United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E., Suite 400
Aberdeen, South Dakota 57401

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

MAR 14 2012

MEMORANDUM

TO: Superintendent, Fort Berthold Agency

FROM: ACTING Regional Director, Great Plains Region

SUBJECT: Environmental Assessment and Finding of No Significant Impact

In compliance with the regulations of the National Environmental Policy Act (NEPA) of 1969, as amended, an Environmental Assessment (EA) has been completed and a Finding of No Significant Impact (FONSI) has been issued. The EA authorizes land use to drill eight oil and gas wells from three well pad locations on the Fort Berthold Indian Reservation.

All the necessary requirements of the National Environmental Policy Act have been completed. Attached for your files is a copy of the EA, FONSI and Notice of Availability. The Council on Environmental Quality (CEQ) regulations require that there be a public notice of availability of the FONSI (40 C.F.R. Part 1506.6(b)). Please post the attached notice of availability at the Agency and Tribal buildings for 30 days.

If you have any questions, please call Marilyn Bercier, Regional Environmental Scientist, Division of Environment, Safety and Cultural Resources Management, at (605) 226-7656.

Tim LaPointe

Attachment

cc: Tex Hall, Chairman, Three Affiliated Tribes (with attachment)
Elgin Crows Breast, Tribal Historic Preservation Officer (with attachment)
Derek Enderud, BLM, Bureau of Land Management (with attachment)
Jason Bivens, SWCA (with attachment)
Eric Wortman, EPA (with attachment)
Jonathon Shelman, Corps of Engineers
Jeff Hunt, Fort Berthold Agency

ENVIRONMENTAL ASSESSMENT

United States Department of the Interior
Bureau of Indian Affairs

Great Plains Regional Office
Aberdeen, South Dakota

Cooperating Agency:

Bureau of Land Management

North Dakota State Office
Dickinson, North Dakota

Petro-Hunt, LLC

Eight Potential Bakken/Three Forks Exploratory
Oil and Gas Wells on Three Well Pads:

Fort Berthold #148-94-9C-4-3H, 4H, -5H
Fort Berthold #148-94-20C-21-4H, 5H
Fort Berthold #148-94-21A-20-1H, 2H, 3H

Fort Berthold Indian Reservation

March 2012

For information contact:
Bureau of Indian Affairs, Great Plains Regional Office
Division of Environment, Safety and Cultural Resources Management
115 4th Avenue SE, Aberdeen, South Dakota 57401 (605) 226-7656

TABLE OF CONTENTS

Page

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION 1
1.1 Introduction 1
1.2 Federal and Other Relevant Regulations and Authorities 6
2.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE 7
2.1 The No Action Alternative 7
2.2 The Proposed Action 7
2.2.1 Well Pad and Infrastructure Locations and Disturbance 7
2.2.2 Well Pads 8
2.2.3 Access Road and Utility Corridor 8
2.2.4 Pipelines 9
2.2.5 Drilling 12
2.2.6 Casing and Cementing 13
2.2.7 Completion and Evaluation 13
2.2.8 Commercial Production 14
2.2.9 Field Camp 15
2.2.10 Construction Details 15
2.2.11 Reclamation 20
2.3 BIA-Preferred Alternative 21
3.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS 22
3.1 Physical Setting 22
3.2 Air Quality 22
3.2.1 Air Quality Standards for Criteria Pollutants 22
3.2.2 Greenhouse Gas Emissions and Responses to the Threat of Climate Change 25
3.2.3 Hazardous Air Pollutants 26
3.2.4 Existing Air Quality in the Project Area 27
3.2.5 Typical Air Emissions from Oil Field Development 28
3.2.6 Air Quality Best Management Practices 28
3.2.7 Potential Air Quality Impacts 29
3.3 Water Resources 30
3.3.1 Surface Water 30
3.3.2 Groundwater 32
3.3.1 Potential Impacts to Surface Water and Groundwater Resources 36
3.4 Soils 40
3.4.1 Natural Resources Conservation Service Soil Data 40
3.4.2 Field-Derived Soil Data 45
3.4.3 Potential Impacts from Soil Erosion 46
3.5 Wetlands 47
3.6 Vegetation and noxious weeds 47
3.6.1 Vegetation Data 47
3.6.2 Noxious Weeds 49
3.6.3 Potential Impacts on Vegetation and Noxious Weeds 51
3.7 Wildlife 52
3.7.1 Threatened and Endangered Species Occurrence and Habitat 52

Finding of No Significant Impact

Petro Hunt, LLC (Petro Hunt)

Eight Potential Bakken/Three Forks Exploratory
Oil and Gas Wells on Three Well Pads:
Fort Berthold #148-94-9C-4-3H, 4H, -5H
Fort Berthold #148-94-20C-21-4H, 5H
Fort Berthold #148-94-21A-20-1H, 2H, 3H

Fort Berthold Indian Reservation
Dunn County, North Dakota

The U.S. Bureau of Indian Affairs (BIA) has received a proposal to drill eight oil and gas wells located atop three well pads as follows:

- **Fort Berthold #148-94-9C-04-3H, -4H, -5H:** SE¼ SW¼ of Section 9, Township (T) 148 North (N), Range (R) 94 West (W)
- **Fort Berthold #148-94-20C-21-4H, -5H:** SW¼ SW¼ of Section 20, T148N, R94W
- **Fort Berthold #148-94-21A-20-1H, -2H, -3H:** SE¼ NE¼ of Section 21, T148N, R94W

Associated federal actions by BIA include determinations of effect regarding environmental resources and positive recommendations to the Bureau of Land Management regarding the Applications for Permit to Drill.

The potential of the proposed action to impact the human environment is analyzed in the following Environmental Assessment (EA), as required by the National Environmental Policy Act. Based on the EA, I have determined that the proposed project will not significantly affect the quality of the human or natural environment. No Environmental Impact Statement is required for any portion of the proposed activities.

This determination is based on the following factors:

1. Agency and public involvement solicited for the preceding NEPA document was sufficient to ascertain potential environmental concerns associated with the currently proposed project.

2. Protective and prudent measures were designed to minimize impacts to air, water, soil, vegetation, wetlands, wildlife, public safety, water resources, and cultural resources. The remaining potential for impacts was disclosed for both the proposed action and the No Action alternatives.

3. Guidance from the U.S. Fish and Wildlife Service has been fully considered regarding wildlife impacts, particularly in regard to threatened or endangered species. This guidance includes the Migratory Bird Treaty Act (16 U.S.C. 703 et seq.) (MBTA), the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) (NEPA), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d, 54 Stat. 250) (BGEPA), Executive Order 13186 "Responsibilities of Federal Agencies to Protect Migratory Birds", and the Endangered Species Act (16 U.S.C. 1531 et seq.) (ESA).

4. The proposed action is designed to avoid adverse effects to historic, archaeological, cultural and traditional properties, sites and practices. Compliance with the procedures of the National Historic Preservation Act is complete.

5. Environmental justice was fully considered.

6. Cumulative effects to the environment are either mitigated or minimal.

7. No regulatory requirements have been waived or require compensatory mitigation measures.

8. The proposed project will improve the socio-economic condition of the affected Indian community.

Tim LaPointe

ACTING Regional Director

3-14-12

Date

TABLE OF CONTENTS (continued)

Page

3.7.2 General Wildlife Species Occurrence and Habitat 52
3.7.3 Potential Impacts to Wetlands, Habitat, and Wildlife 52
3.8 Cultural Resources 56
3.9 Public Health and Safety 57
3.9.1 Potential Impacts to Public Health and Safety 58
3.10 Socioeconomics 58
3.10.1 Socioeconomic Analysis Area 59
3.10.2 Population and Demographic Trends 59
3.10.3 Employment 60
3.10.4 Income 62
3.10.5 Housing 63
3.10.6 Potential Impacts to Area Socioeconomics 64
3.11 Environmental Justice 65
3.11.1 Potential Impacts to Environmental Justice 67
3.12 Mitigation and Monitoring 68
3.12.1 General BMPs 69
3.12.2 Mitigation and Safety Measures Committed to by Petro-Hunt 71
3.13 Irreversible and Irretrievable Commitment of Resources 74
3.14 Short-Term Use versus Long-Term Productivity 74
3.15 Cumulative Impacts 74
4.0 CONSULTATION AND COORDINATION 82
5.0 LIST OF PREPARERS 88
6.0 REFERENCES 89
7.0 ACRONYMS 94

LIST OF FIGURES

Figure **Page**

1-1 Proposed project overview map. 2
1-2 Proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad and infrastructure. 3
1-3 Proposed Fort Berthold #148-94-20C-21-4H, 5H well pad and infrastructure. 4
1-4 Proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad and infrastructure. 5
2-1 Typical road cross sections (BLM and USFS 2007) 9
2-2 Typical drilling rig (Ruffo 2009). 13
2-3 Typical producing oil well pad. 14
2-4 Proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H infrastructure location and spacing unit boundary. 16
2-5 Proposed Fort Berthold #148-94-20C-21-4H, 5H infrastructure location and spacing unit boundary. 18
2-6 Proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H infrastructure location and spacing unit boundary. 19
2-7 Example of reclamation from the BLM Gold Book (BLM and USFS 2007) 21

TABLE OF CONTENTS (continued)

LIST OF FIGURES (continued)

Figure **Page**

3-1 Watersheds and surface runoff directions near the proposed well pads. 31
3-2 Typical stratigraphic column of the Williston Basin, with oil and gas bearing formations (Peterson 1995). 38
3-3 Approximate spatial extent of soil types within and around the proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad. 41
3-4 Approximate spatial extent of soil types within and around the proposed Fort Berthold #148-94-20C-21-4H, 5H well pad. 42
3-5 Approximate spatial extent of soil types within and around the proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad. 43
3-6 Vegetation at the Fort Berthold #148-94-9C-4-3H, 4H, 5H project area, facing west. Photo taken July 20, 2011. 48
3-7 Vegetation at the Fort Berthold #148-94-20C-21-4H, 5H project area, facing south. Photo taken June 2, 2011. 48
3-8 Vegetation at the Fort Berthold #148-94-21A-20-1H, 2H, 3H project area, facing south. Photo taken May 19, 2011. 49
3-9 Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad location. 76
3-10 Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed Fort Berthold #148-94-20C-21-4H, 5H well pad location. 77
3-11 Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad location. 78

LIST OF TABLES

Table **Page**

2-1 Proposed Well Pad and Infrastructure Disturbance. 8
3-1 NAAQS and Other Air Quality Standards. 24
3-2 Maximum Levels of Monitored Pollutants, 2007–2009, as Measured at Dunn Center and Theodore Roosevelt National Park North Unit Monitoring Stations. 27
3-3 Common Aquifers in the Proposed Project Area and Surrounding Region. 32
3-4 Existing Water Wells within 5 Miles of the Proposed Well Pads. 34
3-5 Common Additives of Hydraulic Fracturing Fluid. 36
3-6 Soil Data Obtained through the Excavation of Soil Pits within the Proposed Project Area. 45
3-7 Recognized Noxious Weed Occupied Area in Dunn County, North Dakota. 50
3-8 Summary of Potential Effects to Threatened and Endangered Species. 53
3-9 Population and Demographics. 60
3-10 2009 Total Employment, Average Weekly Wages, and Unemployment Rates. 61

TABLE OF CONTENTS (continued)

LIST OF TABLES (continued)

Table **Page**

3-11 Income and Poverty in Analysis Area, 2008....62
3-12 Housing Development Data for the Reservation and Encompassing Counties....63
3-13 Housing Development Data for the Encompassing Counties 2000–2008....64
3-14 Duration of Employment during Proposed Project Implementation....64
3-15 Minority Population Breakdown by North Dakota County and Race, 2000–2008[2]....66
3-16 Poverty Rates and Median Household Income for the Analysis Area....67
3-17 Number of Confidential, Active, and Permitted Wells Surrounding the Project Area....75
4-1 Scoping Comments....83

LIST OF APPENDICES

Appendix

A Species Accounts and Affects Determinations
B MHA THPO Consultation Letter
C U.S. Fish and Wildlife Service Informal Section 7 Consultation Letter
D General Consultation and Scoping Letters

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

Petro-Hunt, LLC (Petro-Hunt) has acquired the leases and is proposing to drill eight oil wells on three well pads on the Fort Berthold Indian Reservation (the Reservation) to evaluate, and possibly develop, the commercial potential of natural resources. Developments have been proposed on lands held in trust by the United States in Dunn County, North Dakota. The Bureau of Indian Affairs (BIA) is the surface management agency for potentially affected tribal lands and individual allotments. The BIA manages lands held in title by the tribe and tribal members to subsurface mineral rights. Development has been proposed in a location that targets specific areas in the Bakken/Three Forks Formation, a known oil reserve. The following three proposed well pads, shown in Figures 1-1 through 1-4, would be located within the Reservation:

- **Fort Berthold #148-94-9C-04-3H, -4H, -5H:** SE¼ SW¼ of Section 9, Township (T) 148 North (N), Range (R) 94 West (W), Dunn County, North Dakota
- **Fort Berthold #148-94-20C-21-4H, -5H:** SW¼ SW¼ of Section 20, T148N, R94W, Dunn County, North Dakota
- **Fort Berthold #148-94-21A-20-1H, -2H, -3H:** SE¼ NE¼ of Section 21, T148N, R94W, Dunn County, North Dakota

Access roads would be constructed to the well pads to facilitate the construction and operation of the proposed wells. The well pads would be constructed to accommodate drilling activities and well operations. In addition, if commercially recoverable oil and gas are discovered at the well sites, a gathering system would be installed. It is expected that underground electric lines and other pipelines would be constructed within existing rights-of-way (ROWs). Additional National Environmental Policy Act of 1969 (NEPA) analysis and BIA approval prior to construction would be required if these utilities are not constructed within the approved ROW.

All components (e.g., roads, well pads, gathering lines, and supporting facilities) would be reclaimed upon final abandonment unless formally transferred, with federal approval, to either the BIA or the landowner. The proposed wells are exploratory; should they prove productive, further exploration of surrounding areas is possible

This environmental assessment (EA) addresses the potential impacts associated with the construction, and possible long-term operation, of the above-listed well pads and directly related infrastructure and facilities. Further oil and gas exploration and development would require additional NEPA analysis and federal actions.

For these proposed well pads, Petro-Hunt is considered the operator. Petro-Hunt agrees to follow and abide by all commitments and agreements discussed in this document and the associated Applications for Permit to Drill (APDs) for these well pads.

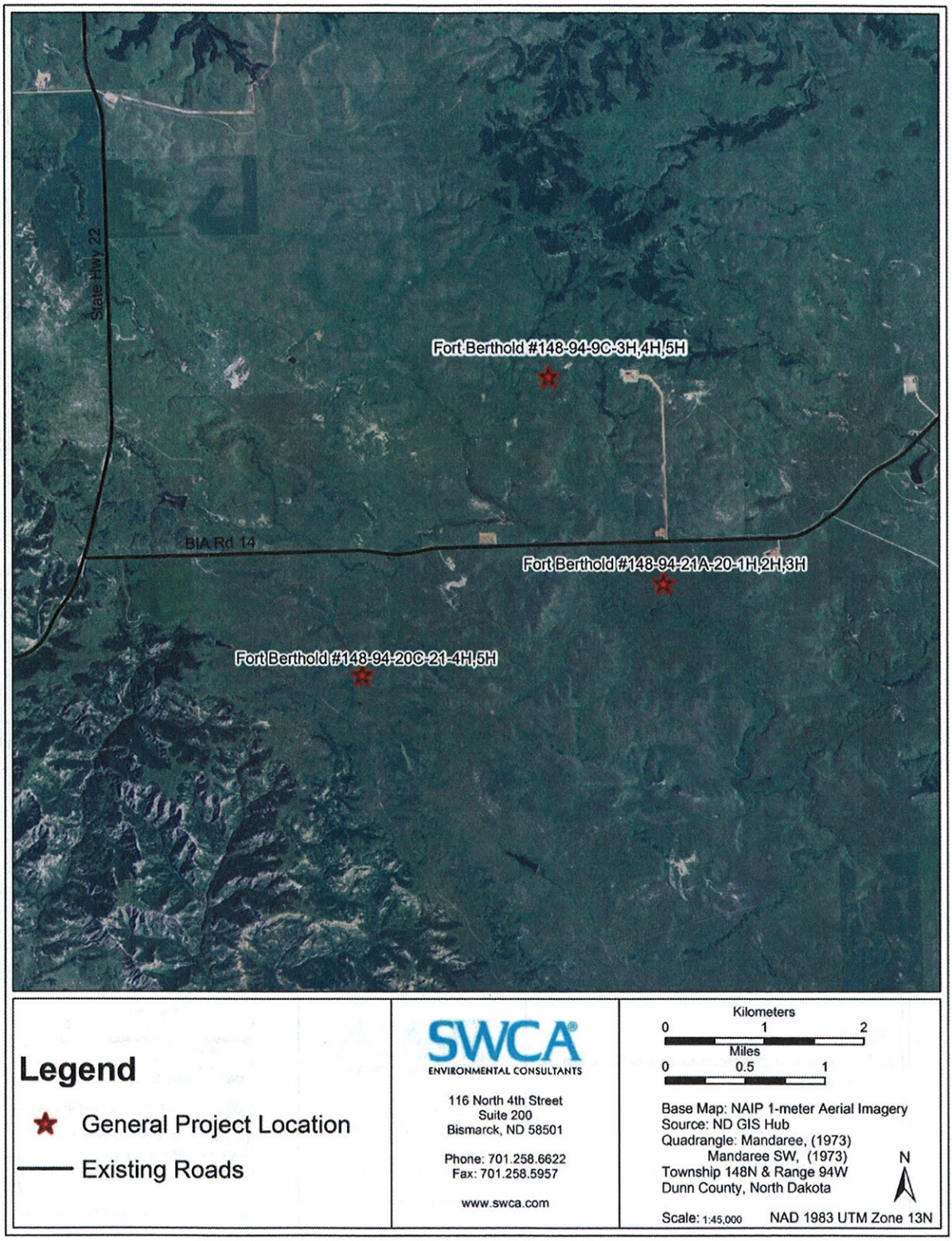


Figure 1-1. Proposed project overview map.

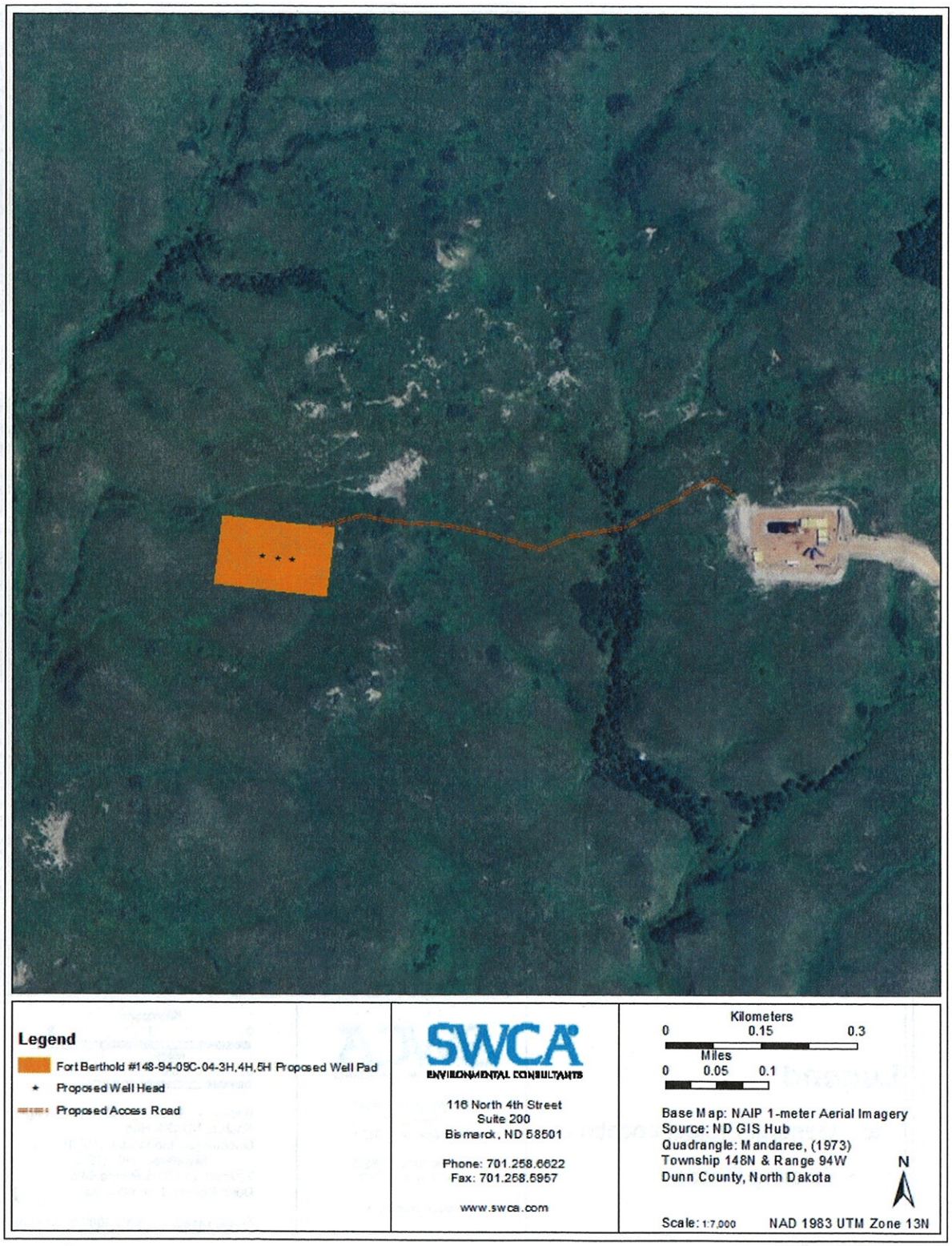


Figure 1-2. Proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad and infrastructure.

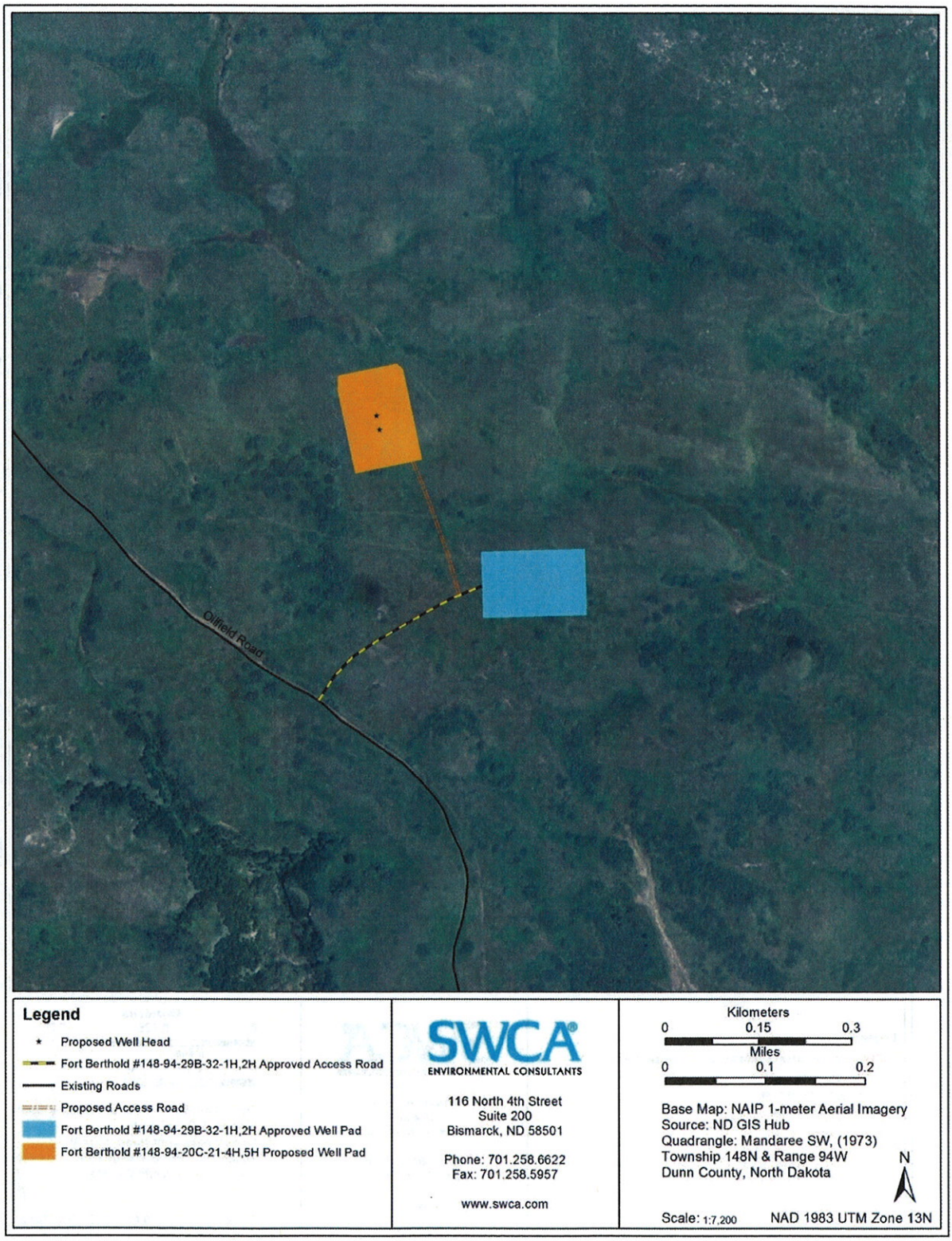


Figure 1-3. Proposed Fort Berthold #148-94-20C-21-4H, 5H well pad and infrastructure.

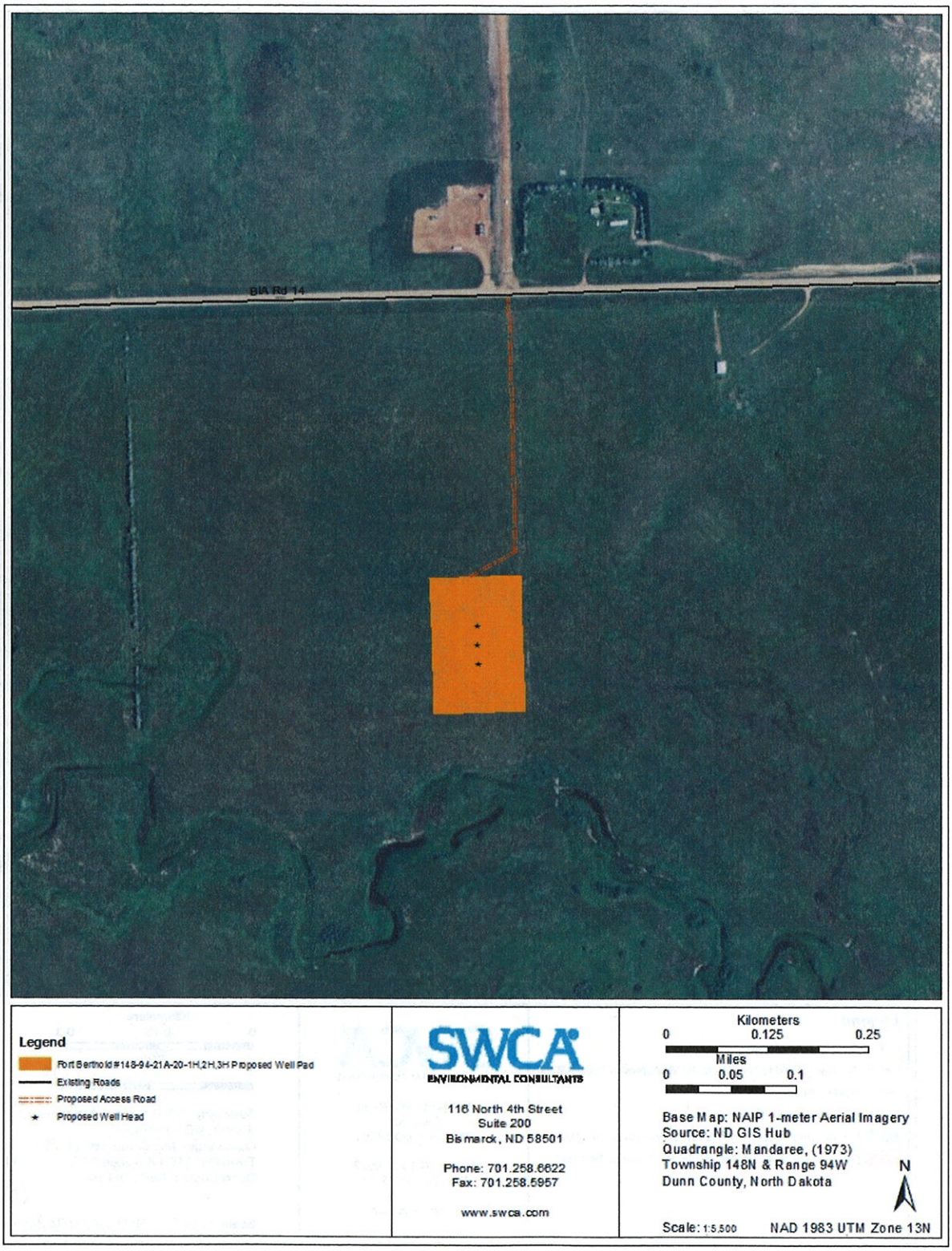


Figure 1-4. Proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad and infrastructure.

1.2 FEDERAL AND OTHER RELEVANT REGULATIONS AND AUTHORITIES

The BIA's general mission is to represent the interests, including the trust resources, of members of the Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara (MHA) Nation, as well as those of individual tribal members. All members of the MHA Nation, including individual allotment owners, could benefit substantially from the development of oil and gas exploration on the Reservation. Oil and gas exploration and subsequent development are under the authority of the Energy Policy Act of 2005 (42 United States Code [USC] 15801, et seq.), the Federal Onshore Oil and Gas Royalty Management Act of 1982 (30 USC 1701, et seq.), the Indian Mineral Development Act of 1982 (25 USC 2101, et seq.), and the Indian Mineral Leasing Act of 1938 (25 USC 396a, et seq.). The BIA's role in the proposed project includes approving easements, leases, and ROWs; determining effects on cultural resources; and making recommendations to the Bureau of Land Management (BLM).

Compliance with NEPA, the Council on Environmental Quality (CEQ) regulations (Title 40 Code of Federal Regulations [CFR] 1500–1508), 43 CFR 3100, and Onshore Oil and Gas Order Nos. 1, 2, 6, and 7 is required due to the project's location on federal lands. The BLM is responsible for the final approval of all APDs after receiving recommendations for approval from the BIA. The BLM is also tasked with on-site monitoring of construction and production activities as well as resolution of any dispute that may arise as a result of any of the aforementioned actions.

The procedures and technical practices described in the APD supporting documents and in the EA describe potential impacts to the project area. This EA analyzes potential impacts to elements in the natural and human environment for both the No Action Alternative (described in Section 2.1) and the Proposed Action. Impacts may be beneficial or detrimental, direct or indirect, and short-term or long-term. The EA also analyzes the potential for cumulative impacts and ultimately makes a determination as to the significance of any impacts.

In the absence of significant negative consequences, this EA would result in a Finding of No Significant Impact. Should significant adverse impacts be identified as a result of the direct, indirect, or cumulative effects of the Proposed Action, then NEPA requires the preparation of an environmental impact statement. It should be noted that a significant benefit from the project does not necessarily require preparation of an environmental impact statement. Commercial viability of the proposed wells could result in additional exploration in the area, and any future oil/gas exploration activities and associated federal actions that are proposed wholly or partly on trust land would require additional NEPA analysis and BIA consideration prior to implementation and/or production activities.

Petro-Hunt will comply with all applicable federal, state, and tribal laws, rules, policies, regulations, and agreements. Petro-Hunt also agrees to follow all best management practices (BMPs) and monitoring mitigations listed in this document. No disturbance of any kind would begin until all required clearances, consultations, determinations, easements, leases, permits, and surveys are in place.

2.0 PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

The BIA, as required by NEPA, must "study, develop, and describe appropriate alternatives to the recommended course of action in any proposal that involves unresolved conflicts concerning alternative uses of available resources..." (NEPA Sec 102[2] [e]). Developing a range of alternatives allows for exploration of options designed to meet the purpose and need for the action. Along with the No Action Alternative, the BIA is considering the Proposed Action.

2.1 THE NO ACTION ALTERNATIVE

Under the No Action Alternative, the proposed project (including the well pads, wells, gathering lines, and access roads) would not be constructed, drilled, installed, or operated. The BIA would not approve easements, leases, or ROWs for the proposed locations and the BLM would not approve the APDs. No impacts would occur as a result of this project to the following critical elements: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and environmental justice (EJ). There would be no project-related ground disturbance, use of hazardous materials, or trucking of product to collection areas. Surface disturbance, deposition of potentially harmful biological material, and traffic levels would not change from present levels. Under the No Action Alternative, the MHA Nation, tribal members, and allottees would not have the opportunity to realize potential financial gains from the discovery and resulting development of resources at this well location.

2.2 THE PROPOSED ACTION

In addition to the No Action Alternative, this document analyzes the potential impacts of three new exploratory oil and gas well pads and their associated infrastructure located in the west-central portion of the Reservation in Dunn County, North Dakota. The proposed wells would test the commercial potential of the Bakken/Three Forks Formation in this vicinity. Project locations, shown in Figures 1-2 through 1-4, were chosen by Petro-Hunt in consultation with tribal and BIA resource managers to provide information for potential future development.

2.2.1 Well Pad and Infrastructure Locations and Disturbance

Well pad and infrastructure locations, shown in Figures 1-1 through 1-4, were developed in consultation with tribal and BIA resource managers during a pre-clearance process that included surveys for cultural, archaeological, and natural (i.e., biological and physical) resources.

Interdisciplinary on-site meetings were conducted on May 3 and 19, June 6, and July 20, 2011, to review the well pad locations and proposed access roads. The on-site meetings were attended by the surveyor, natural and cultural resource specialists, a Petro-Hunt representative, the BIA representative, and the Tribal Historic Preservation Office (THPO) monitor. Surveys were conducted at that time to determine potential impacts to resources; topography, potential drainage issues, erosion control measures, and pad and related facility

locations (access roads, topsoil/subsoil stockpiles, tanks, etc.) were also discussed at the on-site meetings in order to minimize effects to natural and cultural resources. The combined disturbance of the project is estimated to be approximately 32.4 acres, as shown in Table 2-1.

Table 2-1. Proposed Well Pad and Infrastructure Disturbance.

Proposed Well Pad Name	Detailed Disturbance (Acres)	Approximate Total Disturbance (Acres)
Fort Berthold #148-94-9C-4-3H, 4H	Well Pad: 8.5 Access Road: 4.9	13.4
Fort Berthold #148-94-20C-21-4H, 5H	Well Pad: 7.6 Access Road: 1.6	9.2
Fort Berthold #148-94-21A-20-1H, 2H, 3H	Well Pad: 7.0 Access Road: 2.8	9.8

2.2.2 Well Pads

The proposed well pads would include a leveled area (pad) that would be used for the drilling rig and equipment. The well pads would use a closed-loop system. Cuttings and fluid would be hauled off site and disposed of at an approved facility. The pads would be stripped of topsoil and vegetation and then graded. The topsoil would be stockpiled and stabilized with native grasses until it could be used to reclaim and revegetate the disturbed area. The subsoils would be used in the construction of the pads and the finished pads would be graded to ensure that water drains away from the pads. Erosion control BMPs (refer to Section 3.12.1) would be implemented and could include surface drainage controls, soil surface protection methodologies, and sediment capture features. Each well pad would be surrounded by a fence. At the point where the access road and fence meet, a cattle guard would be installed. The fenced area would measure the approximate size of each well pad disturbance area.

2.2.3 Access Road and Utility Corridor

Approximately 0.76 mile (4,036.1 feet) of new and improved access road would be constructed. Using a purchased ROW width of 100 feet, with a final ROW disturbance width of 66 feet, up to approximately 9.3 total acres of new surface disturbance for the access roads would occur but that total would be lowered to approximately 6.1 acres when the access roads are complete and put into use. Signed agreements would be in place allowing road construction across affected private and allotted land surfaces, and any applicable approach permits and/or easements would be obtained prior to any construction activity.

In the future, if commercially recoverable oil and gas are discovered at the well sites, Petro-Hunt would install a gathering system. Petro-Hunt contracts gathering pipeline construction to Arrow Pipeline, LLC (Arrow). Arrow's materials and procedures are listed in Section 2.2.4. It is expected that underground electric lines and other pipelines would be constructed within the existing purchased ROW, or additional NEPA analysis and BIA approval would be completed prior to construction of these utilities.

Construction would follow road design standards outlined in the BLM Gold Book (BLM and U.S. Forest Service [USFS] 2007). At a minimum, 6 inches of topsoil would be removed from

the access road corridors. This stockpiled topsoil would then be placed on the outside slopes of the ditches following road construction. The ditches would be seeded as quickly as possible using a seed mixture determined by the BIA. Care would be taken during road construction to avoid disturbing or disrupting any buried utilities that exist along existing major roads. The access road would be surfaced with a minimum of 4 inches of aggregate if the site were to be established as a commercial production site. Also, the roadway would remain in use for the life of the wells. Details of road construction are addressed in the APD. A diagram of typical road cross sections is provided in Figure 2-1.

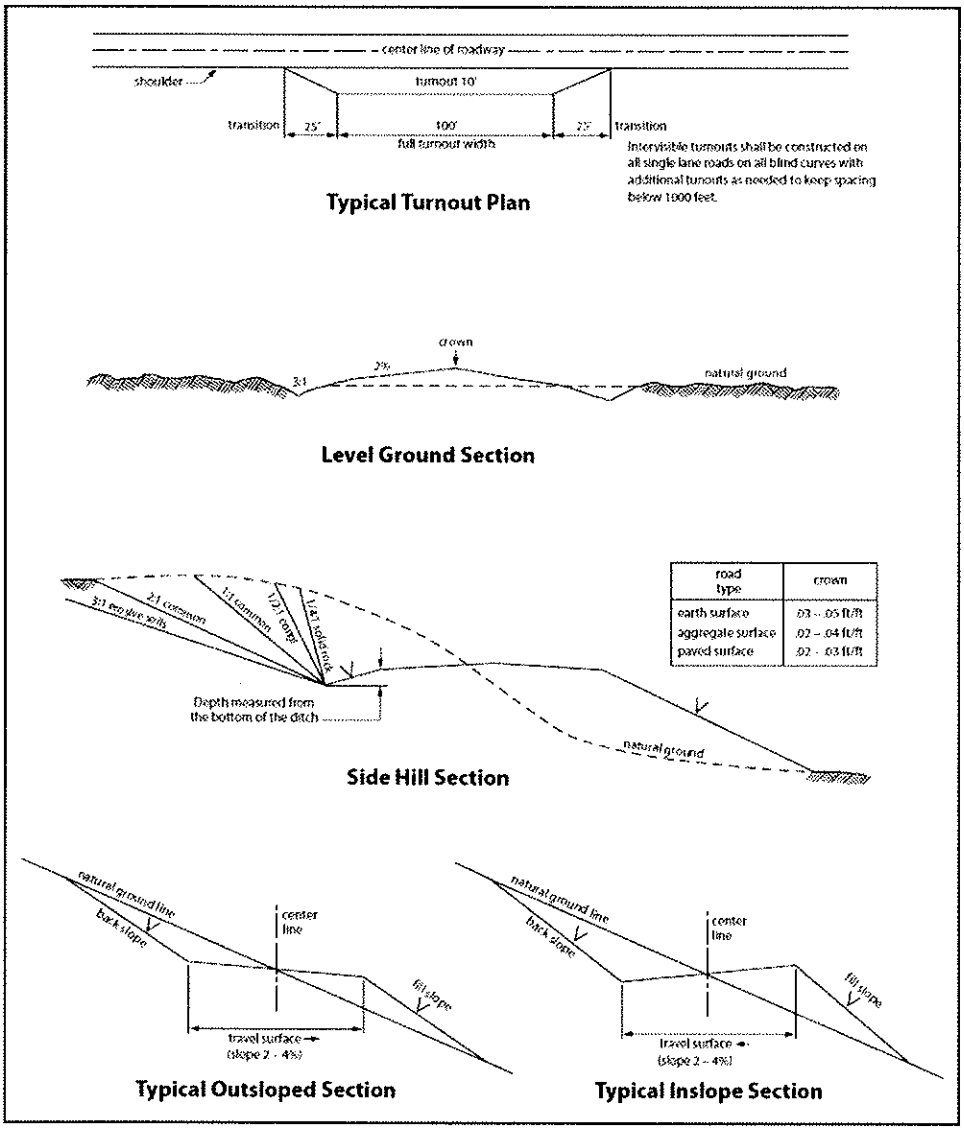


Figure 2-1. Typical road cross sections (BLM and USFS 2007).

2.2.4 Pipelines

2.2.4.1 Steel Pipe

Arrow proposes to construct the oil and gas pipelines using new steel pipe rated by the American Petroleum Institute (API) as 5L X52. Arrow would ensure that each steel pipe

segment is coated with approximately 14 to 16 millimeters of fusion bonded epoxy coating. Further, Arrow would deploy an active cathodic protection system for all steel pipe, which further reduces the likelihood of external corrosion. Arrow would ensure that each steel pipe segment is allotted a 1/16-inch corrosion allowance; however, because of the non-corrosive nature of Bakken crude and the low concentrations of hydrogen sulfide, Arrow does not anticipate any external or internal corrosion during the operating lifetime of the pipe, which, at a minimum, is estimated to be 50 years.

2.2.4.2 Fiberspar® or Similar Pipe

Arrow proposes to construct the produced water gathering pipeline using a material known as Fiberspar or one with the same corrosion-resistant characteristics as Fiberspar. This type of material is not subject to internal or external corrosion.

2.2.4.3 Spill Response Plan

Arrow has developed a Spill Response Plan (Plan) (Middick 2011) for the Phase 3SW pipeline. The spill preventative measures and monitoring protocols, notification procedures, spill detection and on-scene spill mitigation procedures, response activities, contacts, training and drill procedures, and response plan review and update procedures, as referenced in the Plan, apply to the proposed pipelines. A copy of the Plan has been filed with the BIA and Arrow has legally committed to adhering to the procedures and requirements as defined by federal law (49 CFR 194). Arrow has committed to submitting a spill response plan, specific to this proposed project, to the BIA prior to the commencement of construction activities.

2.2.4.4 Pipeline Marking Procedures

Arrow adheres to the requirements of 49 CFR 192.707 with regard to the marking of buried pipelines. Specifically, Arrow would place pipeline markers within 1,000 feet of one another at all public road crossings, railroad crossings, creek crossings, fence crossings, and at all points of major direction change.

2.2.4.5 Quality Control/Quality Assurance Measures

Arrow purchases steel pipe that is rated as API 5L X52 and inspects all pipe while at the mill to ensure quality. Arrow is also present to ensure that external epoxy coating is applied to a minimum thickness of 14 millimeters. During construction, all welds are visually inspected for quality and completeness by qualified professionals. Once welds have passed visual inspection, they are subjected to 100 percent non-destructive testing. After passing these tests, the weld areas are covered for corrosion protection. After the weld areas have been covered, the external coating of the pipe is inspected using a jeepmeter to detect holes and cracks. The pipe is lowered into the trench and buried. Prior to being put into service, the steel pipe is hydrotested to approximately 1.5 times the minimum design pressure of 1,180 pounds per square inch gauge (psig). The produced water pipe is designed to sustain a minimum pressure of 750 psig and is hydrotested to approximately 900 psig prior to being approved for service.

2.2.4.6 Valve Locations

Two valves would be installed at each end of the proposed pipelines. One valve would be installed at the well location while the second valve would be installed at the proposed tie-in.

The installation of two valves would allow Arrow to isolate the proposed gathering pipelines if required.

2.2.4.7 Reclamation

2.2.4.7.1 Interim Reclamation

Reclamation would continue to occur over the life of the pipelines. Initial reclamation would be required after initial construction and then following any maintenance work or additions of infrastructure. Reclamation would be required before final abandonment of the decommissioned pipeline. A successful reclamation would at all times be the responsibility of the system's operator.

Trenches would be back-filled immediately after the pipe is installed and testing is complete, assuming frozen or saturated soils are not present. Back-fill piles would be stored opposite of the topsoil piles during construction. If construction occurs during winter, Arrow would partially fill the trench with useable, non-frozen, back-fill soil to the extent possible and cover the entire ROW, including the trench, with straw. The trench would be back-filled and topsoil distributed as soon as practicable after the soil has defrosted. Topsoil piles would be covered to eliminate the potential for rill erosion and subsequent loss of soil during spring snow melt and precipitation events.

Applicable short- and long-term BMPs would be used to minimize and control erosion in disturbed areas. To reduce compaction, the ROW would be plowed before the stockpiled topsoil is distributed.

The disturbed areas would be reclaimed and contoured as soon as possible after construction is complete (fall/spring). The ROW would be covered with stockpiled topsoil and seeded with a seed mixture determined by the BIA. Arrow would control noxious weeds within the ROW and other applicable facilities by approved chemical or mechanical methods. If seeding of the ROW does not occur due to growing season constraints, Arrow will deploy approved weed-free hay across the entire ROW. The presence of hay across the ROW will reduce the potential for excessive erosion as a result of spring snow melt and precipitation.

The entire ROW would be monitored for erosion, subsidence, or noxious weeds. In areas where problems are found to occur, reclamation efforts would continue until the BIA feels the ROW is successfully reclaimed. Reclamation is considered successful when:

- seeded areas are established;
- adjacent vegetative communities spread back into the disturbed areas; and
- noxious weeds are under control.

If after two growing seasons the new seeding is not successful, the BIA may require additional efforts to establish vegetation. For noxious weeds, a survey was conducted on the ROW prior to the construction commencing. The BIA has developed a weed management plan to treat known or likely to occur noxious weed species.

2.2.4.7.2 Final Reclamation

Final reclamation would occur when the pipeline is decommissioned. All disturbed areas would be reclaimed, reflecting the BIA's view of oil and gas exploration and production as temporary intrusions on the landscape. All facilities would be removed. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and seeded. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. It is economically and environmentally unfeasible to excavate and remove the decommissioned pipeline. Instead, it would be purged with water of any natural gas remaining in the lines and abandoned in place.

2.2.5 Drilling

After securing mineral leases, Petro-Hunt submitted the APDs to the BLM under separate cover. The BIA's office in New Town, North Dakota, will receive a copy of the APDs from the BLM North Dakota Field Office. Construction would begin if the BIA completes the NEPA process, a positive recommendation is given, and the APDs are then approved by the BLM.

Rig transport and on-site assembly would take roughly seven days; a typical drill rig is shown in Figure 2-2. Drilling would require approximately 35 days per well to reach target depth, using a rotary drilling rig rated for drilling to approximately 15,000 feet vertical depth. For the first 2,500 feet drilled, a freshwater-based mud system with non-hazardous additives would be used to minimize contaminant concerns. Water would be obtained from a commercial source for this drilling stage, using approximately 8.4 gallons of water per foot of hole drilled (approximately 21,000 gallons total for this portion).

After setting and cementing the near-surface casing, an oil-based mud system (80% to 85% diesel fuel and 15% to 20% water) would be used to drill to a 7-inch casing point. Oil-based drilling fluids reduce the potential for hole sloughing while drilling through water-sensitive formations (shales). Approximately 4,720 additional gallons of water and 18,900 gallons of diesel fuel per well would be used to complete vertical drilling. The lateral reach of the borehole would be drilled using 33,600 gallons of fresh water as mud and adding polymer sweeps as necessary to clean the hole.

Figure 2-2. Typical drilling rig (Ruffo 2009).

2.2.6 Casing and Cementing

Surface casing would be set at an approximate depth of 2,500 feet and cemented back to the surface during drilling, isolating all near-surface freshwater aquifers in the project area. The Fox Hills Formation and Pierre Formation would be encountered at depths of approximately 1,700 and 1,800 feet, respectively. Production casing would be cemented from a depth approximately 11,256 feet up to about 4,000 feet in order to isolate the hydrocarbon zone present in the Dakota Formation below a depth of 4,500 feet. Casing and cementing operations would be conducted in full compliance with Onshore Oil and Gas Order No. 2 (43 CFR 3160).

2.2.7 Completion and Evaluation

A completion rig unit would be moved on site following the conclusion of drilling and casing activities. Approximately 30 days are usually required, at the proposed well depths, to clean out the well bore, pressure test the casing, perforate and fracture the horizontal portion of the hole, and run production tubing for commercial production. The typical procedure for fracturing a target formation to increase production includes pumping a mixture of sand and a carrier (e.g., water and/or nitrogen) downhole under extreme pressure. The resulting fractures are propped open by the sand, increasing the capture zone of the well and subsequently maximizing the efficient drainage of the field. After fracturing, the well is "flowed back" to the surface where fracture fluids are recovered and disposed of in accordance with North Dakota Industrial Commission rules and regulations and in compliance with applicable U.S. Environmental Protection Agency (EPA) guidelines.

2.2.8 Commercial Production

If drilling, testing, and production support commercial production from any of the proposed well pads, additional equipment would be installed, including a pumping unit at the well head, a vertical heater/treater, tanks (usually 400-barrel steel tanks), and a flare pit (Figure 2-3). An impervious dike sized to hold 110% of the capacity of the largest tank plus one full day's production would surround the tanks and the heater/treater. Load out lines would be located inside the diked area and a heavy screen-covered drip barrel would be installed under the outlet. A metal access staircase would protect the dike and support flexible hoses used by tanker trucks. For all above-ground facilities not subject to safety requirements, the BIA would choose a paint color, recommended by the BLM or the Rocky Mountain Five-State Interagency Committee, which would blend with the natural color of the landscape.

Figure 2-3. Typical producing oil well pad.

The duration of production operations cannot be reliably predicted, but some oil wells have been pumping for more than 100 years. The operator estimates that each of the wells would yield approximately 450 barrels of oil per day and 100 barrels per day of water during the first year of production. After the first year, the operator estimates production would decrease to approximately 250 barrels of oil per day and 50 barrels per day of water. Produced water is mostly recovered frac fluids and is expected to become minimal after two years.

Large volumes of gas are not expected from these locations. Small volumes would be flared in accordance with Notice to Lessees 4A and adopted North Dakota Industrial Commission regulations, which prohibit unrestricted flaring for more than the initial year of operation (North Dakota Century Code 38-08-06.4). If proposed future gathering lines are installed, gas would be carried to market via pipeline and flaring would become minimal.

2.2.9 Field Camp

A few personnel would be housed in self-contained trailers for a very short period of time; long-term housing is not proposed. Most personnel, both construction and drilling, would commute to the site. Human waste would be collected on site in portable toilets and trailers and it would be transported off site to a state-approved wastewater treatment facility. All other solid waste would be contained in enclosed containers and transported to, and disposed of at, state-approved facilities.

2.2.10 Construction Details

The proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad, shown in Figure 1-2, is located approximately 5.7 miles south of Mandaree, Dunn County, North Dakota, in the SE¼ SW¼ Section 9, T148N, R94W. The proposed Fort Berthold #148-94-20C-21-4H, 5H well pad, shown in Figure 1-3, is located approximately 7.5 miles south of Mandaree, Dunn County, North Dakota, in the SW¼ NW¼ Section 20, T147N, R94W. The proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad, shown in Figure 1-4, is located approximately 7.1 miles south of Mandaree, Dunn County, North Dakota, in the SE¼ NE¼ Section 21, T147N, R94W. New or improved access road totaling approximately 0.76 mile would be constructed. The new road would disturb approximately 9.3 acres and the proposed well pads would disturb approximately 23.1 acres; the total anticipated new disturbance of the proposed action would be approximately 32.4 acres.

2.2.10.1 Fort Berthold #148-94-9C-4-3H, 4H, 5H

The spacing unit consists of 1,280 acres (+/-) with the following bottom hole and drilling target locations (Figure 2-4).

- **Fort Berthold #148-94-9C-4-3H:** Bottom hole located in the NE¼ NW¼ Section 4, T148N, R94W. The drilling target is located approximately 250 feet from the north line (FNL) and 2,640 feet from the west line (FWL), approximately 9,710 feet north and 1,042 feet east of the surface hole location.

- **Fort Berthold #148-94-9C-4-4H:** Bottom hole located in the NE¼ NW¼ Section 4, T148N, R94W. The drilling target is located approximately 250 feet FNL and 1,620 feet FWL, approximately 9,701 feet north and 96 feet east of the surface hole location.

- **Fort Berthold #148-94-9C-4-5H:** Bottom hole located in the NW¼ NW¼ Section 4, T148N, R94W. The drilling target is located approximately 250 feet FNL and 600 feet FWL, approximately 9,692 feet north and 849 feet west of the surface hole location.

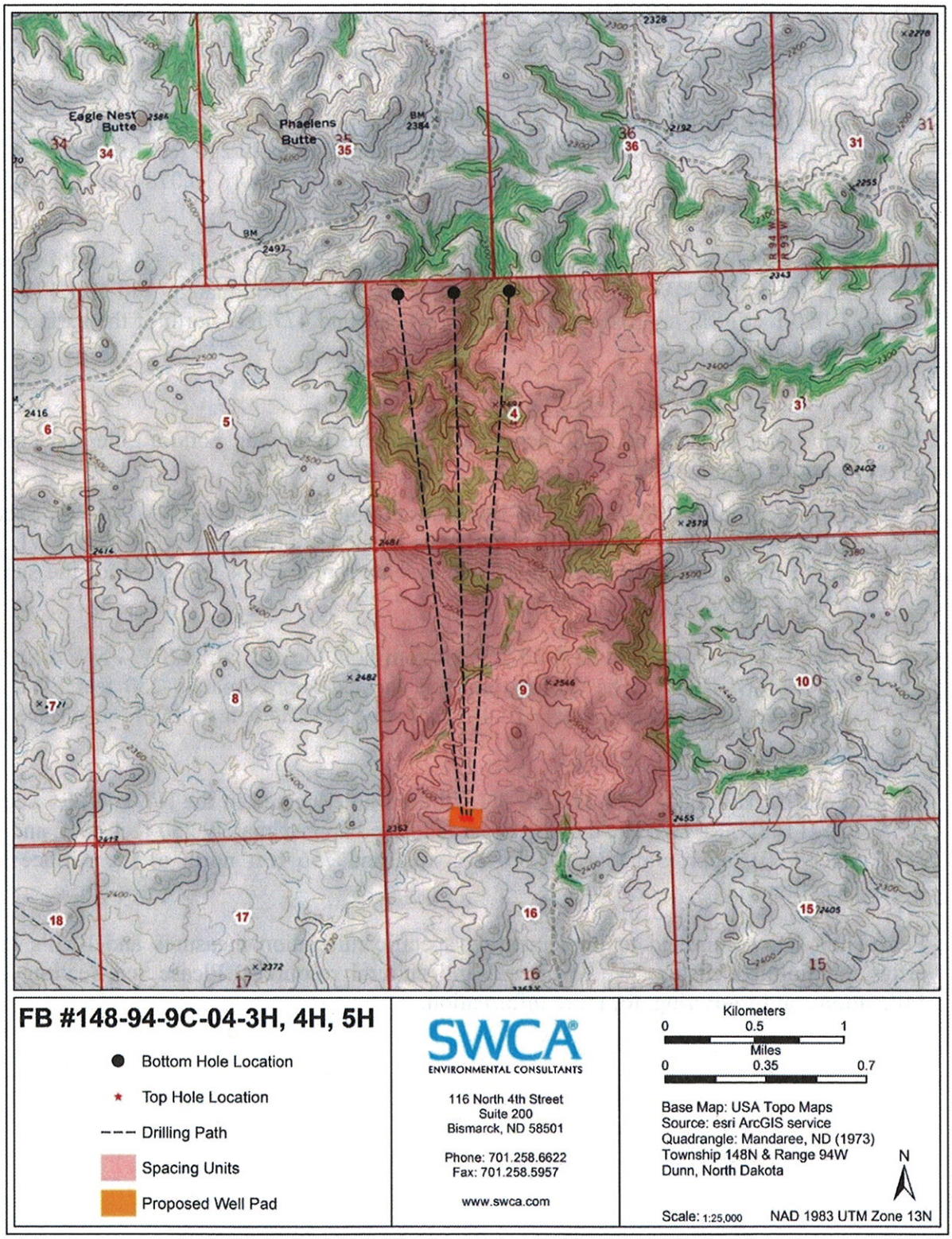


Figure 2-4. Proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H infrastructure location and spacing unit boundary.

2.2.10.2 Fort Berthold #148-94-20C-21-4H, 5H

The spacing unit consists of 1,280 acres (+/-) with the following bottom hole and drilling target locations (Figure 2-5).

- **Fort Berthold #148-94-20C-21-4H:** Bottom hole located in the SE¼ SE¼ Section 21, T148N, R94W. The drilling target is located approximately 250 feet from the east line (FEL) and 600 feet from the south line (FSL), approximately 10,078 feet east and 469 feet south of the surface hole location.

- **Fort Berthold #148-94-20C-21-5H:** Bottom hole located in the NE¼ SE¼ Section 21, T148N, R94W. The drilling target is located approximately 250 feet FEL and 1,620 feet FSL, approximately 10,093 feet east and 477 feet north of the surface hole location.

2.2.10.3 Fort Berthold #148-94-21A-20-1H, 2H, 3H

The spacing unit consists of 1,280 acres (+/-) with the following bottom hole and drilling target locations (Figure 2-6).

- **Fort Berthold #148-94-21A-20-1H:** Bottom hole located in the NW¼ SW¼ Section 20, T148N, R94W. The drilling target is located approximately 250 feet FWL and 2,640 feet FNL, approximately 10,086 feet west and 1,134 feet south of the surface hole location.

- **Fort Berthold #148-94-21A-20-2H:** Bottom hole located in the SW¼ NW¼ Section 20, T148N, R94W. The drilling target is located approximately 250 feet FWL and 1,620 feet FNL, approximately 10,085 feet west and 189 feet south of the surface hole location.

- **Fort Berthold #148-94-21A-20-3H:** Bottom hole located in the NW¼ SW¼ Section 20, T148N, R94W. The drilling target is located approximately 250 feet FWL and 600 feet FNL, approximately 10,085 feet west and 756 feet north of the surface hole location.

Petro-Hunt has committed to implementing specific mitigation measures and BMPs in an effort to minimize disturbance to natural and cultural resources. Please see Section 3.12, Mitigation and Monitoring, for more information.

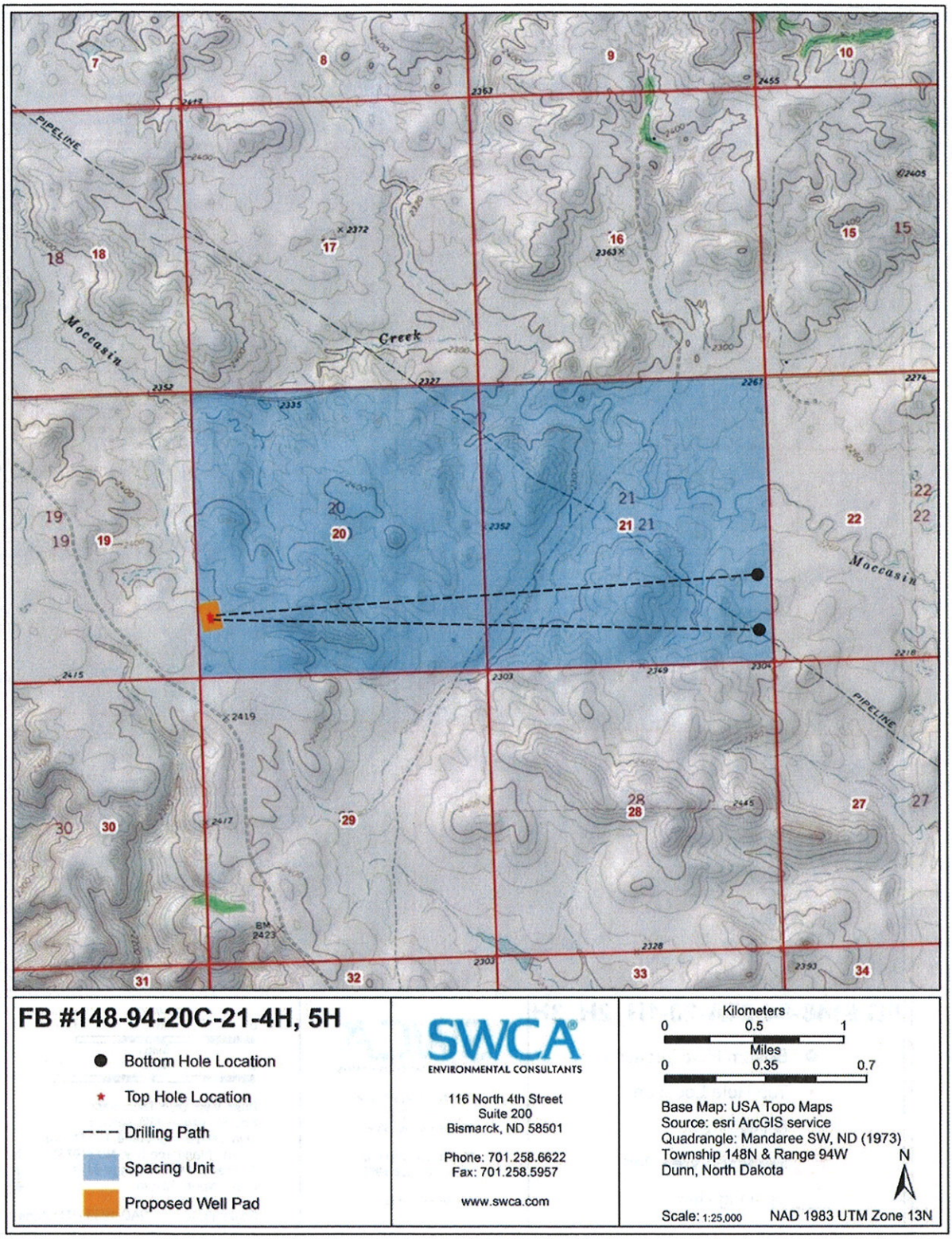


Figure 2-5. Proposed Fort Berthold #148-94-20C-21-4H, 5H infrastructure location and spacing unit boundary.

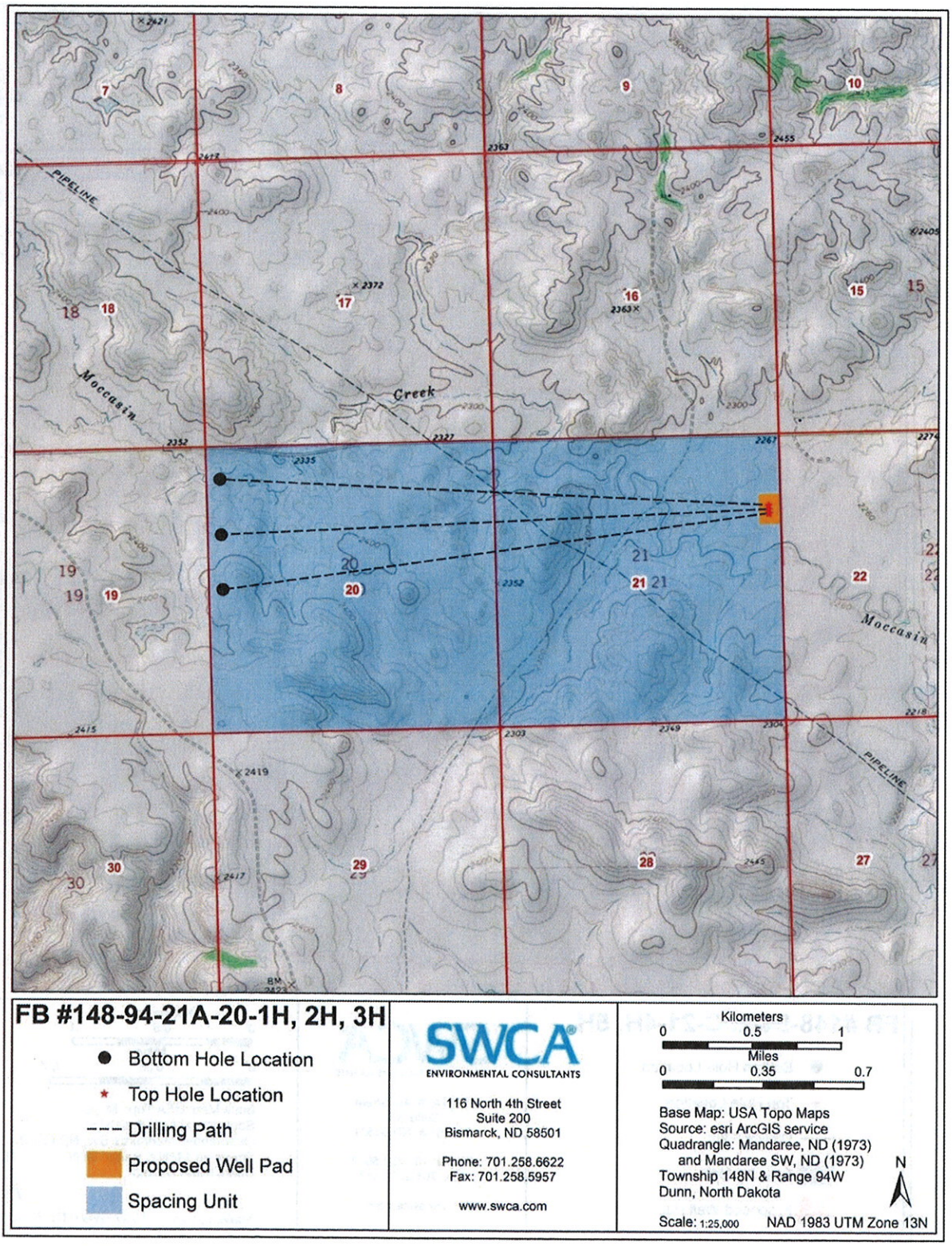


Figure 2-6. Proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H infrastructure location and spacing unit boundary.

2.2.11 Reclamation

2.2.11.1 Interim Reclamation

Reclamation would continue over the life of the well pads and would include the return of topsoil, and contouring and seeding of native vegetation. Initial reclamation would be required 6 months after construction, if environmentally feasible, and then following any maintenance work or additions of infrastructure. Reclamation would be required before final abandonment of the decommissioned well pads. A successful reclamation would at all times be the responsibility of the operator.

The portions of the access roads and well pad areas not used for functionality would be back-filled, assuming frozen or saturated soils are not present. Topsoil piles would be stored on site during construction. If construction is to occur during winter, Petro-Hunt would partially use non-frozen back-fill soil to the extent possible and cover the entire ROW with straw. Topsoil would be distributed as soon as practicable after the soil has defrosted. Topsoil piles would be covered to eliminate the potential for rill erosion and subsequent loss of soil during spring snow melt and precipitation events.

Applicable short- and long-term BMPs would be used to minimize and control erosion in disturbed areas. To reduce compaction, the access road ROW and well pad areas would be plowed before the stockpiled topsoil is distributed.

The disturbed areas would be reclaimed and contoured as soon as possible after construction is complete (fall/spring). The access road ROW and disturbed area outside of the working well pad area would be covered with stockpiled topsoil and seeded with a seed mixture determined by the BIA. Petro-Hunt would control noxious weeds within the ROW and other applicable facilities by approved chemical or mechanical methods. If seeding of the ROW does not occur due to growing season constraints, Petro-Hunt will deploy approved weed-free hay across the entire ROW. The presence of hay across the ROW will reduce the potential for excessive erosion as a result of spring snow melt and precipitation.

The entire ROW would be monitored for erosion, subsidence, and noxious weeds. In areas where problems are found to occur, reclamation efforts would continue until the BIA feels the ROW is successfully reclaimed. Reclamation is considered successful when:

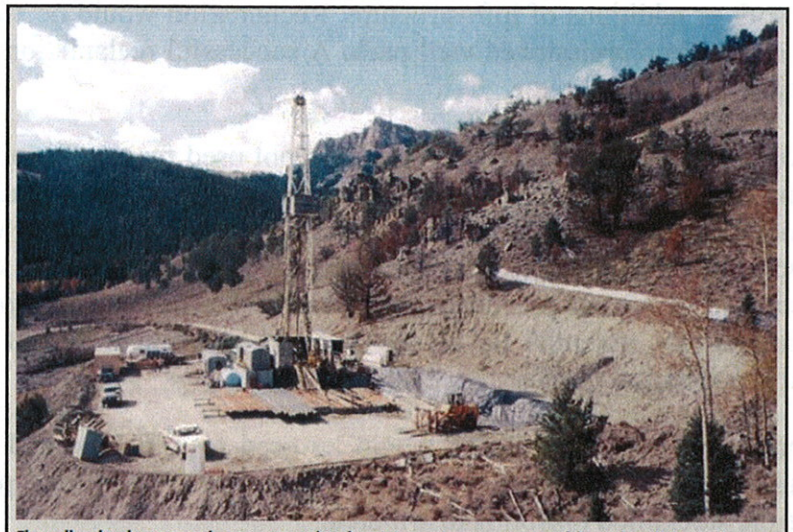
- seeded areas are established;
- adjacent vegetative communities spread back into the disturbed areas; and
- noxious weeds are under control.

If after two growing seasons the new seeding is not successful, the BIA may require additional efforts to establish vegetation. For noxious weeds, a survey was conducted on the access road ROW and well pad area, prior to the construction commencing. The BIA has developed a weed management plan to treat known or likely to occur noxious weed species.

2.2.11.2 Final Reclamation

Final reclamation would occur when each well pad is decommissioned. All disturbed areas would be reclaimed, reflecting the BIA's view of oil and gas exploration and production as

temporary intrusions on the landscape. All facilities would be removed. Access roads and work areas would be leveled or backfilled as necessary, scarified, recontoured, and seeded. Exceptions to these reclamation measures might occur if the BIA approves assignment of an access road either to the BIA roads inventory or to concurring surface allottees. Figure 2-7 shows an example of reclamation (BLM and USFS 2007).



The well pad and access road are constructed to the minimum size necessary to safely conduct drilling and completion operations.

The well pad and access road have been recontoured back to the original contour, the topsoil respread, and the site revegetated.

Figure 2-7. Example of reclamation from the BLM Gold Book (BLM and USFS 2007).

2.3 BIA-PREFERRED ALTERNATIVE

The preferred alternative is to complete all administrative actions and approvals necessary to authorize or facilitate oil and gas developments at the proposed well pad locations.

3.0 THE AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The broad definition of NEPA leads to the consideration of the following elements of the human and natural environment: air quality, public health and safety, water resources, wetland/riparian habitat, threatened and endangered species, soils, vegetation and invasive species, cultural resources, socioeconomic conditions, and EJ.

3.1 PHYSICAL SETTING

The proposed well pad sites and spacing units are in a rural area located on the Reservation in west-central North Dakota. The Reservation is the home of the MHA Nation. The Reservation encompasses more than one million acres, of which almost half, including the project area, are held in trust by the United States for either the MHA Nation or individual allottees.

The proposed well pads, access road, and future gathering pipelines are situated geologically within the Williston Basin, where the shallow structure consists of sandstones, silts, and shales dating to the Tertiary period (65 to 2 million years ago), including the Sentinel Butte and Golden Valley formations. The underlying Bakken/Three Forks Formation is a well-known source of hydrocarbons; its middle member is targeted by the proposed project. Although earlier oil/gas exploration activity within the Reservation was limited and commercially unproductive, recent economic changes and technological advances now make accessing oil in the Bakken/Three Forks Formation feasible.

The Reservation is within the northern Great Plains ecoregion, which consists of four physiographic units: 1) the Missouri Coteau Slope north of Lake Sakakawea; 2) the Missouri River trench (not flooded); 3) the Little Missouri River badlands; and 4) the Missouri Plateau south and west of Lake Sakakawea (Williams and Bluemle 1978). Much of the Reservation is on the Missouri Plateau Slope. Elevations of the unglaciated, gently rolling landscape range from a normal pool elevation of 1,838 feet at Lake Sakakawea to approximately 3,300 feet in the Killdeer Mountains. Annual precipitation on the plateau averages between 15 and 17 inches. Mean temperatures fluctuate between -3 and 21 degrees Fahrenheit (°F) in January and between 55°F and 83°F in July, with 95 to 130 frost-free days each year (U.S. Geological Survey 2010).

3.2 AIR QUALITY

3.2.1 Air Quality Standards for Criteria Pollutants

The federal Clean Air Act (CAA) (USC § 7401–7671, as amended in 1990) established national ambient air quality standards (NAAQS) for criteria pollutants to protect public health and welfare. It also set standards for other compounds that can cause cancer, regulated emissions that cause acid rain, and required federal permits for large sources. NAAQS have been established for ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead (EPA 2010a). The primary NAAQS have been set for pervasive compounds that are generally emitted by industry or motor vehicles. Standards for each pollutant meet specific public health and welfare criteria; thus, they are called the 'criteria pollutants.'

The CAA mandates prevention of significant air quality deterioration in certain designated attainment areas and has designated more stringent air quality standards, known as Secondary Standards, for these areas. Class I attainment areas have national significance and include national parks greater than 6,000 acres, national monuments, national seashores, and federal wilderness areas larger than 5,000 acres that were designated prior to 1977 (Ross 1990). The Class I regulations (40 CFR 51.307) attempt to protect visibility through a review of major new and modified sources of pollutants, and requiring strict air quality emission standards if they will have an adverse impact on visibility within the Class I area (National Park Service 2010).

The nearest designated attainment area to the project area is the Theodore Roosevelt National Park (TRNP), a Class I area that covers about 110 square miles in three units within the Little Missouri National Grassland. The north unit of TRNP is approximately 16 miles south of Watford City, North Dakota, and approximately 40 miles west of the proposed well sites. Two air quality monitoring stations are located there, with the North Unit monitoring most criteria pollutants (National Park Service 2010; North Dakota Department of Health [NDDH] 2010). All other parts of the state, including the Reservation, are classified as Class II attainment areas, affording them protections through the Primary NAAQS (NDDH 2010).

Some states have adopted more stringent standards for criteria pollutants, or have chosen to adopt new standards for other pollutants. For instance, the NDDH has established a standard for hydrogen sulfide (H_2S) (NDDH 2010).

Criteria pollutants and their health effects include the following.

- **Sulfur dioxide (SO_2):** SO_2 is a colorless gas with a strong, suffocating odor. SO_2 is produced by burning coal, fuel oil, and diesel fuel, and can trigger constriction of the airways, causing particular difficulties for asthmatics. Long-term exposure is associated with increased risk of mortality from respiratory or cardiovascular disease. SO_2 emissions are also a primary cause of acid rain and plant damage (EPA 2010a).
- **Inhalable Particulate Matter (PM10 and PM2.5):** PM10 and PM2.5 are classes of compounds that can lodge deep in the lungs, causing adverse health problems, depending on their size, concentration, and content. Based on extensive health studies, particulate matter is regulated under two classes: PM10 is the fraction of total particulate matter 10 microns or smaller, and PM2.5 is two and one-half microns or smaller. Inhalable particulate matter can range from inorganic wind-blown soil to organic and toxic compounds found in diesel exhaust. Toxic compounds such as benzene often find a route into the body via inhalation of fine particulate matter (EPA 2010a).
- **Nitrogen dioxide (NO_2):** NO_2 is a reddish-brown gas with an irritating odor. Primary sources include motor vehicles, industrial facilities, and power plants. In the summer months, NO_2 is a major component of photochemical smog. NO_2 is an irritating gas that may constrict airways, especially of asthmatics, and increase the susceptibility to infection in the general population. NO_2 is also involved in ozone smog production (EPA 2010a).

- **Ozone (O_3):** O_3 is a colorless gas with a pungent, irritating odor and creates a widespread air quality problem in most of the world's industrialized areas. Ozone smog is not emitted directly into the atmosphere but is primarily formed through the reaction of hydrocarbons and nitrogen oxides in the presence of sunlight. Health effects associated with O_3 can include reduced lung function, aggravated respiratory illness, and irritated eyes, nose, and throat. Chronic exposure can cause permanent damage to the alveoli of the lungs. O_3 can persist for many days after formation and travel several hundred miles (EPA 2010a).
- **Carbon monoxide (CO):** CO is a colorless, odorless gas that is a byproduct of incomplete combustion. CO concentrations typically peak nearest a source, such as roadways or areas with high fireplace use, and decrease rapidly as distance from the source increases. Ambient levels are typically found during periods of stagnant weather, such as on still winter evenings with a strong temperature inversion. CO is readily absorbed into the body from the air. It decreases the capacity of the blood to transport oxygen, leading to health risks for unborn children and people suffering from heart and lung disease. The symptoms of excessive exposure are headaches, fatigue, slow reflexes, and dizziness (EPA 2010a).

The Primary and Secondary NAAQS for criteria pollutants are summarized in Table 3-1. NEPA assessments require analysis of both near-field and far-field as part of the cumulative effects of proposals on air quality. Therefore, the North Dakota ambient air quality standards (AAQS) are shown as well as federal standards.

Table 3-1. NAAQS and Other Air Quality Standards.

Pollutant	Averaging Period	Primary Standard (NAAQS)	Secondary Standard (National Parks)	North Dakota AAQS
SO_2 in parts per million of air (ppm)	3-hour	-	0.5	0.273 (1-hour)
	24-hour	0.14	-	0.099
	Annual Mean	0.03	-	0.023
PM10 in micrograms per cubic meter of air ($\mu g/m^3$)	24-hour	150	-	150
	Expected Annual Mean	50		50
PM2.5 ($\mu g/m^3$)	24-hour	35	35	-
	Weighted Annual Mean	15	15	-
NO_2 (ppm)	Annual Mean	0.053	0.053	0.053
CO (ppm)	8-hour	9	-	9
	1-hour	35	-	35
O_3 (ppm)	8-hour	0.075	0.075	-
	1-hour	-	-	0.12
Lead ($\mu g/m^3$)	Quarterly Mean	1.5	1.5	1.5

Pollutant	Averaging Period	Primary Standard (NAAQS)	Secondary Standard (National Parks)	North Dakota AAQS
Hydrogen Sulfide (H_2S) (ppm)	Instantaneous	-	-	10
	1-hour	-	-	0.20
	24-hour	-	-	0.10
	3-month	-	-	0.02

Sources: EPA 2010a; NDDH 2010.

North Dakota has separate state standards for several pollutants that are different from the federal criteria standards. These are the standards for SO_2 and H_2S. All other state criteria pollutant standards are the same as federal. North Dakota was one of 13 states that met standards for all federal criteria pollutants in 2008.

In addition, the EPA averages data from monitoring stations within each county to determine the Air Quality Index (AQI), a general measure of air quality for residents of the county. An AQI greater than 100 is indicative of unhealthy air quality conditions for the county residents, although residents may experience greater or lesser risks depending on their proximity to the sources of pollutants (EPA 2010b).

3.2.2 Greenhouse Gas Emissions and Responses to the Threat of Climate Change

Gases that trap heat in the atmosphere are often called greenhouse gases (GHGs). Some GHGs such as carbon dioxide occur naturally and are emitted to the atmosphere through natural processes and human activities. Other GHGs (e.g., fluorinated gases) are created and emitted solely through human activities. The EPA (2010c) identifies the principal GHGs that enter the atmosphere because of human activities as the following.

- **Carbon Dioxide (CO_2)**: CO_2 enters the atmosphere through the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). CO_2 is also removed from the atmosphere (or "sequestered") when it is absorbed by plants as part of the biological carbon cycle.
- **Methane (CH_4)**: CH_4 is emitted during the production and transport of coal, natural gas, and oil. CH_4 emissions also result from livestock and other agricultural practices and by the decay of organic waste in municipal solid waste landfills.
- **Nitrous Oxide (N_2O)**: N_2O is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.
- **Fluorinated Gases**: Hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride are synthetic, powerful GHGs that are emitted from a variety of industrial processes. Fluorinated gases are typically emitted in small quantities, but are potent GHGs thought to contribute significantly to global warming processes (EPA 2010c).

CO_2 is the primary GHG, responsible for approximately 90 percent of radiative forcing, which is the rate of energy change as measured at the top of the atmosphere. Radiative forcing can

be positive (warmer) or negative (cooler) (EPA 2010c). To simplify discussion of the various GHGs, the term 'Equivalent CO_2 or CO_2e' has been developed. CO_2e is the amount of CO_2 that would cause the same level of radiative forcing as one unit of one of the other GHGs. For example, one ton of CH_4 has a CO_2e of 22 tons; therefore, 22 tons of CO_2 would cause the same level of radiative forcing as one ton of CH_4. N_2O has a CO_2e value of 310 (EPA 2010c). These GHGs are all positive radiative forcing GHGs Thus, control strategies often focus on the gases with the highest positive CO_2e values (EPA 2010c). This document incorporates by reference cited studies and reports from the Pew Center (2009) and the Intergovernmental Panel on Climate Change (2007) concerning GHGs and their impacts.

On May 13, 2010, EPA issued a final rule that establishes thresholds for GHG emissions that define when permits under the New Source Review Prevention of Significant Deterioration and title V Operating Permit programs are required for new and existing industrial facilities (EPA 2010d). This final rule "tailors" the requirements of these CAA permitting programs to limit which facilities will be required to obtain New Source Review Prevention of Significant Deterioration and title V permits. Facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities. Emissions from small farms, restaurants, and all but the very largest commercial facilities will not be covered by these programs at this time; however, the EPA recently initiated additional hearings to help determine the types of industries to be held to new standards under these federal permits (EPA 2010d).

Energy production and supply was estimated to emit up to 25.9% of GHGs world-wide in 2004 (Pew Center 2009). Methane gas (CH_4), with a high radiative forcing CO_2e ratio, is a common fugitive gas emission in oil and gas fields (EPA 2010d). Oil and gas production, however, is highly variable in potential GHG emissions. Oil and gas producers in the United States are not considered large GHG emitters by the EPA, and are not the subject of any current federal proposals that would regulate GHG emissions.

3.2.3 Hazardous Air Pollutants

Hazardous air pollutants (HAPs) are a class of compounds known to cause cancer, mutation, or other serious health problems. HAPs are usually a localized problem near the emission source. HAPs are regulated separately from criteria air pollutants. There are several hundred HAPs recognized by the EPA and State of North Dakota. Health effects of HAPs may occur at exceptionally low levels; for many HAPs it is not possible to identify exposure levels that do not produce adverse health effects. Major sources of toxic air contaminants include industrial processes, commercial operations (e.g., gasoline stations and dry cleaners), wood smoke, and motor vehicle exhaust. Unlike regulations for criteria pollutants, there are no ambient air quality standards for HAPs. Examples of HAPs found in gases released by oil field development and operation include benzene, toluene, xylene, and formaldehyde (BLM 2009). HAP emissions receive evaluation based on the degree of exposure that can cause risk of premature mortality, usually from cancer.

Risk assessments express premature mortality in terms of the number of deaths expected per one million persons. The NDDH typically reviews projects and either requires an applicant to

prepare a risk assessment or assign the state engineers to do the work. For new sources emitting HAPs with known negative health effects, an applicant must demonstrate that the combined impact of new HAP emission does not result in a maximum individual cancer risk greater than one in one hundred thousand.

3.2.4 Existing Air Quality in the Project Area

Federal air quality standards apply in the project area, which is designated as a Class II attainment area. Although the State of North Dakota does not have jurisdiction over air quality matters on the Reservation and no air quality monitoring stations occur within the boundaries of the Reservation, monitoring efforts are being made by the state and industry in the area. The NDDH operates a network of monitoring stations around the state that continuously measure pollution levels. Industry also operates monitoring stations as required by the state. The data from all these stations are subject to quality assurance, and when approved, it is published on the World Wide Web and available from EPA and NDDH (NDDH 2010).

Monitoring stations providing complete data near the project area include Theodore Roosevelt National Park North Unit (TRNP-NU) (Air Quality Station #380530002) in McKenzie County, and Dunn Center (Air Quality Station #38025003) in Dunn County (NDDH 2010). These stations are located west and southeast of the proposed well sites, respectively. Bear Paw Energy and Amerada Hess operate site-specific monitoring stations in the region. However, these stations do not provide coverage that is applicable to this analysis (NDDH 2010).

Criteria pollutants measured at the two monitoring stations include SO_2, PM10, NO_2, and O_3. Lead and CO are not monitored by either of the stations. Table 3-2 summarizes the NAAQS and the maximum levels of criteria pollutants. The highest value at either of the two monitoring locations is shown for each year from 2007 through 2009.

Table 3-2. Maximum Levels of Monitored Pollutants, 2007–2009, as Measured at Dunn Center and Theodore Roosevelt National Park North Unit Monitoring Stations.

Criteria Pollutant	Averaging Period	Primary Standard (NAAQS)	Maximum Reported Level from Dunn Center and TRNP-NU Monitoring Stations		
			2009	2008	2007
SO_2 (parts per million [ppm])	24-hour	0.14	0.006	0.004	0.004
	Annual Mean	0.03	0.0005	0.0004	0.0011
PM10 (micrograms per cubic meter [$\mu g/m^3$])	24-hour	150	54	108	57.4
	Expected Annual Mean	50	11.3	14.2	13.2
PM2.5 ($\mu g/m^3$)	24-hour	35	15	35.7	22.2
	Weighted Annual Mean	15	3.4	3.7	3.6
NO_2 (ppm)	Annual Mean	0.053	0.0015	0.0018	0.0015
O_3 (ppm)	8-hour	0.08	0.057	0.0063	0.0071

Source: NDDH 2010.

All monitored criteria pollutants are well below federal and state standards in the project area for all years in the study period from 2007 through 2009. In addition to the low levels of monitored criteria pollutants, the EPA reports that Dunn County and McKenzie County had zero days in which the AQI exceeded 100 in 2007 and 2008, indicating that general air quality does not pose an unhealthy condition for residents of these counties (EPA 2010b). The AQI was not available for 2009, but is also likely to be zero for these counties.

3.2.5 Typical Air Emissions from Oil Field Development

According to EPA Emission Inventory Improvement documents (EPA 1999), oil field emissions encompass three primary areas: combustion, fugitive, and vented. Typical processes that occur during exploration and production include the following.

- Combustion emissions include SO_2, ozone precursors called volatile organic compounds (VOCs), GHGs, and HAPs. Sources include engine exhaust, dehydrators, and flaring (EPA 1999).
- Fugitive emissions include criteria pollutants, H_2S, VOCs, HAPs, and GHGs. Sources of fugitive emissions include mechanical leaks from well field equipment such as valves, flanges, and connectors that may occur in heater/treaters, separators, pipelines, wellheads, and pump stations. Pneumatic devices such as gas actuated pumps and pressure/level controllers also result in fugitive emissions. Other sources of fugitive emissions include evaporation ponds and pits, condensate tanks, storage tanks, and wind-blown dust (from truck and construction activity) (EPA 1999).
- Vented emissions include GHGs, VOCs, and HAPs. Primary sources are emergency pressure relief valves and dehydrator vents (EPA 1999).

Pad and road construction, drilling activities, and tanker traffic would generate emissions of criteria pollutants and HAPs. Primary emissions sources during drilling are diesel exhaust, wind-blown dust from disturbed areas and travel on dirt roads, evaporation from pits and sumps, and gas venting. Diesel emissions are being progressively controlled by the EPA in a nationwide program (EPA 2010d). This program takes a two-pronged approach. First, fuels are improving to the ultra-low sulfur standard, and secondly manufacturers must produce progressively lower engine emissions.

3.2.6 Air Quality Best Management Practices

Under the CAA, federal land management agencies have an affirmative responsibility to protect air quality. Tribes, federal land managers, and private entities can make emission controls part of a lease agreement. BMPs can be adopted for various portions of an oil/gas well's lifecycle. BMPs fall into the following six general categories.

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
  - Use directional drilling to drill multiple wells from a single well pad;
  - use centralized water storage and delivery, well fracturing, gathering systems;

  - use telemetry to remotely monitor and control production;
  - use water or dust suppressants to control fugitive dust on roads;
  - control road speeds; and
  - use van or carpooling.
- Drilling BMPs to reduce rig emissions
  - Use cleaner diesel (Tier 2, 3, and 4) engines;
  - use natural gas-powered engines; and
  - use "green" completions to recapture product that otherwise would have been vented or flared.
- Unplanned or emergency releases
  - Use high-temperature flaring if gas is not recoverable.
- Vapor recovery
  - Use enclosed tanks instead of open pits to reduce fugitive VOC emissions; and
  - use vapor recovery units on storage tanks.
- Inspection and maintenance
  - Use and maintain proper hatches, seals, and valves;
  - optimize glycol circulation and install a flash tank separator;
  - use selective catalytic reduction; and
  - replace high-bleed with low-bleed devices on pneumatic pumps.
- Monitoring and repair
  - Use directed inspection and maintenance methods to identify and cost-effectively fix fugitive gas leaks; and
  - install an air quality monitoring station.

3.2.7 Potential Air Quality Impacts

Based on the existing air quality of the region, typical air levels and types of emissions from similar oil field projects, and Petro-Hunt's commitment to implementation of BMPs identified in Section 3.2.6, the Proposed Action would not produce significant increases in criteria pollutants, GHGs, or HAPs. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during construction and drilling operations and would therefore be localized, largely temporary, and limited in comparison with regional emissions. Since the AQI is exceptionally low in the cumulative impact analysis area (CIAA) (see Section 3.2), and the expected future development would be widely dispersed in time and space, the proposed project is not expected to impact attainment status based on any of the Primary and Secondary NAAQS for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

3.3 WATER RESOURCES

This section identifies the existing water resources within the project area and potential effects of the project. Specific subjects discussed in this section include surface water and surface water quality, groundwater resources, and the potential short-term and long-term impacts of the proposed project on these water resources.

3.3.1 Surface Water

The surface water resources in the project area would be managed and protected according to existing federal laws and policies regarding the use, storage, and disposal of the resource during the construction and operation of the project. Surface water resource use and protection is administered under the following federal laws:

- Clean Water Act of 1972, as amended (33 USC 1251 et seq.)
- Federal Land Policy and Management Act of 1976 (43 USC 1711–1712)
- National Environmental Policy Act of 1972 (42 USC 4321)
- Safe Drinking Water Act of 1974, as amended (42 USC 300 et seq.)

Water quality is protected under the Federal Water Pollution Control Act (as amended), otherwise known as the Clean Water Act (CWA). The CWA has developed rules for regulating discharges of pollutants into waters of the U.S. and also regulates water quality standards for surface waters. The CWA has also made it unlawful to discharge any pollutant from a point source into any navigable waters of the U.S., unless a permit has been obtained from the National Pollution Discharge Elimination System (NPDES) program.

The Environmental Division of the MHA Nation has had an application pending with the EPA since 1996 for delegation of authority to set federally approved water quality standards on the Reservation. In the absence of tribal surface water quality authorities, enforcement of federal environmental laws regarding surface water on the Reservation is accomplished through permitting, inspection, and monitoring activities of the NPDES, as administered by the EPA.

Surface water is abundant in the project area, as shown in Figure 3-1. The proposed Petro-Hunt well pads, access roads, and utilities would occur within the Upper Moccasin Creek (Hydrologic Unit Code [HUC] 101102050604) sub-watershed; the Waterchief Bay (HUC 1011020506) watershed; and Lower Little Missouri River (HUC 10110205) drainage basin.

Runoff from the proposed well pads would flow, at its closest, from the proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad, approximately 22.2 river miles until reaching Lake Sakakawea (HUC 10110101) (Figure 3-1). Refer to Section 3.12, Mitigation and Monitoring, for further details.

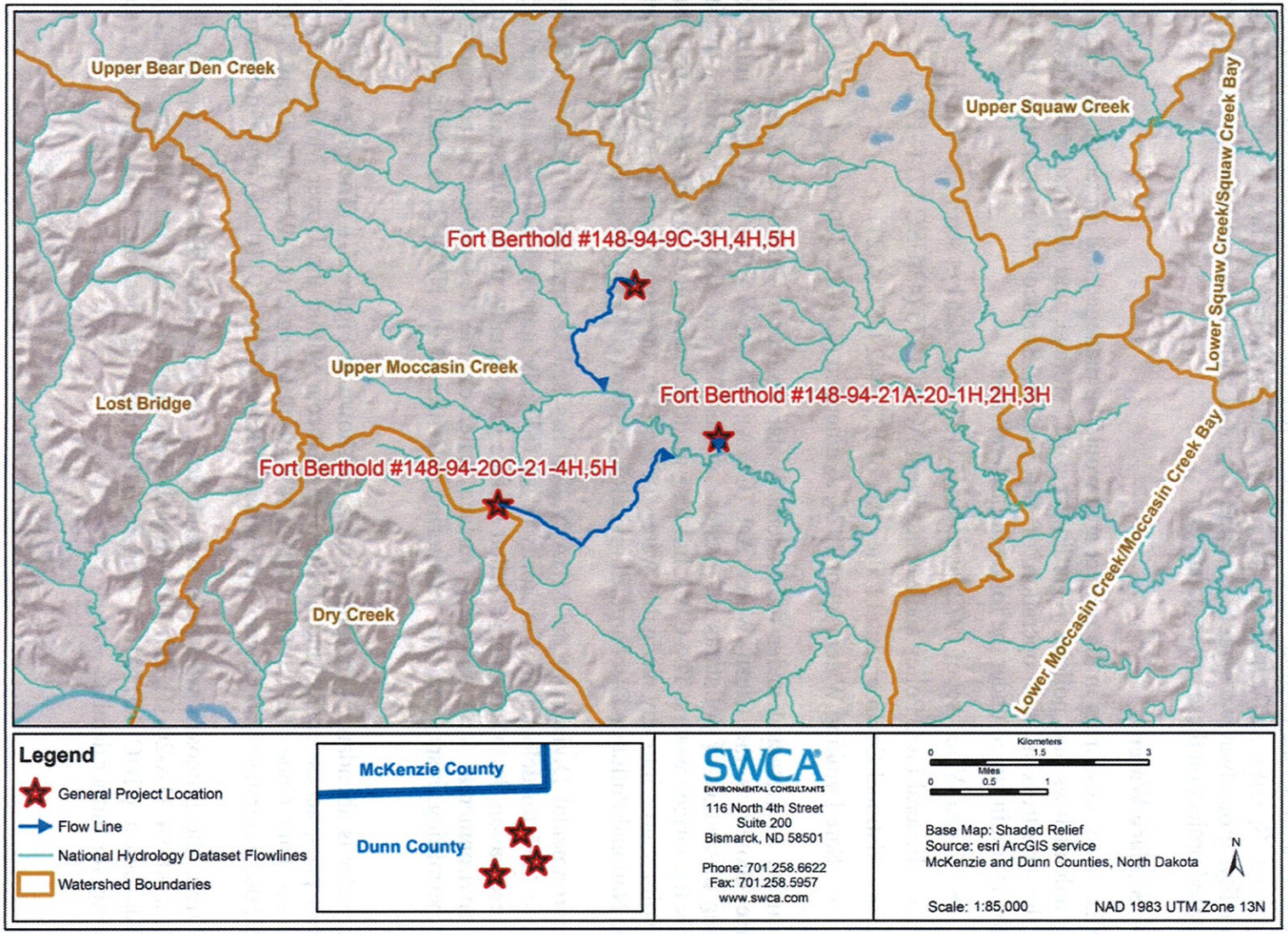


Figure 3-1. Watersheds and surface runoff directions near the proposed well pads.

As part of the NPDES Construction Permit, the proposed project would be engineered and constructed to minimize the suspended sediment (i.e., turbidity) concentration of surface runoff, avoid disruption of drainages, and avoid direct impacts to surface water. No surface water would be used for well drilling operations. Any chemicals or potentially hazardous materials would be handled in accordance with the operator's spill prevention, control, and countermeasure plan. Provisions established under this plan would minimize potential impacts to any surface waters associated with an accidental spill.

3.3.2 Groundwater

Aquifers in the project area include, from deepest to shallowest, the Cretaceous Fox Hills and Hell Creek formations and the Tertiary Ludlow, Tongue River, and Sentinel Butte formations (Table 3-3). Several shallow aquifers related to post-glacial outwash composed of till, silt, sand, and gravel are located in Dunn County. However, none are within the proposed project areas.

Table 3-3. Common Aquifers in the Proposed Project Area and Surrounding Region.

Period	Formation		Depth Range (feet)	Thickness (feet)	Lithology	Water-Yielding Characteristics
Quaternary	Alluvium		0–40	40	Silt, sand, and gravel	Maximum yield of 50 gal/min to individual wells from sand and gravel deposits.
Tertiary	Fort Union Group	Sentinel Butte	0–670	0–670	Silty, clay, sand and lignite	5 to 100 gal/min in sandstone. 1 to 200 gal/min in lignite.
		Tongue River	140–750	350–490	Silty, clay, sand and lignite	Generally less than 100 gal/min in sandstone.
		Cannonball/ Ludlow	500–1,150	550–660	Fine- to medium-grained sandstone, siltstone, and lignite	Generally less than 50 gal/min in sandstone.
Cretaceous	Hell Creek		1,000–1,750	200–300	Claystone, sandstone, and mudstone	5 to 100 gal/min in sandstone.
	Fox Hills		1,100–2,000	200–300	Fine- to medium-grained sandstone and some shale	Generally less than 200 gal/min in sandstone. Some up to 400 gal/min.

Sources: Croft 1985; Klausing 1979.
gal/min = gallons per minute

The shallow Sentinel Butte Formation, commonly used for domestic supply in the area, outcrops in Dunn and McKenzie counties. This aquifer meets standards of the NDDH (Croft 1985). Detailed analyses are available from the North Dakota Geological Survey, Bulletin 68, Part III, 1976.

Review of electronic records of the North Dakota State Water Commission (2011) revealed 18 existing water wells within 5 miles of the proposed well pads (Table 3-4). Of the existing water wells within 5 miles of the proposed well pads, four are observation wells, two are surface water monitoring sites, one is an municipal well, one is an domestic well, two are test holes, and eight are used for an unknown purpose. One surface monitoring site is located approximately 0.71 mile from the proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad.

The identified groundwater wells may have minimal hydrologic connections due to their respective distances greater than 1 mile from the project well pads. Water quality would be protected by drilling with freshwater to a point below the base of the Fox Hills Formation, implementing proper hazardous materials management, and using appropriate casing and cementing to permanently seal the well shaft from any surrounding aquifers. Drilling would proceed in compliance with Onshore Oil and Gas Order No. 2, Drilling Operations (43 CFR 3160).

Since none of the proposed project area lies within the boundaries of the post-glacial outwash aquifers, low porosity bedrock near the project wells would act as confining layers to prevent impacts to groundwater resources. Additionally, well completion methods would prevent cross contamination between aquifers or the introduction of hazardous materials into aquifers.

3.3.2.1 Hydraulic Fracturing Process

Hydraulic Fracturing (HF) is a well stimulation process used in North Dakota's Bakken and Three Forks formations to maximize the extraction of oil and gas. The process enhances subsurface fracture systems, allowing oil to move more freely through porous rock to production wells that bring the oil or gas to the surface (EPA 2011). During HF, fluids, commonly made up of water and chemical additives, are pumped down the well bore into these target formations at high pressure. The HF process uses large volumes of water under high pressure to fracture rock within the target formation to increase formation porosity and allow the flow of petroleum from the rock. Depending upon the characteristics of the well and the rock being fractured, a few million gallons of water can be required to complete a job (Arthur et al. 2008).

Only specific sections of the well within the target formation receive the full force of pumping. As pressure builds up in this portion of the well, water opens fractures, and the driving pressure extends the fractures deep into the rock unit. When pumping stops, these fractures quickly snap closed and the water used to open them is pushed back into the borehole, back up the well and is collected at the surface. The water returned to the surface is a mixture of the water injected and pore water that has been trapped in the rock unit for millions of years. The pore water is usually a brine with significant amounts of dissolved solids (Arthur et al. 2008).

Table 3-4. Existing Water Wells within 5 Miles of the Proposed Well Pads.

Water Well Number	Section	Township/ Range	Type	Depth (feet)	Aquifer	Miles to Proposed Well Pad
Fort Berthold #148-94-09C-04-3H, 4H, 5H						
5225	23	148N/94W	Surface Water Monitoring Site	Unknown	Surface Water	2.50
5224	15	148N/94W	Surface Water Monitoring Site	Unknown	Surface Water	1.30
5221	17	148N/93W	Unknown	Unknown	Sentinel Butte-Tongue River	4.83
5223	13	148N/94W	Unknown	Unknown	Sentinel Butte-Tongue River	2.86
21390	14	148N/94W	Observation Well	315	Tongue River	2.45
21391	12	148N/95W	Observation Well	52	Sentinel Butte-Tongue River	2.75
33281	1	148N/94W	Test Hole	80	No Obs Well Installed	3.75
5222	6	148N/94W	Unknown	Unknown	Sentinel Butte-Tongue River	2.00
26071	27	149N/94W	Domestic Well	36	Undefined	3.69
21501	28	149N/94W	Observation Well	320	Tongue River	4.29
21502	28	149N/94W	Observation Well	120	Sentinel Butte-Tongue River	4.29
25791	22	149N/94W	Test Hole	80	No Obs Well Installed	4.84
Fort Berthold #148-94-20C-21-4H, 5H						
5200	14	147N/95W	Municipal Well	1,430	Fox Hills	4.64
5198	12	147N/95W	Unknown	1,420	Fox Hills	4.10
5197	12	147N/95W	Unknown	Unknown	Tongue River	3.97
5230	35	148N/95W	Unknown	Unknown	Tongue River	2.99
5229	33	148N/95W	Unknown	Unknown	Tongue River	4.90
5225	23	148N/94W	Surface Water Monitoring Site	Unknown	Surface Water	3.10
5226	22	148N/95W	Unknown	1,455	Fox Hills	3.79
5224	15	148N/94W	Surface Water Monitoring Site	Unknown	Surface Water	2.59
5223	13	148N/94W	Unknown	Unknown	Sentinel Butte-Tongue River	4.40
21390	14	148N/94W	Observation Well	315	Tongue River	4.09
21391	12	148N/95W	Observation Well	52	Sentinel Butte-Tongue River	2.30
5222	6	148N/94W	Unknown	Unknown	Sentinel Butte-Tongue River	3.04

Water Well Number	Section	Township/ Range	Type	Depth (feet)	Aquifer	Miles to Proposed Well Pad
Fort Berthold #148-94-21A-20-1H, 2H, 3H						
5230	35	148N/95W	Unknown	Unknown	Tongue River	4.92
5225	23	148N/94W	Surface Water Monitoring Site	Unknown	Surface Water	1.25
5224	15	148N/94W	Surface Water Monitoring Site	Unknown	Surface Water	0.71
5221	17	148N/93W	Unknown	Unknown	Sentinel Butte-Tongue River	4.28
5223	13	148N/94W	Unknown	Unknown	Sentinel Butte-Tongue River	2.46
21390	14	148N/94W	Observation Well	315	Tongue River	2.14
21391	12	148N/95W	Observation Well	52	Sentinel Butte-Tongue River	3.58
33281	1	148N/94W	Test Hole	80	No Obs Well Installed	3.71
5222	6	148N/94W	Unknown	Unknown	Sentinel Butte-Tongue River	3.34

When the pressure exceeds the rock strength, the fluids open or enlarge fractures that can extend several hundred feet from the well shaft, which is oriented laterally within the target formation. After the fractures are created, a propping agent is pumped into the fractures to keep them from closing when the pumping pressure is released. After HF is completed, the internal pressure of the geologic formation causes the injected HF fluids to rise to the surface where they are stored in disposal tanks (EPA 2011).

Proppants are small compression-resistant particles added to the HF fluids to assist in holding the fractures open and creating pore space through which petroleum can flow. Sand was the original proppant but now aluminum beads, ceramic beads, sintered aluminum (i.e., bauxite), and other materials are being used in the wells. Over one million pounds of proppants can be used while HF a single well (Arthur et al. 2008).

In addition to proppants, a variety of chemical additives are included with the water used in HF. Some chemicals are used to thicken the water into a gel that is more effective at opening fractures and carrying proppants deep into the rock unit. Other chemicals are added to reduce friction, keep rock debris suspended in the liquid, prevent corrosion of equipment, kill bacteria, control pH, and other functions (Arthur et al. 2008). Typical chemical additives used in the HF fluids are listed in Table 3-5.

Table 3-5. Common Additives of Hydraulic Fracturing Fluid.

Additive Type	Main Compound	Common Use of Main Compound
Acid	Hydrochloric acid or muriatic acid	Swimming pool chemical and cleaner
Biocide	Glutaraldehyde	Cold sterilant in health care industry
Breaker	Sodium chloride	Food preservative
Corrosion inhibitor	N,n-dimethyl formamide	Used as a crystallization medium in pharmaceutical industry
Friction reducer	Petroleum distillate	Cosmetics including hair, make-up, nail, and skin products
Gel	Guar gum or hydroxyethyl cellulose	Thickener used in cosmetics, sauces, and salad dressings
Iron control	2-hydroxy-1,2,3-propanetricaboxylic acid	Citric acid is used to remove lime deposits; lemon juice ~7% citric acid
Oxygen scavenger	Ammonium bisulfite	Used in cosmetics
Proppant	Silica, quartz sand	Play sand
Scale inhibitor	Ethylene glycol	Automotive antifreeze and de-icing agent

Source: Arthur et al. 2008.

3.3.1 Potential Impacts to Surface Water and Groundwater Resources

The majority of the identified groundwater wells may have minimal hydrologic connections due to their respective distances greater than 1 mile from the nearest project well and shallow depths. Water quality of future wells in the vicinity would be protected by drilling with freshwater to a point below the base of the Fox Hills Formation, implementing proper hazardous materials management, and using appropriate casing and cementing to permanently seal the well shaft from any surrounding aquifers. Surface casing would be employed to a

depth of 2,500 feet below ground surface to isolate and protect all near-surface aquifers from contamination during drilling, as described in Section 2.2.6 of this document, and to protect the potable water aquifers from any potential contamination during the drilling and operations phases.

Since the introduction of technological advances in HF, some environmental concerns have been published related to the use of chemical additives and their potential effect on groundwater resources. These concerns, reviewed in Arthur et al. (2008), include the following.

1. Fractures produced in the well might extend directly into shallow rock units that are used for drinking water supplies, or fractures produced in the well might communicate with natural fractures that extend into shallow rock units that are used for drinking water supplies.

2. The casing of a well might fail and allow fluids to escape into shallow rock units used for drinking water supplies.

3. Accidental spills of HF fluids or fluids expelled during HF might seep into the ground or contaminate surface water.

The EPA recently studied the effects of coalbed methane well fracking, publishing the results in a report entitled *Evaluation of Impacts to Underground Sources of Drinking Water by Hydraulic Fracturing of Coalbed Methane Reservoirs* (EPA 816-R-04-003) in 2004 (EPA 2004). The report has received both internal and external peer review, and public comment on its research design and incident information. Based on its research, the EPA concluded that there was negligible risk of HF fluid contaminating underground sources of drinking water during HF of coalbed methane production wells, which are significantly more shallow than the Bakken and Three Forks formations. However, the EPA continues to monitor the effects of fracking in coalbed methane well completion (EPA 2004). The EPA is currently undertaking a study to evaluate of the effect of oilfield HF technology, processes, and fluids on potable water aquifers. The EPA study is not expected to be completed until 2012 (EPA 2011).

Oil-bearing formations typically occur much deeper than potable water aquifers; approximately 8,700 feet of intervening rock formations occur between the Bakken Formation and the deepest groundwater wells within 1 mile of the proposed wells. In addition, the unique geological position of the Bakken Formation places it immediately beneath the Madison Group, as shown in Figure 3-2. The Madison group of Mississippian age includes three geological formations that have properties that greatly limit the possibility of HF fractures extending vertically into shallower geological formations containing potable water. The following characteristics of the three members of the Madison Group show extremely high resistance to fracturing or vertical transmission of fluids.

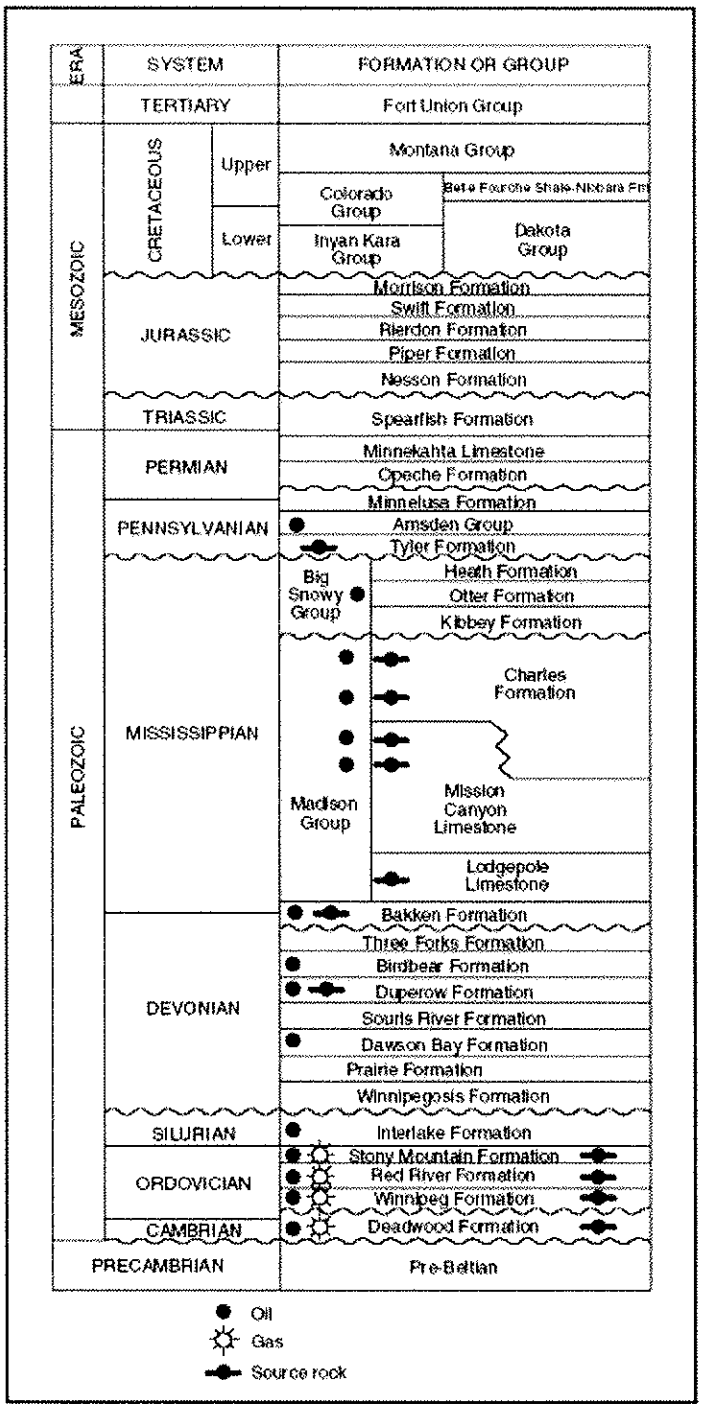


Figure 3-2. Typical stratigraphic column of the Williston Basin, with oil and gas bearing formations (Peterson 1995).

3.3.1.1 Lodgepole Limestone Sequence

This is a sequence of primarily Mississippian limestones, with scattered interbedded shales approximately 900 feet thick. It lies immediately above the Bakken Formation. This sequence

of rocks is characterized as hard and very dense, requiring significant pressure to initiate fractures (Energy Information Administration 2006).

3.3.1.2 Mission Canyon Limestone

Like the Lodgepole Limestone, the Mission Canyon is a dense limestone formation with very low porosity that ranges from 500 to 800 feet thick (Figure 3-2). Any HF pressures within the Bakken Formation that might be sufficient to initiate fracturing of the Lodgepole Limestone are assumed to be greatly reduced before reaching the Mission Canyon Limestone Formation, and very unlikely to cause any fracturing or transmission of fluids.

3.3.1.3 Charles Salt

The Charles Salt is ubiquitous throughout a great portion of the Williston Basin in both Montana and North Dakota and lies immediately above the limestones described above. This salt formation is approximately 600 feet thick. At the depth below the surface and the associated pressures, this salt is ductile, and would flow slowly to fill any void created by drilling or other pressure. This "flow characteristic," although very challenging to well drilling, would serve to seal any potential fracture that might be propagated artificially through HF. The salt would flow completely around the HF fluids or proppant, thereby eliminating any opportunity for the artificially induced fracture to stay open. Further, the water from the Bakken is almost fully salt-saturated; even with water flow from the Bakken to the Charles Salt Formation, there could be almost no dissolution to enhance any fracture, and the formation would form a barrier, or cap, for any potential HR fracture.

Above the Charles Salt lie greater than 6,000 feet of limestones, siltstones, interbedded salts, sandstones, and shales, many of which tend to be soft and incompetent, providing a serious impediment to any fracture height growth and redirecting and attenuating any fracture that is started. The multiple layers encountered would also serve to dissipate any energy from a fracture stimulation resulting in very limited fracture competency.

Potable water aquifers lie approximately 4,000 feet above the Bakken Formation. In general, almost any of the intervening rock packages appear to be able to independently act as an effective impediment to fracture growth in a vertical direction. Although large volumes of sand (proppant) are used in the modern, multi-stage fracture stimulations, relatively small amounts of proppant are used per stage and are specifically designed to limit fracture growth. This technology is highly unlikely to result in fractures that could expand through the Madison Group limestones or reach the Charles Salt Formation.

No direct or indirect impacts to surface water or groundwater resources would be anticipated from drilling of the proposed wells, HF completions, or operation of the proposed wells due to the following.

- The geological setting of the Bakken and Three Forks formations with extremely tight capping formations of the Madison Unit forming an impermeable barrier to upward fracturing or fluid movement.
- The use of closed-loop drilling, construction BMPs, and spill prevention planning during the construction phase of the project.

- Implementation of site-specific measures to reduce long-term erosion and runoff into nearby streams and Lake Sakakawea.
- The use of protective casings on the well shafts to protect shallow water-bearing rock formations during drilling and operation of the oil wells.

3.4 SOILS

The project area is located toward the center of the Williston Basin. The Greenhorn Formation, which consists of thin limestone and dark gray to black organic-rich shale, is found from the surface to a depth of approximately 4,000 feet. The Greenhorn is subdivided into lower and upper intervals of limestone and calcareous shale with a middle interval of shale. Near-surface sediment is of Recent, Pleistocene, or Tertiary age, and includes Sauk, Tippecanoe, Kaskaskia, Absaroka, Zuni, and Tejas Sequences.

3.4.1 Natural Resources Conservation Service Soil Data

The Natural Resources Conservation Service (NRCS 2011) soil series present within the well pad and access road areas, and their respective acreages, are illustrated in Figures 3-3 through 3-5. The acreage shown is based on the spatial extent of soil series combinations derived from NRCS data; therefore, the acreage is approximate and used as a best estimate of soil series distribution at each of the proposed project areas.

The following soil series descriptions represent individual soil series reported to exist within the proposed project area (NRCS 2011). Each individual soil series does not exist individually within the project area, but rather in combination with other soil types.

3.4.1.1 Arnegard

The Arnegard series consists of very deep, well- or moderately well-drained soils that formed in calcareous loamy alluvium on upland swales, terraces, fans, and foot slopes. Permeability is moderate. Slopes range from 0 to 25 percent. The mean annual precipitation found throughout the spatial extent of this soil type is 14 inches and mean annual air temperature is 42°F. Most areas are cropped to spring wheat, oats, barley, and hay. Native vegetation is mid, tall, and short grasses such as western wheatgrass (*Pascopyrum smithii*), green needlegrass (*Nasella viridula*), big bluestem (*Andropogon gerardii*), and blue grama (*Bouteloua gracilis*) (NRCS 2011).

3.4.1.2 Belfield

The Belfield series consists of deep and very deep, well- to moderately well-drained, very slowly permeable soils found on upland flats, terraces, and swales with slopes ranging from approximately 0 to 9 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 43°F. This soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass, blue grama, and green needlegrass (NRCS 2011).

FB #148-94-9C-04-3H, 4H, 5H				
Feature	Map Unit	Soil Series	Acres	% of Location
Well Pad	30E	Cohagen-Vebar fine sandy loams, 9 to 25 percent slopes	3.261	68.05%
	62D	Dogtooth-Cabba complex, 9 to 15 percent slopes	1.531	31.95%
Access Road	30E	Cohagen-Vebar fine sandy loams, 9 to 25 percent slopes	1.281	24.33%
	62D	Dogtooth-Cabba complex, 9 to 15 percent slopes	3.984	75.67%

FB #148-94-9C-04-3H, 4H, 5H

- Proposed Well Head
- Proposed Well Pad
- Proposed Access Road
- Soil Unit Boundary

SWCA ENVIRONMENTAL CONSULTANTS
116 North 4th Street
Suite 200
Bismarck, ND 58501
Phone: 701.258.6622
Fax: 701.258.5957
www.swca.com

Kilometers 0 0.15 0.3
Miles 0 0.1 0.2

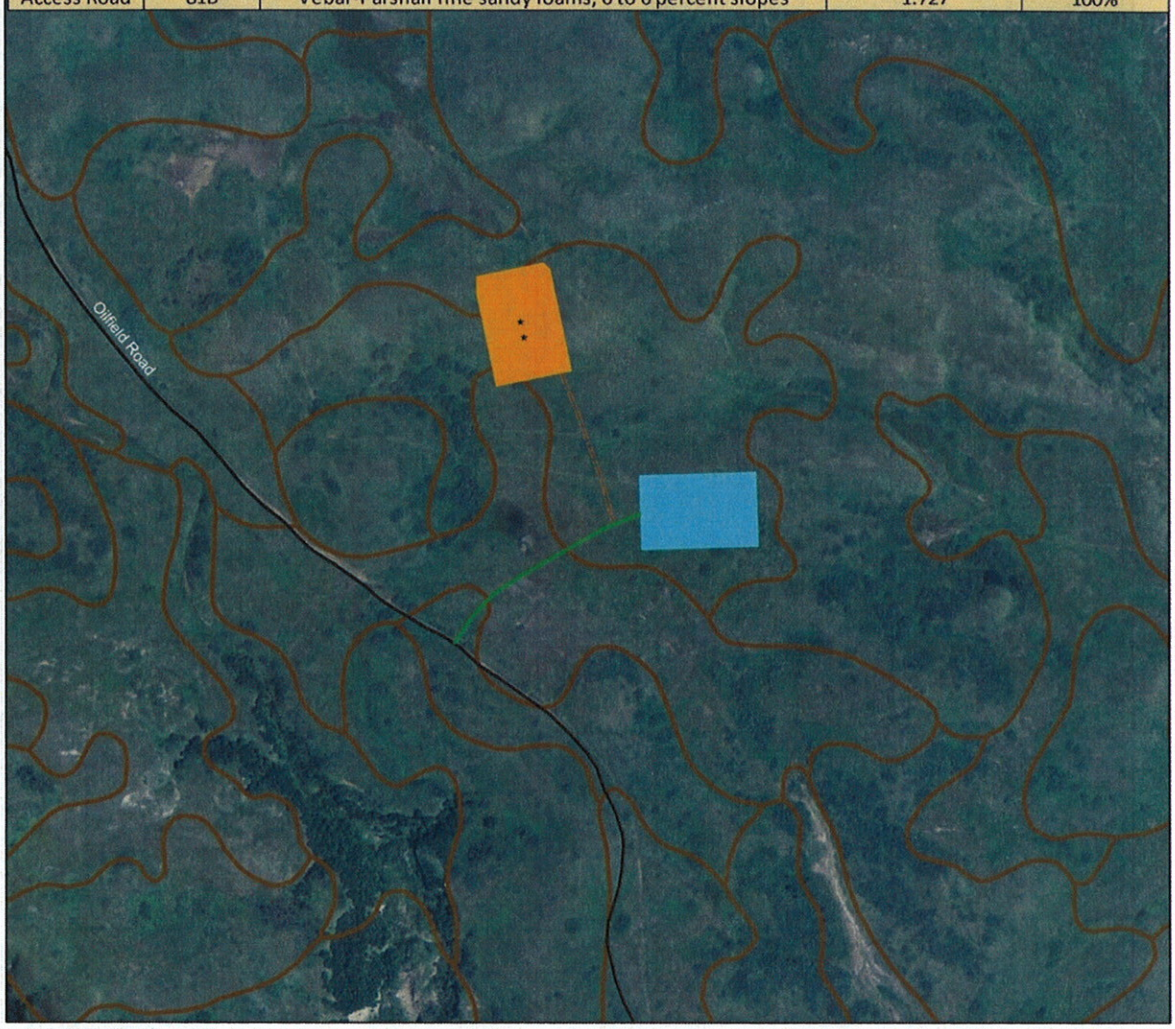
Base Map: NAIP 1-meter Aerial Imagery
Source: ND GIS Hub
Quadrangle: Mandaree, (1973)
Township 148N & Range 94W
Dunn County, North Dakota

N

Scale: 1:8,000 NAD 1983 UTM Zone 13N

Figure 3-3. Approximate spatial extent of soil types within and around the proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad.

FB #148-94-20C-21-4H, 4H				
Feature	Map Unit	Soil Series	Acres	% of Location
Well Pad	30E	Cohagen-Vebar fine sandy loams, 9 to 25 percent slopes	0.054	1.42%
	81B	Vebar-Parshall fine sandy loams, 0 to 6 percent slopes	3.444	89.92%
	4B	Arnegard loam, 2 to 6 percent slopes	0.157	4.10%
	62B	Rhoades silt loam, 0 to 6 percent slopes	0.175	4.57%
Access Road	81B	Vebar-Parshall fine sandy loams, 0 to 6 percent slopes	1.727	100%



FB #148-94-20C-21-4H, 4H

- Proposed Well Head
- Proposed Well Pad
- Proposed Access Road
- FB #148-94-29B-32-1H,2H Well Pad
- FB #148-94-29B-32-1H,2H Access Road
- Soil Unit Boundary
- Existing Roads

SWCA® ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

Kilometers 0 0.15 0.3
Miles 0 0.1 0.2

Base Map: NAIP 1-meter Aerial Imagery
Source: ND GIS Hub
Quadrangle: Mandaree SW, (1973)
Township 148N & Range 94W
Dunn County, North Dakota

N

Scale: 1:8,000 NAD 1983 UTM Zone 13N

Figure 3-4. Approximate spatial extent of soil types within and around the proposed Fort Berthold #148-94-20C-21-4H, 5H well pad.

FB #148-94-21A-20-1H, 2H, 3H				
Feature	Map Unit	Soil Series	Acres	% of Location
Well Pad	75	Straw loam, 0 to 2 percent slopes	0.025	0.54%
	18	Belfield-Grail silty clay loams, 0 to 2 percent slopes	1.981	42.41%
	7	Straw-Rhoades loams, 0 to 2 percent slopes	2.665	57.05%
Access Road	18	Belfield-Grail silty clay loams, 0 to 2 percent slopes	2.878	100%

FB #148-94-21A-20-1H, 2H, 3H

- Proposed Well Head
- Proposed Well Pad
- Proposed Access Road
- Soil Unit Boundary
- Existing Roads

SWCA® ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

Kilometers 0 0.15 0.3
Miles 0 0.1 0.2

Base Map: NAIP 1-meter Aerial Imagery
Source: ND GIS Hub
Quadrangle: Mandaree, (1973)
Township 148N & Range 94W
Dunn County, North Dakota

N

Scale: 1:8,000 NAD 1983 UTM Zone 13N

Figure 3-5. Approximate spatial extent of soil types within and around the proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad.

3.4.1.3 Cabba

The Cabba series consists of shallow, well-drained, moderately permeable soils found on hills, escarpments, and sedimentary plains. The soil slopes broadly range between 2 and 70 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 43°F. The most common vegetation species found on this soil type are little bluestem (*Schizachyrium scoparium*), green needlegrass, and other various herbs, forbs, and shrub species (NRCS 2011).

3.4.1.4 Cohagen

The Cohagen series consists of shallow, well- to excessively drained soils found on sandstone bedrock uplands with slopes ranging from approximately 3 to 70 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for rangeland foraging with occasional cultivation. Native vegetation species common to this soil type include little bluestem, needle and thread (*Hesperostipa comata*), and prairie sandreed (*Calamovilfa longifolia*) (NRCS 2011).

3.4.1.5 Dogtooth

The Dogtooth series consists of moderately deep, well-drained, very slowly permeable soils found in upland pediments, where the predominant slope is between 0 and 6 percent. Parent material consists of clayey residuum weathered from shale. Organic matter is very minimal in surface horizons (3 percent) and the depth to a natric layer is 2 to 4 inches. These clayey, calcareous soils typically have a moderately saline horizon within 30 inches of the soil surface (NRCS 2011).

3.4.1.6 Grail

The Grail series consists of deep to very deep, slowly permeable soils that are well- to moderately well-drained. This soil type is found on uplands with slopes ranging from 0 to 15 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 15 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for cultivating crops. Native vegetation species common to this soil type include western wheatgrass, big bluestem, and green needlegrass (NRCS 2011).

3.4.1.7 Parshall

The Parshall soils developed from coarse-loamy alluvium derived from sedimentary rock. These soils are typically found in swales through relatively gentle terrain (0 to 6 percent). These soils are very low in organic matter content (less than 2 percent) and highly permeable. Parshall soils are deep, well-drained soils that do not meet hydric criteria (NRCS 2011).

3.4.1.8 Rhoades

The Rhoades series consists of deep and very deep, well- to moderately well-drained, very slowly permeable soils found on swales and uplands with slopes ranging from approximately 0 to 25 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This

soil type is largely used for rangeland foraging. Native vegetation species common to this soil type include western wheatgrass and blue grama (NRCS 2011).

3.4.1.9 Straw

The Straw series consists of very deep, moderately well- and well-drained soils that formed in alluvium. These soils are on floodplains, stream terraces, and drainage ways. Slopes are 0 to 8 percent. The mean annual precipitation found throughout the spatial extent of this soil type is about 16 inches, and mean annual air temperature is about 43°F. Straw soils are used mainly for dryland cropland, irrigated cropland, and range. Potential native vegetation is mainly rough fescue (*Festuca* sp.), western wheatgrass, needle and thread, little bluestem, (bluebunch wheatgrass (*Pseudoroegneria spicata*), green needlegrass, forbs, and shrubs (NRCS 2011).

3.4.1.10 Vebar

The Vebar series consists of moderately deep, moderately to rapidly permeable, well-drained soils found on uplands with slopes ranging from approximately 0 to 65 percent. The mean annual precipitation found throughout the spatial extent of this soil type is approximately 16 inches and mean annual air temperature is approximately 42°F. This soil type is largely used for cultivation of corn and small grains. Native vegetation species common to this soil type include needle and thread and prairie sandreed (NRCS 2011).

3.4.2 Field-Derived Soil Data

Soil data derived from on-site excavated soil pits, including the matrix value, hue, chroma, and color name, is summarized in Table 3-6. Additionally, redoximorphic features (i.e., reduced/oxidized iron or manganese deposits), and soil texture were noted. A Munsell Soil Color Chart was used to determine the color of moist soil samples.

Table 3-6. Soil Data Obtained through the Excavation of Soil Pits within the Proposed Project Area.

Proposed Well Pad	Pit Depth (inches)	Soil Matrix Color (color name)	Redoximorphic Feature Color	Texture
Fort Berthold #148-94-9C-4-3H, 4H, 5H	0–20	2.5YR 3/2 (dusky red)	None observed	Clay loam
Fort Berthold #148-94-20C-21-4H, 5H	0–20	7.5YR 3/1(very dark gray)	None observed	Clay loam
Fort Berthold #148-94-21A-20-1H, 2H, 3H	0–10	10YR 3/1 (very dark gray)	None observed	Clay loam
	10–20 (80%)	10YR 4/2 (dark grayish-brown)	None observed	Clay loam
	10–20 (20%)	10YR 3/1 (very dark gray)	None observed	Clay loam

3.4.3 Potential Impacts from Soil Erosion

3.4.3.1 Fort Berthold #148-94-9C-4-3H, 4H, 5H, Fort Berthold #148-94-20C-21-4H, 5H, and Fort Berthold #148-94-21A-20-1H, 2H, 3H

The proposed locations are dominated by soils found within 0 to 6 percent slopes. Care would be taken during construction to minimize soil erosion impacts.

1. The soil types found at the locations have variable run-off depending on the slope, which ranges between 0 and 6 percent (NRCS 2011).
2. Reclamation of vegetative communities should be obtainable due to the affinity of native grassland species to the soil types present (NRCS 2011).
3. The sites would be monitored during and after construction and BMPs would be used to prevent erosion, minimize runoff and loss of sediment, and ensure soil stabilization.

3.4.3.2 General

Precautions will be taken during construction activities to prevent erosion. Proven BMPs are known to significantly reduce erosion of various types of soil, including those in the project area (BLM 2011; BLM and USFS 2007; Grah 1997).

The soil types are not expected to create unmanageable erosion issues or interfere with reclamation of the area. Topsoil stripped from areas of new construction would be retained for use during reclamation. Any areas stripped of vegetation during construction would be reseeded once construction activities have ceased. The implementation of BMPs by the operator would reduce project effects and maintain negligible levels of erosion; therefore, no significant adverse impacts to soil resources are anticipated.

3.4.3.3 BMPs Designed to Reduce Impacts

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The Proposed Action would create approximately 0.76 mile of new and improved roads in the CIAA, adding incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. New well field developments would be speculative until APDs are submitted to the BLM and BIA for approval. Additional wells are likely to be drilled in the same general area as the proposed project, using many of the same main access roads and minimizing the disturbance as much as possible.

Petro-Hunt is committed to using BMPs to mitigate the potential effects of erosion. BMPs would include implementing erosion and sedimentation control measures, such as installing culverts with energy dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars alongside slopes, and planting cover crops to stabilize soil following construction and before permanent seeding takes place. Additional information regarding BMPs can be found in Section 3.12, Mitigation and Monitoring.

3.5 WETLANDS

National Wetland Inventory maps maintained by the U.S. Fish and Wildlife Service (USFWS) do not identify any potential wetlands within the proposed well pad or access road areas (USFWS 2009). The nearest wetlands identified on the National Wetlands Inventory map of the project area is approximately 0.1 mile from the Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad. No wetlands were observed along the proposed access roads or near the proposed well pads for the Fort Berthold #148-94-20C-21-4H, 5H and Fort Berthold #148-94-21A-20-1H, 2H, 3H locations. The proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H access road and utility corridor would cross one ephemeral stream. A 3- by 2-foot box culvert would be utilized at this crossing.

Figure 3-1 displays the surface water runoff direction for each proposed project area. The distance from Lake Sakakawea to the nearest well pad (Fort Berthold #148-94-21A-20-1H, 2H, 3H) is approximately 22.2 river miles. Petro-Hunt has committed to using a closed-loop drilling fluid system. Petro-Hunt would also take precautions to maintain influential runoff by constructing and maintaining an 18-inch berm surrounding the perimeter of the well pads.

3.6 VEGETATION AND NOXIOUS WEEDS

3.6.1 Vegetation Data

The proposed project area occurs in the northwestern Great Plains ecoregion (River Breaks) (U.S. Geological Survey 2010), which is a western mixed-grass and short-grass prairie ecosystem (Bryce et al. 1998). Native grasses include big bluestem, little bluestem, blue grama, and western wheatgrass. Common wetland vegetation includes various sedge species (*Carex* spp.), bulrush (*Scirpus* spp.), and cattails (*Typha* spp.). Common plant species found in woody draws, coulees, and drainages include Juniper (*Juniperus* spp.), silver buffaloberry (*Shepherdia argentea*), and western snowberry (*Symphoricarpos occidentalis*).

3.6.1.1 Fort Berthold #148-94-9C-4-3H, 4H, 5H

Vegetation noted at the project area includes Kentucky bluegrass (*Poa pratensis*), fringed sagewort (*Artemisia frigida*), needle and thread grass, western snowberry, and Canada goldenrod (*Solidago canadensis*) (Figure 3-6).

Figure 3-6. Vegetation at the Fort Berthold #148-94-9C-4-3H, 4H, 5H project area, facing west. Photo taken July 20, 2011.

3.6.1.2 Fort Berthold #148-94-20C-21-4H, 5H

Vegetation noted at the project area includes cudweed sagewort (*Artemisia ludoviciana*), little bluestem, western yarrow (*Achillea millefolium*), and Kentucky bluegrass (Figure 3-7).

Figure 3-7. Vegetation at the Fort Berthold #148-94-20C-21-4H, 5H project area, facing south. Photo taken June 2, 2011.

3.6.1.3 Fort Berthold #148-94-21A-20-1H, 2H, 3H

Vegetation noted at the project area includes smooth brome (*Bromus inermis*), fringed sage, alfalfa (*Medicago sativa*), silver buffaloberry, and common dandelion (*Taraxacum officinale*) (Figure 3-8).

Figure 3-8. Vegetation at the Fort Berthold #148-94-21A-20-1H, 2H, 3H project area, facing south. Photo taken May 19, 2011.

3.6.2 Noxious Weeds

"Noxious weeds" is a general term used to describe plant species that are not native to a given area, spread rapidly, and have adverse ecological and economic impacts. These 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 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 11 species as noxious, as shown in Table 3-7 (NDDA 2009). Each county has the authority to add additional species to their list of noxious weeds. In 2009, three state noxious weed species were found on 86,100 acres in Dunn County. Dunn County does not maintain a list of other noxious species. However, 3,000 acres of black henbane were shown to occur in Dunn County in 2009 (NDDA 2009).

Table 3-7. Recognized Noxious Weed Occupied Area in Dunn County, North Dakota.

Common Name	Scientific Name	Dunn County (acres)
State Noxious Weeds		
absinth wormwood	*Artemisia absinthium*	39,300
Canada thistle	*Cirsium arvense*	28,500
diffuse knapweed	*Centaurea diffusa*	0
leafy spurge	*Euphorbia esula*	18,300
musk thistle	*Carduus nutans*	0
purple loosestrife	*Lythrum salicaria*	0
Russian knapweed	*Acroptilon repens*	0
spotted knapweed	*Centaurea stoebe*	0
yellow toadflax	*Linaria vulgaris*	0
dalmatian toadflax	*Linaria dalmatica*	0
salt cedar	*Tamarix ramosissima*	0
Other Noxious Weeds		
black henbane	*Hyoscyamus niger*	3,000
common burdock	*Arctium minus*	0
houndstongue	*Cynoglossum officinale*	0
halogeton	*Halogeton glomeratus*	0
baby's breath	*Gypsophila muralis*	0

Source: NDDA 2009

Efforts to reduce the spread of noxious weeds would be made during the project construction and maintenance processes. The following guidelines would be followed during construction, reclamation, and maintenance stages of the project to control the spread of noxious weeds.

- Construction equipment, materials, and vehicles would be stored at construction sites or at specified construction yards.
- All personal vehicles, sanitary facilities, and staging areas would be confined to a limited number of specified locations to decrease chances of incidental disturbance and spread of weeds.
- In areas with existing noxious weed infestations, vegetation, soils, and trench spoil material would be stockpiled adjacent to the removal point and, following construction, would be returned to its original locations to prevent spreading.
- Prompt re-establishment of the desired vegetation in disturbed areas is required. Seeding would occur during the frost-free periods after construction. Certified "noxious weed-free" seed would be used on all areas to be seeded.

3.6.3 Potential Impacts on Vegetation and Noxious Weeds

The Proposed Action would result in some loss of native grassland vegetation and some improved livestock pasture vegetation. The potential disturbance associated with this project component would total approximately 32.4 acres overall.

In addition to the removal of typical native grasslands, removal of existing vegetation may facilitate the spread of noxious weeds. The APD and this EA require the operator to control noxious weeds throughout project areas. If a noxious weed community is found, it would be eradicated unless the community is too large, in which case it would be controlled or contained to prevent further growth. The services of a qualified weed control contractor would be utilized.

Surface disturbance and vehicular traffic must not take place outside approved ROWs for the well pads, access roads, and gathering pipelines. Areas that are stripped of topsoil must be seeded and reclaimed at the earliest opportunity. Additionally, certified weed-free straw and seed must be used for all construction, seeding, and reclamation efforts. Prompt and appropriate construction, operation, and reclamation are expected to maintain minimal levels of adverse impacts to vegetation and would reduce the potential establishment of invasive vegetation species.

Construction of the proposed well pads and access road would result in long-term disturbance of approximately 13.7 acres of vegetation, since these facilities would only be partially reclaimed, and would be in continuous use for the life of the project. The loss of acres, with implementation of BMPs and noxious weed management guidelines, would result in negligible levels of vegetation disturbance and would not result in significant adverse impacts to vegetation resources.

The Proposed Action would result in some loss of vegetation and ecological diversity of native mixed-grass prairie habitat. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and further fragmentation, of native mixed-grass prairie habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use native mixed-grass prairie habitats. Such impacts could be partially offset by avoidance of previously undisturbed prairie habitats, as well as implementation of soil and vegetation mitigation measures and BMPs. Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

3.7 WILDLIFE

3.7.1 Threatened and Endangered Species Occurrence and Habitat

Several wildlife species that may exist in Dunn County (USFWS 2010) are listed as threatened or endangered under the Endangered Species Act (ESA) (16 USC 1531 et seq.). According to the USFWS, listed species in Dunn County, North Dakota, include the gray wolf, black-footed ferret, whooping crane, piping plover and its Designated Critical Habitat, interior least tern, and pallid sturgeon, as well as two federal candidate species, the Dakota skipper and the Sprague's pipit. In addition to the ESA, the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668–668d, 54 Sta. 250) and the Migratory Bird Treaty Act of 1918 (MBTA) (916 USC 703–711) protect nesting migratory bird species. The listed species and their federal status are provided in Table 3-8 and discussed in detail in Appendix A. SWCA Environmental Consultants (SWCA) biologists did not observe any of these species within the project area during surveys.

3.7.2 General Wildlife Species Occurrence and Habitat

The potential impacts on various species and their habitats are minimal. Currently, no adverse impacts have been identified for either the Reservation or the adjacent areas.

No suitable eagle nesting habitat was observed within 0.5 mile of the project areas. The nearest known golden eagle nest is approximately 2.5 miles west-northwest of the proposed Fort Berthold #148-94-20A-21-4H, 5H well pad.

3.7.3 Potential Impacts to Wetlands, Habitat, and Wildlife

With the implementation of standard BMPs, no riparian or wetland habitats are anticipated to be directly impacted by the proposed access roads or well pads.

No impacts to listed species are anticipated because of the low likelihood of their occurrence within the proposed project areas, confirmed by on-site assessments conducted by SWCA biologists. Petro-Hunt has committed to using a closed-loop drilling system. For additional information on general BMPs and other operator-committed measures, please see Sections 2.2.9, Construction Details, and 3.12, Mitigation and Monitoring.

Minor impacts to unlisted wildlife species and their habitats could result from the construction of the well pads and new access roads; increased vehicular traffic density; drilling activities; and long-term disturbances during commercial production. Ground clearing may impact habitat for small birds, small mammals, and other wildlife species. The proposed project may affect raptor and migratory bird species through direct mortality, habitat degradation, and/or displacement of individual birds. These impacts are regulated in part through the MBTA. Fragmentation of native prairie habitat can detrimentally affect grouse species; however, due to the ratio of each project area to the total landscape area, the overall disturbance would be negligible.

Table 3-8. Summary of Potential Effects to Threatened and Endangered Species.

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Black-footed Ferret (*Mustela nigripes*)	Endangered	Species is presumed extirpated from North Dakota.	None	No Effect
Gray Wolf (*Canis lupus*)	Endangered	Nearest known gray wolf populations exist in Minnesota, Canada, Montana, and Wyoming. Western North Dakota sightings in the late twentieth century are speculated to be solitary, transient, young adult males seeking to establish territory.	None	No Effect
Whooping Crane (*Grus americana*)	Endangered	No adverse impact is anticipated as a result of construction activities.	Drilling or construction activity will cease and the Bureau of Indian Affairs (BIA) and U.S. Fish and Wildlife Service will be notified if whooping cranes are sighted within 1 mile of the project area. Activities may commence when the birds have left the 1-mile buffer area.	May Affect, Is Not Likely to Adversely Affect
Piping Plover (*Charadrius melodus*)	Threatened	Birds are unlikely to be present due to lack of suitable foraging or nesting habitat. The nearest suitable nesting and foraging habitat occurs on the shoreline and islands of Lake Sakakawea, approximately 2.85 straight line miles from the proposed well pads and access road.	Petro-Hunt will use a closed-loop drilling system for all three proposed well pads. Petro-Hunt will surround each proposed well pad with a 110% daily volume containment berm to prevent hazardous runoff or spills.	May Affect, Is Not Likely to Adversely Affect

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Designated Critical Habitat for Piping Plover	Designated Critical Habitat	Critical Habitat occurs within the watershed of the project area, on the shoreline and islands of Lake Sakakawea, between approximately 22.19 to 25.49 river miles from the proposed well pads and access road.	Petro-Hunt will implement all best management practices (BMPs), erosion control measures, and spill prevention practices required by the Clean Water Act. Petro-Hunt will use a closed-loop drilling system for each proposed well pad. Petro-Hunt will surround each proposed well pad with a 110% daily volume containment berm to prevent hazardous runoff or spills.	May Affect, Is Not Likely to Adversely Affect
Interior Least Tern (*Sterna antillarum)*	Endangered	The nearest suitable nesting and foraging habitat occurs on the shoreline and islands of Lake Sakakawea, approximately 22.19 to 25.49 river miles, and 2.85 straight line miles from the proposed well pads and access road. Migrating or foraging interior least terns may transition through the project area.	See Designated Critical Habitat protective measures for piping plover.	May Affect, Is Not Likely to Adversely Affect
Pallid Sturgeon (*Scaphirhynchus albus)*	Threatened	Lake Sakakawea is between 22.19 and 25.49 river miles from the proposed well pads and access road.	See Designated Critical Habitat protective measures for piping plover.	May Affect, Is Not Likely to Adversely Affect
Dakota Skipper (*Hesperia dacotae)*	Candidate	No adverse impact is anticipated as a result of construction activities.	The proposed well pads will be reclaimed as soon as possible after their lifespan is complete. Impacted areas will be returned to pre-construction contours.	May Affect, Is Not Likely to Adversely Affect

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Sprauge's Pipit (*Anthus spragueii)*	Candidate	No adverse impact is anticipated as a result of construction activities.	The proposed well pads will be reclaimed as soon as possible after their lifespan is complete. Impacted areas will be returned to pre-construction contours.	May Affect, Is Not Likely to Adversely Affect
Other Federally Protected Species				
Bald Eagle (*Haliaeetus leucocephalus)*	BGEPA and MBTA	Raptor habitat survey was conducted. SWCA observed no suitable nesting or foraging habitat within the project area. Transient individuals may enter the project area on occasion.	A 0.5-mile line of sight survey was conducted during the initial field survey and no suitable nesting habitat was observed within the project area.	No Adverse Effects Anticipated
Golden Eagle (*Aquila chrysaetos)*	BGEPA and MBTA	No eagle nests were observed in the project area. Golden eagles may occasionally visit or forage within or around the project area.	A 0.5-mile line of sight survey was conducted during the initial field survey. The closest known golden eagle nest occurrence is approximately 2.5 miles west-northwest of the proposed Fort Berthold #148-94-20C-21-4H, 5H well pad.	No Adverse Effects Anticipated
Migratory Birds	MBTA	Suitable habitat for nesting migratory grassland birds occurs in the project area.	See migratory bird protective measures in section 3.12.2.7.1 *Bald and Golden Eagle and Migratory Bird Protective Measures*.	No Adverse Effects Anticipated

Several precautions that may limit or reduce the possible impact to all wildlife species include:

- locating well pads over areas with existing disturbances;
- installing covers under drip buckets and spigots; and
- conducting interim reclamation of at least half the disturbed area.

Reclamation would begin without delay if a well is determined to be unproductive, or upon completion of commercial production.

3.8 CULTURAL RESOURCES

Historic properties, or cultural resources, on federal or tribal lands are protected by many laws, regulations, and agreements. Section 106 of the National Historic Preservation Act of 1966 (16 USC 470 et seq.) requires, for any federal, federally assisted, or federally licensed undertaking, that the federal agency take into account the affect of that undertaking on any district, site, building, structure, or object that is included in the National Register of Historic Places (National Register) before the expenditure of any federal funds or the issuance of any federal license. Cultural resources is a broad term encompassing sites, objects, or practices of archaeological, historical, cultural, and religious significance. Eligibility criteria (36 CFR 60.4) include association with important events or people in our history, distinctive construction or artistic characteristics, and either a record of yielding or a potential to yield information important in prehistory or history. In practice, properties are generally not eligible for listing on the National Register if they lack diagnostic artifacts, subsurface remains, or structural features, but those considered eligible are treated as though they were listed on the National Register, even when no formal nomination has been filed. This process of taking into account an undertaking's effect on historic properties is known as "Section 106 review," or more commonly as a cultural resource inventory.

The area of potential effect of any federal undertaking must also be evaluated for significance to Native Americans from a cultural and religious standpoint. Sites and practices may be eligible for protection under the American Indian Religious Freedom Act of 1978 (42 USC 1996). Sacred sites may be identified by a tribe or an authoritative individual (Executive Order 13007). Special protections are afforded to human remains, funerary objects, and objects of cultural patrimony under the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.).

Whatever the nature of the cultural resource addressed by a particular statute or tradition, implementing procedures invariably include consultation requirements at various stages of a federal undertaking. The MHA Nation has designated a THPO by Tribal Council resolution, whose office and functions are certified by the National Park Service. The THPO operates with the same authority exercised in most of the rest of North Dakota by the State Historic Preservation Officer. Thus, BIA consults and corresponds with the THPO regarding cultural resources on all projects proposed within the exterior boundaries of the Reservation.

Cultural resource inventories were conducted for the proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H (Schleicher 2011a), Fort Berthold #148-94-20C-21-4H, 5H (Schleicher 2011b),

and Fort Berthold #148-94-21A-20-1H, 2H, 3H (Schleicher 2011c) well pads and access roads by SWCA personnel using an intensive pedestrian methodology.

The well pads and access roads were originally surveyed on the dates listed below with their associated acreages surveyed.

- **Fort Berthold #148-94-9C-4-3H, 4H, 5H:** July 20 and August 17, 2011, 44.01 acres
- **Fort Berthold #148-94-20C-21-4H, 5H:** June 2, 2011, 17.19 acres
- **Fort Berthold #148-94-21A-20-1H, 2H, 3H:** May 3, 2011, 21.90 acres

No cultural resources were identified during this inventory. As the lead federal agency, and as provided for in 36 CFR 800.5, on the basis of the information provided, the BIA reached a determination of **no historic properties affected** for the Fort Berthold #148-94-9C-4-3H, 4H, 5H, Fort Berthold #148-94-20C-21-4H, 5H, and Fort Berthold #148-94-21A-20-1H, 2H, 3H undertakings and consulted with the THPO regarding this determination (Appendix B).

If cultural resources are discovered during construction or operation, the operator shall immediately stop work, secure the affected site, and notify the BIA and THPO. Unexpected or inadvertent discoveries of cultural resources or human remains trigger mandatory federal procedures that include work stoppage and BIA consultation with all appropriate parties. Following any such discovery, operations would not resume without written authorization from the BIA. Project personnel are prohibited from collecting any artifacts or disturbing cultural resources in the area under any circumstance. Individuals outside the ROW are trespassing. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. The presence of qualified cultural resource monitors during construction activities is encouraged.

3.9 PUBLIC HEALTH AND SAFETY

Health and safety concerns include H_2S gas that could be released as a result of drilling activities, hazards introduced by heavy truck traffic, and hazardous materials used or generated during construction, drilling, and/or production activities.

H_2S is extremely toxic in concentrations above 500 parts per million, but it has not been found in measurable quantities in the Bakken/Three Forks Formation. Before reaching the Bakken/Three Forks, however, drilling would penetrate the Mission Canyon Formation, which is known to contain varying concentrations of H_2S. Contingency plans submitted to the BLM comply fully with relevant portions of Onshore Oil and Gas Order No. 6 to minimize potential for gas leaks during drilling. Emergency response plans protect both the drilling crew and the general public within 1 mile of a well; precautions include automated sampling and monitoring by drilling personnel stationed at each well site.

Standard mitigation measures would be applied, and because release of H_2S at dangerous concentration levels is very unlikely, no direct impacts from H_2S are anticipated with implementation of the project.

The number of tanker trips would depend on production, but Petro-Hunt estimates approximately two trucks per day during the initial production period. Trucks for normal production operations would use the existing and proposed access roads. Produced water would be transported to an approved disposal site. All traffic would be confined to approved routes and conform to established load restrictions and speed limits for state and BIA roadways and haul permits would be acquired as appropriate.

The EPA specifies chemical reporting requirements under Title III of the Superfund Amendments and Reauthorization Act (SARA), as amended. No chemicals subject to reporting under SARA Title III (hazardous materials) in an amount greater than 10,000 pounds would be used, produced, stored, transported, or disposed of annually in association with the Proposed Action. Furthermore, no extremely hazardous substances, as defined in 40 CFR 355, in threshold planning quantities would be used, produced, stored, transported, or disposed of in association with the Proposed Action. All operations, including flaring, would conform to instructions from BIA fire management staff.

Spills of oil, produced water, or other produced fluids would be cleaned up and disposed of in accordance with appropriate regulations. Sewage would be contained in a portable chemical toilet during drilling. All trash would be stored in a trash cage and hauled to an appropriate landfill during and after drilling and completion operations.

3.9.1 Potential Impacts to Public Health and Safety

With the implementation of the described reporting and management of hazardous materials, no adverse impacts to public health and safety are anticipated as a result of the proposed well pads. Other potential adverse impacts to any nearby residents from construction would be largely temporary. Noise, fugitive dust, and traffic hazards would be present for about 60 days during construction, drilling, and well completion as equipment and vehicles move on and off the site, and then diminish sharply during production operations. If a well proved productive, one small pumper truck would visit the well once a day to check the pump. Bakken/Three Forks wells typically produce both oil and water at a high rate initially. Gas would be flared initially and intermittently, while oil and produced water would be stored on the well pad in tanks and then hauled out by tankers until the well could be connected to gathering pipelines. Up to four 400-barrel oil tanks and one 400-barrel water tank would be located on the pad inside a berm of impervious compacted subsoil. The berm would be designed to hold 110% of the capacity of the largest tank plus one full day's production.

3.10 SOCIOECONOMICS

This section discusses community characteristics such as population, housing, demographics, employment, and economic trends within the Analysis Area. Also included are data relating to the State of North Dakota and the United States, which provide a comparative discussion when compared to the Analysis Area. Information in this section was obtained from various sources including, but not limited to, the U.S. Census Bureau, the U.S. Bureau of Economics, and the North Dakota State Government.

3.10.1 Socioeconomic Analysis Area

The scope of analysis for social and economic resources includes a discussion of current social and economic data relevant to the Analysis Area and surrounding communities of the Reservation and McKenzie, Dunn, McLean, and Mountrail counties, North Dakota. These counties were chosen for analysis because their proximity to the proposed well pad locations and overlap with the Reservation could result in socioeconomic impacts. These communities are collectively referred to as the Analysis Area.

3.10.2 Population and Demographic Trends

Historic and current population counts for the Analysis Area, compared to the state, are provided below in Table 3-9. The state population showed little change between the previous two census counts (1990–2000); however, in 2010 the state population increased by 4.7% to 672,594 (U.S. Census Bureau 2011a). Populations in McKenzie and Mountrail counties have increased slightly from 2000 to 2009 while McLean and Dunn counties had a rate of decline of -10.8% and -6.5%, respectively (U.S. Census Bureau 2011b). These declines can be attributed to more people moving to metropolitan areas, which are perceived as offering more employment opportunities. However, population on or near the Reservation has increased approximately 13.3% from 2000 to 2005 (BIA 2005). While Native Americans are the predominant group on the Reservation, they are considered the minority in all other areas of North Dakota.

As presented in Table 3-9, population growth on the Reservation (13.3%) exceeds the overall growth in the state of North Dakota (4.7%) and four counties in the Analysis Area. This trend in population growth for the Reservation is expected to continue in the next few years (Fort Berthold Housing Authority 2008).

Table 3-9. Population and Demographics.

County or Reservation	Population in 2009	% of State Population	% Change Between 1990–2000	% Change Between 2000–2009	Predominant Group in 2009 (%)	Predominant Minority in 2009 (Percent of Total Minority Population)
Dunn	3,365	0.5	-10.1	-6.5	Caucasian (85.3%)	American Indian (13.6%)
McKenzie	5,799	0.9	-10.1	1.1	Caucasian (76.7%)	American Indian (21.5%)
McLean	8,310	1.3	-11.0	-10.8	Caucasian (91.2%)	American Indian (7.1%)
Mountrail	6,791	1.0	-5.6	2.4	Caucasian (62.7%)	American Indian (35.1%)
On or near Fort Berthold Indian Reservation[1]	11,897	1.8	178.0[2]	+13.3[3]	American Indian (~73%)	Caucasian (~27%)
Statewide	672,594[4]	100	0.5	4.7[4]	Caucasian (91.1%)	American Indian (5.6%)

Source: U.S. Census Bureau 2011b.

[1] Population shown reflects the total enrollment in the tribe in 2005. 2008 data unavailable. All information related to the Reservation reflects 2005 data, including state population. 11,897 reflects tribal enrollment on or near the Reservation. According to the BIA, near the Reservation includes those areas or communities adjacent or contiguous to the Reservation (BIA 2005).

[2] Reflects percent change between 1991 and 2001 (BIA 2001).

[3] Reflects percent change between 2001 and 2005.

[4] Reflects population levels in 2010 (U.S. Census Bureau 2011a).

3.10.3 Employment

The economy in the state of North Dakota, including the Reservation and four counties in the Analysis Area, has historically depended on agriculture, including grazing and farming. However, 2010 economic data indicate that the major employers in North Dakota include government and government enterprises, which employed 16.6%; health care and social assistance, which employed 11.9%; and retail trade, which employed 10.8% of the state's labor force (U.S. Bureau of Economic Analysis 2011a). Energy development and extraction, power generation, and services related to these activities have become increasingly important over the last several years and many service sector jobs are directly and indirectly associated with oil and gas development.

In 2010, total employment in the state of North Dakota was approximately 355,000 (Table 3-10). The average weekly wage for all employees on private nonfarm payrolls was $697 in North Dakota. The four counties in the Analysis Area showed average weekly wages that were higher than the state and national average in 2010 (Table 3-10).

Table 3-10. 2009 Total Employment, Average Weekly Wages, and Unemployment Rates.

Location	Total Employment	Average Weekly Wage	Unemployment Rate	Change in Unemployment Rate (2005–2010)
United States	139,909,000	$781	9.4%	+4.3%
North Dakota	355,000	$697	3.8%	+0.4%
Dunn County	1,684	$829	3.3%	-0.1%
McKenzie County	2,625	$1,006	2.6%	-1.1%
McLean County	2,674	$820	3.8%	-1.2%
Mountrail County	4,713	$947	2.4%	-3.6%
On or near Fort Berthold Indian Reservation*	1,287	N/A	71%	N/A

Sources: Bureau of Labor Statistics 2011a, 2011b; U.S. Department of Agriculture 2011; BIA 2005.

* Represents 2005 data only.

In 2010, the statewide unemployment rate was 3.8% of the workforce (Table 3-9). This is the lowest unemployment rate in the nation (Bureau of Labor Statistics 2011a). All counties in the Analysis Area experienced a decreased unemployment since 2005 (Table 3-10).

According to the 2005 American Indian Population and Labor Force Report, of the 8,773 tribal members that were eligible for BIA-funded services, 4,381 constituted the total available workforce. Approximately 29%, or 1,287 members, were employed in 2005, indicating a 71% unemployment rate (as a percent of the labor force) for members living on or near the Reservation; 55% of the employed members were living below poverty guidelines. Compared to the 2001 report, 2005 statistics reflect a 6.2% increase in the number of tribal members employed living on or near the Reservation, but unemployment (as a percent of the labor force) has stayed steady at 71% and the percentage of employed people living below the poverty guidelines has increased to 55% (BIA 2005).

Although detailed employment information for the Reservation is not provided by the U.S. Bureau of Economics or the State of North Dakota, residents of the Reservation are employed in similar ventures as those outside the Reservation. Typical employment includes ranching, farming, tribal government, tribal enterprises, schools, federal agencies, and recently, employment related to conventional energy development. The MHA Nation's Four Bears Casino and Lodge, located 4 miles west of New Town, employs approximately 320 people, of which 90% are tribal members (Fort Berthold Housing Authority 2008).

The Fort Berthold Community College, which is tribally chartered to meet the higher education needs of the people of the MHA Nation, had 11 full-time members and 25 adjunct members in academic year 2006–2007. Approximately 73% of the full-time faculty members are of American Indian/Alaska Native descent, approximately 88% of which are enrolled members of the MHA Nation. Additionally, 65% of the part-time faculty members are of American Indian/Alaska Native descent and all (100%) are tribal members.

3.10.4 Income

Per capita income is often used as a measure of economic performance, but it should be used with changes in earnings for a realistic picture of economic health. Since total personal income includes income from 401(k) plans and other non-labor income sources like transfer payments, dividends, and rent, it is possible for per capita income to rise even if the average wage per job declines over time. The North American Industry Classification System is the standard used by federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy. Per capita income, median household income, and poverty rates for the Analysis Area and North Dakota are presented in Table 3-11.

Table 3-11. Income and Poverty in Analysis Area, 2008.

Unit of Analysis	Per Capita Income[1] (2000)	Per Capita Income[1] (2008)	Median Household Income[2] (2009)	Percent of all People in Poverty[2] (2009)
Dunn County	$21,031	$29,558	$44,681	11.2%
McKenzie County	$22,269	$36,862	$49,465	12.8%
McLean County	$23,125	$42,466	$49,212	10.3%
Mountrail County	$23,045	$34,590	$49,884	12.4%
Fort Berthold Indian Reservation[3]	$8,855	$10,291[3]	$26,977[3]	N/A
North Dakota	$25,624	$39,874	$47,898	11.7%

[1] U.S. Bureau of Economic Analysis 2011a, 2011b.
[2] U.S. Census Bureau 2009a.
[3] Population shown reflects the total enrollment in the tribe in 2005. 2008 data unavailable. All information related to the Reservation reflects 2005 data (BIA 2005).

From 2000 to 2008, per capita income increased by 28.8% for Dunn County, 39.6% for McKenzie County, 45.5% for McLean County, and 33.4% for Mountrail County. These figures compare to a 35.7% increase for the State of North Dakota per capita personal income (U.S. Bureau of Economic Analysis 2009).

According to a 2008 report published by the Fort Berthold Housing Authority, the average per capita income for the Reservation was $8,855 in 1999, compared to $25,624 for the state and the national average of $21,587 at that time (Fort Berthold Housing Authority 2008). In 2009, the median household income on the Reservation was $26,977, compared to the national median of $41,994.

With the exception of McLean County, counties that overlap the Reservation tend to have per capita incomes below the North Dakota state average. In addition, Dunn County and the Reservation have median household incomes below the North Dakota state average. As presented in Table 3-10, Dunn, McKenzie, and Mountrail counties have unemployment levels below the state average of 3.8%. Subsequently, Reservation residents and MHA Nation members tend to have per capita incomes and median household incomes below the averages of the encompassing counties, as well as statewide; and higher unemployment.

3.10.5 Housing

Workforce-related housing can be a key issue associated with development. Historical information on housing in the four counties in the Analysis Area was obtained from the U.S. Census Bureau, 2000 Census, with 2009 updates (U.S. Census Bureau 2011c). Because the status of the housing market and housing availability changes often, current housing situations can be difficult to characterize quantitatively. Therefore, this section discusses the historical housing market. Table 3-12 provides housing unit supply estimates for the Analysis Area and the Reservation.

The Fort Berthold Housing Authority manages a majority of the housing units within the Reservation. Housing typically consists of mutual-help homes built through various government programs, low-rent housing units, and scattered-site homes. Housing for government employees is limited, with a few quarters in Mandaree and White Shield available to Indian Health Service employees in the Four Bears Community and to BIA employees. Private purchase and rental housing are available in New Town. New housing construction has recently increased within much of the Analysis Area, but availability remains low.

Table 3-12. Housing Development Data for the Reservation and Encompassing Counties.

Region	Total Housing Units						% Change 2000–2009
	Occupied	Owner Occupied	Renter Occupied	Vacant	Total	Total	
	2000	2000	2000	2000	2000	2009	
Dunn	1,378	1,102	276	587	1,965	1,985	+1.0
McKenzie	2,151	1,589	562	568	2,719	2,801	+2.9
McLean	3,815	3,135	680	1,449	5,264	5,461	+3.6
Mountrail	2,560	1,859	701	878	3,438	3,607	+4.7
Reservation	1,908	1,122	786	973	2,881	N/A	N/A
North Dakota	257,152	171,299	85,853	32,525	289,677	316,435	+8.5

Source: U.S. Census Bureau 2011c.

Availability and affordability of housing could impact oil and gas development and operations. The number of owner-occupied housing units (1,122) within the Reservation is approximately 58% lower than the average number of owner-occupied housing units found in the four overlapping counties (1,921).

In addition to the relatively low percent change of the total housing units compared to the state average, these four counties are ranked extremely low for both the state and national housing starts and have minimal new housing building permits, as presented in Table 3-13.

Table 3-13. Housing Development Data for the Encompassing Counties 2000–2008.

Housing Development	North Dakota County			
	Dunn	McKenzie	McLean	Mountrail
New Private Housing Building Permits 2003–2008	14	14	182	110
Housing Starts-State Rank	51 / 53	15 / 53	21 / 53	17 / 53
Housing Starts-National Rank	3,112 / 3,141	2,498 / 3,141	2,691 / 3,141	2,559 / 3,141

Source: U.S. Census Bureau 2009a, 2009b.

3.10.6 Potential Impacts to Area Socioeconomics

Negative impacts to socioeconomic resources of the Analysis Area would be minimal and therefore would not adversely impact the local area. Short-term impacts to socioeconomic resources would generally occur during the construction/drilling and completion phase of the proposed wells. Long-term effects would occur during the production phase, should the wells prove successful.

As presented in Table 3-14, implementation of the proposed well pads project is anticipated to require between 14 and 28 workers per well in the short term. If the wells prove successful, Petro-Hunt would install production facilities and begin long-term production. To ensure successful operations, production activities require between one and four full-time employees to staff operations. It is anticipated that a mixture of local and Petro-Hunt employees would work in the project area. Therefore, any increase in workers would constitute a minor increase in population in the project area required for short-term operations and would not create a noticeable increase in demand for services or infrastructure on the Reservation or the communities near the project area.

Table 3-14. Duration of Employment during Proposed Project Implementation.

Activity	Duration of Activity (Average Days per Well)	Daily Personnel (Average Number per Well)
Construction (access road and well pad)	5–8 days	3–5
Drilling	30–35 days	8–15
Completion/Installation of Facilities	Approx. 10 days	3–8
Production	Ongoing – life of well	1–4

Although the Analysis Area has experienced a recent decline in population between 2000 and 2008 (as shown in Table 3-9), the population on the Reservation itself has increased. This has not led to significant housing shortages. The historic housing vacancy rate (Table 3-12) indicates that housing has remained available despite the growth of the population on the Reservation. The levels of available housing are therefore anticipated to be able to absorb the projected slight increase in population related to this proposed project. As such, the proposed project would not have measurable impacts on housing availability or community

infrastructure in the area. The proposed project also would not result in any identifiable impacts to social conditions and structures within the communities in the project area.

Implementation of the proposed project would likely result in direct and indirect economic benefits associated with industrial and commercial activities in the area, including the Reservation, State of North Dakota, and potentially local communities near the Reservation. Direct impacts would include increased spending by contractors and workers for materials, supplies, food, and lodging in Dunn County and the surrounding areas, which would be subject to sales and lodging taxes. Other state, local, and Reservation tax payments and fees would be incurred as a result of the implementation of the proposed project, with a small percentage of these revenues distributed back to the local economies. Wages due to employment would also impact per capita income for those that were previously unemployed or underemployed. Indirect benefits would include increased spending from increased oil and gas production, as well as a slight increase in generated taxes from the short-term operations. Mineral severance and royalty taxes, as well as other relevant county and Reservation taxes on production would also grow directly and indirectly as a result of increased industrial activity in the oil and gas industry.

3.11 ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, signed in 1994 by President Clinton, requires agencies advance EJ by pursuing fair treatment and meaningful involvement of minority and low-income populations. Fair treatment means such groups should not bear a disproportionately high share of negative environmental consequences from federal programs, policies, decisions, or operations. Meaningful involvement means federal officials actively promote opportunities for public participation and federal decisions can be materially affected by participating groups and individuals.

The EPA headed the interagency workgroup established by the 1994 Order and is responsible for related legal action. Working criteria for designation of targeted populations are provided in Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses (EPA 1998). This guidance uses a statistical approach to consider various geographic areas and scales of analysis to define a particular population's status under the Order.

EJ is an evolving concept with potential for disagreement over the scope of analysis and the implications for federal responsiveness. Nevertheless, due to the population numbers, tribal members on the Great Plains qualify for EJ consideration as both a minority and low-income population. Table 3-15 summarizes relevant data regarding minority populations for the Analysis Area.

Table 3-15. Minority Population Breakdown by North Dakota County and Race, 2000–2008[2].

Race	Dunn		McKenzie		McLean		Mountrail		North Dakota	
	2000	2008	2000	2008	2000	2008	2000	2008	2000	2008
Total Population	3,600	3,318	5,737	5,674	9,311	8,337	6,629	6,511	642,204	641,481
Non-Hispanic	3,573	3,275	5,679	5,581	9,230	8,191	6,542	6,327	634,418	628,254
Hispanic or Latino[1]	27	43	58	93	81	146	87	184	7,786	13,227
Races										
Caucasian	3,123	2,818	4,457	4,329	8,632	7,610	4,546	4,086	596,722	586,272
African American	1	2	4	30	2	9	7	27	4,157	6,956
American Indians and Alaska Natives	448	467	1,216	1,230	568	587	1,988	2,277	31,440	35,666
Asian / Pacific Islanders	8	3	4	10	12	19	17	20	3,912	5,095
Two or More Races	25	28	39	75	97	112	71	101	5,973	7,492
All Minorities	509	543	1,321	1,438	760	808	2,170	2,609	53,268	55,209
% Minority Population	14.1	16.4	23.0	25.3	8.2	9.7	32.7	40.1	8.3	8.6
Change in Minority Population (2000-2008)	+6.7%		+8.9%		+6.3%		+20.2%		+3.6%	

[1] Hispanic or Latino may be of any race.
[2] U.S. Census Bureau estimates of population demographics were made in July 2008.
Source: U.S. Census Bureau 2011c.

In July 2008, the U.S. Census estimated that North Dakota's total minority population comprised approximately 55,209 persons, or 8.6% of the state's total population (i.e., 641,481 residents). This represents an increase of 3.63% over the 2000 minority population of the state, even though the overall state's total population decreased during the same time. An even stronger trend of increased minority population, and decrease in overall population occurred in the Analysis Area during the same time period. As presented in Table 3-15, the number of Caucasian residents decreased, while minorities in nearly all categories increased, producing a strong increase in the percentage of minority population in each of the counties in the Analysis Area during the period from 2000 until 2008 (U.S. Census Bureau 2011c). The four counties of the Analysis Area showed an increase of 6.3% to 20.2% in minority population, compared with the statewide increase of 3.6%.

The American Indian and Alaska Native population is the largest minority in each of the counties, as well as for the state as a whole (North Dakota Indian Affairs Commission [NDIAC] 2011). The NDIAC reports that American Indian population (race alone or in combination) in North Dakota has increased 12% from 31,440 in 2000 to 35,666 in 2008 (U.S. Census Bureau 2011c), with estimates for the future American Indian population (one race only) at 47,000 in 2015 and 59,000 in 2025 in North Dakota (NDIAC 2010). The Reservation had a total population of 5,915 in the 2000 census, with 67.4% American Indian, mostly with tribal affiliations with MHA Nation (NDIAC 2010).

Poverty rate data for the counties in the Analysis Area are summarized in Table 3-16. The data show that poverty rates have decreased in the Analysis Area during the period from 2000 to 2008 (U.S. Census Bureau 2010). However, except for McLean County, the poverty rates are higher and the median household incomes are lower for area residents in 2008, compared with the statewide poverty rate of 11.5% and median household income of $45,996.

Table 3-16. Poverty Rates and Median Household Income for the Analysis Area.

Location	2000	2008	2008 Median Household Income
Dunn County	13.3%	12.2%	$40,801
McKenzie County	15.7%	14.4%	$44,704
McLean County	12.3%	11.1%	$46,131
Mountrail County	15.7%	14.0%	$41,551
North Dakota	10.4%	11.5%	$45,996

Source: U.S. Census Bureau 2010.

3.11.1 Potential Impacts to Environmental Justice

The Analysis Area, having larger and increasing minority populations, compared with statewide numbers, could result in disproportionately beneficial impacts from the proposed oil field development. These would derive from direct and indirect economic opportunities for tribal members. Generally, existing oil and gas leasing has already benefited the MHA Nation government and infrastructure from tribal leasing, fees, and taxes. Current oil and gas leasing on the Reservation has also already generated revenue to MHA Nation members who hold surface and/or mineral interests. However, owners of allotted surface within the Analysis Area may not necessarily hold mineral rights. In such cases, surface owners do not receive oil and gas lease or royalty income, and their only related income would be compensation for productive acreage lost to road and well pad construction. Those with mineral interests also may benefit from royalties on commercial production if the wells prove successful. Profitable production rates at proposed locations might lead to exploration and development of additional tracts owned by currently non-benefitting allottees. In addition to increased revenue for land and mineral holders, exploration and development would increase employment on the Reservation with oversight from the Tribal Employment Rights Office, which would help alleviate some of the poverty prevalent on or near the Reservation. Tribal members without either surface or mineral rights would not receive any direct benefits, except through potential employment, should they be hired. Indirect benefits of employment and general tribal gains

would be the only potential offsets to negative impacts. Poverty rates in the Analysis Area have already begun to decrease since oil and gas development began after 2000, as shown in Table 3-16. There is potential for adverse economic impacts to tribal members who do not reside within the Reservation and therefore do not share in direct or indirect benefits.

Potential adverse impacts could occur to tribes and tribal members, as well, such as the potential disturbance of any Traditional Cultural Properties and cultural resources. These potential impacts are reduced through surveys of proposed well locations and access road routes and thorough reviews and determinations by the BIA that there would be no effect to historic properties. Furthermore, nothing is known to be present that qualifies as a Traditional Cultural Property or for protection under the American Indian Religious Freedom Act. The possibility of disproportionate impacts to tribes or tribal members is further reduced by the requirement for immediate work stoppage following an unexpected discovery of cultural resources of any type. Mandatory consultation would take place during any such work stoppage, affording an opportunity for all affected parties to assert their interests and contribute to an appropriate resolution, regardless of their home location or tribal affiliation.

The proposed project has not been found to pose a threat for significant impact to any other critical element, including air quality, public health and safety, water quality, wetlands, wildlife, soils, or vegetation within the human environment. Through the avoidance of such impacts, no disproportionate impact is expected to low-income or minority populations. The Proposed Action offers many positive consequences for tribal members, while recognizing EJ concerns. Procedures summarized in this document and in the APD are binding and sufficient. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required.

3.12 MITIGATION AND MONITORING

Many protective measures and procedures are described in this document and in the APD. No laws, regulations, or other requirements have been waived; no compensatory mitigation measures are required. Each phase of construction and development through production would be monitored by the BLM, BIA, and representatives of the MHA Nation to ensure the protection of cultural, archaeological, and natural resources. In conjunction with 43 CFR 46.30, 46.145, 46.310, and 46.415, a report would be developed by the BLM and BIA that documents the results of monitoring in order to adapt the projects to eliminate any adverse impact on the environment.

Mitigation opportunities can be found in general and operator-committed BMPs and mitigation measures. BMPs are loosely defined as techniques used to lessen the visual and physical impacts of development. The BLM has created a catalog of BMPs that, when properly implemented, can assist industry in a project's design, scheduling, and construction techniques. Petro-Hunt would implement, to the extent possible, the use of BMPs in an effort to mitigate environmental concerns in the planning phase allowing for smoother analysis, and possibly faster project approval. Many of these are required by the BLM when drilling federal or tribal leaseholds and can be found in the surface use plan in the APD. The regulatory agencies provide Conditions of Approval and enforcement would occur as a result of non-compliance which adds incentives for strict adherence to the BMPs.

3.12.1 General BMPs

Although largely project-specific, there are a number of BMPs that can, and should, be considered on development projects in general. The following are examples of general BMPs.

- Planning roads and facility sites to minimize visual impacts.
- Using existing roads to the extent possible, upgrading as needed.
- Reducing the size of facility sites and types of roads to minimize surface disturbance.
- Minimizing topsoil removal.
- Stockpiling stripped topsoil and protecting it from erosion, by reseeding with native grasses, until reclamation activities commence. At that time, the soil would be redistributed and seeded on the disturbed areas. The reclaimed areas would be protected and maintained until the sites are fully stabilized.
- Avoiding removal of, and damage to, trees, shrubs, and groundcover where possible.
- Clearing a facility or well site to accommodate vehicles or equipment.
- Maintaining buffer strips or using other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Planning for erosion control.
- Storing chemicals properly (including secondary containment).
- Keeping sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Conducting snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Avoiding or minimizing topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Maintaining buffers around work areas where there is a risk of fire as a result of construction activities.
- Keeping fire extinguishers in all vehicles.
- Planning transportation to reduce vehicle density.
- Avoiding traveling during wet conditions that could result in excessive rutting.
- Painting facilities a color that would blend with the environment.
- Practicing dust abatement on roads.
- Recontouring disturbed areas to approximate the original contours of the landscape.
- Developing a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.

Petro-Hunt commits to implementing all BMPs identified during the on-site inspection that can be used to mitigate environmental concerns specific to projects associated with below-

ground linear alignments, such as those included in the proposed utility corridor. BMPs identified during the on-site inspection include the following.

- Locate proposed well pads and access roads in areas with existing disturbances to the extent possible.
- Install covers under drip buckets and spigots.
- Use a closed-loop drilling system.
- Construct berms and install waddle on the downslope sides of the proposed well pad.
- Follow the contour (form and line) of the landscape.
- Co-locate multiple utility lines in the same trench.
- Use natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.
- Paint facilities a color that would blend with the environment.
- Contour disturbed areas to approximate the original contours of the landscape.
- Implement proper storage of chemicals (including secondary containment).
- Keep sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Avoid or minimize topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Avoid construction and vehicle use during wet conditions that could result in excessive rutting.
- Avoid removal of, or damage to, trees and woody shrubs where possible.
- Mow the facility or well site instead of clearing vegetation to accommodate vehicles or equipment.
- Conduct interim reclamation of at least half the disturbed area.
- Conduct reclamation without delay if a well is determined to be unproductive, or upon completion of commercial production.
- Lay matting and/or conduct hydro seeding on the fill side of the pad.
- Grind trees and other woody material removed from the pad and add to the topsoil.
- Minimize topsoil removal and stockpile stripped topsoil and protect it from erosion until reclamation activities commence.
- During reclamation, redistribute and reseed the topsoil on the disturbed areas, and protect and maintain reclaimed areas until the sites are fully stabilized.
- Develop a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.

- Maintain buffer strips or use other sediment control measures to avoid sediment migration to stream channels as a result of construction activities.
- Implement an erosion control plan.
- Implement approved Stormwater Pollution Prevention Plan and BMPs for the construction of each roadway and proposed well pad to prevent erosion and sedimentation.
- Install appropriately sized culverts or other stable stream crossings for any intermittent stream crossings.
- Design roads and facility sites to minimize visual impacts.
- Use existing roads to the extent possible, upgrading as needed.
- Minimize the size of facility sites and types of roads to reduce surface disturbance.
- Avoid locating ROWs on steep slopes.
- Share any common ROWs whenever possible.
- Plan transportation to reduce vehicle density.
- Post speed limits on roads.
- Conduct snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Require construction crews to carry fire extinguishers in their vehicles and/or equipment.
- Require construction crews be trained in the proper use of fire extinguishers.
- Contract with the local fire district to provide fire protection.

Petro-Hunt is committed to implementing these and/or other BMPs to the extent that they are technically feasible and would add strategic and measurable protection to the project area, as well as all specific items identified at the on-site inspections for the proposed well pads and access roads.

3.12.2 Mitigation and Safety Measures Committed to by Petro-Hunt

3.12.2.1 Air Quality

Petro-Hunt commits to the following.

- Transportation BMPs to reduce the amount of fugitive dust and vehicle emissions
    - Use directional drilling to drill multiple wells from a single well pad;
    - use centralized water storage and delivery, well fracturing, gathering systems;
    - use water or dust suppressants to control fugitive dust on roads; and
    - control road speeds.

- Drilling BMPs to reduce rig emissions
  - Use cleaner diesel (Tier 2, 3, and 4) engines.
- Unplanned or emergency releases
  - Use high-temperature flaring if gas is not recoverable.
- Vapor recovery
  - Use enclosed tanks instead of open pits to reduce fugitive VOC emissions; and
  - use vapor recovery units on storage tanks.
- Inspection and maintenance
  - Use and maintain proper hatches, seals, and valves.

3.12.2.2 Dust Control

During construction, a watering truck may be kept on site and the access roads would be watered as necessary, especially during periods of high winds and/or low precipitation.

3.12.2.3 Utility Lines

All utility lines, including electric lines and other lines essential to oil well operations, would be installed underground.

3.12.2.4 Fire Control

Petro-Hunt would implement fire prevention and control measures including, but not limited to:

- requiring construction crews to carry fire extinguishers in their vehicles and/or equipment;
- training construction crews in the proper use of fire extinguishers; and
- contracting with the local fire district to provide fire protection.

3.12.2.5 Traffic

Construction personnel would stay within the approved ROW or would follow designated access roads.

3.12.2.6 Closed-Loop System

Petro-Hunt commits to using a closed-loop system.

3.12.2.7 Wildlife

During an informal Section 7 consultation with the USFWS, the following mitigation measures were agreed upon to reduce the potential impact to protected species.

3.12.2.7.1 Bald and Golden Eagle and Migratory Bird Protective Measures

- SWCA biologists conducted a 0.5-mile line-of-sight survey for eagle individuals and nests during their on-site environmental survey. No eagles or nests were observed within 0.5 mile of the proposed project area.
- Petro-Hunt would conduct all construction outside of the migratory bird breeding season (between February 1 and July 15); or, if construction occurs during bird breeding season, Petro-Hunt would either:
    - mow and maintain vegetation within the project construction area (access roads and well pads), weather permitting, prior to and during the breeding season to deter migratory birds from nesting in the project area until construction is underway; or
    - if the project areas are not mowed and maintained as indicated above, conduct an avian survey of the project area no greater than five days before construction begins, and if nests are discovered, notify BIA and USFWS.

3.12.2.7.2 ESA Protective Measures

- Piping Plover and its Designated Critical Habitat, Interior Least Tern, and Pallid Sturgeon: Petro-Hunt commits to constructing a 18-inch berm for controlling influential runoff, and additional berms, as needed and agreed to during the on-site inspection, which would hold a minimum 110% of the capacity of the largest tank plus one full day's production, placed around the location to prevent any accidental release of drilling fluids or hazardous materials into the watersheds of Lake Sakakawea. Migratory bird protective measures would be enforced.
- Whooping Crane: If a whooping crane is sighted within 1 mile of the proposed project area, work would be stopped and the BIA and USFWS would be notified. In coordination with the USFWS, work may resume after the bird(s) leaves the area.

It is the opinion of the USFWS that Petro-Hunt's commitment to implement the avoidance measures described above demonstrates compliance with the ESA, MBTA, and BGEPA. Copies of the USFWS letters resulting from the informal Section 7 consultation are provided in Appendix C.

3.12.2.8 Cultural Resources

Petro-Hunt recognizes the need to protect cultural resources on the project locations and has committed to the following.

- Prohibiting all project workers from collecting artifacts or disturbing cultural resources in any area under any circumstances.
- Avoiding impacts to National Register-eligible or unevaluated cultural resources on well sites and access roads. If cultural resources are discovered during construction or operation, work shall immediately be stopped, the affected site be secured, and BIA and THPO notified. In the event of a discovery, work shall not resume until written authorization to proceed has been received from the BIA.

3.13 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Removal and consumption of oil and/or gas from the Bakken/Three Forks Formation would be an irreversible and irretrievable commitment of resources. Other potential resource commitments include land area devoted to the disposal of cutting, soil lost to erosion (i.e., wind and water), unintentionally destroyed or damaged cultural resources, wildlife mortality as a result of collision with vehicles (i.e., construction machinery and work trucks), and energy expended during construction and operation.

3.14 SHORT-TERM USE VERSUS LONG-TERM PRODUCTIVITY

Short-term development activities would not detract significantly from long-term productivity, and use, of the project areas. The construction of the access road and well pad would eliminate any forage or habitat use by wildlife and/or livestock. Any allottees to which compensation for land disturbance is owed would be properly compensated for the loss of land use. The initial disturbance area would decrease considerably once the wells are drilled and non-necessary areas have been reclaimed. Rapid reclamation of the project area would facilitate revived wildlife and livestock usage, stabilize the soil, and reduce the potential for erosion and sedimentation.

3.15 CUMULATIVE IMPACTS

Environmental impacts may accumulate either over time or in combination with similar events in the area. Unrelated and dissimilar activities may also have negative impacts on critical elements, thereby contributing to the cumulative degradation of the environment. For purposes of this analysis, the CIAA is considered to be all lands within a 20-mile radius of the project area.

Past and current disturbances in the CIAA include farming, grazing, roads, and other oil and gas wells, both on the Reservation and off. Although the project area is surrounded on all sides by Reservation lands, land ownership is not relevant to the assessment of cumulative impacts except as it is predictive of future impacts. Farming and grazing activities occur on the Reservation regardless of the density of oil and gas development, since undivided interests in the land surface, range permits, and agricultural leases are often held by different tribal members than those holding mineral rights, such that economic benefits of both agricultural and oil and gas activities currently co-exist.

Over the past several years, exploration has accelerated over the Bakken/Three Forks Formation. Existing oil and gas wells within 1 mile, 5 miles, 10 miles, and 20 miles of the project area are shown in Table 3-17. Existing oil and gas development has been occurring for several years on private fee land surrounding the Reservation, such that many more wells currently exist off the Reservation, as shown in Table 3-17 and Figures 3-9 through 3-11.

Table 3-17. Number of Confidential, Active, and Permitted Wells Surrounding the Project Area.

Well Type	Fort Berthold #148-94-9C-4-3H, 4H, 5H		Fort Berthold #148-94-20C-21-4H, 5H		Fort Berthold #148-94-21A-20-1H, 2H, 3H	
1-mile CIAA						
Reservation (on/off)	on	off	on	off	on	off
Active Wells	1	-	0	-	2	-
Confidential Wells	1	-	4	-	3	-
Permitted Wells	0	-	0	-	0	-
Cumulative total active and confidential wells within 1-mile CIAA	2		4		5	
5-mile CIAA						
Reservation (on/off)	on	off	on	off	on	off
Active Wells	20	-	14	0	18	0
Confidential Wells	71	-	57	0	62	0
Permitted Wells	2	-	2	0	2	0
Cumulative total active and confidential wells within 5-mile CIAA	93		73		82	
10-mile CIAA						
Reservation (on/off)	on	off	on	off	on	off
Active Wells	89	11	63	40	81	13
Confidential Wells	138	19	114	27	131	19
Permitted Wells	4	0	4	0	4	0
Cumulative total active and confidential wells within 10-mile CIAA	261		248		248	
20-mile CIAA						
Reservation (on/off)	on	off	on	off	on	off
Active Wells	261	408	175	440	189	403
Confidential Wells	235	124	226	138	235	129
Permitted Wells	9	1	9	1	9	1
Cumulative total active and confidential wells within 20-mile CIAA	1,038		989		966	

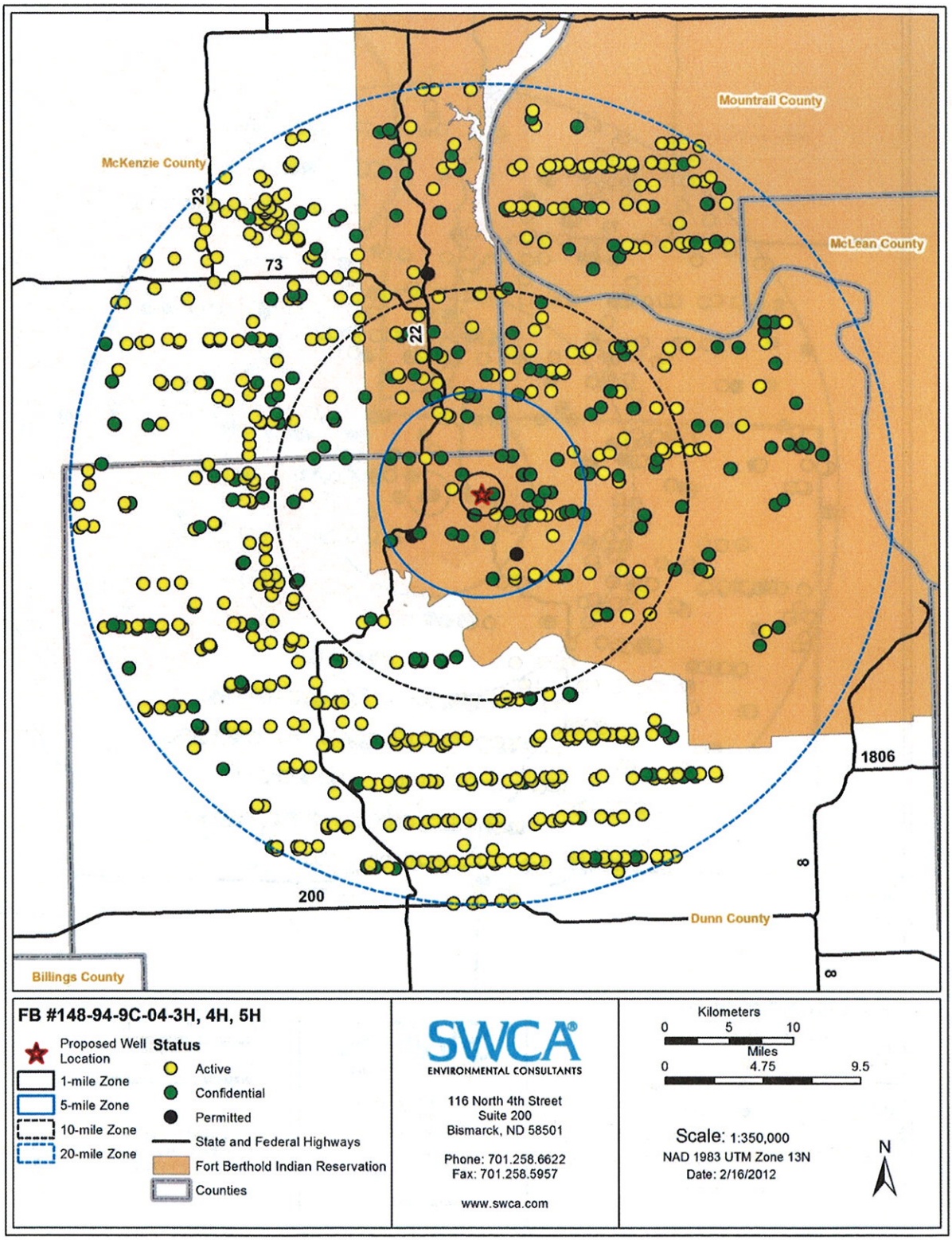


Figure 3-9. Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed Fort Berthold #148-94-9C-4-3H, 4H, 5H well pad location.

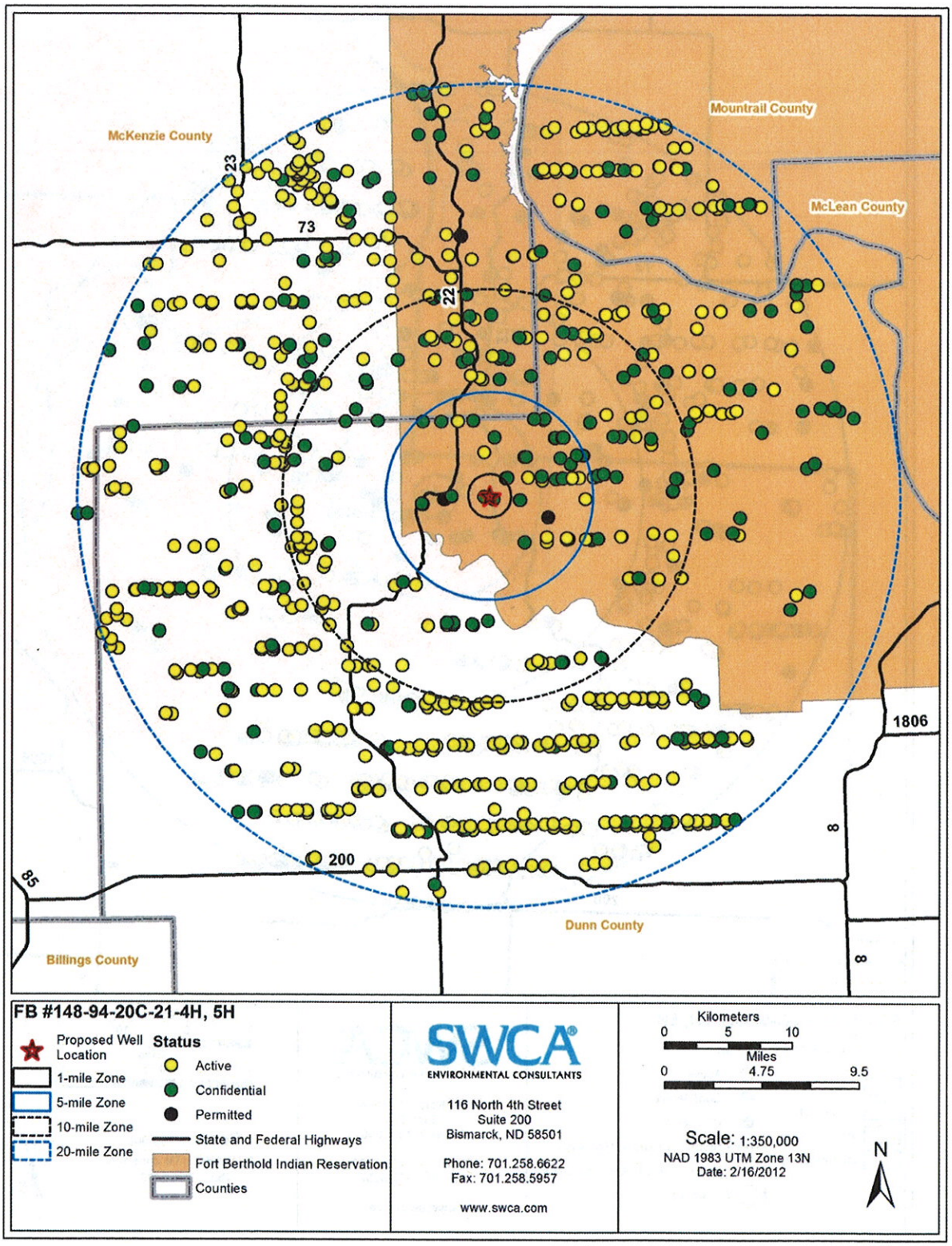


Figure 3-10. Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed Fort Berthold #148-94-20C-21-4H, 5H well pad location.

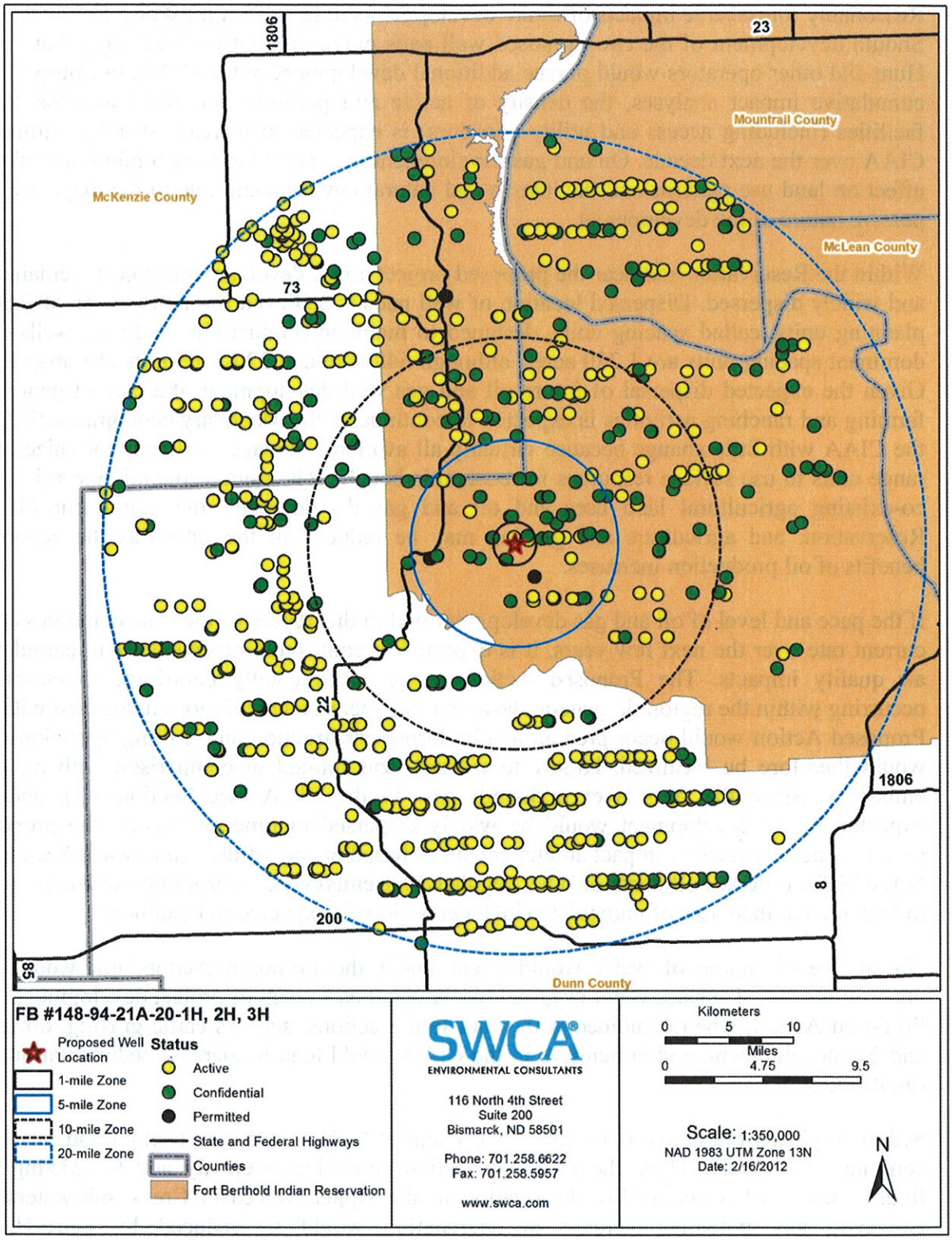


Figure 3-11. Existing and projected future oil and gas development within a 1-, 5-, 10-, and 20-mile radius of the proposed Fort Berthold #148-94-21A-20-1H, 2H, 3H well pad location.

Reasonably foreseeable impacts of future developments in the CIAA must also be considered. Should development of the two proposed well pads prove productive, it is likely that Petro-Hunt and other operators would pursue additional development in the CIAA. For purposes of cumulative impact analyses, the density of active and permitted oil wells and associated facilities (including access and utility corridors) is expected to increase steadily within the CIAA over the next decade. Oil and gas development is expected to have a minor cumulative effect on land use patterns and the human and natural environment, due to the dispersed and passive nature of the development.

Within the Reservation and near the proposed project areas, development projects remain few and widely dispersed. Dispersed location of well pads is achieved through the use of federal planning units, called spacing units, designed to maintain productivity of future wells. The dominant spacing units are 1,280 acres, although 640-acre and 320-acre units also may exist. Given the expected dispersal of future oil and gas well development, the current pattern of farming and ranching activities is expected to continue as the secondary economic activity in the CIAA with little change because virtually all available acreage is already organized into range units to use surface resources for economic benefit. The same economic incentives for co-existing agricultural land uses and oil and gas development may not occur off the Reservation, and agriculture and grazing may be reduced in the future as the economic benefits of oil production increases.

If the pace and level of oil and gas development within this region of the state continues at the current rate over the next few years, it is expected to contribute incrementally to cumulative air quality impacts. The Proposed Action would incrementally contribute to emissions occurring within the region. In general, however, the increase in emissions associated with the Proposed Action would occur predominantly during construction and drilling operations and would therefore be localized, largely temporary, and limited in comparison with regional emissions. Since the AQI is exceptionally low in the CIAA (see Section 3.2), and the expected future development would be widely dispersed in time and space, the proposed project is not expected to impact attainment status based on any of the Primary and Secondary NAAQS for criteria pollutants or other regulated air emissions. Contribution of the proposal to incremental increases of unregulated GHG emissions is expected to be minor.

No surface discharge of water would occur under the Proposed Action, nor would any unpermitted use of surface water or groundwater occur as a result of project development. The Proposed Action, when combined with other future actions, such as cattle grazing, other oil and gas development, and agriculture in the CIAA would tend to increase sedimentation and runoff rates.

Sediment yield from active roadways could occur at higher rates than background rates and continue indefinitely. Thus, the Proposed Action could incrementally add to existing and future sources of water quality degradation in the Upper Moccasin Creek sub-watershed. However, any potential increase in degradation would be reduced by Petro-Hunt's commitment to minimizing disturbance, using erosion control measures as necessary, and implementing BMPs designed to reduce impacts.

Unlike well pads, active roadways are not typically reclaimed, thus sediment yield from roads can continue indefinitely at rates two to three times the background rate. The Proposed Action would create 0.76 mile of roads in the CIAA, adding incrementally to existing and future impacts to soil resources, dust deposition, and erosion processes. New well field developments would be speculative until APDs are submitted to the BLM and BIA for approval. Additional wells are likely to be drilled in the same general area as the proposed project, using many of the same main access roads and minimizing the disturbance as much as possible.

Petro-Hunt is committed to using BMPs to mitigate the potential effects of erosion. BMPs would include implementing erosion and sedimentation control measures, such as installing culverts with energy dissipating devices at culvert outlets to avoid sedimentation in ditches, constructing water bars in conjunction with slopes, planting cover crops to stabilize soil following construction and before permanent seeding takes place. Additional information regarding BMPs can be found in Section 3.12, Mitigation and Monitoring.

The Proposed Action would result in some loss of vegetation and ecological diversity of native mixed-grass prairie habitat. In addition, vegetation resources across the project area could be affected by foreseeable future energy development and surface disturbance in the CIAA. Continued oil and gas development within the CIAA could result in the loss, and further fragmentation, of native mixed-grass prairie habitat. Incremental impacts to quality native prairie may occur in the future from vegetation clearing and soil disturbance, soil loss, compaction, and increased encroachment of unmanaged invasive weed species. Past, present, and reasonably foreseeable future activities within the general area have reduced, and would likely continue to reduce, the amount of available habitat for certain listed species known to use native mixed-grass prairie habitats. Such impacts could be partially offset by avoidance of previously undisturbed prairie habitats, as well as implementation of soil and vegetation mitigation measures and BMPs. Cumulative impacts to vegetation and other biological resources are therefore expected to be minor.

Cumulatively, the potential impacts on various species and their habitats would be minimal. Currently, no adverse impacts have been identified for either the Reservation, or the adjacent areas. The BMPs designed to protect individual species and classes of species of interest would protect most of the remaining species also both locally and cumulatively.

Significant archaeological resources are irreplaceable and often unique; any destruction or damage of such resources can be expected to diminish the archaeological record as a whole. However, no such damage or destruction of significant archaeological resources is anticipated as a result of the Proposed Action, as these resources would be avoided. Therefore, no cumulative impacts to the archaeological record would occur as a result of implementation of the proposal.

The Proposed Action would incrementally add to existing and future socioeconomic impacts in the general area. The Proposed Action includes development of three new well pads, which would be an additional source of revenue for some residents of the Reservation. Increases in employment would be temporary during the construction, drilling, and completion phases of

the proposed project. Therefore, little change in employment would be expected over the long term.

No significant negative impacts are expected to affect any element of the human and natural environment; impacts would generally be low and mostly temporary from both a context and intensity standpoint. Current impacts from oil and gas-related activities are still fairly dispersed, and the required BMPs would limit potential impacts. The cumulative impacts from activities on the Reservation are still limited enough to not appear to be significant also. This is being studied currently by a programmatic EA. Cumulative impacts over the entire field have not been assessed. Information available to the authors of this report from the State of North Dakota indicates all impacts are non-significant also by the standards in 40 CFR 1500.8.28.

Concerns regarding fracturing fluids contamination of aquifers in natural gas formations outside of the Bakken/Three Forks Formation that are commonly used for drinking water, as described in Section 2.2.6 of this document, have been recently investigated by the EPA (EPA 2010e). Aquifers identified in Table 3-3 of this document include the Sentinel Butte Formation which is used for drinking water and occurs at depths of 0 to 670 feet below ground surface, while the deepest aquifer identified in the project area, the Fox Hills Formation, occurs at depths of 1,100 to 2,000 feet below ground surface. By contrast, the oil wells proposed in this undertaking would achieve depths no shallower than approximately 10,900 feet below ground surface, well below any known aquifer in the project area. Additionally, as laid out in Section 2.2.5 of this document, surface casing would be employed to a depth of 2,500 feet below ground surface to isolate all near surface aquifers. Potentially as a result of the disparity in depths of the aquifers and oil wells, no direct or indirect impacts have yet been identified with fracturing in the Bakken/Three Forks Formation.

Petro-Hunt has committed to implementing interim reclamation of the access road, gathering pipelines, and well pads immediately following construction and completion. Implementation of both interim and permanent reclamation measures would decrease the magnitude of cumulative impacts.

4.0 CONSULTATION AND COORDINATION

The BIA must continue to make efforts to solicit the opinions and concerns of all stakeholders (Table 4-1). For the purpose of this EA, a stakeholder is considered any agency, municipality, or individual person to which the proposed action may affect either directly or indirectly in the form of public health, environmental, or socioeconomic issues. A scoping letter declaring the location of the proposed project areas and explaining the actions proposed at each site was sent in advance of this EA to allow stakeholders ample time to submit comments or requests for additional information (Appendix D). With the exception of the USFWS concurrence letter, no other comments or suggestions were received from stakeholders. Additionally, a copy of this EA would be submitted to all cooperating federal agencies and also to those agencies with interests in or near the proposed actions that could be affected by those actions.

Table 4-1. Scoping Comments.

Organization	Name	Comment	Response
Barnes County Municipal Airport, Manager	Lindemann, Larry	No Comment	
Bureau of Indian Affairs	Bercier, Marilyn	No Comment	
Bureau of Land Management	Bagley, Lonny	No Comment	
Bureau of Land Management	Nash, Mike	No Comment	
Dunn County	Hauck, Reinhard	No Comment	
Dunn County	Kadrmas, Ray	No Comment	
Enerplus Resources (USA) Corporation	Rachel Overbey	No Comment	
EOG Resources, Inc.	Smith, Heather	No Comment	
Federal Aviation Administration	Obenauer, Steve	[Patricia Dressler] No objection proved the FDD is notified of construction or alterations as required by Federal Aviation Regulation, Part 77, Objects Affecting Navigable Airspace, Paragraph 77.9.	No construction of objects affecting navigable airspace is planned.
Federal Emergency Management Agency	Kyner, David	Major concern is whether or not project is located within a mapped Special Flood Hazard Area.	Project area is not in a flood hazard area. Please see Section 3.3 *Water Resources*.
Fort Berthold Agency	Turcotte, Daryl	No Comment	
Fort Berthold Rural Water Director, Three Affiliated Tribes	Danks, Marvin	No Comment	
Garrison Project Office Corps of Engineers, Omaha District	Manager	No Comment	
Indian Affairs Commission	Davis, Scott	No Comment	
Killdeer, Weydahl Field	Hoffman, Warren	No Comment	
McKenzie County	Cayko, Richard	No Comment	
McKenzie County	Olson, Frances	No Comment	
McKenzie Electric Cooperative	Thorson, Gary	No Comment	

Organization	Name	Comment	Response
McLean County Board of Commissioners	Hudson-Schenfisch, Julie	No Comment	
McLean Electric Cooperative, Inc.	Rudolph, Reginald	No Comment	
Mercer County County Courthouse		No Comment	
Midcontinent Cable Company	Boyd, Bill	No Comment	
Minot AirForce Base	Chief Missile Engineer	No Comment	
Montana Dakota Utilities	Dixon, Doug	No Comment	
Mountrail Board of County Commissioners, Chairman	Hynek, David	No Comment	
National Parks Service	Chevance, Nick	No Comment	
New Town Municipal Airport	Johnson, Harley	No Comment	
Natural Resources Conservation Service	Ulmer, Michael	[Wade Bott] NRCS recommends that wetland impacts be avoided.	See section 3.5 *Wetlands*.
NoDak Electric Cooperative, Inc.	Berg, George	No Comment	
North Dakota Department of Health	Glatt, David	Impacts will be minor and can be controlled by proper construction methods.	See Sections 2.2.10 *Construction Details* and 3.12 *Mitigation and Monitoring* for site-specific details and BMPs.
North Dakota Department of Transportation	Peterson, Walter	No Comment	
North Dakota Game and Fish Department	McKenna, Mike	[Greg Lick] Recommend that construction be avoided to the extent possible within native prairies, wooded draws, riparian corridors, and wetland areas.	The project location was selected by Petro-Hunt, their consultants, and the tribe to minimize impact to the environment.
North Dakota Parks and Recreation Dept.	Prchal, Doug	No Comment	
Northern Border Pipeline Company	Attn: Land Department	No Comment	
Parshall-Hankins Field Airport	Kuehn, John	No Comment	

Organization	Name	Comment	Response
Petro-Hunt, LLC	Herman, Jeff	No Comment	
Reservation Telephone Cooperative	Jarski, Tim	No Comment	
Sisseton-Wahpeton Sioux Tribe, Chairman	Selvage, Michael	No Comment	
Southwest Water Authority	Massad, Mary	No Comment	
Spirit Lake Sioux Tribe	Pearson, Myra	No Comment	
Standing Rock Sioux Tribe, Chairman	Murphy, Charles	No Comment	
State Historical Society	Paaverud, Merl	Send copy of reports and forms to keep archives current.	Reports will be sent to the required agencies. See Section 3.8 *Cultural Resources*.
THPO, Three Affiliated Tribes	Crows Breast, Elgin	No Comment	
Three Affiliated Tribes	Brugh, V. Judy	No Comment	
Three Affiliated Tribes	Fox, Fred	No Comment	
Three Affiliated Tribes	NAGRPA Office	No Comment	
Three Affiliated Tribes	Natural Resources Dept.	No Comment	
Three Affiliated Tribes	Packineau, Mervin	No Comment	
Three Affiliated Tribes	Poitra, Fred	No Comment	
Three Affiliated Tribes	Strahs, Arnold D.	No Comment	
Three Affiliated Tribes	Whitecalfe, Frank	No Comment	
Three Affiliated Tribes	Williams, Damon	No Comment	
Three Affiliated Tribes		No Comment	
Three Affiliated Tribes, Chairman	Hall, Tex	No Comment	
Turtle Mountain Band of Chippewa	Ferris, Kade M.	No Comment	
U.S. Army Corps of Engineers	Cimarosti, Dan	[Matthew Mikulecky] Send copy of reports and forms to keep archives current.	Reports will be sent to the required agencies. See Section 3.8 *Cultural Resources*.

Organization	Name	Comment	Response
U.S. Army Corps of Engineers	Laux, Eric	[Brad Thompson] Acknowledges receipt of letter. Project is not within USACE owned or operated lands so no floodplain or flood risk information is provided.	Thank you for your comment.
U.S. Army Corps of Engineers	Sorensen, Charles	USACE recommends the construction of a catch trench on the downward slope side of the well location to contain any hazardous materials, using a closed loop drilling system, and if possible, construction should occur between August 15 and April 1 (February 1 if trees are present).	See Section 2.2.10 *Construction Details*, for information regarding berms. Petro-Hunt will construct a berm around the location to contain all hazardous materials. The wells will utilize a closed-loop system.
U.S. Bureau of Reclamation	Nelson, Richard	No Comment	
U.S. Department of Agriculture (NRCS)	Podell, Mary E.	No Comment	
U.S. Dept of Ag, Forest Serv/Natl Grassland	Hecker, Ron	No Comment	
U.S. Environmental Protection Agency	Dhieux, Joyce	No Comment	
U.S. Environmental Protection Agency	Hefferman, Dan	No Comment	
U.S. Environmental Protection Agency	Svoboda, Larry	No Comment	
U.S. EPA - NEPA	Bohan, Suzanna	No Comment	
U.S. Environmental Protection Agency	Truskowski, Brent	No Comment	
Ward County Board of Commissioners	Erickson, Carroll	No Comment	
West Plains Electric Cooperative, Inc.	Schelkoph, David	No Comment	

Organization	Name	Comment	Response
Western Area Power Administration	Paulson, Gerald	No Comment	
Williams Productions RMT Co.	Head, Jennifer	No Comment	
Williams Productions RMT Co.	Klitzka, Nelson	No Comment	
Xcel Energy	Manager	No Comment	
Zenergy Operating Company, LLC	Bryan, Kelley	No Comment	

5.0 LIST OF PREPARERS

An interdisciplinary team contributed to this document according to guidance provided in Part 1502.6 of CEQ regulations. This document was drafted by SWCA under the direction of the BIA. Information was compiled from various sources within SWCA.

SWCA Environmental Consultants

- Sarah Ruffo, Environmental Specialist

Prepared the EA.

- Mike Fettes, Environmental Specialist

Prepared scoping letters and created maps and spatially derived data.

- Jason Bivens, Environmental Specialist

Conducted natural resource surveys.

- Kyle McLean, Environmental Specialist

Conducted natural resource surveys.

- Levi Binstock, Environmental Specialist

Conducted natural resource surveys.

- Vinny Wray, Archaeologist

Conducted cultural resource surveys.

- Chandler Herson, Archaeologist

Conducted cultural resource surveys.

- Andrew Lantz, Archaeologist

Conducted cultural resource surveys.

- Jolene Schleicher, Archaeologist

Conducted cultural resource surveys and prepared cultural resource reports.

- Adam Leroy, Archaeologist

Conducted cultural resource surveys.

- Richard Wadleigh, NEPA Expert

Reviewed document for content and adequacy.

6.0 REFERENCES

Arthur, D.J., B.P.G. Bohm, and M. Layne. 2008. Hydraulic Fracturing Considerations for Natural Gas Wells of the Marcellus Shale. Presented at the Ground Water Protection Council 2008 Annual Forum, Cincinnati, Ohio, September 21–24, 2008.

Bryce, S., J.M. Omernik, D.E. Pater, M. Ulmer, J. Schaar, J. Freeouf, R. Johnson, P. Kuck, and S.H. Azevedo. 1998. Ecoregions of North Dakota and South Dakota. Jamestown, North Dakota: Northern Prairie Wildlife Research Center Online. Available online at http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/index.htm. Accessed April 30, 2010.

Bureau of Indian Affairs (BIA). 2001. 2001 American Indian population and labor force report. Available online at http://www.indianaffairs.gov/WhatWeDo/Knowledge/Reports/index.htm. Accessed December 2009.

———. 2005. 2005 American Indian population and labor force report. Available online at http://www.indianaffairs.gov/WhatWeDo/Knowledge/Reports/index.htm. Accessed December 2009.

Bureau of Labor Statistics. 2011a. Local area unemployment statistics. Available online at http://www.bls.gov/lau/tables.htm. Accessed January 26, 2011.

———. 2011b. Labor force data by county, not seasonally adjusted, October 2009–November 2010. Available online at http://www.bls.gov/lau/laucntycur14.txt. Accessed January 26, 2011.

Bureau of Land Management (BLM). 2009. Air Resource BMPs – Best Management Practices for Fluid Minerals. Available online at http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/technical_information.html. Accessed August 2009.

———. 2011. Erosion Control BMPs. Available online at http://www.blm.gov/pgdata/etc/medialib/blm/wo/MINERALS__REALTY__AND_RESOURCE_PROTECTION_/bmps.Par.3023.File.dat/O_Ch13_Erosion_Control.pdf. Accessed December 2011.

Bureau of Land Management (BLM) and U.S. Forest Service (USFS). 2007. Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development. BLM/WO/ST-06/021+3071/REV 07. Bureau of Land Management. Denver, Colorado. 84 pp.

Croft, M.G. 1985. Groundwater Resources of McKenzie County, North Dakota. Bulletin 80 – Part III. North Dakota Geological Survey.

Fort Berthold Housing Authority. 2008. Mandan, Hidatsa, Arikara Website. Available online at http://www.mhanation.com/main/history_economic_social.html. Accessed November 2009.

Energy Information Administration. 2006. Technology-based Oil and Natural Gas Plays: Shale Shock! Could there be Billions in the Bakken? Energy Information Administration, Office of Oil and Gas, Reserves and Production Division, November 2006.

Grah, O.J. 1997. Soils, Water, and Vegetation Resources Technical Report. Report prepared for the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project Environmental Impact Statement. Prepared for the Casper District Office, Bureau of Land Management, and Gary Holsan Environmental Planning, Thayne, Wyoming, by ECOTONE Environmental Consulting, Inc. Logan, Utah. 101 pp.

Intergovernmental Panel on Climate Change. 2007. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Core Writing Team, Pachauri, R.K. and Reisinger, A. (Eds.), Geneva, Switzerland. Available online at http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf. Accessed October 25, 2010.

Klausing, R.L. 1979. Groundwater Resources of Dunn County, North Dakota. Bulletin 68 – Part III. North Dakota Geological Survey.

Middick, A. 2011. Operations Monitoring and Spill Response Plan. Blackshare Environmental Solutions. Oklahoma City, Oklahoma.

National Park Service. 2010. Visibility Protection. Available online at http://www.nature.nps.gov/air/regs/visibility.cfm. Accessed October 4, 2010.

Natural Resources Conservation Service (NRCS). 2011. Web Soil Survey. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Available online at http://websoilsurvey.nrcs.usda.gov and http://soildatamart.nrcs.usda.gov. Accessed January 12, 2011.

North Dakota Department of Agriculture (NDDA). 2009. Noxious Weed List Survey - Reported Acres. Available online at http://www.agdepartment.com/weedsurvey/report.asp. Accessed May 6, 2010.

North Dakota Department of Health (NDDH) 2010. Air Quality: Ambient Monitoring Annual Reports. Available online at http://www.ndhealth.gov/AQ/AmbientMonitoring.htm. Accessed October 1, 2010.

North Dakota Indian Affairs Commission (NDIAC). 2011. Statewide data: Tribal population projections. Available online at http://www.nd.gov/indianaffairs/?id=37. Accessed February 7, 2011.

North Dakota State Water Commission. 2011. North Dakota State Water Commission Mapservice. Available online at http://mapservice.swc.state.nd.us/. Accessed November 2, 2010.

Peterson, J. 1995. Williston Basin Province, in U.S. Geological Survey 1995 National Assessment of United States Oil and Gas Resources, digital Data Series DDS-30, Release 2, CD-ROM.

Pew Center. 2009. Climate Change 101: Understanding and Responding to Global Climate Change. Available online at http://www.pewclimate.org/docUploads/Climate101-Complete-Jan09.pdf. Accessed October 25, 2010.

Ross, M. 1990. The Clean Air Act. Chapter 4 in M. A. Mantell, ed. Managing National Park System Resources: A Handbook of Legal Duties, Opportunities, and Tools. The Conservation Foundation, Washington, D.C.

Ruffo, J. 2009. Photograph of drilling rig in North Dakota. Personal photograph by Joshua Ruffo.

Schleicher, J. 2011a. A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold #148-94-9C-4-3H, 4H, 5H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. Submitted by SWCA Environmental Consultants to the Bureau of Indian Affairs-Great Plains Regional Office.

———. 2011b. A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold #148-94-20C-21-4H, 5H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. Submitted by SWCA Environmental Consultants to the Bureau of Indian Affairs-Great Plains Regional Office.

———. 2011c. A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold #148-94-21A-20-1H, 2H, 3H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. Submitted by SWCA Environmental Consultants to the Bureau of Indian Affairs-Great Plains Regional Office.

U.S. Bureau of Economic Analysis. 2009. Regional Economic Accounts. Local Area Personal Income. Table CA25 – Total Employment by Industry. Available online at http://www.bea.gov/. Accessed December 2009.

———. 2011a. Regional economic accounts. Local area personal income. Table CA25 – Total Employment by Industry. Available online at http://www.bea.gov/regional/reis/scb.cfm. Accessed January 24, 2011.

———. 2011b. Regional economic accounts. State annual personal income. Table SA25N-Total Full-time and Part-time Employment by NAICS Industry. Available online at http://www.bea.gov/regional/spi/action.cfm. Accessed January 24, 2011.

U.S. Census Bureau. 2009a. Small area income and poverty estimates. Available online at http://www.census.gov//did/www/saipe/county.html. Accessed January 26, 2011.

———. 2009b. Building permits (county). Available online at http://www.census.gov/const/www/permitsindex.html. Accessed December 1, 2009.

———. 2010. Economic Research Service. County-level unemployment and median household income for North Dakota. Available online at http://www.ers.usda.gov/Data/Unemployment/RDList2.asp?ST=ND. Accessed January 26, 2011.

———. 2011a. Resident population data. Available online at http://2010.census.gov/2010census/data/apportionment-pop-text.php. Accessed January 24, 2011.

———. 2011b. State & County QuickFacts. Available online at http://quickfacts.census.gov/qfd/states/38000.html. Accessed January 24, 2011.

———. 2011c. USA counties. Available online at http://censtats.census.gov/cgi-bin/usac/usatable.pl. Accessed January 24, 2011.

U.S. Department of Agriculture (USDA). 2011. Economic Research Service; County level unemployment and median household income for North Dakota. Available online at http://www.ers.usda.gov/data/unemployment/RDList2.asp?ST=ND. Accessed March 11, 2011.

U.S. Environmental Protection Agency (EPA). 1998. Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses. Office of Federal Activities, U.S. Environmental Protection Agency.

———. 1999. Emission Inventory Improvement, Volume II, Chapter 10. Preferred and Alternative Methods for Estimating Air Emissions from Oil and Gas Field Production and Processing Operations. Available online at http://www.epa.gov/ttnchie1/eiip/techreport/volume02/ii10.pdf. Accessed October 25, 2010.

———. 2004. Evaluation of impacts to underground sources of drinking water by hydraulic facturing of coalbed methane reservoirs study. EPA 816-R-04-033. Available online at http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/wells_coalbedmethanestudy.cfm. Accessed November 9, 2011.

———. 2010a. National Ambient Air Quality Standards (NAAQS). Available online at http://www.epa.gov/air/criteria.html. Accessed October 4, 2010.

———. 2010b. Air Quality Indices, by County. Available online at http://www.epa.gov/cgi-bin/broker?grtype=CGM&dbtype=TSV&rpp=25&reqtype=viewdata&_service=airdata&_program=progs.webprogs.msummary.scl&_debug=2&geotype=st&geocode=ND&geoname=North+Dakota&mpol=aqi_days&myear=2008. Accessed October 4, 2009.

———. 2010c. Climate Change-Science. Available online at http://www.epa.gov/climatechange/emissions/. Accessed October 25, 2010.

———. 2010d. Climate Change-Regulatory Initiatives. Available online at http://www.epa.gov/climatechange/initiatives/index.html. Accessed October 25, 2010.

———. 2010e. Hydraulic Fracturing. Available online at http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm. Accessed December 06, 2010.

———. 2011. Hydraulic fracturing. Available online at http://water.epa.gov/type/groundwater/uic/class2/hydraulicfracturing/index.cfm. Accessed March 9, 2011.

U.S. Fish and Wildlife Service (USFWS). 2009. National Wetlands Inventory: Wetlands Online Mapper. Available online at http://westlandsfew.er.usgs.gov/wtlnds/launch.html. Accessed January 4, 2010.

———. 2010. County Occurrence of Endangered, Threatened, and Candidate Species and Designated Critical Habitat in North Dakota. Available online at http://www.fws.gov/northdakotafieldoffice/county_list.htm. Accessed October 14, 2010.

U.S. Geological Survey. 2010. Ecoregions of North and South Dakota. Available online at http://www.npwrc.usgs.gov/resource/habitat/ndsdeco/nodak.htm. Accessed April 30, 2010.

Williams, B.B., and M.E. Bluemle. 1978. Status of Mineral Resource Information for the Fort Berthold Indian Reservation, North Dakota. Administrative Report BIA-40. 35 pp.

7.0 ACRONYMS

°F	degrees Fahrenheit
APD	Application for Permit to Drill
AQI	Air Quality Index
BGEPA	Bald and Golden Eagle Protection Act
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH_4	methane
CIAA	cumulative impact analysis area
CO	carbon monoxide
CO_2	carbon dioxide
CWA	Clean Water Act
EA	environmental assessment
EJ	Environmental Justice
EPA	Environmental Protection Agency
ESA	Endangered Species Act
GHG	greenhouse gas
H_2S	hydrogen sulfide
HAP	hazardous air pollutant
HF	hydraulic fracturing
HUC	hydrologic unit code
MBTA	Migratory Bird Treaty Act
MHA Nation	Three Affiliated Tribes of the Mandan, Hidatsa, and Arikara Nation
NAAQS	National Ambient Air Quality Standards
N_2O	nitrous oxide
NDDA	North Dakota Department of Agriculture
NDDH	North Dakota Department of Health
NEPA	National Environmental Policy Act
NO_2	nitrogen dioxide
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
O_3	ozone
PM	particulate matter
ROW	right-of-way
SO_2	sulfur dioxide
THPO	Tribal Historic Preservation Officer
TRNP	Theodore Roosevelt National Park
USC	United States Code
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound

APPENDIX A

Species Accounts and Effects Determinations

Species Accounts and Affects Determinations

Endangered Species Act

Black-footed Ferret (*Mustela nigripes*)
Affects Determination: No Effect

Black-footed ferrets are nocturnal, solitary carnivores of the weasel family that have been largely extirpated from the wild primarily due to range-wide decimation of the prairie dog (*Cynomys* sp.) ecosystem (Kotliar et al. 1999). They have been listed by the U.S. Fish and Wildlife Service (USFWS) as endangered since 1967, and have been the object of extensive re-introduction programs (USFWS 2010a). Ferrets inhabit extensive prairie dog complexes of the Great Plains, typically composed of several smaller colonies in proximity to one another that provide a sustainable prey base. The *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (USFWS 1989) states that ferrets require black-tailed prairie dog (*Cynomys ludovicianus*) towns or complexes greater than 80 acres in size, and towns of this dimension may be important for ferret recovery efforts (USFWS 1988a). Prairie dog towns of this size are not found in the project area. In addition, this species has not been observed in the wild for more than 20 years. The proposed project will have **no effect** on this species.

Gray Wolf (*Canis lupus*)
Affects Determination: No Effect

The gray wolf, listed as endangered in the United States in 1978 (USFWS 1978), was believed extirpated from North Dakota in the 1920s and 1930s with only sporadic reports from the 1930s to present (Licht and Huffman 1996). 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 that have occurred within North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). The Turtle Mountains region in 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 17.4 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 2010b). Due to a lack of forested habitat and 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, in particular road construction as a result of oil and gas development, may further act as a barrier against wolf recolonization in western North Dakota. Therefore, the proposed project will have **no effect** on the gray wolf.

Whooping Crane (*Grus americana*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

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 U.S. Fish and Wildlife Service 2007).

The July 2010 total wild population was estimated at 383 (USFWS 2010c). 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 U.S. Fish and Wildlife Service 2007; USFWS 2010c). Dunn and McKenzie 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 U.S. Fish and Wildlife Service 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 U.S. Fish and Wildlife Service 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 1 kilometer (km) 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 U.S. Fish and Wildlife Service 2007:18). In these cases, they roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

Suitable whooping crane foraging habitat was not observed near the project area. However, project precautionary measures would be implemented if a whooping crane is sighted within 1 mile of the project area. Petro-Hunt would cease all construction activities and notify the Bureau of Indian Affairs (BIA) and USFWS of the sighting, should a whooping crane be spotted within 1 mile of the project area. As a result, the proposed project **may affect, but is not likely to adversely affect,** the endangered whooping crane.

Piping Plover (*Charadrius melodus*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The piping plover is a small shorebird which breeds only in three geographic regions of North America: the Atlantic Coast, the Northern Great Plains, and the Great Lakes. Piping plover populations were federally listed as threatened and endangered in 1985, with the Northern Great Plains and Atlantic Coast populations listed as threatened, and the Great Lakes population listed as endangered (USFWS 1985a).

Plovers in the Great Plains make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars, and dredged material islands of major river systems (USFWS 2002, 2010d). The shorelines of lakes of the Missouri River constitute significant nesting areas for the bird. Piping plovers nest on the ground, making shallow scrapes in the sand, which they line with small pebbles or rocks (USFWS 1988b). Anthropogenic alterations of the landscape along rivers and lakes where piping plover nest

have increased the number and type of predators, subsequently decreasing nest success and chick survival (USFWS 2002, 2010d). The birds fly south by mid to late August to areas along the Texas coast and Mexico (USFWS 2002). The Northern Great Plains population has continued to decline despite federal listing, with population estimates of 1,500 breeding pairs in 1985 reduced to fewer than 1,100 in 1990. Low survival of adult birds has been identified as a factor (Root et al. 1992). Current conservation strategies include identification and preservation of known nesting sites, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 1988b, 2010d).

Suitable shoreline habitat for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea is a minimum of approximately 22.19 river miles and 2.85 straight line miles away from the proposed project. It is unlikely that migrating plovers would visit the project area during their migration. Therefore, the proposed project **may affect, but is not likely to adversely affect,** piping plovers.

Designated Critical Habitat of Piping Plover
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The USFWS has designated critical habitat for the Great Lakes and Northern Great Plains populations of piping plover (USFWS 2002). Designated Critical habitat for the piping plover includes 183,422 acres and 1,207.5 river miles of habitat, including areas near the proposed Project, along the shoreline of Lake Sakakawea in Dunn and McKenzie counties, North Dakota (USFWS 2002).

It is unlikely that the project will modify, alter, disturb, or affect the shoreline of Lake Sakakawea. Therefore, the proposed project **may affect, but is not likely to adversely affect,** designated critical habitat of the piping plover.

Interior Least Tern (*Sterna antillarum*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The population of the interior least tern is listed as endangered by the USFWS (1985b). This bird is the smallest member of the gull and tern family, measuring approximately 9 inches in length. Terns remain near flowing water, where they feed by hovering over and diving into standing or flowing water to catch small fish (USFWS 2010e).

The population of interior least terns breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, where they nest in small colonies. From late April to August, terns nest in a shallow hole scraped in an open sandy area, gravel patch, or exposed flat and bare sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. The adults continue to care for chicks after they hatch. Least terns in North Dakota will often be found sharing sandbars with the piping plover, a threatened species (USFWS 2010e).

Census data indicate over 8,000 interior least terns in the population. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone rivers upstream of Lake Sakakawea (USFWS 1990a, 2010e). Approximately 100 pairs breed in North Dakota (USFWS 2010e). Details of their

migration are not known, but their winter range is reported to include the Gulf of Mexico and Caribbean Islands (USFWS 1990a, 2010e).

Loss of suitable breeding and nesting habitat for terns has resulted from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. River and reservoir changes have led to reduced sandbar formation and other shoreline habitats for breeding, resulting in population declines. In addition, other human shoreline disturbances affect the species (USFWS 1990a). Critical habitat has not been designated for the species (USFWS 2010e).

Current conservation strategies include identification and avoidance of known nesting areas, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 2010e).

It is unlikely that terns would visit the upland habitats present in the project area. Therefore, the proposed project **may affect, but is not likely to adversely affect,** endangered least terns.

Pallid Sturgeon (*Scaphirhynchus albus*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The pallid sturgeon was listed as Endangered in 1990 in the United States by the USFWS (1990b). The primary factor leading to the decline of this species is the alteration of habitat through river channelization, creation of impoundments, and alteration of flow regimes (USFWS 1990b). These alterations within the Missouri River have blocked movements to spawning, feeding, and rearing areas, destroyed spawning habitat, altered flow conditions which can delay spawning cues, and reduced food sources by lowering productivity (USFWS 2007a). The fundamental elements of pallid sturgeon habitat are defined as the bottom of swift waters of large, turbid, free-flowing rivers with braided channels, dynamic flow patterns, flooding of terrestrial habitats, and extensive microhabitat diversity (USFWS 1990b).

The pallid sturgeon population which is found near the project area occurs from the Missouri River below Fort Peck Dam to the headwaters of Lake Sakakawea and the lower Yellowstone River up the confluence of the Tongue River, Montana (USFWS 2007a). This population consists of approximately 136 wild adult pallid sturgeon (USFWS 2007a). Hatchery reared sturgeon have also been stocked since 1998. The pallid sturgeon has been found to utilize the 25 km of riverine habitat that would be inundated by Lake Sakakawea at full pool (Bramblett 1996 per USFWS 2007a). Larval pallid sturgeons have also been found to drift into Lake Sakakawea. While the majority of pallid sturgeons are found in the headwaters of Lake Sakakawea, North Dakota Game and Fish have caught and released pallid sturgeon in nets set in 80 to 90 feet of water between the New Town and Van Hook area. Based on this information, pallid sturgeon could be found throughout Lake Sakakawea (personal communication, email from Steve Krentz, Pallid Sturgeon Project Lead, U.S. Fish and Wildlife Service, to Mike Cook, Aquatic Ecologist, SWCA Environmental Consultants, September 3, 2010).

Suitable habitat for pallid sturgeon does not occur in the project area, and Lake Sakakawea is a minimum of 22.19 river miles away from the proposed project. Potential pollution and

sedimentation occurring within the project area are concerns for downstream populations of endangered pallid sturgeon. Activities associated with the construction, production, or reclamation of the proposed project area are not anticipated to adversely affect water quality and subsequently the pallid sturgeon. Therefore, the proposed project **may affect, but is not likely to adversely affect,** pallid sturgeon.

Dakota Skipper (*Hesperia dacotae*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Dakota skipper is a small butterfly with a 1-inch wingspan and is found primarily in undisturbed native tall grass and upland dry Northern mixed grass prairie areas with a high diversity of wildflowers and grasses (Committee on the Status of Endangered Wildlife in Canada 2003). The Dakota skipper appears to require a range of precipitation-evaporation ratios between 60 and 105 and a soil pH between 7.2 and 7.9 (McCabe 1981). Larvae feed on grasses, favoring little bluestem. Adults commonly feed on nectar of flowering native forbs such as harebell (*Campanula rotundifolia*), wood lily (*Lilium philadelphicum*), and purple coneflower (*Echinacea angustifolia*). The species is threatened by conversion of native prairie to cultivated agriculture or shrublands, over-grazing, invasive species, gravel mining, and inbreeding (USFWS 2005). Suitable habitat does exist within the proposed project areas; therefore, the project **may affect, but is not likely to adversely affect,** this species. The use of best management practices and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

Sprague's Pipit (*Anthus spragueii*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Sprague's pipit is a small passerine bird that is native to the North American grasslands. It is a ground nester that breeds and winters on open grasslands and feeds mostly on insects and spiders and some seeds. The Sprague's pipit is closely tied with native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota, and South Dakota as well as south-central Canada (USFWS 2010f). Wintering occurs in the southern states of Arizona, Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and New Mexico. Sprauge's pipit are not known to occur within the project area; however, suitable habitat does occur. The proposed project **may affect, but is not likely to adversely affect,** this species. The use of best management practices and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

MIGRATORY BIRD TREATY ACT / THE BALD AND GOLDEN EAGLE PROTECTION ACT

Bald Eagle (*Haliaeetus leucocephalus*)

Status: Delisted in 2007; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

Effects of Project: No adverse effects anticipated

Suitable nesting or foraging habitat for bald eagles includes old growth trees relatively close (usually less than 1.24 miles [Hagen et al. 2005]) to perennial water bodies. The project area does not contain old growth trees and is located at the closest approximately 2.85 straight line miles from Lake Sakakawea. No nests or eagles were observed within 0.5 mile line-of-sight during the field surveys. Therefore, no adverse effects are anticipated. However, the possibility of transient, flying bald eagle individuals traversing the project area does exist.

Golden Eagle (*Aquila chrysaetos*)

Status: Not listed; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act

Effects of Project: No adverse effects anticipated

No eagles or nests were observed during the field surveys; however, golden eagles may occur within or near the project area. The closest known golden eagle nest occurs approximately 2.5 miles west-northwest of the proposed Fort Berthold #148-94-20C-21-4H, 5H well pad. The golden eagle 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. However, no primary or secondary indication of golden eagle presence, including nests, was observed within or near the project area during the field survey. Therefore, the project is unlikely to cause any adverse effects to golden eagles.

References Cited

Armbruster, M.J. 1990. Characterization of habitat used by whooping cranes during migration. Biological Rept. 90(4):1–16.

Bramblett, R.G. 1996. Habitats and movements of pallid and shovelnose sturgeon in the Yellowstone and Missouri Rivers, Montana and North Dakota. Doctoral dissertation. Montana State University, Bozeman.

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. International recovery plan for the whooping crane. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Committee on the Status of Endangered Wildlife in Canada. 2003. COSEWIC Assessment and Status Report on the Dakota Skipper *Hesperia dacotae* in Canada. Ottawa: Committee on the Status of Endangered Wildlife in Canada.

Hagen, S.K., P.T. Isakson, and S.R. Dyke. 2005. North Dakota Comprehensive Wildlife Conservation Strategy. North Dakota Game and Fish Department. Bismarck, ND.

Howe, M.A. 1987. Habitat use by migrating whooping cranes in the Aransas-Wood Buffalo corridor. Pages 303–311, in J. C. Lewis and J. W. Ziewitz, eds. Proc. 1985 Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.

———. 1989. Migration of radio-marked whooping cranes from the Aransas-Wood Buffalo population: Patterns of habitat use, behavior, and survival. USFWS Technical Report.

Kotliar, N.B., B.W. Baker, A.D. Whicker, and G. Plumb. 1999. A critical review of assumptions about the prairie dog as a keystone species. Environmental Management 24(2):177–192.

Licht, D.S., and S.H. Fritts. 1994. Gray wolf *(Canis lupus)* occurrences in the Dakotas. American Midland Naturalist 132:74–81.

Licht, D.S., and L.E. Huffman. 1996. Gray wolf status in North Dakota. The Prairie Naturalist 28(4):169–174.

McCabe, T.L. 1981. The Dakota skipper (*Hesperia dacotae* (Skinner): Range and biology, with special reference to North Dakota. Journal of the Lepidopterists' Society 35(3):179–193.

Root, B.G., Ryan, M.R., and Mayer, P.M., 1992. Piping plover survival in the Great Plains. Journal of Field Ornithology, Vol. 63, No. 1, pp. 10–15.

U.S. Fish and Wildlife Service (USFWS). 1978. Reclassification of the gray wolf in the United States and Mexico, with determination of critical habitat in Michigan and Minnesota. Federal Register 43(47):9607–9615.

———. 1985a. Endangered and Threatened Wildlife and Plants: Determination of Endangered and Threatened Status for the Piping Plover. Federal Register 50 (238):50726–50734.

———. 1985b. Interior population of the least tern. Federal Register 50 FR 21784–21792. May 28, 1985.

———. 1988a. Black-footed Ferret Recovery Plan. U.S. Fish and Wildlife Service. Denver, Colorado. 154 pp.

———. 1988b. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, MN. 160 pp.

———. 1989. Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver and Albuquerque: U.S. Fish and Wildlife Service.

———. 1990a. Interior Population of the Least Tern Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, MN. 160 pp.

———. 1990b. Endangered and threatened wildlife and plants; Determination of endangered status for the pallid sturgeon. Federal Register 55(173):36641–36647.

———. 2002. Designation of Critical Habitat for the Northern Great Plains Breeding Population of the Piping Plover; Final Rule. Federal Register. September 11, 2002 (Volume 67, Number 176), Rules and Regulations, pp. 57637–57717.

———. 2005. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule. Federal Register 70(90):24870–24934.

———. 2007a. Pallid sturgeon (*Scaphirhynchus albus)* 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Pallid Sturgeon Recovery Coordinator. Billings, Montana.

———. 2007b. Dakota skipper conservation guidelines *Hesperia dacotae* (Skinner) (Lepidoptera: Hesperiidae). U.S. Fish and Wildlife Service, Twin Cities Field Office. Available online at http://www.fws.gov/midwest/endangered/insects/dask-cons-guid2007.pdf. Accessed September 3, 2010.

———. 2010a. Black-footed ferret. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A004. Accessed September 7, 2010.

———. 2010b. Gray wolf. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A00D. Accessed September 7, 2010.

———. 2010c. Whooping crane. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B003. Accessed September 2, 2010.

———. 2010d. Piping plover. Available online at http://www.fws.gov/mountain-prairie/species/birds/pipingplover. Accessed September 7, 2010.

———. 2010e. Least Tern (Interior population). Available online at http://www.fws.gov/southwest/es/oklahoma/lestern.htm. Accessed September 7, 2010.

———. 2010f. Sprague's Pipit. Available online at http://www.fws.gov/mountain-prairie/species/birds/spraguespipit/index.html. Accessed December 28, 2010.

APPENDIX B

MHA THPO Consultation

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E., Suite 400
Aberdeen, South Dakota 57401

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

FEB 02 2012

Elgin Crows Breast, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Crows Breast:

We have considered the potential effects on cultural resources of a dual oil well pad in Dunn County, North Dakota. Approximately 17.19 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking. Catalogued as **BIA Case Number AAO-2057/FB/12**, the proposed undertaking, location, and project dimensions are described in the following report:

Schleicher, Jolene
(2012) A Class I and Class III Cultural Resource Inventory of the Petro-Hunt Fort Berthold #148-94-20C-21-4H, 5H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Petro-Hunt, LLC, Bismarck.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. We will adhere to the Standard Conditions of Compliance.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E., Suite 400
Aberdeen, South Dakota 57401

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

FEB 06 2012

Elgin Crows Breast, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Crows Breast:

We have considered the potential effects on cultural resources of a triple oil well pad in Dunn County, North Dakota. Approximately 44.01 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking. Catalogued as **BIA Case Number AAO-2057/FB/12**, the proposed undertaking, location, and project dimensions are described in the following report:

Schleicher, Jolene
(2012) A Class I and Class III Cultural Resources Inventory of the Petro-Hunt Fort Berthold #148-94-9C-4-3H, 4H, 5H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Petro-Hunt, LLC, Bismarck.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. We will adhere to the Standard Conditions of Compliance.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

ACTING Regional Director

Enclosure

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

United States Department of the Interior

BUREAU OF INDIAN AFFAIRS
Great Plains Regional Office
115 Fourth Avenue S.E., Suite 400
Aberdeen, South Dakota 57401

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
DESCRM
MC-208

FEB 08 2012

Elgin Crows Breast, THPO
Mandan, Hidatsa and Arikara Nation
404 Frontage Road
New Town, North Dakota 58763

Dear Mr. Crows Breast:

We have considered the potential effects on cultural resources of a triple oil well pad in Dunn County, North Dakota. Approximately 21.9 acres were intensively inventoried using a pedestrian methodology. Potential surface disturbances are not expected to exceed the area depicted in the enclosed report. No historic properties were located that appear to possess the quality of integrity and meet at least one of the criteria (36 CFR 60.4) for inclusion on the National Register of Historic Places. No properties were located that appear to qualify for protection under the American Indian Religious Freedom Act (42 USC 1996).

As the surface management agency, and as provided for in 36 CFR 800.5, we have therefore reached a determination of **no historic properties affected** for this undertaking. Catalogued as **BIA Case Number AAO-2057/FB/12**, the proposed undertaking, location, and project dimensions are described in the following report:

Schleicher, Jolene
(2012) A Class I and Class III Cultural Resources Inventory of the Petro-Hunt Fort Berthold #148-94-21A-20-1H, 2H, 3H Well Pad and Access Road, Fort Berthold Indian Reservation, Dunn County, North Dakota. SWCA Environmental Consultants for Petro-Hunt, LLC, Bismarck.

If your office concurs with this determination, consultation will be completed under the National Historic Preservation Act and its implementing regulations. We will adhere to the Standard Conditions of Compliance.

If you have any questions, please contact Dr. Carson N. Murdy, Regional Archaeologist, at (605) 226-7656.

Sincerely,

ACTING Regional Director

Enclosures

cc: Chairman, Three Affiliated Tribes
Superintendent, Fort Berthold Agency

APPENDIX C

U.S. Fish and Wildlife Service Informal Section 7 Consultation and Concurrence Letter

SWCA®
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

Bismarck Office
116 N. 4th Street, Suite 200
Bismarck, ND 58501
701.258.6622
www.swca.com

January 03, 2012

Jeffrey K. Towner
U.S. Fish and Wildlife Service
3425 Miriam Avenue
Bismarck, ND 58501

RE: Request for Concurrence Letter

Dear Mr. Towner,

The Bureau of Indian Affairs (BIA) is preparing an environmental assessment (EA) under the National Environmental Policy Act (NEPA), in cooperation with the Bureau of Land Management (BLM). The proposed action (Project) includes approval by the BIA and BLM for the construction, drilling, completion, and production of eight exploratory oil and gas wells on three associated well pads (Fort Berthold #148-94-20C-21-4H, -5H, Fort Berthold #148-94-21A-20-1H, -2H, -3H, and Fort Berthold #148-94-9C-04-3H, -4H, -5H) on the Fort Berthold Indian Reservation (Reservation) by Petro-Hunt, LLC (Petro-Hunt).

The proposed surface locations for the three well pads are summarized below, and illustrated in Figures 1 through 4.

- **Fort Berthold #148-94-20C-21-4H, -5H:** SW¼ SW¼ of Section 20, Township (T) 148 North (N), Range (R) 94 West (W), Dunn County, North Dakota
- **Fort Berthold #148-94-21A-20-1H, -2H, -3H:** SE¼ NE¼ of Section 21, T148N, R94W, Dunn County, North Dakota
- **Fort Berthold #148-94-9C-04-3H, -4H, -5H:** SE¼ SW¼ of Section 9, T148N, R94W, Dunn County, North Dakota

Mr. Towner
January 4, 2012
Page 2

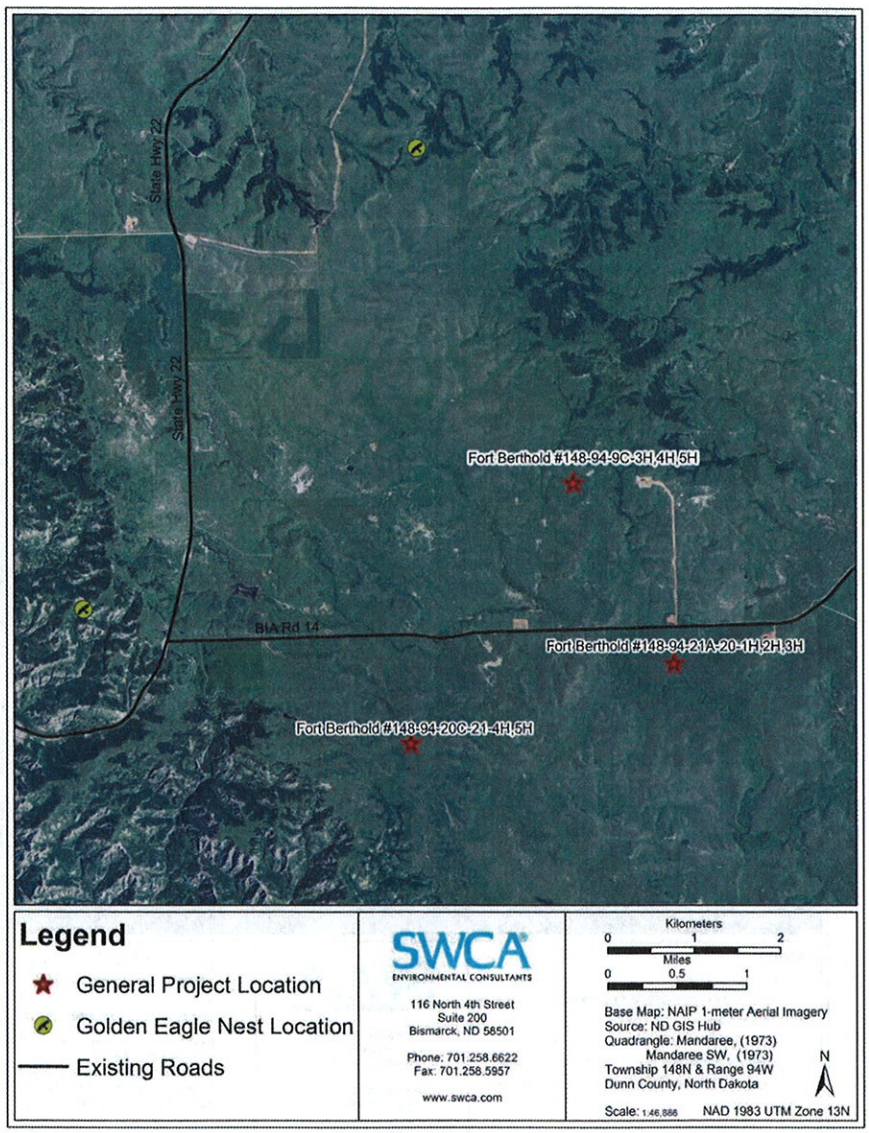


Figure 1. Proposed project overview map.

Mr. Towner
January 4, 2012
Page 3

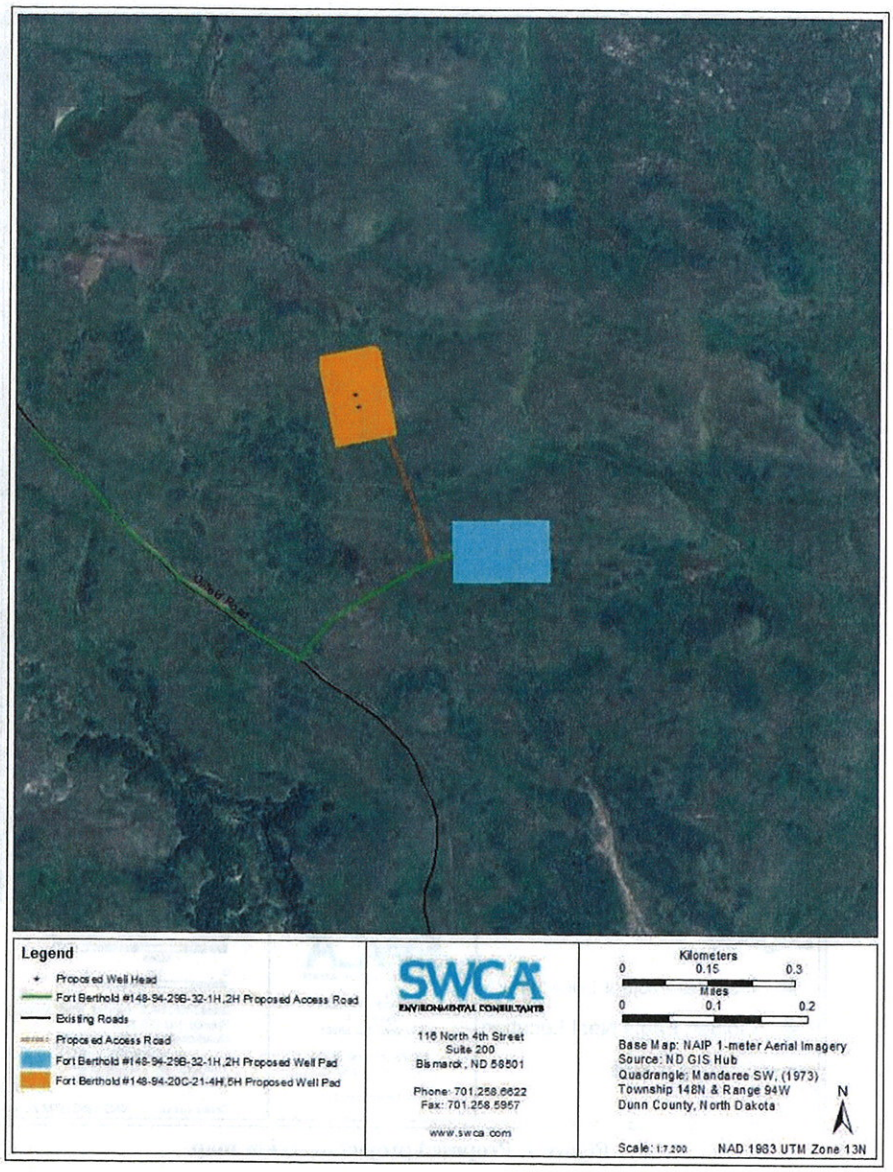


Figure 2. Proposed Fort Berthold #148-94-20C-21-4H, -5H well pad and access road location.

Mr. Towner
January 4, 2012
Page 4

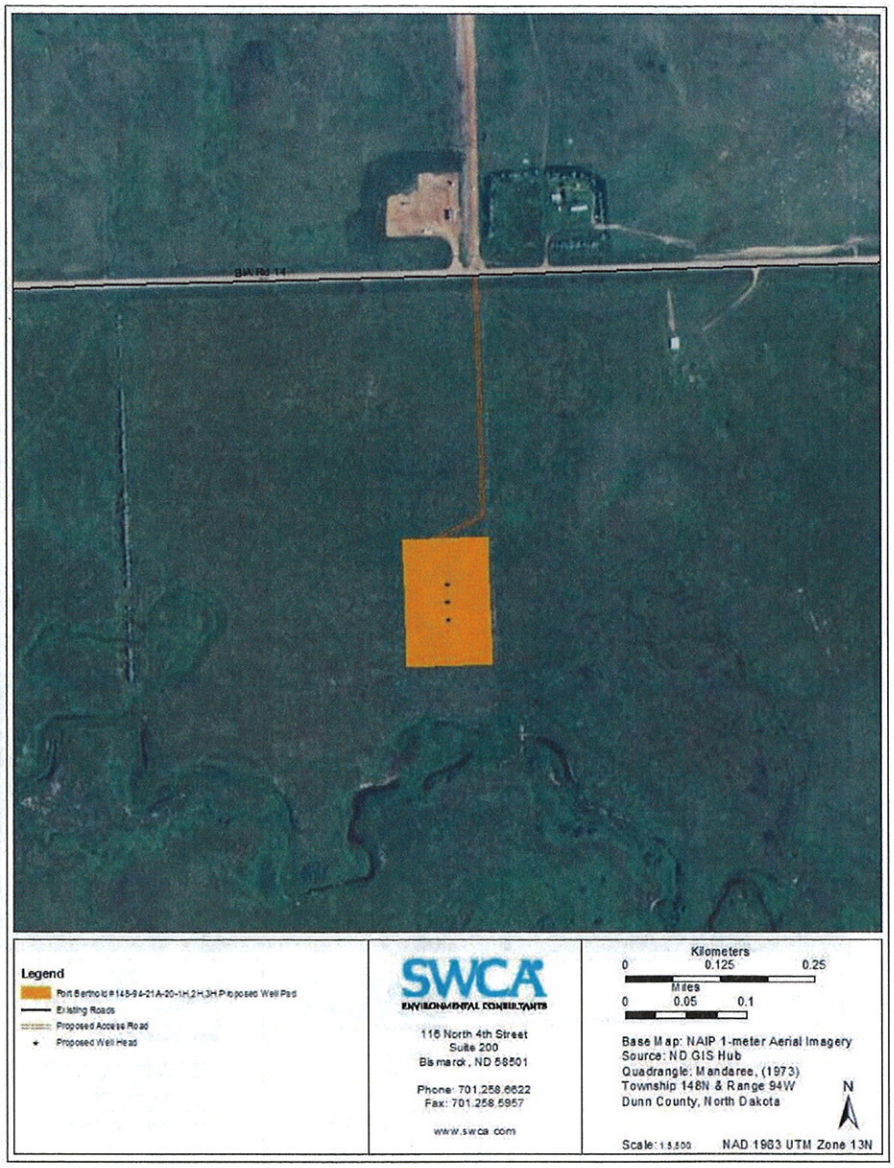


Figure 3. Proposed Fort Berthold #148-94-21A-20-1H, -2H, -3H well pad and access road location.

Mr. Towner
January 4, 2012
Page 5

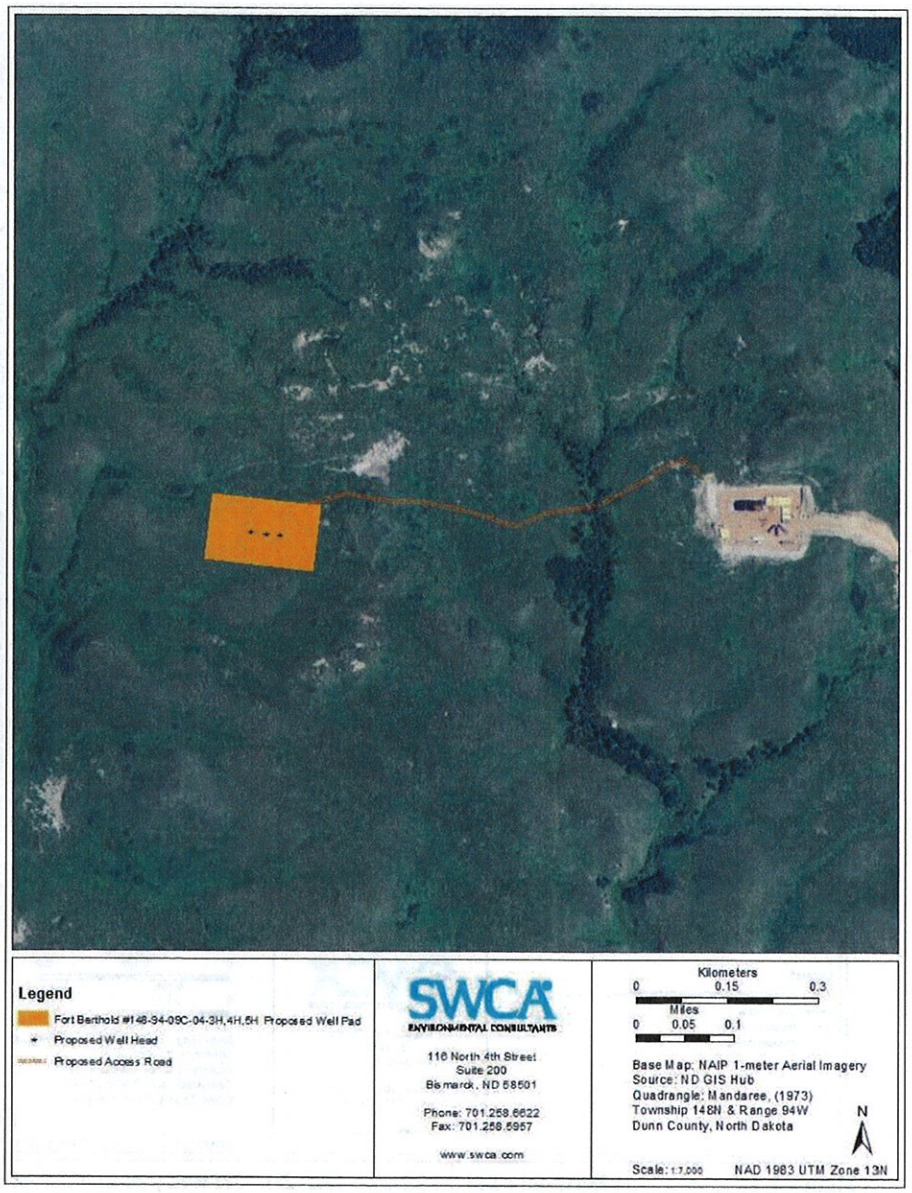


Figure 4. Proposed Fort Berthold #148-94-9C-04-3H, -4H, -5H well pad and access road location.

The associated facilities required by the Project would include roads, utility lines, production facilities (production tanks), gathering pipelines, and equipment storage facilities. Trucking will initially occur until gathering pipeline can be installed. Construction of the proposed access roads would utilize a 100-foot-wide purchased right-of-way (ROW). Petro-Hunt would use existing roads and previous disturbances to the greatest extent practicable. In total, the construction of the access roads and well pads would encompass approximately 9.3 acres and 23.1 acres, respectively (Table 1).

Table 1. Proposed Well Pad Locations and Biological Observations for Project Area.

Proposed Well Pad Name	Area of Disturbance and Location	Biological Observations
Fort Berthold #148-94-20C-21-4H, -5H	7.6-acre well pad	Habitat Type: Native Prairie
	684.6-foot, 1.6-acre access road	Vegetation observed: cudweed sagewort (*Artemisia ludoviciana*), little bluestem (*Schizachyrium scoparium*), western yarrow (*Achillea millefolium*), and Kentucky bluegrass (*Poa pratensis*)
	SW¼ SW¼ Section 20, T148N, R94W, Dunn County, North Dakota	Wildlife observations: No raptors or nests, or threatened and endangered species observed. The nearest known golden eagle nest is approximately 2.5 miles west-northwest of the proposed well pad (Figure 1).
Fort Berthold #148-94-21A-20-1H, -2H, -3H	7.0-acre well pad	Habitat Type: Rangeland
	1,232.0-foot, 2.8-acre access road	Vegetation observed: smooth brome (*Bromus inermis*), fringed sage (*Artemisia frigida*), alfalfa (*Medicago sativa*), silver buffaloberry (*Shepherdia argentea*), and common dandelion (*Taraxacum officinale*)
	SE¼ NE¼ Section 21, T148N, R94W, Dunn County, North Dakota	Wildlife observations: No raptors or nests, or threatened and endangered species observed. The nearest known golden eagle nest is approximately 4.1 miles northwest of the proposed well pad (Figure 1).
Forth Berthold #148-94-9C-04-3H, -4H, -5H	8.5-acre well pad	Habitat Type: Herbaceous Upland
	2,119.5-foot, 4.9-acre access road	Vegetation Observed: Kentucky bluegrass, fringed sagewort,needle and thread grass (*Hesperostipa comata*), western snowberry (*Symphoricarpos occidentalis*), and Canada goldenrod (*Solidago canadensis)*
	SE¼ SW ¼ Section 9, T148N, R94W, Dunn County, North Dakota	Wildlife Observations: No raptors or nests, or threatened and endangered species observed. The nearest known golden eagle is approximately 2.7 miles northwest of the proposed well pad (Figure 1).

Wildlife and Habitat Observations

SWCA Environmental Consultants (SWCA) biologists conducted wetland/waterbody and wildlife surveys, including threatened and endangered species habitat assessments on May 3, May 19, June 6, and July 20, 2011. Vegetation and wildlife habitats observed in the vicinity of each proposed well pad are summarized in Table 1.

Project Area Hydrology

The project area is located within the Upper Moccasin Creek (Hydrologic Unit Code [HUC] 101102050604) sub-watershed; the Waterchieff Bay (HUC 1011020506) watershed; and Lower Little Missouri River (HUC 10110205) drainage basin. Table 2 provides the nearest perennial stream and the surface water runoff distance to Lake Sakakawea for each proposed well pad. Figure 4 illustrates the surface water runoff direction for each proposed well pad. The distance from Lake Sakakawea to the project area ranges from 22.19 to 25.49 river miles. No wetlands were identified during surveys of the project area, however SWCA observed two intermittent streams during the survey of the Fort Berthold #148-94-9C-4-3H, -4H, -5H well pad. The nearest wetland identified on the National Wetlands Inventory (NWI) map of the project area is approximately 0.109 mile from the nearest proposed well pad or access road, as shown in Table 2.

Best management practices (BMPs) will be implemented for all ground-disturbing activities, as required by the Clean Water Act (CWA). With the implementation of all the provisions of the CWA National Pollutant Discharge Elimination System, including federal requirements for implementation of adequate Spill Prevention, Control and Countermeasures during drilling and construction, no impacts to water resources are anticipated.

Table 2. Proposed Well Pad Distances to Wetlands, Perennial Streams, and River Miles to Lake Sakakawea.

Proposed Well Pad Name	Nearest Wetland (NWI) (Miles)	Nearest Waterbody (River Miles)	River Miles to Lake Sakakawea
Fort Berthold #148-94-20C-21-4H,- 5H	0.212	0.556 (Intermittent stream)	24.83
Fort Berthold #148-94-21A-20-1H, -2H,- 3H	0.109	0.109 (Moccasin Creek)	22.19
Fort Berthold #148-94-9C-04--3H, -4H, -5H	0.167	0.167 (Intermittent stream)	25.49

Mr. Towner
January 4, 2012
Page 8

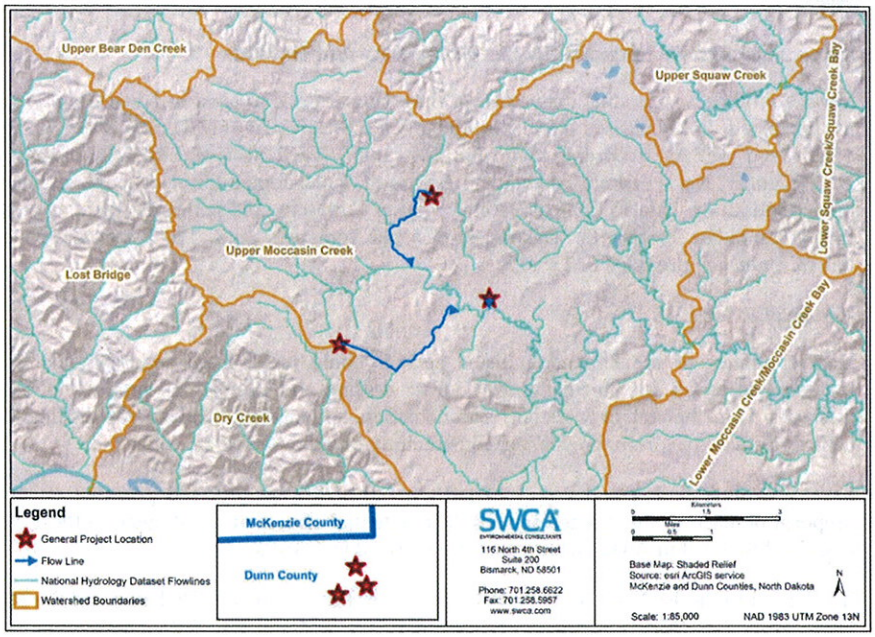


Figure 4. Watersheds and surface runoff.

Threatened and Endangered Species Occurrence and Habitat

Several wildlife species that may exist, or have been known to exist in Dunn County, are listed as threatened or endangered under the Endangered Species Act (16 United States Code [USC] 1531 et seq.) (ESA). According to the U.S. Fish and Wildlife Service (USFWS), listed species in Dunn County, North Dakota, include the gray wolf, black-footed ferret, whooping crane, piping plover and its Designated Critical Habitat, interior least tern, and pallid sturgeon, as well as two federal candidate species, the Dakota skipper and Sprague's pipit. The listed species and their federal status are provided in Table 3.

Potential Effects

Indirect effects of the Project on listed species could result from anthropogenic influences including increases in vehicular traffic during drilling and commercial production, as well as indirectly from habitat degradation, sedimentation, or accidental release of drilling fluids or hazardous materials from the drilling, construction, or operation of the wells.

SWCA wildlife biologists have evaluated the status, life history, and potential effects of the proposal on each of these listed species. The potential effects of the Project on these species is described in detail in Attachment 1, and summarized in Table 3.

In addition to the ESA, the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA) protect nesting migratory bird species. With implementation of the protective and other specific measures identified in Table 3, and Owner-Committed Measures discussed in this letter, the proposed Project is unlikely to adversely affect bald or golden eagles or nesting migratory birds.

Table 3. Summary of Potential Effects to Threatened and Endangered Species.

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Black-footed Ferret (*Mustela nigripes*)	Endangered	Species is presumed extirpated from North Dakota.	None	No Effect
Gray Wolf (*Canis lupus*)	Endangered	Nearest known gray wolf populations exist in Minnesota, Canada, Montana, and Wyoming. Western North Dakota sightings in the late twentieth century are speculated to be solitary, transient, young adult males seeking to establish territory.	None	No Effect

Mr. Towner
January 4, 2012
Page 10

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Whooping Crane (*Grus americana*)	Endangered	No adverse impact is anticipated as a result of construction activities.	Drilling or construction activity will cease and the Bureau of Indian Affairs (BIA) and U.S. Fish and Wildlife Service will be notified if whooping cranes are sighted within 1 mile of the project area. Activities may commence when the birds have left the 1-mile buffer area.	May Affect, Is Not Likely to Adversely Affect
Piping Plover (*Charadrius melodus*)	Threatened	Birds are unlikely to be present due to lack of suitable foraging or nesting habitat. The nearest suitable nesting and foraging habitat occurs on the shoreline and islands of Lake Sakakawea, approximately 2.85 straight line miles from the proposed well pads and access road.	Petro-Hunt will use a closed-loop drilling system for all three proposed well pads. Petro-Hunt will surround each proposed well pad with a 110% daily volume containment berm to prevent hazardous runoff or spills.	May Affect, Is Not Likely to Adversely Affect
Designated Critical Habitat for Piping Plover	Designated Critical Habitat	Critical Habitat occurs within the watershed of the project area, on the shoreline and islands of Lake Sakakawea, between approximately 22.19 to 25.49 river miles from the proposed well pads and access road.	Petro-Hunt will implement all best management practices (BMPs), erosion control measures, and spill prevention practices required by the Clean Water Act. Petro-Hunt will use a closed-loop drilling system for each proposed well pad. Petro-Hunt will surround each proposed well pad with a 110% daily volume containment berm to prevent hazardous runoff or spills.	May Affect, Is Not Likely to Adversely Affect

Mr. Towner
January 4, 2012
Page 11

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Interior Least Tern (*Sterna antillarum*)	Endangered	The nearest suitable nesting and foraging habitat occurs on the shoreline and islands of Lake Sakakawea, approximately 22.19 to 25.49 river miles, and 2.85 straight line miles from the proposed well pads and access road. Migrating or foraging interior least terns may transition through the project area.	See Designated Critical Habitat protective measures for piping plover.	May Affect, Is Not Likely to Adversely Affect
Pallid Sturgeon (*Scaphirhynchus albus*)	Threatened	Lake Sakakawea is between 22.19 and 25.49 river miles from the proposed well pads and access road.	See Designated Critical Habitat protective measures for piping plover.	May Affect, Is Not Likely to Adversely Affect
Dakota Skipper (*Hesperia dacotae*)	Candidate	No adverse impact is anticipated as a result of construction activities.	The proposed well pads will be reclaimed as soon as possible after their lifespan is complete. Impacted areas will be returned to pre-construction contours.	May Affect, Is Not Likely to Adversely Affect
Sprauge's Pipit (*Anthus spragueii*)	Candidate	No adverse impact is anticipated as a result of construction activities.	The proposed well pads will be reclaimed as soon as possible after their lifespan is complete. Impacted areas will be returned to pre-construction contours.	May Affect, Is Not Likely to Adversely Affect
Other Federally Protected Species				
Bald Eagle (*Haliaeetus leucocephalus*)	BGEPA and MBTA	Raptor habitat survey was conducted. SWCA observed no suitable nesting or foraging habitat within the project area. Transient individuals may enter the project area on occasion.	A 0.5-mile line of sight survey was conducted during the initial field survey and no suitable nesting habitat was observed within the project area.	No Adverse Effects Anticipated

Species	Federal Status	Habitat Suitability or Known Occurrence	Operator-Committed Measures	Effects Determination
Golden Eagle (*Aquila chrysaetos*)	BGEPA and MBTA	No eagle nests were observed in the project area. Golden eagles may occasionally visit or forage within or around the project area.	A 0.5-mile line of sight survey was conducted during the initial field survey. The closest known golden eagle nest occurrence is approximately 2.5 miles west-northwest of the proposed Fort Berthold #148-94-20C-21-4H, -5H well pad.	No Adverse Effects Anticipated
Migratory Birds	MBTA	Suitable habitat for nesting migratory grassland birds occurs in the project area.	See migratory bird protective measures.	No Adverse Effects Anticipated

Owner-Committed Best Management Practices, Mitigation, and Safety Measures

Petro-Hunt has committed to implementing the following measures for all drilling, construction, and operations on the Reservation, including the proposed Project.

Construction and Design Measures

- Locate the proposed well pads and access roads in areas with existing disturbances to the extent possible.
- Implement approved Stormwater Pollution Prevention Plan and BMPs for the construction of each roadway and proposed well pad to prevent erosion and sedimentation.
- Lay matting and/or conduct hydro seeding on the fill side of each pad. Construct berms and install silt barrier fencing on the downslope sides of the proposed well pads.
- Install appropriately sized culverts.
- Install covers under drip buckets and spigots.
- Use a closed-loop drilling system.
- Conduct interim reclamation.
- Conduct reclamation without delay if a well is determined to be unproductive, or upon completion of commercial production.
- Grind trees and other woody material removed from the pad and add to the topsoil.
- Design roads and facility sites to minimize visual impacts.
- Use existing roads to the extent possible, upgrading as needed.
- Minimize the size of facility sites and types of roads to reduce surface disturbance.

- Minimize topsoil removal and stockpile stripped topsoil and protect it from erosion until reclamation activities commence.
- During reclamation, redistribute and seed the topsoil on the disturbed areas, and protect and maintain reclaimed areas until the sites are fully stabilized.
- Avoid removal of, or damage to, trees and woody shrubs where possible.
- Follow the contour (form and line) of the landscape.
- Avoid locating ROWs on steep slopes.
- Share any common ROWs whenever possible.
- Co-locate multiple lines in the same trench.
- Use natural (topography, vegetation) or artificial (berms) features to help screen facilities such as valves and metering stations.
- Paint facilities a color that would blend with the environment.
- Contour disturbed areas to approximate the original contours of the landscape.
- Develop a final reclamation plan that allows disturbed areas to be quickly absorbed into the natural landscape.
- Implement proper storage of chemicals (including secondary containment).
- Keep sites clean, including containing trash in a portable trash cage. The trash cage would be emptied at a state-approved sanitary landfill.
- Conduct snow removal activities in a manner that does not adversely impact reclaimed areas and areas adjacent to reclaimed areas.
- Avoid or minimize topographic alterations, activities on steep slopes, and disturbances within stream channels and floodplains to the extent possible.
- Require construction crews to carry fire extinguishers in their vehicles and/or equipment.
- Require construction crews be trained in the proper use of fire extinguishers.
- Plan transportation to reduce vehicle density.
- Avoid construction and vehicle use during wet conditions that could result in excessive rutting.

Bald and Golden Eagle Protective Measures

- SWCA biologists conducted a 0.5-mile line of sight survey from the project area for bald and golden eagle nests. No nests were observed. No previously recorded nests are known to be present within 0.5 mile of the project area.
- The nearest known golden eagle nest to the project area occurs approximately 2.5 miles west-northwest of the proposed Fort Berthold #148-94-20C-21-4H, -5H well pad.

Mr. Towner
January 4, 2012
Page 14

Migratory Bird Protective Measures

- Petro-Hunt will conduct all construction outside of the migratory bird breeding season (between July 16 and January 31); or, if construction occurs during the bird breeding season, Petro-Hunt will either:
    - mow, maintain, or completely remove vegetation within the Project construction area (access road and proposed well pad disturbance) prior to the migratory bird breeding season and maintain such conditions during the breeding season to deter migratory birds from nesting in the project area until construction is underway, weather conditions permitting; or
    - if the project area is not mowed and maintained as indicated above, conduct an avian survey of the project area no greater than five days before construction begins, and if nests are discovered, notify BIA and USFWS.
- Petro-Hunt will use a closed-loop drilling system and surround the proposed well pads with both a 110% daily volume primary containment and secondary containment berm.

ESA Protective Measures

- **Piping Plover and its Designated Critical Habitat, Interior Least Tern, and Pallid Sturgeon:** Erosion control mechanisms will be deployed to reduce the potential for sediment transport into drainages and subsequently Lake Sakakawea. The disturbed area will be reclaimed per the BIA's requirements as soon as practicable after construction is complete.
- **Whooping Crane:** If a whooping crane is sighted within 1 mile of the proposed project area, work will be stopped and the BIA and USFWS will be notified. In coordination with the USFWS, work may resume after the bird(s) leaves the area.
- Petro-Hunt will use a closed-loop drilling system for each of the proposed well pads and surround each proposed well pad with a 110% daily volume containment berm.

With the implementation of the above standard BMPs, general design measures, and species-specific measures, no riparian areas or wetlands would be directly or indirectly affected by the proposed access roads or proposed well pads.

No effects to black-footed ferret or gray wolf are anticipated because of the low likelihood of their occurrence in the proposed project area and other factors discussed in Attachment 1. With implementation of the protective and other specific measures identified in Table 3 and Owner-Committed Measures discussed in this letter, the proposed Project **may affect but is not likely to adversely affect** the whooping crane, piping plover and its Designated Critical Habitat, the interior least tern, and the pallid sturgeon.

Mr. Towner
January 4, 2012
Page 15

We are requesting a concurrence letter be sent before February 15, 2012, so that it may be addressed in the final EA. Please send the concurrence letter to the addresses below.

SWCA Environmental Consultants
Jason Bivens, Environmental Specialist
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501
(701) 258-6622
jbivens@swca.com

Bureau of Indian Affairs
Marilyn Bercier, Regional Environmental Scientist
115 4th Avenue SE
Aberdeen, South Dakota 57401
(605) 226-7656
Marilyn.Bercier@bia.gov

Sincerely,

Jason Bivens
Environmental Specialist

Enclosures: Attachment 1

ATTACHMENT 1 – SPECIES ACCOUNTS AND EFFECTS DETERMINATIONS

ENDANGERED SPECIES ACT

Black-footed Ferret (*Mustela nigripes*)
Affects Determination: No Effect

Black-footed ferrets are nocturnal, solitary carnivores of the weasel family that have been largely extirpated from the wild primarily due to range-wide decimation of the prairie dog (*Cynomys* sp.) ecosystem (Kotliar et al. 1999). They have been listed by the U.S. Fish and Wildlife Service (USFWS) as endangered since 1967, and have been the object of extensive re-introduction programs (USFWS 2010a). Ferrets inhabit extensive prairie dog complexes of the Great Plains, typically composed of several smaller colonies in proximity to one another that provide a sustainable prey base. The *Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act* (USFWS 1989) states that ferrets require black-tailed prairie dog (*Cynomys ludovicianus*) towns or complexes greater than 80 acres in size, and towns of this dimension may be important for ferret recovery efforts (USFWS 1988a). Prairie dog towns of this size are not found in the project area. In addition, this species has not been observed in the wild for more than 20 years. The proposed Project will have **no effect** on this species.

Gray Wolf (*Canis lupus*)
Affects Determination: No Effect

The gray wolf, listed as endangered in the United States in 1978 (USFWS 1978), was believed extirpated from North Dakota in the 1920s and 1930s with only sporadic reports from the 1930s to present (Licht and Huffman 1996). 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 that have occurred within North Dakota are believed to be young males seeking to establish territory (Hagen et al. 2005). The Turtle Mountains region in 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 17.4 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 2010b). Due to a lack of forested habitat and 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, in particular road construction as a result of oil and gas development, may further act as a barrier against wolf recolonization in western North Dakota. Therefore, the proposed Project will have **no effect** on the gray wolf.

Whooping Crane (*Grus americana*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

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 U.S. Fish and Wildlife Service 2007).

The July 2010 total wild population was estimated at 383 (USFWS 2010c). 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 U.S. Fish and Wildlife Service 2007; USFWS 2010c). Dunn and McKenzie 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 U.S. Fish and Wildlife Service 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 U.S. Fish and Wildlife Service 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 1 kilometer (km) 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 U.S. Fish and Wildlife Service 2007:18). In these cases, they roost on submerged sandbars in wide, unobstructed channels that are isolated from human disturbance (Armbruster 1990).

Suitable whooping crane foraging habitat was not observed near the project area. However, project precautionary measures would be implemented if a whooping crane is sighted within 1 mile of the project area. Petro-Hunt would cease all construction activities and notify the Bureau of Indian Affairs (BIA) and USFWS of the sighting, should a whooping crane be spotted within 1 mile of the project area. As a result, the proposed Project **may affect, but is not likely to adversely affect** the endangered whooping crane.

Piping Plover (*Charadrius melodus*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The piping plover is a small shorebird which breeds only in three geographic regions of North America: the Atlantic Coast, the Northern Great Plains, and the Great Lakes. Piping plover populations were federally listed as threatened and endangered in 1985, with the Northern Great Plains and Atlantic Coast populations listed as threatened, and the Great Lakes population listed as endangered (USFWS 1985a).

Plovers in the Great Plains make their nests on open, sparsely vegetated sand or gravel beaches adjacent to alkali wetlands, and on beaches, sand bars, and dredged material islands of major river systems (USFWS 2002, 2010d). The shorelines of lakes of the Missouri River constitute significant nesting areas for the bird. Piping plovers nest on the ground, making shallow scrapes in the sand, which they line with small pebbles or rocks (USFWS 1988b). Anthropogenic alterations of the landscape along rivers and lakes where piping plover nest have increased the number and type of predators, subsequently decreasing nest success and

chick survival (USFWS 2002, 2010d). The birds fly south by mid to late August to areas along the Texas coast and Mexico (USFWS 2002). The Northern Great Plains population has continued to decline despite federal listing, with population estimates of 1,500 breeding pairs in 1985 reduced to fewer than 1,100 in 1990. Low survival of adult birds has been identified as a factor (Root et al. 1992). Current conservation strategies include identification and preservation of known nesting sites, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 1988b, 2010d).

Suitable shoreline habitat for breeding and nesting plovers does not occur in the project area, and Lake Sakakawea is a minimum of approximately 22.19 river miles and 2.85 straight line miles away from the proposed Project. It is unlikely that migrating plovers would visit the project area during their migration. Therefore, the proposed Project **may affect, but is not likely to adversely affect** piping plovers.

Designated Critical Habitat of Piping Plover
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The USFWS has designated critical habitat for the Great Lakes and Northern Great Plains populations of piping plover (USFWS 2002). Designated Critical habitat for the piping plover includes 183,422 acres and 1,207.5 river miles of habitat, including areas near the proposed Project, along the shoreline of Lake Sakakawea in Dunn and McKenzie counties, North Dakota (USFWS 2002).

It is unlikely that the Project will modify, alter, disturb, or affect the shoreline of Lake Sakakawea. Therefore, the proposed Project **may affect, but is not likely to adversely affect** designated critical habitat of the piping plover.

Interior Least Tern (*Sterna antillarum*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The population of the interior least tern is listed as endangered by the USFWS (1985b). This bird is the smallest member of the gull and tern family, measuring approximately 9 inches in length. Terns remain near flowing water, where they feed by hovering over and diving into standing or flowing water to catch small fish (USFWS 2010e).

The population of interior least terns breeds in isolated areas along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, where they nest in small colonies. From late April to August, terns nest in a shallow hole scraped in an open sandy area, gravel patch, or exposed flat and bare sandbars along rivers, sand and gravel pits, or lake and reservoir shorelines. The adults continue to care for chicks after they hatch. Least terns in North Dakota will often be found sharing sandbars with the piping plover, a threatened species (USFWS 2010e).

Census data indicate over 8,000 interior least terns in the population. In North Dakota, the least tern is found mainly on the Missouri River from Garrison Dam south to Lake Oahe, and on the Missouri and Yellowstone rivers upstream of Lake Sakakawea (USFWS 1990a, 2010e). Approximately 100 pairs breed in North Dakota (USFWS 2010e). Details of their migration are not known, but their winter range is reported to include the Gulf of Mexico and Caribbean Islands (USFWS 1990a, 2010e).

Loss of suitable breeding and nesting habitat for terns has resulted from dam construction and river channelization on major rivers throughout the Mississippi, Missouri, and Rio Grande River systems. River and reservoir changes have led to reduced sandbar formation and other shoreline habitats for breeding, resulting in population declines. In addition, other human shoreline disturbances affect the species (USFWS 1990a). Critical habitat has not been designated for the species (USFWS 2010e).

Current conservation strategies include identification and avoidance of known nesting areas, public education, and limiting or preventing shoreline disturbances near nests and hatched chicks (USFWS 2010e).

It is unlikely that terns would visit the upland habitats present in the project area. Therefore, the proposed Project **may affect, but is not likely to adversely affect** endangered least terns.

Pallid Sturgeon (*Scaphirhynchus albus*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The pallid sturgeon was listed as Endangered in 1990 in the United States by the USFWS (1990b). The primary factor leading to the decline of this species is the alteration of habitat through river channelization, creation of impoundments, and alteration of flow regimes (USFWS 1990b). These alterations within the Missouri River have blocked movements to spawning, feeding, and rearing areas, destroyed spawning habitat, altered flow conditions which can delay spawning cues, and reduced food sources by lowering productivity (USFWS 2007a). The fundamental elements of pallid sturgeon habitat are defined as the bottom of swift waters of large, turbid, free-flowing rivers with braided channels, dynamic flow patterns, flooding of terrestrial habitats, and extensive microhabitat diversity (USFWS 1990b).

The pallid sturgeon population which is found near the project area occurs from the Missouri River below Fort Peck Dam to the headwaters of Lake Sakakawea and the lower Yellowstone River up the confluence of the Tongue River, Montana (USFWS 2007a). This population consists of approximately 136 wild adult pallid sturgeon (USFWS 2007a). Hatchery reared sturgeon have also been stocked since 1998. The pallid sturgeon has been found to utilize the 25 km of riverine habitat that would be inundated by Lake Sakakawea at full pool (Bramblett 1996 per USFWS 2007a). Larval pallid sturgeons have also been found to drift into Lake Sakakawea. While the majority of pallid sturgeons are found in the headwaters of Lake Sakakawea, North Dakota Game and Fish have caught and released pallid sturgeon in nets set in 80 to 90 feet of water between the New Town and Van Hook area. Based on this information, pallid sturgeon could be found throughout Lake Sakakawea (personal communication, email from Steve Krentz, Pallid Sturgeon Project Lead, U.S. Fish and Wildlife Service, to Mike Cook, Aquatic Ecologist, SWCA Environmental Consultants, September 3, 2010).

Suitable habitat for pallid sturgeon does not occur in the project area, and Lake Sakakawea is a minimum of 22.19 river miles away from the proposed Project. Potential pollution and sedimentation occurring within the project area are concerns for downstream populations of endangered pallid sturgeon. Activities associated with the construction, production, or reclamation of the proposed project area is not anticipated to adversely affect water quality and

subsequently the pallid sturgeon. Therefore, the proposed Project **may affect, but is not likely to adversely affect** pallid sturgeon.

Dakota Skipper (*Hesperia dacotae*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Dakota skipper is a small butterfly with a 1-inch wingspan and is found primarily in undisturbed native tall grass and upland dry Northern mixed grass prairie areas with a high diversity of wildflowers and grasses (Committee on the Status of Endangered Wildlife in Canada 2003). The Dakota skipper appears to require a range of precipitation-evaporation ratios between 60 and 105 and a soil pH between 7.2 and 7.9 (McCabe 1981). Larvae feed on grasses, favoring little bluestem. Adults commonly feed on nectar of flowering native forbs such as harebell (*Campanula rotundifolia*), wood lily (*Lilium philadelphicum*), and purple coneflower (*Echinacea angustifolia*). The species is threatened by conversion of native prairie to cultivated agriculture or shrublands, over-grazing, invasive species, gravel mining, and inbreeding (USFWS 2005). Suitable habitat does exist within the proposed project areas, therefore the Project **may affect, but is not likely to adversely affect** this species. The use of best management practices and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

Sprague's Pipit (*Anthus spragueii*)
Affect Determination: May Affect, Is Not Likely to Adversely Affect

The Sprague's pipit is a small passerine bird that is native to the North American grasslands. It is a ground nester that breeds and winters on open grasslands and feeds mostly on insects and spiders and some seeds. The Sprague's pipit is closely tied with native prairie habitat and breeds in the north-central United States in Minnesota, Montana, North Dakota, and South Dakota as well as south-central Canada (USFWS 2010f). Wintering occurs in the southern states of Arizona, Texas, Oklahoma, Arkansas, Mississippi, Louisiana, and New Mexico. Sprauge's pipit are not known to occur within the project area; however, suitable habitat does occur. The proposed Project **may affect, but is not likely to adversely affect** this species. The use of best management practices and conservation guidelines (USFWS 2007b) during construction and operation and immediate reclamation of short-term disturbance should decrease direct, indirect, and cumulative impacts to this species.

MIGRATORY BIRD TREATY ACT / THE BALD AND GOLDEN EAGLE PROTECTION ACT

Bald Eagle (*Haliaeetus leucocephalus*)
Status: Delisted in 2007; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

Suitable nesting or foraging habitat for bald eagles includes old growth trees relatively close (usually less than 1.24 miles [Hagen et al. 2005]) to perennial water bodies. The project area does not contain old growth trees and is located at the closest approximately 2.85 straight line

miles from Lake Sakakawea. No nests or eagles were observed within 0.5 mile line-of-sight during the field surveys. Therefore, no adverse effects are anticipated. However, the possibility of transient, flying bald eagle individuals traversing the project area does exist.

Golden Eagle (*Aquila chrysaetos*)
Status: Not listed; protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act
Effects of Project: No adverse effects anticipated

No eagles or nests were observed during the field surveys; however, golden eagles may occur within or near the project area. The closest known golden eagle nest occurs approximately 2.5 miles west-northwest of the proposed Fort Berthold #148-94-20C-21-4H, -5H well pad. The golden eagle 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. However, no primary or secondary indication of golden eagle presence, including nests, was observed within or near the project area during the field survey. Therefore, the Project is unlikely to cause any adverse effects to golden eagles.

References Cited

Armbruster, M.J. 1990. Characterization of habitat used by whooping cranes during migration. Biological Rept. 90(4):1–16.

Bramblett, R.G. 1996. Habitats and movements of pallid and shovelnose sturgeon in the Yellowstone and Missouri Rivers, Montana and North Dakota. Doctoral dissertation. Montana State University, Bozeman.

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. International recovery plan for the whooping crane. Ottawa: Recovery of Nationally Endangered Wildlife (RENEW), and U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Committee on the Status of Endangered Wildlife in Canada. 2003. COSEWIC Assessment and Status Report on the Dakota Skipper *Hesperia dacotae* in Canada. Ottawa: Committee on the Status of Endangered Wildlife in Canada.

Hagen, S.K., P.T. Isakson, and S.R. Dyke. 2005. *North Dakota Comprehensive Wildlife Conservation Strategy*. North Dakota Game and Fish Department. Bismarck, ND.

Howe, M.A. 1987. Habitat use by migrating whooping cranes in the Aransas-Wood Buffalo corridor. Pages 303–311, in J. C. Lewis and J. W. Ziewitz, eds. Proc. 1985 Crane Workshop. Platte River Whooping Crane Habitat Maintenance Trust and USFWS, Grand Island, Nebraska.

———. 1989. Migration of radio-marked whooping cranes from the Aransas-Wood Buffalo population: Patterns of habitat use, behavior, and survival. USFWS Technical Report.

Kotliar, N.B., B.W. Baker, A.D. Whicker, and G. Plumb. 1999. A critical review of assumptions about the prairie dog as a keystone species. Environmental Management 24(2):177–192.

Licht, D.S., and S.H. Fritts. 1994. Gray wolf *(Canis lupus)* occurrences in the Dakotas. *American Midland Naturalist* 132:74–81.

Licht, D.S., and L.E. Huffman. 1996. Gray wolf status in North Dakota. *The Prairie Naturalist* 28(4):169–174.

McCabe, T.L. 1981. The Dakota skipper (*Hesperia dacotae* (Skinner): Range and biology, with special reference to North Dakota. Journal of the Lepidopterists' Society 35(3):179–193.

Root, B.G., Ryan, M.R., and Mayer, P.M., 1992. Piping plover survival in the Great Plains. Journal of Field Ornithology, Vol. 63, No. 1, pp. 10–15.

U.S. Fish and Wildlife Service (USFWS). 1978. Reclassification of the gray wolf in the United States and Mexico, with determination of critical habitat in Michigan and Minnesota. Federal Register 43(47):9607–9615.

———. 1985a. Endangered and Threatened Wildlife and Plants: Determination of Endangered and Threatened Status for the Piping Plover. Federal Register 50 (238):50726–50734.

———. 1985b. Interior population of the least tern. Federal Register 50 FR 21784–21792. May 28, 1985.

———. 1988a. Black-footed Ferret Recovery Plan. U.S. Fish and Wildlife Service. Denver, Colorado. 154 pp.

———. 1988b. Great Lakes and Northern Great Plains Piping Plover Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, MN. 160 pp.

———. 1989. Black-footed Ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver and Albuquerque: U.S. Fish and Wildlife Service.

———. 1990a. Interior Population of the Least Tern Recovery Plan. U.S. Fish and Wildlife Service, Twin Cities, MN. 160 pp.

———. 1990b. Endangered and threatened wildlife and plants; Determination of endangered status for the pallid sturgeon. Federal Register 55(173):36641–36647.

———. 2002. Designation of Critical Habitat for the Northern Great Plains Breeding Population of the Piping Plover; Final Rule. Federal Register. September 11, 2002 (Volume 67, Number 176), Rules and Regulations, pp. 57637–57717.

———. 2005. Endangered and Threatened Wildlife and Plants; Review of Native Species that are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule. Federal Register 70(90):24870–24934.

———. 2007a. Pallid sturgeon (*Scaphirhynchus albus)* 5-year review summary and evaluation. U.S. Fish and Wildlife Service, Pallid Sturgeon Recovery Coordinator. Billings, Montana.

———. 2007b. Dakota skipper conservation guidelines *Hesperia dacotae* (Skinner) (Lepidoptera: Hesperiidae). U.S. Fish and Wildlife Service, Twin Cities Field Office. Available online at http://www.fws.gov/midwest/endangered/insects/dask-cons-guid2007.pdf. Accessed September 3, 2010.

———. 2010a. Black-footed ferret. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A004. Accessed September 7, 2010.

———. 2010b. Gray wolf. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A00D. Accessed September 7, 2010.

———. 2010c. Whooping crane. Available online at http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B003. Accessed September 2, 2010.

———. 2010d. Piping plover. Available online at http://www.fws.gov/mountain-prairie/species/birds/pipingplover. Accessed September 7, 2010.

———. 2010e. Least Tern (Interior population). Available online at http://www.fws.gov/southwest/es/oklahoma/lestern.htm. Accessed September 7, 2010.

———. 2010f. Sprague's Pipit. Available online at http://www.fws.gov/mountain-prairie/species/birds/spraguespipit/index.html. Accessed December 28, 2010.

SWCA
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

Bismarck Office
116 N. 4th Street, Suite 200
Bismarck, ND 58501
701.258.6622
www.swca.com

U.S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES
ND FIELD OFFICE

Project as described will have no significant impact on fish and wildlife resources. No endangered or threatened species are known to occupy the project area and/or are not likely to be adversely affected. IF PROJECT DESIGN CHANGES ARE MADE, PLEASE SUBMIT PLANS FOR REVIEW.

2-16-12 Jeffrey K. Towner
Date Jeffrey K. Towner
Field Supervisor

January 03, 2012

Jeffrey K. Towner
U.S. Fish and Wildlife Service
3425 Miriam Avenue
Bismarck, ND 58501

RE: Request for Concurrence Letter

Dear Mr. Towner,

The Bureau of Indian Affairs (BIA) is preparing an environmental assessment (EA) under the National Environmental Policy Act (NEPA), in cooperation with the Bureau of Land Management (BLM). The proposed action (Project) includes approval by the BIA and BLM for the construction, drilling, completion, and production of eight exploratory oil and gas wells on three associated well pads (Fort Berthold #148-94-20C-21-4H, -5H, Fort Berthold #148-94-21A-20-1H, -2H, -3H, and Fort Berthold #148-94-9C-04-3H, -4H, -5H) on the Fort Berthold Indian Reservation (Reservation) by Petro-Hunt, LLC (Petro-Hunt).

The proposed surface locations for the three well pads are summarized below, and illustrated in Figures 1 through 4.

- **Fort Berthold #148-94-20C-21-4H, -5H:** SW¼ SW¼ of Section 20, Township (T) 148 North (N), Range (R) 94 West (W), Dunn County, North Dakota
- **Fort Berthold #148-94-21A-20-1H, -2H, -3H:** SE¼ NE¼ of Section 21, T148N, R94W, Dunn County, North Dakota
- **Fort Berthold #148-94-9C-04-3H, -4H, -5H:** SE¼ SW¼ of Section 9, T148N, R94W, Dunn County, North Dakota

Mr. Towner
January 3, 2012
Page 15

We are requesting a concurrence letter be sent before February 15, 2012, so that it may be addressed in the final EA. Please send the concurrence letter to the addresses below.

SWCA Environmental Consultants
Jason Bivens, Environmental Specialist
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501
(701) 258-6622
jbivens@swca.com

Bureau of Indian Affairs
Marilyn Bercier, Regional Environmental Scientist
115 4th Avenue SE
Aberdeen, South Dakota 57401
(605) 226-7656
Marilyn.Bercier@bia.gov

Sincerely,

Jason Bivens
Environmental Specialist

Enclosures: Attachment 1

APPENDIX D

General Consultation and Scoping Letter

SWCA
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

Bismarck Office
116 North 4th St, Ste 200
Bismarck, ND 58501
701.258.6622
701.258.5298
www.swca.com

December 28, 2011

Dear Interested Party:

The Bureau of Indian Affairs (BIA), in cooperation with the Bureau of Land Management (BLM), is preparing an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA). The proposed action includes approval by the BIA and BLM for the construction, drilling, completion, and production of twelve exploratory oil and gas wells (3 dual pads, and 2 triple pads) located on the Fort Berthold Indian Reservation by Petro-Hunt, LLC (Petro-Hunt). The surface locations for these wells are proposed in the following locations and shown on the enclosed project location map.

- **Fort Berthold #148-94-20C-21-4H, -5H:** SW¼ SW¼ of Section 20, Township (T) 148 North (N), Range (R) 94 West (W), Dunn County, North Dakota
- **Fort Berthold #148-94-21A-20-1H, -2H, -3H:** SE¼ NE¼ of Section 21, T148N, R94W, Dunn County, North Dakota
- **Fort Berthold #148-94-9C-04-3H, -4H, -5H:** SE¼ SW¼ of Section 9, T148N, R94W, Dunn County, North Dakota
- **Fort Berthold #148-94-28A-33-1H, -2H:** NW¼ NE¼ Section 28 T148N R94W, Dunn County, North Dakota
- **Fort Berthold #148-94-19D-18-3H/ Fort Berthold #148-94-30A-31-3H:** SW¼ SE¼ of Section 19, T148N, R94W, Dunn County, North Dakota

All twelve proposed exploratory oil and gas wells will be located within their own 1,280-acre spacing unit. The wells will be positioned to utilize existing roadways for access to the greatest extent possible. The drilling of these well sites is proposed to begin as early as March 2012.

The associated facilities required by the project would include roads, utility lines, production facilities (production tanks), and equipment storage facilities. In general, oil would be stored on location in tank batteries and then hauled (or in the future sent via pipeline) to the nearest processing plant or sales point. Produced water would be transported by truck or pipeline to water disposal wells or enclosed tanks. Gas produced from these wells would initially be flared, then sent via pipeline to markets and processing points. Petro-Hunt would utilize existing roads and previous disturbances to the greatest extent practicable. Project development would result in the construction of approximately 1.01 miles of new or upgraded/improved roads and disturbance of approximately 30.7 acres for the construction of all five well pads.

To ensure that any affect on social, economic, and environmental issues are analyzed accurately, we solicit your views and comments on the proposed action, pursuant to Section 102(2) (D) (IV) of NEPA, as amended. We are interested in developments proposed or underway that should be considered in connection with the proposed project. We also ask your assistance in identifying any property or resources that you own, manage, oversee, or otherwise value that might be adversely impacted. Please send your replies and requests for additional project information to:

SWCA Environmental Consultants
Jason Bivens, Assistant Project Manager
116 North 4th Street, Suite 200
Bismarck, North Dakota 58501
(701) 258-6622
jbivens@swca.com

Comments should be submitted before January 28, 2012 so that they may be addressed in the final EA. Questions for the BIA can be directed to Marilyn Bercier, Regional Environmental Scientist, or Mark Herman, Environmental Engineer, at (605) 226-7656.

Sincerely,

Jason Bivens

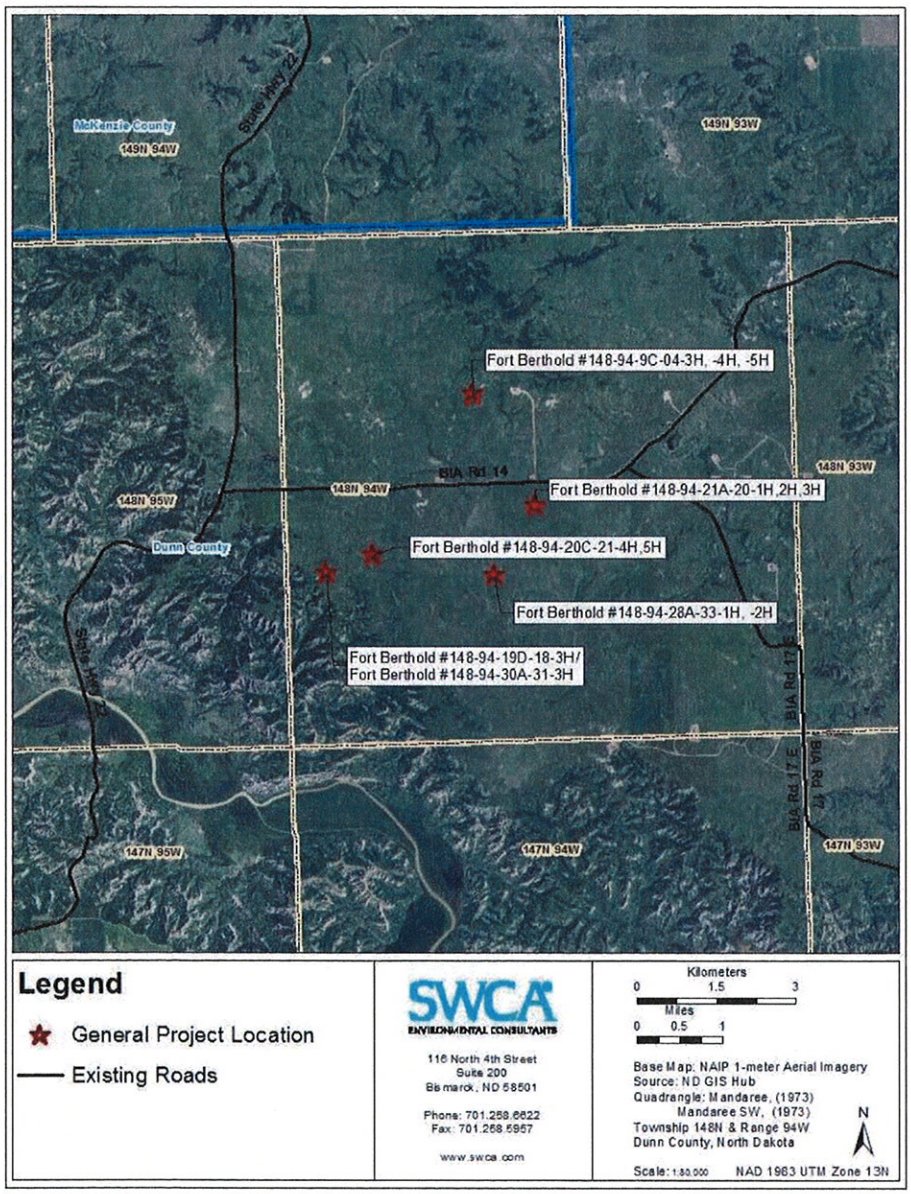


Figure 1. Project Location Overview.

Notice of Availability and Appeal Rights

Petro-Hunt, LLC: Eight Bakken/Three Forks Exploratory Oil and Gas Wells on Three Well Pads

The Bureau of Indian Affairs (BIA) is planning to issue administrative approvals related to an Environmental Assessment to Authorize Land Use for the Installation of Eight Bakken/Three Forks Exploratory Oil and Gas Wells on Three Well Pads on the Fort Berthold Reservation as shown on the attached map. Construction by Petro-Hunt is expected to begin in 2012.

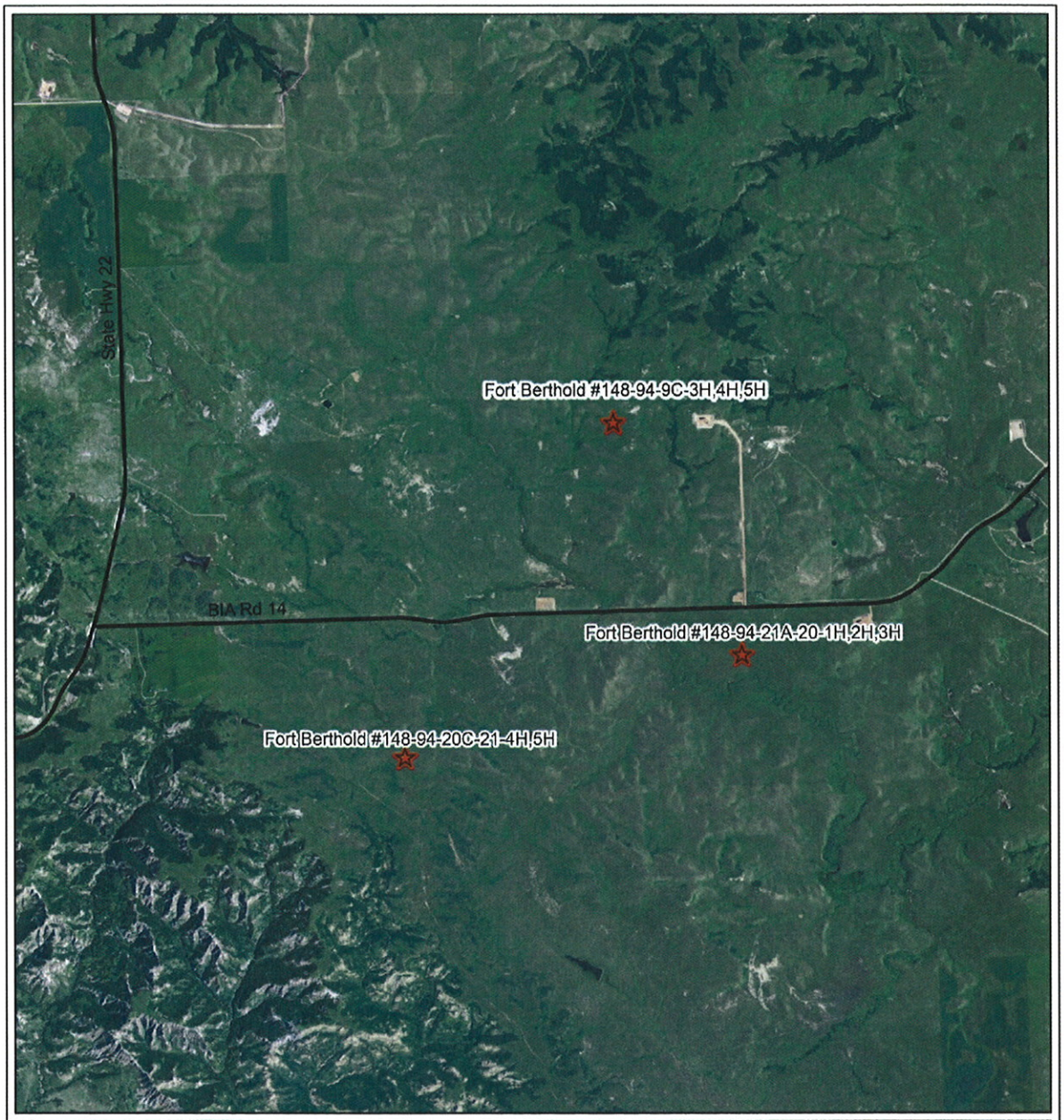
An environmental assessment (EA) determined that proposed activities will not cause significant impacts to the human environment. An environmental impact statement is not required. Contact Earl Silk, Superintendent at 701-627-4707 for more information and/or copies of the EA and the Finding of No Significant Impact (FONSI).

The FONSI is only a finding on environmental impacts – it is not a decision to proceed with an action and *cannot* be appealed. BIA's decision to proceed with administrative actions *can* be appealed until April 13, 2012, by contacting:

United States Department of the Interior
Office of Hearings and Appeals
Interior Board of Indian Appeals
801 N. Quincy Street, Suite 300, Arlington, Va 22203.

Procedural details are available from the BIA Fort Berthold Agency at 701-627-4707.

Project locations.



Legend

General Project Location

Existing Roads

SWCA®
ENVIRONMENTAL CONSULTANTS

116 North 4th Street
Suite 200
Bismarck, ND 58501

Phone: 701.258.6622
Fax: 701.258.5957

www.swca.com

Kilometers
0 1 2

Miles
0 0.5 1

Base Map: NAIP 1-meter Aerial Imagery
Source: ND GIS Hub
Quadrangle: Mandaree, (1973)
Mandaree SW, (1973)
Township 148N & Range 94W
Dunn County, North Dakota

N

Scale: 1:45,000 NAD 1983 UTM Zone 13N