES SHOULD BE PLACED UP–GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

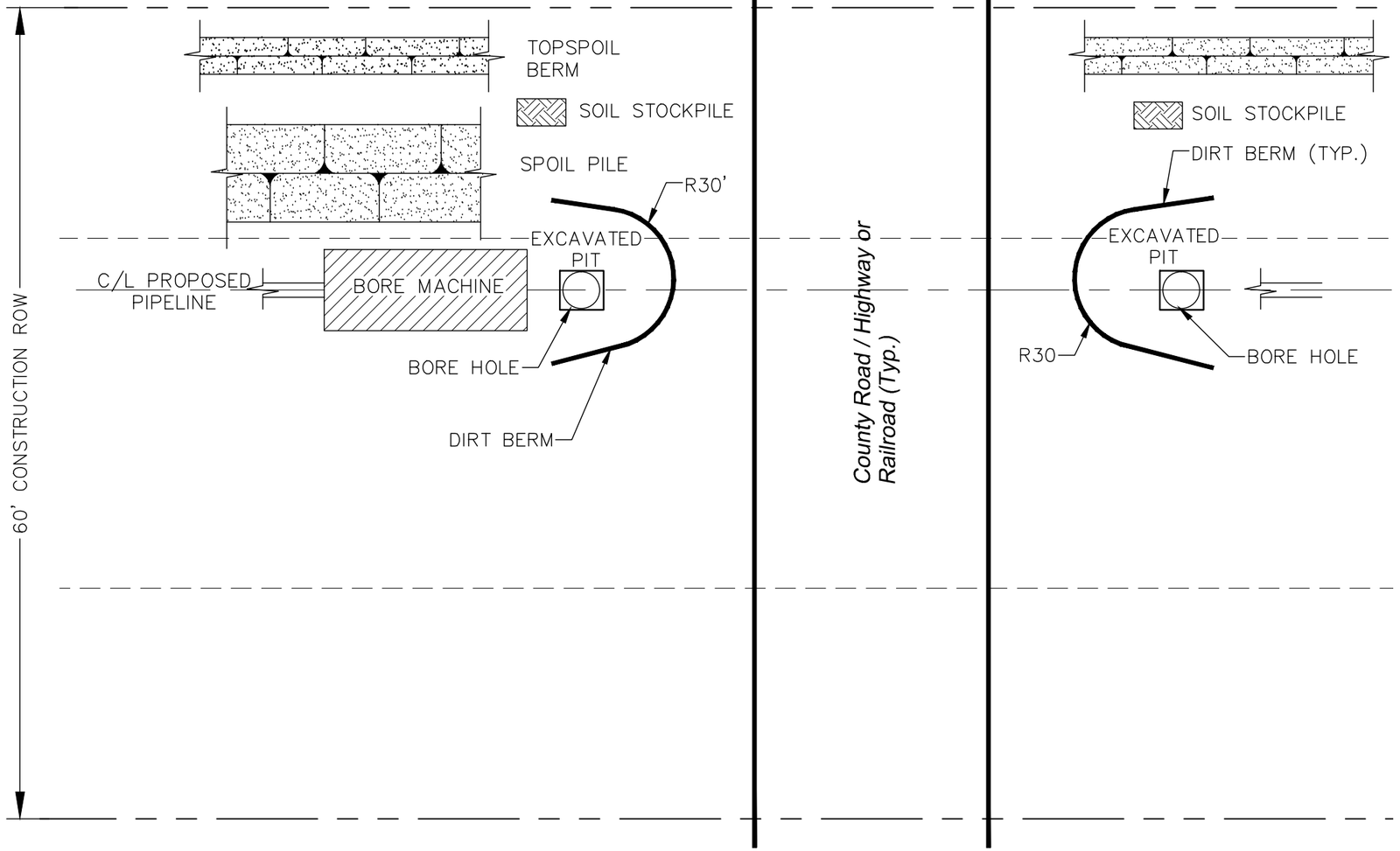
3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL / SCRAPED AS NEEDED.

NOTE:
TYPICAL BMP DETAIL FOR USE WHEN GROUND SURFACE FLOW DIRECTION IS TOWARDS THE PIPELINE TRENCH.

NOT TO SCALE

PROJECT NO:	TYPICAL BMP DURING CONSTRUCTION	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				3 OF 6
DATE:				



TYPICAL BMP FOR BORED ROAD CROSSING NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE USING HORIZONTAL DIRECT DRILLING TECHNIQUES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

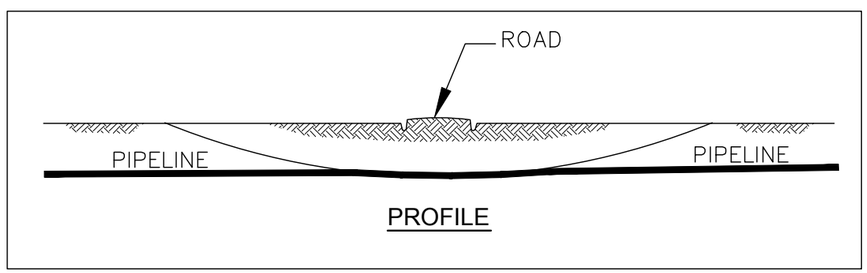
2. EXCAVATION PITS WILL REMAIN OPEN WITH PERIMETER ORANGE FENCING FOR THE DURATION OF THE BORING ACTIVITY.

3. STOCKPILES SHOULD BE PLACED UP-GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

4. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

5. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

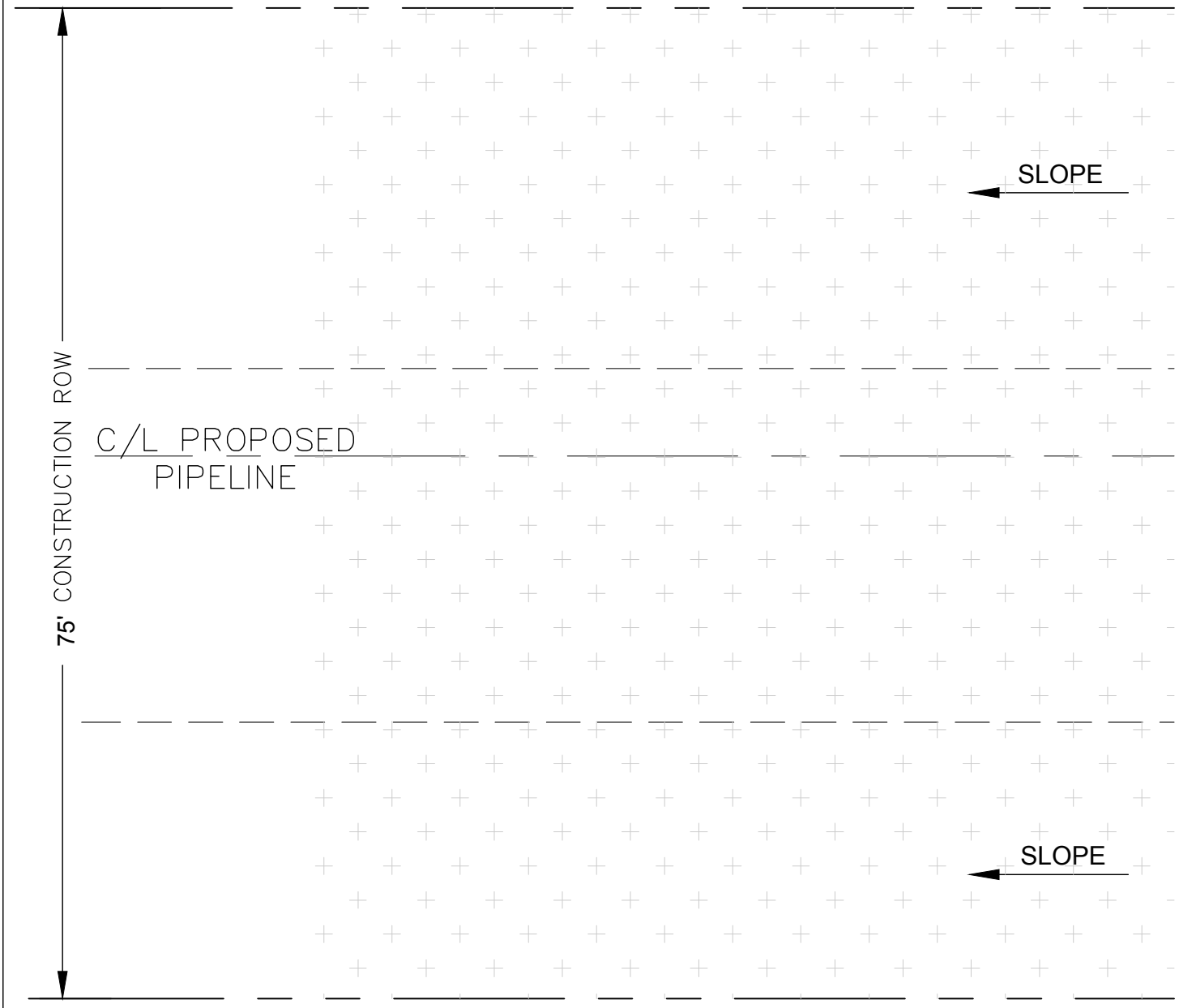
NOTE:
IF ROAD CROSSING IS PAVED, INSTALL VEHICLE STABILIZED CONSTRUCTION ENTRANCE BMP AT ACCESS POINTS TO PREVENT TRACKING OF DIRT/MUD ONTO PAVEMENT.



PROFILE

NOT TO SCALE

PROJECT NO:	TYPICAL BMP FOR BORED ROAD AND RAILROAD CROSSINGS	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	DETAIL
DRAWN BY:		116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	4 OF 6
DATE:			



TYPICAL BMP FOR POST CONSTRUCTION STABILIZATION NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

2. STOCKPILES SHOULD BE PLACED UP-GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

LEGEND

SEED AND MULCH WITH CRIMP STRAW

NOT TO SCALE

PROJECT NO:	TYPICAL BMP FOR POST-CONSTRUCTION STABILIZATION ON SLOPES OF 3:1 OR GREATER	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	DETAIL
DRAWN BY:		116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	5 OF 6
DATE:			

SURFACE ROUGHENING INSTALLATION NOTES

1. SURFACE ROUGHENING SHOULD BE PROVIDED ON ALL FINISHED GRADES.

2. DISTURBED SURFACES SHALL BE ROUGHENED USING TILLING EQUIPMENT.

SURFACE ROUGHENING MAINTENANCE NOTES

1. VEHICLES AND EQUIPMENT SHOULD BE CONFINED TO ACCESS DRIVES NEAR THE EDGE OF THE RIGHT-OF-WAY AND NOT DRIVE OVER AREAS THAT HAVE BEEN SURFACE ROUGHENED.



SURFACE ROUGHENING

NOT TO SCALE

PROJECT NO:	SURFACE ROUGHENING	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				6 OF 6
DATE:				

ENGINEERING DRAWINGS

APPENDIX B
Environmental Mitigation Plan

Carbon Dioxide Transmission Pipeline

Environmental Mitigation Plan

ND PSC Case No. PU-xx-xxx

July 2019

TABLE OF CONTENTS

Description			Page
1.0		INTRODUCTION	1
2.0		GENERAL MITIGATION MEASURES	1
	2.1	Contractor	1
	2.2	Line List and Permits	1
	2.3	Third-party Inspector	1
	2.4	Rights-Of-Way	2
	2.5	Dust Control	2
	2.6	Undesirable Species Control	2
	2.7	Non-Hazardous Wastes	3
	2.8	Hazardous Wastes	3
	2.9	Burning and Fire Prevention	3
	2.10	Wet Weather	4
3.0		SPILL PREVENTION	4
	3.1	General	4
	3.2	Storage	4
	3.3	Refueling	4
	3.4	Cleanup and Emergency Notification	5
4.0		TEMPORARY EROSION AND SEDIMENT CONTROL	5
	4.1	General	5
	4.2	Sediment Barriers	5
	4.3	Temporary Slope Breakers	6
	4.4	Temporary Mulching	6
5.0		HIGHWAY, ROAD, AND RAILROAD CROSSINGS	7
6.0		UPLANDS	7
	6.1	Clearing	7
	6.2	Grading	7
	6.3	Topsoil Removal and Storage	7
	6.4	Tree and Shrub Mitigation	7
	6.5	Trenching	8
	6.6	Pipe Preparation and Installation	9
	6.7	Backfilling	9

6.8 Cleanup 9
6.9 Permanent Erosion and Sediment Control 10
6.9.1 Permanent Slope Breakers 10
6.10 Reclamation and Revegetation 10
6.10.1 Soil Compaction 10
6.10.2 Rock Removal 11
6.10.3 Seeding and Mulching 11
6.10.4 Fences 12
6.10.5 Right-of-Way and Pipeline Markers 12
7.0 WETLAND CROSSINGS 13
7.1 General 13
7.2 Easement and Workspace 13
7.3 Wetland Crossing Methods 13
7.3.1 General Mitigation Procedures 13
7.3.2 Dry Wetland Crossing Method 14
7.3.3 Standard Wetland Crossing Method 15
7.4 Restoration and Reclamation 15
8.0 WATERBODIES AND RIPARIAN AREAS 16
8.1 General 16
8.2 Easement and Work Space 16
8.3 Waterbody Crossing Methods 16
8.3.1 Horizontal Directional Drill Crossing 16
8.3.2 Boring Crossing Method 17
9.0 HYDROSTATIC TESTING 17
9.1 General 17
9.2 Test Water Source 17
9.3 Water Discharge 18

Appendix A: Construction Schematics
Appendix B: Frac-out Contingency Plan

1.0 INTRODUCTION

Denbury Green Pipeline-Montana, LLC (Denbury) proposes to construct the Carbon Dioxide Transmission Pipeline project (Project) that will consist of a 12-inch diameter, approximately 17.77-mile-long welded steel pipeline to transport carbon dioxide from a pipeline source in Fallon County, Montana to Denbury's Cedar Hills South Unit oil production wells in Bowman County, North Dakota. Approximately 6.25 miles of the pipeline will be in Fallon County, Montana and the remaining 11.52 miles will be in Slope and Bowman Counties, North Dakota.

This EMP outlines general construction-related mitigation measures that will be implemented by Denbury and its construction contractor (Contractor) during construction of the Carbon Dioxide Transmission Pipeline project. Specific conditions associated with agency permits are not specifically addressed herein.

This EMP has been developed to meet or exceed applicable industry standards and regulatory requirements. Guidance documents used in the preparation of this EMP include North Dakota's Guide to Temporary Erosion-Control Measures for Contractors, Designers, and Inspectors (2001), U.S. Bureau of Reclamation Engineering and O&M Guidelines for Crossings (2008), and several USACE regional conditions for projects operating under Nationwide Permits in North Dakota.

The Carbon Dioxide Transmission Pipeline will cross the Little Beaver Creek and its intermittent tributaries. Denbury proposes to cross these features using horizontal directional drilling (HDD). Little Beaver Creek is considered jurisdictional waters under the Clean Water Act and if those waters will be impacted by construction activities, Denbury will conduct such construction under the U.S. Army Corps of Engineers (USACE) Nationwide Permit 12 (NWP 12). Specific details of the HDD borings are not included in this EMP. Denbury will coordinate with the local water resources district for crossing irrigation canals, ditches, and/or drains along the ROW.

If irrigation canals and ditches are dry (i.e., inactive), Denbury proposes to trench through them and repair/reconstruct them immediately after pipeline placement. If the canals and ditches are water-filled (i.e., active), Denbury proposes to bore under those features using HDD technology. Site-specific details for the HDD borings and the trenching crossings are not included in this EMP.

2.0 GENERAL MITIGATION MEASURES

2.1 Contractor

Denbury will make the requirements of this EMP and applicable environmental permits a contractual obligation for the Contractor. The Contractor will ensure that persons engaged in construction of the Carbon Dioxide Transmission Pipeline are informed of these construction requirements.

2.2 Line List and Permits

Denbury will provide the Contractor with a construction list that describes special requirements, as agreed upon with private landowners and as required through agency permitting processes (e.g., stream crossing, section line, and road crossing permits).

2.3 Third-party Inspector

Denbury will provide construction oversight to confirm Contractor compliance with the measures of this EMP and any landowner agreements as well as applicable federal, state, and local environmental permits. Denbury will have third-party environmental inspectors (EIs) for each portion construction segment who are knowledgeable of the environmental mitigation requirements for this project. The third-party inspector will have the authority to stop construction activities and order corrective mitigation for actions that are not in compliance with this EMP, any landowner agreements, or environmental permit requirements. The third-party inspectors will maintain appropriate records to document compliance with these and other applicable environmental permit conditions. At the end of each week, the third-party inspector will summarize daily reports into a weekly report that will be submitted to Denbury and the North Dakota Public Service Commission (NDPSC).

2.4 Rights-Of-Way

Access to the pipeline construction right-of-way will be from public roadways and private landowner-approved access roads. The Contractor will mark access routes with signs to clearly identify approved access roads.

All construction equipment and vehicles will be confined to approved access roads, the permitted pipeline construction right-of-way, and additional temporary workspaces.

2.5 Dust Control

Dust control related to construction activities will be accomplished through administrative and physical means.

All construction-related vehicles will adhere to posted speed limits on public roadways and as designated in landowner agreements on private lands. Work hours near residential areas may be limited.

The Contractor may use multiple methods to wet the right-of-way to control airborne dust, including water trucks and sprinklers, or additional appropriate measures, such as chemical application and/or reduced speed limits, based on site-specific conditions.

2.6 Undesirable Species Control

Denbury will require that all construction-related equipment be thoroughly cleaned prior to moving the equipment to the job site to limit the potential for the spread of noxious weeds, insects and soil-borne pests. All equipment will be cleaned with high-pressure washing equipment.

Denbury or its agents will perform a noxious weed survey prior to construction. If a noxious weed species is present within the construction right-of-way, the extent of infestation areas will be clearly demarcated in the field with flagging or staking prior to clearing and grubbing operations so that the infestation area can be segregated and the vegetative materials destroyed or removed prior to reclamation of the right-of-way.

During construction, the Contractor will clean the surface area of all vehicles and construction machinery, including the undercarriage, to remove excess soil and

vegetative debris, if that equipment is known to have passed through a weed or soil-borne pest infested area.

Only certified weed free vegetative components (e.g., mulch, straw/hay bales, seed mixes) will be used on the project.

2.7 Non-Hazardous Wastes

The Contractor will handle and dispose of human wastes by use of portable, self-contained chemical toilets. Wastes from these units will be collected by a licensed contractor for disposal only at licensed and approved facilities.

The Contractor will remove all trash from the construction right-of-way on a daily basis unless otherwise approved or directed by Denbury.

The Contractor will dispose of horizontal directional drilling (HDD) cuttings and drilling mud at an approved landfill or disposal area located off of the right-of-way.

2.8 Hazardous Wastes

The Contractor will ensure that all hazardous and potentially hazardous materials are transported, stored, and handled in accordance with all applicable regulations. Workers exposed to or required to handle hazardous materials will have received proper training in use of those materials, in accordance with the applicable regulations and the manufacturer's recommendations.

The Contractor will dispose of all hazardous materials at licensed waste disposal facilities.

If toxic or hazardous waste materials or containers are encountered during construction, the Contractor will stop work immediately and notify Denbury. The Contractor will not restart work until clearance is granted by Denbury.

2.9 Burning and Fire Prevention

The Contractor will comply with all federal, state, county, and local fire regulations regarding prevention of uncontrolled fires.

The Contractor will maintain a contact list and information of jurisdictional fire authorities. Fire control equipment, including water and chemical fire extinguishers, will be available at construction sites and construction personnel will be properly trained in the use of such equipment.

Flammable materials kept on a construction site will be stored in approved containers away from ignition sources. All flammable wastes will be removed from construction sites on a regular basis.

Smoking will be prohibited at construction sites, except in designated areas away from flammable materials.

2.10 Wet Weather

Denbury plans on stripping topsoil from all work areas to avoid mixing of topsoil and subsoil. However, if wet weather conditions exist, construciton activities may be suspended by the Environmnetal Inspector based on the following conditions:

- type of equipment and nature of construction activity planned for that day;
- potential that rutting may cause mixing of topsoil with subsoil layers;
- extent of surface ponding; and
- the potential for excessive soil compaction.

If these conditions cannot be appropriately mitigated through equipment rerouting or the use of construction mats, then construction work will be suspended until adequate protection measures, approved by the NDPSC are taken to avoid irreparable damage to roads or land.

3.0 SPILL PREVENTION

3.1 General

The Contractor will ensure that all equipment is free of leaks prior to use on the construction right-of-way and access roads. Throughout the period of construction, the Contractor will conduct regular maintenance and inspections of the equipment to reduce the potential for spills or leaks.

All equipment parked overnight will be at least 100 feet from a watercourse or wetland, unless otherwise approved by the Environmental Inspector (EI).

Stationary equipment will be placed within a secondary containment if it will be operated or require refueling within 100 feet of a wetland or waterbody boundary.

3.2 Storage

Fuels and lubricants will be stored only at designated staging areas. Storage of fuel and lubricants will be at least 100 feet away from the edge of any perennial watercourse, wetland, storm drain, or any identified environmentally sensitive area.

No bulk fuel or storage tanks will be placed in the construction right-of-way. Bulk fuel storage at temporary work or construction staging areas will be located in a secondary containment structure with sufficient capacity to capture spills or leaks during filling and/or dispensing activities.

3.3 Refueling

Refueling and lubrication of equipment will be restricted to upland areas at least 100 feet away from any perennial watercourse, wetland, storm drain, or any environmentally sensitive area, except where equipment is required to be within 100 feet of a waterbody (e.g., trench dewatering pump).

Rubber-tired vehicles (e.g., pickup trucks) normally will refuel at the construction staging areas or commercial gas stations. Tracked machinery (e.g., backhoes, bulldozers) will be refueled and lubricated on the construction right-of-way. Equipment maintenance will

be conducted in staging areas when practical. When necessary and with EI approval, equipment repairs may be made on the construction right-of-way.

Each fuel truck that transports and dispenses fuel to construction equipment or project vehicles along the construction right-of-way or within equipment staging areas will carry oil spill response equipment and materials onboard at all times. Truck drivers and construction crew personnel will be trained on proper use of this equipment and materials.

3.4 Cleanup and Emergency Notification

Construction activities will be conducted to allow for prompt and effective cleanup of spills of fuel and other hazardous materials. Each construction crew will have sufficient tools and material to stop leaks and supplies of absorbent and barrier materials to allow rapid containment and recovery of spilled materials. Crew members must know and follow the procedure for reporting spills.

Emergency notification procedures between the Contractor and Denbury will be established in the planning stages of construction. In the event of a spill meeting agency reporting criteria, the Contractor will immediately notify Denbury who will then promptly notify the appropriate regulatory agency.

4.0 TEMPORARY EROSION AND SEDIMENT CONTROL

4.1 General

Temporary erosion and sediment control measures will be installed as detailed in the Stormwater Pollution Prevention Plan (SWPPP) for this project prior to initial disturbance of the soil, maintained throughout construction, and reinstalled as necessary until replaced by permanent erosion control structures or restoration of the construction right-of-way is complete.

The Contractor will inspect all temporary erosion control measures within 24 hours of each significant rainfall event of 0.25 inches or greater. The Contractor will repair or replace all ineffective temporary erosion control measures as expediently as practicable, but prior to the next rainfall event.

4.2 Sediment Barriers

Sediment barriers will be constructed of silt fence, staked hay or straw bales, fiber rolls, compacted earth (e.g., drivable berms across travel lanes), sand bags, or other appropriate materials.

Sediment barriers will be installed below disturbed areas where there is the potential for offsite sedimentation. Areas where temporary sediment barriers will be placed include: the base of sloped approaches to roadways, flowing streams, and wetlands; along the edge of the construction right-of-way, as needed to prevent downslope siltation of adjacent waterbodies and wetlands; and, along trench or test water discharge locations, as required.

Sections of temporary sediment barriers may be designed to allow passage of construction equipment. Sediment barriers will be reinstalled to their original specifications when equipment passage is no longer required, heavy precipitation is imminent, or at the end of the work day, whichever is sooner.

The Contractor will maintain hay or straw bale/wattle and silt fence sediment barriers by removing collected sediment when it reaches one-half the height of the barrier and replacing the damaged control. If bale filters cannot be replaced due to access problems, the Contractor will place a new row of sediment barriers upslope.

The Contractor will use hay or straw bales that are free of noxious weeds.

The Contractor will remove sediment barriers, except those needed for permanent erosion and sediment control, during cleanup of the construction right-of-way.

4.3 Temporary Slope Breakers

Temporary slope breakers will be installed to minimize concentrated or sheet flow runoff in disturbed areas at the following recommended spacing:

Slope (%)	Spacing (feet)
1	300
2	200
3-5	150
>5	100

Temporary slope breakers will be constructed of earthen material, silt fence, staked hay or straw bales, fiber rolls, sand bags, or similar materials.

When earthen berms are constructed, they will be constructed of subsoil material, when practical, and have a two to eight percent slope with a 4-foot base and 1.5-foot height, or as site conditions require.

Temporary slope breakers will direct outfall to a stable, well-vegetated area or an appropriate energy-dissipating device (e.g., silt fence, hay or straw bales/wattles) at the end of the slope breaker and off the construction right-of-way. The outfall of each temporary slope breaker will be installed to prevent sediment discharge into wetlands, waterbodies, or other sensitive resources.

A hard plug will be left in place where a slope breaker crosses an open trench.

Temporary slope breakers will not be installed on cultivated land except by landowner request.

4.4 Temporary Mulching

If a disturbed construction work area is inactive for one month or is expected to be inactive for one month or more, the Contractor will apply temporary seed and/or mulch to reduce risk of erosion. The Contractor will not apply temporary mulch in cultivated areas unless specifically requested by the landowner. The Contractor will not apply mulch within wetland boundaries.

Temporary mulch of straw or equivalent applied on slopes will be spread uniformly to cover at least 75 percent of the ground surface at an approximate rate of 2 tons per acre of straw

or its equivalent. Mulch application on slopes within 100 feet of waterbodies and wetlands will be increased to an approximate rate of 3 tons per acre.

5.0 HIGHWAY, ROAD, AND RAILROAD CROSSINGS

Construction across paved roads, highways, and railroads will be in accordance with the requirements of the road and railroad crossing permits and approvals obtained by Denbury. All graded roads will be bored. The Contractor will take measures, such as posting informational signs along the routes being bored to ensure traffic safety.

6.0 UPLANDS

6.1 Clearing

The initial stage of construction will involve clearing the construction right-of-way to allow for a safe operating environment. Clearing of trees, brush, and other vegetation from the right-of-way may be accomplished with hand-held chainsaws, brush hogs, hydraulic tree-cutting equipment, bull dozers, or other equipment designed for that purpose. Woody material will be chipped or mulched onsite or hauled off to an appropriate disposal location, or as otherwise directed by the landowner. No burning will be conducted as part of this project.

6.2 Grading

After clearing, the construction right-of-way will be graded to develop a right-of-way that allows for a safe working surface for equipment and pipeline fabrication and bending requirements. All work will be conducted in accordance with applicable permits, regulations, or guidelines. All grading will be undertaken with the understanding that original contours and drainage patterns will be re-established to the extent practicable.

6.3 Topsoil Removal and Storage

Measures will be taken to preserve the physical and chemical property integrity of topsoil so it may be used during final reclamation of the construction right-of-way. Generally, these measures will segregate the topsoil from underlying subsoil layers to prevent mixing during construction and to allow for easy retrieval during reclamation. Topsoil will not be used for construction of earthen berms, trench breakers, to fill low areas, or to backfill the trench.

Topsoil, to a maximum depth of 12 inches or topsoil to the depth of cultivation, whichever is greater will be stripped. Stripped topsoil will be stockpiled in a windrow along the edge of the right-of-way. After backfilling is completed, excess subsoil must be placed over the excavation area and blending the grade to the existing topography. Topsoil is replaced to the area of excavation after the subsoil is replaced.

6.4 Tree and Shrub Mitigation

Denbury will address mitigation, reclamation and remediation measures with individual landowners and comply with any applicable state requirements, including the NDPSC's Tree and Shrub Mitigation Specifications.

Denbury will inventory all trees and shrubs anticipated to be cleared, including those that are considered invasive species or noxious weeds (e.g., *Caragana arborescens*

[Siberian Peashrub]; *Elaeagnus angustifolia* [Russian olive]; *Rhamnus cathartica* [buckthorn]; *Tamarix chinensis*], *T. parviflora*, and *T. ramosissima* [saltcedar]; and, *Ulmus pumila* [Siberian elm]) before cutting. The inventory will record the location, number, and species of trees and shrubs. Two 2-year-old saplings will be planted for every one tree removed. Two shrubs (stem cuttings) will be planted for every one shrub removed.

Except in the case of invasive or noxious species, trees and shrubs will be replaced by the same species or similar species, suitable for North Dakota growing conditions, as recommended by the North Dakota Forest Service. Invasive or noxious species will be replaced by similar non-invasive or non-noxious species suitable for North Dakota growing conditions as recommended by the North Dakota Forest Service.

Tree and shrub replacement will not be conducted within a 20- to 30-foot wide path over the pipeline to facilitate visual inspections of the right-of-way in accordance with U.S. Department of Transportation safety regulations.

Landowners will be given the option of having replacement trees and shrubs planted on the landowner's property, either on or off the right-of-way, but not directly over top of the pipeline itself. The landowner will also be given the opportunity to waive those options, in writing, to have replacement trees and shrubs planted off the landowner's property.

6.5 Trenching

Trenching in uplands is typically accomplished with a backhoe excavator or a rotary wheel ditching machine to provide a ditch of sufficient depth and width, with a bottom to continuously support the pipeline. The trench will be excavated to a depth that will enable the pipeline to be installed in accordance with the NDPSC requirements (i.e. 48 inches in rangeland, 48 inches in cultivated land, 48 inches at the bottom of the ditch for road crossings, and 72 inches across undeveloped section lines) and in accordance with applicable U.S. Department of Transportation regulations. If an increased pipeline depth is requested by a state-level agency, modifications to additional temporary workspace may be necessary to accommodate the increased amount of trench spoil.

Excavated material will be sidecast within the construction right-of-way with consideration for topsoil segregation, as noted in Section 6.3. Excavated material will be stored in a manner to minimize erosion and sedimentation.

Gaps will be left in the right-of-way lateral spoil piles that coincide with breaks in the strung pipe to facilitate natural drainage patterns and to allow the passage of livestock or wildlife.

Trenching operations will be followed as closely as practicable by lower-in and backfill operations to minimize the length of time the ditch is open.

When pumping captured stormwater from the trench, the Contractor will ensure that adequate pumping capacity and sufficient hose is available. The discharge of pumped water will be through filter bags or other method detailed in the SWPPP and in accordance with the environmental mitigation measures outlined throughout this EMP. If shallow groundwater is encountered during trenching that requires more extensive dewatering, a separate dewatering discharge permit will be obtained.

If drain tile is encountered during construction, the Contractor will repair and/or replace

the drain tile. Additionally, if any culverts are disturbed during construction the Contractor will repair and/or replace the culverts.

6.6 Pipe Preparation and Installation

Prior to lowering into the trench, pipe section ends are beveled to prepare them for welding. This process produces shavings which will be removed, to the extent practicable, immediately following beveling. Sections are then welded together to form a continuous pipe.

The pipe may be wrapped with a protective shielding (e.g., epoxy, urethane epoxy) to protect the pipe coating during backfilling. This process is typically completed prior to pipeline delivery to the right-of-way, except for a 3- to 6-inch section at each end to prevent the coating from interfering with the welding process. This bare section of pipe will be coated with a two-part epoxy liquid coating that will be brush applied. Any residual material from this coating process will be disposed of in accordance with measures outlined in Section 2.8.

Prior to lowering into the trench, the coated and welded pipeline will be inspected to ensure it is free of defects.

6.7 Backfilling

The subsoil excavated during the trenching process is initially used to backfill the trench. Prior to backfilling, the trench will be dewatered and trench breakers (soft plugs) installed on slopes where necessary to minimize the potential for water movement and erosion of the trench after the trench is backfilled. Trench breakers will be constructed of materials such as sand bags, sand/cement bags, bentonite bags, or other suitable materials. Topsoil will not be used to construct trench breakers.

Stormwater accumulated in the trench will be removed and discharged in accordance with the SWPPP and the environmental mitigation measures outlined throughout this EMP.

Backfill will be comprised of soil material excavated from the trench. If rocky conditions, as determined by the Denbury inspector, are encountered so that the backfill will contain rocks that could cause damage to the pipeline or the pipeline coatings, the pipe will be shielded or padded with an approved material for at least 6 inches above the pipeline before any rock is introduced back into the ditch.

The lesser of 4 feet or the actual depth of topsoil cover, will not be backfilled with soil containing rocks of any greater concentration or size than existed prior to pipeline construction in the pipeline trench, bore pits, or other excavations.

To reduce the potential for ditch line subsidence, spoil will be replaced and compacted by backhoe bucket or roller or by the wheels or tracks of equipment traversing down the trench.

6.8 Cleanup

Cleanup activities to restore the right-of-way and other disturbed areas to the approximate pre-construction conditions will be conducted immediately following backfilling operations, as weather conditions permit.

All non-hazardous and hazardous materials will be disposed of in accordance with measures outlined in Section 2.7 and Section 2.8.

The right-of-way will be re-contoured with spoil material to approximate pre-construction contours and surface drainage patterns. Loading of slopes with unconsolidated spoil material will be avoided during slope re-contouring. Topsoil will be replaced after re-contouring of the grade with subsoil. The topsoil will be replaced on the subsoil storage area and over the trench so that after settling occurs, the topsoil's approximate original depth and contour (with an allowance for settling) will be achieved. Subsoil will not be placed on top of topsoil.

Temporary sediment barriers will be removed and accumulated sediment will be re-contoured with the rest of the right-of-way. As needed, permanent erosion controls will be installed.

6.9 Permanent Erosion and Sediment Control

After final grading and contouring of upland areas, sloped areas will be stabilized with permanent erosion control structures.

6.9.1 Permanent Slope Breakers

Permanent slope breakers (e.g., diversion berms/ditches and level spreaders) will be installed to minimize concentrated or sheet flow runoff in disturbed areas. Permanent slope breakers will be constructed of earthen material. Slope breakers will divert surface runoff to adjacent stable vegetated areas or to energy-dissipating devices. In general, permanent slope breakers should be installed immediately downslope of all trench breakers. Permanent slope breakers will be installed as specified on the construction drawings or generally with a minimum spacing as shown on the following table:

Slope (%)	Spacing (feet)
<5	125
5-10	100
10-20	75
20-30	50
>30	25

The gradient (fall) for each slope breaker will be two to eight percent unless otherwise modified as required by site-specific conditions.

6.10 Reclamation and Revegetation

Reclamation and revegetation activities are designed to return disturbed areas to approximately pre-construction use and capability. The following mitigation measures will be utilized, unless otherwise modified to address site specific conditions or circumstances.

6.10.1 Soil Compaction

Compacted cultivated land and any other severely compacted or rutted areas within the construction right-of-way will be tilled or chiseled to loosen compacted soils. The subsoil surface will be graded smooth and any subsoil clumps broken up (disc and harrow) in an effort to avoid topsoil mixing. Denbury will pay the landowner for any such activities in agricultural areas.

Plowing under of organic matter, including wood chips and manure, or planting of a green crop such as alfalfa, to decrease soil bulk density and improve soil structure or any other measures will be considered, in consultation with the NRCS, if mechanical relief of compaction is unsuccessful.

6.10.2 Rock Removal

On agricultural land, rocks greater than 4 inches in diameter that are exposed on the surface due to construction activity will be removed from the right-of-way prior to and after topsoil replacement.

Clearing of rocks may be conducted with a mechanical rock picker or by manual means, provided that preservation of topsoil is assured. Rock removed from the right-of-way will be hauled off the landowner's premises or disposed of on the landowner's premises at a location that is mutually acceptable to the landowner and to Denbury.

6.10.3 Seeding and Mulching

The final seed mixture will be based on recommendations from the local Natural Resources Conservation or otherwise specified by the landowner with NDPSC approval.

Certificates of seed analysis are required for all seed mixes to restrict the introduction of noxious weeds.

Seed will be used within 12 months of testing. Seeding will follow cleanup, re-grading, and topsoil replacement as closely as possible. Seed will be applied to all disturbed surfaces, except cultivated fields unless requested by the landowner.

If mulch was applied for temporary erosion control during construction activities, the Contractor will remove and dispose of the excess mulch prior to seedbed preparation to ensure that seedbed preparation equipment and seed drills do not become plugged with mulch. After seeding, the Contractor may evenly re-apply and anchor (straw crimp) the removed temporary mulch on the construction right-of-way.

Seeding will be completed at a rate appropriate for the region and stability of the reclaimed surface. Seeding rates will be based on pure live seed specifications for the seed mix.

The Contractor will use a drill seeder equipped with a cultipacker designed and equipped to apply grass and grass-legume seed mixtures. Equipment will include mechanisms (e.g., seed box agitator) to allow even distribution of all species in each seed mix, an adjustable metering mechanism to accurately deliver the

specified seeding rate, and with a mechanism (e.g., depth bands) to accurately place the seed at the specified depth.

The Contractor will plant seed at depths consistent with the local or regional agricultural practices.

Broadcast or hydro seeding, used in lieu of drilling, will require double the recommended seeding rates. Where seed is broadcast, a cultipacker or other equipment will be used immediately following broadcasting to incorporate the seed to the specified depth and to firm the seedbed.

Areas that are too steep or otherwise cannot be safely harrowed or cultipacked will be hand-raked in order to incorporate the broadcast seed to the specified depth.

Denbury will work with landowners to discourage intense livestock grazing of the construction right-of-way during the first growing season by use of temporary fencing or a decreased grazing regimen.

Immediately after seeding, the Contractor will apply certified weed free mulch on all areas with high erosion potential and on slopes greater than 5 percent. The Contractor will spread mulch uniformly over the area to cover at least 75 percent of the ground surface at an approximate rate of 2 tons per acre of hay or straw or their equivalent. The Contractor will not apply mulch in cultivated areas unless requested by the landowner.

If a mulch blower is used, the majority of strands of the mulching material will not be shredded to less than 8 inches in length to allow anchoring. The Contractor will anchor mulch immediately after application to minimize loss by wind and water. Depending upon the length of straw mulch, a soil tackifier may be applied to the soil before the mulch is blown onto help anchor the mulch.

When anchoring (straw crimping) by mechanical means, the Contractor will ensure that the straw stalks are a minimum of 12 inches in length and will use a tool specifically designed for mulch anchoring with flat, notched disks to properly crimp the mulch to a depth of 2 to 3 inches.

6.10.4 Fences

Upon completion of all backfilling, cleanup, and restoration, including mulching and seeding of the construction right-of-way, permanent repairs will be made to all fences by using either the original material or good quality new material similar to existing fences.

Historic fences will be carefully reassembled by hand from the original material. Where the original material has deteriorated to a state that makes it unsalvageable, replacement material similar to the original will be used if possible.

6.10.5 Right-of-Way and Pipeline Markers

Upon completion of all cleanup and restoration activities and during the time when the Contractor is making permanent repairs to fences, the Contractor will install pipeline markers on each side of all roads, railroads, section line crossings, fence

lines, stream crossings, and other areas where the pipeline markers do not conflict with intended land use or as required by Title 49 Coder of Federal Regulations Part 195.

7.0 WETLAND CROSSINGS

7.1 General

The Contractor will comply with requirements of all permits issued for the wetland crossings by federal, state or local agencies.

Wetland boundaries will be clearly marked in the field with signs and/or highly visible flagging during construction.

In the event a waterbody crossing is located within or adjacent to a wetland crossing, the measures of both Section 7 and Section 8 will be implemented to the extent practicable.

7.2 Easement and Workspace

The Contractor will maintain wetland boundary markers during construction in all areas and until permanent seeding is complete in non-cultivated areas.

The Contractor will locate extra work areas (such as staging areas and additional spoil storage areas) at least 100 feet away from wetland boundaries, where topographic conditions permit.

The Contractor will limit clearing of vegetation between extra work areas and the edge of the wetland to the construction right-of-way and limit the size of extra work areas to the minimum needed to construct the wetland crossing.

7.3 Wetland Crossing Methods

7.3.1 General Mitigation Procedures

All work will be conducted in accordance with applicable permits. The following general mitigation procedures will be followed by the Contractor in all wetland areas, unless otherwise approved or directed by Denbury, based on site-specific conditions:

- limit the duration of construction-related disturbance within wetlands to the extent practicable;
- use no more than two layers of timber riprap to stabilize the construction right-of-way;
- cut vegetation off at ground level leaving existing root systems in place and remove it from the wetland for disposal;
- limit pulling of tree stumps and grading activities to directly over the trench line unless safety concerns require the removal of stumps from the working side of the construction ROW;
- segregate a maximum of 12 inches of topsoil from the area disturbed by trenching in dry wetlands, where practicable;
- restore topsoil to its approximate original stratum, after backfilling

is complete;

- dewater the trench in a manner to prevent erosion and having heavily silt-laden water flowing directly into any wetland or waterbody;
- remove all timber riprap and prefabricated equipment mats upon completion of construction;
- locate hydrostatic test manifolds outside wetlands and riparian areas to the maximum extent practicable;
- prohibit storing hazardous materials, chemicals, fuels, or lubricating oils, or performing concrete coating activities in a wetland, or within 100 feet of any wetland boundary;
- perform all equipment maintenance and repairs in upland locations at least 100 feet from waterbodies and wetlands;
- avoid parking equipment overnight within 100 feet of a watercourse or wetland;
- prohibit washing equipment in streams or wetlands;
- install trench breakers and/or seal the trench to maintain the original wetland hydrology, where the pipeline trench may drain a wetland;
- attempt to refuel all construction equipment in an upland area at least 100 feet from a wetland boundary (otherwise follow the procedures outlined in Section 3); and,
- avoid sand blasting in wetlands to the extent practicable. If sandblasting is performed within a wetland, the Contractor shall place a tarp or suitable material in such a way as to collect as much waste shot as possible and dispose of the collected waste. The Contractor shall clean up all visible deposits of wastes and dispose of the waste at an approved disposal facility.

Specific procedures for each type of wetland crossing method are listed below and shall be designated on the construction drawings but may be modified depending on site conditions at the time of construction. All work shall be conducted in accordance with applicable permits.

7.3.2 Dry Wetland Crossing Method

Topsoil shall be segregated. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace.

The dry wetland crossing procedure shall be used where this type of wetland is identified on the construction drawings. The following are exceptions to standard wetland crossing methods:

- the width of the construction right-of-way for upland construction is maintained through the wetland;

- where extra work areas (such as staging areas and additional spoil storage areas) are designated on the construction drawings, they may be placed no closer than 100 feet from the wetland's edge;
- if the wetland is cultivated, the topsoil shall be stripped using the trench and spoil side method at the same depth as the adjacent upland areas; and,
- seeding requirements for agricultural lands shall be applied to farmed wetlands.

7.3.3 Standard Wetland Crossing Method

Topsoil stripping is impracticable due to the saturated nature of the soil. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace. Based upon the length of a standard wetland crossing and presence of sufficient water to float the pipe, the Contractor may elect to install a standard wetland crossing utilizing the "push/pull" method.

The standard wetland crossing procedure shall be used where this type of wetland is identified on the construction drawings.

Procedures unique to standard wetlands include:

- limiting construction right-of-way width to a maximum of 75 feet unless site conditions warrant a wider width;
- utilizing low-ground-pressure construction equipment or support equipment on timber riprap or timber mats; and,
- installing sediment barriers across the entire right-of-way where the right-of-way enters and exits the wetland.

7.4 Restoration and Reclamation

All timber riprap, timber mats, and prefabricated equipment mats and other construction debris shall be removed upon completion of construction. As much as is feasible, the Contractor shall replace topsoil and restore original contours with no crown over the trench. Any excess spoil shall be removed from the wetland. The Contractor shall stabilize wetland edges and adjacent upland areas by establishing permanent erosion control measures and revegetation, as applicable, during final clean up.

In the absence of detailed revegetation plans or until the appropriate seeding season for permanent wetland vegetation in standard wetlands, the Contractor shall apply a temporary cover crop on the construction right-of-way at a rate adequate for germination and ground cover unless standing water is present. The Contractor shall apply the temporary cover crop during final cleanup. For farmed wetlands, the Contractor shall apply seeding requirements for agricultural lands or as required by the landowner.

The Contractor shall not use fertilizer, lime, or mulch in wetlands unless required in writing by the appropriate land management agency.

All wetland areas within conservation lands or easements shall be restored to a level

consistent with any additional criteria established by the relevant managing agency.

8.0 WATERBODIES AND RIPARIAN AREAS

8.1 General

The Contractor will comply with requirements of all permits issued for the waterbody crossings by federal, state or local agencies.

Waterbody is defined as any natural or artificial stream, river, or drainage with perceptible flow at the time of crossing, and other permanent waterbodies such as ponds and lakes.

In the event a waterbody crossing is located within or adjacent to a wetland crossing, the measures of both Section 7 and Section 8 will be implemented to the extent practicable.

The use and storage of chemicals, fuels, lubricating oils, or other hazardous materials will be performed according to measures outlined in Section 2 and Section 3.

Denbury will complete site-specific crossing plans for waterbody crossings if required by the applicable regulatory agencies during federal or state permitting processes.

Denbury may allow modification of the following specifications as necessary to accommodate specific situations or procedures. Any modifications must comply with all applicable regulations and permits.

8.2 Easement and Work Space

Extra work areas will be limited to the minimum size needed to construct the stream crossing. Construction activities will be contained within these areas and the construction right-of-way.

The Contractor will locate all extra work areas (such as staging areas and additional spoil storage areas) at least 50 feet from the water's edge taking into account engineering and topographic constraints. If conditions do not allow for a 50-foot setback, extra work areas will be located no closer than 10 feet from the water’s edge.

At all waterbody crossings, the Contractor will install flagging across the construction right-of-way at least 10 feet from the water’s edge prior to clearing and ensure that riparian cover is maintained where practicable during construction.

8.3 Waterbody Crossing Methods

Construction methods pertinent to waterbody crossings are presented below.

8.3.1 Horizontal Directional Drill Crossing

In conjunction with the appropriate jurisdictional agency, Denbury will develop specific crossing plans for the Maple River and the Lower Branch Rush River crossings and/or other identified features (e.g., irrigation ditches or canals and wetlands) that cannot be trenched through. The Contractor shall construct each directional drill waterbody crossing in accordance with a site specific plan as shown in the construction drawings.

Drilling fluids and additives utilized during implementation of a directional drill shall be non-toxic to the aquatic environment.

The Contractor will follow the Frac-out Contingency Plan included as Appendix B or will develop his own, equivalent contingency plan to address a frac-out during a directional drill. The plan shall include instructions for monitoring during the directional drill and mitigation in the event that there is a release of drilling fluids. Additionally, the waterbody shall be monitored downstream by the Contractor for any signs of drilling fluid.

The Contractor shall dispose of all drill cuttings and drilling mud at a Denbury-approved location. Disposal options may include spreading over the construction right-of-way in an upland location approved by Denbury or hauling to an approved licensed landfill or other site approved by Denbury.

8.3.2 Boring Crossing Method

Carbon Dioxide Transmission Pipeline will utilize the HDD slick-bore process for boring under highways, roadways, the BNSF railroad tracks, and waterbodies, including rivers, irrigation canals, and wetlands.. With this method, an entry bore pit and exit bore pit will be excavated on both sides of the crossing. The boring machine shall be placed in the entry pit where it will drill a pilot hole through to the exit pit. This hole will then be widened to accept the carrier pipe by back reaming. A section of pipeline that is already welded together, inspected, and pressure tested is then pulled back through the drilled hole. The minimum depth of cover for these road and irrigation canal crossings shall be 5 feet or greater depending upon the minimum depth as specified by the crossing permit and the PSC. The bored crossing pipe will extend at least 10 feet beyond either side of the road right-of-way and 25 feet beyond the toe of the canals. A pipeline marker shall be placed at either end of the bored crossing when completed.

9.0 HYDROSTATIC TESTING

9.1 General

The Contractor will provide for the safety of all pipeline construction personnel and the general public during hydrostatic test operations by placing warning signs in populated areas.

Staging and work areas for filling the pipeline with water will be located a minimum of 100 feet from a waterbody or wetland boundary if topographic conditions permit.

The Contractor will locate hydrostatic test manifolds 100 feet outside wetlands and riparian areas to the extent practicable.

9.2 Test Water Source

Denbury will provide the Contractor with a copy of the appropriate withdrawal/discharge permits for hydrostatic test water. The Contractor will keep water withdrawal/discharge permits on site at all times during testing operations.

In some instances sufficient quantities of water may not be available from the permitted water sources at the time of testing. Withdrawal rates may be limited as stated by the permit. If the quantity of water from the permitted source is insufficient to allow for hydrostatic testing of the pipeline, an alternative source will be identified and permit authorization sought by Denbury.

The Contractor will be responsible for obtaining any required water analyses from each source to be used in sufficient time to have a lab analysis performed prior to any filling operations. The analysis will determine the pH value and total suspended solids and other parameters that may be required by the North Dakota Department of Health.

No chemicals will be used in the test water.

9.3 Water Discharge

The Contractor will comply with state-issued National Pollutant Discharge Elimination System permits for discharging test water.

The Contractor will not discharge any water containing oil or other substances that are in sufficient amounts as to create a visible color film ("sheen") on the surface of the receiving water.

The Contractor will not discharge into state-designated exceptional value waters, waterbodies which provide habitat for federally listed threatened or endangered species, or waterbodies designated as public water supplies, unless appropriate federal, state, and local permitting agencies grant written permission. To avoid impacts from introduced species, no inter-basin transfers (discharge) of hydrostatic test water will occur.

The discharge operation will be monitored and water samples will be collected and analyzed prior to the beginning of the discharge to ensure that it complies with the project and permit requirements. If required by state permits, additional water quality testing will be conducted during discharge, in accordance with permit conditions.

The Contractor will regulate the PIG velocity discharge rate (3,000 gpm maximum), use energy dissipation devices, and install sediment barriers, as necessary, to prevent erosion, streambed scour, suspension of sediments, or excessive stream flow. Water must be disposed of using good engineering judgment so that all federal, state, and local environmental standards are met. Dewatering lines will be of sufficient strength and be securely supported and tied down at the discharge end to prevent whipping during this operation.

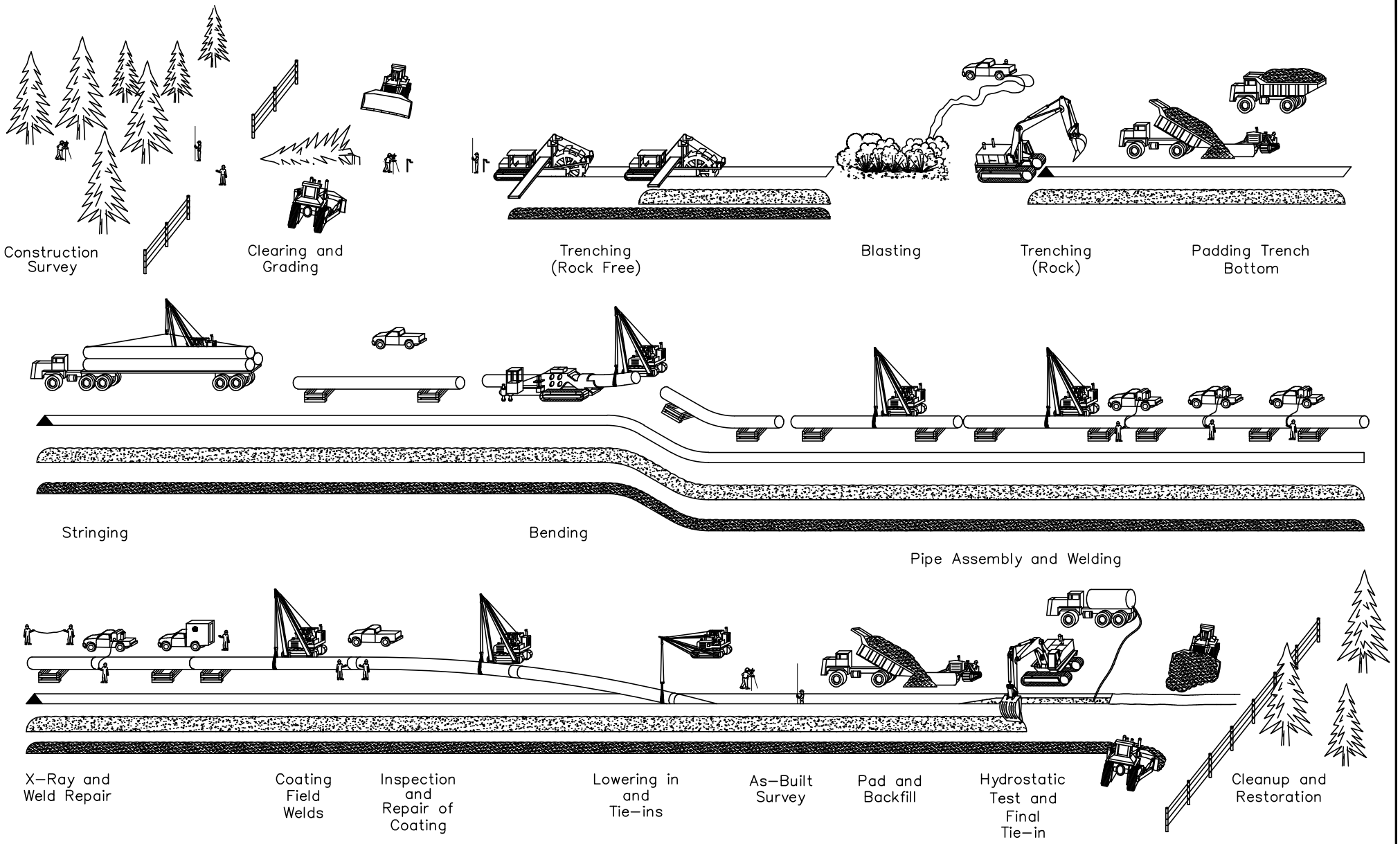
Selected road and highway, BNSF railroad, and river crossing pipe sections will be pressure tested for 4 hours to installation in the bore and the entire completed pipeline will be pressure tested for 8 hours after construction has been completed. The water for pre-testing of any road and railroad crossings will be hauled by a tanker truck from an approved water source. Since the volume of water utilized in these pre-tests will be relatively small, the water will be discharged overland along the construction right-of-way and allowed to soak into the ground utilizing erosion and sediment control measures.

APPENDIX A

PIPELINE CONSTRUCTION SEQUENCE

TYPICAL ROW PLAN & PROFILE DETAILS

PIPELINE CONSTRUCTION SEQUENCE



REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

REVISIONS

Denbury

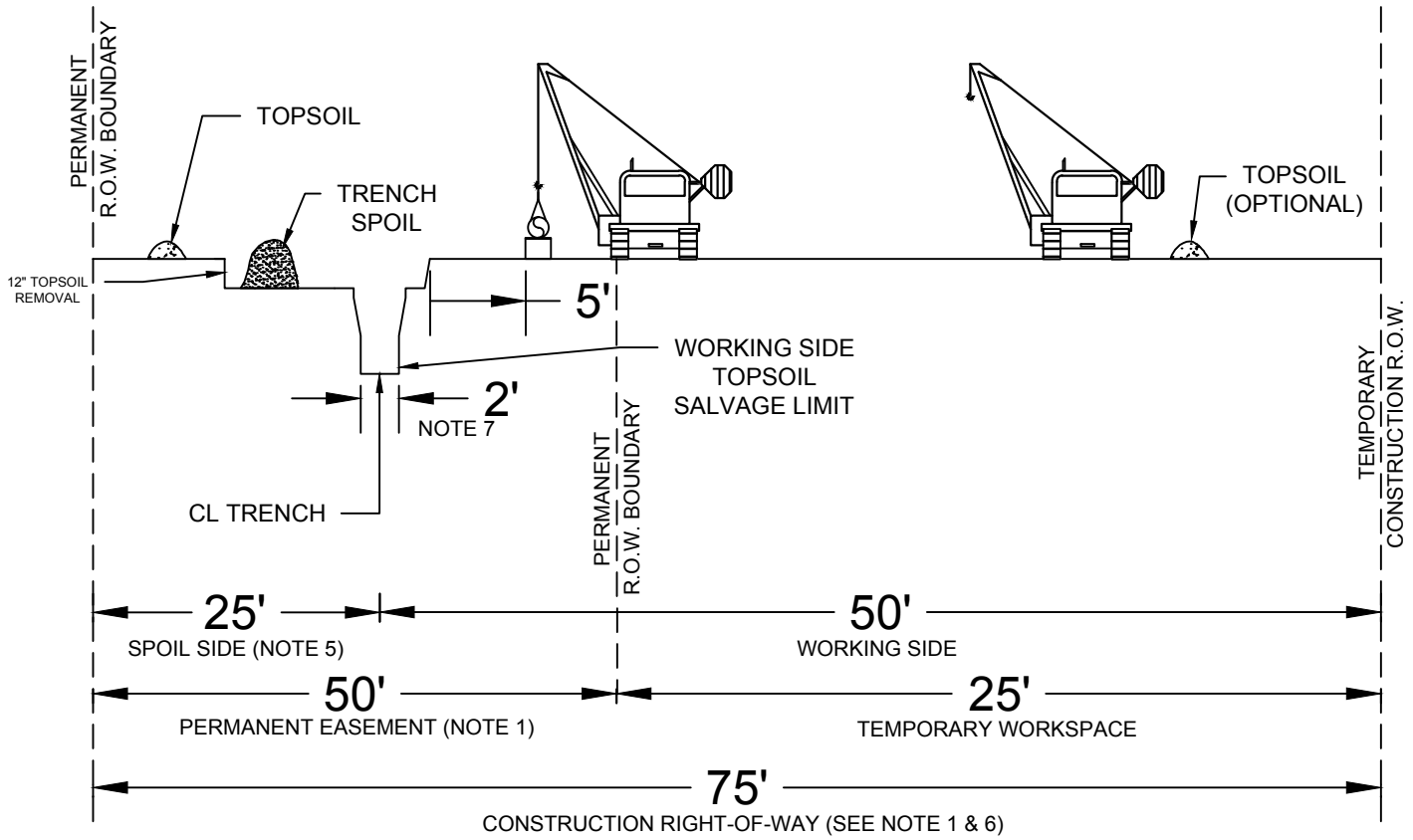
Carbon Dioxide Transmission Pipeline

PIPELINE CONSTRUCTION SEQUENCE

CASS COUNTY NORTH DAKOTA

DATE:	PLOT DATE:	DRAWN BY:	LOC. NO:	DRAWING NUMBER:	SHEET NO:	REV:

CONSTRUCTION RIGHT-OF-WAY TYPICAL



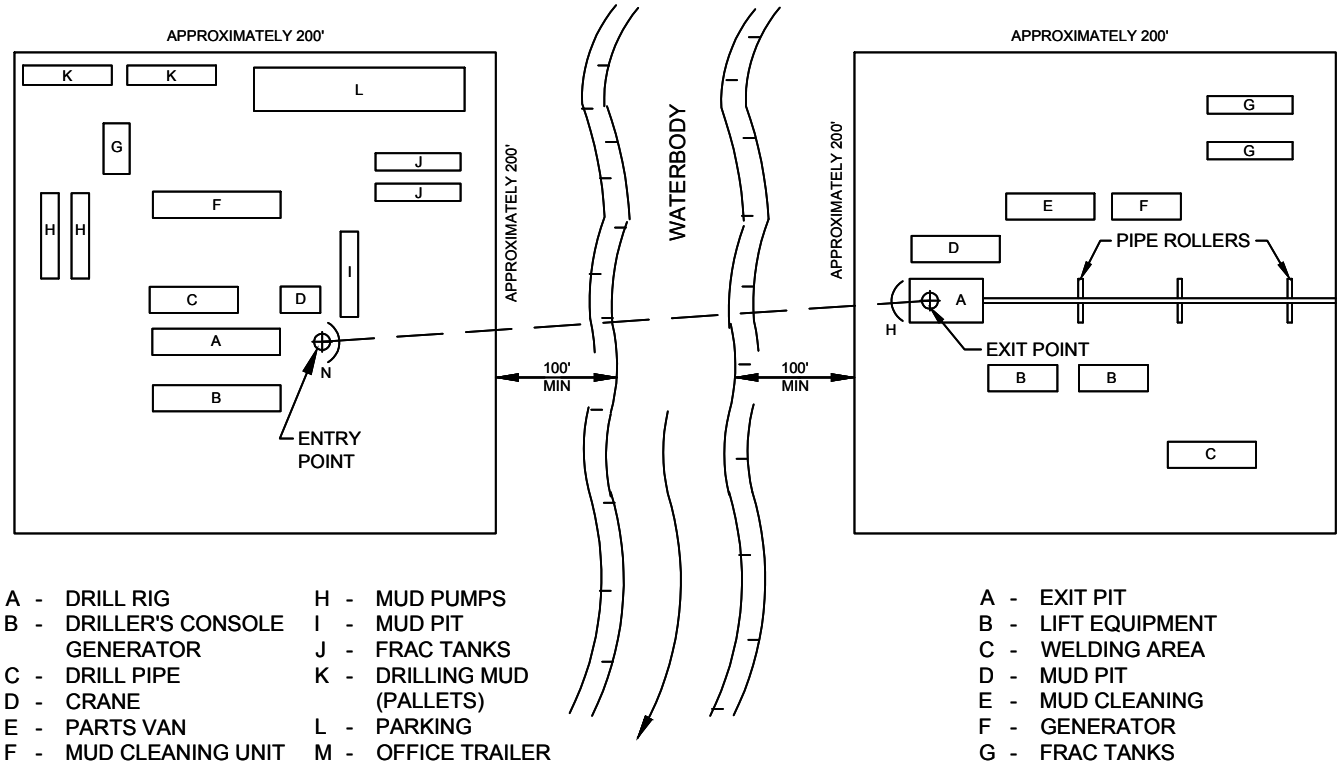
PROFILE
NOT TO SCALE

NOTES:

1. CONSTRUCTION RIGHT-OF-WAY WILL TYPICALLY BE 75' WIDE CONSISTING OF 50' OF PERMANENT EASEMENT AND 25' OF TEMPORARY WORKSPACE. EXTRA TEMPORARY WORKSPACE WILL BE NECESSARY AT MAJOR ROAD, RAIL, RIVER CROSSINGS AND OTHER SPECIAL CIRCUMSTANCES, AS REQUIRED. CERTAIN SITUATIONS MAY REQUIRE A NARROWER WIDTH.
2. THIS DRAWING REFLECTS "TRENCH AND SPOIL SIDE" TOPSOIL STRIPPING PROCEDURE. SALVAGE TOPSOIL OVER TRENCH AND UNDER THE SPOIL PILE AT LOCATION IDENTIFIED ON THE CONSTRUCTION ALIGNMENT SHEETS, OR AS DIRECTED BY THE COMPANY INSPECTOR. DEPTH OF TOPSOIL STRIPPING IS NOT TO EXCEED 12".
3. STOCKPILE TOPSOIL AS SHOW OR IN ANY CONFIGURATION APPROVED BY THE COMPANY INSPECTOR. KEEP TOPSOIL AND SPOIL PILES CLEAN OF ALL CONSTRUCTION DEBRIS. MAINTAIN A MINIMUM OF 12" OF SEPARATION BETWEEN TOPSOIL AND TRENCH SPOIL PILES. ENSURE THAT TOPSOIL AND TRENCH SPOIL DO NOT MIX.
4. LEAVE GAPS IN TOPSOIL AND SPOIL PILES AT OBVIOUS DRAINAGES. DO NOT PUSH UPLAND SOILS INTO CREEKS OR WETLANDS. DO NOT USE TOPSOIL FOR PADDING. AVOID SCALPING VEGETATED GROUND SURFACE WHEN BACKFILLING TOPSOIL AND SPOILS PILES.
5. THE OFFSET FROM EXISTING PIPELINE, WHERE APPLICABLE, WILL BE 25', BUT MAY BE INCREASED OR DECREASED DEPENDING ON THE SITE SPECIFIC CONSTRUCTION REQUIREMENTS.
6. TEMPORARILY SUSPEND TOPSOIL HANDLING OPERATION DURING EXCESSIVELY WINDY CONDITIONS UNTIL MITIGATIVE MEASURES TO MINIMIZE WIND EROSION CAN BE IMPLEMENTED.
7. BOTTOM OF TRENCH WIDTH WILL BE AN AVERAGE OF 2' (TYPICAL). HOWEVER, UNDER CERTAIN CIRCUMSTANCES, THE TRENCH MAY BE A MAXIMUM OF 10' WIDE.
8. TOPSOIL AND TRENCH SPOIL RELATIVE POSITIONS CAN, AS DIRECTED BY THE COMPANY INSPECTOR, BE REVERSED.

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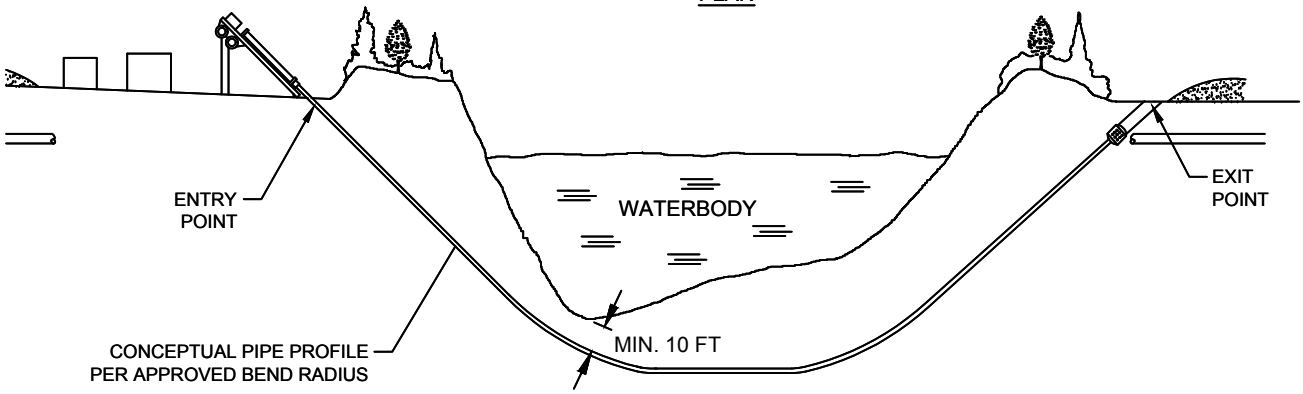
TYPICAL ROW PLAN & PROFILE DETAILS



A - DRILL RIG
B - DRILLER'S CONSOLE GENERATOR
C - DRILL PIPE
D - CRANE
E - PARTS VAN
F - MUD CLEANING UNIT
G - MUD MIXING TANK
H - MUD PUMPS
I - MUD PIT
J - FRAC TANKS
K - DRILLING MUD (PALLETS)
L - PARKING
M - OFFICE TRAILER
N - CONTAINMENT BERM

A - EXIT PIT
B - LIFT EQUIPMENT
C - WELDING AREA
D - MUD PIT
E - MUD CLEANING
F - GENERATOR
G - FRAC TANKS
H - CONTAINMENT BERM

PLAN



PROFILE

NOTES:

1. SET UP DRILLING EQUIPMENT A MINIMUM OF 300 FEET FROM THE EDGE OF THE WATERCOURSE. DO NOT CLEAR OR GRADE WITHIN THE 100 FOOT ZONE.
2. ENSURE THAT ONLY BENTONITE BASED DRILLING MUD IS USED. DO NOT ALLOW THE USE OF ANY ADDITIVES TO THE DRILLING MUD WITHOUT THE APPROVAL OF COMPANY'S INSPECTOR.
3. INSTALL SUITABLE DRILLING MUD TANKS OR SUMPS TO PREVENT CONTAMINATION OF WATERCOURSE.
4. INSTALL BERMS DOWNSLOPE FROM THE DRILL ENTRY AND ANTICIPATED EXIT POINTS TO CONTAIN ANY RELEASE OF DRILLING MUD.
5. DISPOSE OF DRILLING MUD IN ACCORDANCE WITH THE APPROPRIATE REGULATORY AUTHORITY REQUIREMENTS.

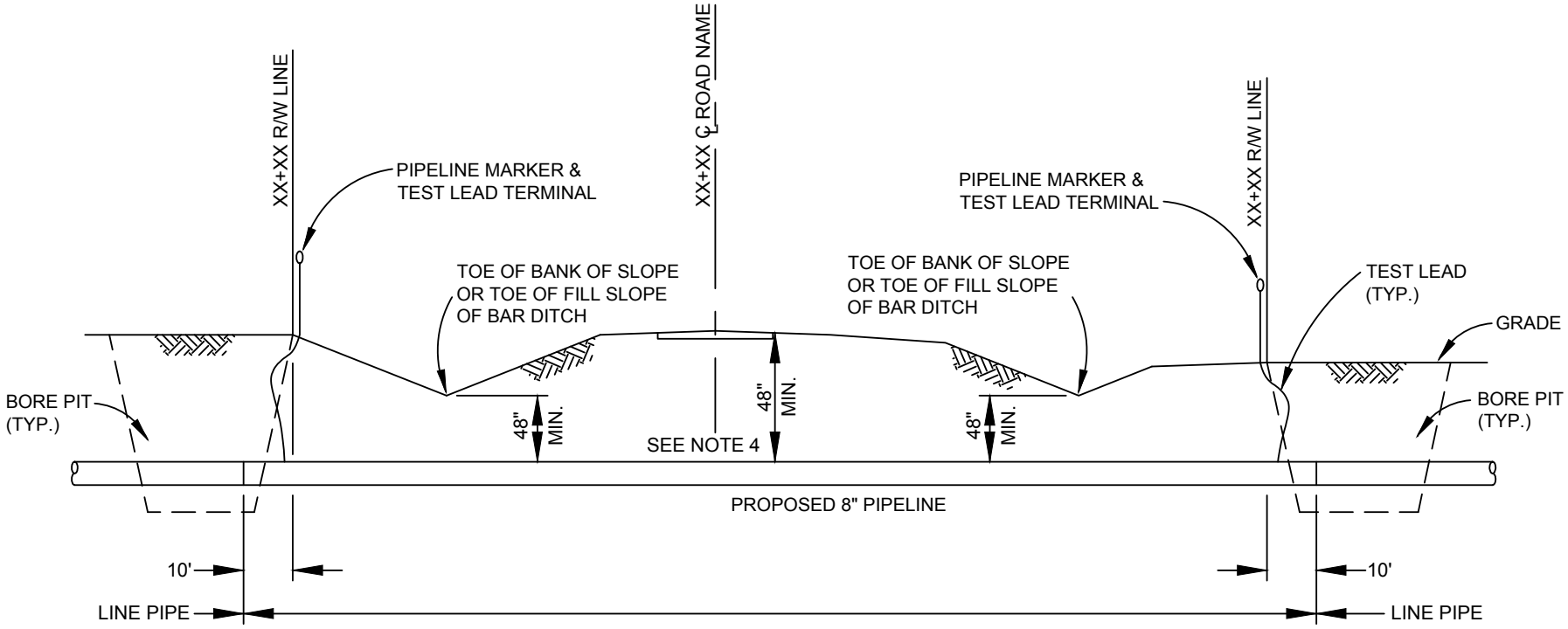
SWCA ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.
A	04/17/15	KBW	ISSUED FOR PERMIT	DK	JN

REVISIONS

TYPICAL WATERBODY CROSSING
HORIZONTAL DIRECTIONAL DRILLING

DATE:	PLOT DATE:	DRAWN BY:	LOC. NO:	DRAWING NUMBER:	SHEET NO:	REV:
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IMPROVED UNCASED ROAD - CROSSING BORING METHOD

NOTES:

1. DESIGN FACTOR: IN ACCORDANCE WITH ALIGNMENT SHEETS
2. 100% X-RAY INSPECT ALL WELDS ON CARRIER PIPE IN ACCORDANCE WITH API STANDARD 1104 AND CONTRACT DOCUMENTS.
3. CONTRACTOR TO SLICK BORE CARRIER PIPE WITH A PROCEDURE SUBMITTED BY CONTRACTOR AND APPROVED BY THE COMPANY.
4. MINIMUM DEPTH OF COVER UNDER ROAD TO TOP OF PIPE SHALL BE 4'-0" OR SHALL CONFORM TO THE ROAD CROSSING PERMIT, WHICHEVER IS GREATER. ROAD CROSSING PIPE TO EXTEND 10' BEYOND ON EITHER SIDE OF DESIGNATED ROAD RIGHT-OF-WAY.
5. CATHODIC TEST STATION TO BE INSTALLED (IF REQUIRED), SEE CST-P-1085-B030.
6. PIPELINE MARKER TO BE INSTALLED PER DRAWING STD-P-0100-A200 AND STD-P-0100-A205.
7. PIPELINE MARKER & TEST STATIONS TO BE INSTALLED ON ROW LINE NEXT TO FENCE IF POSSIBLE.
8. CARRIER PIPE IS TO BE COATED WITH APPROVED EXTERNAL PROTECTIVE COATING, SEE ENGINEERING SECTION #M8380.
9. CROSSING TO BE AS NEAR TO 90° TO THE CENTERLINE OF ROADWAY AS PRACTICAL.
10. CONTRACTOR TO COMPLY TO THE SPECIFICATION REQUIREMENTS.

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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

REVISIONS

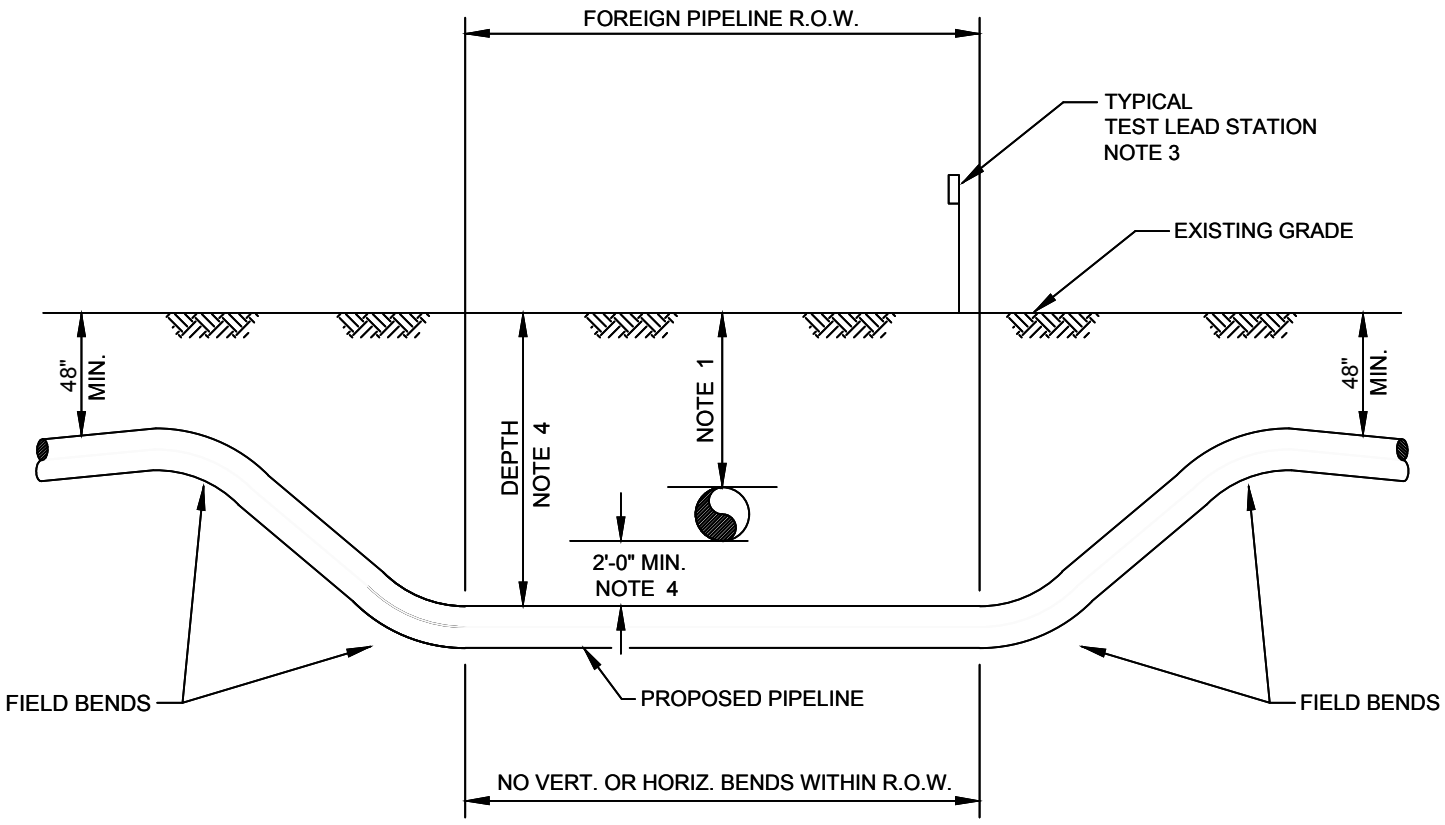
Denbury

Carbon Dioxide Transmission Pipeline

BORED ROAD CROSSING

CASS COUNTY NORTH DAKOTA

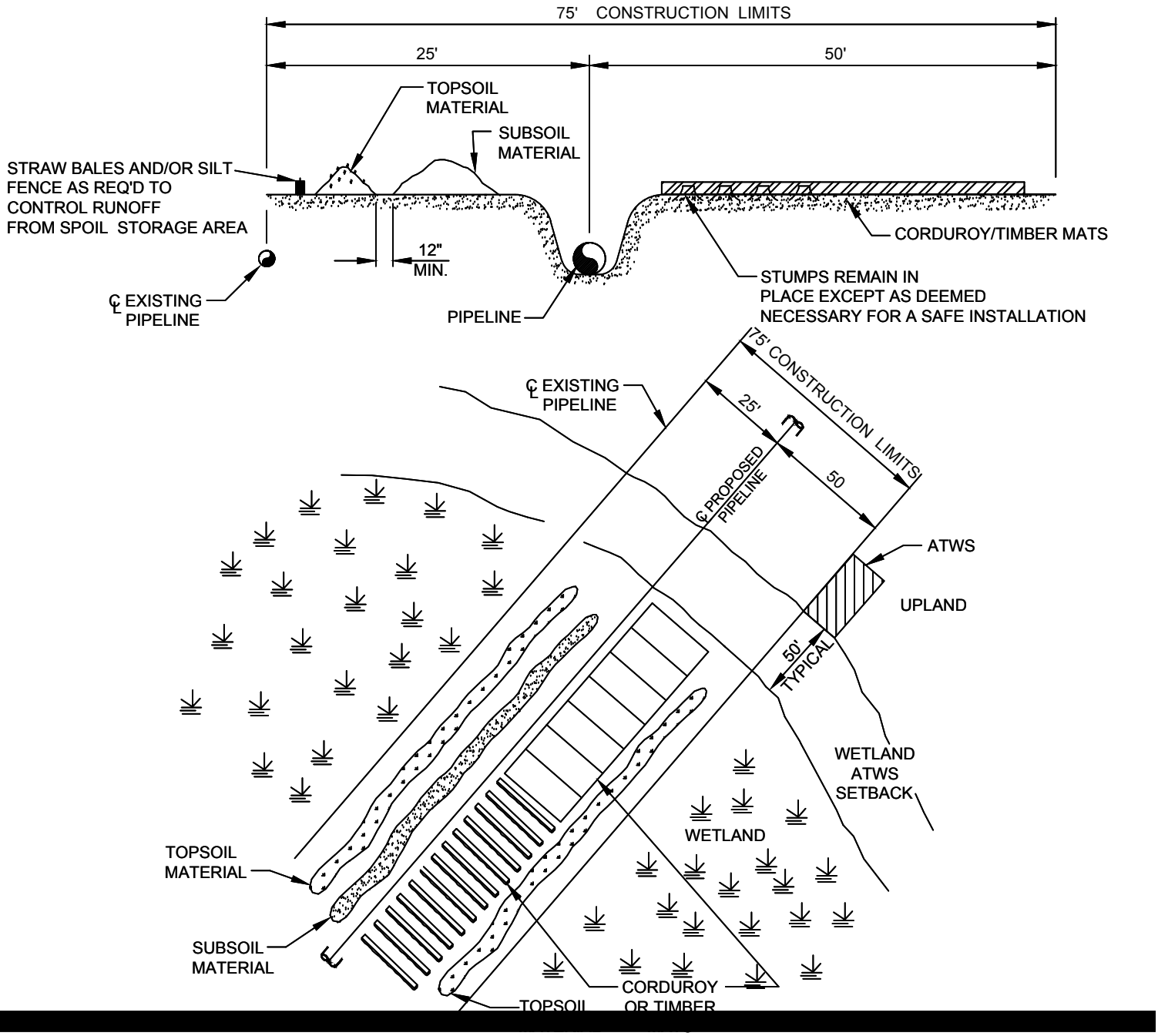
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CROSS SECTION OF FOREIGN P/L R.O.W.

NOTES:

1. FOREIGN PIPELINE LOCATIONS & DEPTHS TO BE DETERMINED BY ELECTRONIC MEANS IN ADVANCE OF PIPELINE CONSTRUCTION AND CONFIRMED BY CAREFULLY EXPOSING BY HAND DIGGING WITHIN 24" IN ANY DIRECTION FROM THE PIPELINE.
2. OWNER OF FOREIGN PIPELINE(S) SHALL BE NOTIFIED A MINIMUM OF 48 HOURS IN ADVANCE OF EXCAVATION OF CROSSING.
3. TEST LEAD STATION TO BE INSTALLED WHERE PRACTICAL AT THE NEAREST FENCE, HEDGE ROW OR FIELD EDGE, AND WHERE READILY ACCESSIBLE. INSTALL COMPANY-SUPPLIED PERMANENT REFERENCE CELL AND EXTEND CELL LEAD TO TEST LEAD STATION.
4. DEPTH OF PIPELINE INCLUDING 2'-0" MIN. CLEARANCE SHALL BE MAINTAINED FOR ALL FULL ANGULAR WIDTH OF FOREIGN PIPELINE R.O.W.
5. PROPOSED PIPELINE MAY CROSS ABOVE THE FOREIGN PIPELINE(S) ONLY WHERE REQUESTED BY OR APPROVED BY FOREIGN OWNER IN WRITING.



NOTES:

1. SEGREGATE TOPSOIL FROM THE AREA DISTURBED BY TRENCHING, EXCEPT IN AREAS WHERE STANDING WATER IS PRESENT OR SOILS ARE SATURATED OR FROZEN.
2. RE-SEED WITH ANNUAL RYEGRASS @ 40 LBS/ACRE (NOT TO EXCEED 48 LBS/ACRE) IN ALL AREAS WITHOUT STANDING WATER UNLESS ALTERNATIVES HAVE BEEN APPROVED BY MANAGING AGENCY.
3. NO FERTILIZER OR LIME SHALL BE USED.
4. INSTALL TRENCH PLUGS & WATERBAR ON BOTH SIDES OF WETLAND IF THE HYDROLOGICAL CONDITIONS WOULD DRAIN THE WETLAND.
5. DO NOT USE LIQUID MULCH BINDERS WITHIN 100' OF WETLANDS OR WATERBODIES.
6. IT IS ACCEPTABLE FOR E&S BMPS TO BE TEMPORARILY REMOVED FROM EQUIPMENT CROSSING PATHWAYS DURING PERIODS OF ACTIVE CONSTRUCTION IF THESE CONTROLS WILL BE PROPERLY REINSTALLED AT THE END OF EACH WORK DAY.
7. WETLAND MATS WILL BE PERMANENTLY REMOVED AFTER CLEAN UP/RESTORATION
8. MATS WILL BE 12' WIDE AND LENGTH IS DEPENDENT ON THE WETLAND CROSSING LENGTH FROM START TO END.

SWCA ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.®

REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

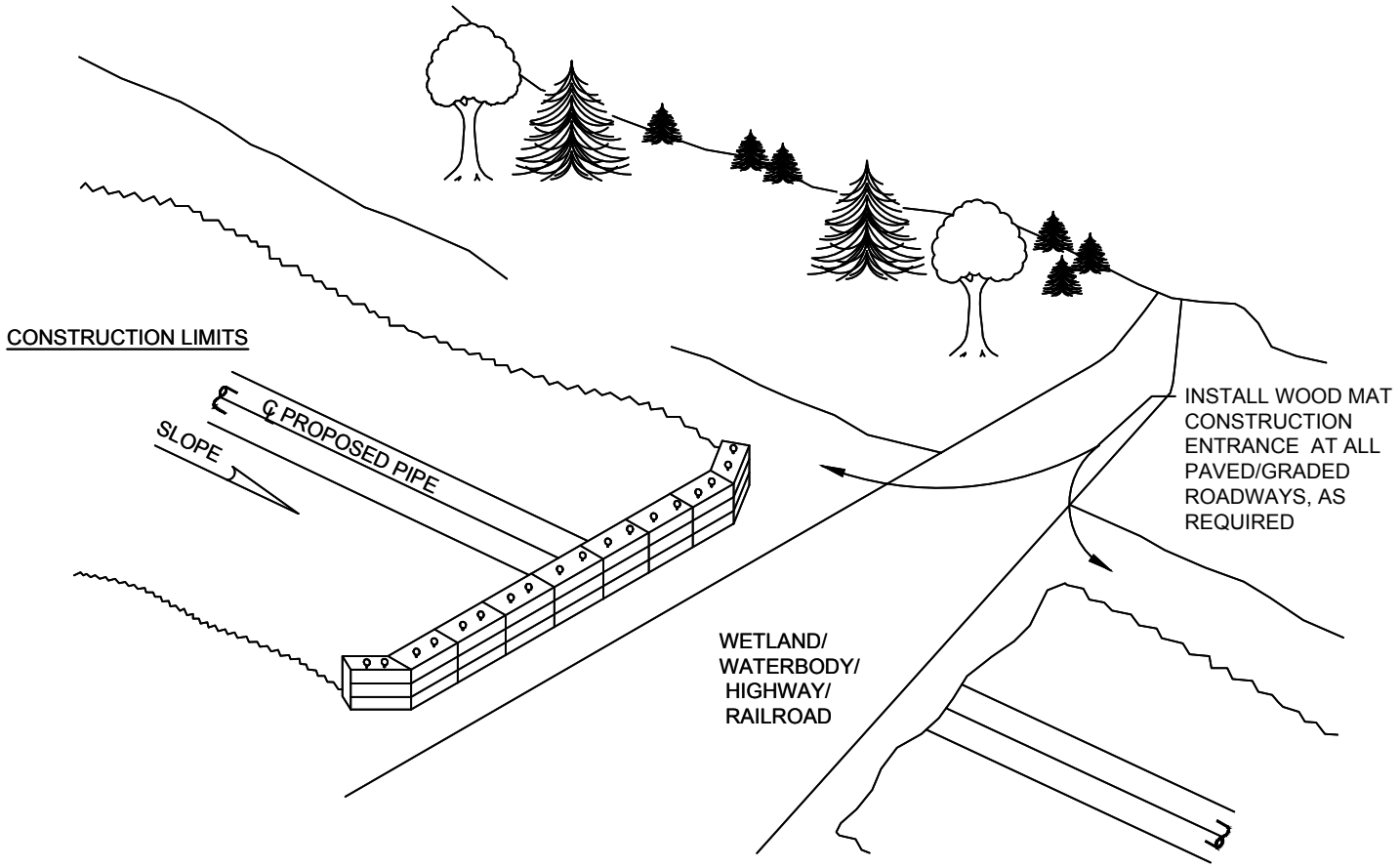
REVISIONS

Denbury

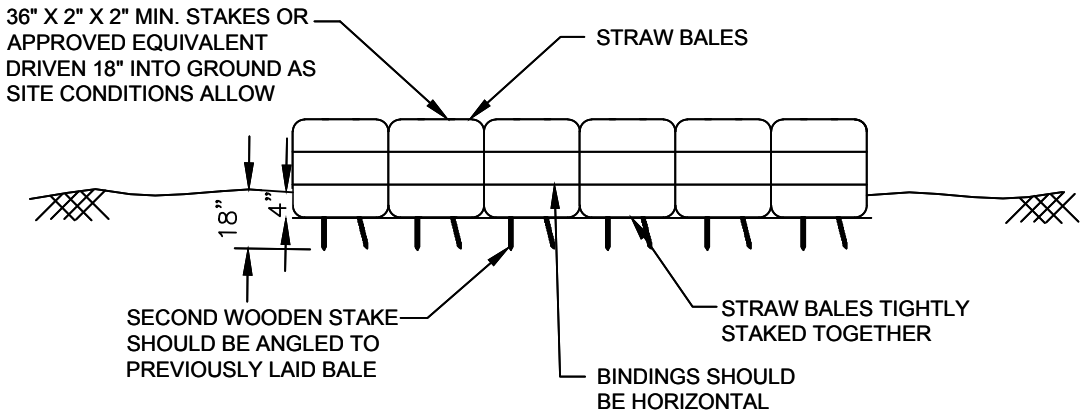
Carbon Dioxide Transmission Pipeline

TYPICAL WETLAND CONSTRUCTION

DATE: | PLOT DATE: | DRAWN BY: | LOC. NO: | DRAWING NUMBER: | SHEET NO: | REV:



FRONT VIEW



NOTES:

1. STRAW BALES TO BE EMBEDDED 4" MIN. INTO GROUND AS SITE CONDITIONS ALLOW.
2. SEDIMENT SHALL BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE ABOVE GROUNDS HEIGHT OF THE BARRIER.
3. STRAW BALES REMOVED FOR ACCESS PURPOSES DURING THE DAY MUST BE REINSTALLED AFTER THE CONSTRUCTION ACTIVITY HAS PASSED THROUGH OR BY THE END OF THE DAY.
4. STRAW BALES SHOULD NOT BE USED FOR PROJECTS LASTING MORE THAN 3 MONTHS.
5. STAKES TO BE DRIVEN FLUSH WITH THE TOP OF THE BALE. BOTH ENDS OF THE BARRIER TO BE EXTENDED AT LEAST 8' UP SLOPE AT 45 DEGREES TO MAIN BARRIER ALIGNMENT.
6. STRAW BALE BARRIERS THAT ARE UNDERMINED OR TOPPED SHALL BE REPLACED WITH A ROCK FILTER OUTLET.
7. BALES WILL BE REMOVED WHEN PERMANENT STABILAZATION IS ACHIEVED.
8. COMPACTED BACKFILL WILL BE PLACED ON DISTURBED SIDE.

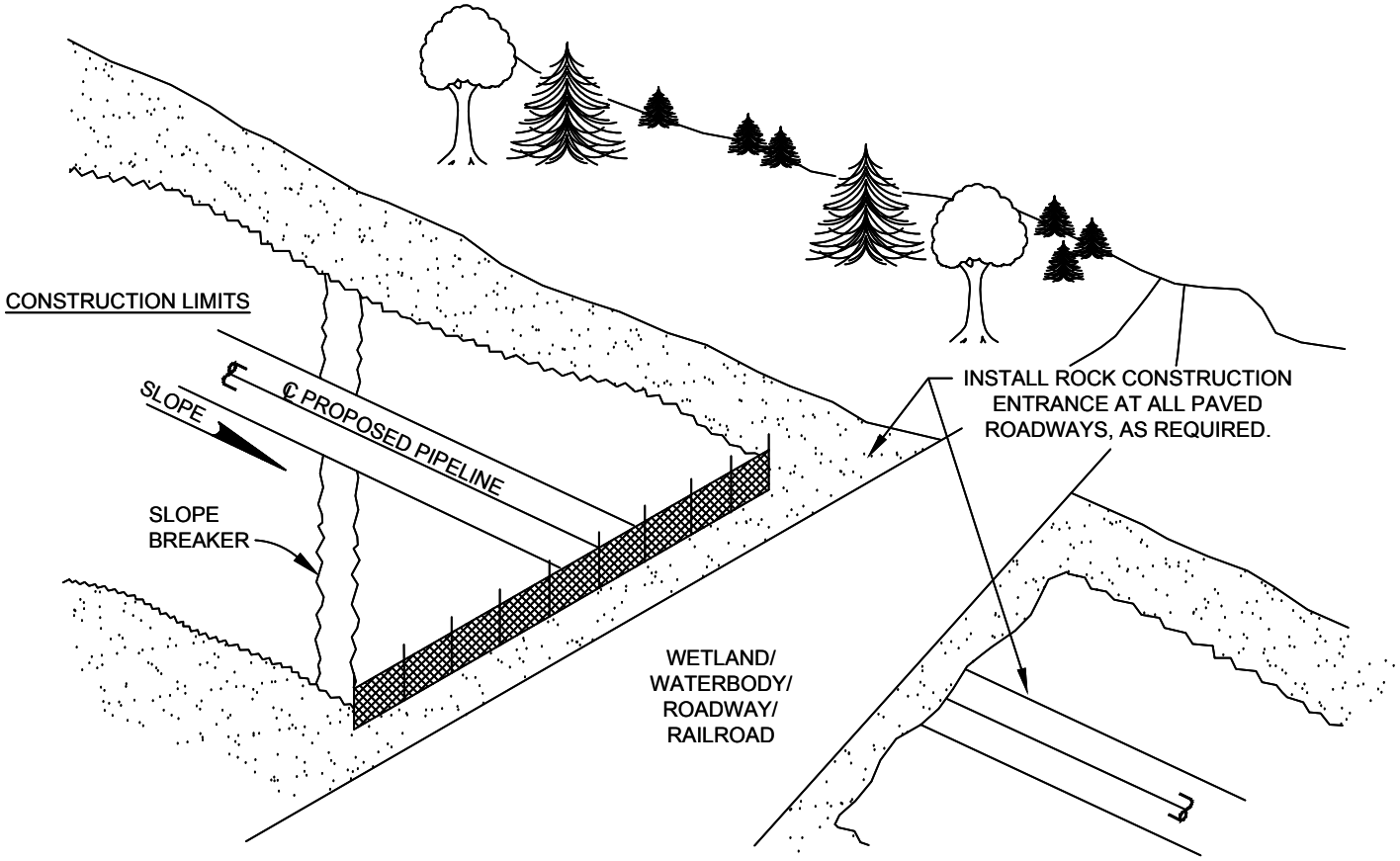
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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

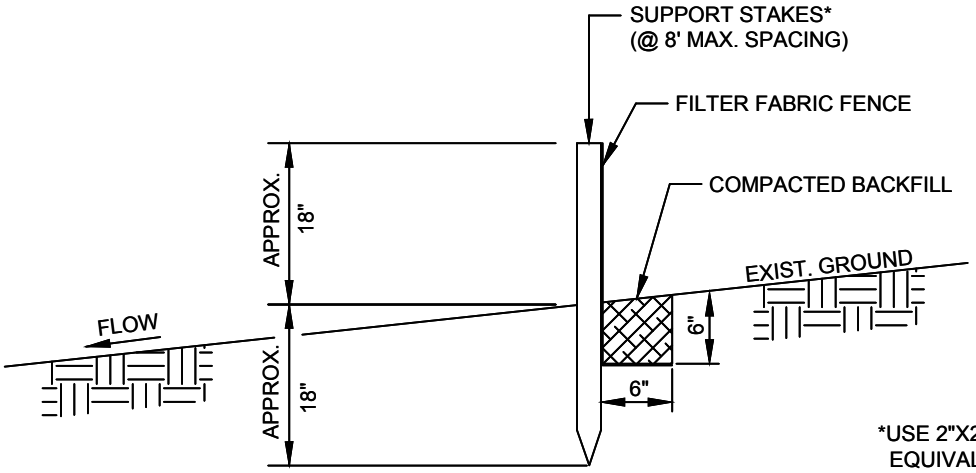
REVISIONS

TYPICAL STRAW BALE INSTALLATION

DATE: | PLOT DATE: | DRAWN BY: | LOC. NO: | DRAWING NUMBER: | SHEET NO: | REV:



NOTES:



*USE 2"X2" WOOD OR EQUIVALENT STEEL STAKES

PERMANENT STABILIZATION IS DEFINED AS MINIMUM, UNIFORM, PERENNIAL 70% VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED EROSION.

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REV LEVEL	DATE	BY	DESCRIPTION	CK.	APP.

REVISIONS

TYPICAL STANDARD
18" SILT FENCE INSTALLATION
(SHEET 1 OF 2)

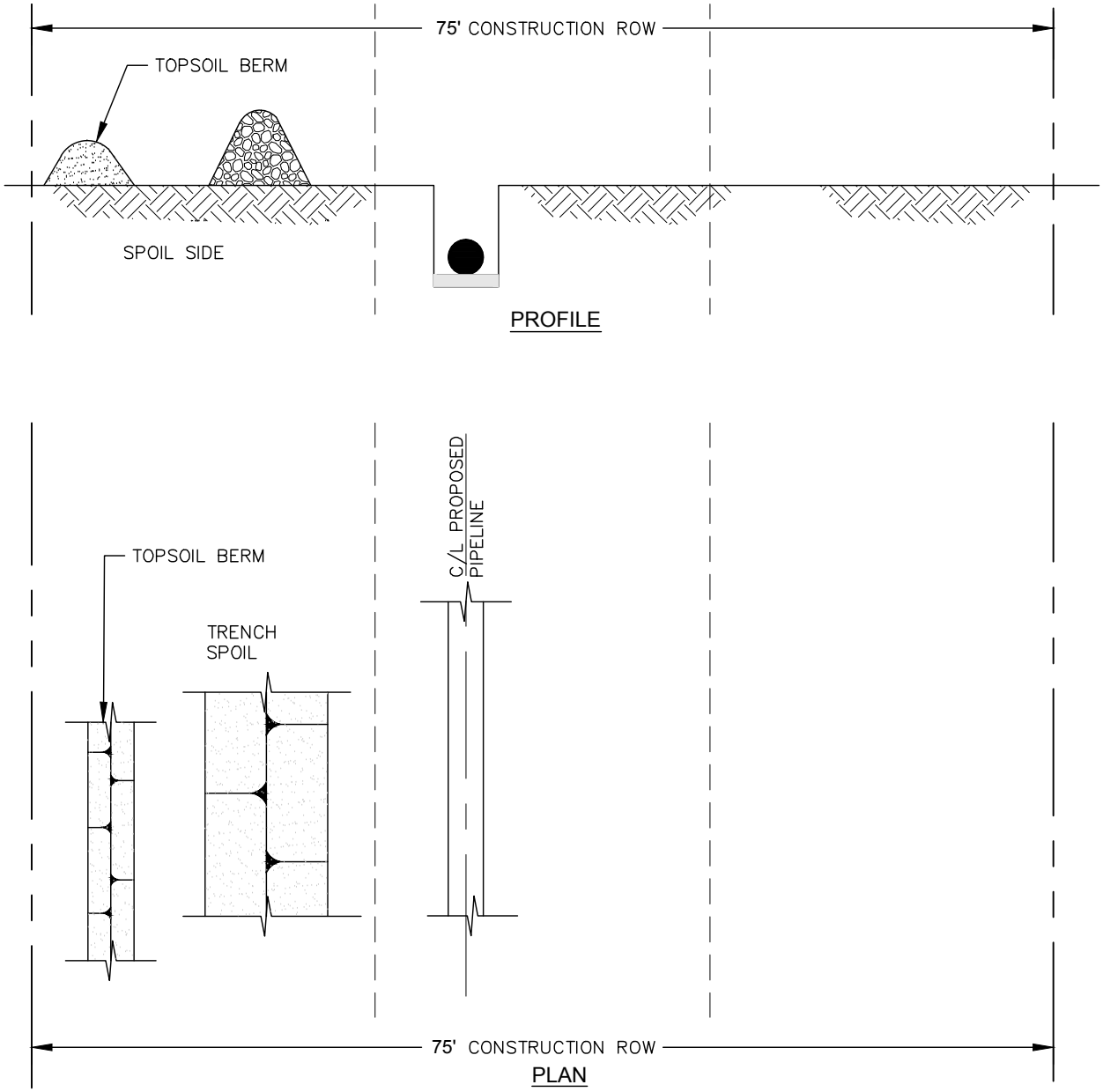
DATE:	PLOT DATE:	DRAWN BY:	LOC. NO:	DRAWING NUMBER:	SHEET NO:	REV:

NOTES:

1. SILT FENCE MUST BE LEFT IN PLACE UNTIL PERMANENT STABILIZATION.
2. FILTER FABRIC FENCE MUST BE INSTALLED AT EXISTING LEVEL GRADE.
3. SEDIMENT MUST BE REMOVED WHERE ACCUMULATIONS REACH 1/2 THE ABOVE GROUND HEIGHT OF THE FENCE.
4. ANY SECTION OF SILT FENCE WHICH HAS BEEN UNDERMINED OR TOPPED MUST BE IMMEDIATELY REPLACED WITH A ROCK FILTER OUTLET.
5. AT A MINIMUM, THE FABRIC SHOULD HAVE THE FOLLOWING PROPERTIES:

FABRIC PROPERTY	MINIMUM ACCEPTABLE VALUE	TEST METHOD
GRAB TENSILE STRENGTH (lb)	120	ASTM D1682
ELONGATION AT FAILURE (%)	20% MAX.	ASTM D1682
MULLEN BURST STRENGTH (lb)	200	ASTM D3786
TRAPEZOIDAL TEAR STRENGTH (lb)	50	
PUNCTURE STRENGTH (lb)	40	ASTM D 751 (MODIFIED)
SLURRY FLOW RATE (gal/min/sf)	0.3	
EQUIVALENT OPENING SIZE	30	US STD. SIEVE CW-02215
ULTRAVIOLET RADIATION STABILITY (%)	80	ASTM G-26

6. SILT FENCE MUST BE PLACED AT EXISTING LEVEL GRADE. BOTH ENDS OF THE BARRIER WILL BE EXTENDED 8' UPSLOPE AT 45 DEGREES TO THE MAIN BARRIER ALIGNMENT.



TYPICAL ROW–PLAN & PROFILE NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING AND CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

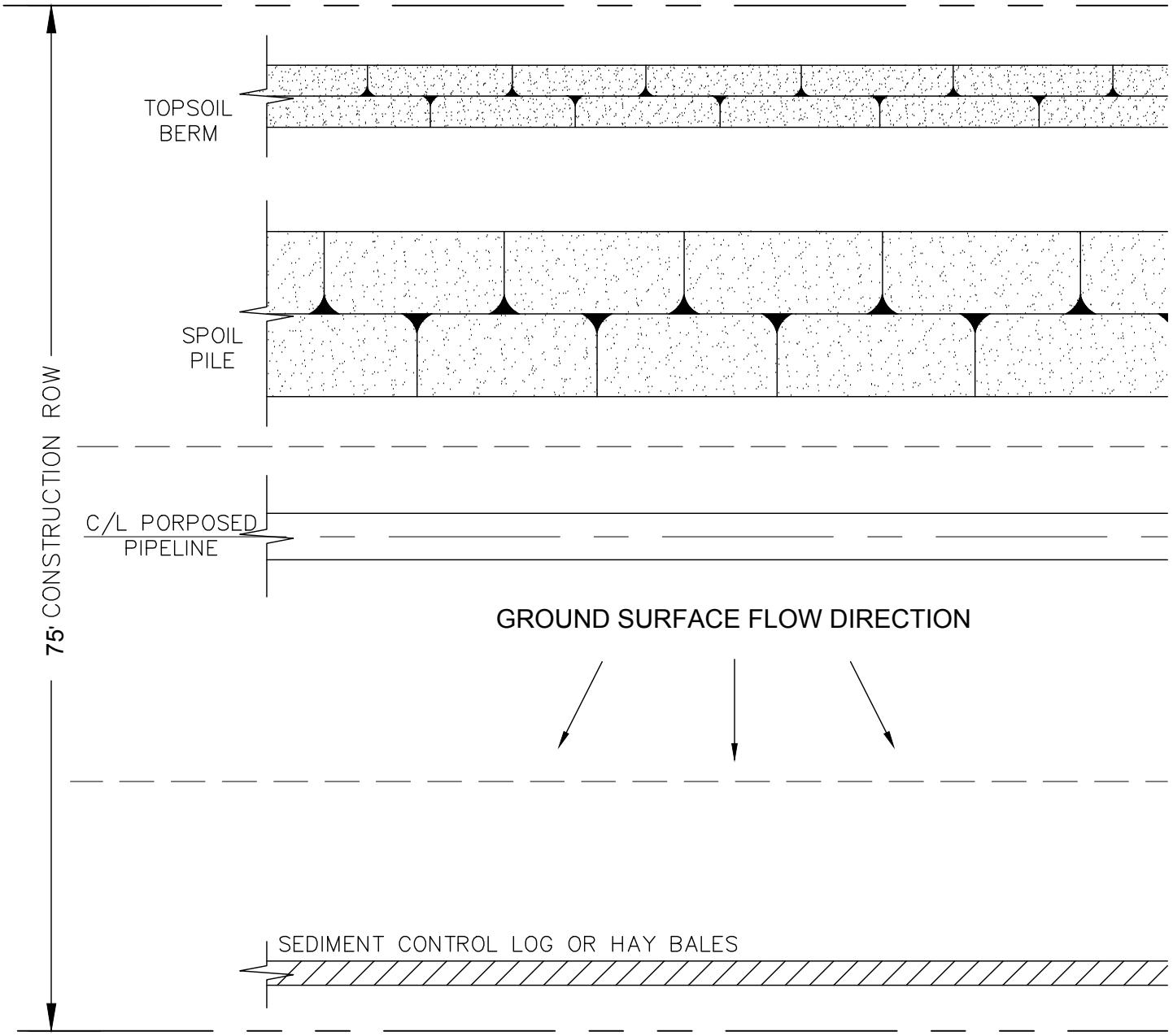
2. STOCKPILES SHOULD BE PLACED UP–GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

NOT TO SCALE

PROJECT NO:	TYPICAL ROW-PLAN & PROFILE VIEW	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				1 OF 6
DATE:				



TYPICAL ROW–PLAN & PROFILE NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING AND CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

2. STOCKPILES SHOULD BE PLACED UP–GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

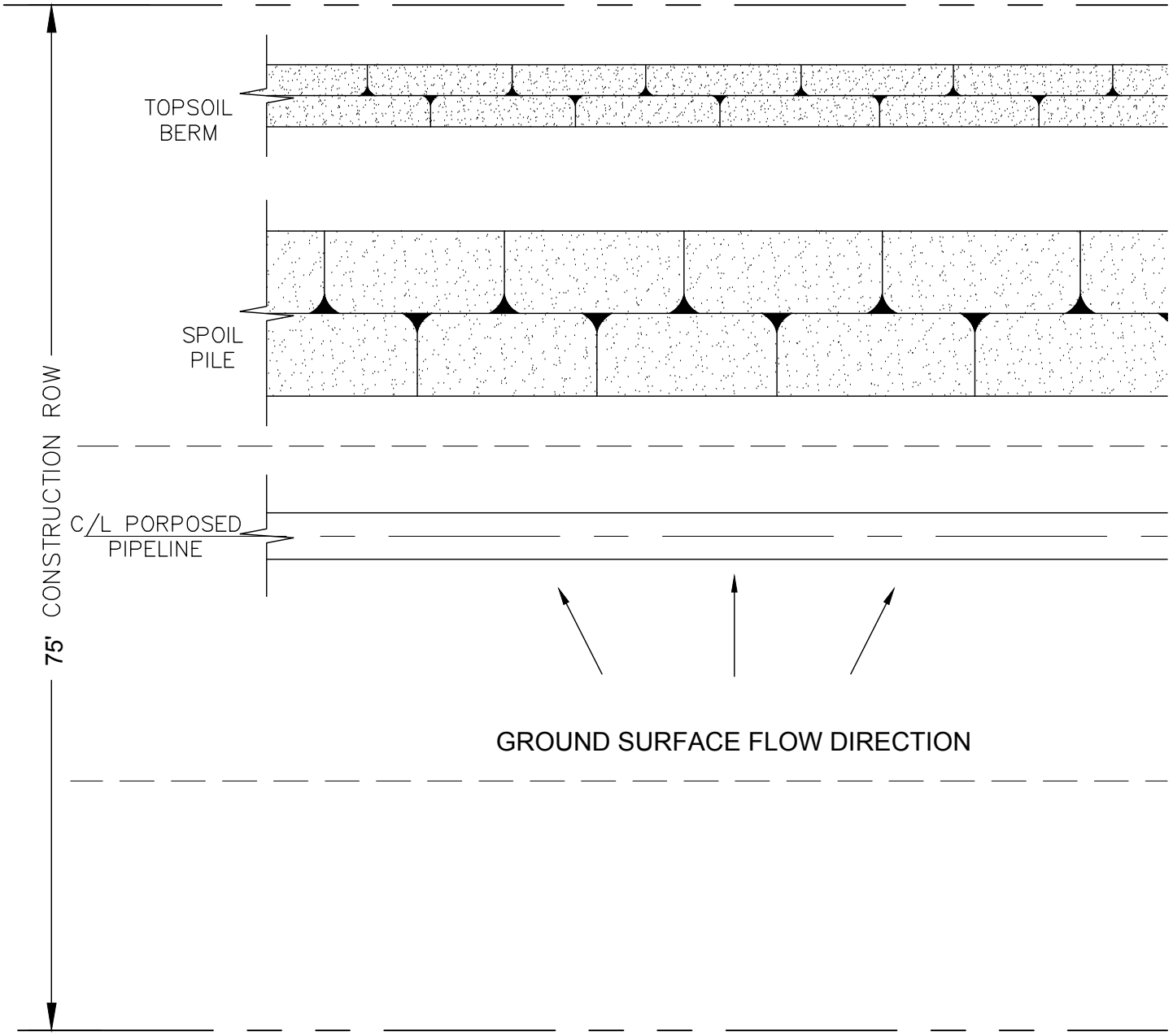
3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

NOTE:
TYPICAL BMP DETAIL FOR USE WHEN GROUND SURFACE FLOW DIRECTION IS DOWN–GRADIENT FROM PIPELINE TRENCH AND SOIL STOCKPILES

NOT TO SCALE

PROJECT NO:	TYPICAL BMP DURING CONSTRUCTION	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				2 OF 6
DATE:				



TYPICAL ROW–PLAN & PROFILE NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING AND CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

2. STOCKPILES SHOULD BE PLACED UP–GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

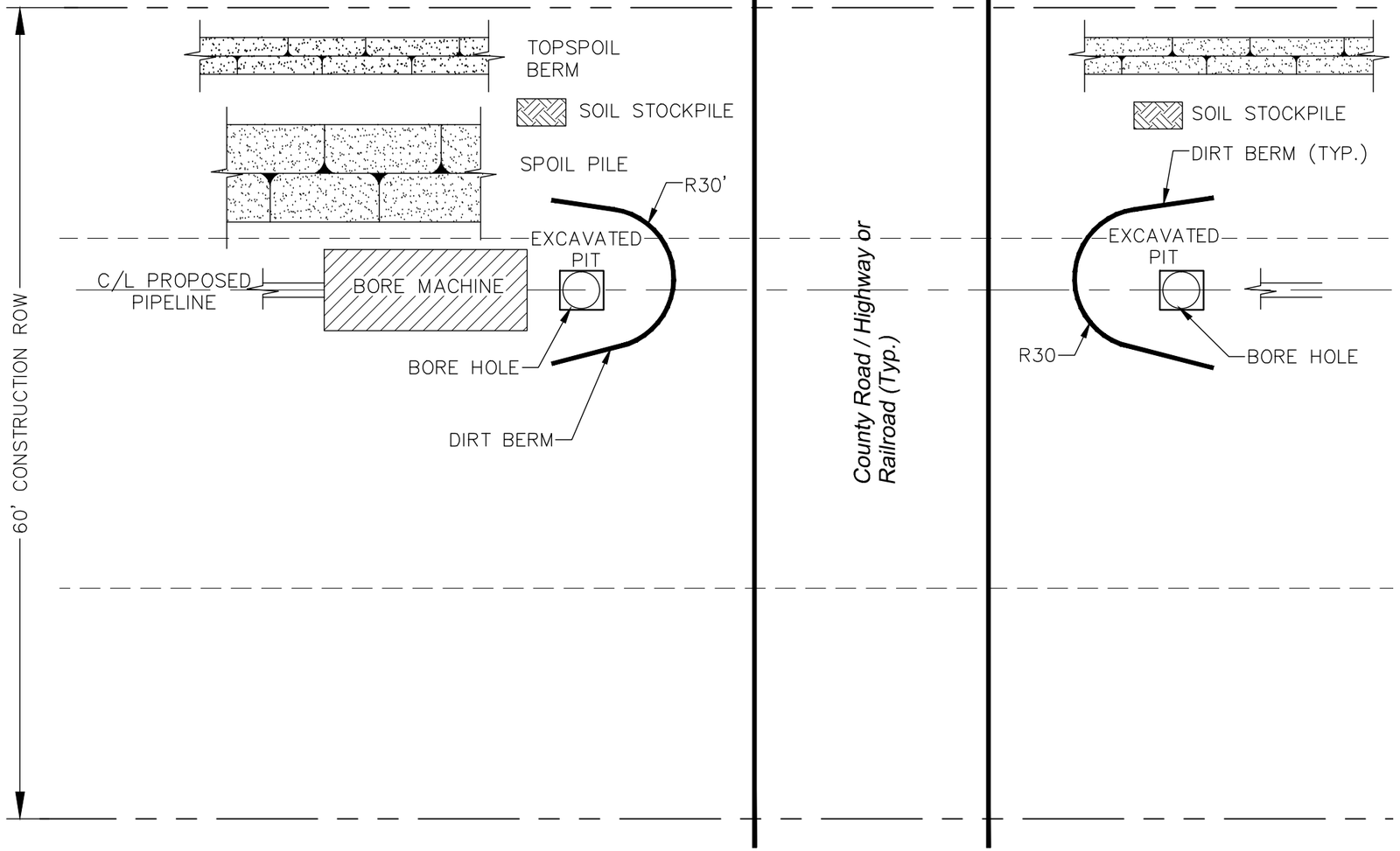
3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL / SCRAPED AS NEEDED.

NOTE:
TYPICAL BMP DETAIL FOR USE WHEN GROUND SURFACE FLOW DIRECTION IS TOWARDS THE PIPELINE TRENCH.

NOT TO SCALE

PROJECT NO:	TYPICAL BMP DURING CONSTRUCTION	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				3 OF 6
DATE:				



TYPICAL BMP FOR BORED ROAD CROSSING NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE USING HORIZONTAL DIRECT DRILLING TECHNIQUES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

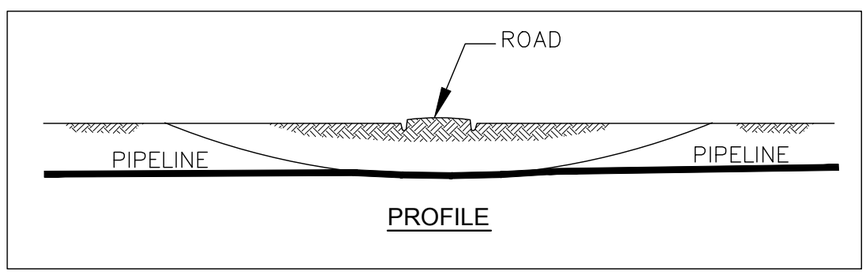
2. EXCAVATION PITS WILL REMAIN OPEN WITH PERIMETER ORANGE FENCING FOR THE DURATION OF THE BORING ACTIVITY.

3. STOCKPILES SHOULD BE PLACED UP-GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

4. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

5. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

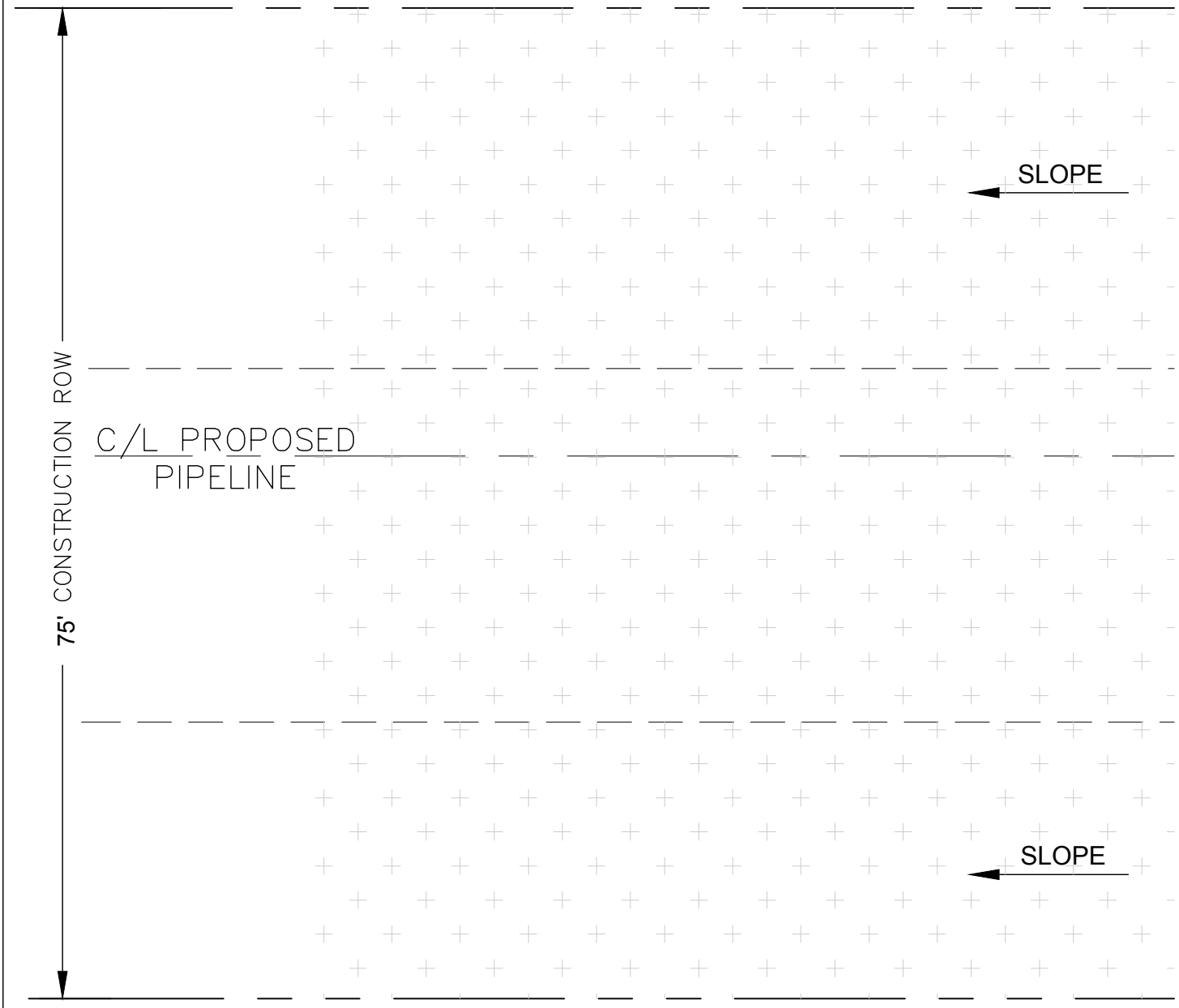
NOTE:
IF ROAD CROSSING IS PAVED, INSTALL VEHICLE STABILIZED CONSTRUCTION ENTRANCE BMP AT ACCESS POINTS TO PREVENT TRACKING OF DIRT/MUD ONTO PAVEMENT.



PROFILE

NOT TO SCALE

PROJECT NO:	TYPICAL BMP FOR BORED ROAD AND RAILROAD CROSSINGS	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	DETAIL
DRAWN BY:		116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	4 OF 6
DATE:			



TYPICAL BMP FOR POST CONSTRUCTION STABILIZATION NOTES

APPLICATION:
THESE STANDARD PRACTICES ARE USED FOR THE TYPICAL CONSTRUCTION ACTIVITIES PERFORMED WHILE INSTALLING NEW PIPELINE THROUGH TRENCHING AND BORING CONSTRUCTION ACTIVITIES.

GENERAL PRACTICES:
1. BMPS SHOULD BE PLACED PRIOR TO THE START OF ANY CONSTRUCTION ACTIVITY.

2. STOCKPILES SHOULD BE PLACED UP-GRADIENT OF THE TRENCH UTILIZING THE TRENCH ITSELF AS A BMP.

3. VEGETATIVE BUFFERS SHOULD BE PRESERVED AND UTILIZED AS A BMP WHENEVER POSSIBLE.

4. PAVED SURFACES IMPACTED BY THE SITE WILL BE SWEPT OF SOIL/ SCRAPED AS NEEDED.

LEGEND

SEED AND MULCH WITH CRIMP STRAW

NOT TO SCALE

PROJECT NO:	TYPICAL BMP FOR POST-CONSTRUCTION STABILIZATION ON SLOPES OF 3:1 OR GREATER	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	DETAIL
DRAWN BY:		116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	5 OF 6
DATE:			

SURFACE ROUGHENING INSTALLATION NOTES

1. SURFACE ROUGHENING SHOULD BE PROVIDED ON ALL FINISHED GRADES.

2. DISTURBED SURFACES SHALL BE ROUGHENED USING TILLING EQUIPMENT.

SURFACE ROUGHENING MAINTENANCE NOTES

1. VEHICLES AND EQUIPMENT SHOULD BE CONFINED TO ACCESS DRIVES NEAR THE EDGE OF THE RIGHT-OF-WAY AND NOT DRIVE OVER AREAS THAT HAVE BEEN SURFACE ROUGHENED.



SURFACE ROUGHENING

NOT TO SCALE

PROJECT NO:	SURFACE ROUGHENING	SWCA® ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.®	116 NORTH 4TH STREET SUITE 200 BISMARCK, ND 58501 TEL 701.258.6622 FAX 701.258.5957	DETAIL
DRAWN BY:				6 OF 6
DATE:				

APPENDIX B

FRAC-OUT CONTINGENCY PLAN

FRAC-OUT CONTINGENCY PLAN

CARBON DIOXIDE TRANSMISSION PIPELINE

Prepared for:

Denbury Green Pipeline-Montana, LLC

5320 Legacy Drive
Plano, Texas 75024

Prepared by:

SWCA Environmental Consultants 116
North 4th Street, Suite 200
Bismarck, ND 58801

December 2018

TABLE OF CONTENTS

Description **Page**

APPENDIX B 1
1.0 INTRODUCTION 1
2.0 DRILLING PROCESS AND DRILLING FLUID SYSTEMS 1
3.0 HDD CONTRACTOR RESPONSIBILITIES AND REQUIREMENTS 3
4.0 FRACTURE DETECTION 4
5.0 CORRECTIVE ACTIONS FOR AN INADVERTANT RELEASE 5
7.0 CLEAN-UP OF RELEASESE 6
8.0 AGENCY NOTIFICATION PROCEDURES 6

LIST OF TABLES

Table 1. Notification of Government Agencies 7

LIST OF FIGURES

Figure 1. Carbon Dioxide Transmission Pipeline Location Map 2
Figure 2. Typical Surface Expression of a Frac-Out 4

LIST OF ATTACHMENTS

Attachment A Safety Data Sheets

1.0 INTRODUCTION

This Frac-out Contingency Plan (Plan) provides specific procedures and steps to contain the inadvertent releases of drilling mud (frac-outs) for wetlands, lakes, ponds, highways, roads and other areas or structures that are crossed underneath using horizontal directional drilling (HDD) techniques. This plan is intended to:

- Provide for the timely detection of frac-outs.
- Ensure an organized, timely, and "minimum-impact" response in the event of a frac-out.
- Ensure that the HDD Contractor makes all the appropriate notifications.

This Plan is applicable for the Carbon Dioxide Transmission Project to be constructed in Slope and Bowman Counties, North Dakota by Denbury Green Pipeline-Montana, LLC (Denbury). As illustrated in Figure 1, the proposed Carbon Dioxide Transmission Pipeline will be an approximately 17.77-mile long, 12-inch-diameter steel pipeline that will connect transport carbon dioxide from a source in Fallon County, Montana to Denbury's oil production facilities in the Cedar Hills South Unit in Bowman County, North Dakota. The pipeline will enter North Dakota in southwestern Slope County and traverse east and south for 11.52 miles to its terminus. Along the proposed route in North Dakota, the pipeline will cross 2 waterbodies (e.g., streams and wetlands), 1 county or township road, and the Burlington Northern and Santa Fe Railroad tracks. Denbury plans to bore under these features using horizontal directional drilling (HDD) technology.

2.0 DRILLING PROCESS AND DRILLING FLUID SYSTEMS

The drilling process begins when the HDD machine pushes a bore head connected to hollow pipe into the ground at an angle. As each joint of drill pipe is pushed into the ground, a new one is added behind it. This process is continued until the bore head comes out of the ground at the end of the bore.

The most commonly used equipment for determining the location of the bore head is called a 'Walk Over' Locating system that uses a transmitter behind the drill bit that registers angle, rotation, magnetic direction and temperature data. The information is then encoded into an electro-magnetic signal, which is transmitted through the ground to the surface. At the surface, a receiver is manually positioned over the transmitting signal where the signal is decoded and steering directions are relayed to the operator of the drill machine.

The HDD process involves the use of drilling fluids (referred to as drilling mud) that consist primarily of water. Bentonite clay is added to the water to enhance lubrication, soil cuttings transport and caking properties of the drilling fluid. Bentonite is a naturally occurring, non-toxic, inert substance that meets NSF/ANSI 60 NSF Drinking Water Additives Standards and is frequently used as a component in drilling mud for drilling potable water wells.

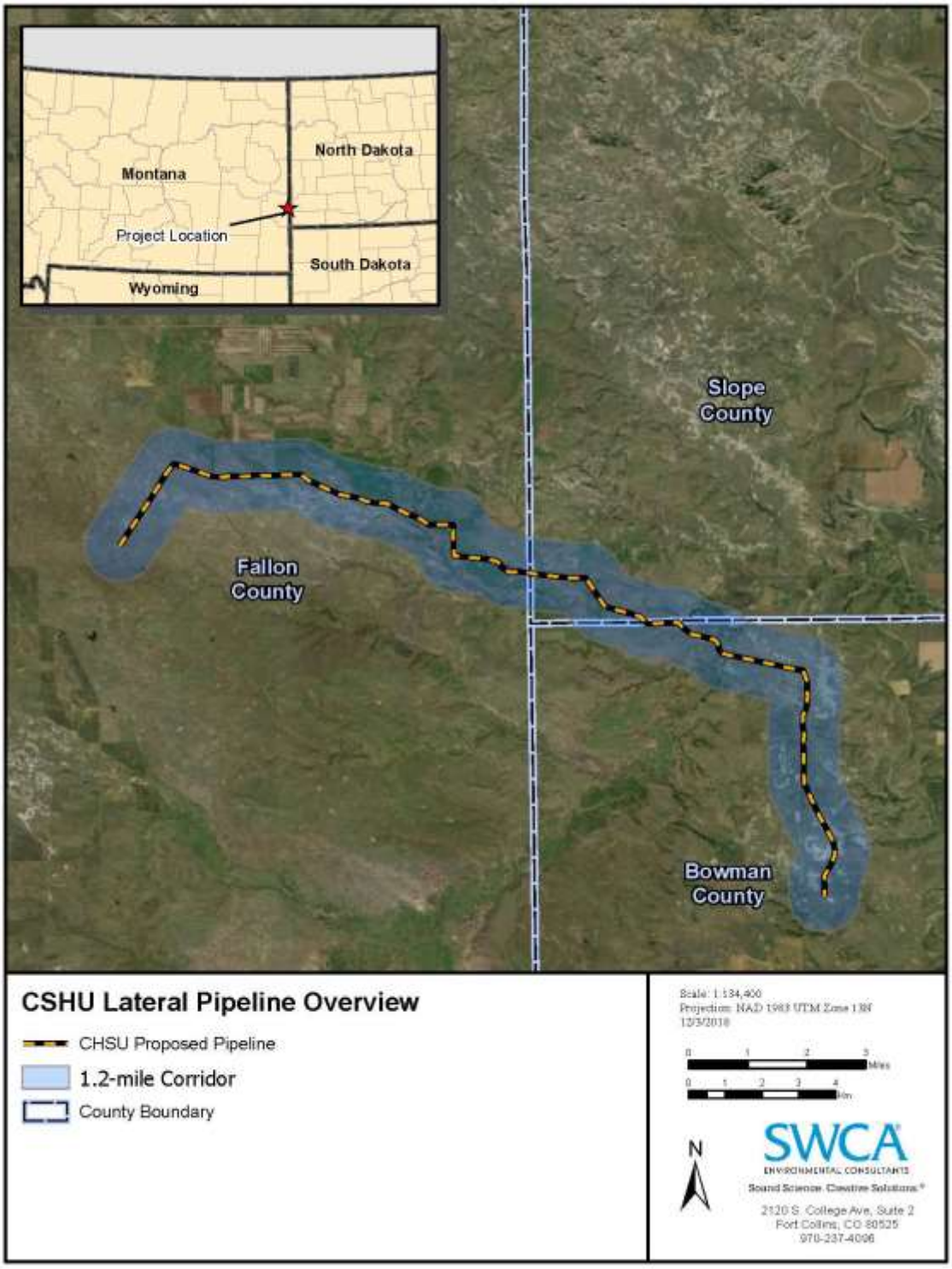


Figure 1. Carbon Dioxide Transmission Pipeline Location Map

The drilling fluid is prepared in a mixing tank containing both new and clean recycled drilling fluid. The drilling fluids to be used in this project may include Extra High Yield bentonite, Pipeclad 2000 Slow Gel, and FlowPac™. The Safety Data Sheets (SDS) for these materials are located in Appendix A. The fluid is pumped at a rate of 100 to 1,000 gallons per minute (gpm) through the center of the drill pipe to the drill head bit.

Return flow is through the annulus created between the wall of the boring and the drill pipe. The cuttings are then carried back to either the entry or the exit pit, depending on a combination of elevation difference and drilling/hole opening direction. Once in the entry pit, the fluid moves to the pickup pit to be pumped to the fluid processing equipment. Typically, shaker screens, desanders and desilters remove increasingly finer cuttings from the drilling fluid. The cleaned and recycled fluid is returned to the mixing tank and pumps for reuse in the borehole.

Upon reaching the exit point, the drill bit is detached and a reamer tool is attached. The reamer is pulled back while rotating the drill pipe, with as many passes as required to widen the borehole to the desired diameter. Once the borehole is the correct size for the pipe to be installed, it is attached to the end of the reamer and pulled through the hole. Throughout this process, bore fluid is being continually pumped into the hole to ensure that the hole is sealed, with no void being left between the pipe and the native soil.

The HDD method has the potential for loss or seepage of drilling fluid into subsurface unconsolidated soil through which the drill passes. In some cases, the drilling fluid may be forced to the surface resulting in what is commonly referred to as an inadvertent release or a frac-out. Drilling fluid release is typically caused by pressurization of the drill hole beyond the containment capability of the overburden soil material or due to an inherent weakness within the overlying soils, such as a fissure, fracture or other pathway.

The HDD operation is a closed system to minimize the discharge of drilling mud and cuttings outside the work area. To minimize the possibility of fluid escape, berms will be constructed around reserve pits used to contain the drilling fluid. Any drilling mud that inadvertently exits at points other than the entry and exit points will be contained and collected to the extent practical. Additional frac-out response actions are provided in the following sections.

3.0 HDD CONTRACTOR RESPONSIBILITIES AND REQUIREMENTS

The HDD contractor is responsible for detecting and controlling the inadvertent release of drilling fluid. A Denbury inspector will closely observe the progress and actions of the HDD contractor.

The HDD contractor will be equipped with a trac-hoe excavator, straw bales, stakes to secure bales, silt fence, sand bags, shovels, pumps, and any other materials or equipment necessary to contain and clean up inadvertent releases. A vacuum truck will be on call and available to respond to frac-out events during drilling operations.

4.0 FRACTURE DETECTION

Drilling crew personnel, the mud system operator, and the Denbury inspector will be responsible for the detection and monitoring of frac-outs. The most obvious signs of a frac-out are the visible pooling of drilling mud on the surface, a sudden decrease in mud volume returns during drilling operations, or loss in drilling mud pump pressure. The mud system operator will observe the volume of drilling fluid return and immediately report reductions to the drilling supervisor and Denbury inspector.

The mud system operator will monitor actual drilling fluid volumes from the pumps and the return flow from the borehole and will alert the on-site personnel if there is a significant variance. In the event of partial circulation loss, pumping of drilling fluid may be decreased to reduce borehole mud pressures applied to subsurface soil materials. Figure 2 illustrates a typical frac-out surface expression.



Figure 2. Typical Surface Expression of a Frac-Out

5.0 CORRECTIVE ACTIONS FOR AN INADVERTANT RELEASE

In the event of an inadvertent release to the surface, the following actions will be taken:

If the release is large, mud circulation will cease immediately as practical. If the spill is small to moderate, the contractor will continue circulation in order to maintain pressure in the borehole. Maintaining circulation may be necessary to maintain borehole stability.

In all cases, the HDD contractor will proceed as follows:

- Contain any drilling fluid that has surfaced;
- Notify the Denbury inspector;
- Reduce circulation pressure and evaluate the circumstances leading to the circulation loss to determine if the fracture can be sealed; and,
- Thicken the drilling fluid in an attempt to seal off the location of the release, if practical.

6.1 CONTAINMENT OF DRILLING FLUID RELEASE

Immediately following the detection of the inadvertent drilling fluid release, containment and clean-up operations will begin. For releases on land, the HDD contractor will use straw bales, silt fences, sand bags, hand tools and earthen berms to prevent fluid from migrating or flowing from the immediate area of the discharge. If the volume released is too small for containment measures or if the release occurs in an environmentally sensitive area where cleanup actions would cause environmental surface damage, the receiving area will be allowed to dry naturally. If there is a threat to a sensitive resource, or a threat to public safety, HDD activities will cease immediately until a plan to proceed is discussed and approved by Denbury.

Other containment measures include the following:

- Additional berms and sediment control devices may be constructed around the release area as directed by the Denbury inspector to prevent the release of drilling mud into an adjacent water body;
- If hand tools cannot contain a small on-land release, small collection sumps may be constructed to pump the released material into the mud processing systems;
- Sump pumps or vacuum trucks will be used to remove and dispose of any drilling fluids as needed.

In cases of inadvertent releases to open water or flooded wetlands, it may be impractical or impossible to contain the release. For releases in shallow water, the HDD contractor will shut down drilling fluid circulation to minimize the volume of the release.

The decision to proceed with the HDD drilling operation will be at the sole discretion of Denbury after all practical methods to seal off the release location of the discharge have been attempted.

7.0 CLEAN-UP OF RELEASESE

Cleanup activities will start immediately after the release has been contained and will entail removal of as much bentonite drilling mud that can be collected. Removal methods will vary based on the volume of the release and site-specific conditions. Removal equipment may include vacuum trucks, loader and trackhoe buckets, small pumps, and hand tools (e.g., shovels and buckets). In some instances, the bentonite drilling mud may remain in place because cleanup operations would cause more harm to the wetland or water body. Special tools, such as open-ended wooden boxes, opened ended steel drums or other similar equipment, may be used to isolate the drilling fluid in water so it can be removed using vacuum truck. After removal of the released drilling fluid, the release area will be returned as close to the original condition as possible.

8.0 AGENCY NOTIFICATION PROCEDURES

If an inadvertent release is discovered, steps will be taken to contain the release as described in Section 6.0. Notification procedures for Denbury construction management personnel and regulatory agencies are as follows:

- When monitoring indicates that a wetland or surface water body release has occurred, the Denbury inspector will notify the Denbury Project Manager as soon as possible. The nature of the release will be described and corrective actions will be detailed. The Project Manager will determine if additional measures are required and if drilling operations should continue; and,
- The Project Manager will notify the appropriate government agencies listed in Table 1 as soon as possible, depending on site conditions, but no later than 24 hours after the release.

Table 1. Notification of Government Agencies

NOTIFICATION OF OUTSIDE PARTIES
PUBLIC SAFETY OFFICIALS AND GOVERNMENT AGENCIES

Denbury Pipeline Operating Partnership, L.P.
Carbon Dioxide Transmission Pipeline Project

PUBLIC SAFETY NOTIFICATION

Fire 911
Police 911

GOVERNMENT AGENCY NOTIFICATIONS

National Response Center **1-800-424-8802**
(24 hr/day-7 days/week)

North Dakota Department of Health (toll free) ..... **1-(800) 472-2121**
Environmental Health Section (701) 328-5150
Division of Water Quality ..... (701) 328-5210
Division of Waste Management ..... (701) 328-5166

North Dakota Industrial Commission,
Department of Mineral Resources, Oil and Gas Division ..... (701) 328-8020
North Dakota Department of Emergency Services ..... (701) 328-8100

Slope County

Slope County Highway Department (Dale Powell, Foreman) ..... (701) 879-5667
Emergency Management (Richard Frederick, Manager) ..... (701) 879-6329
Slope County Sheriff's Department (Rory Teigen, Sheriff) ..... (701) 879-6271

Bowman County

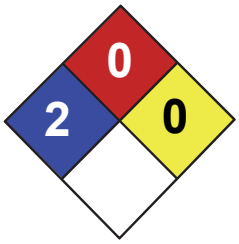
Bowman County Highway Department (Shane Biggs, Superintendent) ..... (701) 523-5843
Emergency Management (Dean Pearson, Manager) ..... (701) 523-3129
Bowman County Sheriff's Department (Dick Frederick, Sheriff) ..... (701) 523-5421

APPENDIX A

SAFETY DATA SHEETS

Attachment A

Safety Data Sheet



Health	2
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Bentonite MSDS

Section 1: Chemical Product and Company Identification

Product Name: Bentonite

Catalog Codes: SLB1441, SLB2935, SLB4435

CAS#: 1302-78-9

RTECS: CT9450000

TSCA: TSCA 8(b) inventory: Bentonite

CI#: Not applicable.

Synonym: Montmorillonite;

Chemical Name: Not available.

Chemical Formula:
(Al,Fe1.67Mg.33)Si10(OH)2Na(+)Ca(++)/2.33

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Bentonite	1302-78-9	100

Toxicological Data on Ingredients: Bentonite LD50: Not available. LC50: Not available.

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant), of ingestion.

Potential Chronic Health Effects:
Hazardous in case of inhalation. CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not breathe dust. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If you feel unwell, seek medical attention and show the label when possible.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 10 from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Odorless.

Taste: Not available.

Molecular Weight: Not available.

Color: Beige. (Light.)

pH (1% soln/water): Not available.

Boiling Point: Not available.

Melting Point: Decomposes.

Critical Temperature: Not available.

Specific Gravity: 2.5 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Very slightly soluble in cold water, hot water. Insoluble in methanol, diethyl ether, n-octanol, acetone.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Not available.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans: Causes damage to the following organs: lungs.

Other Toxic Effects on Humans:
Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Bentonite

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): R36- Irritating to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:14 PM

Last Updated: 11/01/2010 12:00 PM

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Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO2 Lateral Pipeline, Slope and Bowman Counties, North Dakota

MARCH 2019

PREPARED FOR

Denbury Green Pipeline Montana, LLC

AGENCY

State Historical Society of North Dakota

PREPARED BY

SWCA Environmental Consultants

UNANTICIPATED DISCOVERY PLAN FOR DENBURY'S CEDAR HILLS SOUTH UNIT CO2 LATERAL PIPELINE, SLOPE AND BOWMAN COUNTIES, NORTH DAKOTA

Submitted to

State Historical Society of North Dakota

Prepared for

Denbury Green Pipeline – Montana, LLC
5320 Legacy Drive
Plano, Texas 75024

Prepared by

Christine Varah
Principal Investigator: Naomi Ollie

SWCA Environmental Consultants
1892 South Sheridan Ave.,
Sheridan, Wyoming 82801

March 15, 2019

CONTENTS

Introduction **1**
Qualifications **1**
Construction Personnel 1
Discovery Definition **2**
Procedures for Addressing Discoveries Identified by Construction Personnel **2**
Treatment of Discoveries by Archaeological Personnel **3**
Agency Notification and Reporting **3**
Special Procedures for Discoveries of Human Remains **3**
References Cited **5**

Tables

Table 1. Contact Information 4

Appendices

Appendix A. Procedures for Addressing Cultural Resource Discoveries by Construction Personnel
Appendix B. Procedures for the Treatment of Unanticipated Discovery of Human Remains

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INTRODUCTION

This Unanticipated Discovery Plan (Plan) documents the procedures to be implemented in the event cultural resources are discovered during construction of the Cedar Hills South Unit CO2 Lateral Pipeline (CHSU Pipeline). Denbury Green Pipeline -Montana, LLC (Denbury) proposes to construct a 17.76-mile-long pipeline through southeast Montana and southwest North Dakota. The 12-inch-diameter pipeline would carry CO_2 from a facility in the Coral Creek Oil Unit south of Baker, Montana, to the Cedar Hills South Oil Unit south of Marmarth, North Dakota. The proposed temporary surface disturbance would consist of a 75-foot disturbance corridor. This Plan applies to the 9.22 miles of the proposed pipeline in North Dakota located on privately owned lands in Slope and Bowman Counties. Denbury retained SWCA Environmental Consultants (SWCA) to complete this Plan in support of the North Dakota Public Service Commission's Certificate of Corridor Compatibility and Route Permit application.

Significant historic or archaeological artifacts or sites located on lands under the jurisdiction of the State of North Dakota or its political subdivisions are protected under Section 55-02-07 of the North Dakota Century Code (NDCC). Furthermore, NDCC Section 23-06-27 and North Dakota Administrative Code (NDAC) Section 40-02-03 provide special protection of human burial sites, human remains, and burial goods. In accordance with applicable North Dakota laws and regulations, this Plan contains procedures for addressing cultural resource discoveries identified by construction personnel during construction of Denbury's Cedar Hills South Unit CO2 Lateral Pipeline including procedures for the initial treatment of discoveries, the evaluation and treatment of discoveries, and the treatment of human remains.

A Class I and Class III cultural resource inventory was performed for the project area (Varah 2019). During the inventory, SWCA personnel recorded one newly identified site—32SL0406, a historic farmstead site—and one isolated find (32BOX0461). No previously recorded sites were encountered. 32SL0406 is recommended not eligible for inclusion in the National Register of Historic Places (NRHP). Isolated finds are considered to lack the historic integrity necessary to be considered eligible for the NRHP. Therefore, no further work is recommended for these resources and SWCA recommends the project be granted a determination of No Historic Properties Affected and clearance to proceed as planned. This Plan has been prepared because the potential exists for exposure of previously unidentified or buried cultural material within the project route during mechanical excavation.

QUALIFICATIONS

Construction Personnel

Training is necessary to ensure construction personnel recognize potential archaeological resources. All Denbury responsible parties and construction personnel will meet with Denbury representatives for basic training prior to participating in construction. This training will provide orientation regarding recognition of cultural resources as well as a general overview of the culture history of the region, so that construction personnel are familiar with the types of archaeological resources that may be encountered during construction. The training will also outline the steps to be followed in the event of a significant archaeological discovery during construction (e.g., the discovery of human remains). The following items will be reviewed during the training program.

- Definition of a discovery and examples of discoveries.
- Steps towards discovery protection until such time as they can be properly evaluated by a qualified archaeologist.
- Proper notification of the appropriate Denbury personnel.

- The necessity of reporting discoveries in a timely manner and complying with the other stipulations provided in this Plan.
- The need to treat any human skeletal remains that are encountered with dignity and respect.
- Penalties for failure to report discoveries or to comply with the procedures outlined in this Plan.

DISCOVERY DEFINITION

Archaeological discoveries consist of evidence of human activity that is more than 50 years old with potential to yield data pertinent to regional history and prehistory. Prehistoric discoveries include, but are not limited to, features (small hearth features, house pit features, storage features, etc.), artifact concentrations, and activity areas. Historic discoveries include, but are not limited to, features (historic hearths, trash deposits, structures, old canals, roads, etc.), artifact concentrations, and activity areas. Small concentrations of non-human bone with no evidence of cultural modifications (i.e. butchering, processing, or other modifications) will not be considered discoveries.

PROCEDURES FOR ADDRESSING DISCOVERIES IDENTIFIED BY CONSTRUCTION PERSONNEL

The following procedures will be initiated in the event unanticipated cultural resources are discovered. A flow chart presenting an abbreviated version of the procedures is provided in Appendix A. When a discovery is encountered, the construction activity that resulted in the exposure of the discovery will be immediately halted and the construction manager will be notified. The construction manager in turn will notify the Denbury project manager.

Denbury's responsible party involved in unanticipated discoveries of archeological materials will order construction contractors to suspend ground-disturbing activities adjacent to the discovery. Cessation of ground-disturbing activity will encompass a sufficient area to protect the discovery and provide a buffer zone for adequate and safe investigation of the discovery and any associated features or artifacts. A recommended guideline for the buffer zone is at least 50 feet (15 meters [m]) around the discovery, but its size can be adjusted to protect the discovery adequately without unnecessary hindrance to construction. Visual barriers such as temporary fencing or flagging will be placed around the discovery area to protect it from further disturbance. Vehicle traffic within the vicinity may need to be limited or halted until the discovery is inspected.

Denbury's responsible party will then notify and consult an archeologist qualified under NDAC Section 40-02-02 to review the discovery. In the event a qualified archaeologist is not immediately available, photographs of the discovery may be transmitted to the archaeologist for review, at which time the archaeologist will determine if a field visit is required. During the review phase, suspension of all work and vehicle traffic in the buffered area is required. If the archaeologist determines that the discovery is non-cultural, Denbury will be notified, and the halted construction activity can resume.

If the discovery is deemed cultural and a field visit is required, the archaeologist will be scheduled for an on-site visit as soon as possible. In the meantime, Denbury's responsible party will notify the construction manager to suspend work within the buffered discovery area until the field visit by the archaeologist occurs. During the field visit, the archaeologist will determine whether the discovery is potentially significant.

TREATMENT OF DISCOVERIES BY ARCHAEOLOGICAL PERSONNEL

When a discovery is reviewed by an archaeologist, the discovery will be fully recorded according to approved standards. The initial treatment of any discovery will consist of recording the location of the discovery; recording summary data concerning the feature(s) and/or other remains (including dimensions, qualitative characteristics, and associated remains); photographing the discovery and the overall context of the exposed material; and profiling trench walls containing cultural features or strata (where safe and prudent). The feature(s) will then be excavated and a sample or all feature fill will be collected for laboratory analysis including pollen studies, flotation, and carbon dating as appropriate. Feature plans and profiles will be drawn. Features will be photographed. Uncollected feature fill will be screened using 0.25-inch mesh. If necessary, additional horizontal exposure of sediments/deposits around the feature may be investigated to evaluate the feature context.

When appropriate, the location around the discovered cultural material will be tested to determine the extent of the cultural material. Testing can include, but is not limited to, excavation of controlled units over and around the feature area or placement of test units and/or auger probes. Testing will be designed to identify the nature and extent of the discovery and any associated activity area(s) or other features, if present. Collection of a discovery will occur when appropriate.

AGENCY NOTIFICATION AND REPORTING

If a discovery is deemed potentially significant, Denbury and the archaeologist will consult and coordinate with a Principal Investigator to determine the next course of action. If necessary, the Principal Investigator will coordinate with the State Historical Society of North Dakota (SHSND) to propose procedures for further treatment of the discovery, while minimizing impacts to the construction schedule to the extent possible. Construction activities in the discovery area may not proceed until approval has been obtained from the SHSND and other involved agencies and parties.

A report detailing all cultural resources identified, recorded, tested, and/or excavated during the construction phase of the Denbury's CHSU Pipeline Project, regardless of significance, will be prepared by the archaeologist and submitted to the SHSND for review.

SPECIAL PROCEDURES FOR DISCOVERIES OF HUMAN REMAINS

Should human remains be encountered during construction of the Denbury's CHSU Pipeline Project, per the protocol outlined above, all work will be immediately halted at the general location of the discovery. This location will be immediately secured, including a buffer zone of 50 feet (15 m) surrounding the discovery. Construction personnel and vehicles will promptly vacate the buffer zone. Vehicle traffic within the buffer zone will be limited to that necessary to remove vehicles and equipment from the buffer zone. Care will be taken to prevent any disturbance of the potential human remains during removal of vehicles and equipment. Until appropriate consultation has occurred, the discovery will remain protected from any disturbance, such that no remains or associated artifacts are touched, moved, or collected.

Following notification of the construction manager and Denbury project manager, Denbury will immediately notify local law enforcement, the county coroner, and the SHSND. Contact information for relevant parties is listed in Table 1.

Table 1. Contact Information

Contact/Agency	Telephone	Address
County Sherriff's Office, Slope County, North Dakota	701.879.6271	PO Box 485 Amidon, North Dakota 58620
County Sherriff's Office, Bowman County, North Dakota	701.523.5421	104 1st St NW, Suite #9 Bowman, North Dakota
Slope County Coroner & Medical Examiner's Office, Slope County, North Dakota	701.879.6271	PO Box 485 Amidon, North Dakota 58620
Bowman County Medical Examiner & Coroner	701-523-3290	301 South Main Street Bowman, North Dakota 58623
Chief Archaeologist (Paul Picha), Archaeology and Historic Preservation Division, State Historical Society of North Dakota	701.328.3574	612 East Boulevard Avenue Bismarck, North Dakota 58505

The coroner and local law enforcement will make the official ruling on the nature of the remains, being either forensic or archaeological. The subsequent treatment of the discovery, including custody of the remains, will follow guidelines set forth in the NDCC Chapter 23-06 and NDAC Section 40-02-03, as follows.

- If the remains are deemed forensic (non-archaeological), the county coroner will retain custody of the remains and determine the plan of action.
- If the remains are deemed to be archaeological (historic or prehistoric) in nature, within 24 hours of notification, the SHSND will send a staff member to evaluate the remains and determine the cultural affiliation and age of the remains, if possible. The subsequent plan of action will depend on the cultural affiliation of the burial.
    - If human remains are determined to be non-Native American, the SHSND will retain custody of the burial and, following consultation with appropriate parties, determine a plan of action.
    - If the human remains are determined to be Native American or of unknown cultural affiliation, the remains will be left in place and protected from any form of disturbance until a plan for their protection or removal can be generated. The SHSND will contact and consult with the North Dakota Intertribal Reinternment Committee to determine the subsequent plan of action.

A flow chart presenting an abbreviated version of the procedures to be followed should human remains be encountered is provided in Appendix B.

REFERENCES CITED

Varah, Christine

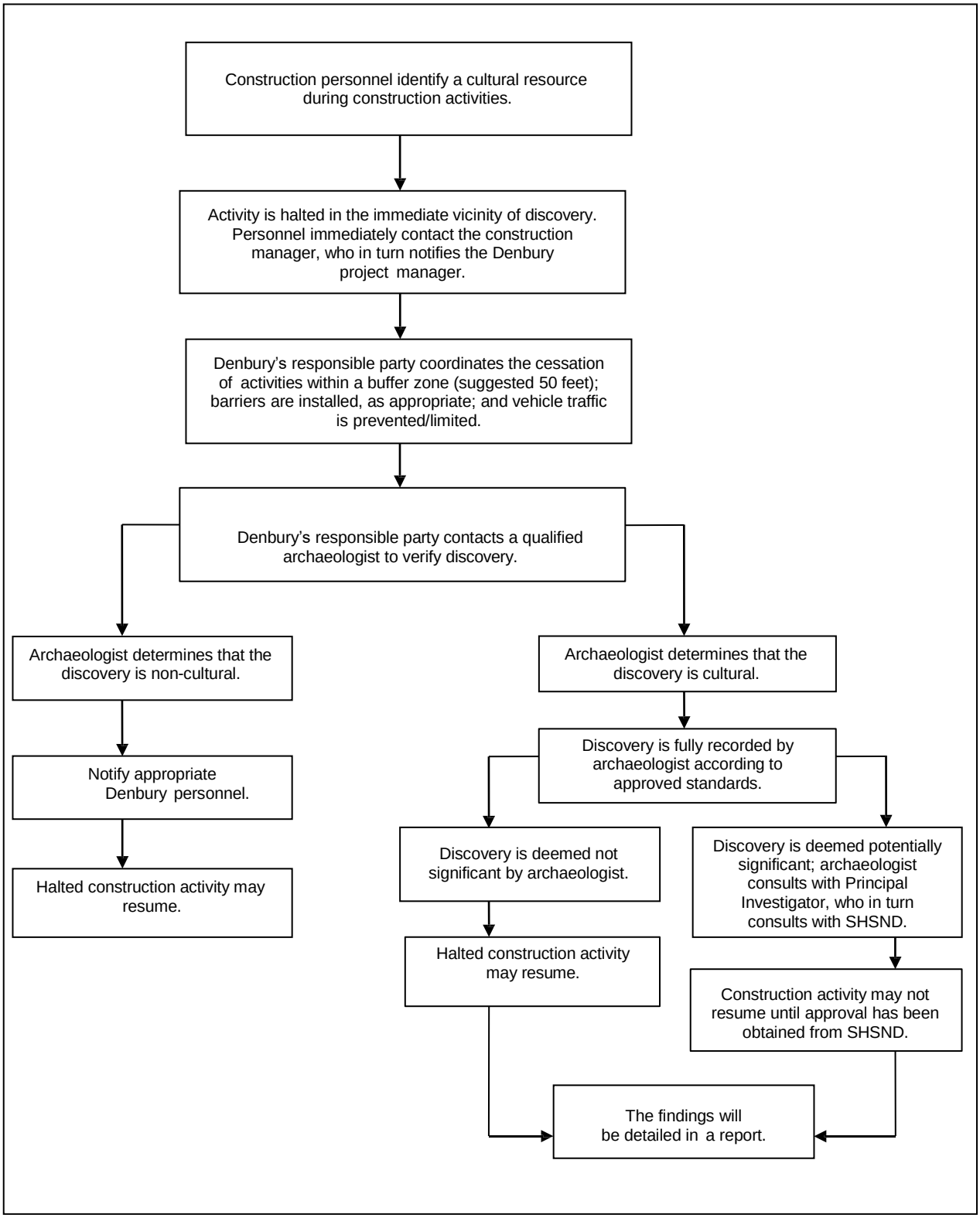
2019 *A Class I and Class III Cultural Resource Inventory for Denbury's Cedar Hills South Unit CO2 Lateral Pipeline, Slope and Bowman Counties, North Dakota.* An unpublished report prepared by SWCA Environmental Consultants and submitted to the State Historical Society of North Dakota.

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APPENDIX A

Procedures for Addressing Cultural Resource Discoveries by Construction Personnel

PROCEDURES FOR ADDRESSING CULTURAL RESOURCE DISCOVERIES BY CONSTRUCTION PERSONNEL

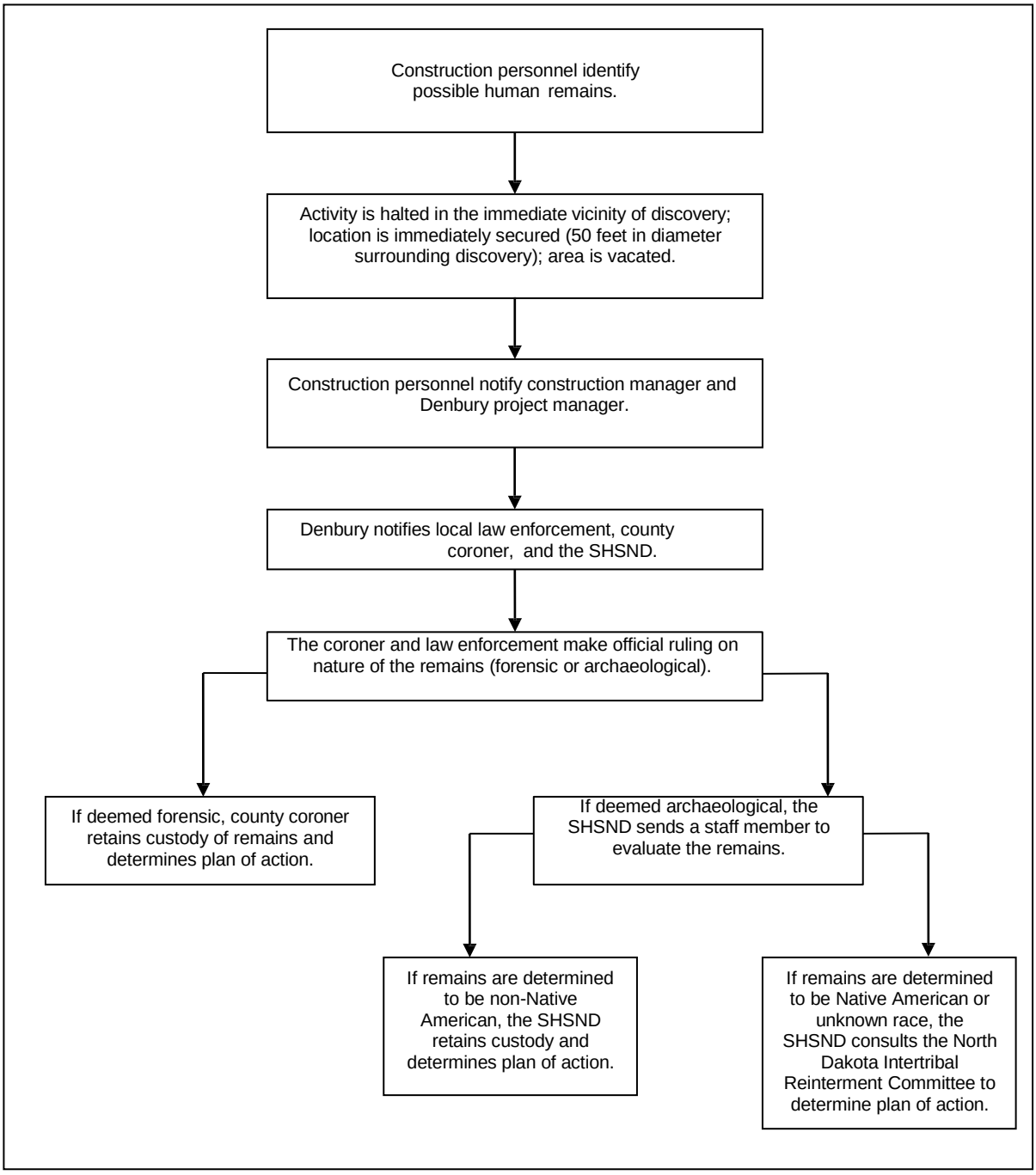


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APPENDIX B

Procedures for the Treatment of Unanticipated Discovery of Human Remains

PROCEDURES FOR THE TREATMENT OF UNANTICIPATED DISCOVERY OF HUMAN REMAINS



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STATE HISTORICAL SOCIETY OF NORTH DAKOTA

Doug Burgum
Governor of North Dakota

North Dakota State Historical Board

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Medora - Vice President

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Sara Otte Coleman
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Alvin A. Jaeger
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Melissa Baker
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Department of Transportation

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Director

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March 28, 2019

Ms. Naomi Ollie
Principal Investigator
SWCA
1892 South Sheridan Avenue
Sheridan, WY 82801

ND SHPO Ref: 19-0233 ND Public Service Commission "A Class I ad Class III Cultural Resource Inventory and an Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota"

Dear Ms. Ollie,

We reviewed ND SHPO Ref: 19-0233 ND Public Service Commission "A Class I ad Class III Cultural Resource Inventory and an Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO2 Lateral Pipeline, Slope and Bowman Counties, North Dakota," and find the revised (March 26, 2019) report acceptable. We concur with a "No Significant Sites Affected" determination for project, provided site 32BO245 is avoided by the project, and provided the project remains as mapped and described in the revised SWCA report.

The "Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota" is acceptable.

Thank you for the opportunity to review this project. Please include the ND SHPO reference number listed above in any further correspondence for this specific project. If you have any questions, please contact Paul Picha at (701)-328-3574 or Susan Quinnell at (701) 328-3576 or squinnell@nd.gov.

Sincerely,

Claudia J. Berg
Director, State Historical Society of North Dakota

APPENDIX D
Natural Resources Report

Natural Resources and Wetland Delineation Report for the Cedar Hills South Unit Lateral CO_2 Pipeline Project, Bowman and Slope Counties, North Dakota

APRIL 1, 2019

PREPARED FOR

Denbury Green Pipeline- Montana, LLC

PREPARED BY

SWCA Environmental Consultants

NATURAL RESOURCES AND WETLAND DELINEATION REPORT FOR THE CEDAR HILLS SOUTH UNIT LATERAL CO_2 PIPELINE PROJECT, BOWMAN AND SLOPE COUNTIES, NORTH DAKOTA

Prepared for

Denbury Green Pipeline - Montana LLC

Prepared by

Jenny McCarty

Reviewed by

Mac Fuller, Senior Biologist

SWCA Environmental Consultants
2120 South College Ave, Suite 2
Fort Collins, CO 80525
Phone (970) 237-4096

SWCA Project No. 28464.32

April 1, 2019

TABLE OF CONTENTS

1 INTRODUCTION 1
1.1 Background 1
1.2 Survey Area 3
1.3 Regulatory Background 3
1.3.1 North Dakota Administrative Code Section 69-06-08-02 3
1.3.2 Clean Water Act, Section 404 4
1.3.3 USACE Nationwide Permit 12 4
1.3.4 USACE Regional Conditions 4
1.3.5 Endangered Species Act 5
1.3.6 Migratory Bird Treaty Act 5
1.3.7 Bald and Golden Eagle Protection Act 5
2 METHODS 5
2.1 Pre-Field Review 5
2.2 Wetlands 5
2.2.1 Hydrophytic Vegetation 6
2.2.2 Wetland Hydrology 6
2.2.3 Hydric Soil 6
2.3 Waterbodies 6
2.4 Tree, Sapling, and Shrub Count 7
2.5 Noxious Weed Surveys 7
2.6 Wildlife Including Threatened and Endangered Species 8
2.7 Mapping 8
3 RESULTS 8
3.1 Vegetation 8
3.1.1 Herbaceous Upland 8
3.1.2 Cropland 9
3.1.3 Hydrophytic Vegetation 9
3.2 Hydrology 9
3.3 Wetlands 10
3.4 Waterbodies 10
3.5 Soils 11
3.6 Tree, Sapling, and Shrub Count 12
3.7 Noxious Weeds 14
3.8 Wildlife 14
3.8.1 Gray Wolf 15
3.8.2 Whooping Crane 15
3.8.3 Northern Long-eared Bat 16
3.8.4 Greater Sage-grouse 16
3.8.5 Wildlife Observed 17
3.8.6 Migratory Birds 17
3.8.7 Bald Eagle 17
3.8.8 Golden Eagle 18
4 CONCLUSIONS and Recommendations 18
5 LITERATURE CITED 20

List of Appendices

Appendix A. Vicinity Site Layout and Natural Resource Maps
Appendix B. NWP 12 Fact Sheet
Appendix C. Wetland Delineation Data Forms
Appendix D. Photographs of Project Area
Appendix E. State of North Dakota 401 Certification
Appendix F. Soil Descriptions

Figures

Figure 1. Project location map. 2
Figure 2. General topography within project area. 3

Tables

Table 1. Monthly Recorded Rainfall at National Weather Service Station in Bowman, North Dakota 9
Table 2. PEM Wetland Acreage within the Survey Area 10
Table 3. Waterbodies Width and Survey and Disturbance Length and Acreage 11
Table 4. Soil Map Units Present within the Survey Area 11
Table 5. Tree, Sapling, and Shrub Count 13
Table 6. Listed Noxious Weeds in Bowman and Slope Counties, North Dakota (2019) 14
Table 7. Wildlife Observed during Field Surveys of the Pipeline Route 17

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1 INTRODUCTION

1.1 Background

Denbury Green Pipeline - Montana LLC (Denbury) is proposing to construct and operate the Cedar Hills South Unit (CHSU) Lateral Carbon Dioxide (CO_2) Pipeline Project (Project) on privately owned lands in Bowman and Slope Counties, North Dakota and Fallon County, Montana. SWCA Environmental Consultants (SWCA) conducted natural resources field surveys to identify exclusion and avoidance areas as specified in North Dakota Administrative Code 69-06-08-02 for the proposed pipeline system.

The Project will include an approximately 17.77-mile-long, 12-inch-diameter pipeline carrying CO_2 from a facility in the Coral Creek Oil Unit south of Baker, Montana, to the Cedar Hills South Oil Unit south of Marmarth, North Dakota (Figure 1). The section of the project within North Dakota falls under the jurisdiction of the North Dakota Public Service Commission (NDPSC). This report will focus solely on the portion of the project that is located within North Dakota bounds (9.23 miles) to support NDPSC permitting. Denbury contracted SWCA Environmental Consultants, LLC (SWCA) to conduct natural resources field services for this Project.

SWCA conducted field surveys of a 200-foot-wide pipeline survey corridor (75-foot-wide right-of-way [ROW]) and associated infrastructure on October 11 and 12, 2018, to determine the potential presence and extent of wetlands and waterbodies, including those that are likely jurisdictional waters of the U.S. according to the U.S. Army Corps of Engineers (USACE) regulatory program. Concurrently with the wetland determinations, SWCA conducted a cursory threatened and endangered species survey and habitat assessment; a tree, sapling, and shrub enumeration survey; and a noxious weed survey. Site layout maps of the survey area and natural resource features identified during the field surveys are provided in Appendix A.

This report describes the methodology used by SWCA to complete each of the aforementioned surveys. Additionally, this report presents the results of the completed field surveys and provides regulatory recommendations to comply with the Clean Water Act of 1972 (33 United States Code [USC] 1251-1387). Lastly, this report ensures observance of and offers mitigation measures for resources protected by the Endangered Species Act of 1973 (ESA) (16 USC 1531-1544), Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712), and Bald and Golden Eagle Protection Act of 1940 (BGEPA) (16 USC 668).

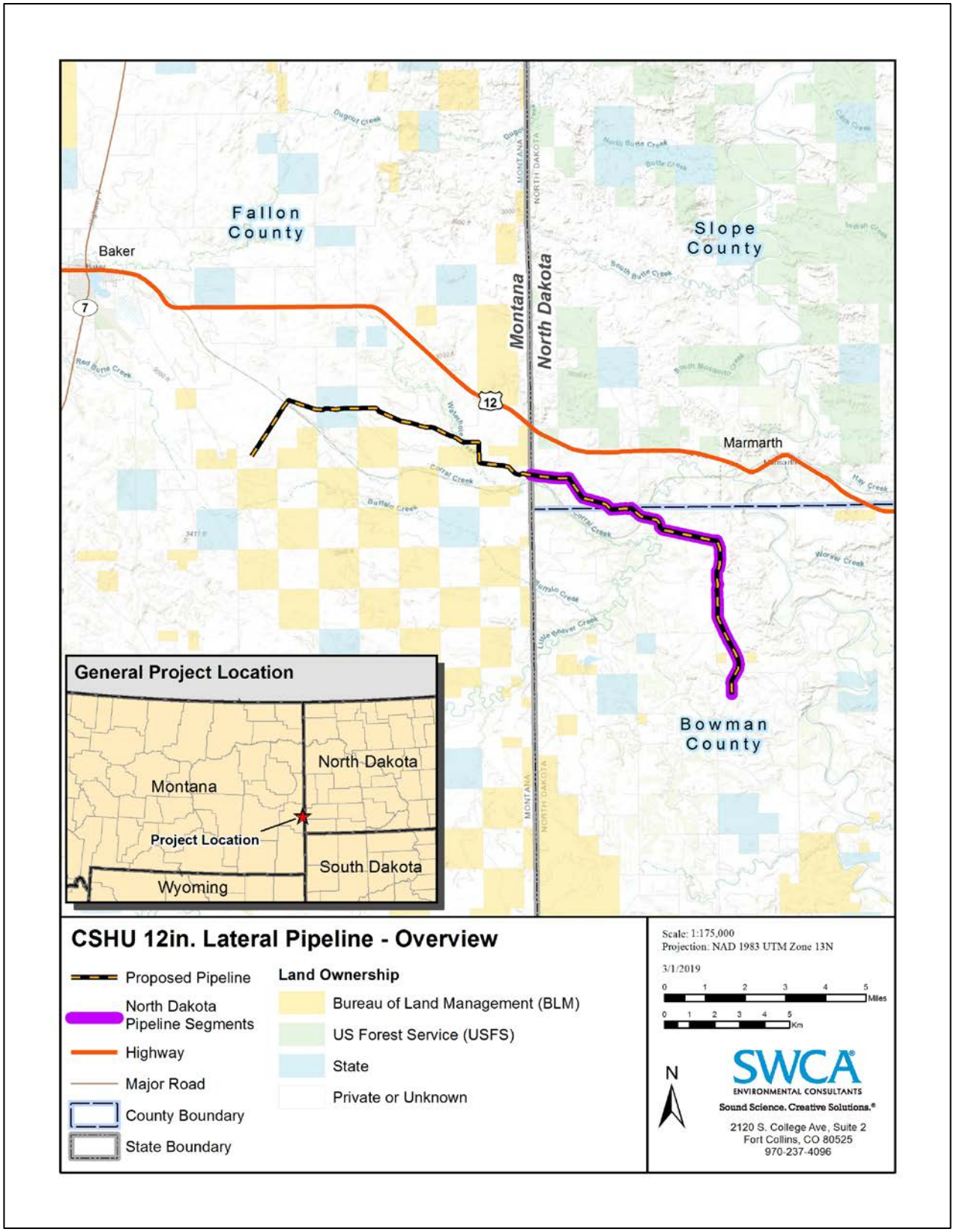


Figure 1. Project location map.

1.2 Survey Area

The survey area is within the following major land resource areas (MLRA): 58A-Northern Rolling Hills, Northern Part; 58C-Northern Rolling High Plains, Northeastern Part; 58D-Northern Rolling Hills, Eastern Part; and 60B-Pierre Shale Plains, Northern Part (Natural Resources Conservation Service [NRCS] 2017). The area is in the Missouri Plateau, Unglaciated, section of the Great Plains Province, Interior Plains (USGS 2008). The survey area is primarily comprised of rangelands, with some cultivated fields and tame pasture (grazing unit dominated by non-native forage species). Agriculture, energy extraction, and transportation are the primary land uses.

The average annual precipitation in this steppe climate area is 13 to 22 inches (National Weather Service 2019). Most of the rainfall occurs as frontal storms early in the growing season, in May and June. Some highly intensive convective thunderstorms occur in July and August. Winter precipitation occurs as snow. The freeze-free period averages about 140 days, and the average temperature ranges from 42 to 49 degrees Fahrenheit. (National Weather Service 2019).



Figure 2. General topography within project area.

1.3 Regulatory Background

1.3.1 North Dakota Administrative Code Section 69-06-08-02

In accordance with North Dakota Administrative Code Section 69-06-08-02, Transmission Facility Corridor and Route Criteria, certain geographical areas shall be either excluded or avoided from consideration for a transmission facility route.

Areas to be excluded include, but are not limited to, areas critical to the life stages of threatened or endangered animal or plant species, and areas where animal or plant species that are unique or rare to this state would be irreversibly damaged. To comply, proponents shall not cross any areas critical to the life stages of threatened or endangered animal or plant species and not cross any areas where animal or plant species that are unique or rare to this state occur.

Areas to be avoided include, but are not limited to, Scenic, or Recreational Rivers; Wildlife Refuges; Designated or Registered State Wild, Scenic, or Recreational Rivers; Game Refuges; Game Management Areas; Management Areas; Forests; Forest Management Lands; and Grasslands. To comply, proponents shall avoid previously listed areas unless the applicant shows that, under the circumstances, there is no reasonable alternative.

1.3.2 Clean Water Act, Section 404

Section 404 of the Clean Water Act prohibits the discharge of dredged or fill material into waters of the U.S., including certain wetlands, also known as jurisdictional waters, without a permit from the USACE.

1.3.3 USACE Nationwide Permit 12

Nationwide Permit (NWP) 12 authorizes the construction of utility line projects in non-tidal waters of the U.S., provided the activity does not result in the permanent loss of greater than 0.5 acre of waters of the U.S., including wetlands. In conjunction with NWP 12, Section 401 certification is required for all Section 404 permits (i.e., NWP 12). Section 401 certification is mandated by the North Dakota Department of Health (NDDH) and requires all projects under this certification to follow NDDH's Construction and Environmental Disturbance Requirement guidelines.

NWP 12 requires that the permittee submit a pre-construction notification prior to commencing construction if any of the following criteria are met.

- The activity involves mechanized land clearing in a forested wetland.
- The utility line exceeds 500 feet in length through any single crossing of a water of the U.S.
- The utility line is placed within a jurisdictional area (i.e., water of the U.S.) and it runs parallel to a streambed that is within that jurisdictional area.
- Discharges result in the permanent loss of greater than 0.1 acre of waters of the U.S.
- Permanent access roads are constructed above grade in waters of the U.S. for a distance of more than 500 feet.
- Permanent access roads are constructed in waters of the U.S. with impervious materials.

1.3.4 USACE Regional Conditions

The USACE has published several regional conditions for projects operating under NWPs in North Dakota (USACE 2012). The regional conditions apply to wetlands classified as "fens," waters adjacent to natural springs, the Missouri River, historic properties, and fish-spawning areas.

1.3.5 Endangered Species Act

In the absence of a federal nexus (i.e., any action carried out, funded, or permitted by a federal agency), the ESA protects endangered and threatened species and their habitats by prohibiting the "take" of a listed animal, except as authorized by the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 10 of the ESA. The use of a Section 404 NWP will include the project meeting NWP general condition 18 on endangered species.

The lack of discovery of threatened or endangered species does not signify their non-existence within any particular area, but only that no primary or secondary indications of these species were recorded.

1.3.6 Migratory Bird Treaty Act

The MBTA provides that it is unlawful to pursue, hunt, take, capture, or kill; attempt to take, capture, or kill; possess, offer to sell, barter, purchase, deliver, or cause to be shipped, exported, imported, transported, carried, or received any migratory bird, part, nest, egg, or product, manufactured or not. Oil and gas developments are advised to consider this federal act when considering seasonal timing, best management practices, and pre-construction survey requirements.

1.3.7 Bald and Golden Eagle Protection Act

The BGEPA prohibits anyone, without a take permit issued by the Secretary of the Interior, from "take" of an eagle. This may include 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. Oil and gas developments in North Dakota are subject to compliance with the BGEPA and should consider this federal act when planning spatial and temporal aspects of construction or other disruptive activities, best management practices, and pre-construction survey requirements.

2 METHODS

2.1 Pre-Field Review

Prior to conducting field surveys, SWCA reviewed applicable National Wetlands Inventory (NWI) data (USFWS 2018a), National Hydrography Dataset (NHD) flowline data (USGS 2018), the threatened and endangered species list for Bowman and Slope Counties (USFWS 2019), as well as preliminary National Weather Service climatic data.

2.2 Wetlands

NWI mapping for the region indicates the presence of wetlands within the project area (USFWS 2018a). SWCA biologists conducted wetland delineations within the survey area based on the principles and guidelines provided in the *Corps of Engineers Wetlands Determination Manual* (Manual) (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Determination Manual: Great Plains Region Version 2.0* (Supplement) (USACE 2010). According to the Manual, an area is a wetland if three specific wetland indicators—hydrophytic vegetation, wetland hydrology, and hydric soils—are present, with certain exceptions. All wetlands

and waterbodies geographically referenced within the survey area during field survey are depicted on the site layout maps in Appendix A. Wetland delineation data forms are provided in Appendix B.

2.2.1 Hydrophytic Vegetation

SWCA recorded all plants within the vegetative community of the data point survey area based on the respective stratum in which each species is located. The Supplement defines a tree as a woody-stemmed plant with a trunk diameter at breast height (DBH) of equal to or greater than 3 inches, regardless of height. The sapling and shrub stratum is composed of woody-stemmed plants with a DBH of less than 3 inches, regardless of height. The herbaceous stratum includes all non-woody-stemmed plants regardless of height. Finally, the woody vine stratum includes all woody-stemmed vines, regardless of diameter.

SWCA recorded the binomial scientific name and percent cover of all plants within a 30-foot radius for the tree stratum, a 15-foot radius for the sapling/shrub stratum, a 5-foot radius for the herbaceous stratum, and a 30-foot radius for the woody vine stratum. SWCA noted each plant species' respective USFWS wetland indicator status (i.e., upland [UPL], facultative upland [FACU], facultative [FAC], facultative wetland [FACW], and obligate [OBL]). Common hydrophytic indicators include; Rapid Test, where all dominant species across all strata are rated OBL or FACW based on visual assessment; Dominance Test, whereas using the "50/20 rule" greater than 50% of dominant species had an indicator status of FAC, FACW, or OBL; and Prevalence index (PI), whereas the PI is 3.0 or less.

2.2.2 Wetland Hydrology

A wetland was determined to contain wetland hydrology if at least one primary indicator or at least two secondary indicators of wetland hydrology were present, as defined by the Manual and Supplement. Common hydrologic indicators include the presence of surface water, high water table, soil saturation, water marks on trees or other objects, sediment deposits, water-stained leaves, and oxidized rhizospheres on living roots.

2.2.3 Hydric Soil

Biologists recorded detailed notes regarding soil profiles including the hue, value, and chroma (i.e., color) of the soil (using Munsell Soil Color Charts); the depth and extent of that soil color within the entire soil profile; the concentration of any redoximorphic concentrations or depletions; and the texture of the soil at each depth where a color change was observed. Common hydric soil indicators of the Northern Great Plains subregion include the presence of hydrogen sulfide gas within the soil pit, redox depressions, redox dark surfaces, and depleted matrix.

2.3 Waterbodies

The lateral extent of jurisdictional waterbodies (i.e., ponds, creeks, streams, lakes) was identified by the presence of an ordinary high water mark (OHWM), if present. Common identifiable indicators of an OHWM include physical characteristics such as a clear, natural line impressed on the bank; shelving; changes in the character of soil; destruction of terrestrial vegetation; the presence of litter and debris; or other appropriate means that consider the characteristics of the surrounding areas. The OHWM typically represents the potential limits of USACE jurisdiction, unless there is a wetland adjacent to the waterbody (USACE 2008). Please note that the USACE has full discretion in determining the jurisdictional status of referenced wetlands and waterbodies.

The NHD is a digital vector dataset referred to by SWCA biologists in the field to confirm or disprove the existence of features such as lakes, ponds, streams, rivers, canals, dams, and stream gages (USGS 2011). NHD flowlines are features that contain flow direction and form a network (USGS 2011). In the field, SWCA can confirm or disprove NHD flowlines lines based on the presence of streams, OHWMs, hydrophytic vegetation, wetland hydrology, and hydric soils. A desktop analysis is then performed to determine if the confirmed waterbodies show significant nexus to waters as described in Definition of Waters of the United States (Title 33 Code of Federal Regulations Part 328.3 [a] [1]–[3]).

SWCA classified streams as perennial, intermittent, or ephemeral based on field observations. During a typical year, a perennial stream contains flowing water year-round and the water table is located above the streambed. Groundwater is the primary water source for stream flow while precipitation runoff is supplemental. Additionally, the USGS topographic maps were used as reference.

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

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

2.4 Tree, Sapling, and Shrub Count

SWCA ecologists determined the total number of trees, saplings, and shrubs present within the survey area by employing several different techniques depending on the type of woody vegetation habitat (i.e., forested upland, shrubland, or shelterbelt) encountered and the overall extent of each habitat within the ROW. The boundary of all forested upland, shrubland, and shelterbelt habitat were mapped using a Trimble Geode (Section 2.7). In forested upland and shrubland habitat, SWCA counted the number of all woody-stemmed vegetation with a diameter at breast height (DBH) of ≥1 inch. In shelterbelt areas, all woody-stemmed vegetation, regardless of DBH were inventoried via direct count. Biologists taxonomically identified all recorded individuals to the species level within each habitat type.

2.5 Noxious Weed Surveys

“Noxious weed” is a plant species designated as state-listed or county-listed noxious weed. They generally are not native to a given area, spread rapidly, and have adverse health, ecological, and economic impacts. Noxious weed species may have high reproduction rates and are usually adapted to occupy a diverse range of habitats otherwise occupied by native species. These species may subsequently out-compete native plant species for resources, causing a reduction in native plant populations. Noxious weed communities (both alive and residual) were identified and mapped during field surveys by visual inspection of the survey corridor.

2.6 Wildlife Including Threatened and Endangered Species

Prior to conducting field surveys, SWCA reviewed information obtained from the USFWS list of threatened and endangered species by North Dakota counties (USFWS 2019) regarding the presence of threatened or endangered species that may occur within the survey area. This document does not represent a comprehensive survey, but rather acknowledges the potential presence of listed species. Wildlife sightings can involve primary observations (i.e., actual sighting of an animal) or secondary observations (i.e., observation of scat, tracks, feathers, or fur deposits). SWCA completed surveys for suitable habitats that would have the potential to support any listed species. No occupancy or species-specific surveys were conducted.

A 0.5-mile line-of-sight binocular survey for raptor nests was conducted. SWCA noted all wildlife observed during the field survey.

2.7 Mapping

The boundaries of each wetland, waterbody, and woody vegetation habitat were geographically recorded using a handheld tablet with an external Trimble Geode global positioning system (GPS) antenna connected via Bluetooth technology. The GPS antenna is capable of recording geographic data with sub-meter accuracy. SWCA used Universal Transverse Mercator Zone 13 North as the projected coordinate system and North American Datum 1983 as the datum. ArcGIS v10.3 (ESRI Redlands, California) was used to analyze recorded features, calculate areas, and generate the maps provided in Appendix A. Please note that all data recorded using the tablet and displayed on the attached maps are for review purposes only and do not represent a professional civil survey.

3 RESULTS

3.1 Vegetation

During the field survey, SWCA ecologists identified four general types of vegetative communities within the survey area. These vegetative communities were classified as herbaceous upland, shrubland and upland woody vegetation, cropland, and palustrine emergent (PEM) wetland. PEM wetlands are characterized by the presence of herbaceous hydrophytic or submergent aquatic macrophytes. Photographs of the survey area are provided in Appendix C.

Vegetation communities met the hydrophytic vegetation criterion for wetlands if any of the hydrophytic indicators as described in the Supplement were met. The upland communities failed to meet at least one of the three assessed wetland criterion.

3.1.1 Herbaceous Upland

The herbaceous upland community identified in the survey area was dominated by non-woody vegetation such as grasses and forbs. The dominant herbaceous community within the proposed pipeline survey area includes native and non-native grasses and forbs such as Kentucky bluegrass (*Poa pratensis*), smooth brome (*Bromus inermis*), and western wheatgrass (*Pascopyrum smithii*).

3.1.2 Cropland

The Cropland identified in the survey area were small grains. Common crops in the area include common wheat (*Triticum aestivum*), durum wheat (*Triticum durum*), and sunflower seeds (*Helianthis annuus*) (U.S. Department of Agriculture 2012).

3.1.3 Hydrophytic Vegetation

Most delineated wetlands were dominated by herbaceous species and lacking a shrub or tree stratum (Appendix C). The species distribution was predicated on the duration of hydrology. Areas of prolonged saturation/inundation were dominated with prairie cordgrass (*Spartina pectinata*), Baltic rush (*Juncus balticus*), common spikerush (*Eleocharis palustris*), and/or Nebraska sedge (*Carex nebrascensis*). In areas that received intermittent saturation or were located in depressions, foxtail barley (*Hordeum jubatum*), inland saltgrass (*Distichlis spicata*), and/or alkali grass (*Puccinellia nuttalliana*) was prevalent.

3.2 Hydrology

Although precipitation data are not available for the exact site of the project, it is likely analogous to the precipitation data for Bowman, Bowman County, North Dakota, due to proximity of the Bowman weather station to the project area: Bowman is approximately 26.3 miles east of the project area.

Preliminary climatological data for Bowman estimate that 3.80 inches of precipitation were recorded from July 2018 to October 2018 (Table 1; US Climate Data 2019). This amount is 2.11 inches below normal for this time period, suggesting dryer than normal conditions at the time surveys were completed.

Table 1. Monthly Recorded Rainfall at National Weather Service Station in Bowman, North Dakota

Month	Recorded Precipitation (inches)	Normal Precipitation (inches)	Difference (inches)
July 2018	1.07	2.17	-1.10
August 2018	0.75	1.06	-0.31
September 2018	0.83	1.30	-0.47
October 2018	1.15	1.38	-0.23
Total	**3.80**	**5.91**	**-2.11**

Source: US Climate Data 2019.

Wetland communities observed during the delineation effort displayed at least one primary or two secondary indicators of wetland hydrology, as defined by the Manual and Supplement. Upland communities either failed to display hydrologic indicators or failed to meet the hydrophytic vegetation and hydric soils criteria defined by the Manual and Supplement. Common indicators of wetland hydrology observed during field surveys included Saturation (A3), Algal Mat or Crust (B4), Salt Crust (B11), Surface Soil Cracks (B6), Drainage Patterns (B10), Geomorphic Position (D2), and FAC-Neutral Test (D5).

3.3 Wetlands

SWCA recorded five PEM wetlands within the 200-foot-wide survey corridor, totaling approximately 0.42 acres (Table 2 and Appendix A). W22ABO002, W22ABO003, W22ABO004, and W22ABO005 are seasonal wetlands found within uncultivated fields. W22ASL006 is associated with an NHD flowline. W22ABO002 and W22ASL006 may require Nationwide Permits due to predicted disturbances greater than 0.1 acre, unless bored; however, the USACE has the final authority to determine jurisdictional status.

Table 2. PEM Wetland Acreage within the Survey Area

Feature ID	Associated Sampling Point	Sample Point Location		Total Size (acres)	Total Size within 75-foot Construction ROW (acres)
		Latitude	Longitude		
W22ABO002	W22ABO002_DP02	46.238326	-103.948687	0.15	0.15
	W22ABO002_DP01	46.238367	-103.948731		
W22ABO003	W22ABO003_DP02	46.268563	-103.955266	0.0002	0.0002
	W22ABO003_DP01	46.268559	-103.955275		
W22ABO004	W22ABO004_DP02	46.268673	-103.958163	0.04	0.03
	W22ABO004_DP01	46.268693	-103.958088		
W22ABO005	W22ABO005_DP02	46.270329	-103.967735	0.005	0.005
	W22ABO005_DP01	46.270330	-103.967735		
W22ASL006	W22ASL006_DP02	46.292308	-104.041384	0.22	0.22
	W22ASL006_DP01	46.292294	-104.041454		
Total				**0.42**	**0.41**

3.4 Waterbodies

During the field surveys, SWCA identified and delineated five waterbodies. Table 3 presents the delineated waterbody flow regime, median width, the length, and the acreage within the survey area, and the length and acreage within the disturbance corridor. All the waterbodies identified were streams, although the ephemeral streams had lightly defined OHWMs and were more indicative of landscape feature water flow areas. WB22ABO008 is a perennial anthropogenically straightened stream reach of Little Beaver Creek. It appears that Little Beaver Creek was straightened for protection of residential and cropland areas (these are located outside of the survey area). Little Beaver Creek will be crossed by the horizontal directional drilling (HDD) construction method and therefore will have no impacts associated with this aquatic feature.

Table 3. Waterbodies Width and Survey and Disturbance Length and Acreage

Waterbody Name	Flow Regime	Median Width (feet)	Survey Area Acreage (acres)	Survey Area Delineated Linear Length (feet)	Disturbance Corridor Temporary Construction Impact Acreage (acres)	Temporary Construction Impact Delineated Linear Length (feet)
WB22ABO003	Ephemeral	2	0.009	200	0.004	85
WB22ABO005	Ephemeral	0.5	0.009	771	0.002	164
WB22ABO006	Ephemeral	0.5	0.008	733	0.001	80
WB22ABO007	Ephemeral	0.5	0.004	373	0.002	131
WB22ABO008 (Little Beaver Creek)	Perennial	89	0.670	328	None	None

3.5 Soils

Based on Natural Resources Conservation Service (NRCS) mapping (NRCS 2017), 27 soil map units are present in the project corridor (Table 4). The project area analyzed for soils covers the 200-foot-wide survey corridor. All soil map units within the survey area are listed in Table 4. The soil series that are most prevalent within the survey area are described in Appendix E.

Table 4. Soil Map Units Present within the Survey Area

Soil Map Units	MUSYM[1]	% Slope	Area within 200-foot Survey Corridor (acres)	% of Total Area
Archin-Zeona-Ladner complex	L1237B	0 to 6	45.4	13.5%
Badland-Cabbart complex	L3101F	6 to 70	7.7	2.3%
Boxwell-Cabbart loams	L2601D	9 to 15	3.4	1.0%
Chinook-Rhame fine sandy loams	L1639B	3 to 6	11.8	3.5%
Fleak-Badland complex	L3109F	9 to 70	10.1	3.0%
Gerda-Gerda, barren complex	L0531B	0 to 6	3.4	1.0%
Gerda-Maltese complex	L0516B	0 to 6	41.6	12.4%
Glendive-Havre-Fluvaquents complex, channeled	L4155A	0 to 2	4.8	1.4%
Havre clay loam	L4122A	0 to 2	8.7	2.6%
Lonna-Cabbart silt loams	L3161F	6 to 35	3.8	1.1%
Marmarth-Janesburg, low precipitation complex	L2427B	3 to 6	6.5	1.9%
Other*	*	*	16.3	4.8%
Patent, gullied-Sham-Patent complex	L3237D	2 to 15	14.8	4.4%

Soil Map Units	MUSYM[1]	% Slope	Area within 200-foot Survey Corridor (acres)	% of Total Area
Rhame-Blacksheep fine sandy loams	L1333D	9 to 15	6.3	1.9%
Rhame-Fleak complex	L1425F	9 to 50	26.4	7.9%
Tinsley-Chanta complex	L4567F	6 to 35	24.0	7.1%
Tusler, severely eroded-Ladner-Archin complex	L1249B	0 to 6	10.3	3.1%
Tusler-Fleak-Chinook complex	L1405D	9 to 15	28.4	8.4%
Tusler-Fleak-Telfer, low precipitation loamy fine sands	L1857D	6 to 15	44.9	13.3%
Tusler-Telfer, low precipitation loamy fine sands	L1859B	0 to 6	17.7	5.3%
Total			**336.4**	**100.0%**

[1]MUSYM = Map Unit Symbol

*Other = Pooled soil map units that individually comprise less than 1.0% of Total Area: Archin-Desart, low precipitation fine sandy loams (L1235B, 0-6); Belfield, low precipitation-Ethridge-Maltese complex (L0617B, 2-6); Belfield, low precipitation-Maltese complex (L0415A, 0-2); Boxwell-Kremlin loams (L2807C, 6-9); Burgraff-Floweree-Cabbart silt loams (L2913B, 3-6); Fleak-Rock outcrop-Tusler complex (L1475F, 15-50); Glendive fine sandy loam (L4187B, 2-6); Kremlin, gravelly substratum-Chanta loams (L4573B, 2-6); Lallie silty clay, low precipitation (L4033A0-1); Patent loam (L3241B, 0-6).

Source: NRCS 2017.

3.6 Tree, Sapling, and Shrub Count

During SWCA's field survey, 18 tree and shrubland areas were geographically referenced within the survey area. The number of trees SWCA counted that may be impacted by the project as currently proposed are summarized in Table 5 (see tree and shrubland locations in Appendix A). The NDPSC requires a 2:1 post- to pre-construction mitigation for all trees, saplings, and shrubs impacted during the construction of the proposed pipeline. Based on the 161 trees and shrubs identified within the proposed disturbance area, SWCA estimates approximately 322 2-year-old sapling individuals would need to be replanted in order to fulfill the 2:1 mitigation requirement.

SWCA recommends that only native species of trees and shrubs be used, and that they be planted in habitats where they are typically found on the landscape. Trees and shrubs should not be planted in native prairie.

Table 5. Tree, Sapling, and Shrub Count

Woody Vegetation (WV) ID	Common Name	Species Name	Number of Trees		Estimated Mitigation Commitment
			Survey Corridor	75-foot-wide Construction ROW (estimated)	
WV02	Buffalo Berry	*Shepherdia argentea*	18	5	10
WV03	Cottonwood	*Populus spp.*	2	0	0
WV04	Buffalo Berry	*Shepherdia argentea*	5	0	0
WV05	Cottonwood	*Populus spp.*	1	0	0
WV06	Buffalo Berry	*Shepherdia argentea*	43	10	20
WV07	Buffalo Berry	*Shepherdia argentea*	11	0	0
WV08	Buffalo Berry	*Shepherdia argentea*	17	0	0
WV09	Buffalo Berry	*Shepherdia argentea*	15	0	0
WV10	Buffalo Berry	*Shepherdia argentea*	26	26	52
WV11	Buffalo Berry	*Shepherdia argentea*	36	32	64
WV11	Creeping Juniper	*Juniperus horizontalis*	3	3	6
WV12	Buffalo Berry	*Shepherdia argentea*	6	6	12
WV12	Creeping Juniper	*Juniperus horizontalis*	1	1	2
WV13	Chokecherry	*Prunus virginiana*	33	0	0
WV14	Buffalo Berry	*Shepherdia argentea*	129	34	68
WV14	Green Ash	*Fraxinus pennsylvanica*	12	3	6
WV14	Hawthorn	*Crataegus spp.*	41	11	22
WV14	Chokecherry	*Prunus virginiana*	56	15	30
WV15	Buffalo Berry	*Shepherdia argentea*	2	0	0
WV16	Cottonwood	*Populus spp.*	3	0	0
WV17	Green Ash	*Fraxinus pennsylvanica*	52	0	0
WV17	Cottonwood	*Populus spp.*	24	0	0
WV21	Buffalo Berry	*Shepherdia argentea*	48	15	30
WV22	Buffalo Berry	*Shepherdia argentea*	14	0	0
		Total	**598**	**161**	**322**

3.7 Noxious Weeds

Noxious weeds have the potential to detrimentally affect public health, ecological stability, and agricultural practices. North Dakota Century Code (Chapter 63-01.1) and the North Dakota Department of Agriculture (NDDA) recognize 13 species as noxious, as listed in Table 6 (NDDA 2019). Individual counties have the authority to include additional species to their list of noxious weeds. Including state-listed species, Bowman County recognizes three additional species and Slope County one additional species to their noxious weed lists, as shown in Table 6 (NDDA 2019).

SWCA did not identify any occurrences of state-listed or county-listed noxious weeds within the survey corridor. Surveys were conducted outside of the growing season; however residual plant matter would have likely been observed if noxious weed communities were present. Denbury will monitor and control noxious weeds within their ROW prior to and subsequent to construction.

Table 6. Listed Noxious Weeds in Bowman and Slope Counties, North Dakota (2019)

Common Name	Scientific Name
State-Listed Noxious Weeds	
Absinth wormwood	*Artemisia absinthium*
Canada thistle	*Cirsium arvense*
Dalmatian toadflax	*Linaria dalmatica*
Diffuse knapweed	*Centaurea diffusa*
Houndstongue	*Cynoglossum officinale*
Leafy spurge	*Euphorbia esula*
Musk thistle	*Carduus nutans*
Palmer amaranth	*Amaranthus palmeri*
Purple loosestrife	*Lythrum salicaria*
Russian knapweed	*Acroptilon repens*
Saltcedar	*Tamarix ramosissima*
Spotted knapweed	*Centaurea stoebe*
Yellow toadflax	*Linaria vulgaris*
Bowman County-Listed Noxious Weeds	
Baby's breath	*Gysophila paniculate L.*
Black henbane	*Hyoscyamus niger*
Scotch thistle	*Centaurea solstitialis*
Slope County-Listed Noxious Weeds	
Black henbane	*Hyoscyamus niger*

Source: North Dakota Department of Agriculture 2019.

3.8 Wildlife

Three wildlife species listed as threatened or endangered under the ESA have potential to occur in Slope and Bowman Counties (USFWS 2019). The listed endangered species include the gray wolf

(*Canis lupus*) and whooping crane (*Grus americana*). The Northern long-eared bat (*Myotis septentrionalis*) is the listed threatened species. The Greater sage-grouse is a level I species of conservation priority in North Dakota.

SWCA conducted a threatened and endangered species suitable habitat survey concurrently with the wetland determinations. SWCA did not observe any primary (i.e., actual sighting) or secondary (i.e., tracks, scat, feather, or fur) indication of the presence of threatened or endangered species. However, the lack of discovery of threatened or endangered species does not signify their non-existence within the area, but only that no primary or secondary indications of these species were recorded.

3.8.1 Gray Wolf

Federal Status: Endangered

The gray wolf, listed as endangered in the United States in 1978, was believed extirpated from North Dakota in the 1920s and 1930s, with only sporadic reports from the 1930s to the present (Licht and Huffman 1996; USFWS 1978). The presence of wolves in most of North Dakota consists of occasional dispersing animals from Minnesota and Manitoba (Licht and Fritts 1994; Licht and Huffman 1996). Most documented gray wolf sightings within western North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). The Turtle Mountain region of north-central North Dakota provides marginal habitat that may be able to support a very small population of wolves. The closest known pack of wolves is the Minnesota population located approximately 17 miles from the northeast corner of North Dakota.

The gray wolf uses a variety of habitats that support a large prey base, including montane and low-elevation forests, grasslands, and desert scrub (USFWS 2013a). Due to a lack of forested habitat and the distance from Minnesota and Manitoba populations, as well as the troubled relationship between humans and wolves and their vulnerability to being shot in open habitats (Licht and Huffman 1996), the re-establishment of gray wolf populations in North Dakota is unlikely. Additionally, habitat fragmentation may further act as a barrier against wolf recolonization in western North Dakota. The gray wolf is not expected to be impacted by the proposed project.

3.8.2 Whooping Crane

Federal Status: Endangered

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

The winter 2017–2018 total wild population of the Wood Buffalo-Aransas population was estimated at 505 birds (USFWS 2018b). There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park population, which nests in Wood Buffalo National Park and adjacent areas in Canada, where approximately 83% of the wild nesting sites occur (Canadian Wildlife Service and USFWS 2007; USFWS 2013b). Bowman and Slope Counties, including the project area, are within the primary migratory flyway of whooping cranes.

Whooping cranes probe the soil subsurface with their bills for foods on the soil or vegetation substrate (Canadian Wildlife Service and USFWS 2007). Whooping cranes are omnivores and foods typically

include agricultural grains, as well as insects, frogs, rodents, small birds, minnows, berries, and plant tubers. The largest amount of time during migration is spent feeding in harvested grain fields (Canadian Wildlife Service and USFWS 2007). Studies indicate that whooping cranes use a variety of habitats during migration, in addition to cultivated croplands, and generally roost in small palustrine (marshy) wetlands within 0.62 mile of suitable feeding areas (Howe 1987, 1989). Whooping cranes have been recorded in riverine habitats during their migration, with eight sightings along the Missouri River in North Dakota (Canadian Wildlife Service and USFWS 2007). In these cases, they roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

It is well-documented that migrating whooping cranes use habitats in the vicinity of the project for roosting and feeding. The project area is located within the migratory corridor for the whooping crane, with the nearest sighting being approximately 13.31 miles west from the pipeline corridor (Sullivan et al. 2009). Suitable whooping crane foraging habitat (i.e., cultivated cropland) was observed within the survey area; however, high levels of disturbance near the project area from existing roads, agriculture production, oil and gas activity, etc., minimize the likelihood for cranes to use the area within or near the pipeline corridor. The whooping crane is not expected to be impacted by the proposed project.

3.8.3 Northern Long-eared Bat

Federal Status: Threatened

On May 4, 2015, the USFWS listed the northern-long eared bat as threatened under the ESA (USFWS 2015a). The USFWS also issued an interim rule pursuant to Section 4(d) of the ESA in conjunction with the final rule (50 CFR Part 17). For areas within the species' range that are not affected by white-nose syndrome (i.e., areas outside the 150-mile white-nose syndrome buffer zone), including all of North Dakota, the interim 4(d) rule exempts incidental take from certain activities.

This medium-sized bat ranges across the eastern and north-central United States and all of the Canadian provinces (USFWS 2015b). Throughout most of this species' range, populations are patchily distributed. They emerge at dusk to fly through the understory of forested hillsides and ridges, feeding on moths, flies, leafhoppers, caddisflies, and beetles.

Most records of northern long-eared bats are from winter hibernacula surveys, with more than 780 hibernacula identified within the United States. No known hibernacula are located in North Dakota, due to either no suitable hibernacula present or a lack of survey effort (USFWS 2013c). This bat species occupies a wide range of rocky and forested habitats. Suitable winter habitat includes large caves and mines (USFWS 2015b). Summer day roosts include abandoned buildings, bridges, hollow trees, stumps, under loose bark, and rock fissures (Jones and Choate 1978). The summer roosting period is from May through October. Removal of any potential roost trees may impact the northern long-eared bat.

Suitable winter habitat for northern long-eared bats does not occur in the pipeline ROW. Nearby trees, including Green Ash trees and rocky outcrops can act as suitable summer day roosts. Suitable habitat in the project area is minimal and the 4(d) rule exempts incidental take for the proposed project; therefore, the northern long-eared bat is not expected to be impacted by the proposed project.

3.8.4 Greater Sage-grouse

Status: North Dakota Level I Species of Conservation Concern

The greater sage-grouse is a Level I species of conservation priority and is in danger of being extirpated in North Dakota due to loss and fragmentation of native sagebrush habitats. The Project is located within greater sage-grouse primary range. There are no sage-grouse leks located within 2-miles of the project; the closest lek to the project is approximately 2.2 miles to the south (J.L. Kollar, [NDGFD] personal email communication, March 29, 2019).

Suitable sagebrush habitat for sage-grouse is present along the pipeline ROW and Denbury will follow recommendations from the North Dakota Game and Fish Department to minimize impacts and reclaim these areas.

3.8.5 Wildlife Observed

During the field survey, SWCA observed wildlife species within the survey area (Table 7). Common wildlife species may be affected both directly via death or injury from construction activities or indirectly through the temporary fragmentation of habitat as a result of construction activities and disturbance which may disrupt normal activities such as breeding, feeding, and sheltering.

Table 7. Wildlife Observed during Field Surveys of the Pipeline Route

Common Name	Scientific Name	Number of Individuals Observed
Ring-necked pheasant	*Phasianus colchicus*	1
Mule deer	*Odocoileus hemionus*	1

3.8.6 Migratory Birds

Status: Protected under the MBTA

Suitable habitat for migratory birds exists in the entire pipeline ROW. Specifically, grassland nesting birds have the potential to occur, feed, and nest in the project area, especially during the migratory bird breeding season, which generally occurs between February 1 and July 15. Suitable woodland nesting habitat occurs in and adjacent the project area, but it is minimal. All take of migratory birds, their parts, or their active nests, including eggs and young, must be avoided to prevent a violation of the MBTA.

3.8.7 Bald Eagle

Federal Status: Delisted in 2007; protected under the MBTA and the BGEPA

The bald eagle (*Haliaeetus leucocephalus*) feeds on fish and carrion and typically roosts in large trees near a water source. Bald eagle nesting habitat is typically any mature stands of conifer (*Pinophyta*) or cottonwood (*Populus* sp.) trees in association with rivers, streams, reservoirs, lakes, or any significant body of water. Bald eagles in North Dakota are usually observed along the Missouri River (North Dakota Game and Fish Department 2015) and Yellowstone River. Bald eagles frequently migrate through the grassland habitats. Though there is potential eagle nesting and roosting habitat, no nests or individuals were observed during the field surveys. The USFWS generally recommends a buffer of 0.5 mile from any eagle nest. If any active nests are discovered within 0.5 mile of the pipeline ROW, construction should halt and the USFWS should be contacted for further direction. If these recommendations are followed, bald eagles are not expected to be impacted by the proposed project.

3.8.8 Golden Eagle

Federal Status: Unlisted; protected under the MBTA and the BGEPA

The golden eagle (*Aquila chrysaetos*) prefers habitat characterized by open prairie, plains, and forested areas. Usually, golden eagles can be found in proximity to badland cliffs which provide suitable nesting habitat (Sullivan et al. 2009). Public sightings of golden eagles are common in and adjacent the project area (Sullivan et al. 2009); however, no golden eagles or nests were observed during the field surveys. The USFWS generally recommends a buffer of 0.5 mile from any eagle nest. If any active nests are discovered within 0.5 mile of the pipeline ROW, construction should halt and the USFWS should be contacted for further direction. If these recommendations are followed, golden eagles are not expected to be impacted by the proposed project.

4 CONCLUSIONS AND RECOMMENDATIONS

1. SWCA biologists recorded five wetlands, totaling approximately 0.42 acres within the 200-foot-wide survey area; 0.41 acre will be temporarily impacted by project construction.
2. SWCA recorded one waterbody within the survey area classified as a small lake/pond. This feature is outside of the proposed construction ROW and will not be impacted by the project.
3. Each of the wetland crossings is a single, and complete project as defined by the USACE and can be constructed under NWP 12. NWP 12 authorizes the construction of utility line projects in non-tidal waters of the U.S., provided the activity does not result in the permanent loss of greater than 0.5 acre of waters of the U.S., including wetlands, and all general conditions are met. Following are the details on the use of NWP 12 for this project:
    a. The impacts to the wetlands from the pipeline construction will be temporary and no permanent loss of wetlands will occur.
    b. A pre-construction notice will not be required for the use of NWP 12 due to it not meeting the notification requirements of the permit.
    c. No USACE regional conditions are applicable to this project.
    d. Follow the guidelines for construction described in NWP 12, including the temporary impact area must be revegetated, as applicable, and the bed returned to pre-disturbance elevation.
    e. The construction manager should keep a copy of NWP 12 onsite during construction of the three wetland crossings.
4. In conjunction with NWP 12, Section 401 certification is required for all section 404 permits (i.e. NWP 12). This project falls under blanket Section 401 certification by the North Dakota Department of Health (NDDH). No action is needed. NDDH requires all projects under this certification to follow their Construction and Environmental Disturbance Requirement guidelines. These can be found on the second page of the NDDH letter in Appendix D.
5. SWCA counted 161 tree, sapling, and shrub individuals that may be impacted by construction activities. Therefore, approximately 322 2-year-old saplings may need to be replanted to fulfill the NDPSC's 2:1 mitigation requirement. According to the recommendations of the North Dakota Forest Service, tree species selection for replacement should be accomplished through collaboration with a reputable area nursery. This will allow for species to be selected based on various factors including species hardiness and area soil type.

6. No threatened or endangered species or habitat were observed during the field survey.
7. The following threatened and endangered species are listed in Bowman and Slope County: gray wolf, whooping crane, and northern long-eared bat; however, these species are not likely to be impacted by construction of the proposed project.
8. Migratory birds and suitable nesting habitat were observed throughout the survey area. In order to avoid unauthorized take of migratory birds and active nests, SWCA recommends conducting construction outside of the migratory bird breeding season as practicable. If construction occurs during the bird breeding season (February 1–July 15), SWCA recommends to either mow, maintain, or completely remove vegetation within the project construction area outside the migratory bird nesting season; conduct migratory bird nesting surveys 5 days prior to construction; or prepare a habitat mitigation plan for approval by the USFWS which, once approved, would allow for clearing active nests and habitat during any time of year. If active nests (i.e., nests with eggs or young) are identified, the USFWS should be notified.
9. No active raptor nests were observed within 0.5 mile of the project area. No bald or golden eagle nests were observed. No impacts to raptors or eagles are anticipated.
10. To minimize impacts to greater sage-grouse and their habitats, no surface use within 2-miles of active leks or documented nest sites during the breeding and nesting season (March 1 to June 15). Areas of sagebrush disturbed during construction should be reclaimed with 10% cover of sagebrush plugs or seedlings. During the operations phase of the pipeline, maintenance activities should be restricted in sage-grouse breeding or nesting complexes between March 1 and June 15 during the hours of 8:00 pm to 8:00 am.

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APPENDIX A

Vicinity Site Layout and Natural Resource Maps

APPENDIX B

NWP 12 Fact Sheet

APPENDIX C

Wetland Delineation Data Forms

APPENDIX D

Photographs of Project Area



Figure C1. WET2, facing south (photograph taken October 11, 2018).



Figure C2. WET3, facing west (photograph taken October 11, 2018).



Figure C3. WET4, facing northwest (photograph taken October 11, 2018).



Figure C4. WET5, facing south (photograph taken October 11, 2018).



Figure C5. WET6, facing southwest (photograph taken October 11, 2018).

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APPENDIX E

State of North Dakota 401 Certification

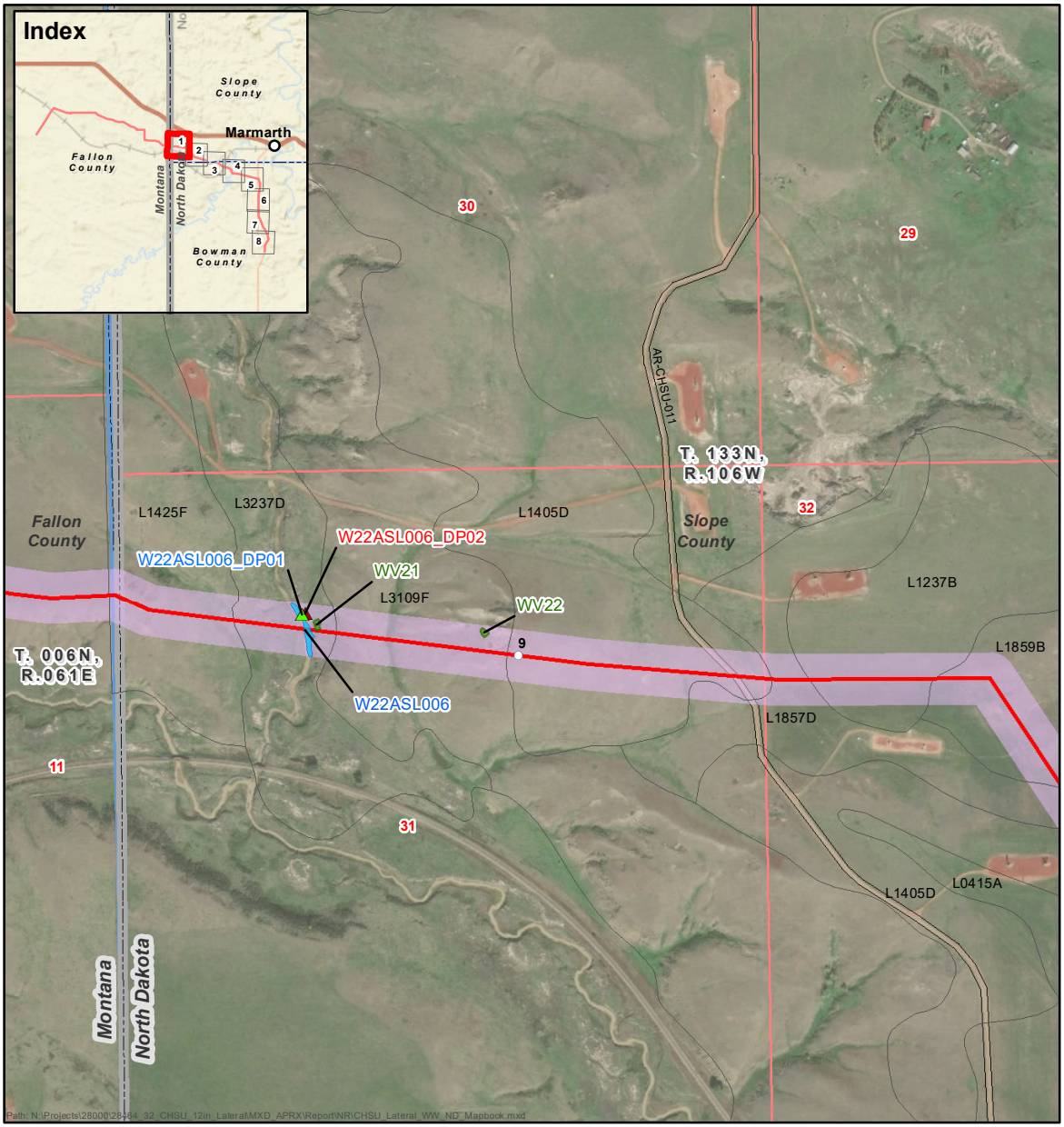
APPENDIX F

Soil Descriptions

Table F1 - Soil Descriptions

Soil Series	Description
Archin	Consists of very deep, well drained soils formed in loamy and sandy alluvium on upland fans and on terraces. Permeability is very slow. Slopes range from 0 to 9 percent. Mean annual precipitation is about 14 inches, and the mean annual air temperature is about 44 degrees F. These are used mainly for rangeland, but some areas are cultivated. Principal vegetation is western wheatgrass (*Pascopyrum smithii*), needleandthread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), buffalograss (*Bouteloua dactyloides*), green needlegrass (*Nassella viridula*), and threadleaf sedges (*Carex filifolia*), and forbs.
Fleak	Consists of excessively drained, rapidly permeable soils that formed in calcareous soft sandstone. These soils are shallow to soft sandstone. These soils are on crests of hills and ridges, and on valley sides. Slope ranges from 2 to 70 percent. Mean annual temperature is 42 degrees F, and mean annual precipitation is 14 inches. Used mainly for range and pasture. Native vegetation is prairie sandreed (*Calamovilfa longifolia*), little bluestem (*Schizachyrium scoparium*), needleandthread (*Hesperostipa comata*), and other mid and short grasses.
Gerda	Consists of very deep, well drained, very slowly permeable soils formed in alluvium. These soils are on fans or flats on uplands and have slopes of 0 to 9 percent. Mean annual air temperature is about 43 degrees F., and the mean annual precipitation is about 14 inches. The Gerda soils are used as rangeland. The native vegetation is western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nassella viridula*), inland saltgrass (*Distichlis spicata*), and Nuttall saltbush (*Atriplex nuttallii*).
Ladner	Consists of very deep, well drained, slowly permeable soils that formed in materials weathered from sandstone. These soils are on uplands, terraces and fans and have slopes ranging from 0 to 12 percent. Mean annual air temperature is 42 degrees F, and mean annual precipitation is 14 inches. Used mainly for range. A few areas are cropped to small grains. Native vegetation consists of needleandthread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), western wheatgrass (*Pascopyrum smithii*), and upland sedges.
Maltese	Consists of very deep, well and moderately well drained soils formed in clayey alluvium or residuum. These soils are on flats and swales on terraces and uplands and have slopes ranging from 0 to 25 percent. They are slowly or very slowly permeable. Mean annual precipitation is about 14 inches, and mean annual air temperature is about 43 degrees F. Used for range, pasture or hay. Native vegetation is western wheatgrass (*Pascopyrum smithii*), blue grama (*Bouteloua gracilis*), and threadleaf sedge (*Carex filifolia*).
Telfer	Consists of very deep, excessively and somewhat excessively drained, rapidly permeable soils that formed in wind and water deposited sands. These soils are on terraces and uplands and have slopes ranging from 0 to 25 percent. Mean annual air temperature is 42 degrees F, and mean annual precipitation is 16 inches. Used mainly for native range, hay and pasture. Native vegetation is prairie sandreed (*Calamovilfa lonngifolia*), needleandthread (*Hesperostipa comata*), sand bluestem (*Andropogon hallii*), sun sedge (*Carex inops*), leadplant amorpha (*Amorpha canescens*), and forbs.
Tusler	Consists of somewhat excessively drained, rapidly permeable soils that are moderately deep to weakly consolidated sandstone bedrock. They formed in sandy materials weathered from calcareous soft sandstone. These soils are on sedimentary uplands and have slopes of 3 to 40 percent. Mean annual air temperature is 42 degrees F, and mean annual precipitation is 12 inches. The Tusler soils are used mainly for rangeland, but small areas are used for nonirrigated cropland. The native vegetation is needleandthread (*Hesperostipa comata*), prairie sandreed (*Calamovilfa longifolia*), threadleaf sedge (*Carex filifolia*), sand reedgrass (*Calamovilfa longifolia*), and Indian ricegrass (*Oryzopsis hymenoides*).
Zeona	Consists of very deep, excessively drained soils formed in sandy eolian material on uplands. Permeability is rapid. Slopes range from 0 to 25 percent. Mean annual precipitation is about 15 inches and mean annual air temperature is about 44 degrees F. Mainly rangeland. Native vegetation is prairie sandreed (*Calamovilfa longifolia*), sand bluestem (*Andropogon hallii*), sun sedge (*Carex inops*), little bluestem (*Schizachyrium scoparium*), needleandthread (*Hesperostipa comata*), blue grama (*Bouteloua gracilis*), and sand dropseed (*Sporobolus cryptandrus*).

Source: United States Department of Agriculture. 2019. Natural Resources Conservation Service: Web Site for Official Soil Series Descriptions and Series Classification. Available at: https://soilseries.sc.egov.usda.gov/. Accessed February 28, 2019.



CHSU Pipeline

- Milepost
- Upland Data Point
- Wetland Data Point
- Proposed Pipeline

Access Road

- Improved

- Survey Area
- Wetland Boundary
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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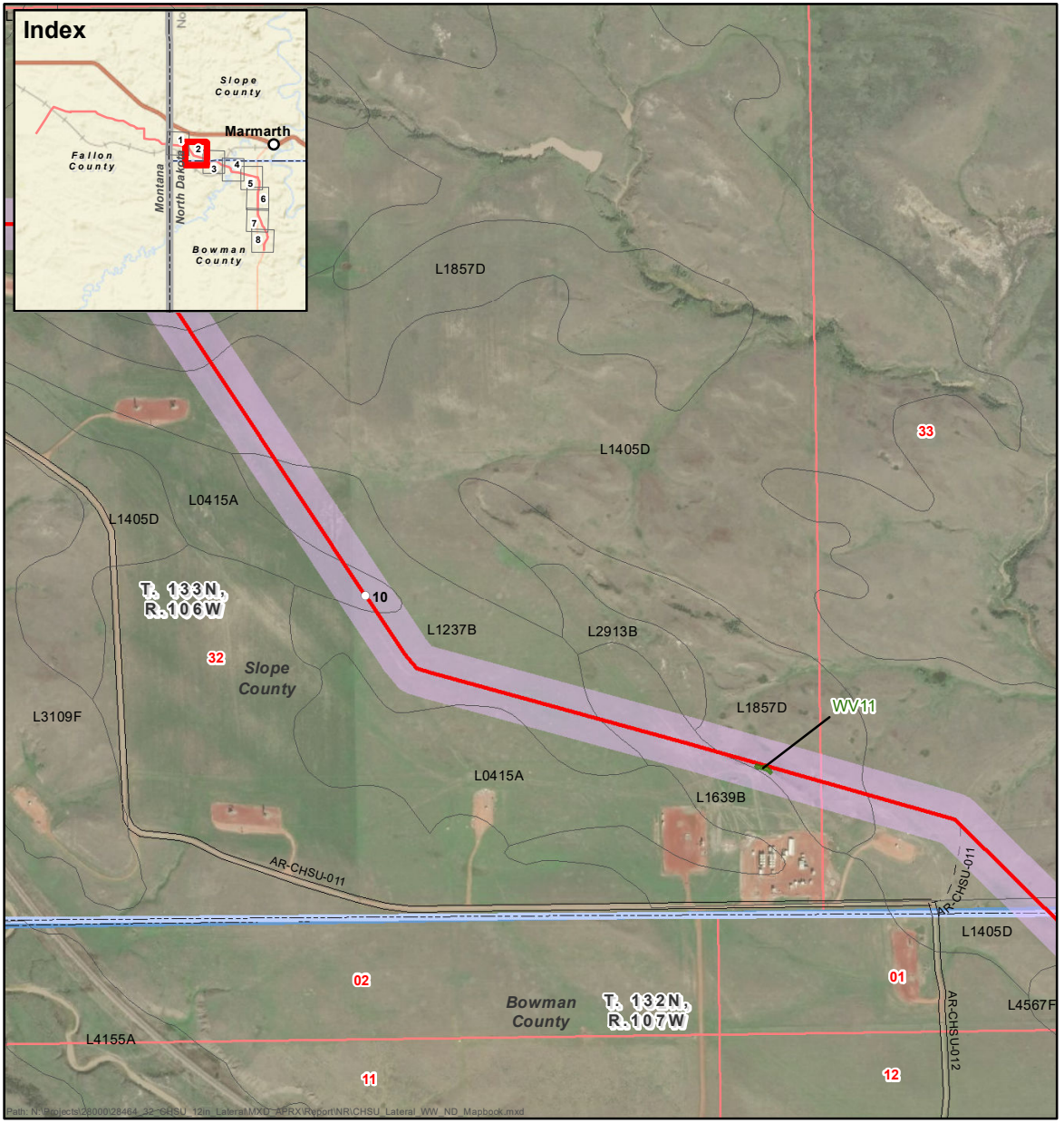
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CHSU Pipeline

- Milepost
- Proposed Pipeline

Access Road

- Improved
- Unimproved

- Survey Area
- Woody Vegetation
- Soil Boundary
- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

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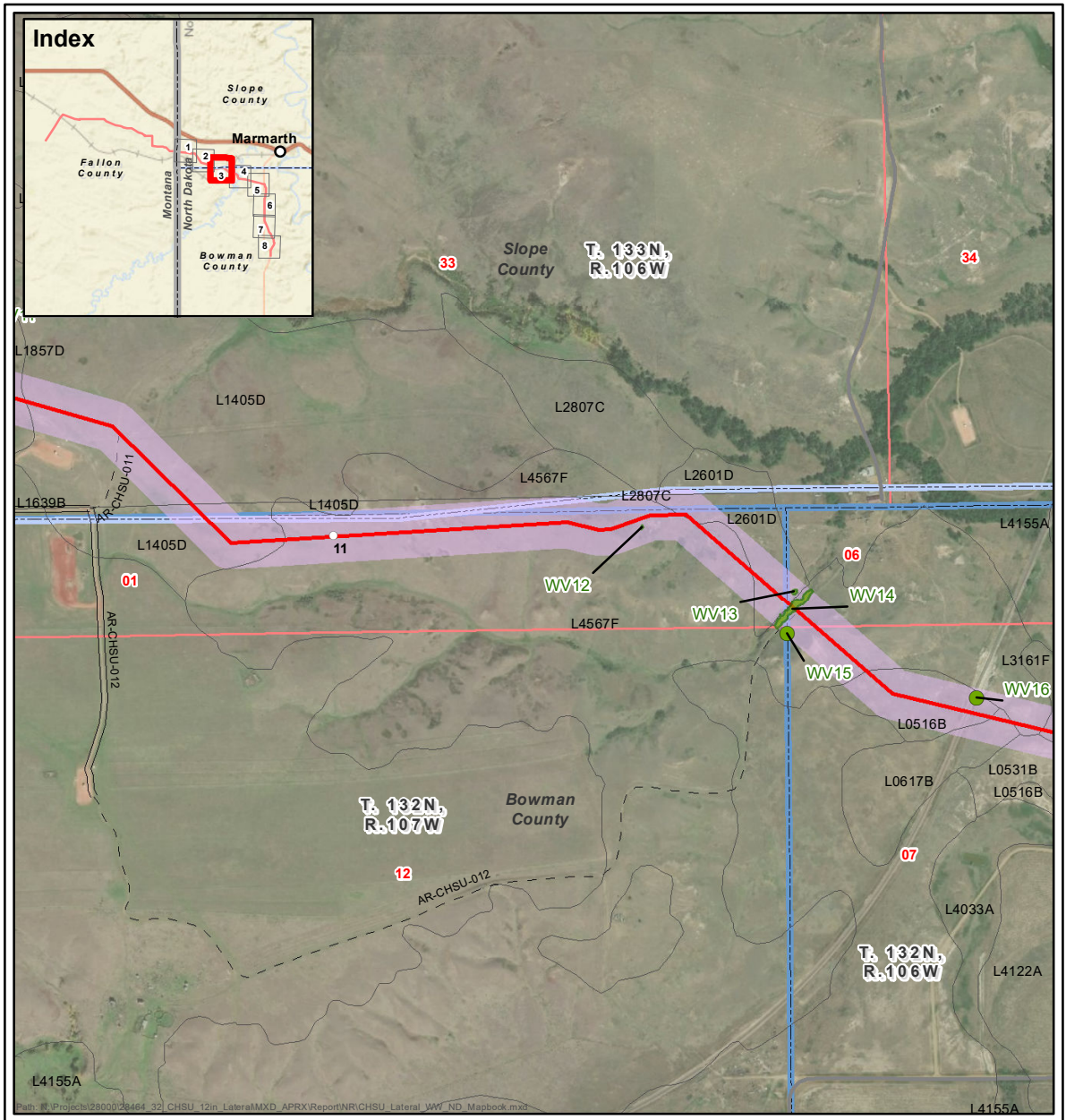
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CHSU Pipeline

- Milepost
- Woody Vegetation
- Proposed Pipeline

Access Road

- Improved
- Unimproved
- Existing Road

- Survey Area
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

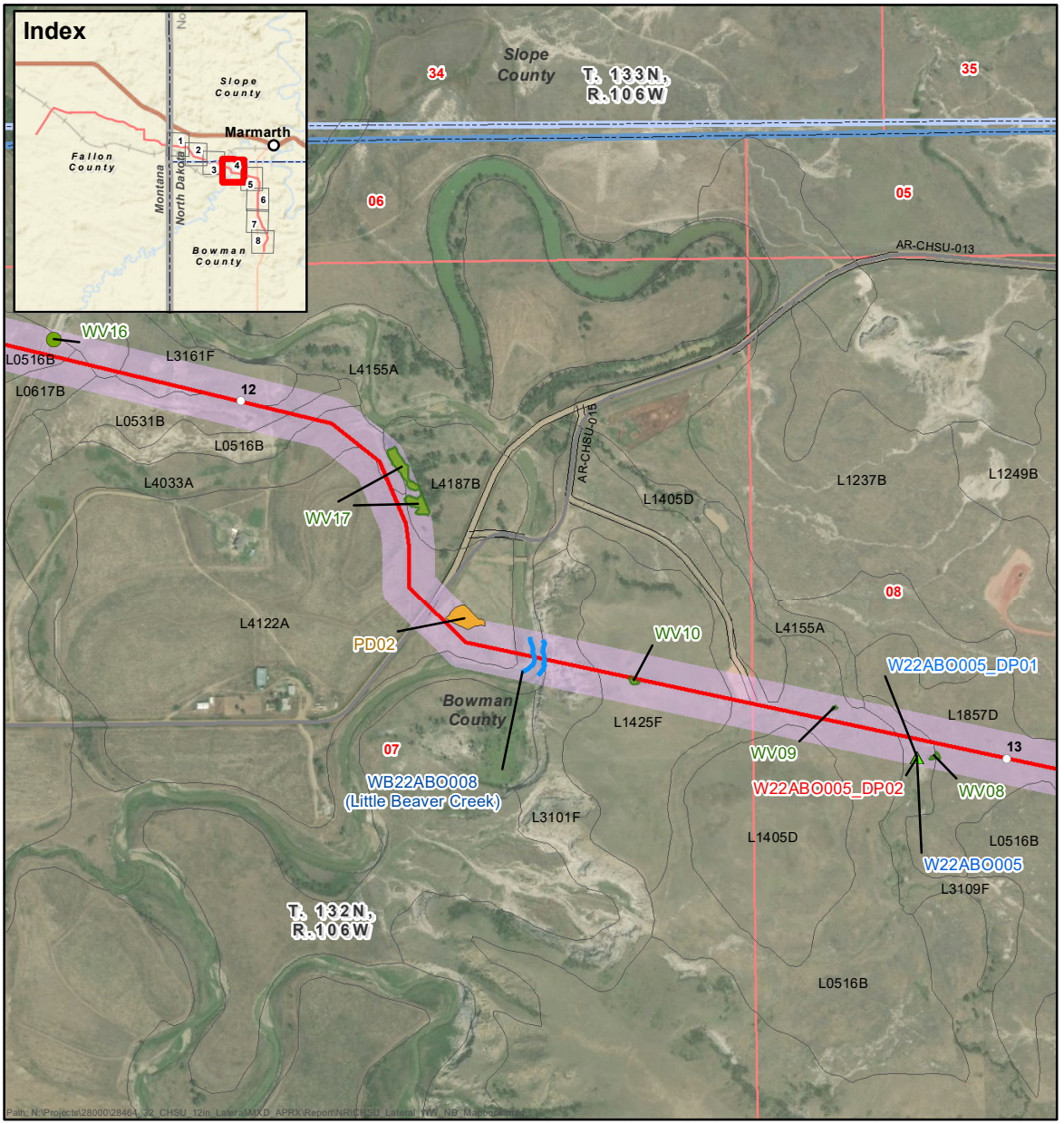
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CHSU Pipeline

- Milepost
- Upland Data Point
- Wetland Data Point
- Woody Vegetation
- Proposed Pipeline
- Waterbody (OHWM)

Access Road

- Improved
- Existing Road

- Survey Area
- Prairie Dog Colony
- Wetland Boundary
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

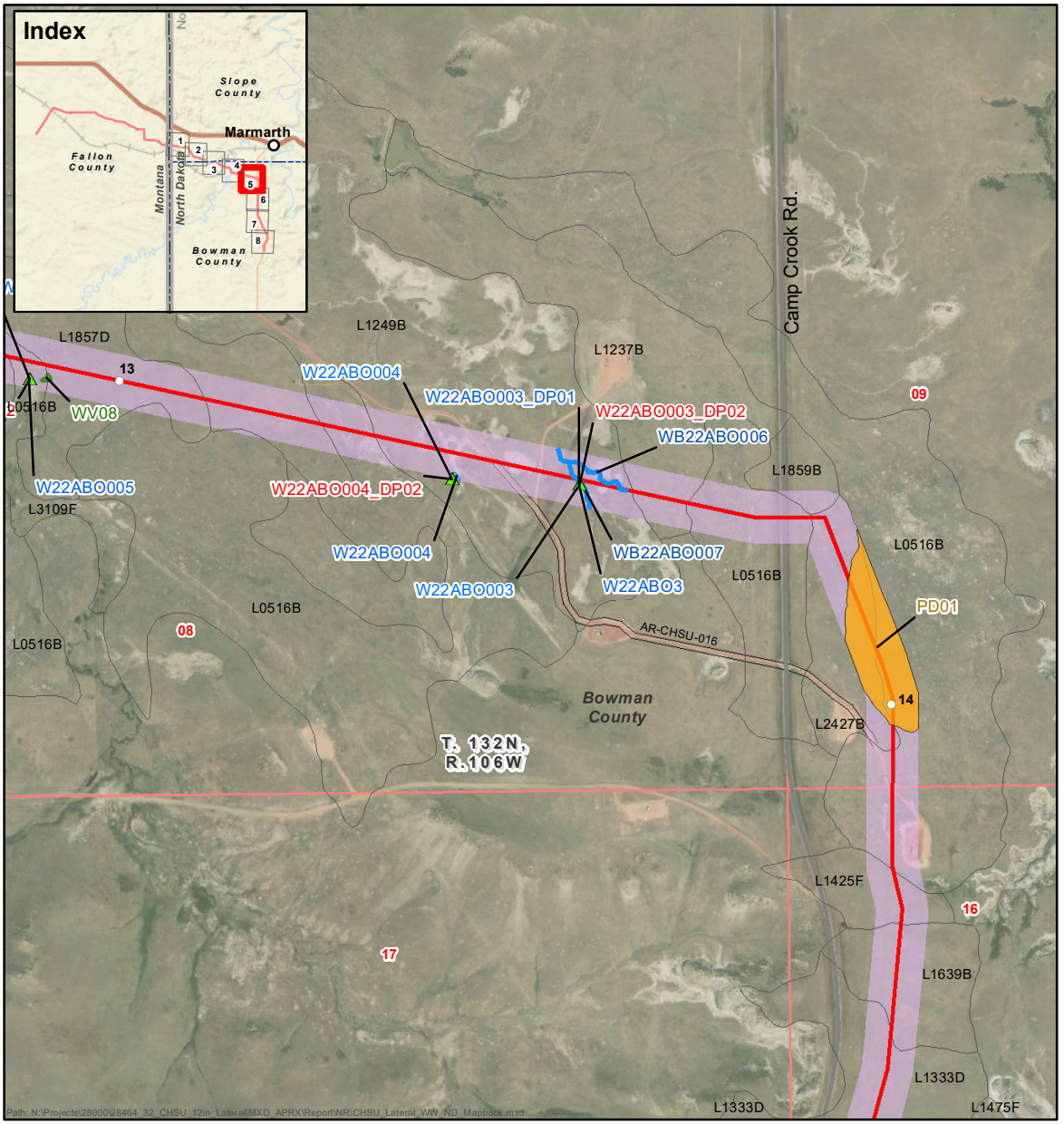
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CHSU Pipeline

- Milepost
- Upland Data Point
- Wetland Data Point
- Proposed Pipeline
- Waterbody (OHWM)

Access Road

- Improved
- Existing Road

- Survey Area
- Prairie Dog Colony
- Wetland Boundary
- Woody Vegetation
- Soil Boundary

- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

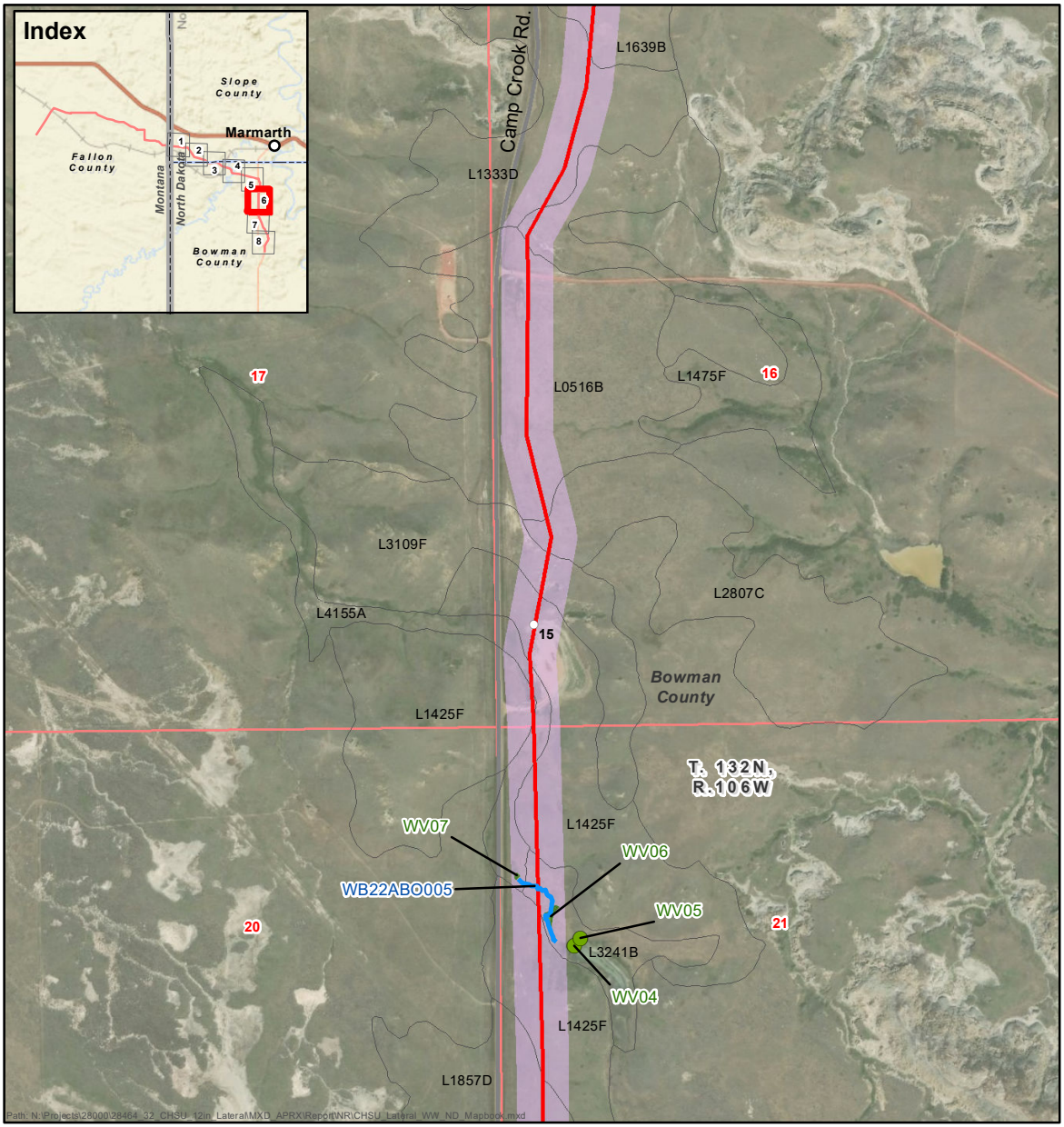
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Scale: 1:12,000
Projection: NAD 1983 UTM Zone 13N
Basemap: World Imagery (ESRI Basemaps)

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Date: 3/15/2019



CHSU Pipeline

- Milepost
- Woody Vegetation
- Proposed Pipeline
- Waterbody (OHWM)
- Existing Road
- Survey Area
- Woody Vegetation
- Soil Boundary
- Section Boundary (PLSS)
- Township/Range Boundary (PLSS)
- County Boundary
- State Boundary

0 350 700 1,050 1,400 1,750 Feet

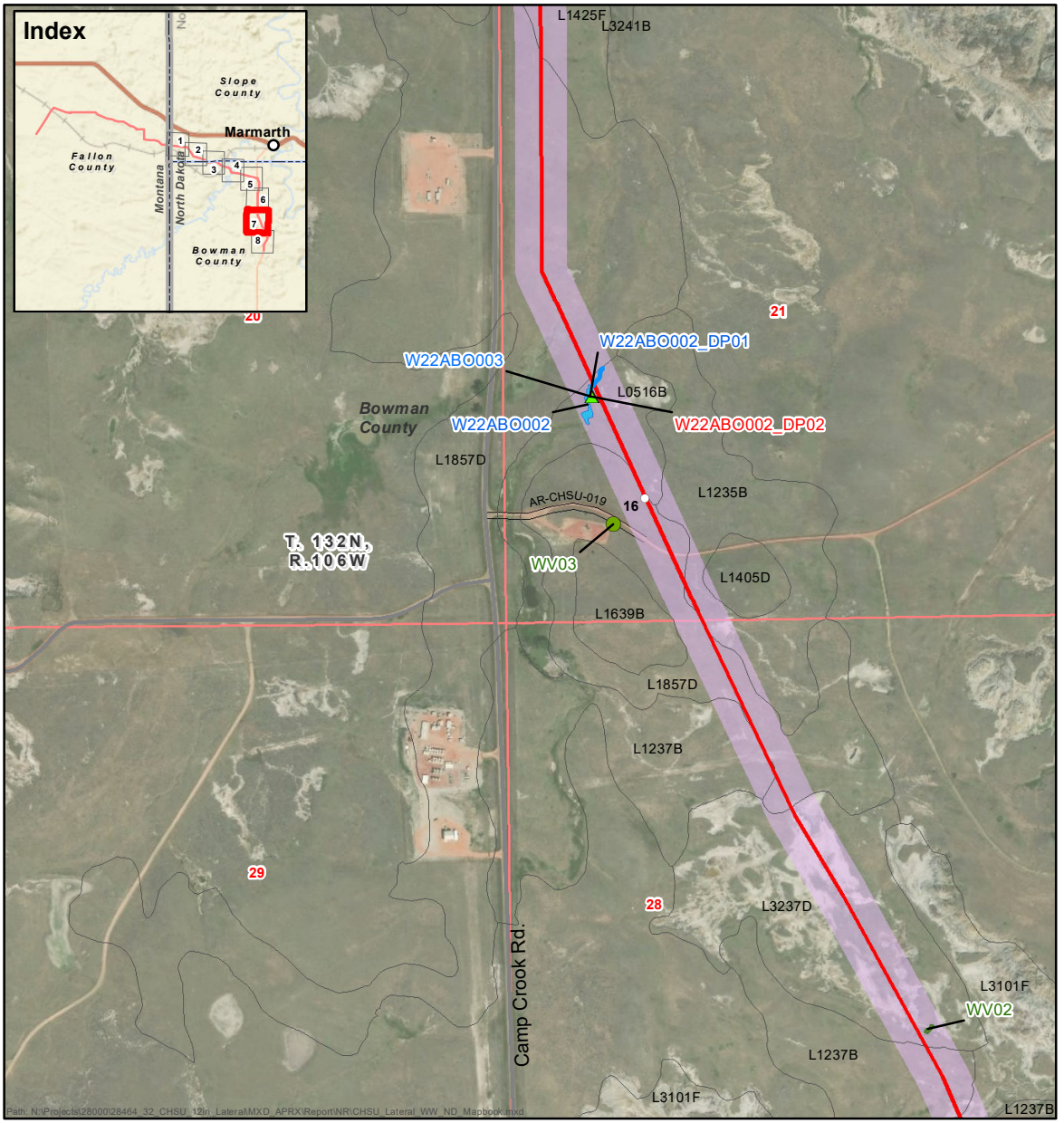
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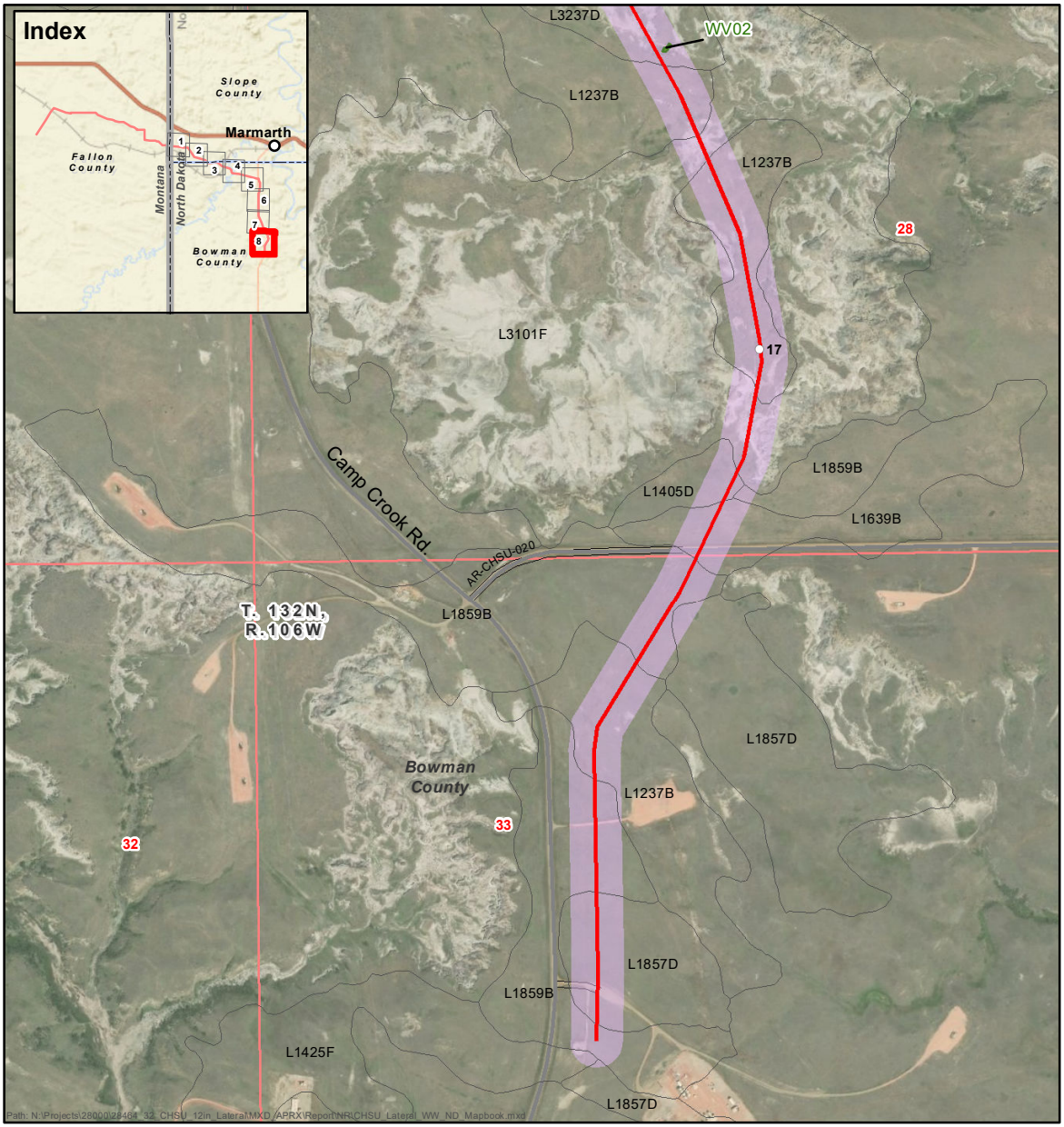
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Nationwide Permit 12

Utility Line Activities

Activities required for the construction, maintenance, repair, and removal of utility lines and associated facilities in waters of the United States, provided the activity does not result in the loss of greater than 1/2-acre of waters of the United States for each single and complete project.

Utility lines: This NWP authorizes the construction, maintenance, or repair of utility lines, including outfall and intake structures, and the associated excavation, backfill, or bedding for the utility lines, in all waters of the United States, provided there is no change in pre-construction contours. A "utility line" is defined as any pipe or pipeline for the transportation of any gaseous, liquid, liquescent, or slurry substance, for any purpose, and any cable, line, or wire for the transmission for any purpose of electrical energy, telephone, and telegraph messages, and radio and television communication. The term "utility line" does not include activities that drain a water of the United States, such as drainage tile or french drains, but it does apply to pipes conveying drainage from another area.

Material resulting from trench excavation may be temporarily sidecast into waters of the United States for no more than three months, provided the material is not placed in such a manner that it is dispersed by currents or other forces. The district engineer may extend the period of temporary side casting for no more than a total of 180 days, where appropriate. In wetlands, the top 6 to 12 inches of the trench should normally be backfilled with topsoil from the trench. The trench cannot be constructed or backfilled in such a manner as to drain waters of the United States (e.g., backfilling with extensive gravel layers, creating a french drain effect). Any exposed slopes and stream banks must be stabilized immediately upon completion of the utility line crossing of each waterbody.

Utility line substations: This NWP authorizes the construction, maintenance, or expansion of substation facilities associated with a power line or utility line in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not result in the loss of greater than 1/2-acre of waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters of the United States to construct, maintain, or expand substation facilities.

Foundations for overhead utility line towers, poles, and anchors: This NWP authorizes the construction or maintenance of foundations for overhead utility line towers, poles, and anchors in all waters of the United States, provided the foundations are the minimum size necessary and separate footings for each tower leg (rather than a larger single pad) are used where feasible.

Access roads: This NWP authorizes the construction of access roads for the construction and maintenance of utility lines, including overhead power lines and utility line substations, in non-tidal waters of the United States, provided the activity, in combination with all other activities included in one single and complete project, does not cause the loss of greater than 1/2-acre of non-tidal waters of the United States. This NWP does not authorize discharges into non-tidal wetlands adjacent to tidal waters for access roads. Access roads must be the minimum width necessary (see Note 2, below). Access roads must be constructed so that the length of the road minimizes any adverse effects on waters of the United States and must be as near as possible to pre-construction contours and elevations (e.g., at grade corduroy roads or geotextile/gravel roads). Access roads constructed above pre-construction contours and elevations in waters of the United States must be properly bridged or culverted to maintain surface flows.

This NWP may authorize utility lines in or affecting navigable waters of the United States even if there is no associated discharge of dredged or fill material (See 33 CFR Part 322). Overhead utility lines constructed over section 10 waters and utility lines that are routed in or under section 10 waters without a discharge of dredged or fill material require a section 10 permit.

This NWP also authorizes temporary structures, fills, and work necessary to conduct the utility line activity. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials,

and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate. (Sections 10 and 404)

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if any of the following criteria are met: (1) the activity involves mechanized land clearing in a forested wetland for the utility line right-of-way; (2) a section 10 permit is required; (3) the utility line in waters of the United States, excluding overhead lines, exceeds 500 feet; (4) the utility line is placed within a jurisdictional area (i.e., water of the United States), and it runs parallel to or along a stream bed that is within that jurisdictional area; (5) discharges that result in the loss of greater than 1/10-acre of waters of the United States; (6) permanent access roads are constructed above grade in waters of the United States for a distance of more than 500 feet; or (7) permanent access roads are constructed in waters of the United States with impervious materials.

Note 1: Where the proposed utility line is constructed or installed in navigable waters of the United States (i.e., section 10 waters) within the coastal United States, the Great Lakes, and United States territories, copies of the pre-construction notification and NWP verification will be sent by the Corps to the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), for charting the utility line to protect navigation.

Note 2: Access roads used for both construction and maintenance may be authorized, provided they meet the terms and conditions of this NWP. Access roads used solely for construction of the utility line must be removed upon completion of the work, in accordance with the requirements for temporary fills.

Note 3: Pipes or pipelines used to transport gaseous, liquid, liquescent, or slurry substances over navigable waters of the United States are considered to be bridges, not utility lines, and may require a permit from the U.S. Coast Guard pursuant to Section 9 of the Rivers and Harbors Act of 1899. However, any discharges of dredged or fill material into waters of the United States associated with such pipelines will require a section 404 permit (see NWP 15).

Note 4: For overhead utility lines authorized by this NWP, a copy of the PCN and NWP verification will be provided to the Department of Defense Siting Clearinghouse, which will evaluate potential effects on military activities.

Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while

the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a

stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____
(Transferee)

_____
(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 45 calendar days of the date of receipt and, if the PCN is determined to be incomplete, notify the prospective permittee within that 45 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or

any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.

2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.

3. NWPs do not grant any property rights or exclusive privileges.

4. NWPs do not authorize any injury to the property or rights of others.

5. NWPs do not authorize interference with any existing or proposed Federal project.

2012 Nationwide Permits
Regional Conditions
Omaha District
State of Montana

The following Nationwide Permit regional conditions will be used in the State of Montana. Regional conditions are placed on Nationwide Permits to ensure projects result in less than minimal adverse impacts to the aquatic environment and to address local resources concerns.

Wetlands Classified as Peatlands – Revoked for Use

All Nationwide Permits, with the exception of 3, 5, 6, 20, 27, 32, and 38, are revoked for use in peatlands in Montana.

"Peatlands" are waterlogged areas with a surface accumulation of peat (organic matter) 30 centimeters (12 inches) or more thick. Any type of peat-covered terrain, including fens, bogs, and muskegs, are all peatlands

Wetlands Classified as Peatlands – Pre-construction Notification Requirement

For Nationwide Permits 3, 5, 6, 20, 27, 32, and 38 permittees must notify the Corps in accordance with General Condition No. 31 (Notification) prior to initiating any regulated activity impacting peatlands in Montana.

Waters Adjacent to Natural Springs – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) for regulated activities located within 100 feet of the water source in natural spring areas in Montana.

For purposes of this condition, a spring is defined as any location where there is groundwater flow emanating from a distinct point. Springs do not include seeps or other groundwater discharge areas where there is no distinct point source.

Riffle and Pool Complexes – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) prior to initiating any regulated activity involving the discharge of dredge or fill material into riffle and pool complexes.

Riffle and pool complexes are special aquatic sites and sometimes characterize steep gradient sections of streams. The rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas adjacent to riffles and are characterized by slower stream velocities, a smooth water surface, and finer substrate material.

Scrub-Shrub and Forested Wetlands – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) prior to initiating any regulated activity involving the discharge of dredge or fill material into scrub-shrub and/or forested wetlands.

Forested wetlands are characterized by woody vegetation that is 20 feet tall or taller and normally possess an overstory of trees and an understory of young trees or shrubs and an herbaceous layer. Scrub-shrub wetlands include areas dominated by wood vegetation that is less than 20 feet tall including true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions.

Yellowstone River (including the Special River Management Zone) – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) for regulated activities within the Yellowstone River and impoundments.

Milk River, Missouri River, Bitterroot River, Clark Fork River (tributary to the Columbia River), the Flathead River above Flathead Lake, and Flathead Lake – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) for regulated activities in these waterways and their impoundments.

Indian Reservations in Montana – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) for regulated activities within the boundaries of any Indian Reservation in Montana.

Channel Straightening and Relocation Activities – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) prior to straightening, relocating and/or shortening an existing perennial stream channel. For all nationwide permits, except NWP 27, the total channel length reduction for all ephemeral, intermittent or perennial channels must be less than 100 feet. This requirement may be waived by the Corps for impacts to man-made ditches, canals or conveyances on a case-specific basis.

Bank and Shoreline Stabilization Activities (except activities located in the Special River Management Zone of the upper Yellowstone River) – Pre-construction Notification Requirement

For all Nationwide Permits, permittees must notify the Corps in accordance with General Condition No. 31 (Notification) prior to initiating any non-bioengineered bank stabilization activity involving all new bank or shoreline stabilization, including activities extending the length of previously stabilized areas. The following additional requirements apply to all bank and shoreline stabilization for all Nationwide Permits:

For bank revetments such as riprap, root wads, rock or log toes, or any bioengineered revetment, a. through c. apply:

a. The revetment must conform to the existing bankline.
b. The revetment must not extend above the elevation of the existing top of the bank (i.e., no new levees).
c. The revetment must not wholly or partially block flows from entering a side channel or an overflow channel.

For bank stabilization structures that project into the stream, such as weirs, barbs or vanes, d. through i. apply:

d .The bank-end of the structure can be no higher than the ordinary high water mark.

e. The top of the structure must decrease in elevation as it extends away from the bank.

f. The structure must angle upstream from the bank.

g. The structure must be keyed into the bed and the bank.

h. The structure must not wholly or partially block flows from entering a side channel or an overflow channel.

i. The structure cannot extend out more than 25% of the bankfull channel width from the existing bank.

For the purposes of this condition, bioengineering is defined as bank stabilization methods utilizing predominantly live and/or dead vegetation. Bioengineering can sometimes include minor amounts of soil, rock, and/or large dead wood.

Special River Management Zone of the Upper Yellowstone River – Bank Stabilization Activities - All Nationwide Permits

For bank stabilization activities associated with any Nationwide Permit, including maintenance of bank stabilization, the following apply:

For bank revetments such as riprap, root wads or any bioengineered revetment, a. through e. apply:

a. Revetments must conform to the existing eroded or eroding bankline, unless such work is determined by the Corps to be biologically or geomorphically beneficial for the upper Yellowstone River.

b. Revetment slopes must be flatter than the angle of repose for the selected revetment material. For example, rock riprap normally needs to be placed on a slope flatter than 1.5H:1V (1.5 Horizontal to 1 Vertical).

c. Revetments are only permittable under Nationwide Permits if they are parallel to and near the lateral boundaries of the Special River Management Zone.

d. Revetments must not extend above the elevation of the adjacent natural bank height (i.e., no new levees).

e. Revetments must not wholly or partially block flows from entering a side channel, secondary channel, or an overflow channel, unless such work is determined by the Corps to be necessary for maintaining or restoring the geomorphic integrity of the upper Yellowstone River.

For bank stabilization structures that project into the stream, such as weirs, barbs, hard points, or vanes, f. through k. apply:

f. Bank stabilization structures must not wholly or partially block flows from entering a side channel, secondary channel, or an overflow channel, unless such work is determined by the Corps to be necessary for maintaining or restoring the geomorphic integrity of the upper Yellowstone River.

g. Bank stabilization structures are only permittable under Nationwide Permits if they result in an effective bankline that is approximately parallel to and near the lateral boundaries of the Channel Migration Zone.

h. Bank stabilization structures must be keyed into the bank far enough to prevent flanking.

i. Bank stabilization structures cannot occupy more than 10% of the bankfull channel area. Bankfull channel area pertains to the specific primary or secondary channel in question, and is not the aggregate channel area of all primary and secondary channels in multi-channel reaches.

j. Bank stabilization structures must not present hazardous obstructions to boating, floating, or other river uses.

k. Bank stabilization structures that are low in elevation, project only a short distance out from the bank, and angle upstream are more likely to qualify for Nationwide Permits because they typically result in less adverse impact on aquatic resources than structures that are tall, long, and point downstream.

Special River Management Zone of the Upper Yellowstone River - Sediment Management – All Nationwide Permits

Sediment removal is allowable only to maintain function of existing facilities and structures, or as necessary to maintain or restore the geomorphic integrity of the upper Yellowstone River. Diversion or removal of sediment or alluvium from the river channel and adjacent wetlands for other purposes is not allowed in the Special River Management Zone (SRMZ) under a Nationwide Permit. Examples of sediment diversion or removal not allowed under a Nationwide Permit include hydraulic dredging and mining and mechanical excavation to obtain aggregate, fill material, or minerals, including gold. Processing of material for the purpose of obtaining select minerals or a specific gradation of material, where only a portion of the sediment or alluvium is removed and the remainder returned to the SRMZ, is not allowed under a Nationwide Permit in the SRMZ.

Special River Management Zone of the Upper Yellowstone River – Dams – All Nationwide Permits

New dams, diversions, and/or impoundments are not authorized under a Nationwide Permit in the Special River Management Zone. These projects typically have more than minimal adverse impacts and must be reviewed under standard (individual) permit procedures.

Special River Management Zone of the Upper Yellowstone River - Constructed Ponds and Stream Channels – All Nationwide Permits

Construction of ponds and new artificial stream channels is prohibited under a Nationwide Permit in the Special River Management Zone, unless they are necessary and appropriate elements of a stream or wetland restoration project.

Special River Management Zone of the Upper Yellowstone River - Placement and Removal of Temporary Fills – All Nationwide Permits

Temporary fills in waters of the United States must be placed on a horizontal marker layer such as fabric or certified weed-free straw to delineate the pre-project ground elevation and facilitate complete fill removal and site restoration.

Borrow Site Identification – All Nationwide Permits

The permittee is responsible for ensuring that the Corps is notified of the location of any borrow site that will be used in conjunction with the construction of the authorized activity so that the Corps may evaluate the site for potential impacts to aquatic resources, historic properties, and endangered species. For projects where there is another lead Federal agency, the permittee shall provide the Corps documentation indicating that the lead Federal agency has complied with the National Historic Preservation Act and Endangered Species Act for the borrow site. The permittee shall not initiate work at the borrow site in conjunction with the authorized activity until approval is received from the Corps.

Temporary Vegetation Impacts – All Nationwide Permits

Limit clearing of riparian or wetland vegetation to the absolute minimum necessary. Where temporary riparian or wetland vegetation impacts are unavoidable, mow or cut off the vegetation above the ground, leaving the topsoil and root mass intact. Restore disturbed areas to original or pre-construction contours and use seeding and planting as necessary to re-establish desirable vegetative cover, utilizing native species in areas where native species were impacted.

Erosion and Sediment Control Blanket – All Nationwide Permits

All erosion control blanket or fabric used in or adjacent to waters of the U.S. must be comprised of degradable material to ensure decomposition. Do not use material that includes stabilized netting or stabilized open mesh, as those products take a long time to degrade and they can trap small animals, birds, amphibians and fish. This prohibition also applies to mesh materials used for wattles, rolled materials, and bank wraps. Erosion control blanket or fabrics that break down within 24 months are acceptable. Non-degradable blankets or fabric may be allowed on a case-specific basis if it will be buried beneath riprap or structures and it is not likely to be exposed. Non-degradable blanket or fabric that becomes exposed within waters of the U.S. must be removed.

Counter-Sinking Riprap Associated with Culvert Installation – All Nationwide Permits

When riprap inlet and outlet protection is used below the ordinary high water mark, it must be placed to match the adjacent culvert bottom elevations. Where culvert bottom elevations are lower than the stream bed elevation, the riprap must be lower than the stream bed and match the culvert elevation.

Minimum Culvert Size – All Nationwide Permits

Culverts installed in ephemeral, intermittent, and perennial streams must completely span the bankfull width of the stream channel. This requirement can be waived by the Corps for culverts installed in man-made ditches or canals. For the purpose of this condition bankfull width is defined as the width of the channel at the elevation where overbank or out-of-bank flow begins.

REGIONAL CONDITIONS APPLICABLE TO SPECIFIC NATIONWIDE PERMITS

Nationwide Permit 7 – Outfall Structures and Associated Intake Structures and
Nationwide Permit 12 – Utility Line Activities - Intakes in the Yellowstone River or the Missouri River in Blaine, Chouteau, Custer, Dawson, Fergus, Garfield, McCone, Petroleum, Phillips, Prairie, Richland, Roosevelt, Valley and Wibaux Counties. Inlet screens will be installed on all pump intakes, with a screen mesh opening size no larger than 0.25 inches. Water intake velocities must not to exceed 0.5 feet per second through the mesh. Intakes must be located in the deepest water available and be elevated off the bottom of the river bed.

Nationwide Permit 11 – Temporary Recreational Structures. Temporary recreational structures within the Special River Management Zone of the upper Yellowstone River can be installed no earlier than 7 calendar days in advance of an event and must be removed no later than 7 calendar days after the event concludes.

Nationwide Permit 12 – Utility Line Activities. Trench excavation and backfill for utility lines is prohibited within the Ordinary High Water Mark of main and secondary flow channels and in adjacent wetlands within the Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 12 - Utility Line Activities. Permittees must notify the Corps in accordance with General Condition No. 31 (Pre-Construction Notification) prior to initiating any utility line activity that involves the discharge of dredged or fill material into open water such as lakes, ponds and perennial streams, or into wetlands, intermittent streams, or ephemeral streams when surface water is present.

The following activities normally do not usually involve a discharge of dredged or fill material and do not normally require a Section 404 permit:

1) Utility line activities involving only directional drilling or boring under the waterway where the bed and banks of the waterway and wetlands are not disturbed;

2) Utility line suspension over the waterway where wetlands and the bed and banks of the waterway are not disturbed;

3) Plowing or knifing methods of utility line installation where the soil or substrate is briefly separated and the utility line placed in the crease before the soil falls back into place; and

4) Permits are required for all of the above activities (1 through 3) in waters regulated under Section 10 of the Rivers and Harbors Act.

Nationwide Permit 13 – Bank Stabilization – Special River Management Zone of the Upper Yellowstone River

a. Temporary bank stabilization is prohibited during spring runoff.

b. Construction of temporary or permanent levees is prohibited within the Special River Management Zone.

c. Only bank stabilization that is parallel to and adjacent to the valley wall and/or Special River Management Zone boundary is allowed. All other bank stabilization must be reviewed under Standard Permit procedures. Bank stabilization along roads, ditches, fills, or structures already located along the valley wall is allowed under this Nationwide Permit.

Nationwide Permit 14 – Linear Transportation Projects. The construction of new transportation facilities in waters of the U.S. within the Special River Management Zone (SRMZ) of the upper Yellowstone River is prohibited under this Nationwide Permit and must be reviewed under Standard Permit procedures. The replacement, reconstruction, and upgrading of existing transportation facilities are allowed under this Nationwide Permit within the SRMZ.

Nationwide Permit 17 – Hydropower Projects. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 21 – Surface Coal Mining Activities. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 23 – Approved Categorical Exclusions. All permittees must notify the Corps in accordance with the General Condition No. 31 (Pre-Construction Notification) prior to initiating any activities authorized under this permit.

Nationwide Permit 27 – Aquatic Habitat Restoration, Establishment, and Enhancement Activities. The construction of water control structures, dikes, berms, current deflectors, bank stabilization, and ponds is prohibited within the Channel Migration Zone of the upper Yellowstone River unless it is demonstrated that the proposed features contribute to the restoration or rehabilitation of previously lost or impaired functions of the upper Yellowstone River and adjacent aquatic areas.

Nationwide Permit 27 - Aquatic Habitat Restoration, Establishment, and Enhancement Activities. All permittees must notify the Corps in accordance with the General Condition No. 31 (Pre-Construction Notification) prior to initiating any aquatic habitat restoration, establishment or enhancement activities.

Notifications for pond projects must demonstrate there will be no net loss of emergent wetlands (if present) once the pond site matures in order for the project to qualify for NWP 27. Monitoring will be required to assure no net loss of emergent wetlands.

NWP 27 will not be used to authorize berms, dams, or similar structures for on-stream ponds on perennial, intermittent, or ephemeral streams unless they are necessary and appropriate elements of a stream or wetland restoration project.

Post-construction monitoring is required for wetland restoration, establishment, and enhancement projects exceeding ½ acre in size, and for stream restoration, establishment, and enhancement projects exceeding 500 feet in length.

Nationwide Permit 29 - Residential Developments. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 30 – Moist Soil Management for Wildlife. Fire breaks within the Channel Migration Zone of the upper Yellowstone River must be reclaimed and restored within six months after the fire event ends.

Nationwide Permit 33 – Temporary Construction, Access, and Dewatering.

a. Temporary bank stabilization is prohibited during spring runoff within the Special River Management Zone of the upper Yellowstone River.

b. Construction of temporary levees is prohibited within the Special River Management Zone.

Nationwide Permit 39 - Commercial and Institutional Developments

This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 40 – Agricultural Activities. Only those activities associated with the reduction of existing adverse impacts on the upper Yellowstone River are authorized by this Nationwide Permit. Examples of allowable projects include work associated with livestock management, moving livestock watering areas off the river or out of the Channel Migration Zone, removal of irrigation systems from the Channel Migration Zone, and the removal or conversion of irrigation systems from flood irrigation to sprinkler irrigation.

Nationwide Permit 42 - Recreational Facilities. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 43 - Stormwater Management Facilities. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 44 - Mining Activities. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 45 - Repair of Uplands Damaged by Discrete Events. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 49 – Coal Remining Activities. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

Nationwide Permit 50 – Underground Coal Mining Activities. This Nationwide Permit has been revoked within the 48-mile Special River Management Zone of the upper Yellowstone River.

GENERAL CONDITIONS (REGIONAL ADDITIONS)

General Condition 6 – Suitable Material

The use of precast or cast in place concrete materials or structures for permanent stream bank or shoreline stabilization, or as a component of a stream channelization or relocation project, is prohibited in Montana. Articulated concrete matting or similar material may be used on a case-specific basis such as for boat ramps, bridge pier scour protection, low water fords, culvert aprons, etc.

The use of clean brick, broken concrete and cinder block (in lieu of rock riprap) for fill can be considered on a case-specific basis. A list of materials prohibited or restricted as fill material in waters of the United States within Montana can be found at http://www.nwo.usace.army.mil/html/od-rmt/mtspecific.html.

DEFINITIONS

"Discrete Event," as used in Nationwide Permit 3 – Maintenance and Nationwide Permit 45 – Repair of Uplands Damaged by Discrete Events does not include runoff or stream flow events equal to or less than the bankfull discharge.

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO002_DP01
Investigator(s): Robert Frank Section, Township, Range: 21 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%): 1
Subregion (LRR): G Lat: 46.238358 Long: -103.948795 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Hordeum jubatum*	80%	Y	FACW
2. *Juncus balticus*	10%	N	FACW
3. *Poa pratensis*	5%	N	FACU
4.			
	95%	= Total Cover	
Woody Vine Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	

% Bare Ground in Herb Stratum 0.00%

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	90%	x 2	180.0%
FAC species	0%	x 3	0.0%
FACU species	5%	x 4	20.0%
UPL species	0%	x 5	0.0%
Column Totals:	95.0% (A)		200% (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test if >50%
- Y 3 - Prevalence Index is ≤ 3.0
- 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
- Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks: Small low lying wetlands body

Sampling Point: W22ABO002_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
16	7.5YR 3/1	100%			D		Clay Loam	High clay.

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO002_DP02
Investigator(s): Robert Frank Section, Township, Range: 21 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): <5%
Subregion (LRR): G Lat: 46.238327 Long: -103.948686 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Artemisia tridentata*	10%	Y	UPL
2.			
	10% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Pascopyrum smithii*	25%	Y	FACU
2. *Bouteloua gracilis*	12%	Y	UPL
3. *Hesperostipa comata*	10%	N	UPL
4. *Poa secunda*	10%	N	FACU
5. *Achillea millefolium*	8%	N	FACU
6. *Artemisia frigida*	8%	N	UPL
7.			
	73% = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	43%	x 4	172.0%
UPL species	40%	x 5	200.0%
Column Totals:	83.0% (A)		372% (B)

Prevalence Index = B/A = 4.48

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test if >50%
____ 3 - Prevalence Index is ≤ 3.0
____ 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
____ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks:

Sampling Point: W22ABO002_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
16	2.5Y 4/2	100%					Sandy Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	n/a
Water Table Present?	Yes ___	No X	Depth (inches):	n/a
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	n/a

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: W22ABO003_DP01
Investigator(s): Robert Frank Section, Township, Range: 8 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%): 0
Subregion (LRR): G Lat: 46.268564 Long: -103.955290 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:
Small wetland

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Juncus dudleyi*	100%	Y	FACW
2.			
	100%	= Total Cover	
Woody Vine Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	100%	x 2	200.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	0%	x 5	0.0%
Column Totals:	100.0% (A)		200% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test if >50%
- Y 3 - Prevalence Index is ≤ 3.0
- 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
- Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

Sampling Point: W22ABO003_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
16	7.5YR 3/2	85%	7.5YR 5/4	15%	C	M	Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** X **No** ___

Remarks: 15% redox feature

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- __Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present? Yes X No ___ Depth (inches): 2

Water Table Present? Yes X No ___ Depth (inches): 0

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): n/a

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO003_DP02
Investigator(s): Robert Frank Section, Township, Range: 8 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): <5%
Subregion (LRR): G Lat: 46.268563 Long: -103.955267 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Artemisia cana*	10%	Y	FACU
2.			
	10% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Calamovilfa longifolia*	30%	Y	UPL
2. *Poa pratensis*	20%	Y	FACU
3. *Bouteloua gracilis*	15%	N	UPL
4. *Achillea millefolium*	10%	N	FACU
5. *Artemisia frigida*	8%	N	UPL
6.			
	83% = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	40%	x 4	160.0%
UPL species	53%	x 5	265.0%
Column Totals:	93.0% (A)		425% (B)

Prevalence Index = B/A = 4.57

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test if >50%
____ 3 - Prevalence Index is ≤ 3.0
____ 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
____ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks:

Sampling Point: W22ABO003_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
6	5YR 5/1	100%					Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Frozen ground

Depth (inches): 6

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	n/a
Water Table Present?	Yes ___	No X	Depth (inches):	n/a
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	n/a

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO004_DP01
Investigator(s): Robert Frank Section, Township, Range: 8 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Linear Slope Slope (%): 2
Subregion (LRR): G Lat: 46.268646 Long: -103.958066 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Hordeum jubatum*	75%	Y	FACW
2. *Pascopyrum smithii*	10%	N	FACU
3. *Carex duriuscula*	5%	N	UPL
4.			
	90%	= Total Cover	
Woody Vine Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)
Total Number of Dominant Species Across All Strata: 1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	75%	x 2	150.0%
FAC species	0%	x 3	0.0%
FACU species	10%	x 4	40.0%
UPL species	5%	x 5	25.0%
Column Totals:	90.0% (A)		215% (B)

Prevalence Index = B/A = 2.39

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test if >50%
- Y 3 - Prevalence Index is ≤ 3.0
- 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
- Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

Sampling Point: W22ABO004_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	%	Redox Features Color:	%	Type:	Loc:	Texture:	Remarks:
16	7.5YR 3/2	85%	7.5YR 5/4	15%	C	M	Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** X **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes	X	No	___	Depth (inches): 1
Water Table Present?	Yes	___	No	X	Depth (inches): n/a
Saturation Present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): n/s

Wetland Hydrology Present? **Yes** X **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO004_DP02
Investigator(s): Robert Frank Section, Township, Range: 8 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): <5%
Subregion (LRR): G Lat: 46.268674 Long: -103.958164 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Artemisia cana*	12%	Y	FACU
2.			
	12% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Poa secunda*	30%	Y	FACU
2. *Pascopyrum smithii*	20%	Y	FACU
3. *Bromus tectorum*	20%	Y	UPL
4. *Koeleria macrantha*	10%	N	UPL
5. *Bouteloua gracilis*	5%	N	UPL
6.			
	85% = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	62%	x 4	248.0%
UPL species	35%	x 5	175.0%
Column Totals:	97.0% (A)		423% (B)

Prevalence Index = B/A = 4.36

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test if >50%
____ 3 - Prevalence Index is ≤ 3.0
____ 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
____ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks:

Sampling Point: W22ABO004_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
16	7.5YR 4/2	100%					Sandy Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	n/a
Water Table Present?	Yes ___	No X	Depth (inches):	n/a
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	n/a

Wetland Hydrology Present? **Yes** ___ **No** **X**

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO005_DP01
Investigator(s): Robert Frank Section, Township, Range: 8 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%): 2
Subregion (LRR): G Lat: 46.270326 Long: -103.967722 Datum: NAD83
Soil Map Unit Name: NWI classification:
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
		= Total Cover	
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	
Herb Stratum (Plot size: 5 ft)			
1. *Hordeum jubatum*	65%	Y	FACW
2. *Spartina pectinata*	25%	Y	FACW
3. *Carex nebrascensis*	15%	N	OBL
4. *Carex duriuscula*	5%	N	UPL
5.			
	110%	= Total Cover	
Woody Vine Stratum (Plot size: 15 ft)			
1.			
		= Total Cover	

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	15%	x 1	15.0%
FACW species	90%	x 2	180.0%
FAC species	0%	x 3	0.0%
FACU species	0%	x 4	0.0%
UPL species	5%	x 5	25.0%
Column Totals:	110.0% (A)		220% (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test if >50%
- Y 3 - Prevalence Index is ≤ 3.0
- 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
- Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

Sampling Point: W22ABO005_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
7	7.5YR 4/1	85%	7.5YR 4/4	15%	C	M	Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ High PLains Depression (F16)
  (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16)
  (LRR H outside of MLRA 72 & 73)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	n/a	
Water Table Present?	Yes ___	No X	Depth (inches):	n/a	**Wetland Hydrology Present?** **Yes** **X** **No** ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	n/a	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Bowman Sampling Date: 10/11/2018
Applicant/Owner: Denbury State: ND Sampling Point: N22ABO005_DP02
Investigator(s): Robert Frank Section, Township, Range: 8 , 132N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): <5%
Subregion (LRR): G Lat: 46.270329 Long: -103.967735 Datum: NAD83
Soil Map Unit Name: NWI classification: n/a
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Artemisia cana*	8%	Y	FACU
2.			
	8% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Pascopyrum smithii*	30%	Y	FACU
2. *Bromus tectorum*	25%	Y	UPL
3. *Poa secunda*	15%	Y	FACU
4. *Achillea millefolium*	5%	N	FACU
5.			
	75% = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	58%	x 4	232.0%
UPL species	25%	x 5	125.0%
Column Totals:	83.0% (A)		357% (B)

Prevalence Index = B/A = 4.30

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test if >50%
____ 3 - Prevalence Index is ≤ 3.0
____ 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
____ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks:

Sampling Point: W22ABO005_DP

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
6	10YR 3/2	100%					Clay Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Frozen ground

Depth (inches): 6

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	n/a
Water Table Present?	Yes ___	No X	Depth (inches):	n/a
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	n/a

Wetland Hydrology Present? **Yes** ___ **No** X

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Slope Sampling Date: 10/12/2018
Applicant/Owner: Denbury State: ND Sampling Point: W22ASL006_DP01
Investigator(s): Robert Frank Section, Township, Range: 31 , 133N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Concave Slope (%):
Subregion (LRR): G Lat: 46.292302 Long: -104.041441 Datum: NAD83
Soil Map Unit Name: NWI classification: PEMA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	X	No	
Hydric Soil Present?	Yes	X	No	
Wetland Hydrology Present?	Yes	X	No	

Is the Sampled Area within a Wetland? **Yes X No**

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30 ft)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15 ft)			
1.			
	= Total Cover		
Herb Stratum (Plot size: 5 ft)			
1. *Spartina pectinata*	45%	Y	FACW
2. *Carex aquatilis*	35%	Y	OBL
3. *Hordeum jubatum*	25%	N	FACW
4. *Carex nebrascensis*	10%	N	OBL
5. *Juncus balticus*	5%	N	FACW
6. *Poa pratensis*	5%	N	FACU
7. *Juncus dudleyi*	5%	N	FACW
8.			
	130% = Total Cover		
Woody Vine Stratum (Plot size: 15 ft)			
1.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 2 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	45%	x 1	45.0%
FACW species	80%	x 2	160.0%
FAC species	0%	x 3	0.0%
FACU species	5%	x 4	20.0%
UPL species	0%	x 5	0.0%
Column Totals:	130.0% (A)		225% (B)

Prevalence Index = B/A = 1.73

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- Y 2 - Dominance Test if >50%
- Y 3 - Prevalence Index is ≤ 3.0
- 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
- Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes X No**

Remarks:

Sampling Point: W22ASL006_DP0

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
16	10YR 3/1	100%					Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: none

Depth (inches): n/a

Hydric Soil Present? **Yes** **X** **No** ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- X Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- X Geomorphic Position (D2)
- X FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes	X	No	___	Depth (inches): 2
Water Table Present?	Yes	X	No	___	Depth (inches): 1
Saturation Present? (includes capillary fringe)	Yes	___	No	X	Depth (inches): n/a

Wetland Hydrology Present? **Yes** **X** **No** ___

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: CHSU Lateral City/County: Slope Sampling Date: 10/12/2018
Applicant/Owner: Denbury State: ND Sampling Point: W22ASL006_DP02
Investigator(s): Robert Frank Section, Township, Range: 31 , 133N, 106W
Landform (hillslope, terrace, etc.): Local relief (concave, convex, none): Slope (%): <5%
Subregion (LRR): G Lat: 46.292312 Long: -104.041376 Datum: NAD83
Soil Map Unit Name: NWI classification: PEMA
Are climatic/hydrologic conditions on the site typical for this time of year? Yes X No (if no, explain in Remarks.)
Are Vegetation No , Soil No , or Hydrology No significantly disturbed? Are "Normal Circumstances" present? Yes X No
Are Vegetation No , Soil No , or Hydrology No naturally problematic? (if needed, explain in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important feautres, etc.

Hydrophytic Vegetation Present?	Yes	No X	**Is the Sampled Area within a Wetland?** **Yes** **No X**
Hydric Soil Present?	Yes	No X	
Wetland Hydrology Present?	Yes	No X	

Remarks:

VEGETATION – Use scientific names of plants

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
	= Total Cover		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Artemisia cana*	10%	Y	FACU
2.			
	10% = Total Cover		
Herb Stratum (Plot size: 5)			
1. *Pascopyrum smithii*	25%	Y	FACU
2. *Agropyron cristatum*	25%	Y	UPL
3. *Calamovilfa longifolia*	15%	Y	UPL
4. *Achillea millefolium*	8%	N	FACU
5.			
	73% = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
	= Total Cover		

% Bare Ground in Herb Stratum

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0.0% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species	0%	x 1	0.0%
FACW species	0%	x 2	0.0%
FAC species	0%	x 3	0.0%
FACU species	43%	x 4	172.0%
UPL species	40%	x 5	200.0%
Column Totals:	83.0% (A)		372% (B)

Prevalence Index = B/A = 4.48

Hydrophytic Vegetation Indicators:

____ 1 - Rapid Test for Hydrophytic Vegetation
____ 2 - Dominance Test if >50%
____ 3 - Prevalence Index is ≤ 3.0
____ 4 - Morphological Adaptations (Provide supporting data in Remarks or on a seperate sheet)
____ Problematic Hydrophytic Vegetation (Explain)

Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** **No X**

Remarks:

Sampling Point: W22ASL006_DP0

SOIL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators

Depth (inches)	Matrix Color:	Matrix %	Redox Features Color:	Redox Features %	Redox Features Type:	Redox Features Loc:	Texture:	Remarks:
8	5YR 4/1	100%					Sandy Loam	

Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR F)**
- ___ 1 cm Muck (A9)**(LRR F, G, H)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Muck Mineral (S1)
- ___ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ___ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ High PLains Depression (F16) **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils

- ___ 1 cm Muck (A9)**(LRR I, J)**
- ___ Coast Prarie Redox (A16) **(LRR F, G, H)**
- ___ Dark Surface (S7) **(LRR G)**
- ___ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: Frozen ground

Depth (inches): 8

Hydric Soil Present? **Yes** ___ **No** **X**

Remarks:

HYDROLOGY

Wetland Hydrology Indicators

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Oxidized Rhizospheres along Living Roots (C3) **(where not tilled)**
- ___ Presence of Reduced Iron (C4)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ FAC-Neutral Test (D5)
- ___ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches):	n/a	
Water Table Present?	Yes ___	No X	Depth (inches):	n/a	**Wetland Hydrology Present?** **Yes** ___ **No** **X**
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches):	n/a	

Describe Recorded Data (stream guage, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX E
Paleontological Resources Report

Paleontological Survey Report for the Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota

APRIL 2019

PREPARED FOR

Denbury Green Pipeline - Montana, LLC

SUBMITTED TO

North Dakota Public Service Commission

PREPARED BY

SWCA Environmental Consultants

PALEONTOLOGICAL SURVEY REPORT FOR THE CEDAR HILLS SOUTH UNIT CO_2 LATERAL PIPELINE, SLOPE AND BOWMAN COUNTIES, NORTH DAKOTA

Prepared for

Denbury Green Pipeline – Montana, LLC
5320 Legacy Drive
Plano, Texas 75024

Submitted to

North Dakota Public Service Commission
600 East Boulevard, Department 408
Bismarck, North Dakota 58505

Prepared by

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SWCA Paleontological Report No. ND18-28464-01

April 2019

CONTENTS

1 Introduction 1
2 Definition and Significance of and potential Impacts to Paleontological Resources 3
3 Methods 3
3.1 Personnel 4
3.2 Assessment of Paleontological Potential 4
3.3 Methods for Analyzing Existing Data 5
3.4 Field Survey Methods 5
3.5 Distribution of Data 6
4 Literature Review 6
4.1 Pierre Shale Formation 6
4.2 Fox Hills Formation 7
4.3 Hell Creek Formation 8
4.4 Surficial Deposits 9
5 Records Search Results 9
6 Field Survey Results 10
7 Literature Cited 29

Appendices

Appendix A Fossil Locality Forms for Recorded Fossil Localities (Confidential: For Agency Only)

Figures

Figure 1. Overview map of the CHSU CO_2 Lateral Pipeline Project. 2
Figure 2. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 9.2 – 10.9. 11
Figure 3. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 10.2 – 12.7. 12
Figure 4. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 12.2 – 15.1. 13
Figure 5. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 14.4 – 17.0. 14
Figure 6. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 15.7 – 17.8. 15
Figure 7. Hill of partially covered Fox Hills Formation along pipeline by milepost 9 in Section 9, T133N, R106W, (photo point P16-181219-02), view facing northeast. 19
Figure 8. Rolling vegetated hills in the Fox Hills Formation with surface exposures along proposed pipeline near milepost 10.6 in Section 33, T133N, R106W (photo point P16-181219-04), view facing west. 19
Figure 9. Rolling vegetated hills with weathered Fox Hills Formation exposures along proposed pipeline route at milepost 11.1 in Section 01, T132N, R107W (photo point P16-181219-06), view facing west-northwest. 20
Figure 10. Steep exposures of Fox Hills Formation along the pipeline route just south of milepost 12.3 in Section 07, T132N, R106W; vegetated hilltops and flatland (photo point P16-181219-18), view facing east. 20
Figure 11. Steep badland exposures of Fox Hills Formation near Little Beaver Creek along the proposed pipeline route near milepost 12.5 in Section 7, T132N, R106W (photo point P16-181220-02), view facing east. 21
Figure 12. Vegetated hills with exposures of Hell Creek Formation on hills along proposed pipeline route near milepost 12.6 in Section 07, T132N, R106W (photo point P16-181220-03), view facing southeast. 21
Figure 13. Muddy exposures of the Hell Creek Formation along proposed pipeline between mileposts 13.4 and 13.5 in Section 08, T132N, R106W (photo point P16-181219-17), view facing east. 22
Figure 14. Grass-covered area along the proposed pipeline route near milepost 16.1, Section 21, T132N, R106W, in an area of mapped Hell Creek Formation (photo point P16-181219-13), view facing north. 22
Figure 15. Surface exposures of the Hell Creek Formation in valley along proposed pipeline centerline near milepost 16.4 (photo point P16-181219-10), view facing south. 23
Figure 16. Exposures of the Hell Creek Formation covered by ice, water, and snow on the flats and on badland buttes in the background south of milepost 17 in Section 28, T132N, R106W (photo point P16-181219-08), view facing north. 23
Figure 17. Vegetated slopes and exposures of Hell Creek Formation in the distance along the pipeline route near milepost 17.2 in Section 23, T2S, R59E (photo point P16-181219-07), view facing northeast. 24
Figure 18. Grass-covered rolling hills in area mapped as Hell Creek Formation in Section 33, T2S, R59E near pipeline milepost 17.5 (photo point P16-181219-11), view facing north. 24
Figure 19. Vertebrata rounded bone fragment. 25
Figure 20. Hadrosaurian ossified tendon fragment. 25

Tables

Table 1. Mapped Geologic Units Crossed by the Project 4
Table 2. Previously Recorded Fossil Localities within 1 Mile of the North Dakota Portion of the CHSU Lateral Pipeline Project 10
Table 3. Summary of CHSU Pipeline Project 2018 Infrastructure Surveys 17
Table 4. Fossil Locality Documented during the Paleontological Field Surveys Conducted for the CHSU Lateral Pipeline Project 27

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1 INTRODUCTION

This report presents the 2018 results of the paleontological field survey completed by SWCA Environmental Consultants (SWCA) for the proposed Cedar Hills South Unit (CHSU) Carbon Dioxide (CO_2) Lateral Pipeline Project (Project) on behalf of Denbury Green Pipeline – Montana, LLC (Denbury). Denbury proposes to construct a 17.76-mile-long pipeline through southeast Montana and southwest North Dakota. This report details the results of the paleontological survey of 9.22 miles of pipeline on privately owned land in Slope and Bowman Counties, North Dakota. As currently planned, the 12-inch-diameter pipeline would transport CO_2 from a facility in the Coral Creek Oil Unit south of Baker, Montana, to the Cedar Hills South Oil Unit south of Marmarth, North Dakota. The proposed temporary surface will be a 75-foot disturbance corridor.

The Project is located on private lands in Sections 6 through 9, 16, 21, 28 and 33, Township (T) 132 North (N), Range (R) 106 West (W); Section 1, T132N, R107W; and Sections 31, 32, 33, T133N, R106W (Figures 1–6) within the Waterhole Creek (1981), Kid Creek (1976), and Marmarth (1980), North Dakota, U.S. Geological Survey (USGS) 7.5-minute quadrangle. A 200-foot-wide corridor centered on the proposed pipeline centerline was surveyed. SWCA's objective was to complete a thorough pedestrian examination of potentially fossiliferous bedrock outcrops within the Project area to locate and document surface fossils and provide information on the potential for impact to paleontological resource during the construction phase of the project.

The North Dakota Public Service Commission is the lead regulatory agency under the North Dakota Energy Conversion and Transmission Facility Siting Act (excluding any applicable county or local requirements). The paleontological resource assessment was conducted for the undertaking because published geologic mapping indicates that most of the area overlies geologic units with high potential to contain scientifically important paleontological resources. According to previous geological mapping (Carlson 1979, 1983; Clayton et al. 1980; Vuke et al. 2001), the Project overlies the Cretaceous-age Pierre Shale Formation, the Colgate Member and undifferentiated Trail City and Timber Lake Members of the Fox Hills Formation (mapped as two separate units only in extreme western Slope County), and the Hell Creek Formation. The survey of the proposed pipeline was conducted by SWCA lead paleontologist Georgia E. Knauss.

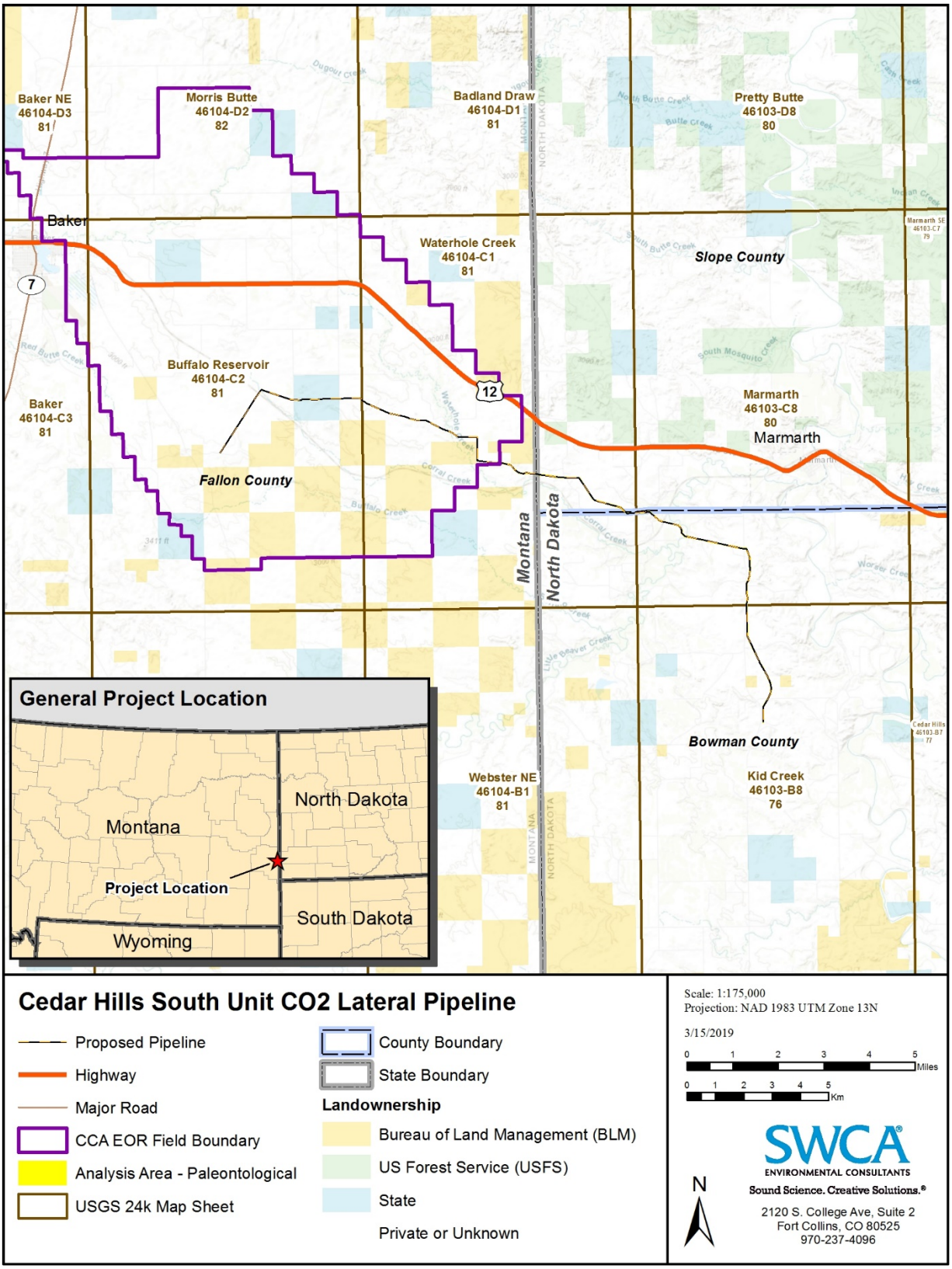


Figure 1. Overview map of the CHSU CO_2 Lateral Pipeline Project.

2 DEFINITION AND SIGNIFICANCE OF AND POTENTIAL IMPACTS TO PALEONTOLOGICAL RESOURCES

The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered nonrenewable resources because the organisms they represent no longer exist, and such resources, if destroyed, cannot be replaced. Paleontological resources are important scientific and educational resources that paleontologists use to study taphonomic processes. Paleontologists also use the morphologic information that fossils provide to reconstruct the phylogenetic relationships of extinct and extant organisms; study evolution, extinction, and speciation patterns; reconstruct ancient environments and paleobiogeographic relationships; and provide relative geologic dates through biochronology and biostratigraphy.

In general, surface-disturbing activities have the potential to adversely affect surface and subsurface paleontological resources in rock units and overlying sediments known to contain such resources. Direct impacts include destruction from breakage and crushing as the result of surface and subsurface disturbance. Indirect impacts also occur as the result of the construction of new roads and trails in areas that were previously less accessible. This increases public access and therefore increases the likelihood of the loss of paleontological resources through vandalism and unlawful collecting.

During this paleontological resource investigation, SWCA conducted background research to determine the paleontological sensitivity of the geologic units within the analysis area and completed a paleontological field survey to identify survey exposures of potentially sensitive geologic units for surface fossils. The purpose of this work is to reduce adverse Project effects on significant paleontological resources.

Since this Project is entirely on private land, it is appropriate to also consider a general significance criterion. In the following criteria, fossils are considered important if one or more of the following criteria (modified from Scott and Springer 2003) are met.

1. The fossils provide data on the evolutionary relationships and developmental trends among organisms, both living and extinct.
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein.
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas.
4. The fossils demonstrate unusual or spectacular circumstances in the history of life.
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

It will also be useful to evaluate scientific importance by considering the converse; in other words, paleontological resources that may be considered not scientifically important are those that lack provenience or context, lack physical integrity because of decay or natural erosion, or are overly redundant or are otherwise not useful for research (per Murphey et al. 2019).

3 METHODS

This section details the methods SWCA used to perform paleontological work for the Project.

3.1 Personnel

Georgia E. Knauss completed the survey for this undertaking. Georgia E. Knauss, Vicki L. Meyers, and Andrew N. Gerwitz prepared this report, and Brian Brokling produced the associated maps.

3.2 Assessment of Paleontological Potential

The Potential Fossil Yield Classification (PFYC) system classifies geologic units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher-class number indicating a higher potential (Bureau of Land Management [BLM] 2016). This, or similar, classification system is frequently used to evaluate project areas even if they do not have federal oversite as the information shared through these class numbers are applicable to assessing the paleontological potential of any location regardless of the landowner. The PFYC ranks (Classes 1–5) have been assigned to each geologic unit (formation, member, or other distinguishable units) at the most detailed mappable level based on the taxonomic diversity and abundance of previously recorded scientifically significant paleontological resources associated with the unit and the potential for future discoveries, with a higher class number indicating higher potential (BLM 2016). Additional rankings are provided for geologic units of unknown potential (U), water (W), and ice (I). The PFYC system is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally exist in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to serve as the major determinant for the class assignment. The PFYC system provides baseline guidance for predicting, assessing, and mitigating paleontological resources in areas of development.

Previously published geologic maps (Clayton et al. 1980) indicate that approximately three geologic units underlie the analysis area (Table 1).

Table 1. Mapped Geologic Units Crossed by the Project

Geologic Unit	Map Symbol*	Age	Typical Fossils	PFYC
Alluvium and terrace deposits of modern channels and floodplains	Qal, Qat	Holocene	Holocene-age deposits contain the unfossilized remains of modern taxa and are too young to contain fossils.	2
Hell Creek Formation	Khc	Late Cretaceous	Abundant, diverse, and well-preserved terrestrial vertebrates (fish, amphibians, mammals, and reptiles including dinosaurs), invertebrates (mollusks), and terrestrial plants.	5
Fox Hills Formation; Colgate, Undifferentiated Timber Lake, and Trail City Members	Kfh, Kfc, Kftt (Kftl, Kftc)	Late Cretaceous	Marine invertebrates and vertebrates (fish, sharks) are common; terrestrial plants and vertebrates (reptiles, dinosaurs, and mammals) are less common.	3 (Kftc); 5 (Kftt, Kftc, Kftl)
Pierre Shale	Kp	Late Cretaceous	Plants (wood); trace fossils (burrows, borings, fecal pellets, and gastroliths); abundant invertebrates (mollusks, gastropods, and bivalves); locally abundant vertebrates (fish, turtles, mosasaurs, plesiosaurs, and more rare dinosaurs, pterosaurs, and birds).	4 (Kp); 3 (Kpg)

Note: Geologic units are listed approximately in descending stratigraphic order from youngest to oldest. Typical fossil information is summarized from authors' personal experience and the literature review.

* Sources: Carlson 1979, 1983; Clayton et al. 1980; Vuke et al. 2001; BLM 2015

3.3 Methods for Analyzing Existing Data

Before the field survey, SWCA analyzed existing data on the Project to identify known fossil resources therein and nearby in the same geologic formation. SWCA then used that information and the PFYC ranking of the underlying geologic unit to evaluate the paleontological sensitivity of the Project and assess the potential for construction to disturb known and unknown paleontological resources. SWCA's pre-field research included a review of geologic maps and current literature. In addition, SWCA reviewed previously obtained paleontological records maintained by the Pioneer Trails Regional Museum and North Dakota State Fossil Collection. The records search was conducted to 1) determine whether any previously recorded fossil localities occur in the analysis area, 2) assess the potential for disturbance of these localities during construction, and 3) evaluate the paleontological sensitivity of the analysis area.

3.4 Field Survey Methods

SWCA designed the paleontological field survey for the Project to determine the surface presence of previously unknown significant vertebrate fossils and/or noteworthy invertebrate, plant, or trace fossils and to evaluate potential adverse impacts to subsurface paleontological resources during construction. The paleontological assessment covered the pipeline corridor as represented by geographic information system (GIS) data provided by Denbury (see Figures 1–6). The survey area consists of a 100-foot buffer on either side of the pipeline center, creating a 200-foot-wide corridor.

SWCA reviewed aerial imagery of the Project area before the survey and cleared highly vegetated and farmland areas. The field survey concentrated on exposures of geologic units with high to very high paleontological potential (PFYC Class 4 and Class 5). During fieldwork, the paleontologist looked for 1) surface fossils, 2) exposures of potentially fossiliferous rock, and 3) areas in which construction would expose or otherwise affect fossiliferous rock. Exposures of paleontologically sensitive geologic units received a thorough pedestrian survey. A visual review from a distance is appropriate only for areas in which the absence of bedrock exposures can be visually confirmed from that distance. The paleontologist visually inspected heavily vegetated areas to confirm that those areas contained no exposed bedrock.

It is SWCA's standard operating procedure to record all fossils discovered during the field surveys as significant fossil localities (SFLs) or non-significant fossil occurrences (NFOs). An SFL requires documentation of the location, identification, and description of the qualifying significant paleontological resources along with their geologic context, and these resources may require avoidance or mitigation of impact from Project activities. The presence of highly weathered, fragmentary, or otherwise unidentifiable fossils is recorded as an NFO to communicate the presence of fossils in a manner that avoids unnecessarily triggering avoidance or mitigation measures. NFOs typically consist of more than five fragments of turtle shell, unidentifiable bone and tooth fragments, and/or unidentifiable plant fossils and fragments of fossilized wood. Fossil locality data are sensitive; therefore, detailed locality information, including locality forms, are appended only to the agency copies of this report.

Paleontological resources collected from privately owned or split-estate land are the property of the surface-estate owner, and their disposition shall be in accordance with the agreement between the surface landowner and the project proponent. Surface owners are encouraged to consider the scientific value of finds made on their lands and to donate potentially important finds to a public museum for the benefit of society. As is standard practice on private land, SWCA notifies landowners of any significant fossil discoveries if avoidance of those resources through Project design is not feasible. Such fossils are documented but not collected at the time of discovery. Rather, SWCA communicates their presence in a letter that provides each landowner with the option to a) have the fossils collected and donated to a public museum for curation and permanent storage at no expense to the landowner; b) have the fossils collected

and returned to the landowner; or c) not have the fossils collected, recognizing that construction may damage or destroy resources and waiving all claims to Denbury for damages or loss of economic value to the fossils. At the written request of landowners who choose option c, SWCA will prepare significant fossils discovered on their lands to the point of identification before transferring them to a museum. SWCA will not prepare fossils returned to landowners.

3.5 Distribution of Data

SWCA will submit copies of this report to North Dakota Public Service Commission and Denbury and will retain an electronic file and relevant field notes, maps, and other data on SWCA's corporate server.

4 LITERATURE REVIEW

The Project begins in the northeastern portion of the Powder River Basin in southeastern Montana and trends northeast before ending near the crest of the Cedar Creek Anticline (CCA) near Baker, Montana. The geologic units traversed by the Project include an array of fossiliferous bedrock formations and surficial deposits of Cretaceous and Quaternary (Pleistocene) age. The fossils contained within these units, together with the sediments in which they are preserved, provide evidence of the history of life in the western interior of North America at the time of the Cretaceous leading up to the mass extinction event. During the late Cretaceous, the Western Interior Seaway covered much of central North America and underwent its final major regressive depositional cycle, depositing marine, beach, estuarine, and strand line sediments, marking the end of the seaway. Continued uplift of the mountains along with faulting and folding of the underlying rock units through the remainder of the Paleogene and Neogene eroded the overlying sediments and exposed the underlying Cretaceous sediments on the surface. From Quaternary to recent times, the landscape was further altered as the result of erosion by water and wind, and the modern topography was formed.

The general geology and paleontological content of the geologic units within the Project area are described in this section of the report in approximately ascending stratigraphic order (from oldest to youngest).

4.1 Pierre Shale Formation

The marine upper Cretaceous-age Pierre Formation (Campanian-Maastrichtian, also spelled Maestrichtian) occurs in Montana, North Dakota, South Dakota, Wyoming, and Colorado. Although the Pierre Formation (also known as Pierre Shale) originally was formally assigned a formation-level designation, Martin et al. (2007) recommend elevation of the Pierre Formation to group status in Nebraska, North Dakota, South Dakota, and eastern Wyoming; however, this change has not yet been implemented. Within the Project area, the Pierre Shale consists of dark gray to brownish-black bentonitic claystone, mudstone, and shale that contain thin jarosite stringers and bentonite beds that range from less than 1 inch to 2 feet thick (Vuke et al. 2001). The formation also includes large fossiliferous limestone concretions that contain marine ammonites and pelecypods. The Pierre Shale underlies and is gradational with the lateral and overlying Fox Hills Formation. Generally, lithologies of the Pierre Shale include hard, platy to flaky gray, dark-gray, brownish-gray, grayish-black, and tan shale and silty shale; light-olive-gray silty bentonitic shale; limestone; and ironstone concretions (Gill and Cobban 1966; Haymes 1989; Scott and Wobus 1973).

The invertebrate and vertebrate fossil faunas of the Pierre Shale in Colorado, Wyoming, South Dakota, North Dakota, Montana, Kansas, and New Mexico have been the subject of far more studies than SWCA

can cite here (Bergstresser 1981; Bishop 1985; Carpenter 1996; Cobban et al. 1993; Gill and Cobban 1966; Kauffman and Kesling 1960; Lammons 1969; Martin and Parris 2007; Martz et al. 1999; Scott and Cobban 1986; and many others). The invertebrate fauna includes a diverse assemblage of mollusks (primarily ammonites and inoceramids) as well as other bivalves, bryozoans, gastropods, and calcareous worm tubes. Corals and extremely rare echinoids have been recorded from the Baculites *baculus* range zone of the CCA of eastern Montana (Gill and Cobban 1966). The ichnofauna consists primarily of trails, burrows, tubes, fecal pellets, and raspings on shells (Gill and Cobban 1966) as well as gastroliths. Plant fossils are less common and consist of logs and wood fragments. The vertebrate fauna is also diverse, containing a variety of fish; turtles; mosasaurs; plesiosaurs; and more rare dinosaurs, pterosaurs, and birds (Carpenter 1996, 2006). Vertebrate fossils are more localized than invertebrate fossils in this formation. Most discovered Pierre Shale vertebrate fossils have been found in the Sharon Springs Member in Wyoming, South Dakota, and Kansas. Additional vertebrate material has been discovered in the Pierre Shale in the Walsenburg area of southern Colorado.

Exposures of the Pierre Shale in Montana and North Dakota are not widespread but do occur locally. Fossils in the Pierre Shale in Montana and North Dakota are reportedly not as abundant or diverse as in other states (Gill and Cobban 1965). However, fossils are present locally and include a moderate diversity of marine vertebrates such as the sea turtle *Archelon;* the mosasaur *Plioplatecarpus;* sharks including *Squalus*, *Squalicorax*, *Pseudocorax*, *Cretolamna*, and *Carcharius*; bony fish; the sea bird *Hesperornis* (Hoganson and Woodward 2005); and a diverse invertebrate fauna (Hoganson et al. 1996).

4.2 Fox Hills Formation

The late Cretaceous (Maastrichtian) Fox Hills Formation is considered part of the Montana Group and is often referred to as the Fox Hills Sandstone. The Fox Hills Formation is exposed in the numerous basins and uplifts in North Dakota, Montana, South Dakota, Wyoming, and Colorado. Although not typically differentiated on state scale maps (1:500,000), the Fox Hills Formation has been divided into members in many places, including southwestern Montana and North and South Dakota. Rocks mapped as the Trail City Member, Timber Lake Member, and the Colgate Member of the Fox Hills Formation occur within the Project area.

The Fox Hills Formation is mainly marine in origin but does contain minor amounts of terrestrial sediments. This formation was deposited during the last stages of the retreating Western Interior Seaway. Therefore, the upper portion (members) of the formation was deposited closer to the shore with a higher likelihood of terrestrial influence (Colson et al. 2004; Murphy et al. 2002; Waage 1968). Most of the formation consists of thinly interbedded tan clay, silt, and sandstone underlying well-sorted, very fine- to medium-grained, upward-coarsening, cross-bedded, poorly consolidated sandstone. The base of the formation contains a thinly interbedded transitional sequence of very fine-grained tan sand, light-gray to brownish-gray silt, and gray to dark-gray or medium- to dark-brown clay, which grades downward into the sandy shale beds of the upper Pierre Shale Formation. A light-gray to white, weathered, fine- to medium-grained, cross-bedded sandstone locally forms the top of the Fox Hills Formation. The thickness of the formation in the Project area ranges from 40 to 180 feet (Wilde and Bergantino 2004).

Extensive paleontological research has been completed in the Fox Hills Formation, with most projects concentrated in North and South Dakota. Peppe et al. (2007) described numerous fossil plant species from the formation in central North Dakota. Fossil invertebrate research for the unit encompasses a large range of topics including taxonomic studies of ammonites (Landman and Waage 1993), including Baculites (Cobban and Kennedy 1992), bivalves (Erickson 1978; Speden 1970), bryozoans (Cobban and Kennedy 1992; Cuffey et al. 1981), echinoids (Holland and Feldman 1967), beetles (Northrop 1928), and decapod crustaceans (Crawford et al. 2006). In addition, Harries and Schopf (2007) examined gastropod densities from drill cores, and Erickson (1973) used gastropods to study Maastrichtian paleogeography. Oman

(1937) discovered preserved insect remains in the Fox Hills Formation of Colorado. Trace fossils of burrowing invertebrates from southwestern North Dakota have also been described (Daly 1997). The Fox Hills also contain the important trace fossil Ophiomorpha, which consists of 0.5- to 1.0-inch-diameter burrows formed by the tunneling activities of callianassid shrimp. These fossils indicate marginal marine to littoral conditions deposited in tidal environments (Rigby and Rigby 1990). Other reported trace fossils include structures interpreted as sea turtle nests (Bishop and Anonymous 2002). Although much less common than invertebrates, vertebrate fossils (Cope 1876; Hoganson and Erickson 2004; Hoganson et al. 1994) have been collected and studied; these include fish (Hoganson and Erickson 2005), mammals (Clemens et al. 1979; Wilson 1987), mosasaurs (Harrell and Martin 2014), dinosaurs, amphibians, and reptiles (Nelson et al. 2003). The Red Owl and Iron Lightning localities are two famous Fox Hills terrestrial mammal localities in northwestern South Dakota (Clemens et al. 1979; Wilson 1987).

4.3 Hell Creek Formation

Named by Barnum Brown in 1907, the Cretaceous-age Hell Creek Formation (Lancian, deposited 70 to 65 million years ago) is exposed in North Dakota, Montana, and South Dakota (Brown 1907). The Hell Creek Formation is laterally equivalent to the Lance Formation of Wyoming. Connor (1992) chose to refer to both formations as Lance. It is also partially correlative with the Laramie and Denver Formations in Colorado. The Hell Creek Formation was deposited in a lowland environment as the Cretaceous Interior Sea retreated. The Hell Creek Formation is composed dominantly of gray and grayish-brown sandstone and smectitic, silty shale and mudstone, with thin beds of lignite and carbonaceous shale. Sandstones are fine- or medium-grained and contain carbonate-cemented concretions. The mudstone exposures often form “popcorn” weathered badland topography as a result of smectitic clay swelling. Within the Project area, the base of the formation is brownish-orange, medium- to coarse-grained sandstone with rip-up clasts overlying a scour base and occurs unconformably on the Fox Hills Formation with some intertonguing (Rigby and Rigby 1990). Depending on distance axis of the CCA, the Hell Creek rests on progressively older Fox Hills Formation beds at the crest than away from the axis: Trail City Member (at the crest) through the Colgate Member (away from the crest). The thickness of the Hell Creek in the Project area reaches 260 feet. The basal contact with the underlying Fox Hills Formation may be either locally gradational or erosional (Vuke et al. 2001). The Hell Creek Formation is conformably overlain by the Tullock or Ludlow member of the Fort Union Formation. In this area, the top of Hell Creek is placed at the base of the first continuous lignite bed in the Fort Union Formation (Vuke et al. 2001). This upper formation boundary is close to or equivalent with the Cretaceous/Tertiary (K-T) boundary horizon, which is well known for the global dinosaur extinction as well as the disappearance of numerous other taxa. The K-T boundary has been defined by its documentation of changes in pollen composition and an iridium spike and the presence of shocked quartz (Bohor et al. 1984; Johnson et al. 1989).

The Hell Creek Formation contains abundant and diverse fossil fauna and flora. Most previously published works on the Hell Creek are based on outcrops from McCone County, Montana, and around the margins of the CCA in Montana and North Dakota (Johnson et. al. 2002). Barnum Brown collected the first fossils from the Hell Creek of Montana in the early 1900s, and interest in the formation has continued to increase throughout the last century. Clemens (2002) completed a detailed account of historical and current paleontological research around Fort Peck Lake. Known best for dinosaurs (Molnar 1980; Ott 2007), including the type specimen of *Tyrannosaurus rex* (Osborn 1905), the Hell Creek Formation has also produced important mammalian, non-dinosaurian reptilian, and plant fossil assemblages. Mammals of the Hell Creek Formation provide important information for understanding the evolution of modern orders (Clemens 2002; Hunter and Archibald 2002; Hunter and Pearson 1996; Wilson et al. 2016; Zhang and Archibald 2007). In addition to its important mammalian fauna, the Hell Creek Formation’s fossil record also includes plants (Arens et al. 2014; Johnson 1996; Shoemaker 1966);

bivalves and numerous other invertebrates (Hartman 1998; Johnson et al. 2002; Scholz and Hartman 2007a); trace fossils; fish (Brinkman et al. 2014; Estes 1969); amphibians (Estes 1965); turtles (Holroyd and Hutchison 2002; Joyce and Lyson 2017; Knauss et al. 2010;); crocodiles (Estes et al. 1969); dinosaurs and dinosaur bonebeds (Carpenter 1982; Griffin et al. 1988; Mathews et al. 2009; Rohrer and Konizeski 1960; Russell and Manabe 2002; Scanella et al. 2014; Sloan et al. 1986); pterosaurs (Henderson and Peterson 2006); and birds (Sankey et al. 2003). Two particularly well-known fossil localities in the Hell Creek Formation are Bug Creek and Harbicht Hill in McCone County, Montana (Lofgren 1995; Sloan and Van Valen 1965). The Hell Creek Formation is important for understanding changes in the animal and plant biotas from the Cretaceous to the Paleocene and for testing hypotheses regarding the global mass extinction at the end of the Cretaceous Period (Archibald 1982; Bercovici and Fastovsky 2015; Bryant 1989; Hartman et al. 2002; Hunter et al. 1997; Hutchison and Archibald 1986; Johnson 1993; Johnson and Hickey 1990; Johnson et al. 1989; Scholz and Hartman 2007b).

4.4 Surficial Deposits

Pleistocene and Holocene surficial deposits occur in stream channels and terraces along floodplains, locally scattered throughout the Project area.

The alluvium and colluvium are typically less than 10 feet (12 m) thick (Vuke et al. 2001). In southeastern Montana, alluvial deposits consist chiefly of poorly to well-stratified, light-brown to light-grayish orange, poorly to well-sorted, moderately to well-rounded gravel, sand, silt, and clay in terrace remnants above Waterhole and Buffalo Creek and its tributaries (Vuke et al. 2001). In North Dakota, alluvium occurs within and surrounding Little Beaver Creek as floodplain deposits consisting of brownish gray silt, clay, sand, and gravel sediments from recent drainage.

Pleistocene-age surficial deposits, particularly alluvium, may contain mineralized or partially mineralized animal bones, invertebrates, and plant remains of paleontological significance. Except for in some caves, hot springs, and tar deposits, these fossils typically occur in low density and usually consist of scattered and poorly preserved remains. The most common Pleistocene vertebrate fossils include the bones of mammoth, bison, deer, and small mammals; however, other taxa, including horse, lion, cheetah, wolf, camel, antelope, peccary, mastodon, and giant ground sloth, have been reported from the Rocky Mountain region (Cook 1930, 1931; Emslie 1986; Hunt 1954; Lewis 1970; Scott 1963). Most Pleistocene-age deposits within the study area contain few fossils. Holocene-age alluvium and colluvium may contain the unfossilized remains of modern taxa but are too young to contain in situ fossils.

5 RECORDS SEARCH RESULTS

This section summarizes the paleontological records search completed before the Project survey. SWCA compiled locality data from the Pioneer Trails Regional Museum and North Dakota State Fossil Collection. Eight previously documented localities are within the same sections as the Project area in North Dakota, none of which are within the Project survey area. Table 2 provides additional information regarding the localities within 1 mile of the project.

Table 2. Previously Recorded Fossil Localities within 1 Mile of the North Dakota Portion of the CHSU Lateral Pipeline Project

Distance from Project Area (miles)	Fossil Locality ID	Geologic Unit*	Source	Fossil Description†	Legal Location
>0.5	Ludlow Formation Location #2	Tfl	NDGS Frye (1967)	Plant (?*Carax* sp. from Frye 1967)	T133N, R106W, Section 33
Unknown, as location in section is not known	None given	Kfh	NDGS; by Hares (1928)	Plant (from NDGS); shark teeth and ?*Halymenites major* (from Hares, 1928)	T 132N, R106W, Section 33
>0.4	Not provided	Tfl	NDGS	Crocodylians, champsosaurids, turtles and fish	T132N, R106W, Section 16
>0.4	Not provided	Tfl	NDGS	Crocodylians, champsosaurids, turtles and fish	T132N, R106W, Section 16
0.9	V05004	Khc	PTRM	Surface Scatter	T132N, R106W, Section 21
0.6	V05005	Khc	PTRM	Surface Scatter, uncollected	T132N, R106W, Section 21
0.5	V05006	Khc	PTRM	Dinosaur, uncollected	T132N, R106W, Section 21
0.5	V05007	Khc	PTRM	Dinosaur, uncollected	T132N, R106W, Section 21

* R = Range; T = Township; Tfl = Ludlow Formation; Kf = Fox Hills Formation; Khc = Hell Creek Formation

† Sites may have produced additional undocumented material.

6 FIELD SURVEY RESULTS

This section presents the results of the field survey completed December 19 and 20, 2018. Appendix A contains maps of the areas surveyed. The paleontological analysis area totals 224 acres. Approximately 32% of the analysis area was cleared using visual checks during the survey. Nearly 50% of the analysis area received a pedestrian survey, whereas approximately 18% of the analysis area was cleared using aerial images before the field survey; Figures 2–6 demarcate these areas (labelled as pedestrian survey, visual review, and aerial photo review, respectively). Figures 7–18 are photographs of the analysis area and examples of fossils documented during the field survey are provided in Figures 19 and 20.

SWCA prepared fossil locality forms, maps, and photographic pages for one new fossil locality recorded during the field survey (Appendix A, Confidential: For Agency Only) based on gross lithology, preservation, and/or the fossil taxa documented at the new locality, which is in the Hell Creek Formation on private land. Table 3 summarizes non-confidential locality information.

SWCA's lead paleontologists determined the fossils exposed at the new locality to be non-significant; they do not meet the standard significance criteria. The NFO is limited to a small isolated incomplete and mostly unidentified fossils, which are common in their respective areas, as indicated by the results of the previously recorded locality search, literature review, and previous Project surveys; however, the fossil concentration and/or distribution at the NFO location suggest that ground disturbance may reveal additional fossils.

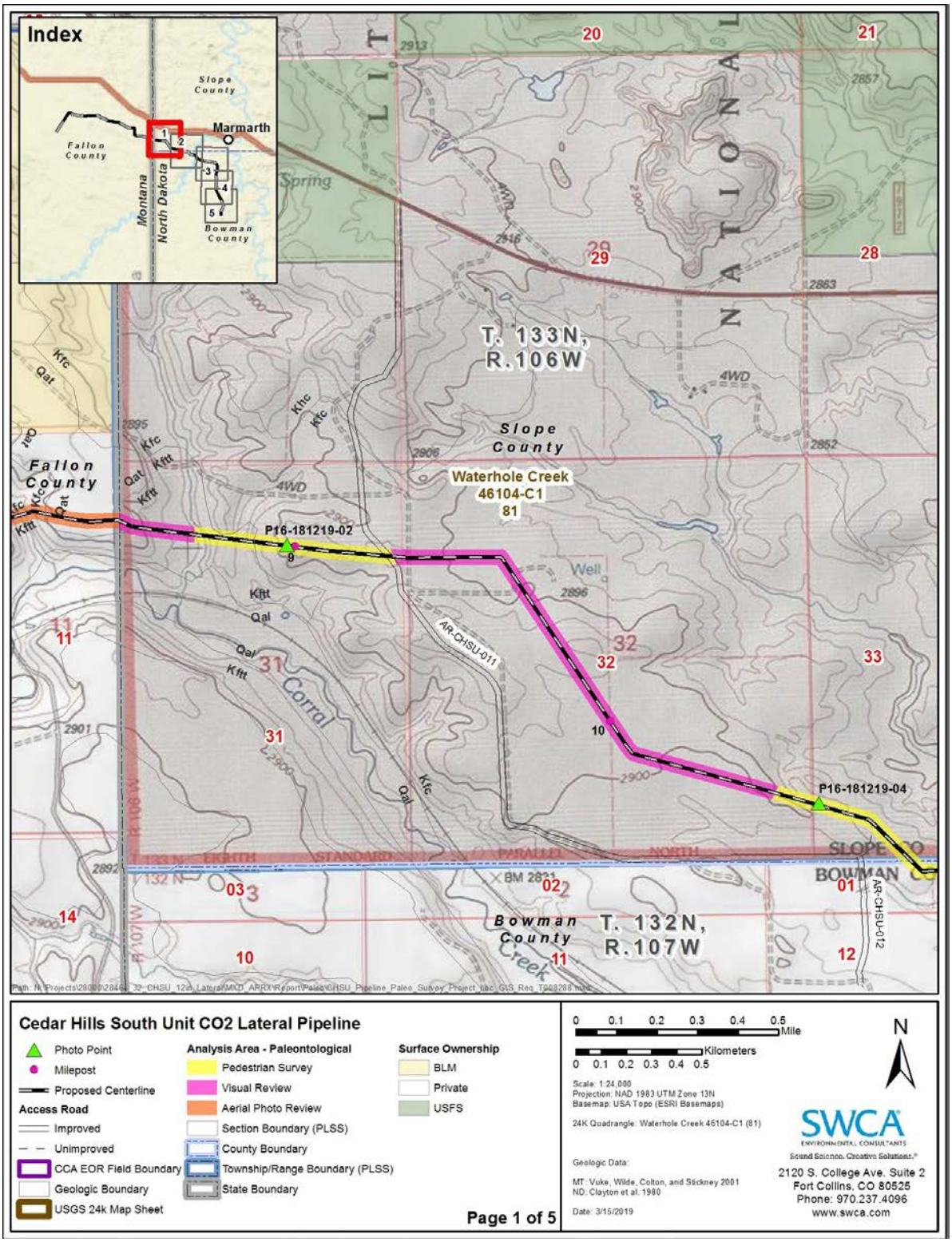


Figure 2. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 9.2 – 10.9.

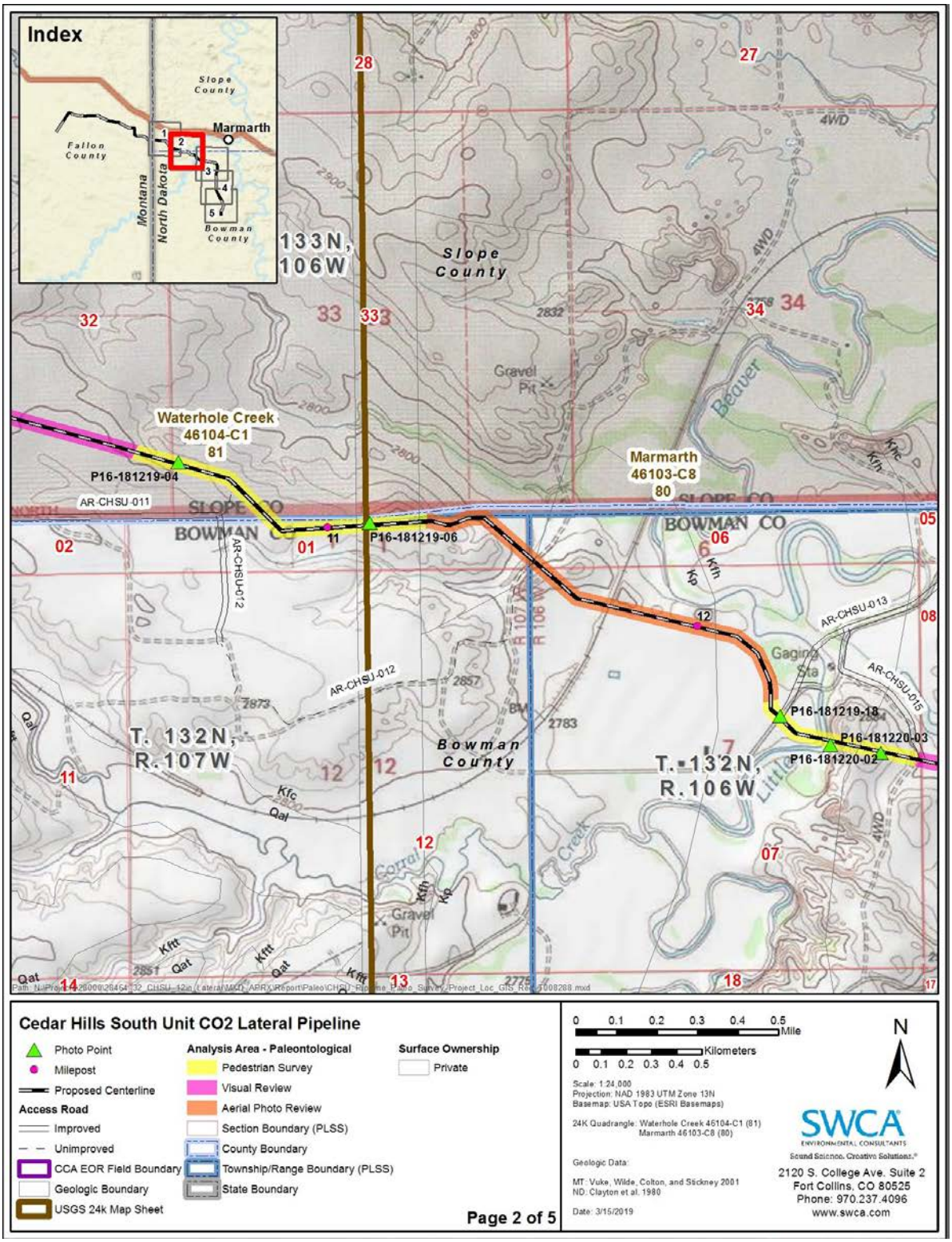


Figure 3. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 10.2 – 12.7.

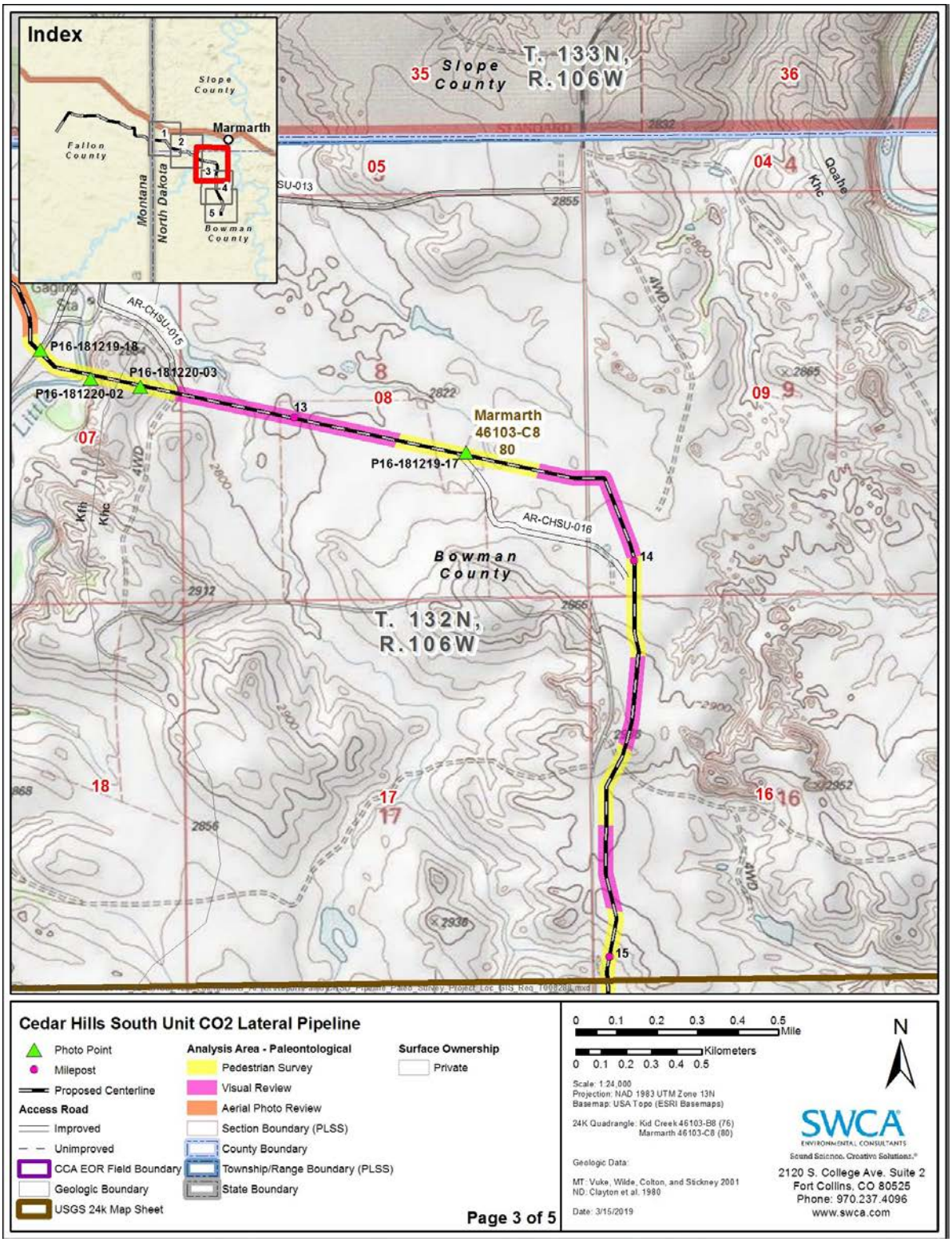


Figure 4. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 12.2 – 15.1.

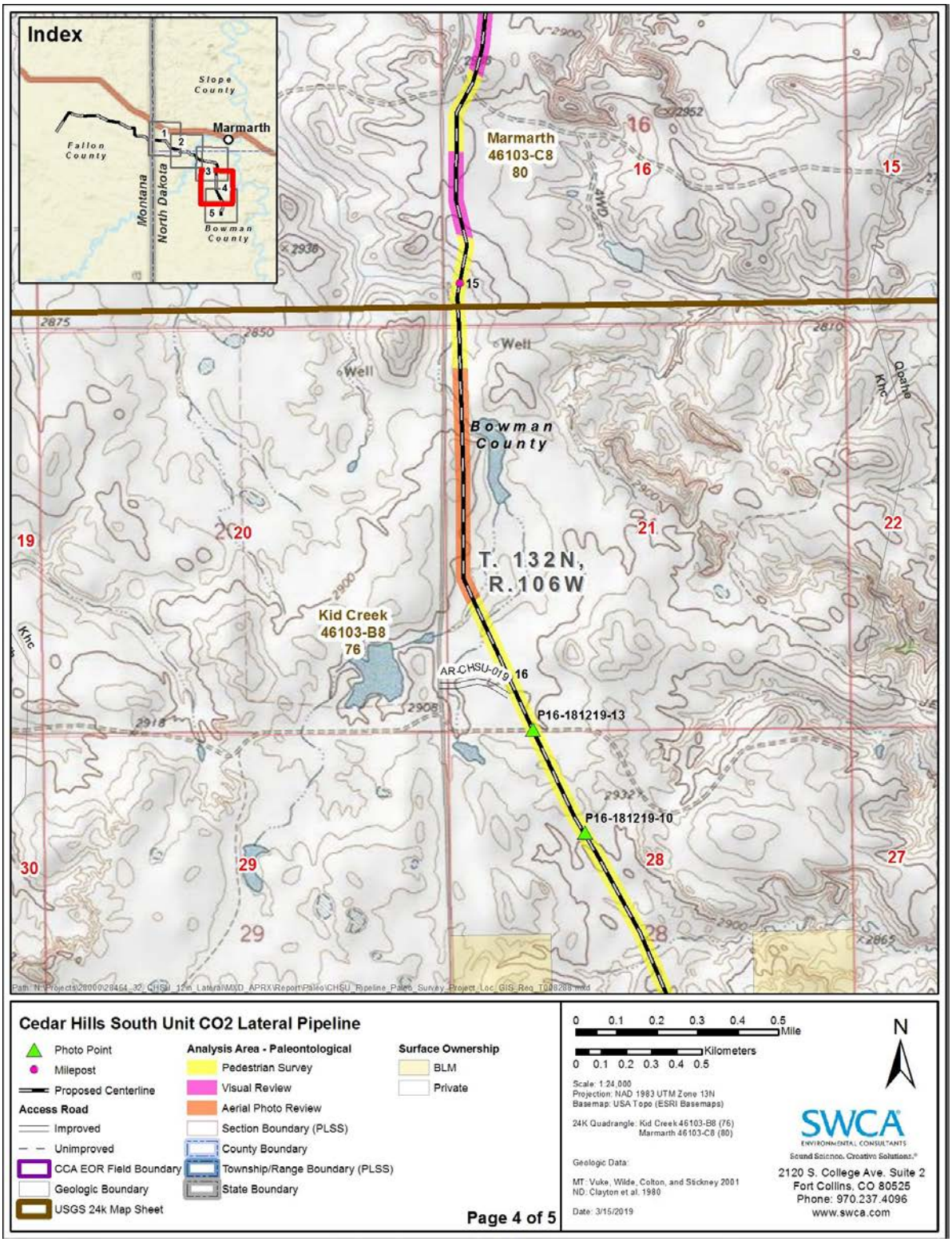


Figure 5. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 14.4 – 17.0.

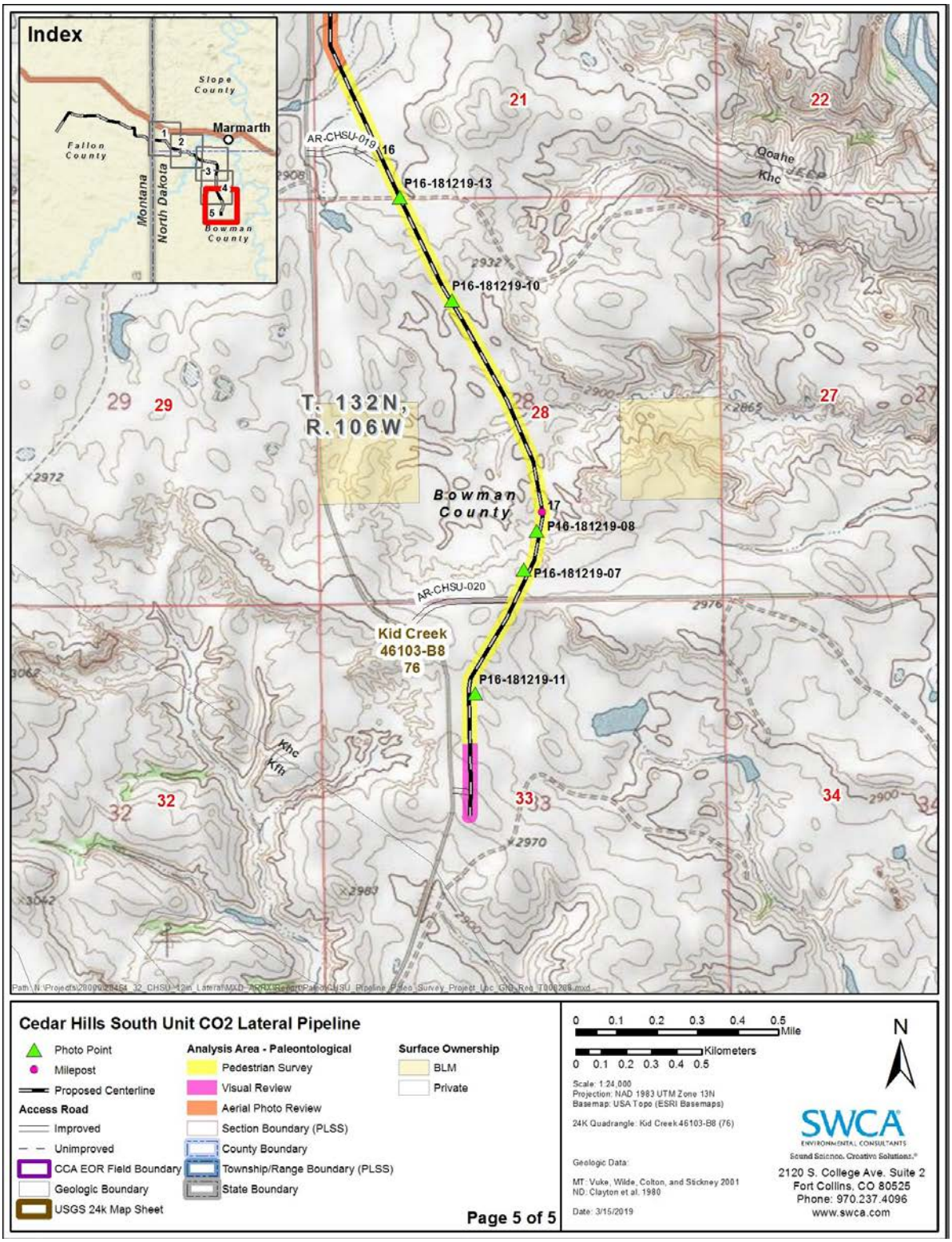


Figure 6. Paleontological analysis area of the CHSU CO_2 Lateral Pipeline Project mileposts 15.7 – 17.8.

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Table 3. Summary of CHSU Pipeline Project 2018 Infrastructure Surveys

Survey Area by Milepost Range	Section	Township	Range	Survey Date	Survey Type (% aerial/visual/ pedestrian)	Mapped Geologic Units	Topography	% Bedrock Exposed	Bedrock Exposure Locations (and/or groundcover details)	Lithology (listed for each area in stratigraphically ascending order)	Number of New Fossil Localities	Surface Owner	Photographic and/or Stratigraphic Points (see Figures 2–6)
8.55–9.20	31	133N	108W	12/19/2018	0/38/62	Kftt, Kfc, Kfh, Qat	Small rolling grass covered hills	5	Mostly grassy; bedrock exposures occur on steep cuts in hill slopes	Brown to dark gray thin shale units interbedded with light to medium gray thicker mudstones	-	Unknown private owner/s in Slope County	P16-181219-02 Figure 7
9.20–10.55	32	133N	108W	12/19/2018	0/0/100	Kfc, Kftt, Kfh	Small rolling grass covered hills	5	Mostly grassy; bedrock exposures occur on steep cuts on hill slopes	Brown to dark gray thin shale units interbedded with, light to medium gray thicker mudstones	-	Unknown private owner/s in Slope County	P16-181219-04 Figure 8
10.55–11.30	32-33; 1	133N; 132N	108W; 107W	12/19/2018	0/13/87	Kfh	Small rolling grass covered hills	5	Mostly vegetated; bedrock exposures occur on steep cuts in hill slopes, and some surface exposure on grassy flats	Light to medium gray silty carbonaceous shale with medium tan to light orange iron and sandstone concretions	-	Unknown private owner/s in Slope County, Hadley Brothers LLP	P16-181219-06 Figure 9
11.30–12.30	01; 06, 07	132N	107W; 106W	12/19/2018	0/100/0	Kfh, Kp	Small, steeply sloped hills and valleys	<5	Mostly vegetated; little to no exposures	-	-	Hadley Brothers LLP, Alvin Graham et al.	P16-181219-18 Figure 10
12.30–13.55	07, 08	132N	106W	12/20/18	0/60/40	Kfh, Khc	Steep badlands at milepost 12.5; rest of area mostly grassy flats with small hills	<10	Mostly vegetated; cliffs and badland exposures around milepost 12.5; some limited surface exposures on flats and gentle hill slopes between mileposts 13.4 and 13.5	Medium to light gray carbonaceous shale and mudstone intermixed with thin fine sand to silt layers; tan block sandstone; dark brown silty mudstone intermixed with red to purplish sandy siltstones; greenish gray mudstone to shale; darker brownish tan gray mudstone and shale with rusty orange to red gravely sandstones; medium gray gravely mudstone.	1	Scott P. Bradac, Alvin Graham et al.	P16-181220-02 P16-181220-03 P16-181220-17 Figures 11–13
13.55–15.90	8, 9, 16, 21	132N	106W	12/19/18	0/90/10	Khc	Small rolling hills	<5	Mostly vegetated; some surface exposures, especially along hill slopes	Light to medium gray mudstone with some loose gravely sandy concretionary layers	-	Alvin Graham et al., Scott P. Bradac, Daniel J. and Joanne I. Fischer, Double S-K Flatness Ranch LTD	None
15.90–17.80	21, 28, 33	132N	106W	12/19/2018	0/33/77	Khc	Grassy rolling hills, to badlands exposures	30	Grassy vegetative areas throughout with some surface exposures; becomes intermixed with small badlands exposures around mileposts 16.5 to 17.2; grassy cover from milepost 17.2 to end	Light, medium gray to variegated mudstones interbedded with thin layers of silty shale, and relatively thicker tan to rusty orange sandstone layers.	-	Double S-K Flatness Ranch LTD, Scott P. Bradac, Mork Family Charit. REM. Trust	P16-181219-07 P16-181219-08 P16-181219-10 P16-181219-11 P16-181219-13 Figures 14–18

Note: Ktc = Colgate Member, Fox Hills Formation; Kftt = Trail City and Timber Lake undifferentiated, Fox Hills Formation; Khc = Hell Creek Formation; Kp = Pierre Shale; Qat = Quaternary terrace deposits; Qat = Quaternary alluvium, floodplain deposits

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Figure 7. Hill of partially covered Fox Hills Formation along pipeline by milepost 9 in Section 9, T133N, R106W, (photo point P16-181219-02), view facing northeast.



Figure 8. Rolling vegetated hills in the Fox Hills Formation with surface exposures along proposed pipeline near milepost 10.6 in Section 33, T133N, R106W (photo point P16-181219-04), view facing west.



Figure 9. Rolling vegetated hills with weathered Fox Hills Formation exposures along proposed pipeline route at milepost 11.1 in Section 01, T132N, R107W (photo point P16-181219-06), view facing west-northwest.



Figure 10. Steep exposures of Fox Hills Formation along the pipeline route just south of milepost 12.3 in Section 07, T132N, R106W; vegetated hilltops and flatland (photo point P16-181219-18), view facing east.



Figure 11. Steep badland exposures of Fox Hills Formation near Little Beaver Creek along the proposed pipeline route near milepost 12.5 in Section 7, T132N, R106W (photo point P16-181220-02), view facing east.



Figure 12. Vegetated hills with exposures of Hell Creek Formation on hills along proposed pipeline route near milepost 12.6 in Section 07, T132N, R106W (photo point P16-181220-03), view facing southeast.



Figure 13. Muddy exposures of the Hell Creek Formation along proposed pipeline between mileposts 13.4 and 13.5 in Section 08, T132N, R106W (photo point P16-181219-17), view facing east.



Figure 14. Grass-covered area along the proposed pipeline route near milepost 16.1, Section 21, T132N, R106W, in an area of mapped Hell Creek Formation (photo point P16-181219-13), view facing north.

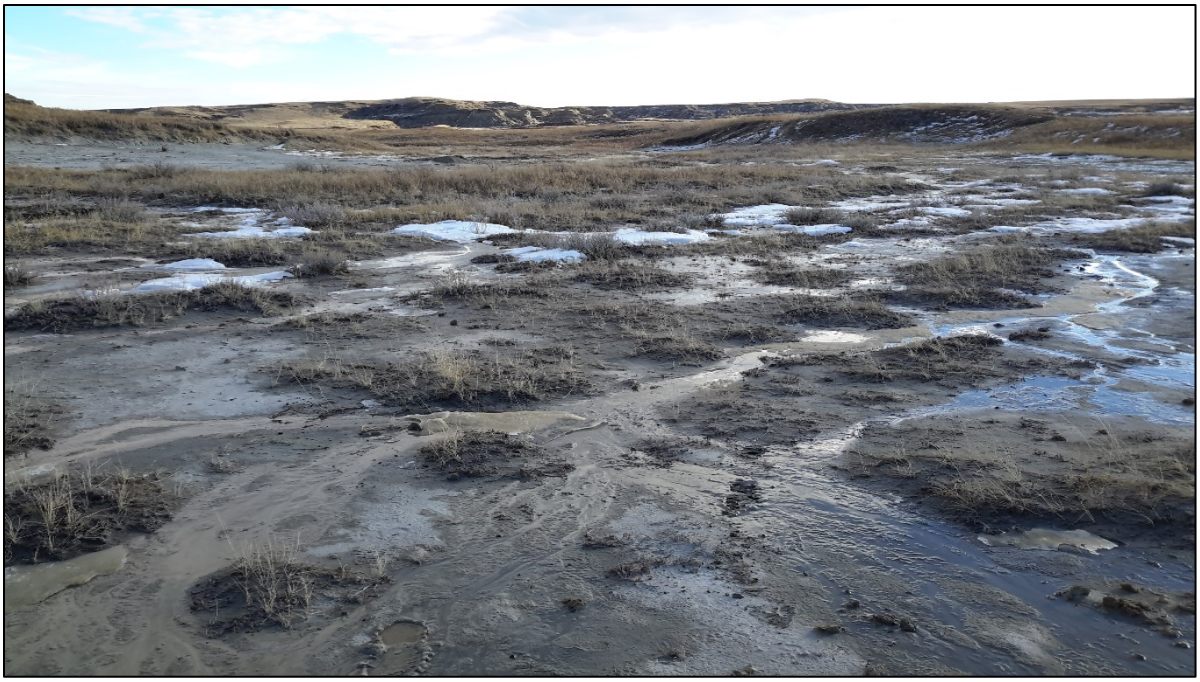


Figure 15. Surface exposures of the Hell Creek Formation in valley along proposed pipeline centerline near milepost 16.4 (photo point P16-181219-10), view facing south.



Figure 16. Exposures of the Hell Creek Formation covered by ice, water, and snow on the flats and on badland buttes in the background south of milepost 17 in Section 28, T132N, R106W (photo point P16-181219-08), view facing north.



Figure 17. Vegetated slopes and exposures of Hell Creek Formation in the distance along the pipeline route near milepost 17.2 in Section 23, T2S, R59E (photo point P16-181219-07), view facing northeast.



Figure 18. Grass-covered rolling hills in area mapped as Hell Creek Formation in Section 33, T2S, R59E near pipeline milepost 17.5 (photo point P16-181219-11), view facing north.



Figure 19. Vertebrata rounded bone fragment.



Figure 20. Hadrosaurian ossified tendon fragment.

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Table 4. Fossil Locality Documented during the Paleontological Field Surveys Conducted for the CHSU Lateral Pipeline Project

Field Number	General Fossil Type	Fossil Description	Distance to Centerline (feet)	Sec.	Township	Range	Geologic Formation	Area (m)	Fossils Collected?
F16-181219-01	V	Hadrosaurian undet. - ossified tendon fragment (1); Vertebrata undet. - rounded bone fragment (1)	38	8	132N	107W	Khc	~ 2.4	No; surface fossils are not significant.

Note: Khc = Hell Creek Formation; ROW = right-of-way; V = Vertebrate

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APPENDIX A
(CONFIDENTIAL: FOR AGENCY ONLY)

Fossil Locality Forms for Recorded Fossil Localities

APPENDIX D

Fossil Locality Summary Table and Forms for Recorded Fossil Localities

(Confidential: For Agency Only)

Table A-1. Fossil Locality Documented during the Paleontological Field Surveys Conducted for the CHSU Pipeline Project

Field Number/ SMITH Number (if applicable)	Fossil Locality Type	General Fossil Type	Fossil Description	Land Status	Landownership†	Quarter Quarter	Section	Township	Range	UTM, NAD 83, Zone 13 North*		Geologic Formation	Area (square meters)	Fossils Collected?	Mitigation Recommendations‡
										Easting	Northing				
F16-181219-01	NFO	V	Hadrosaurian undet. - ossified tendon fragment (1); Vertebrata undet. - rounded bone fragment (1)	Private	Alvin Graham et al.	SENW	8	132N	107W	580575.06	5124432.26	Khc	2.4	No, surface fossils are not significant.	While fossils at this locality are not significant, there is potential for subsurface fossils within this formation. Monitor subsurface disturbance in the area.

Note: Khc = Hell Creek Formation; NFO = Non-significant Fossil Occurrence; V = Vertebrate

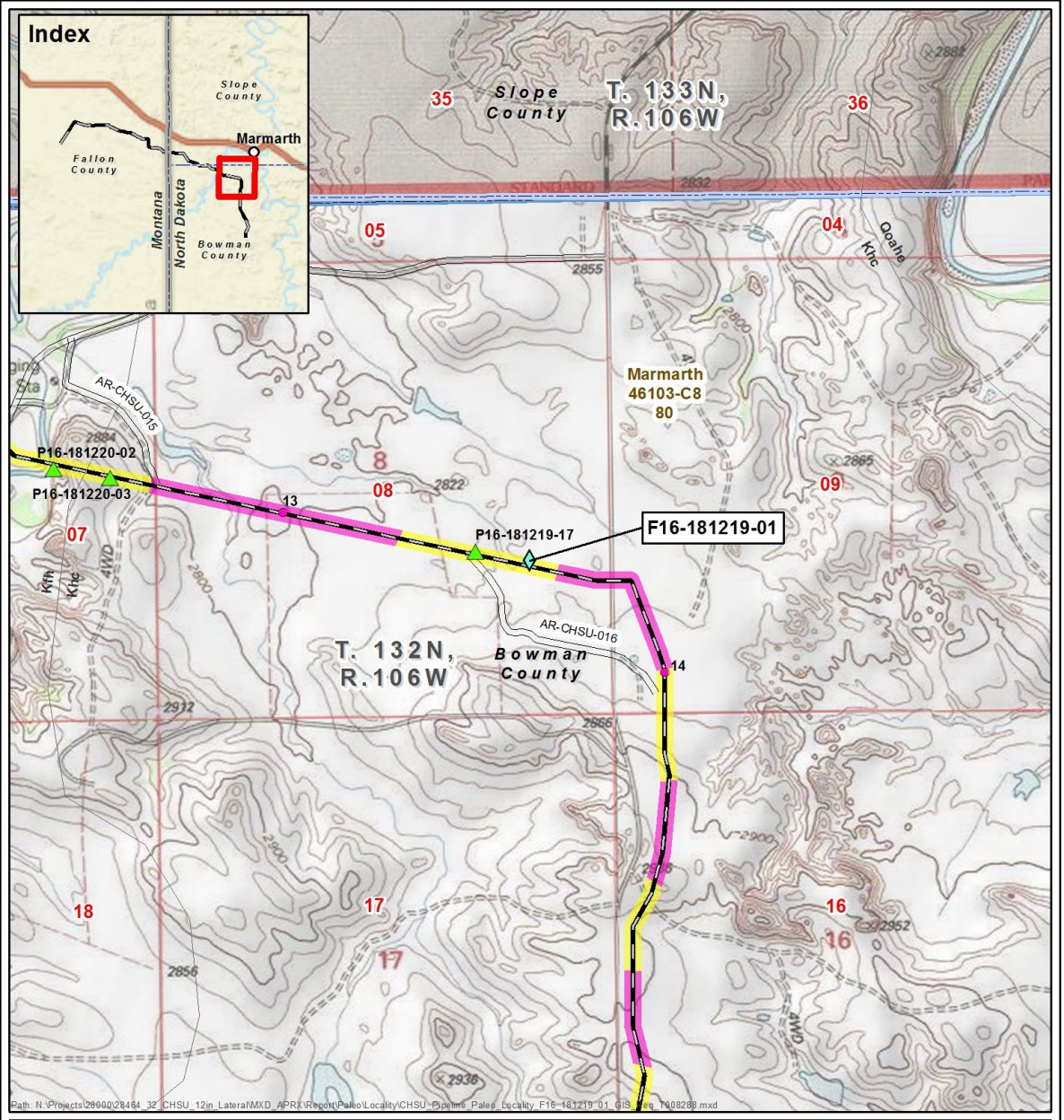
* UTM, NAD 83, Zone 13 North = Universal Transverse Mercator, North American Datum 1983, Zone 13 North.

† Landownership information was provided by Denbury and is included as is.

‡ For future surface-disturbing projects in the vicinity of all localities, re-survey area before surface disturbance if more than 5 years have elapsed since previous survey.

Locality Data Form

Field No.	F16-181219-01	**Client Locality No.**	NA (Not Applicable)
Locality Name	NA	**Smithsonian No.**	NA
Agency Locality No.		**Agency Project No.**	
SWCA Project No.	28464.32	**Project Name**	Cedar Hills South CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota
Permit No.	Not Applicable	**Permitees**	Lead Paleontologist - Georgia E. Knauss
Permitee Contact	SWCA Environmental Consultants, 307-673-4303, gknass@swca.com		
Land Status	Private	**Land Ownership**	Alvin Graham et al.
State	North Dakota	**County**	Bowman
PLSS Location	SENW of Section 8, Township 132N and Range 107W		
UTM Coordinates	580575.06mE, 5124432.26mN	**Datum**	NAD 83, Zone 13N
Source	Tablet	**Site Confidence**	High
Geometry	Polygon	**Dimensions**	2.4 square meters
Location Description	Approximately 16 miles southeast of Bakker, MT and 2 miles southwest of Marmarth, ND		
Elevation (feet)/Source	2858/Google Earth		
7.5' Topographic Quad(s)	Marmarth		
Geologic Map(s)	Carlson, C.G. 1979. Adams and Bowman Counties, North Dakota. North Dakota Geological Survey, Bulletin 65, Part I; North Dakota State Water Commission, County Groundwater Studies 22 – Part I		
Formation	Hell Creek	**Member**	
Era	Mesozoic	**System/Period**	Cretaceous
Series-Epoch	Late	**Stage/NALMA**	
Lithologies	Medium gray gravely mudstone.		
Stratigraphic Position	No detailed stratigraphic position recorded due to limited bedrock exposures and project scope.		
Depositional Environment	Terrestrial		
Taphonomic Information	Moderately weathered and fragmented, small (<3 cm) identifiable partial bone pieces		
Topography	Small vegetated rolling hills with some bare surface exposures		
Fossil Type(s)	Vertebrate	**Dominant Taxa**	Dinosauria
Fossil ID/Description	Hadrosauridae undet. – ossified tendon fragment (1); Dinosauria undet. – rounded bone fragment (1)		
Fossil ID/Description By	Georgia E. Knauss		
Significance	Non-significant Fossil Locality	**In-situ or Ex-situ**	Float
Preservation	Moderate to poor		
Fossils Collected	No; not significant, and will be avoided by the project	**Collection Date**	NA
Collector(s)	NA		
Collection Methodology	NA		
Designated Repository	NA		
Actual Repository	NA	**Accession No.**	NA
Field Recordation Date	12/19/2018	**Found by**	Georgia E. Knauss
Initial Recorder(s)	Georgia E. Knauss		
Date Form Initially Completed	3/14/2019	**Completed By**	Andrew Gerwitz, Georgia Knauss
Date/s Updated		**Updated By**	
Photo(s)	Figures 1-4	**Map(s)**	Map 1
Associated Report(s)	Knauss, G.E., V.M. Meyers and A.N. Gerwitz. 2019. Paleontological Survey Report for the Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota SWCA Paleontological Report No. ND18-28464-01. Sheridan, Wyoming: SWCA Environmental Consultants.		
Recommendation(s)	Although fossils on the surface are weathered and broken, fossils are known to occur in the surrounding area especially within the Hell Creek Formation, and additional fossils could exist subsurface. Monitor area for any additional fossils which may be uncovered during construction.		
Client	Denbury Green Pipeline – Montana LLC 5320 Legacy Drive Plano, Texas 75024		
Comments	It is unlikely that this locality will be disturbed by currently proposed construction as it is over 35 feet from the proposed ROW (or 60 feet from the proposed centerline).		



Path: N:\Projects\28000\28464_32_CHSU_12in_Lateral\MXD_APRX\Report\Paleo\Locality\CHSU_Pipeline_Paleo_Locality_F16_181219_01_GIS_Seq_T008288.mxd

Cedar Hills South Unit CO2 Lateral Pipeline - F16-181219-01

- Fossil Point
- Photo Point
- Milepost
- Proposed Centerline

Access Road

- Improved
- Unimproved

Analysis Area - Paleontological

- Pedestrian Survey
- Visual Review
- Aerial Photo Review
- Section Boundary (PLSS)
- County Boundary
- Township/Range Boundary (PLSS)
- State Boundary
- Locality - Paleontological
- Geologic Boundary
- USGS 24k Map Sheet

Surface Ownership

- Private

0 0.1 0.2 0.3 0.4 0.5 Mile

0 0.1 0.2 0.3 0.4 0.5 Kilometers

N

Scale: 1:24,000
Projection: NAD 1983 UTM Zone 13N
Basemap: USA Topo (ESRI Basemaps)

24K Quadrangle: Marmarth 46103-C8 (80)

Geologic Data:

MT: Vuke, Wilde, Colton, and Stickney 2001
ND: Clayton et al. 1980

Date: 3/15/2019

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www.swca.com



Figure 1. View of locality, surface exposure of pebbly mudstone within a blowout at the base of grassy rolling hills. Glove marks the location of the fossil. View facing north.



Figure 2. Small rounded dinosaurian bone fragment within a pebbly mudstone unit. Fossil is approximately (~1 x 2 cm).



Figure 3. View of locality, surface exposure of pebbly mudstone unit within a blowout at the base of grassy rolling hills. Glove marks the location of the fossil. View facing east.



Figure 4. Small hadrosaurid ossified tendon fragment, found within surface exposure of pebbly mudstone unit; approximately 1.5 cm long.

APPENDIX F

Agency Correspondence/Consultation

Consultation Letter Template

Agencies and Addresses

Agency Responses

North Dakota State Historic Preservation Office

U.S. Fish and Wildlife Service

North Dakota State Water Commission

North Dakota Game and Fish Department

North Dakota Department of Transportation

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

November 30, 2018

{Name}
{Agency}
{Street}
{City, State, Zip}

Re: Denbury Green Pipeline-Montan, LLC, Carbon Dioxide Transmission Pipeline
Slope and Bowman Counties, North Dakota

Dear {Name}:

Denbury Green Pipeline-Montan, LLC (Denbury) is proposing the Carbon Dioxide Transmission Pipeline project (Project) that will consist of a 12-inch diameter, approximately 11.52-mile-long welded steel pipeline to transport carbon dioxide from a source in Fallon County, Montana to Denbury's Cedar Hills South Unit oil production wells. As shown on the enclosed Project Location Map, the pipeline route will enter southwestern Slope County, traverse southeast for 2.28 miles to Bowman County, and then continue southeast and south for 9.24 miles to Denbury's facilities. The Project analysis area is a 1.2-mile wide corridor pipeline centerline that encompasses the following legal locations in North Dakota:

- Slope County – Sections 31, 32, and 33, Township (T) 133 North (N), Range (R) 106 West (W)
- Bowman County – Section 1, T132N, R107W;
  Sections 6, 7, 8, 9, 16, 21, 28, and 33, T132N, R106W

The project is scheduled to begin construction in the spring of 2019.

SWCA Environmental Consultants is notifying the {Agency} of the proposed Project and offering the opportunity for comments. Information received from the {Agency} will be used in a North Dakota Public Service Commission application being prepared for the Project. Please send your replies and/or requests for additional project information to:

James W. Dawson, Senior Project Manager
SWCA Environmental Consultants
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501 (701) 258-6622
jdawson@swca.com

Sincerely,

James W. Dawson

Enclosure: Project Location Map



CSHU Lateral Pipeline Overview

- CHSU Proposed Pipeline
- 1.2-mile Corridor
- County Boundary

Scale: 1:134,400
Projection: NAD 1983 UTM Zone 13N
12/3/2018

0 1 2 3 Miles

0 1 2 3 4 Km

N

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Fort Collins, CO 80525
970-237-4096

CONSULTATION LETTER AGENCIES					
Name	**Agency**	**Street**	**CITY, STATE ZIP**	**STATE**	**ZIP**
Kyle C. Wanner	North Dakota Aeronautics Commission	PO Box 5020	Bismarck	ND	58502
Wayne Stenehjem	State Capitol	600 East Boulevard Avenue, Dept 125	Bismarck	ND	58505
Doug Goehring	North Dakota Department of Agriculture	600 E. Boulevard Avenue, Dept 602	Bismarck	ND	58505
David Glatt	North Dakota Department of Health	918 Divide Avenue, 4th Floor	Bismarck	ND	58501
Maggie D. Anderson	North Dakota Department of Human Services	600 East Boulevard Avenue, Dept 325	Bismarck	ND	58505-0250
Michelle Kommer	North Dakota Department of Labor	600 East Boulevard Avenue, Dept 406	Bismarck	ND	58505-0340
Wayne Sick	North Dakota Department of Career and Technical Education	600 East Boulevard Avenue, Dept. 270	Bismarck	ND	58505-0610
Shawn Kessel	North Dakota Department of Commerce	1600 E. Century Ave., Suite 2	Bismarck	ND	58503
Gerry Fisher	North Dakota Energy Infrastructure and Impact Office	1707 North 9th Street	Bismarck	ND	58506-5523
Terry Steinwand	North Dakota Game & Fish Department, Conservation and Communication Division	100 N. Bismarck Expressway	Bismarck	ND	58501
Lynn Helms	NDIC Oil and Gas Division	600 East Boulevard Avenue, Dept 405	Bismarck	ND	58505-0840
Doug Burgum	State Capitol 14th Floor	600 East Boulevard Avenue, Dept 405	Bismarck	ND	58505-0840
Tom Sorel	North Dakota Department of Transportation	608 East Boulevard Avenue	Bismarck	ND	58505-0700
Claudia J. Berg	State Historical Society of North Dakota, North Dakota Heritage Center	612 East Boulevard Avenue	Bismarck	ND	58505-0830
Scott Davis	North Dakota Indian Affairs Commission	600 East Boulevard Avenue	Bismarck	ND	58505-0300
Michelle Kommer	Job Service North Dakota	PO Box 5507	Bismarck	ND	58506-5507
Jodi A. Smith	North Dakota State Trust Lands Department	1707 North 9th Street	Bismarck	ND	58506-5523
Melissa Baker	North Dakota Parks and Recreation Department	1600 East Century Avenue, Suite 3	Bismarck	ND	58503
Barton Schott	North Dakota State Soil Conservation Committee	2718 Gateway Avenue, Suite 104	Bismarck	ND	58503
Garland Erbele	North Dakota State Water Commission	900 East Boulevard Avenue	Bismarck	ND	58505
Chief Missile Engineer	U.S. Department of Defense Minot AFB	320 Peacekeeper PL	Minot AFB	ND	58705
Al Sapa	U.S. Fish and Wildlife Service	3425 Miriam Avenue	Bismarck	ND	58501
U.S. Army Corps of Engineers	U.S. Army Corps of Engineers North Dakota Regulatory Office	1513 South 12th Street	Bismarck	ND	58504
Laurie Suttmeier	U.S Federal Aviation Administration	2301 University Drive	Bismarck	ND	58504
Sandi Tabor	North Dakota Transmission Authority	600 E Boulevard Ave. Dept. 405	Bismarck	ND	58505-0840
Justin Kringstad	North Dakota Pipeline Authority	600 E. Boulevard Ave. Dept. 405	Bismarck	ND	58505-0840
Nick Chevance	U.S. National Park Service	601 Riverfront Drive	Omaha	NE	68102
Kelly McPhillips	U.S. Bureau of Reclamation, Great Plains Region	P.O. Box 1017	Bismarck	ND	58502
Senator Dale Patton	North Dakota Legislature	P.O. Box 812	Watford City	ND	58854-0812
Representative Denton Zubke	North Dakota Legislature	P.O. Box 927	Watford City	ND	58854-0927
Representative Keith Kempenich	North Dakota Legislature	9005 151st Avenue SW	Bowman	ND	58623-8857
Michael Teske	Slope County Board of County Commissioners	206 South Main Street, P.O. Box JJ	Amidon	ND	58620-0445
Lynn Brackel	Bowman County Board of County Commissioners	104 1st Street, NW, Suite 1	Bowman	ND	58623

STATE HISTORICAL SOCIETY OF NORTH DAKOTA

Doug Burgum
Governor of North Dakota

North Dakota State Historical Board

Terrance Rockstad
Bismarck - President

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Daniel Stenberg
Watford City

Calvin Grinnell
Bismarck

Allan Demaray
New Town

Sara Otte Coleman
Director
Tourism Division

Kelly Schmidt
State Treasurer

Alvin A. Jaeger
Secretary of State

Melissa Baker
Director
Parks and Recreation Department

Sondra Goebel
Representative
Department of Transportation

Claudia J. Berg
Director

Accredited by the American Alliance of Museums since 1986

December 6, 2018

Mr. James W. Dawson
Senior Project Manager
SWCA
116 North 4th, Suite 200
Bismarck, ND 58501

ND SHPO Ref: 19-0046 PSC Denbury Green Pipeline – Montana LLC Carbon Dioxide Transmission Pipeline project in portions of Slope and Bowman Counties, North Dakota

Dear Mr. Dawson,

We reviewed your preliminary information on ND SHPO Ref: 19-0046 PSC Denbury Green Pipeline – Montana LLC Carbon Dioxide Transmission Pipeline project in portions of Slope and Bowman Counties, North Dakota. We recommend a Class I (file search) and Class III (pedestrian) survey of the project area.

Thank you for the opportunity to review this project to date. We look forward to review of the Class I/Class III survey. Please include the ND SHPO reference number listed above in any further correspondence for this specific project. If you have any questions, please contact Paul Picha at (701)-328-3574 or Susan Quinnell at (701) 328-3576 or squinnell@nd.gov.

Sincerely,

Claudia J. Berg
Director, State Historical Society of North Dakota

STATE HISTORICAL SOCIETY OF NORTH DAKOTA

Doug Burgum
Governor of North Dakota

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Secretary of State

Melissa Baker
Director
Parks and Recreation Department

Sondra Goebel
Representative
Department of Transportation

Claudia J. Berg
Director

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March 28, 2019

Ms. Naomi Ollie
Principal Investigator
SWCA
1892 South Sheridan Avenue
Sheridan, WY 82801

ND SHPO Ref: 19-0233 ND Public Service Commission "A Class I ad Class III Cultural Resource Inventory and an Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota"

Dear Ms. Ollie,

We reviewed ND SHPO Ref: 19-0233 ND Public Service Commission "A Class I ad Class III Cultural Resource Inventory and an Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO2 Lateral Pipeline, Slope and Bowman Counties, North Dakota," and find the revised (March 26, 2019) report acceptable. We concur with a "No Significant Sites Affected" determination for project, provided site 32BO245 is avoided by the project, and provided the project remains as mapped and described in the revised SWCA report.

The "Unanticipated Discovery Plan for Denbury's Cedar Hills South Unit CO_2 Lateral Pipeline, Slope and Bowman Counties, North Dakota" is acceptable.

Thank you for the opportunity to review this project. Please include the ND SHPO reference number listed above in any further correspondence for this specific project. If you have any questions, please contact Paul Picha at (701)-328-3574 or Susan Quinnell at (701) 328-3576 or squinnell@nd.gov.

Sincerely,

Claudia J. Berg
Director, State Historical Society of North Dakota

United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Dakota Ecological Services Field Office
3425 Miriam Avenue
Bismarck, North Dakota 58501
(701) 250-4481, ndfieldoffice@fws.gov

In Reply Refer To:
06E15000-2019-CPA-0022

December 18, 2018

Mr. James W. Dawson
Senior Project Manager
SWCA Environmental Consultants
116 North Fourth Street, Suite 200
Bismarck, North Dakota 58501

Dear Mr. Dawson:

The purpose of this letter is to provide environmental comments and recommendations regarding the proposed Denbury Green Pipeline which will transport carbon dioxide through portions of Fallon County, Montana and Bowman and Slope Counties in North Dakota. We offer the following comments under the authority of and in accordance with the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703 *et seq.*), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds," the Endangered Species Act (ESA) (16 U.S.C. 1531 *et seq.*), the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250), and the National Environmental Policy Act (NEPA) (Pub. L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended).

Threatened, Endangered and Candidate Species

In accordance with section 7(c) of the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), we have determined that the following federally listed species may occur in the project area:

Species	Status	Expected Occurrence
Gray Wolf *(Canus lupus)*	Endangered	No known populations, but individuals may occur
Whooping Crane (*Grus americana*)	Endangered	Spring and fall migration
Northern Long-eared bat (*Myotis septentrionalis*)	Threatened	Resident, seasonal migrant
Dakota Skipper (*Hesperia dacotae*)	Threatened	Year round resident

Dakota Skipper

The Dakota skipper (*Hesperia dacotae*), a federally threatened species, is a small to medium-sized hesperine butterfly associated with high quality prairie ranging from wet-mesic tallgrass prairie to dry-mesic mixed grass prairie. The first type of habitat is relatively flat and moist native bluestem prairie. Three species of wildflowers are usually present: wood lily (*Lilium philadelphicum*), harebell (*Campanula rotundifolia*), and smooth camas (*Zygadenus elegans*). The second habitat type is upland (dry) prairie that is often on ridges and hillsides. Bluestem grasses and needlegrasses dominate these habitats. On this habitat type, three wildflowers are typically present in high quality sites that are suitable for Dakota skipper: pale purple (*Echinacea pallida*) and upright (*E. angustifolia*) coneflowers and blanketflower (*Gaillardia sp.*). Because of the difficulty of surveying for Dakota skippers and a short survey window, we recommend that the project avoid any impacts to potential Dakota skipper habitat.

Whooping Crane

The Aransas Wood Buffalo Population (AWBP) of the endangered whooping crane (*Grus americana*) is the only self-sustaining migratory population of whooping cranes remaining in the wild. Whooping cranes breed in the wetlands of Wood Buffalo National Park in Alberta and the Northwest Territories of northern Canada, and overwinter on the Texas coast. Whooping cranes in the AWBP annually migrate through North Dakota during their spring and fall migrations.

Potential whooping crane habitat in North Dakota has been identified by the Service's Habitat and Population Evaluation Team in Bismarck. Per Niemuth et al. (2018) and associated model, the proposed project footprint encompasses areas of low relative probability of landscape-level habitat use by migrating whooping crane.

The absence of suitable roosting and feeding habitat for whooping cranes indicate a low potential for whooping crane presence in the proposed project area. The Service recommends that if a whooping crane is sighted within one mile of the project while it is under construction, that all work cease within one mile of that part of the project and the Service be contacted immediately.

In coordination with the Service, work may resume after the bird(s) leave the area. Whooping cranes are unlikely to spend more than a few days in any one spot during migration.

Northern Long Eared Bat

The northern long-eared bat (*Myotis septentrionalis*) (NLEB), a federally threatened species in areas affected by white nose syndrome, is known to inhabit the Missouri River corridor. At this time, no critical habitat has been proposed for the NLEB. The state of North Dakota is within the known range of the NLEB and the white nose syndrome area now includes the eastern half and southwestern counties of the state. During the summer, NLEBs typically roost singly or in colonies in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches dbh). Males and non-reproductive females may also roost in cooler places, like caves and mines. This bat seems opportunistic in selecting roosts, using tree species based on presence of cavities or crevices or presence of peeling bark. It has also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable). They forage for insects in upland and lowland woodlots and tree lined corridors. During the winter, NLEBs predominately hibernate in caves and abandoned mine portals. Additional habitat types may be identified as new information is obtained. If suitable NLEB habitat is present within the proposed project area, we recommend further coordination with our office. Additional information regarding NLEB and consultation procedures can be found at https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=9045.

Eagle Guidance

Golden eagles (*Aquila chrysaetos*) are year-round residents in western North Dakota, and may occasionally be found throughout the state in winter or during migration. The golden eagle (*Aquila chrysaetos*) is protected from a variety of harmful actions via take prohibitions in both the Migratory Bird Treaty Act[1] (MBTA; 16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. 668–668d). The BGEPA, enacted in 1940 and amended several times, prohibits take of bald eagles and golden eagles, including their parts, nests, young or eggs, except where otherwise permitted pursuant to federal regulations. Incidental take of eagles from actions such as electrocutions from power lines or wind turbine strikes are prohibited unless specifically authorized via an eagle incidental take permit from US Fish and Wildlife

1 On December 22, 2017, the Department of the Interior's (DOI) Office of the Solicitor Memorandum M-37050 titled The Migratory Bird Treaty Act Does Not Prohibit Incidental Take https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf) concludes that the MBTA's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs. The MBTA list of protected species includes bald and golden eagles, and the law has been an effective tool to pursue incidental take cases involving eagles. However, the primary law protecting eagles is the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S. Code § 668), since the bald eagle was delisted under the Endangered Species Act in 2007. Memorandum-37050 does not affect the ability of the Service to refer entities for prosecution that have violated the take prohibitions for eagles established by the BGEPA.

Service (Service). BGEPA provides penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner,

any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." BGEPA defines take to include the following actions: "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." The Service expanded this definition by regulation to include the term "destroy" to ensure that "take" also encompasses destruction of eagle nests. Also the Service defined the term disturb which means 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.

The Service has developed guidance for the public regarding means to avoid take of bald and golden eagles:

- The 2007 *National Bald Eagle Management Guidelines* serve to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of BGEPA may apply. They provide conservation recommendations to help people avoid and/or minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the BGEPA.
  https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf

- The 2013 *Eagle Conservation Plan Guidance, Module 1- Land-based Wind Energy, Version 2* is specific to wind energy development and provides in-depth guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities. Development of an Eagle Conservation Plan per these guidelines may serve as the basis for applying for an eagle incidental take permit for wind energy facilities. Applications for such eagle incidental take permits must include an Eagle Conservation Plan.
  https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf

The Service also has promulgated new permit regulations under BGEPA:

- New eagle permit regulations, as allowed under BGEPA, were promulgated by the Service in 2009 (74 FR 46836; Sept. 11, 2009) and revised in 2016 (81 FR 91494; Dec. 16, 2016). The regulations authorize the limited take of bald and golden eagles where the take to be authorized is associated with otherwise lawful activities. These regulations also establish permit provisions for intentional take of eagle nests where necessary to

- ensure public health and safety, in addition to other limited circumstances. The revisions in 2016 included changes to permit issuance criteria and duration, definitions, compensatory mitigation standards, criteria for eagle nest removal permits, permit application requirements, and fees in order to clarify, improve implementation and increase compliance while still protecting eagles. https://www.gpo.gov/fdsys/pkg/FR-2016-12-16/pdf/2016-29908.pdf

The Service's Office of Law Enforcement carries out its mission to protect eagles through investigations and enforcement, as well as by fostering relationships with individuals, companies, industries and agencies that have taken effective steps to avoid take, including incidental take of these species, and encouraging others to implement measures to avoid take. The Office of Law Enforcement focuses its resources on investigating individuals and entities that take eagles without identifying and implementing all reasonable, prudent and effective measures to avoid that take. Those individuals and entities are encouraged to work closely with Service biologists to identify available protective measures, and to implement those measures during all activities or situations where their action or inaction may result in the take of an eagle(s).

Restoration

The Service recommends that Denbury Green Pipeline-Montana, LLC develop and implement a comprehensive restoration plan, in particular for grasslands and any impacted wetlands along the proposed project route. The Service recommends that Denbury Green Pipeline-Montana, LLC survey the native habitats along the proposed project route to determine existing species composition and replant with a mix designed to replace the diversity and composition of plant communities along the pipeline route area. While commercial cultivars of native seeds can be effectively used to boost production, we recommend that Denbury Green Pipeline-Montana, LLC collect local seeds during the summer/fall to replant the disturbed areas. If seeds and/or plants are obtained commercially, we recommend obtaining seed stock from nurseries within 250 miles of the project area to ensure the particular cultivars are well adapted to the local climate. The Natural Resources Conservation Service (NRCS) compiles a list of vendors in North Dakota that supply conservation seed and plants at http://www.plantmaterials.nrcs.usda.gov/pubs/ndpmcmt 8152.pdf.

The prairie is most likely to recover if replanted with a diverse mix using local cultivars. Including more species, including numerous forb species, is not only ecologically beneficial but is also more weed resistant, allowing for less intensive management and chemical use. In essence, the more species included in a mixture, the higher the probability of providing competition to resist invasion by non-native plants.

Specifically, the Service recommends that the following recommendations be incorporated when replanting grassland areas:

- Plant a high diversity seed mix (minimum of 19 species).
- The mix should include **at least** 9 grass species and 10 forb species. Avoid excessively low (<10) and excessively high (>30) numbers of forb species.
- Use planting equipment that will adequately disperse variable seed sizes.
- Control litter build up throughout establishment and management phase.

The Service recommends using broadcast seeding, which tends to produce higher germination per species of grasses and forbs than drill seeding. If germination is low, we recommend reseeding early in the restoration time period to meet the final performance metrics.

Based on previous planting experience, we anticipate that there may not be much Canada thistle present in the first year, but it will increase in ensuing years until natives becomes established and can out-compete it. Since herbicide application will kill all forbs, invasives like Canada thistle must be spot-sprayed. Mowing can be used to impede thistle growth, but since tall natives will shade thistle out, mowing should be used judiciously since it cuts down all species indiscriminately. The following forbs are in the same functional group as Canada thistle. Once they become established, they can out-compete Canada thistle:

- Black-eyed susan
- common gaillardia
- upright prairie coneflower
- tall cinquefoil
- stiff goldenrod
- hoary verbena
- Lewis flax
- common evening primrose
- Maximillian sunflower
- purple prairie clover
- Canada milkvetch

We recommend that the restoration plan include the following commitments. The replanted grassland areas will be monitored for a minimum of five years, with the first year being the first full growing season after planting. Checking on progress before the first full growing season is advisable to identify and treat any areas in which noxious weeds are becoming established. We recommend that the replanted areas will be burned or grazed every three-to-five years starting in year three or four.

The Service recommends that the restoration plan include a rigorous, sample-based approach to evaluate planting success. We recommend using a randomly placed one-foot quadrat, with a minimum of ten replicates per ten acres. There should be a density of at least three-to-five native seedlings (of the planted mix or volunteer native species) per square foot of area. If at least three

of the seedlings are rhizomatous species, the lower limit of three seedlings per square foot is adequate. The upper limit of five seedlings per square foot is necessary when all are bunch-type

species or a mixture of rhizomatous and bunch-type species. Invasive and weedy species should be less than 25 percent cover across each area by year two of the planting.

For each replanted area to be considered reclaimed, no more than 30 percent of the cover area (as measured in the one-foot quadrats) should be non-native species, with no more than 15 percent invasive species. These criteria should be met for at least the final two consecutive years post reclamation, so in a best-case scenario, an area could be considered reclaimed if it meets the above criteria in years four and five after planting. As the Service has noted previously, in our experience native prairie usually takes at least ten years to become established. Ongoing management will likely be required to control invasive species even after this time. We recommend that Denbury Green Pipeline-Montana, LLC, develop a management plan for continued invasive species control.

The Herbaceous Vegetation Establishment Guide (USDA-NRCS 2011) located at http://efotg.sc.egov.usda.gov/references/public/ND/Herbaceous_Veg_Est_Guide.pdf as well as the Prairie Restoration Guidebook (NDSU 2017) located at https://www.ag.ndsu.edu/publications/landing-pages/environment-natural-resources/prairie-reconstruction-guidebook-for-north-dakota-r1840 can be used for additional guidance regarding reclaiming grassland areas. However, keep in mind that this document includes replanting with non-native species. Some of the recommendations cannot be transferred directly.

Similarly, for wetlands and native woodlands and scrubland areas, Denbury Green Pipeline-Montana, LLC, should develop a restoration plan including monitoring commitments and clear criteria that define success. Restoration should not be considered complete until those criteria are met.

With the continued fragmentation and loss of native prairie habitat in North Dakota, the Service recommends the Denbury Green Pipeline-Montana, LLC, work with willing developers to voluntarily offset any unavoidable loss of native prairie habitat that may compensate for impacts to endangered species and grassland nesting birds that may occupy the action area.

Thank you for the opportunity to comment on this project proposal. If you require further information, please have your staff contact Jerry Reinisch of my staff at (701) 333-0267 or you can contact me at (605) 224-8693, extension, 224.

Sincerely,

Scott V. Larson
North Dakota Field Supervisor
North Dakota Field Office

Literature Cited:

Niemuth, N. D., A. J. Ryba, A. T. Pearse, S. M. Kvas, D. A. Brandt, B. Wangler. 2018. Opportunistically collected data reveal habitat selection by migrating whooping cranes in the U.S. Northern Plains. Condor 120:343-356.

Cc: Maria Boroja, Regional Environmental Contaminants Coordinator, Region 6, USFWS
Jeff Bergland, U.S. Fish and Wildlife Service, Montana Field Office
Greg Link, Division Chief, North Dakota Game and Fish Department

North Dakota State Water Commission

900 EAST BOULEVARD AVENUE, DEPT 770 • BISMARCK, NORTH DAKOTA 58505-0850
(701) 328-2750 • TTY 1-800-366-6888 or 711 • FAX (701) 328-3696 • http://swc.nd.gov

December 21, 2018

James Dawson
SWCA
116 N 4th Street, STE 200
Bismarck, ND 58501

Dear Mr. Dawson:

This is in response to your request for a review of the environmental impacts associated with the Denbury Green Pipeline-Montana, LLC, Carbon Dioxide Transmission Pipeline project located in Slope and Bowman Counties, ND.

The proposed project has been reviewed by State Water Commission staff, and the following comments are provided:

- If surface water or groundwater will be diverted for construction or operation of the project, a water permit is required per North Dakota Century Code (NDCC) § 61-04-02. Permits for temporary surface water diversions within the Little Missouri River Basin, if issued, have additional conditions per an Interim Policy signed by the State Engineer on June 22, 2017. Please consult with the Water Appropriations Division of the Office of the State Engineer (OSE) at (701) 328-2754 or waterpermits@nd.gov if you have any questions regarding this comment.

- Through the National Flood Insurance Program, a floodplain permit is required for all development that takes place within a Special Flood Hazard Area, as identified by FEMA. Please work with the local floodplain administrator(s) for additional information and permit requirements. The floodplain administrator for Slope County is Richard Frederick, 701-879-6329 or outlaw@ndsupernet.com. The floodplain administrator for Bowman County is Dean Pearson, 701-523-3129 or dapearson@bowmancountynd.gov.

Thank you for the opportunity to provide review comments. If you have any questions, please call me at 701-328-4967.

Sincerely,

Jared Huibregtse
Water Resource Planner IV

JH:dm/1570

DOUG BURGUM, GOVERNOR
CHAIRMAN

GARLAND ERBELE, P.E.
CHIEF ENGINEER-SECRETARY

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"VARIETY IN HUNTING AND FISHING"

NORTH DAKOTA GAME AND FISH DEPARTMENT
100 NORTH BISMARCK EXPRESSWAY BISMARCK, NORTH DAKOTA 58501-5095 PHONE 701-328-6300 FAX 701-328-6352

January 10, 2019

James W. Dawson
Senior Project Manager
SWCA Environmental Consultants
116 North 4th Street, Suite 200
Bismarck, ND 58501

Dear Mr. Dawson:

RE: Carbon Dioxide Transmission Pipeline Project
Slope & Bowman Counties, ND

Denbury Green Pipeline-Montana, LLC is proposing to construct an approximately 11.52-mile-long welded steel pipeline to transport carbon dioxide from a source in Fallon County, Montana to Denbury's Cedar Hills South Unit oil production wells in Bowman County, North Dakota. The North Dakota Game and Fish Department has reviewed this project for wildlife concerns.

A primary concern with pipeline projects is the possible disturbance of native prairie and wooded draws associated with construction of the pipeline and access roads. Avoidance of native prairie areas reduces impacts to a number of grassland species including many species of conservation priority. We ask that work within these areas be avoided to the extent possible, every effort be made to prevent destruction of woody vegetation, and disturbed areas be reclaimed to pre-project conditions.

This pipeline is located within the primary range of greater sage-grouse in North Dakota. Sage-grouse are a Level I species of conservation priority and in danger of being extirpated from the state. Oil and gas development can negatively affect sage-grouse populations if sagebrush habitats are lost, fragmented, or changed in ways unfavorable to grouse. We recommend the following actions to minimize possible adverse effects:

- No surface occupancy within ¼ mile of active leks.
- No surface use in nesting habitat within 2 miles of active leks or documented nest sites during the breeding and nesting season -- March 1 to June 15.

- Restrict maintenance and related activities in sage-grouse breeding / nesting complexes during the breeding and nesting season between the hours of 8:00 pm and 8:00 am.

- Allow no surface use activities within crucial sage-grouse wintering areas from November 15 to March 14.

- Avoid locating roads and power lines in crucial sage-grouse breeding, nesting, and wintering areas.

- Use minimal surface disturbance to install roads and pipelines and reclaim sites to natural communities.

- Re-plant sagebrush habitat disturbed during construction with 10% cover of sagebrush plugs (seedlings) to increase likelihood of sagebrush recovery.

Mr. Jesse Kolar, Upland Game Supervisor, should be contacted at 701-227-7431 for more details regarding greater sage-grouse in North Dakota.

The National Wetland Inventory indicates various wetlands within the proposed project corridor. Steps should be taken to protect any wetlands that cannot be avoided, no alterations should be made to existing drainage patterns, and above-ground appurtenances should not be placed in wetland areas. Unavoidable destruction or degradation of wetland acres should be mitigated in kind.

The pipeline crosses Little Beaver Creek, a Classified fishery. We ask that this stream be crossed by directional boring if possible. If this method is not feasible, construction should not take place within the waterway between April 15 and June 1, and controls should be implemented to minimize erosion and sedimentation.

Aerial surveys should be conducted for raptor nests before construction begins. We recommend that a ½-mile construction buffer be implemented around active eagle nest sites (known occupied within the past 5 years). Ms. Sandra Johnson, Conservation Biologist, may be contacted at 701-328-6327 for additional information on eagle nest sites in the state.

Sincerely,

Greg Link
Chief
Conservation & Communication Division

js

North Dakota Department of Transportation

Thomas K. Sorel
Director

Doug Burgum
Governor

January 14, 2019

James W. Dawson
Senior Project Manager
SWCA
116 N. 4th St., Suite 200
Bismarck, ND 58501

PROPOSING CARBON DIOXIDE TRANSMISSION PIPELINE PROJECT FROM FALLON COUNTY MONTANA TO DENBURY'S CEDAR HILLS SOUTH UNIT OIL PRODUCTION WELLS, SLOPE AND BOWMAN COUNTIES, NORTH DAKOTA

We have reviewed your November 30, 2018, letter.

This project should have no adverse effect on the North Dakota Department of Transportation highways.

However, if because of this project any work needs to be done on highway right of way, appropriate permits and risk management documents will need to be obtained from the Department of Transportation District Engineers, Rob Rayhorn at 701-227-6510.

Robert Fode

ROBERT A. FODE, P.E., DIRECTOR – OFFICE OF PROJECT DEVELOPMENT

57/raf/js
c: Rob Rayhorn, Dickinson District Engineer