United States Department of the Interior
Bureau of Land Management

Environmental Assessment-DOI-BLM-MT-C030-2013-221-EA
January 28, 2014

North Dakota Field Office Oil and Gas Leasing EA for January 2014
Location: North Dakota Field Office

Location: North Dakota Field Office (see attached Appendix A for list of lease parcels by number and legal description and Map 1.1.1)

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In Reply Refer To:
1600/3100 (MTC030)

August 23, 2013

Dear Reader:

The Bureau of Land Management (BLM) North Dakota Field Office has prepared an environmental assessment (EA) to analyze the potential effects from offering 43 nominated lease parcels for competitive oil and gas leasing in a sale tentatively scheduled to occur on January 28, 2014.

The EA with an unsigned Finding of No Significant Impact (FONSI) is available for a 30-day public comment period. Written comments must be postmarked by September 24, 2013 to be considered. Comments may be submitted using one of the following methods:

Email: MT_North_DakotaFO_Lease_EA@blm.gov

Mail: North Dakota Field Office
Attn: Shelly Gerhart
99 23rd Avenue West, Suite A
Dickinson, ND 58601-2619

Before including your address, phone number, e-mail address, or other personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – will be available for public review. If you wish to withhold personal identifying information from public review or disclosure under the Freedom of Information Act (FOIA), you must clearly state, in the first line of your written comment, "CONFIDENTIALITY REQUESTED." While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so. All submissions from organizations, from businesses, and from individuals identifying themselves as representatives of organizations or businesses, will be available for public review.

Upon review and consideration of public comments, the EA will be updated as needed. Based on our analysis, parcels recommended for leasing in our assessment would be included as part of a competitive oil and gas lease sale tentatively scheduled to occur on January 28, 2014.

Prior to issuance of any leases, the Decision Record and FONSI will be finalized and posted for public review on our BLM website. Please refer to the Montana/Dakotas BLM website at www.blm.gov/mt. From this home page, go to the heading titled "Frequently Requested," where you will find a number of links to information about our oil and gas program. Current and updated information about our environmental assessments can be found on the link titled "Oil & Gas Info / Sales" listed under the heading "Frequently Requested". Next, click on the link titled "Oil and Gas Leasing". Then click on the link titled "Oil and gas lease sale information". Once there, click on "2014", where you will find the NDFO EA for the January 28, 2014 lease sale for your review.

If you have any questions or would like more information about lease sale notices or the issuance of the EA, Decision Record and FONSI, please contact me at 701-227-7700.

Sincerely,

Richard A. Rymerson
Field Manager

North Dakota Field Office Oil and Gas Leasing EA for January 2014

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North Dakota Field Office Oil and Gas Leasing EA for January 2014

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1.0 PURPOSE & NEED

1.1 Introduction

It is the policy of the Bureau of Land Management (BLM) to make mineral resources available for use and to encourage development of mineral resources to meet national, regional, and local needs. This policy is based on various laws, including the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. The Federal Onshore Oil and Gas Leasing Reform Act of 1987 (Sec. 5102(a)(b)(1)(A)) directs the BLM to conduct quarterly oil and gas lease sales in each state whenever eligible lands are available for leasing.

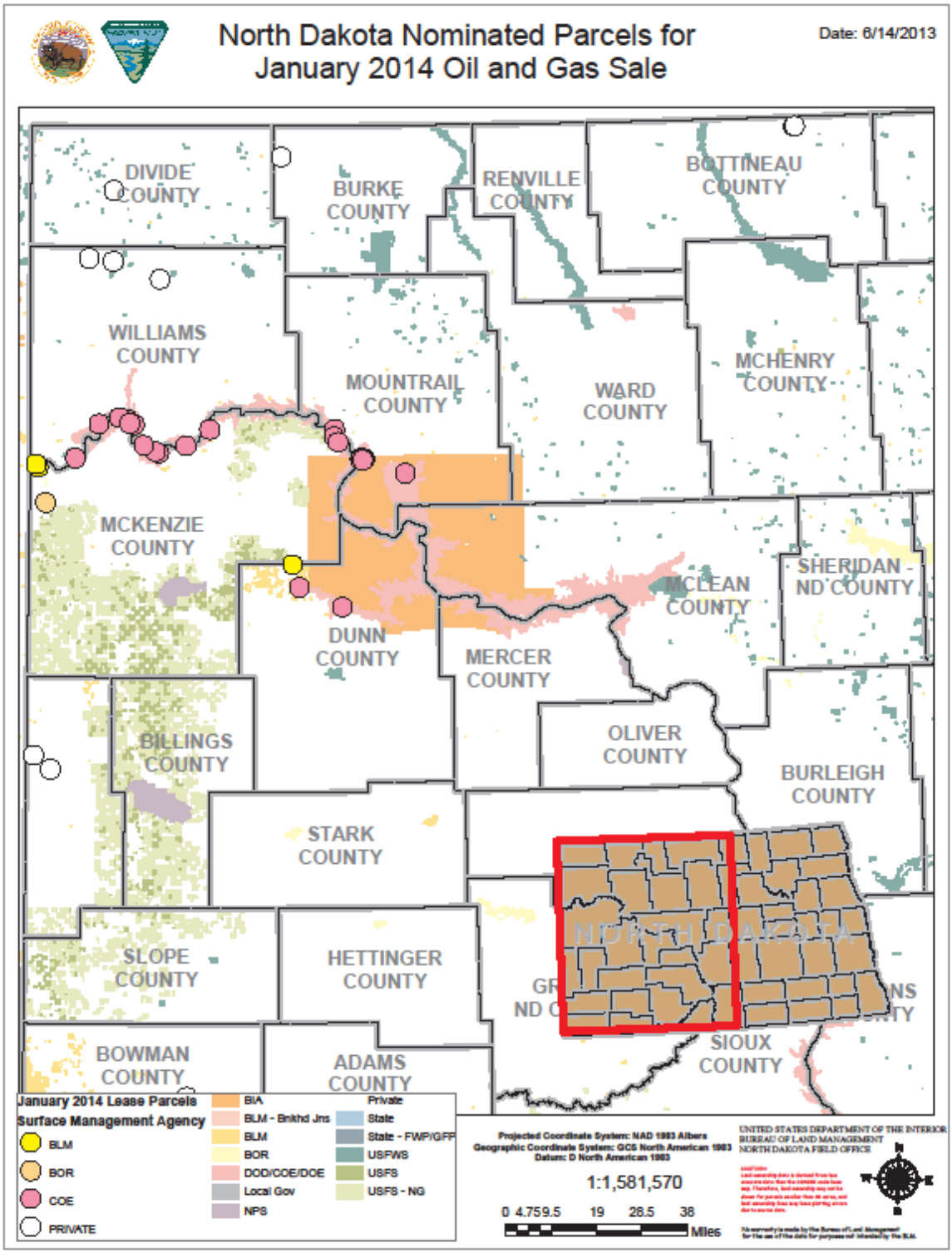
The Montana State Office (MSO) conducts mineral estate lease auctions for lands managed by the federal government, whether the surface is managed by the Department of the Interior (BLM or BOR), United States Forest Service (USFS), US Army Corps of Engineers (COE) or other departments and agencies. In some cases, the BLM holds subsurface mineral rights on split estate lands where the surface estate is owned by another party other than the federal government.

Oil and gas companies file Expressions of Interest (EOI) to nominate parcels for leasing by the BLM. From these EOIs, the MSO provides draft parcel lists to the appropriate field offices for review. BLM field offices then review legal descriptions of nominated parcels to determine: if they are in areas open to leasing; if new information has come to light which might change previous analyses conducted during the land use planning process; if there are special resource conditions of which potential bidders should be made aware; and which stipulations should be identified and included as part of a lease. Ultimately, all of the lands in proposed lease sales (including those covered by this Environmental Assessment [EA]) are nominated by the oil and gas industry and, therefore, represent areas of high interest.

This EA has been prepared to disclose and analyze the environmental consequences of leasing 43 parcels located in the North Dakota Field Office (NDFO) to be included in as part of a competitive oil and gas lease sale tentatively scheduled to occur January 28, 2014.

All 43 nominated parcels are located in western North Dakota within the NDFO planning area (see Map 1.1.1). Four parcels are located, in whole or in part, on BLM surface-controlled acreage. The 43 parcels (herein referred to as the "study area") are located within 9 counties in North Dakota. The counties included in the study area are: Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McKenzie, Mountrail and Williams.

Map 1.1.1 General Map of Nominated Lease Parcels



1.2 Purpose and Need for the Proposed Action

The purpose of offering parcels for competitive oil and gas leasing is to allow private individuals or companies to explore for and develop oil and gas resources for sale on public markets.

This action is needed to help meet the energy needs of the people of the United States. By conducting lease sales, the BLM provides for the potential increase of energy reserves for the U.S., a steady source of significant income, and at the same time meets the requirement identified in the Energy Policy Act, Sec. 362(2), Federal Oil and Gas Leasing Reform Act of 1987, and the Mineral Leasing Act of 1920, Sec. 17.

The decision to be made in the Proposed Action for this EA is whether or not to sell oil and gas leases on the parcels identified, and, if so, identify stipulations that would be included with specific lease parcels at the time of lease sale.

1.3 Conformance with Land Use Plan(s)

This EA is tiered to the information and analysis and conforms to the decisions contained in the North Dakota RMP (April 1988) and its associated Environmental Impact Statement (EIS), the governing land use plan for the NDFO. An electronic copy of the North Dakota RMP and its associated EIS can be located via the internet on the BLM home page, www.blm.gov/mt. On the home page, locate the heading titled *"Montana/Dakotas,"* then select *"What We Do"*, then click on the *"Planning"* link.

A more complete description of activities and impacts related to oil and gas leasing, development, production, etc. can be found on pages 9-10 in Chapter 2 of the RMP/EIS.

The parcels to be offered are within areas open to oil and gas leasing. Analysis of the 43 parcels is documented in this EA, and was conducted by NDFO resource specialists who relied on professional knowledge of the areas involved, review of current databases, site visits and file information to ensure that appropriate stipulations were recommended for a specific parcel. Analysis may also identify the need to defer entire or partial parcels from leasing pending further environmental review.

At the time of this review it is unknown whether a particular parcel will be sold and a lease issued. It is also unknown when, where, or if future well sites, roads, and facilities might be proposed. Assessment of projected activities and impacts was based on potential well densities discerned from the Reasonably Foreseeable Development (RFD) Scenario developed. The RFD contains projections of the number of possible oil and gas wells that could be drilled and produced in the NDFO area and used to analyze projected wells for the 43 nominated lease parcels. Detailed site-specific analysis of activities associated with any particular parcel would occur when a lease holder submits an application for permit to drill (APD).

Offering the parcels for sale and issuing leases would not be in conflict with any local, county, or state laws or plans.

1.4 Public Scoping and Identification of Issues

Public scoping for this project was conducted through a 15-day scoping period advertised on the BLM MSO website and posting on the NDFO website NEPA notification log (http://www.blm.gov/mt/st/en/fo/north_dakota_field.html. Scoping was initiated July 1, 2013. Two scoping comments were specific to potential future development concerns within a specified radius of the Fort Union Trading Post.

Issues identified through scoping related to oil and gas leasing includes identification of mitigation measures to minimize impacts from operations, such as view-shed impacts and noise disturbance.

2.0 DESCRIPTION OF ALTERNATIVES, INCLUDING PROPOSED ACTION

2.1 Alternative A – No Action

For EAs on externally initiated Proposed Actions, the No Action Alternative generally means that the Proposed Action would not take place. In the case of a lease sale, this would mean that all expressions of interest to lease (parcel nominations) would be denied or rejected.

The No Action Alternative would exclude all 43 parcels, covering 2,873 surveyed federal mineral acres, from the competitive oil and gas lease sale. Surface management would remain the same and ongoing oil and gas development would continue on surrounding federal, private, and state leases.

2.2 Alternative B – Proposed Action

The Proposed Action Alternative would be to offer 43 lease parcels of federal minerals for oil and gas leasing, covering 2,873 surveyed federal mineral acres, in conformance with the existing land use planning decisions. The parcels are located in western North Dakota. Parcel number, size, and detailed locations and associated stipulations are listed in Appendix A. Appendix C contains County maps indicating the location of each parcel.

Of the 2,873 acres of federal mineral estate considered in this EA, approximately 116.6 surface acres (4 parcels in whole or part) are managed by the BLM, and 1,396.16 surface acres (29 parcels in whole or part) are managed by other federal agencies. The remaining parcels are split-estate.

In the instance of the parcels which are split estate, the BLM provided courtesy notification to private landowners that their lands would be included in this lease sale. If any activity were to occur on such split estate parcels, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance and reclamation.

Standard lease terms, conditions, and operating procedures, as well as additional stipulations listed in Appendix A would apply to the split estate parcels. Standard operating procedures for oil and gas development include measures to protect the environment and resources such as groundwater, air, wildlife, historical and prehistorical concerns, and others as mentioned in the 1988 RMP on pages 7 through 22. Lease stipulations would be attached to the parcels to address site-specific concerns or new information not previously identified in the land use planning process. Once sold, the lease purchaser would have the right to use as much of the leased lands as is reasonably necessary to explore and drill for all of the oil and gas within the lease boundaries, subject to the stipulations attached to the lease (43 CFR 3101.1-4).

Standard operating procedures, best management practices and required conditions of approval and the application of lease stipulations change over time to meet overall RMP objectives. In some cases new lease stipulations may need to be developed and these types of changes may require an RMP amendment.

Lease parcels NJ, TU, QT, YB, TY, NG, R9, TG, YF, YH, YL, YP, YQ, YG, YK, YJ, YM, YN, MX, WN, TK, ML, MM, QV, AR, M4, YC, QW, TM (1567 acres) contain 25 sites (32MZ00819, 32MZ01107, 32MZ01174, 32WI00276, 32MZ01908, 32MZ01909, 32WI01367, 32DU00406, 32MN00141, 32MZ01900, 32WI00481, 32WI01281, 32MN00395, 32MN00091, 32MN00096, 32MN00097,32MN00010, 32MN0010 historic, 32MN00017, 32MN00090, 32MN00100, 32,MN00397, 32MN00153, 32MN00494, 32MN01015) that are potentially eligible for the NRHP and must remain undisturbed and avoided by any construction activities (refer to Cultural Resources Lease Stipulation 16-1). There must be no ground disturbance of any kind within or up to 100 feet of the above mentioned 25 sites until they are fully tested and evaluated for the NRHP. Any of the above mentioned sites (32WI00276, 32MZ01909, 32WI01281, 32MZ01900) that contain a prehistoric archeological component consisting of stone circles, rock cairns, earthlodge depressions, or any other stone features must be avoided by at least 300 feet by all ground disturbing activities until further consultation can take place with any Tribal Historic Preservation Office that is interested in the site, and considers the site within their traditional territory. If an archeological site is within the boundary of the Fort Berthold Indian Reservation then consultation will be limited to the Mandan, Hidatsa and Arikara Nation (MHAN).

Site 32MZ00820 is the Fairview Lift Bridge, located within Lease Parcel M4 (10.75 acres), and it is listed on the NRHP. This site is a through-truss type bridge, and is the only lift bridge in North Dakota. It is eligible under Criteria A and listed on the NRHP on 3/14/1997. This site must remain avoided and undisturbed by all construction and ground disturbing activities. Further consultation and mitigation may need to take place if construction for oil and gas development is within the view shed of this site.

Site 32MN01015 is the Old Sanish Town Site, established on the east bank of the Missouri river in 1915, and abandoned in 1953 due to the formation of Lake Sakakawea. The majority of the site is underwater, with only a small portion of the site visible during low water levels. This site needs to be further tested and evaluated for the NRHP. It has been recommended potentially eligible under Criteria A due to the very large and popular Sanish Rodeo held annually before the site's abandonment; and Criteria D due to the potential of having substantial buried cultural deposits. Past research and investigations suggest the site is unlikely to be potential for the NRHP under criteria B or C. The site is unlikely to be disturbed by oil and gas construction activates due to the majority of the site is located under water, or just along the edge of Lake Sakakawea, down a very steep cut bank. The site is also within the boundary of the Fort Berthold Indian Reservation, and consultation will take place with the MHAN THPO for any future APD development within the site's area of potential effect (APE).

Twenty three lease parcels in whole or in part have been found in areas classified as moderate/unknown (3) to very high (5) fossil potential according to the Potential Fossil Yield Classification (PFYC) system map. Accordingly, they have been given Lease Notice (LN) 14-12, which stipulates that prior to undertaking any surface-disturbing activities the lessee or project proponent shall contact the BLM to determine if a paleontological resource inventory is required. The other parcels have LN 14-3, which specifies that the lessee or operator shall immediately

bring to the attention of the surface management agency any paleontological resources or other objects of scientific interest discovered as a result of approved operation under the lease.

Oil and gas leases would be issued for a 10-year period and would continue for as long thereafter as oil and gas is produced in paying quantities. If a lessee fails to produce oil and gas, does not make annual rental payments, does not comply with the terms and conditions of the lease, or relinquishes the lease; the lease would terminate and would be available for releasing in the future.

Drilling wells on a lease would not be permitted until the lease owner or operator secures approval of a drilling permit and a surface use plan specified at 43 CFR 3162.

3.0 AFFECTED ENVIRONMENT

3.1 Introduction

This chapter describes the existing environment (i.e., the physical, biological, social, and economic values and resources) within the analysis area, which includes the 43 nominated parcels in Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McKenzie, Mountrail, and Williams counties (Map 1.1.1), that could be affected by implementation of the alternatives described in Chapter 2.

The existing environment is described by the different resources found throughout the counties listed above. Within each resource description, lease parcels containing the resource will be listed and analyzed further in Chapter 4. If the lease parcel does not contain the resource, then the lease parcel will be omitted from the description of the specific resource.

Unless otherwise stated, resource analysis in this chapter, and Chapter 4, will be described in approximate acres due to the scaling and precision parameters associated with the Geographic Information System (GIS), in addition to being referenced to a different land survey.

All 43 parcels are located in western North Dakota, which is located in the Northern Mixed Grass Prairie, known for its high diversity of vegetation types and topography. Vegetation is comprised of both tall and short grass as well as both warm and cool season grasses. A variety of grass-like plants, forbs, shrubs, and trees also add to the vegetation diversity of this rangeland type.

Western North Dakota is comprised of gently rolling hills, buttes, badlands, wetlands, riparian areas, and river breaks. Lands in North Dakota are primarily privately owned and are mainly utilized for agricultural uses. Lands that are not restricted by topography or soil constraints generally have been cultivated for crop production. Lands that have limitations from crop production are generally rangelands or pasture lands. Rangelands and pasture lands can be native, but can also be improved or rehabilitated croplands. Rehabilitated croplands are usually evident due to their near monoculture of introduced cool season grasses such as crested wheatgrass or smooth brome.

Temperatures throughout North Dakota fluctuate widely on an annual, seasonal, and daily basis. Annual mean temperatures range from 37°F in the northeast to about 43°F in the southwest. Temperature extremes can range from below -40°F to over 110°F. Average July temperature is about 69°F, and average January temperature is 10°F. Average annual precipitation varies from 13 inches in the northwest to about 20 inches in the east with up to 70 percent of the precipitation falling as rain between May and July. Precipitation is mainly derived from air masses originating from the Gulf of Mexico. Winters are long and cold with snow accumulations from November or December through March. Windy conditions are common due to the greatly fluctuating temperatures and lack of physical barriers. Prevailing winds are from the north-northwest at an average speed of 12 miles per hour (mph). Winds of 25-30 mph will often last for six hours and can last as long as 15 hours. Winds in excess of 30 mph have lasted more than six hours. Severe weather may occur almost any time during the year. Blizzards are a common

occurrence during winter and early spring. High winds and hail frequently occur in connection with summer thunderstorms (NDFO RMP, 1988).

Only those aspects of the existing environment that are potentially impacted by this project are described in detail. The following aspects of the existing environment were determined to not be present or not potentially impacted by this project include: Lands and Realty, Coal, Locatable Minerals, Lands with Wilderness Characteristics, Cave and Karst Resources, Forest Products and Special Designations. Therefore; these resources and resource uses will not be discussed further in this EA.

3.2 Air Resources

Air resources include air quality, air quality related values (AQRVs), and climate change. As part of the planning and decision making process, BLM considers and analyzes the potential effects of BLM and BLM-authorized activities on air resources.

The U.S. Environmental Protection Agency (USEPA) has the primary responsibility for regulating air quality, including seven criteria air pollutants subject to National Ambient Air Quality Standards (NAAQS). Pollutants regulated under NAAQS include carbon monoxide (CO), lead, nitrogen dioxide (NO_2), ozone, particulate matter with a diameter less than or equal to 10 microns (PM_{10}), particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$), and sulfur dioxide (SO_2). Two additional pollutants, nitrogen oxides (NO_x) and volatile organic compounds (VOCs), are regulated because they form ozone in the atmosphere. Air quality is determined by pollutant emissions and emission characteristics, atmospheric chemistry, dispersion meteorology, and terrain. AQRVs include effects on soil and water, such as sulfur and nitrogen deposition and lake acidification, and aesthetic effects, such as visibility.

In addition to USEPA federal regulations, air quality is also regulated by the North Dakota Department of Health, Division of Air Quality. This agency develops state-specific regulations and issues air quality permits to emission sources.

Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. Climate change includes both historic and predicted climate shifts that are beyond normal weather variations.

3.2.1 Air Quality

Air quality is monitored at State and Local Air Monitoring Systems (SLAMS) monitors within the following counties containing the parcels or near the parcels: Burke, Dunn, and McKenzie. The USEPA air quality index (AQI) is an index used for reporting daily air quality (http://www.epa.gov/oar/data/geosel.html) to the public. The index tells how clean or polluted an area's air is and whether associated health effects might be a concern. The USEPA calculates the AQI for five criteria air pollutants regulated by the Clean Air Act (CAA): ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide. For each of these pollutants, USEPA has established NAAQS to protect public health. An AQI value of 100

generally corresponds to the primary NAAQS for the pollutant. The following terms help interpret the AQI information:

- **Good** – The AQI value is between 0 and 50. Air quality is considered satisfactory and air pollution poses little or no risk.
- **Moderate** – The AQI is between 51 and 100. Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to ozone may experience respiratory symptoms.
- **Unhealthy for Sensitive Groups** – When AQI values are between 101 and 150, members of "sensitive groups" may experience health effects. These groups are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to ozone, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.
- **Unhealthy** – The AQI is between 151 and 200. Everyone may begin to experience some adverse health effects, and members of the sensitive groups may experience more serious effects.
- **Very Unhealthy** – The AQI is between 201 and 300. This index level would trigger a health alert signifying that everyone may experience more serious health effects.

AQI data show that there is little risk to the general public from air quality in the analysis area (Table 3.2.1). Based on available aggregate data for Burke, Dunn, and McKenzie counties for years 2009–2012, at least 95 percent of the days were rated "good." The three-year median daily AQIs were 33.0, 33.0, and 34.4 for the Burke, Dunn, and McKenzie county monitors.

Table 3.2.1. USEPA Air Quality Index Reports

County[1]	# Days in Period	# Days Rated Good or No Data	Percent of Days Rated Good or No Data	# Days Rated Moderate	# Days Rated Unhealthy for Sensitive Groups	# Days Rated Unhealthy	# Days Rated Very Unhealthy
Burke	1,450	1,381	95%	67	2	0	0
Dunn	1,128	1,092	97%	36	0	0	0
McKenzie	1,461	1,392	95%	68	0	0	1

Source: USEPA 2013a. AirData website (http://www.epa.gov/airdata/ad_rep_aqi.html, accessed August 6, 2013).
[1] Monitor names and station identifiers are as follows:
The Burke County monitor is located in the Lostwood Wilderness (38-013-004).
The Dunn County monitor is located in Dunn Center (38-025-003).
The McKenzie County monitor is located at the Theodore Roosevelt National Park's North Unit (38-053-002).

The area managed by the NDFO is in compliance with all National Ambient Air Quality Standards (NAAQS). Maximum concentrations as a percentage of the NAAQS are summarized in Table 3.2.2 based on information through 2012. Gaseous pollutant concentrations are

provided in terms of parts per million (ppm) or parts per billion (ppb), while particulate concentrations are provided in terms of micrograms per cubic meter ($\mu g/m^3$). Data are not provided for CO and lead, which are not monitored within the analysis area.

Table 3.2.2. Monitored Concentrations Representative of the Study Area

Pollutant	Averaging Time	Applicable Standard	Ambient Concentrations[a] (Burke, Dunn, McKenzie Counties)	Percentages of NAAQS (Burke, Dunn, McKenzie Counties)
NO_2	1 hour	100 ppb	15, 13, 9	15%, 13%, 9%
O_3	8 hour	0.075 ppm	0.056, 0.057, 0.057	75%, 76%, 76%
PM_{10}	24 hour	150 $\mu g/m^3$	48, 73, 44	32%, 49%, 2%
$PM_{2.5}$	24 hour	35 $\mu g/m^3$	16, 17, 17	46%, 49%, 49%
	Annual	12 $\mu g/m^3$ [c]	7.2, 5.8, 7.0	60%, 48%, 58%
SO_2	1 hour	75 ppb	24, 10, 10	32%, 13%, 13%

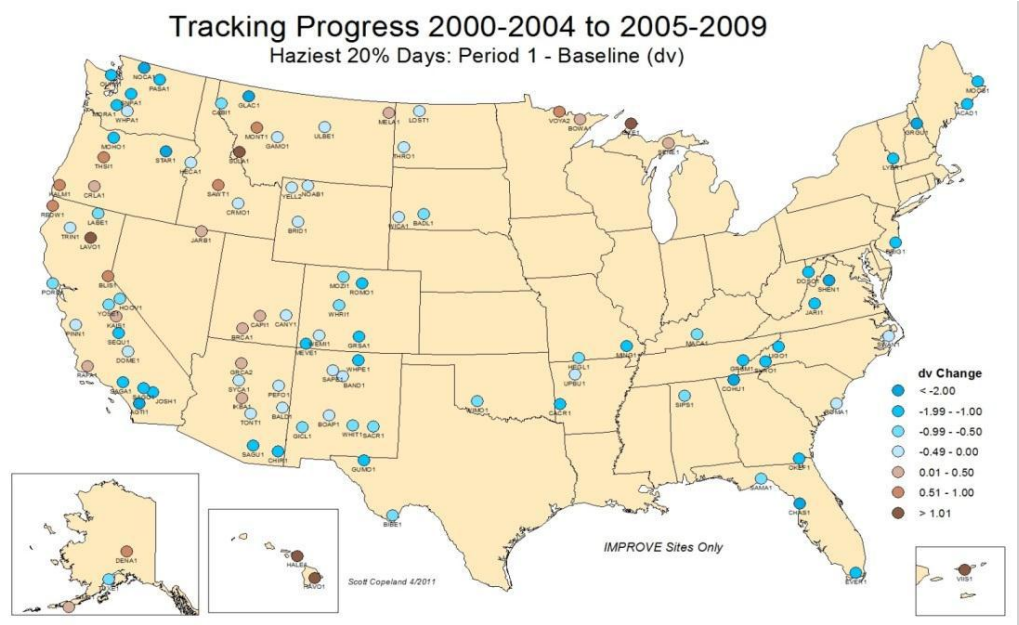
Source: USEPA 2013a. AirData website (http://www.epa.gov/airdata/ad_rep_con.html, accessed August 6, 2013).

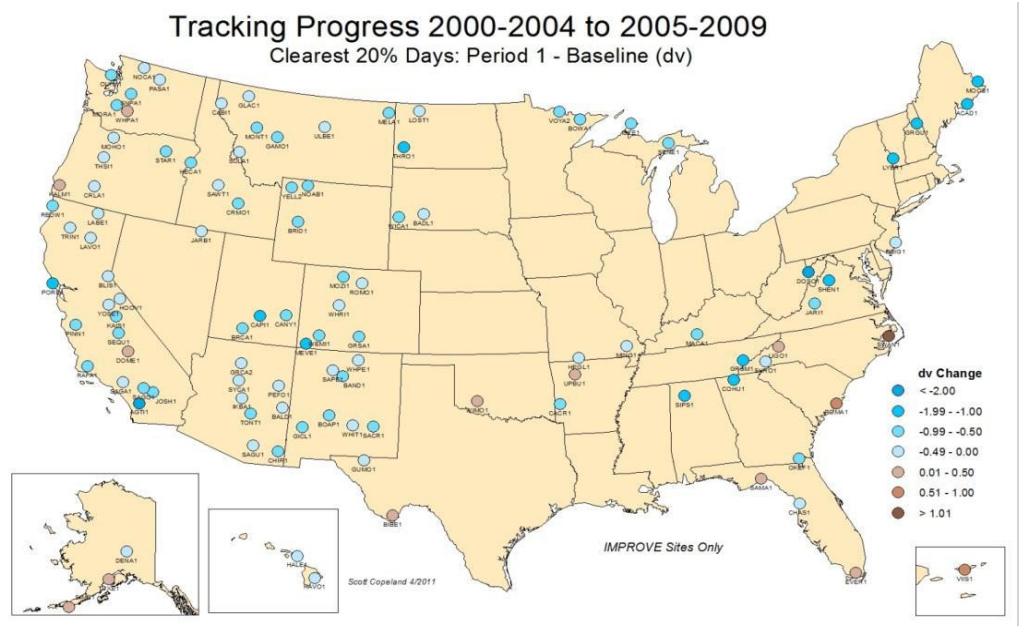
Hazardous air pollutants (HAPs) would also be emitted from oil and gas operations, including well drilling, well completion, and gas and oil production. Recent air quality modeling performed for the Miles City Field Office, which is located west of the NDFO, indicates that concentrations of benzene, ethylbenzene, formaldehyde, n-hexane, toluene, and xylene would be less than 14 percent of applicable health-based standards and that the additional risk of cancer would be less than 0.18 in one million (BLM 2013).

Air resources also include visibility, which can be degraded by regional haze due primarily to sulfur, nitrogen, and particulate emissions. Based on trends identified during 2005-2009, visibility has improved slightly at the Lostwood Wilderness and Theodore Roosevelt National Park IMPROVE monitor stations on the haziest days (20 percent worse days), as shown in Figure 3.2.1. On the 20 percent best (clearest) days, visibility at these monitors has been improving, with greater improvement at Theodore Roosevelt National Park.

A review of the USEPA 2008 National Emission Inventory (NEI) emissions in Bottineau, Burke, Divide, Dunn, Golden Valley, McKenzie, Mountrail, and Williams counties show that biogenic emissions from vegetation and soil are the primary sources of CO, NO_x, and VOC emissions, resulting in 35, 36, and 89 percent, respectively, of these pollutant emissions (USEPA 2012a). Approximately 84 percent of SO_2 emissions result from oil and gas production. With regard to PM_{10} and $PM_{2.5}$, approximately 74 percent and 76 percent of these emissions, respectively, are caused by fugitive dust from agricultural crops and livestock. As shown above, these emissions occur in an area with good air quality. Due to recent growth in oil and gas activity, current emissions from oil and gas production are likely to be underestimated by the 2008 NEI.

Figure 3.2.1. Trends in Haze Index (Deciview) on Haziest and Clearest Days.





Source: IMPROVE 2011.

3.2.2 Climate Change

Climate change is defined by the Intergovernmental Panel on Climate Change (IPCC) as "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and persist for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity." (IPCC 2007). Climate change and climate science are discussed in detail in the *Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota*, Bureau of Land Management (BLM 2010). This document is often referred to as the "Climate Change SIR" and is incorporated by reference into this EA.

The Intergovernmental Panel on Climate Change (IPCC 2007) states, "Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." Global average temperature has increased approximately 1.4°F since the early 20th century (BLM 2010). Warming has occurred on land surfaces, oceans and other water bodies, and in the troposphere (lowest layer of earth's atmosphere, up to 4-12 miles above the earth). Other indications of global climate change described by the IPCC (BLM 2010) include:

- Rates of surface warming increased in the mid-1970s and the global land surface has been warming at about double the rate of ocean surface warming since then;
- Eleven of the last 12 years rank among the 12 warmest years on record since 1850;
- Lower-tropospheric temperatures have slightly greater warming rates than the earth's surface from 1958-2005.

Earth has a natural greenhouse effect wherein naturally occurring gases such as water vapor, CO_2, methane, and N_2O absorb and retain heat. Without the natural greenhouse effect, earth would be approximately 60°F cooler (BLM 2010). Current ongoing global climate change is caused, in part, by the atmospheric buildup of greenhouse gases (GHGs), which may persist for decades or even centuries. Each GHG has a global warming potential that accounts for the intensity of each GHG's heat trapping effect and its longevity in the atmosphere (BLM 2010). The buildup of GHGs such as CO_2, methane, N_2O, and halocarbons since the start of the industrial revolution has substantially increased atmospheric concentrations of these compounds compared to background levels. At such elevated concentrations, these compounds absorb more energy from the earth's surface and re-emit a larger portion of the earth's heat back to the earth rather than allowing the heat to escape into space than would be the case under more natural conditions of background GHG concentrations.

A number of activities contribute to the phenomenon of climate change, including emissions of GHGs (especially CO_2 and methane) from fossil fuel development, large wildfires, activities using combustion engines, changes to the natural carbon cycle, and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs will have a sustained climatic impact over different temporal scales due to their differences in global warming potential (described

above) and lifespans in the atmosphere. For example, CO_2 may last 50 to 200 years in the atmosphere while methane has an average atmospheric life time of 12 years (BLM 2010).

Some information and projections of impacts beyond the project scale are becoming increasingly available. Chapter 3 of the Climate Change SIR (BLM 2010) describes impacts of climate change in detail at various scales, including the state scale when appropriate. The USEPA identifies western North Dakota as part of the Great Plains region. The following summary characterizes potential changes identified by the U.S. Climate Change Science Program (CCSP 2008) that are expected to occur at the regional scale, where the Proposed Action and its alternatives are to occur.

- The region is expected to experience warmer temperatures with less snowfall.
- Temperatures are expected to increase more in winter than in summer, more at night than in the day, and more in the mountains than at lower elevations.
- Earlier snowmelt means that peak stream flow would be earlier, weeks before the peak needs of ranchers, farmers, recreationalist, and others. In late summer, rivers, lakes, and reservoirs would be drier.
- More frequent, more severe, and possibly longer-lasting droughts are expected to occur.
- Crop and livestock production patterns could shift northward; less soil moisture due to increased evaporation may increase irrigation needs.
- Drier conditions would reduce the range and health of ponderosa and lodgepole pine forests, and increase the susceptibility to fire. Grasslands and rangelands could expand into previously forested areas.
- Ecosystems would be stressed and wildlife could be further stressed.

Other impacts could include:

- Increased particulate matter in the air as drier, less vegetated soils experience wind erosion.
- Shifts in vegetative communities which could threaten plant and wildlife species.
- Changes in the timing and quantity of snowmelt which could affect both aquatic species and agricultural needs.

Projected and documented broad-scale changes within ecosystems of the U.S. are summarized in the Climate Change SIR (BLM 2010). Some key aspects include:

- Large-scale shifts have already occurred in the ranges of species and the timing of the seasons and animal migrations. These shifts are likely to continue. Climate changes include warming temperatures throughout the year and the arrival of spring an average of 10 days to 2 weeks earlier through much of the U.S. compared to 20 years ago. Multiple bird species now migrate north earlier in the year.
- Fires, insect epidemics, disease pathogens, and invasive weed species have increased and these trends are likely to continue. Changes in timing of precipitation and earlier runoff would increase fire risks.

More specific to North Dakota, additional projected changes associated with climate change described in Section 3.0 of the Climate Change SIR (BLM 2010) include:

- Temperature increases in North Dakota are predicted to be between 3 to 5°F at mid-21st century. As the mean temperature rises, more heat waves are predicted to occur.
- Precipitation is expected to increase during winter and spring, decrease slightly in summer, and remain relatively unchanged in the fall.
- For the western portion of the state, annual median runoff is expected to decrease between 2 and 5 percent by mid-21st century, while runoff in the northeastern part of the state would increase by 5-10 percent.
- Crop yields may increase in North Dakota, associated with predicted temperature increases.
- North Dakota's Prairie Pothole wetlands are expected to decline in quality, due to their shallow depths and rapid evaporation rates. Shrinking wetlands may lead to decreases in waterfowl populations.
- Wildland fire risk is predicted to continue to increase due to climate change effects on temperature, precipitation, and wind. One study predicted an increase in median annual area burned by wildland fires in the western portion of North Dakota, based on a 1°C global average temperature increase, to be 393 percent.

While long-range regional changes will occur within this analysis area, it is impossible to predict precisely when these changes will occur.

3.3 Soil Resources

The soil-forming factors (climate, parent material, topography, biota, and age) are variable across the planning area, which results in soils with diverse physical, chemical, and biotic properties. Important properties of naturally functioning soil systems include biotic activity, diversity, and productivity; water capture, storage, and release; nutrient storage and cycling; contaminant filtration, buffering, degradation, immobilization, and detoxification; and biotic system habitat.

The lease parcels are located within 10 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Lake Sakakawea (HUC 10110101), Little Muddy (HUC 10110102), Lower Little Missouri (HUC 10110205), Lower Souris (09010003), Headwater Souris River (09010007), Charlie-Little Muddy (10060005), Brush Lake Closed Basin (10060007), Beaver (10110204), North Fork Grand (10130301), and Lower Yellowstone (10100004). The acreage of the lease parcels comprises less than 0.1 percent of each watershed. Soils considered prime farmlands do not occur within any of the lease parcels. The following describes the common soil properties of lease parcels within each watershed:

The Lake Sakakawea watershed contains proposed parcels NDM 97300-LU, MX, NJ, NG, QM, QT, QW, R9, TE, TF, TT, TU, TY, YB, YC, YF, YG, YH, YJ, YK, YL, YM, YP, YQ, and WN. The lease parcels are located in Mountrail, McKenzie, and Williams Counties. NDM 97300- NG, QT, QW, YB, and WN are the only parcels not inundated with water. The rest of the parcels are under water and contain sediment rather than soil. Parcel soils generally developed from glacial

till or residuum derived from the Bullion Creek Formation. Ecological sites are typically loamy or thin loamy (MLRA 54X, 14-18 p. z.). Terrain within the parcels is commonly hilly or erosive draws.

The Little Muddy watershed contains proposed parcels NDM 97300- TL, TM, and TN. The lease parcels are located in Williams County. NDM 97300- TM and TL generally developed from the Sentinel Butte Formation. NDM 97300 – TN generally developed from the Bullion Creek Formation. Ecological Site Descriptions for these parcels include Loamy (MLRA 54X, 14-18 p. z.) and Loamy (MLRA 53B, 15-20 p.z.) are typically Terrace or Till and Lake Plain. Loamy (MLRA 54, 14-18 p. z.) are typically Hills or Alluvial Flats and Fans.

The Lower Little Missouri watershed contains proposed parcels NDM 97300- QV and NDM 79010- AR and MR. The lease parcels are located in Dunn County. Parcel NDM 97300- QV and NDM 79010 - MR are inundated with water and contains sediment rather than soil. Parcel soils generally developed from the Sentinel Butte Formation. Ecological sites are typically Thin Loamy (MLRA 54, 14-18 p. z.). Terrain within the parcels is typically Hills, Knolls and Ridges. The soil surface is unstable and slumping, erosion and deposition is common to the site.

The Lower Souris watershed contains proposed parcel NDM 97300- YE and YD. The lease parcel is located in Bottineau County. Parcel soils generally developed from the Cannonball Formation. The survey for MLRA 55A is not completed. These soils are formed in fine-loamy till located on ridges on till plains under grass/herbaceous cover and grassland rangeland, and comprise approximately 40% of the map unit.

The Headwater Souris River watershed contains proposed parcel NDM 97300- TG. The lease parcel is located in Burke County. Soils generally developed from glacial till plains of the Bullion Creek Formation. The survey for MLRA 53A is not completed. Terrain is typically rolling till plains in this MLRA include kettle holes, kames, moraines, and small glacial lakes. Moderately steep and steep slopes are adjacent to the major stream valleys.

The Charlie-Little Muddy watershed contains proposed parcel NDM 97300- ML, MM, and TK. The lease parcel is located in Williams and McKenzie County. Parcel NDM 97300 – TK and ML is inundated with water and contains sediment as opposed to soil. The soil on parcel NDM 97300- MM generally developed form the Bullion Creek Formation. The ecological site description for this area is (MLRA 54X, 14-18 p. z.). Terrain in this area is flood plain and terraces.

The Brush Lake Closed Basin watershed contains proposed parcel NDM 97300- T3. The lease parcel is located in Divide County. The soils within this parcel developed from the Bullion Creek Formation or the Sentinel Butte Formation. Ecological sites are typically Thin Loamy (MLRA 53B, 15-20 p.z.). These sites occur on steep moraines, hills and till plains. Soils are highly susceptible to water erosion and wind erosion to a lesser degree.

The Beaver watershed contains proposed parcel NDM 97300- R7 and TW. The lease parcel is located in Golden Valley County. The soils within the parcels generally developed from alluvium and residuum of the Bullion Creek Formation. The typical ecological site description for the parcel is Loamy (MLRA 54X 14-18 p.z.). This site occurs on gently undulating to rolling sedimentary uplands. The soil surface is generally stable and intact.

The North Fork Grand watershed contains proposed parcel NDM 97300- TX. The lease parcel is located in Bowman County. The soils on this parcel formed from alluvium and residuum of the Sentinel Butte Formation. The ecological site description for this area is (MLRA 54X, 14-18 p. z.) The landforms in this area consist of alluvial fans and hills.

The Lower Yellowstone watershed contains proposed parcel NDM 97300- M4. The lease parcel is located in McKenzie County. This parcel is inundated with water and contains sediment as opposed to soils.

3.4 Water Resources

3.4.1 Surface Hydrology

Surface water resources across the NDFO are present as lakes, reservoirs, rivers, streams, wetlands, and springs. Water resources are essential to the residents of western North Dakota to support agriculture, public water supplies, industry, and recreation. Water resources and riparian areas are crucial to the survival of many BLM-sensitive fish, reptiles, birds, and amphibians.

Perennial streams retain water year-round and have variable flow regimes. Intermittent streams flow during the part of the year when they receive sufficient water from springs, groundwater, or surface sources such as snowmelt or storm events. Ephemeral streams flow only in direct response to precipitation. Intermittent and ephemeral streams play an important role in the hydrologic function of the ecosystems within the lease parcels by transporting water, sediment, nutrients, and debris and providing connectivity within a watershed. They filter sediment, dissipate energy from snowmelt and storm water runoff, facilitate infiltration, and recharge groundwater (Levick et al. 2008). The pools of intermittent prairie streams retain water in the summer months, supporting riparian vegetation, providing habitat for aquatic wildlife (fish, amphibians, reptiles, and invertebrates), and provide water resources for wildlife and livestock.

Stream morphology is influenced by a number of factors including: stream flow regime, geology, soils, vegetation type, climate, and land use history. Stream conditions reflect a number of historic and current impacts, ranging from agriculture to mining. Surficial geology is generally represented by Tertiary sandstones, siltstones, and shales, with some alluvium and glacial till which tends to form fine grain soils (loams to clays), that are highly erosive. Streambeds consist typically of sand and silt, with few bedrock channels. Stream morphology is highly influenced by the presence and type of riparian vegetation because streambeds and stream banks generally lack control features (e.g., rocks, cobles, bedrock). The condition of associated uplands is also an important factor due to the ability of high-velocity water to transport large amounts of sediment to streams.

The lease parcels are located within 10 watersheds [HUC 8 (Hydrological Unit Code); subbasins]: Beaver (HUC 10110204), Brush Lake Closed Basin (10060007), Charlie – Little Middy (10060005), Headwaters Souris River (9010007), Lake Sakakawea (HUC 10110101), Little Muddy (HUC 10110102), Lower Little Missouri (HUC 10110205), Lower Yellowstone (HUC 10100004), Lower Souris (9010003) and North Ford Grand (10130301). The acreage of the lease parcels comprises less than 0.1 percent of each watershed.

The Beaver watershed contains proposed parcels NDM 97300-TW and R7; comprising less than 0.07 percent of the watershed. The lease parcels are located in Golden Valley County.

The Brush Lake Closed Basin watershed contains proposed parcel NDM 97300-T3; comprising less than 0.03 percent of the watershed. This lease parcel is located in Divide County.

The Charlie – Little Muddy watershed contains proposed parcels NDM 97300-TK, ML, and MM; comprising less than 0.006 percent of the watershed. These parcels are located in McKenzie and Williams Counties.

The Headwaters Souris River watershed contains proposed parcel NDM 97300-TG; comprising less than 0.03 percent of the watershed. This parcel is located in Burke County.

The Lake Sakakawea watershed contains proposed parcels NDM 97300-LU, MX, NG, NJ, QM, QT, QW, R9, TE, TF, TT, TU, TY, WN, YB, YC, YF, YG, YH, YJ, YK, YL, YM, YN, YP, and YQ; comprising less than 0.04 percent of the watershed. The lease parcels are located in Mountrail, McKenzie, and Williams Counties.

The Little Muddy watershed contains proposed parcels NDM 97300-TL, TM, and TN; comprising less than 0.08 percent of the watershed. The lease parcels are located in Williams County.

The Lower Little Missouri watershed contains proposed parcel NDM 79010-AR and MR and NDM 97300-QV; comprising less than 0.02 percent of the watershed. The lease parcels are located in Dunn County.

The Lower Yellowstone watershed contains proposed parcel NDM 97300-M4; comprising less than 0.0004 percent of the watershed The lease parcel is located in McKenzie County.

The Lower Souris watershed contains proposed parcels NDM 97300-YD and NDM 97300-YE; comprising .0025 percent of the watershed. The lease parcels are located in Bottineau County.

The North Fork Grand watershed contains proposed parcel NDM 97300-TX; comprising .01 percent of the watershed. The lease parcel is located in Bowman County.

Any beneficial use of produced water requires water rights to be issued by the North Dakota State Water Commission as established by law. This water has been used for watering livestock, irrigation, drilling operations, and industrial applications.

3.4.2 Groundwater

The quality and availability of groundwater varies greatly across the region. Residents in western North Dakota commonly get their ground water from aquifers consisting of unconsolidated, alluvial valley-fill materials, glacial outwash, or consolidated sedimentary rock formations and some coal beds.

Alluvial aquifers within the area generally consist of Quaternary alluvium and undifferentiated Quaternary/Tertiary sediments, which include sand and gravel deposits. Alluvial aquifers occur in terrace deposits, within floodplains, and along the channels of larger streams, tributaries, and rivers, and they are among the most productive sources of groundwater. They are typically 0-40 feet thick. The quality of groundwater from alluvial aquifers is generally good, but can be highly variable [approximately 100 mg/l to 2,800 mg/l TDS, specific conductance (SC) of 500 to 125,000 microsiemens/centimeter (uS/cm), and sodium adsorption ratio (SAR) of 5.0 to 10]. Wells completed in coarse sand and gravel alluvial aquifers can yield as much as 100 gallons per minute (gpm), although the average yield is 15 gpm. Alluvial deposits associated with abandoned river channels or detached terraces are topographically isolated and have limited saturation and yield as much as 20 gpm (Zelt et al. 1999).

Within the analysis area, the primary bedrock aquifers occur in sandstones and lignites of the Tertiary Fort Union Formation (Cenozoic rocks) (including Sentinel Butte, Cannonball, and Slope Formations) and the sandstones of the Cretaceous Hell Creek and Fox Hills formations (Mesozoic rocks). Wells within the Fort Union formation aquifers are typically 100 to 200 feet deep, but can be up to 1500 feet in depth. These wells may produce as much as 40 gpm, but yields of 15 gpm are typical. Where aquifers are confined and artesian conditions exist, wells in the Fort Union Formation will generally flow less than 10 gpm. Well depths to the Hell Creek and Fox Hills formation aquifers are highly variable, but typically range from 200 to 1,000 feet in depth. Groundwater yields from these aquifers may be as much as 200 gpm, but are generally less than 100 gpm. Artesian wells within these aquifers may flow as high as 20 gpm (Zelt et al. 1999). Groundwater yields from the deeper Paleozoic Madison formation aquifer can range from 20 to 6,000 gpm, or can be higher, in karst areas. The depth to the Madison formation aquifer in the planning area can exceed 6,000 feet. Due to the extreme depth of this aquifer, it is rarely accessed for water use. Water quality of this aquifer is highly variable and is dependent on depth, bedrock type, recharge rate, and other factors. North Dakota State Water Commission well log searches in areas close to the proposed parcels showed domestic/stockwater well depths of 28-500 feet and outputs of 4.5-40 gpm.

3.5 Vegetation Resources

As described in the Introduction to this EA, all the lease parcels are located in western North Dakota, which is located in the Northern Mixed Grass Prairie. The Northern Mixed Grass Prairie is known for its diverse vegetation types, soil types, and topography. Vegetation is

comprised of both tall and short grass as well as both warm and cool season grasses. A variety of grass-like plants, forbs, shrubs, and trees also add to the vegetation diversity of this rangeland type. Many of these plant species are found in woody draws and riparian/wetland zones.

Existing influences on local distribution of plant communities include soils, topography, surface disturbance, availability of water, management boundary fence lines, and soil salinity. Vegetation communities have been affected by human activities for over a century. Some of these activities include: infrastructure developments (roads, power lines, pipelines, etc.), chemical applications, livestock grazing, farming, and wildlife rehabilitation, prevention, manipulation, and suppression.

3.5.1 Vegetation Communities

Six major vegetation communities have been identified for the study area: native mixed grass prairie, wooded draws, agricultural lands, improved or restored pastures, riparian-wetlands, and other disturbed vegetative communities.

As a whole, the North Dakota landscape is comprised of a mosaic pattern. Settlement and privatization of most of the state has led to this pattern; therefore, large blocks of vegetative communities free of human disturbances are rare.

3.5.1.1 Native Mixed Grass Prairie

The native mixed grassland community is dominated by perennial grasses. Perennial grasses can be both warm season and cool season grasses, and they can also be both tall and short grasses. Some of the more common grasses include: western wheatgrass (*Pascopyrum smithii*), needle-and-thread (*Hesperostipa comata*), green needlegrass (*Nassella viridula)*, blue grama (*Bouteloua gracilis)***,** and prairie junegrass (*Koeleria macrantha)*. Various forbs and shrubs are present but occur as a minor species composition component throughout the community. Many of these species occur in woody draws.

3.5.1.2 Wooded Draw

The wooded draw habitat type develops in ravines where the microclimate, primarily greater moisture, is suitable for the growth and development of trees. The major species include green ash, American elm, cottonwood, and quaking aspen. Wooded draws also support a variety of shrub species including chokecherry, American plum, western snowberry, buffaloberry, red-osier dogwood, Missouri gooseberry, and juneberry. (North Dakota RMP/EIS, 1988).

3.5.1.3 Improved or Restored Pasture

Improved pastures consists of cultivated areas planted with introduced forage species, including crested wheatgrass and smooth brome *(Bromus inermis)* and intermediate wheatgrass *(Thinopyrum intermedium)* and alfalfa *(Medicago sativa*), planted specifically for the improved forage production for livestock consumption.
Restored pastures may include sub-marginal agricultural lands that have been restored due to poor crop production and/or high erosion potential. Historically, restored pastures were dominated by a monoculture of crested wheatgrass. These crested wheatgrass seedings are still

present today and are essentially unchanged from when they were planted. They can be visible on aerial photographs, and grass, forb, and shrub species composition are similar from one crested seeding to another. More recent restoration activities of agricultural lands use a combination of crested wheatgrass, smooth brome, intermediate wheatgrass, or species native to Northern Mixed Grass Prairie.

3.5.1.4 Agriculture

The agriculture community is comprised of monocultures of crops which may include small grains, alfalfa, corn, sunflowers, or other crops grown primarily as supplemental feed sources for livestock production operations. These areas have been completely disturbed from the native vegetation potentials.

3.5.1.5 Riparian-Wetlands

Riparian-wetland areas are among the most productive and important ecosystems, comprising approximately one percent of all national public lands. Characteristically, riparian-wetland areas display a greater diversity of plant, fish, wildlife, and other animal species and vegetative structure than adjoining ecosystems. Some of the more common vegetative species that occur in these areas include: prairie cordgrass, switchgrass, Canada wildrye, western wheatgrass, sedges (*Carex spp.*), rushes (*Juncus spp.*), willow, chokecherry, buffaloberry, and plains cottonwood. Healthy riparian systems filter and purify water as it moves through the riparian-wetland zone, reduce sediment loads and enhance soil stability, provide micro-climate moderation when contrasted to temperature extremes in adjacent areas, and contribute to ground water recharge and base flow (USDI, BLM, 1987b).

Prairie potholes are depressional wetlands created by the scouring action of glaciers. The formerly glaciated landscape within the study area is pockmarked with a number of these potholes, which fill with snowmelt and rain in the spring. Some prairie pothole marshes are temporary, while others may be essentially permanent. Submerged and floating aquatic plants take over the deeper water in the middle of the potholes, while bulrushes and cattails grow closer to shore.

3.5.1.6 Other Disturbed Vegetation Communities

Other disturbed vegetation communities include human disturbances or alterations to the landscape. These disturbances include, but are not limited to: infrastructure developments (e.g., roads, powerlines, pipelines, and fences), chemical applications, livestock grazing, farming and ranching, and industrial and commercial facilities. Invasive, non-native grasses such as smooth brome and crested wheatgrass are commonly found on these disturbed areas. For example, smooth brome was planted in many road ditches and has encroached into areas bordering road ditches. This is often true for native prairie sites adjacent to roadways; therefore, these sites often have a smooth brome component due to its ability to spread by creeping rhizomes.

Wildfire prevention, manipulation, and suppression activities are also human alterations on natural processes that have altered vegetation communities in western North Dakota.

3.5.2 Noxious Weeds

Noxious weeds occur randomly in isolated pockets within the study area. No known populations are located within the parcels, but all of North Dakota has the potential for infestation. The following table (Table 3.5.2.1) shows the noxious weeds in North Dakota.

Table 3.5.2.1. Noxious weeds in North Dakota

Common Name	Scientific Name
Absinth wormwood	*Artemisia absinthium*
Canada thistle	*Cirsium arvense*
Dalmatian toadflax	*Linaria genistifolia*
Diffuse knapweed	*Centaurea diffusa*
Field bindweed	*Convolvulus arvensis*
Leafy spurge	*Euphorbia esula*
Musk thistle	*Carduus nutans*
Purple loosestrife	*Lythrum salicaria*
Russian knapweed	*Acroptilon repens*
Saltcedar	*Tamarix ramosissima*
Spotted knapweed	*Centaurea maculosa*

3.6 Special Status Species

3.6.1 Special Status Animals Species

A number of animal species are priority species for BLM and could be found occupying habitats associated with the proposed lease nominations. Special status species (SSS) are species that are limited in number or that have observed a steady decline in their numbers across their range. The **Special Status Species** designation includes **sensitive** and **state listed** as well as federally **proposed, listed**, and **candidate** species.

Sensitive species are those designated as sensitive by a BLM state director, usually in cooperation with the state agency responsible for managing the species and state natural heritage programs. They are those species that: (1) could become endangered in or extirpated from a state or within a significant portion of its distribution; (2) are under status review by the U.S. Fish and Wildlife Service (FWS); (3) are undergoing significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution; (4) are undergoing significant current or predicted downward trends in population or density such that federal listed, proposed, candidate, or state-listed status may become necessary; (5) typically have small and widely dispersed populations; (6) inhabit ecological refugia or other specialized or unique habitats; or (7) are state-listed but which may be better conserved through application of the BLM Sensitive Species Status.

State Listed (or Species of Conservation Priority) this designation includes species in decline at the state level whose population levels are not well known but are thought to be in decline.

Proposed species are species that have been officially proposed for listing as threatened or endangered by the Secretary of the Interior, and a proposed rule has been published in the Federal Register.

Listed species are designated as **threatened or endangered** by the Secretary of the Interior under the provisions of the Endangered Species Act, and a final rule for the listing has been published in the Federal Register.

Candidate species are designated as candidates for listing as threatened or endangered by the FWS, and listings have been published in the Federal Register.

3.6.1.1 Aquatic Wildlife

The analysis area contains sufficient habitat for five fish, one amphibian, and one reptile that are special status species. All of these species depend on perennial and intermittent streams or rivers with intact floodplains, wetlands and riparian areas that are properly functioning. Threats to the aquatic species include but are not limited to habitat modification, exotic or non-native species, small population size, limited natural reproduction, hybridization, pollution and contaminants.

Table 3.6.1. Aquatic sensitive or specials status wildlife species in the analysis area

Species	USFWS Status	BLM Sensitive	In Range	Suitable Habitat present
Blue sucker	none	Sensitive	Yes	Yes
Northern Redbelly X Finescale Dace	none	Sensitive	Yes	Yes
Paddlefish	none	Sensitive	Yes	Yes
Sicklefin Chub	none	Sensitive	Yes	Yes
Sturgeon Chub	none	Sensitive	Yes	Yes
Snapping Turtle	none	Sensitive	Yes	Yes
Plains spadefoot	none	Sensitive	Yes	Yes

3.6.1.2 Terrestrial Wildlife

Evaluation of wildlife values at the landscape scale as a first step is key to understanding potential impacts of a large project. Various agencies and non-governmental organizations have evaluated wildlife values, including terrestrial conservation species, species richness, game quality, etc. and have been mapped to various degrees at the landscape level.

Lease parcels were reviewed utilizing GIS overlays to assess potential aquatic, terrestrial and other habitat values. This course-scale landscape analysis of wildlife resources provides one tool for understanding the context of the wildlife values at a large scale. Fine-scaled tools, data, and resource information based on inventory and monitoring data, as well as local knowledge from BLM and NDGF employees, are used to further examine resource issues at the site-specific level.

The analysis area covers a wide variety of habitat consistent with the Northern Great Plains. Lease parcels are located within tame grasslands, short and mixed grass prairies, riparian and woody draw habitats, wetland habitats, under Lake Sakakawea and others. See section 3.5 for a detailed description of vegetation.

3.6.1.2.1 Grassland Birds

Several of the proposed lease nomination areas provide quality-habitat for a suite of sensitive bird species associated with northern mixed-grass and short-grass prairie habitats. The mixed-grass prairie contains both warm season grasses and cool season grasses such as blue grama, needle-and-thread, prairie junegrass, western snowberry, and western wheatgrass.
Some of the more common species which depend on these habitats are: Swainson's hawk (***Buteo swainsoni***), ferruginous hawk (***Buteo regalis***), golden eagle (***Aquila chrysaetos***), long-billed curlew (***Numenius americanus***), marbled godwit (***Limosa fedoa***), burrowing owl (***Athene cunicularia***), Sprague's pipit (***Anthus spragueii***), Le Conte's sparrow (***Ammodramus leconteii***), Baird's sparrow ***(Ammodramus bairdii***), logger-head shrike (***Lanius ludovicianus***), black tern (*Chlidonias niger*), Nelson's sharp-tailed sparrow (*Ammodramus nelsonii*), willet (*Catoptrophorus semipalmatus*), Wilson's phalarope (*Phalaropus tricolor*), and the yellow rail (*Coturnicops noveboracensis*). [see table 3.6.2 for a complete list]

Most birds found within the analysis area are migratory. Populations of some of these species are declining as a consequence of land use practices and other factors predominately outside of BLM's control. Many species of grassland birds nest and raise their young on these lease parcels or very near the lease parcels. Neo-tropical migrants exhibit quite variable habitat requirements and are found in most habitat types.

3.6.1.2.2 Mammals and Reptiles

Four sensitive species of mammals and three species of reptiles have the potential to be found within the analysis area. Several species of bats which are commonly found in close relation to conifer stands and rocky outcroppings, prairie dogs and the swift fox complete the list. Swift fox sightings were last observed in Mercer and Golden Valley Counties in 1976 and 1990 respectively.

Table 3.6.2. Presents sensitive bird/mammal/reptile species found in North Dakota and includes their global, state, and North Dakota Game and Fish (NDGF) ranks.

Birds	Scientific Name	Global Rank	State Rank	NDGF Rank
Baird's Sparrow	***Ammodramus bairdii***	**G4**	**SU**	**Level 1**
Black Tern	***Chlidonias niger***	**G4**	**SU**	**Level 1**
Brewer's Sparrow	***Spizella breweri***	**G5**	**S3**	**Level 3**
Burrowing Owl	***Athene cunicularia***	**G4**	**SU**	**Level 2**
Chestnut-collared Longspur	***Calcarius ornatus***	**G5**	**SU**	**Level 1**

Common Loon	***Gavia immer***	**G5**	**S4**	**Not Ranked**
Dickcissel	***Spiza americana***	**G5**	**SU**	**Level 2**
Ferruginous Hawk	***Buteo regalis***	**G4**	**SU**	**Level 1**
Franklin's Gull	***Larus pipixcan***	**G4, G5**	**SU**	**Level 1**
Golden Eagle	***Aquila chrysaetos***	**G5**	**S3**	**Level 2**
Greater Sage-grouse	***Centrocercus urophasianus***	**G4**	**SU**	**Level 2**
Le Conte's Sparrow	***Ammodramus leconteii***	**G4**	**SU**	**Level 2**
Loggerhead Shrike	***Lanius ludovicianus***	**G4**	**SU**	**Level 2**
Long-billed Curlew	***Numenius americanus***	**G5**	**S2**	**Level 1**
Marbled Godwit	***Limosa fedoa***	**G5**	**SU**	**Level 1**
McCown's Longspur	***Calcarius mccownii***	**G4**	**S2**	**Level 3**
Nelson's Sharp-tailed Sparrow	***Ammodramus nelsonii***	**G5**	**SU**	**Level 1**
Northern Goshawk	***Accipiter gentilis***	**G5**	**SU**	**Not Ranked**
Peregrine Falcon	***Falco peregrinus***	**G4, T4**	**S1**	**Level 3**
Sedge Wren	***Cistothorus platensis***	**G5**	**SU**	**Level 2**
Sprague's Pipit	***Anthus spragueii***	**G4**	**S3**	**Level 1**
Swainson's Hawk	***Buteo swainsoni***	**G5**	**SU**	**Level 1**
White-faced Ibis	***Plegadis chihi***	**G5**	**SU**	**Not Ranked**
Willet	***Catoptrophorus semipalmatus***	**G5**	**SU**	**Level 1**
Wilson's Phalarope	***Phalaropus tricolor***	**G5**	**SU**	**Level 1**
Yellow Rail	***Coturnicops noveboracensis***	**G4**	**S2**	**Level 1**
Snapping Turtle	***Chelydra serpentine***	**n/a**	**n/a**	**Level 2**
Western Hog-nosed snake	***Heterodon nasicus***	**n/a**	**n/a**	**Level 3**
Long-legged myotis	***Myotis volans***	**n/a**	**n/a**	**Level 3**
Long-eared myotis	***Myotis evotis***	**n/a**	**n/a**	**Level 3**
Black-tailed Pr. Dog	***Cynomys ludovicianus***	**n/a**	**n/a**	**Level 1**
Swift Fox	***Vulpes velox***	**n/a**	**n/a**	**Level 2**

The State of North Dakota employs the standardized ranking system to denote global (or range-wide) and state status (Nature Serve, 2006). NDGF assigns numeric ranks ranging from 1 (highest risk, greatest concern) to 5 (demonstrably secure), reflecting the relative degree of risk to the species' viability, based on available information.

3.6.1.3 Threatened, Endangered, Candidate, and Proposed Species

Threatened, endangered, candidate, or proposed bird species may occupy habitat infrequently or seasonally within the analysis area. These species include:

Interior Least Tern--S*terna antillarum athalassos* (Endangered)
Whooping Crane--*Grus Americana* (Endangered)
Piping Plover --*Charadrius melodus* (Threatened)
Pallid Sturgeon-- *Scaphirhynchus albus* (Endangered)
Dakota Skipper Butterfly-- *Hesperia dacotae* (Candidate)
Spragues pipit--*Anthus spraguii* (Candidate)

The Greater Sage Grouse (*Centrocercus urophasianus*), Black-footed Ferret (*Mustela nigripes*) and the Gray Wolf (*Canis lupis*) are not known to occur within the planning area. Occasional sightings of wolves have been reported, but no documented home range has been identified.

3.6.1.3.1 Interior Least Tern

The interior least tern was listed as endangered in 1985. From mid-May to mid-August, interior least terns use sparsely vegetated sandbars or shoreline salt flats of lakes along the Missouri River system including Lake Sakakawea. They are not found on any other water body or waterway in North Dakota.

3.6.1.3.2 Whooping Crane

The whooping crane was listed as endangered in 1967. North Dakota lies directly in the middle of the major migratory path utilized by the remaining wild bird population. Sightings have been recorded in all the counties within western ND with the exception of McKenzie and Bowman counties. Palustrine wetland and cropland ponds are used during the migration for feeding and roosting. There has not been any recording nesting activity in North Dakota for more than 90 years. Recovery actions to protect and restore whooping cranes are outlined in the 2005 FWS Recovery Plan and can be found at: (http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf

3.6.1.3.3 Piping Plover

Preferred habitat for the piping plover is generally characterized as exposed, sparsely vegetated shores and islands of shallow alkali lakes and impoundments. Salt-encrusted, alkali, or sub-saline semi-permanent lakes, ponds, and rivers with wide shorelines of gravel, sand, or pebbles are preferred.

The piping plover was listed as threatened in 1985. Critical habitat was designated in North Dakota in 2002 for the entire Lake Sakakawea boundary, the Missouri River as well as areas in Mountrail, Williams, Ward and Burke counties. The FWS estimated approximately 2,000 breeding pairs were located in North Dakota in 1993, compared to 11,000 breeding pairs in 1967 (http://www.fws.gov/mountain-prairie/species/birds/pipingplover/)

3.6.1.3.4 Pallid Sturgeon

The pallid sturgeon was listed as endangered in 1990. Pallid sturgeons are found in the upper reaches of the Missouri River in North Dakota near the confluence with the Yellowstone River

and in the Yellowstone River proper. However, the confluence is continuous with Lake Sakakawea, and this species may be found throughout the entire system. The pallid sturgeon is adapted for living close to the bottom of large, silty rivers with swift currents. They prefer habitat consisting of sand flats and gravel bars.

3.6.1.3.5 Dakota Skipper Butterfly – Candidate Species

The Dakota skipper butterfly species may occupy habitat infrequently or seasonally within the analysis area, however, it is not known to occupy any nominated lease parcels. The following counties in the analysis area have recorded sightings: Burke, Bottineau, Dunn, McHenry, McKenzie, Mountrail, and Ward.

The Dakota skipper can survive only in undisturbed, tall grass and mid-grass prairie. In the western part of North Dakota, the skipper can be found in ungrazed native pastures with little bluestem, needle-and-thread, and purple coneflower. Bluestem grass is a favorite food plant for the larval stage of the skipper. Dakota skippers rarely travel more than one-half mile in their entire lifetime.

3.6.1.3.6 Sprague's Pipit – Candidate Species

A 12 month finding for the Sprague's Pipit was published in the Federal Register by the Fish and Wildlife Service (USFWS) on September 15, 2010, warranting the listing of the Sprague's Pipit as a Federal protected species, but precluded the listing due to higher priority species. The species is currently on the candidate species list.

The Sprague's pipit is a relatively small (4–6 inches long and weighs 0.8-0.9 ounces) passerine endemic to the North American grasslands. It has a plain buff colored face with a large eye-ring. The Sprague's pipit is a ground nester that requires grassland habitats, preferably larger non-fragmented undisturbed habitat, at least 80 acres in size. It feeds mostly on insects, spiders, and some seeds.

Sprague's pipits are strongly tied to native prairie (land which has never been plowed) throughout their life cycle (Owens and Myres 1973, pp. 705, 708; Davis 2004, pp. 1138-1139; Dechant et al. 1998, pp. 1-2; Dieni et al. 2003, p. 31; McMaster et al. 2005, p. 219). They are rarely observed in cropland (Koper et al. 2009, p. 1987; Owens and Myres 1973, pp. 697, 707; Igl et al. 2008, pp. 280, 284) or land in the Conservation Reserve Program (a program whereby marginal farmland is planted primarily with grasses) (Higgins et al. 2002, pp. 46-47). Sprague's pipits will use nonnative planted grassland (Higgins et al. 2002, pp. 46-47; Dechant et al. 1998, p. 3; Dohms 2009, pp. 77-78, 88). Vegetation structure may be a better predictor of occurrence than vegetation composition (Davis 2004, pp. 1135, 1137).

Potential habitats for the Sprague's Pipit exist throughout western North Dakota.

3.6.2 Special Status Plant Species

There are no known threatened or endangered plant species in the study area and no special status plant species identified for North Dakota.

3.7 Fish and Wildlife

A diversity of wildlife habitat, topography, and vegetation types exists across the analysis area. This diversity across western North Dakota and the analysis area provides habitat for many wildlife species in addition to those previously mentioned.

Current and historic land uses across the lease parcels include grazing, farming, hunting, energy development, and others. Consequently, some areas contain large contiguous blocks of well-functioning habitats, while other areas are composed of small, fragmented patches of native habitats. In some areas, existing anthropogenic disturbance at some frequency has been attributed to reducing habitat suitability for some species of wildlife intolerant to human activities.

Wildlife species and habitat surveys have been conducted throughout the analysis area at various times and for various species. The entire area has not been comprehensively surveyed for all wildlife resources; however, a combination of past surveys provides insight into what species have been documented, and what other species are expected within those habitat types.

Big game species in the analysis area include mule deer, white-tailed deer, pronghorn antelope, Bighorn sheep and elk.

White-tailed deer are the most abundant big game species and use the greatest variety of habitats, generally preferring riparian corridors, along creeks and rivers, as well as woody draws and grasslands (NDGF web site). Habitat diversity appears to be a good indicator of intensity of deer use. In mule deer habitats, diversity of vegetation usually followed topographic diversity; thus, rugged topography may be the ultimate factor influencing mule deer use of an area (Mackie et. al, 1998).

Winter range is often part of year-round habitat in western North Dakota for Mule Deer. Winter ranges are typically in areas of rougher topography and are often dominated by shrub species that provide crucial browse during winter months. Escape and thermal cover are also important for maintenance and survival. Thick stands of ponderosa pine and juniper are examples of important escapes and thermal cover used by mule deer in the analysis area while woody draws, shelterbelts and farmsteads provide winter cover for white-tailed deer.

Pronghorn antelope are sparsely distributed across the analysis area with Bowman County being the core area. They are generally associated with grasslands and shrublands, but they will also use agricultural fields. Winter ranges for pronghorn antelope generally occur within sagebrush grasslands with at least greater densities of big sagebrush than the surrounding areas.

Elk are primarily associated with the timbered portion of the breaks and the riparian bottoms along the river corridors. The riparian areas are used in conjunction with the upland areas for forage and security purposes. The riparian bottoms become increasingly important during the drought periods when upland reservoirs become dry.

The potential for big game movements or migrations through western North Dakota are not fully understood. At a local level, it is reasonable to assume big game movements occur at least seasonally. Migration corridors have not been identified through any of the lease parcels.

The analysis area provides habitat for sharp-tailed grouse, turkeys, Hungarian partridge, and pheasants.

In addition to sage grouse, sharp-tailed grouse are the other native prairie grouse species in the analysis area. Sharp-tailed grouse generally prefer hardwood draws, riparian areas, and prairie grasslands intermixed with shrubs such as chokecherry and buffaloberry. NDGF survey data on sharp-tailed grouse leks is sporadic throughout much of the study area. No known sharp-tailed grouse leks are located on the existing lease parcels.

Wild turkeys, pheasants, and Hungarian partridge are all species that have been introduced to western North Dakota and would be expected to utilize available habitats within some of the lease parcels.

3.7.1 Waterfowl

A portion of the lease parcels are north of the Missouri River and fall within the Prairie Pothole Region of North Dakota. Statewide, this region encompasses nearly 37,000 square miles and is one of the most important waterfowl-producing areas within North America. Region wide, more than half of all the annual duck production in North America occurs within the entire 300,000 square miles of prairie potholes.

From the mid-1950s to the mid-1970s, approximately 458,000 acres per year of wetland habitat was lost to agriculture and drainage within the Prairie Pothole Region. This loss has increased the importance of wetland habitat, even though the study area makes up less than 1/10 percent of the pothole region in North America. While natural wetlands are crucial for waterfowl nesting, reservoirs become increasingly important during the dry years. Often, they are the only water sources for waterfowl during extended drought periods.

Most species of North American waterfowl have been found nesting within the study area, and many of these species are common migrants. Common nesters found here include but not limited to: mallard (***Anas platyrhynchos***), Canada goose (***Branta canadensis***), gadwall (***Anas strepera***), blue-winged teal (***Anas discors***), and northern shoveler (***Anas clypeata***).

The North American Waterfowl Management Plan was developed in 1988 because of the decline of waterfowl production in the United States and Canada (FWS, August 15, 2007; http://library.fws.gov/Bird_Publications/nawmp_98.pdf). The plan has been divided into various localized “Joint Ventures” such as the Prairie Pothole Joint Venture and the Great Plains Joint Venture, which encompass the entire study area. Joint venture projects not only benefit waterfowl but also provide needed habitat for various guilds of resident and migratory birds.

3.8 Cultural Resources

The Bureau of Land Management (BLM) manages and protects cultural resources on public land for the purpose of public interpretation, cultural importance to Native American Indians or other cultural groups, and for scientific research. Mandatory legislation is outlined for the protection of cultural resources in 36 CFR 800. Under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended, historic properties are evaluated for their significance or "eligibility" for nomination to the National Register of Historic Places. Potential effects to sites evaluated as eligible, potentially eligible, and Traditional Cultural Properties must be considered. Protection or mitigation treatments are used to avoid or reduce adverse affects.
Common prehistoric archaeological site types in North Dakota are lithic artifact scatters, earthlodge villages, stone circles, short-term camp sites, stone cairns, rock art, and Knife River Flint tool stone quarries. Also common to a lesser degree are animal bone concentrations resulting from game drives, vision quest stations, eagle-trapping pits, stone alignments, and scatters of artifacts that include ceramics or factory-made trade goods. Well-stratified, multiple-component sites, which are typically significant sites, have been found in remnant alluvial fans, stream terraces, and spring deposits, and in the terraces lining the Missouri and Little Missouri rivers. Common historic archaeological sites in the state are the remains of homesteads, farmsteads, dumps, school and churches, roads, railroad grades, trails, trading posts, and military forts.

A literature search (Class I) of records at the North Dakota State Historical Society was conducted for all of the nominated lease parcels and immediate vicinity to determine what types and number of known cultural resources are present within or adjacent to the nominated lease parcels. Additional cultural resource information was reviewed for the general area in the North Dakota RMP/EIS and the North Dakota Statewide Comprehensive Historic Preservation Plan. Requests for additional cultural information, culturally sensitive areas, or areas of concern were made to the Tribal Historic Preservation Offices and other interested tribes in North Dakota, Montana, and Minnesota.

Following are the results of the Class I inventories. Of the 43 lease parcels being reviewed for Alternative B, 36 lease parcels have been partially covered by previous cultural resource inventories. Many of the proposed leases are located along the Missouri River Corridor. This corridor area or Missouri River shoreline has been surveyed in sample form since the 1940s. Early 1940's and 1950's shoreline inventories were considered more of an overview than a field survey. Other projects conducted in the mid-1970's and mid-1980's are reconnaissance or sample type surveys also in the trench areas. Although these inventories documented the majority of the sites known for this area; the age of the project and type of ground surface coverage does not meet with today's standards for Class III cultural resource survey coverage. Therefore, acres of coverage from these projects inside the lease parcels were not calculated or considered for these parcels.

Other surveys conducted inside the proposed lease parcels consist primarily of linear surveys with narrow corridors such as highways, roads, transmission, telephone, and fiber optic cable lines, water, gas and oil pipelines, seismic lines, and a fence. Other surveys that also do not offer

much survey coverage area were completed for small recreation areas; 10, 20, 30, and 40-acre oil well pads; gravel and borrow pits; a wind farm and communication tower; dams; boat ramps; and a water treatment plant.

Federal land projects including adjustments, exchanges, acquisitions, and surface tract inventories offer more opportunity for larger block surveys; however, projects completed inside the nominated lease parcels still do not offer much coverage. Based on the age and type of previous large block river shoreline surveys, and the small scale of other previous projects, it is estimated less than 15 percent of the leases have received adequate cultural resource coverage.

3.8.1. Previous Cultural Resource Surveys in Lease Parcels

Previous surveys projects documented a large number of cultural resources within and adjacent to the proposed lease parcels. The radius adjacent to the lease was also reviewed for sites, and in high site density areas this review radius was moved out to 1-mile. There are 29 (1,567 acres) nominated parcels that contain 70 cultural resource sites and isolates in and within a 1-mile radius of the parcel. Most of these sites are located on the Missouri and Little Missouri River terraces with some completely inundated or close to the water's edge.

Of the 70 cultural resources located within the 29 parcels (1,567 acres) that contained recorded cultural resources, there are a total of 36 cultural sites and 34 isolated cultural finds. Of the isolates 30 are prehistoric and 4 are historic. Of the cultural sites 17 are prehistoric archeological sites (pre-European contact), 1 is both prehistoric and historic, 11 sites are historic (post European contact), and 7 sites are historic architectural.

3.8.2. Cultural Resource Types and Numbers inside Lease Parcels

Other cultural resource projects completed in the nominated parcels include historic overviews and paleontological reviews; cemetery and historic sites surveys; historic bridges; phase I projects for recreation areas and trails; and site evaluation, mitigations, and monitoring projects. Only 1 cultural resource evaluation project has been conducted; none of the other 35 sites have been completely evaluated or mitigated. Inventory data is not available for 7 of the nominated parcels and portions of the remaining 36 parcels.

3.9 Native American Religious Concerns

BLM's management of Native American Religious concerns is guided through its 8120 Manual: *Tribal Consultation Under Cultural Resources Authorities* and 8120 Handbook: *Guidelines for Conducting Tribal Consultation*. Further guidance for consideration of fluid minerals leasing is contained in BLM Washington Office Instruction Memorandum 2005-003: Cultural Resources, Tribal Consultation, and Fluid Mineral Leasing. The 2005 memo notes leasing is considered an undertaking as defined in the National Historic Preservation Act. Generally areas of concern to Native Americans are focused on cultural properties of religious and cultural concern, or "Traditional Cultural Properties" (TCPs); which are defined as cultural properties eligible for the National Register because of its association with cultural practices or beliefs that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community.

Based on a settlement agreement between the BLM and the Mandan, Hidatsa, and Arikara Nation (MHAN), additional guidance for lease parcel reviews is provided in BLM Instruction Memorandum MT-2009-14: The agreement provides that upon receipt of lease nominations inside the exterior boundary of the Fort Berthold Indian Reservation, the NDFO will notify by letter the MHAN Tribal Chairperson and Tribal Historic Preservation Officer. The locations of lease parcels that are being reviewed must be presented so MHAN representatives can offer information on TCPs or other sensitive areas or concerns.

A packet that included a formal cover letter, an official list and maps of the lease parcels, and Class I site and survey information for each lease parcel were sent certified mail to the tribal historic preservation officer (THPO) and tribal chairmen for each of the Turtle Mountain Band of the Chippewa (TMBC) Tribe; the Standing Rock Sioux Tribe (SRST); the Mandan Hidatsa, and Arikara Nation (MHAN); the Spirit Lake Tribe of Fort Totten, ND; the Northern Cheyenne Tribe, of Lamedeer MT; and the Lower Sioux Indian Community of Morton, MN (June 27th, 2013). The tribal chairman and THPOs from each of the six above mentioned Tribal Nations received and signed for the packet by July 5th 2013. To date no TCPs have been brought to the attention of the BLM archaeologist by the Tribal Nations mentioned above.

3.10 Paleontology

According to Section 6301 of the Paleontological Resource Protection Act of 2009 Omnibus Public Lands Bill, Subtitle D, SEC. 6301, defines paleontological resources as "any fossilized remains, traces, or imprints of organisms, preserved in or on the earth's crust, that are of paleontological interest and that provide information about the history of life on earth." All vertebrate fossils, be they fossilized remains, traces, or imprints of vertebrate organisms, are considered significant, and certain invertebrate and plant fossils are as well.

The geologic formations containing paleontological resources in the western part North Dakota extend into several of the neighboring states and Canada, with only minor sedimentary or depositional differences. The formations on the lease parcels considered here span the time period from after the Cretaceous extinction of the dinosaurs and the rapid rise of mammals during the Paleocene and Eocene Epochs of the Tertiary Period through the recent glacial deposits of the Pleistocene.

The late Cretaceous/early Tertiary formations in the northern Great Plains region are world-renowned for their dinosaur and early mammal fossils; most of the major museums in the United States have fossils from this region. The Tertiary formations in particular have produced a huge number of significant mammal fossils over the last 130 years.

Most paleontologic localities recorded with BLM offices resulted from researchers performing field work. A few localities have been found during BLM-required mitigation of surface-disturbing activities. Some localities are simply local knowledge. The investigation of illegal collecting activities has revealed the location of some fossils.

The geologic formations and units across the region have been ranked according to the Potential Fossil Yield Classification system, a numerical rank from 1 (very low) to 5 (very high) to predict the likelihood of finding significant fossils. Several important points should be kept in mind. Fossils are not evenly distributed throughout a formation, and so even highly ranked formations may produce only occasional fossils in a given locality. Similarly, fossils can be found in unlikely places. For example, granite bedrock might be given the lowest potential rating, but have a crevice or cave structure that is rich in fossils. Fossils have been found in basalt, a rock type that would be easy to discount as fossil bearing. Indeed, the discovery of a fossil in a class 1 rock unit might be all the more significant given its unexpected occurrence. The system is designed to help in planning, and cannot replace detailed analysis on a case-by-case basis by trained personnel.

These ranks are as follows:

(1) ***Very Low*** – Class 1: Igneous and metamorphic geologic units, or very old deposits not likely to contain recognizable fossils.
(2) ***Low*** – Class 2: Geologic units not likely to contain vertebrate fossils or scientifically significant non-vertebrate fossils, such as very young sedimentary deposits.
(3) ***Moderate or Unknown*** –Class 3: Fossiliferous sedimentary geologic units – content varies in significance, abundance, and predictable occurrence. Includes some units of unknown potential that should be reviewed.
(4) ***High*** –Class 4: Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability.
(5) ***Very High*** –Class 5: Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plan fossils.

A review of Potential Fossil Yield Category (PFYC) formations indicates that 23 of the 43 lease parcels are wholly or partially located within PFYC formations rated 3, 4, or 5. The formations identified as moderate to very high potential include: Coleharbor; Golden Valley; Sentinel Butte; Bullion Creek; Ludlow; and Cannonball formations.

3.11 Minerals

3.11.1 Fluid Minerals

It is the policy of the BLM to make mineral resources available for disposal and to encourage development of these resources to meet national, regional, and local needs, consistent with national objectives of an adequate supply of minerals at reasonable prices. At the same time, the BLM strives to assure that mineral development occurs in a manner which minimizes environmental damage and provides for the reclamation of the lands affected.

Federal Oil and Gas Lease Information and Federal, State and Private Oil and Gas Development Activity within the External Boundaries of the NDFO

The USFS manages large areas of land within the boundaries of the NDFO that contain federal oil and gas lease acreage. Currently, there are 2,035 federal oil and gas leases covering

approximately 1,024,146 acres in the State of North Dakota. Existing production activity holds approximately 54 percent of this lease acreage (1098 leases; total of 550,820 acres). Approximately 78 percent of this federal oil and gas lease acreage is within the boundaries of the USFS Little Missouri National Grasslands (1279 leases; 802,603 acres).

Information regarding the numbers and status of wells on federal, private/State, and Indian lands within the external boundary of the NDFO is displayed in Table 3.12.1. Numbers of townships, lease acres within those townships, and development activity for all jurisdictions are summarized in Table 3.12.2.

If a lease parcel receives interest and oil and gas lease sales lead to lease issuance, exploration or development activity could occur during the term of the lease. Exploration and development proposals in the future would require a separate environmental document to consider specific proposals and address site-specific resource concerns.

Table 3.12.1 Existing Development Activity

	FEDERAL WELLS	PRIVATE AND STATE WELLS	INDIAN
Drilling Well(s)	89	471	138
Producing Gas Well(s)	108	91	0
Producing Oil Well(s)	1,024	6,641	551
Water Injection Well(s)	207	805	3
Shut-in Well(s)	64	73	3
Temporarily Abandoned Well(s)	55	318	1

Table3.12.2. Oil and Gas Leasing and Existing Development within Townships Containing Lease Parcels

	Bottineau	Bowman	Burke	Divide	Dunn	Golden Valley	McKenzie	Mountrail	Williams
Townships	T163N R76W	T130N R101W	T163N R94W	T161N R100W	T147N R94W T148N R95W T148N R96W	T141N R105W T142N R105W	T151N R104W T152N R100W T152N R104W T153N R93W T153N R98W T153N R100W T154N R101W	T152N R91W T152N R93W T153N R93W	T152N R100W T152N R103W T152N R104W T153N R98W T153N R100W T153N R101W T158N R99W T159N R101W
Number of Townships Containing Lease Parcels	1	1	1	1	3	2	7	3	8
Total Acres Within Applicable Township(s)	23,039	23,003	22,996	23,072	67,765	45,446	157,712	69,846	183,426
Acres Federal O&G Minerals	201	80	320	160	21,114	839	12,048	11,175	7,187
Percent of Township(s)	0.8%	0.3%	1.4%	0.7%	31.2%	1.8%	7.6%	16%	3.9%
Acres Leased Federal O&G Minerals	0	0	0	0	16,956	518	9,267	7,861	4,632
Percent of Township(s)	0	0	0	0	25%	1.1%	5.9%	11.3%	2.5%
Acres Leased Federal O&G Minerals Suspended	0	0	0	0	0	0	0	0	0
Percent of Township(s)	0	0	0	0	0	0	0	0	0
Federal Wells	0	0	0	0	26 HOW 1 OIL	0	2 DRG 35 HOW	2 DRG 23 HOW	1 DRG 24 HOW

Private and State Wells	9 HOW 1 TA	0	2 HOW	2 HOW	8 HOW 4 OIL 2 TA 1 WDW 1 WIW	3 DRG 2 HOW 2 OIL 1 WDW	3 DRG 1 GAS 146 HOW 25 OIL 1 TA 4 WDW	1 DRG 93 HOW	2 DRG 1 GIWO 131 HOW 189 OIL 1 PGW 8 TA 2 WDW 2 WIW
Indian Wells	0	0	0	0	6 DRG 20 HOW	0	0	2 DRG 22 HOW	0

Table 3.12.3 Oil and Gas Leasing and Existing Development Abbreviations Key

Acronym	Description
DRG	Drilling Well
GAS	Gas Well
GIWO	Gas Injection Well Oil
HOW	Horizontal Oil Well
OIL	Oil Well
PGW	Producing Gas Well
TA	Temporarily Abandoned
WDW	Water Disposal Well
WIW	Water Injection Well

3.11.2 Solid Minerals

3.11.2.1 Salable Minerals

Salable minerals, often referred to as mineral materials, are common varieties of minerals such as sand, gravel, and stone, as well as petrified wood. Mineral materials may be sold or disposed of through free use permits under the provision of the Materials Act of July 31, 1947, amended July 23, 1955, and September 25, 1962. The disposition of salable minerals will be evaluated during the development of the site-specific NEPA document for the application for permit to drill (APD).

3.12 Visual Resources

3.12.1 Visual Resource Management

The Federal Land Policy and Management Act requires that the BLM consider the scenic values of public land as a resource that merits management and preservation, as determined through the land use planning process. In response to this mandate, the BLM developed the Visual Resource Management (VRM) System, with the primary objective of managing public land in a manner that will protect the quality of scenic (visual) values (Information Bulletin No. 98-135). The VRM System provides guidance relating to the Visual Resource Inventory Process that the BLM implements to inventory scenic values (BLM Handbook 8410-1), as well as assess the potential effects of proposed actions based on the analysis of visual contrast (BLM Handbook 8431-1). Handbook 8410-1 also provides guidance regarding VRM classes, which set management objectives for BLM-administered land.

Primary factors considered for the inventory of scenic values are scenic quality, sensitivity level rating units, and distance zones (DZ), collectively referred to as the "VRI". These three factors are combined to develop Visual Resource Inventory (VRI) classes, which represent the scenic values of BLM-managed land. The management of inventoried scenic values is evaluated during the land use planning process and VRM classes (I-IV) are assigned to all BLM administered lands.

The assignment of VRM classes is based on the consideration of: (1) inventoried scenic values (i.e., the VRI and VRI classes), (2) other land use and resource allocations within a given field office or management unit, and (3) public needs and national priorities for federal land. VRM assignments are land use plan decisions that guide future land management actions. It is important to note that VRM class assignments do not have to be consistent with inventoried scenic values (i.e., VRI classes) and should reflect a balance between the protection of visual values and other uses of BLM land to meet public demand or national priorities.

VRM classifications are only applied to BLM surface, as such; the affected environment for visual resources consists of approximately 116.60 acres of BLM-administered surface in the analysis area.

A Class II VRM area classification means that the character of the landscape has unique combinations of visual features such as land, vegetation, and water. The existing character of the landscape should be retained. Activities or modifications of the environment should not be

evident or attract the attention of the casual observer. Changes caused by management activities must repeat the basic element of form, line, color, and texture found in the predominant natural features of the characteristic landscape.
A Class III VRM area classification means the level of change to the character of the landscape should be moderate. Changes caused by management activities should not dominate the view of the casual observer and should not detract from the existing landscape features. Any changes made should repeat the basic elements found in the natural landscape such as form, line, color and texture.

A Class IV VRM area classification means that the characteristic landscape can provide for major modification of the landscape. The level of change in the basic landscape can be high. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements.

The NDFO does not currently have Visual Resource Classifications established for any lands found within the analysis area.

3.12.2 Visual Resource Inventory

As previously described, the VRI comprises three primary components: scenic quality, sensitivity level rating units, and DZs, per BLM VRM policy. These three factors are combined using a geographic information system to define VRI classes, which represent the scenic values of BLM-managed land.

The BLM completed a comprehensive inventory of visual resources in August of 2011. The inventory was administered through a contract with a reputable land-use planning firm. The BLM-surface parcels identified in the proposed action were classified as VRI III or VRI IV based on their combination of the factors described above.

3.12.2.1 Scenic Quality

Scenic quality is a measure of the aesthetic value of a given landscape and is based on the following seven landscape factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications. Based on the diversity of landscape factors, the VRM system classifies landscapes as either A, B, or C class landscapes.

The proposed lease parcels with BLM surface ownership fall within the Lewis and Clark Trail Scenic Quality Rating Unit #5 were rated as having a Class B Scenery. This landscape is located along the Missouri River, which is characterized as flat valley bottoms with steep sideslope escarpments and vertical cliffs in some areas. The vegetation varies from tree to shrubs to grasses, with riparian plant communities along the river. Cultural modifications to the landscape vary from rural and pastoral to somewhat industrial where occasional towns are located.

3.12.2.2 Sensitivity Levels

Sensitivity levels are a measure of public concern for the maintenance of scenic quality. Public lands are assigned high, medium, or low sensitivity by analyzing the various factors of public

concern, including type of user, amount of use, public interest, adjacent land uses, special areas, and other factors that indicate sensitivity. The proposed lease parcels with BLM surface ownership along the Missouri River are within an area that was determined to have a Medium sensitivity to changes in the visual environment based on the presence of national historic trails, National Park Service historic forts, and heavy dispersed recreational use, primarily associated with hunting.

3.12.2.3 Distance Zones

Per BLM guidance, landscapes are subdivided into three DZs, based on relative visibility from travel routes or other public viewing locations. The three zones are foreground-middle ground, background, and seldom seen. The foreground-middle ground zone includes areas seen for highways, rivers, or other viewing locations that are less than 3 to 5 miles away. Areas viewed beyond the foreground-middle ground zone but usually less than 15 miles away, are in the background zone. Areas not seen as foreground-middle ground or background (i.e., hidden from view) are in the seldom seen zone.

The proposed lease parcels with BLM surface ownership are associated with the foreground-middle ground viewing distances, with visibility generally up to 5 miles.

3.12.3 Current Management

The North Dakota Field Office did not assign VRM classifications in the current Resource Management Plan. However, the following general objectives and management actions were approved in the RMP:

RMP Objective: "To maintain visual qualities wherever possible."
RMP Management Actions:

- Consider impacts to the visible landscape during all phases of land use planning.
- Ensure that the high visual qualities of National Park Service Units are considered in cooperation with the NPS when a specific mineral lease or developmental action is proposed that potentially affects existing visual qualities.
- Mitigate visual impacts from oil and gas development within a 3.5 mile radius of Fort Union Historic Site. If visual impacts cannot be adequately mitigated within the 3.5 mile radius, oil and gas development will not be permitted.

3.12.4 National Historic Trails

National Historic Trails commemorate historic or pre historic travel routes that are of significance to the entire nation. A designated trail should generally follow the route of the historic trail but may deviate if necessary. To qualify for designation as a national historic trail, a trail must meet the following criteria: have been established by a historic use and have historical significance as a result of that use, have historic use of the trail that has had a far and reaching effect on broad pattern of American culture, and has significant potential for public recreational or historical interest.

National Historic Trails are managed in accordance with the National Trail System Act of 1968, as amended (16 USC 1241-1251) to identify and protect the historic route and its historic remnants and artifacts for public use and enjoyment. The following proposed lease parcels are located along the Lewis and Clark National Historic Trail: NDM 79010-MR, NDM 97300-QV, M4, QW, YC, YF, YH, YL, YP, YQ, YG, YK, YJ, YM, YN, MX, TT, WN, TK, ML, MM, QM, TE, TF, NJ, TU, QT, YB, LU, TY, NG, and R9.
The BLM guidance further provides that National Historic Trails (NHT) should be managed to promote preservation, public access, travel opportunities, enjoyment, and appreciation of National Trails for present and future generations as a component of the National Landscape Conservation System or the National Trails System.

The following proposed lease parcels with BLM surface ownership are located along the Lewis and Clark National Historic Trail: NDM 97300-TK, NDM 97300-ML, and NDM 97300-MM.

3.13 Recreation and Travel Management

BLM only manages recreational opportunities and experiences on BLM-administered surface. The affected environment consists of approximately 116.60 acres of BLM-administered public lands (surface). Recreational activities enjoyed by the public on BLM lands within the analysis area include hunting, hiking, camping, fishing, photography, off-road vehicle activities, picnicking, and winter activities such as snowmobiling. Benefits and experiences enjoyed by recreational users include opportunities for solitude, spending time with families, enhancing leisure time, improving sports skills, enjoying nature and enjoying physical exercise.

Much of the approximately 116.60 BLM-administered acres proposed for lease consist of small and scattered tracts with limited legal public access (i.e., no public easements or rights-of-way across private property). The lack of public access limits use of the BLM parcels for recreational use by the general public. The types of limited public use on these lease parcels can be characterized as casual dispersed recreational activities including hiking, hunting, camping, and wildlife viewing.

The general public will follow policy of no cross country travel off existing roads per the *June 2003 Record of Decision: Off-Highway Vehicle Environmental Impact Statement and Proposed Plan Amendment for Montana, North Dakota and South Dakota.*

3.13.1 Noise

Due to the close proximity to the river, if these lease parcels along the Missouri and Yellowstone Rivers were developed there would be a change in both the physical and social setting through the introduction of roads, equipment, noise and traffic associated with drilling operations detracting from the peaceful setting provided by the state along this stretch of river.

Sound levels in the remaining project area would vary greatly, depending on proximity to existing residences, roadways, or other sources. These sound levels would fluctuate with variations in weather conditions including temperature, wind, humidity, and the general topography of the area. No background noise studies have been conducted, but the project area

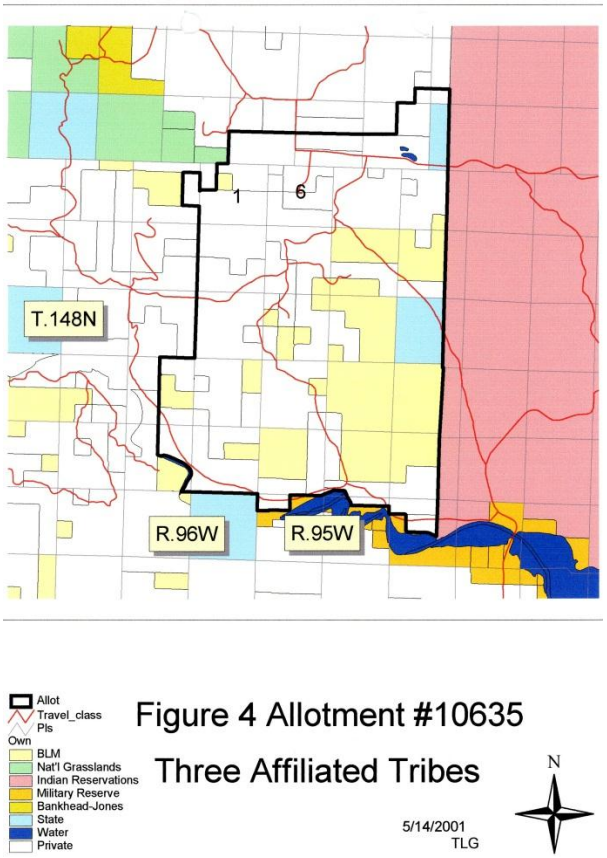
is located in the vicinity of existing county roads, with noise disturbance already present to a degree.

3.14 Livestock Grazing

Parcels NDM 79010-AR and NDM 79010-MR are located within one BLM grazing allotment located in Dunn County. Table 3.15.1 identifies allotment specific information for these parcels. This custodial grazing allotment is operated by one lessee using the allotment for cattle operations. This allotment has several range improvements such as fences, stock ponds, pipelines, and access roads for livestock management purposes.

Allotment Number	Allotment Name	Parcel ID	Allotment Category	Livestock Type	Season of Use	Number of Lessees	County	Surface Ownership
10635	Figure 4	NDM 79010-AR NDM 79010-MR	C	Cattle	3/1-2/28	1	Dunn	BLM

3.15.1 Map of Figure 4 Allotment



The remaining lease parcels are not located within grazing allotments.

3.15 Economic Conditions

3.15.1 Introduction

There are characteristics of North Dakota counties leasing land for oil and gas exploration and development which define and influence the relationship between BLM-administered lands and social and economic activity within the region. These characteristics may include local populations, the presence and proximity of cities or regional business centers, longstanding industries, infrastructure, predominant land and water features, and amenities unique to the area. In order to accurately portray the relationship of current BLM management, and examine the social and economic effects of leasing new parcels for fluid minerals exploration and development, the geographic scope of the analysis was defined by a 13 county impact area. This impact area includes nine North Dakota counties which contain parcels currently nominated for oil and gas leasing: Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McKenzie, Mountrail, and Williams counties. Four additional counties (Renville, Stark, Slope, and Ward) were also included in the economic area of influence because of trade flows, population bases, and business centers serving the counties with lease parcels. Although the distribution of effects stemming from additional fluid minerals leasing are likely to vary across the impact area, the distribution of economic effects stemming from the sale of additional lease will be based on the number of acres leased, levels of production, and the business patterns of these counties.

3.15.2 Affected Environment

Recently, western North Dakota experienced tremendous growth associated with oil development of the Bakken formation. In 2010, the population of the 13-county impact area was 136,733 people and 61,137 households were reported in the area. Major population and business centers include Minot (in Ward County), Williston (which is the county seat for Williams County and the epicenter of North Dakota's recent oil boom and a business center), and Dickinson (in Stark County).

According to IMPLAN's 2010 model, there were 207 industrial sectors represented in the 13-county economy that covers the economic impact area. These industries supported 112,034 local jobs, $7.2 billion in total personal income, and an average income per household was $118,067 (IMPLAN, 2010). Within this local economy, there were 1.22 people per job and 0.55 households per job.

3.15.3 Nature of the Oil and Gas Industry in North Dakota

Oil and Gas development, which includes the extraction of oil and gas, drilling of wells, and support activities, has significantly increased in North Dakota over the last decade as exploration in the Bakken formation has intensified. North Dakota is consistently ranked one of the U.S's top oil and gas producing states, producing more than 242 million barrels (bbls) of oil and 258.9 MCF of natural gas in 2012(ND Department of Mineral Resources, 2013). According to the Independent Petroleum Association of America, a total of 1,179 wells were drilled in 2010. Of these, 1,105 were oil wells, 3 were gas wells, and 71 were reported as dry holes.. North Dakota had 153 active operators in 2010. The average cost of drilling and equipping a well was

$8,908,325 (oil), $2,359,507[1] (gas), and $201,912 (dry holes) (IPAA, 2013). Average 2012 wellhead price of oil produced from BLM-managed minerals in North Dakota for crude oil was $83.68 per bbl (ONRR, 2013). Leasing federal minerals for oil and gas exploration, development, and production stimulates tremendous economic activity within the state, influencing employment, income, and public revenues. The extent to which economic impacts of federal minerals leasing affects local communities depends on the number of acres leased, the number of wells drilled, and the amount of oil and gas produced by these wells.

3.15.4 Leasing

As of June 18, 2013, there were 212,992 acres of federal minerals leased for oil and gas development in the nine ND Field Office counties with lease nominations. Approximately, 27 percent of the leased acres within these nine counties are not held by production. Currently, annual lease rental is paid on 57,819 acres which are not held by production. Lease rental is $1.50 per acre per year for the first five years and $2.00 per acre per year thereafter. Annual average lease and rental revenue from BLM lands in these nine counties was estimated to generate about $147,000 for the federal government. Lease rents were not paid on 155,173 acres which were held by production. Instead, royalties were paid on the oil and gas production from these leases.

In addition to annual rents, federal oil and gas leases generate a one-time lease "bonus" bid. The minimum lease bid is $2.00 per acre. Average annual per acre bonus bids in North Dakota have steadily increased over the past five years as development in the Bakken formation intensified. In 2012 the NDFO sold 58 leases at an average rate of $2,436 per acre. Typically, oil and gas leases expire after 10 years unless production begins on the lease. Once a well begins extracting minerals, the parcel is said to be held by production (HBP) at which time, annual rent on the land ceases and royalties assessed at 12.5% of the value of production begin. About 27 percent of the acres with BLM leases in the nine counties with nominated parcels are not held by production. Rental revenue is collected on about 57,808 acres. Forty-nine percent of the federal leasing revenues from public domain minerals are distributed to the state. The state of North Dakota distributes 50 percent of the revenues received from federal oil and gas leasing and rents to the counties where the leased parcels are located. The other 50 percent of funds that North Dakota receives is distributed to school districts (ND state code 15.1-27-25).

3.15.5 Production

In 2012, production from federal minerals in the nine-counties with nominated parcels equaled 11,041,402 barrels of oil and the average price received was $83.68 per barrel (ONRR, 2013). Royalties paid to the federal government generally amount to 12.5 percent of the value of production (43 CFR 3103.3.1). This was $113,749,000 in 2012 for the nine-county area. Other royalty revenues to these counties come from gas plan products, processed (residue) gas, unprocessed (wet) gas, condensates, etc. and amounted to $7,842,000 in 2012 (ONRR, 2013).

About 52 percent of the federal minerals managed by the BLM are public domain minerals (mineral estate that has never left federal ownership). Forty-nine percent of the federal royalties from public domain minerals are distributed directly back to the state. In North Dakota, 50 percent of the royalty revenues that the state receives are redistributed to the counties of production and the remaining 50 percent is distributed to school districts across the state (North Dakota Code 15.1-27-25).

The other 48 percent of minerals managed by the BLM are acquired minerals (Federal minerals obtained by purchase, condemnation, exchange, or gift under laws other than public land laws). A weighted average of 19 percent of federal revenue from acquired minerals is distributed directly to the counties with leases and production.
The amount of federal minerals, and the economic contributions to local economies from their production, varies across geographic regions and among counties within the analysis area.

3.15.6 Local Economic Contribution

The economic contribution of oil and gas leasing to a local economy is measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing, rent, and bonus bids, 2) local royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production form a basic industry that brings money into the state and region and creates jobs in various economic sectors. Extraction of oil and natural gas (IMPLAN sector 20), drilling oil and gas wells (IMPLAN sector 28), and support activities for oil and gas operations (IMPLAN sector 29) supported an estimated 9,931 local jobs and $808.3 million in employee compensation and proprietor's income within the 13-county local economy (IMPLAN, 2010).

Federal revenues distributed to the state and counties help fund traditional county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that may be funded include operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. A significant amount of funding is used for primary and secondary education.

The estimated annual economic contribution associated with federal leases, rents, drilling, production, and royalty payments combined to support about 277 total jobs and $10.5 million in labor income, respectively within the 13-county local economy (IMPLAN, 2010). This amounts to less than one percent of total local employment and income. Table Econ. 1 shows the current contributions of leasing federal oil and gas minerals and the associated exploration, development, and production of federal oil and gas minerals to the local 13-county economy.

Table 3.15.6 Econ.1. Current Contributions of Federal Oil and Gas Leasing, Exploration, Development, and Production to the North Dakota Economy (Source: IMPLAN, 2010)

Industry	Employment (jobs)		Labor Income (Thousands of 2011 dollars)	
	Area Totals	Federal O&G -Related	Area Totals	Federal O&G-Related
Agriculture	9,053	0	$347,689	$10
Mining	10,359	5	$938,066	$350
Utilities	388	2	$46,209	$220
Construction	6,751	6	$413,656	$370
Manufacturing	2,678	0	$136,138	$14
Wholesale Trade	4,776	3	$363,604	$197
Transportation & Warehousing	4,524	3	$366,198	$172
Retail Trade	11,252	11	$310,605	$284
Information	1,327	5	$69,274	$314
Finance & Insurance	5,592	20	$226,271	$727
Real Estate & Rental & Leasing	3,307	7	$91,532	$88
Prof, Scientific, & Tech Services	3,452	8	$167,569	$337
Mngt of Companies	170	0	$10,904	$6
Admin, Waste Mngt & Rem Serv	3,063	9	$75,598	$210
Educational Services	723	1	$18,432	$25
Health Care & Social Assistance	10,758	11	$460,582	$484
Arts, Entertainment, and Rec	1,265	2	$19,434	$27
Accommodation & Food Services	7,071	15	$113,790	$237
Other Services	5,718	9	$165,712	$280
Government	19,806	160	$1,252,602	$6,195
Total	112,034	277	5,593,865	10,546
Federal O&G as Percent of Total	---	0.25%	---	0.19%

3.16 Social Conditions and Environmental Justice

3.16.1 Introduction

As with the economic affected environment and impact analysis, the social conditions and environmental justice discussions focus on the same 13 county impact area. Local populations, employment, number of households, average income per household, and total personal income are presented in the previous economics section. This section will go into more depth on population and demographics, quality of life, households, and community services.

3.16.2 Population and Demographics

Population and demographic changes are instrumental to understanding a community, since they may drive many of the other community changes brought upon by federal resource management actions. Demographic changes such as large age cohort sizes or residential mobility can affect the local institutions and social context (Burdge 1983; Finsterbusch 1980). A community with an older cohort age (say 65 and older) may need different community services available to meet the 'senior' market. Population changes due to in- or out-migration can affect local community ties and social relationships. A federal management action that affects local communities' populations or demographics can have impacts that ripple throughout the social and economic contexts. For example, an action that can bring in a large workforce can have immediate impacts upon the housing availability, school enrollment, employment changes and income; and the magnitude of these impacts are often dependent upon changing community population and demographics. Understanding the past and current trends occurring in a community provides a baseline for future impact analyses.

Table Social 1 indicates that there is an increasing population trend for the impact counties from 2010 to 2012. Ward County has the largest population (64,798) while Slope County has the smallest (758). Dickinson (Stark Co.) and Williston (Williams Co.) are the largest communities in the impact area and much of the oil and gas related business activities, employment, and households are located there. The population estimates are of residents which means that many individuals associated with a transient workforce are likely not counted.

Table 3.16.2.1 Social 1. Census and Population Estimates, 2010-2012.

Geography	Census (as of April 1)	Population Estimate (as of July 1)	
	2010	2011	2012
North Dakota	672,591	684,740	699,628
Bottineau County	6,429	6,486	6,579
Bowman County	3,151	3,134	3,202
Burke County	1,968	2,058	2,171
Divide County	2,071	2,132	2,228
Dunn County	3,536	3,746	3,967
Golden Valley County	1,680	1,750	1,804
McKenzie County	6,360	7,016	7,987
Mountrail County	7,673	8,104	8,734
Renville County	2,470	2,490	2,559
Slope County	727	719	758

Stark County	24,199	25,147	26,771
Ward County	61,675	64,311	64,798
Williams County	22,398	24,416	26,697

Source: U.S. Census Bureau, Population Division, 2012. Annual Estimates of the Resident Population: April 1, 2010 to July 1, 2012.

For all of the impact counties except Slope County, the increase in population has been due to in-migration. Table Social 2 shows that Williams County saw the largest in-migration of residents from 2010 to 2012. Bottineau and Bowman counties saw a natural decrease in population (more deaths than births), but still had a positive total population change indicating that in-migration was the dominant cause for that population increase. In rural communities, large in-migration can be a concern in terms of infrastructure and public service needs, housing availability, and community relationships.

Table 3.16.2.2 Social 2. Cumulative Estimates of the Components of Population Change, 2010-2012

Geography	Cumulative Estimates of the Components of Population Change						
	April 1, 2010 to July 1, 2012						
	Total Population Change [1]	Natural Increase	Vital Events		Net Migration		
			Births	Deaths	Total	Inter-national	Domestic
North Dakota	27,037	7,094	20,393	13,299	19,506	2,117	17,389
Bottineau County	150	-69	154	223	220	19	201
Bowman County	51	-18	82	100	63	-2	65
Burke County	203	5	54	49	195	0	195
Divide County	157	2	46	44	157	4	153
Dunn County	431	34	89	55	387	23	364
Golden Valley County	124	14	43	29	106	0	106
McKenzie County	1,627	97	212	115	1,500	12	1,488
Mountrail County	1,061	132	298	166	901	2	899
Renville County	89	5	69	64	84	2	82
Slope County	31	18	23	5	11	0	11
Stark County	2,572	218	736	518	2,296	37	2,259
Ward County	3,123	1,201	2,361	1,160	1,924	448	1,476
Williams County	4,299	313	811	498	3,883	19	3,864

Source: U.S. Census Bureau, Population Division, 2012. Estimates of the Components of Resident Population Change, April 1, 2010 to July 1, 2012.
[1] Total population change includes a residual. This residual represents the change in population that cannot be attributed to any specific demographic component.

Changes in population can influence the age and sex structure of the communities. Table Social 3 provides information from the 2010 and 2012. The sex structure has remained relatively the same for those years, likely because of the small timeframe. In terms of median age, across the impact counties the trend was a decrease in age, which was also the case for the State of North Dakota as well. This downward trend could be the result of in-migration of a younger population which would be consistent with increasing energy development.

Table 3.16.2.3 Social 3. 2010 Census and 2012 Estimates of Sex and Median Age

	2010 Census, April 1		2012 Estimate, July 1		Median Age	
	Male	Female	Male	Female	2010 Census, April 1	2012 Estimate, July 1
North Dakota	50.5%	49.5%	50.8%	49.2%	37.0	36.1
Bottineau County	51.7%	48.3%	52.3%	47.7%	48.0	46.2
Bowman County	50.1%	49.9%	51.0%	49.0%	46.9	45.1
Burke County	52.6%	47.4%	53.5%	46.5%	48.1	44.3
Divide County	51.2%	48.8%	51.8%	48.2%	51.4	50.2
Dunn County	52.7%	47.3%	52.9%	47.1%	44.4	42.3
Golden Valley County	49.5%	50.5%	49.9%	50.1%	45.9	44.1
McKenzie County	51.6%	48.4%	52.3%	47.7%	38.0	34.7
Mountrail County	54.5%	45.5%	54.9%	45.1%	37.0	35.2
Renville County	51.4%	48.6%	51.9%	48.1%	45.4	44.1
Slope County	54.5%	45.5%	54.5%	45.5%	49.2	49.0
Stark County	50.0%	50.0%	51.1%	48.9%	38.3	35.5
Ward County	50.7%	49.3%	51.7%	48.3%	32.7	31.6
Williams County	51.6%	48.4%	53.2%	46.8%	39.0	34.9

Source: U.S. Census Bureau, Population Division, 2012. Annual Estimates of the Resident Population for Selected Age Groups.

3.16.3 Quality of Life

Quality of Life (QOL) is an integral aspect of understanding a community and its people. The components of this outline help to provide a basis for which QOL can be discussed. QOL is what brings pleasure and happiness to life-it can include "feeling a part of the community where you live; knowing where you stand in relationship to other people; having a sense that you and people in your community have control over the decisions that affect your future;….living without undue fear of crime or personal attack…" (Branch et al. 1982). The components of QOL can differ amongst individuals, however generally many components relate to income, employment and job satisfaction, affordable housing, health, food, culture, leisure, and amenities. Understanding these components can then help provide a sense of the QOL available in the impact area.

Farming and ranching has been and continues to be a long-standing influence on local business, culture, and social activities in the area. In 2007 there were 7544 farms in the impact area and 11,124,900 acres in farm land (NASS, 2007). In 2011across North Dakota counties, Bottineau County ranked second in barley production; Dunn County ranked first in beef cattle and second for all cattle; Mountrail County ranked second for durum wheat; and Williams County ranked first in durum wheat (NASS, 2012). Average rental rates for non-irrigated land have increased across all of the impact counties with Bottineau County seeing the largest increase ($7.50 increase/acre) and the remaining counties seeing an average of $4.00-$5.00/acre increases (NASS, 2012).

However, the general quality of life for long-time residents is changing in many of the communities in the impact area. A 2011 study highlights several of the changes that have been seen across the Bakken oil counties and the impacts to quality of life (Bohnenkamp et. al., 2011). For example, the study highlights that the familiarity of residents with other residents and the safety often felt in small rural communities has shifted to in-migration of new people and safety concerns resulting from not knowing these people. There has also been an increasing division being seen between the "haves" and the "have-nots" including between long-time residents and a general increase in the cost of living. Additionally, housing availability is very limited and this causes housing prices to be high compared to similar rural areas in North Dakota and Montana outside the influence of the Bakken oil boom. Many people live in man camps (similar to college dormitories), commute relatively long distances to work, or live in what otherwise may be considered substandard housing. The study also highlights concerns over housing prices and values increasing and the changing of the population. While there is an in-migration of people for oil field jobs, there has also been an out-migration of long-time residents due to not being able to afford the rising housing costs (Bohnenkamp et. al., 2011).

3.16.4 Housing

Changes in population, both short-term and long-term changes, can have a direct impact on housing availability. Increases in population, especially in a short time period can cause housing shortages especially for affordable housing (Franks et al. 2011). This can be exacerbated cumulatively if there are a multitude of reasons/actions causing rapid population increase. Housing development is not always in sync with population needs, especially if in- or out-migration occurs in a short time-frame.

The 2010 Census indicates a range of vacancy rates across the impact counties with a high of 34.8 percent vacant housing units in Bottineau County to a low of 6.1 percent of vacant housing units in Stark County (Table Social 4). Vacant housing units in Bowman, Burke, Divide, Golden Valley, McKenzie, Slope, Stark, Ward, and Williams counties were predominately for "other vacant" use. Other vacant use is defined as, "[i]f a vacant unit does not fall into any of the [other vacant] categories specified, it is classified as "Other Vacant." For example, this category includes units held for occupancy by a caretaker or janitor and units held for personal reasons of the owner" (US Census Bureau, 2010). For the remaining impact counties, Bottineau, Dunn, Mountrail, and Renville counties, vacant housing units were predominately "for seasonal, recreational, or occasional use" which is often associated with second home ownership. The definition of "for seasonal, recreational, or occasional use" is "[t]hese are vacant units used or intended for use only in certain seasons or for weekends or other occasional use throughout the year. Seasonal units include those used for summer or winter sports or recreation….Seasonal units also may include quarters for such workers as herders and loggers. Interval ownership units, sometimes called shared-ownership or time-sharing condominiums, also are included here. Having vacant housing units predominately being classified as "other vacant" and "for seasonal, recreational, or occasion use" makes sense given the amount of recreation across the impact area and the various types of housing used by energy related workers and their families.

Table 3.16.4.1 Social 4. Housing Percent Occupancy and Vacancy Status for 2010

	Occupancy Status (Percent of Total Housing Units)		Vacancy Status (Percent of Vacant Housing Units)						
	Occupied housing units	Vacant housing units	For rent	Rented, not occupied	For sale only	Sold, not occupied	For seasonal, recreational, or occasional use	For migratory farm workers	Other vacant
North Dakota	88.6	11.4	20.4	1.5	7.5	2.9	31.6	0.9	35.1
Bottineau County	65.2	34.8	7.6	0.4	2.7	1.5	64.7	0.1	23.1
Bowman County	82.3	17.7	18.8	0.3	6.7	0.0	20.8	1.0	52.3
Burke County	68.1	31.9	3.7	0.7	4.9	1.6	32.6	0.0	56.4
Divide County	73.8	26.2	0.9	0.9	1.7	0.6	30.0	1.7	64.3
Dunn County	65.7	34.3	5.1	1.0	0.4	0.8	53.2	0.4	39.1
Golden Valley County	80.0	20.0	9.8	1.0	2.6	0.0	31.6	1.0	53.9
McKenzie County	78.0	22.0	10.3	3.5	1.2	1.6	34.1	0.0	49.3
Mountrail County	67.8	32.2	4.5	0.8	0.8	1.8	68.4	2.6	21.0
Renville County	76.6	23.4	5.2	0.3	4.0	4.3	48.3	0.0	37.8
Slope County	74.8	25.2	2.7	1.8	1.8	0.0	39.1	0.0	54.5
Stark County	93.9	6.1	23.2	3.1	11.4	2.8	16.9	1.5	41.1
Ward County	93.6	6.4	23.2	4.2	11.1	4.3	18.5	0.5	38.2
Williams County	88.8	11.2	10.8	1.9	3.2	3.1	35.6	4.0	41.4

Source: U.S. Census Bureau, 2010. QT-H1-General Housing Characteristics: 2010

3.16.5 Public Services and Infrastructure

The current oil boom in North Dakota associated with oil and gas exploration, development, and production from the Bakken formation limits housing availability, increases traffic, increases pressure on existing infrastructure, and generally affects the quality of life for long-time residents as well as new residents attracted to the area by the oil boom.

Traffic associated with the Bakken oil boom is currently an issue. Increased truck traffic hauling heavy equipment, fracking fluids, and water as well as increased traffic associated with oil workers and increased populations cause more traffic congestion, increase commuting times, and affect public safety.

The Bakken boom has also increased infrastructure pressure. Demand for better roads, upgrades to waste water treatment, increased police protection, more hospital and school services, and other public services is apparent in many communities.

3.16.6 Environmental Justice

Executive Order 12898, Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations, requires the identification and addressing of disproportionately high and adverse human health and environmental impacts of federal programs, policies, and activities on minority and low-income populations. We used the following criteria to determine if there was an environmental justice population:

- At least one-half of the population is of minority or low-income status, or
- The percentage of the population that is of minority or low-income status is at least 10 percent higher than for the entire State of North Dakota

In 2012, all of the impact counties are predominately white, however, McKenzie and Mountrail counties so meet the second criteria above for American Indian and Alaska Native populations (Table Social 5). This indicates that outreach and ability to participate in the decision-making process is necessary, which is standard procedure for the BLM. None of the impact counties meet the criteria for low-income or poverty concerns (Table Social 6).

Table 3.16.6.1 Social 5. Race and Hispanic Percentages.

	North Dakota	Bottineau County	Bowman County	Burke County	Divide County	Dunn County	Golden Valley County
White alone, percent, 2012 (a)	90.1%	94.7%	97.7%	97.4%	97.2%	86.8%	97.5%
Black or African American alone, percent, 2012 (a)	1.5%	0.6%	0.2%	0.4%	0.6%	0.5%	0.8%
American Indian and Alaska Native alone, percent, 2012 (a)	5.5%	2.3%	1.4%	0.8%	0.8%	10.4%	0.7%
Asian alone, percent, 2012 (a)	1.1%	0.4%	0.2%	0.6%	0.5%	0.5%	0.1%
Native Hawaiian and Other Pacific Islander alone, percent, 2012 (a)	0.1%	Z	0.0%	0.0%	0.0%	0.0%	0.1%
Two or More Races, percent, 2012	1.8%	2.0%	0.6%	0.8%	0.9%	1.8%	0.8%
Hispanic or Latino, percent, 2012 (b)	2.5%	1.5%	3.7%	2.2%	2.2%	2.0%	2.2%
White alone, not Hispanic or Latino, percent, 2012	88.1%	93.5%	94.7%	95.4%	95.3%	85.1%	95.5%
	McKenzie County	Mountrail County	Renville County	Slope County	Stark County	Ward County	Williams County
White alone, percent, 2012 (a)	79.2%	67.2%	97.8%	96.8%	95.1%	90.6%	92.1%

Black or African American alone, percent, 2012 (a)	0.4%	0.6%	0.4%	0.1%	1.0%	3.0%	0.8%
American Indian and Alaska Native alone, percent, 2012 (a)	18.4%	28.9%	0.5%	2.2%	1.2%	2.5%	3.9%
Asian alone, percent, 2012 (a)	0.4%	0.5%	0.2%	0.1%	1.3%	1.2%	0.5%
Native Hawaiian and Other Pacific Islander alone, percent, 2012 (a)	0.1%	Z	0.0%	0.0%	0.1%	0.1%	0.1%
Two or More Races, percent, 2012	1.6%	2.9%	1.2%	0.7%	1.3%	2.5%	2.7%
Hispanic or Latino, percent, 2012 (b)	3.5%	4.4%	1.4%	2.2%	3.1%	3.8%	3.1%
White alone, not Hispanic or Latino, percent, 2012	77.0%	64.6%	96.4%	95.6%	92.3%	87.5%	89.5%

Source: US Census Bureau, State & County QuickFacts, 2012.

(a) Includes persons reporting only one race.

(b) Hispanics may be of any race, so also are included in applicable race categories.

Z: Value greater than zero but less than half unit of measure shown

Table 3.16.6.2 Social 6. Percent Poverty, All Ages for 2011

	Percent Poverty
North Dakota	12.0
Bottineau County	10.4
Bowman County	8.5
Burke County	8.8
Divide County	9.4
Dunn County	10.8
Golden Valley County	14.2
McKenzie County	12.5
Mountrail County	13.7
Renville County	8.4
Slope County	11.0
Stark County	10.2
Ward County	9.8
Williams County	8.1

Source; US Census Bureau, 2012. Small Area Estimates Branch

4.0 ENVIRONMENTAL IMPACTS

4.1 Assumptions and Reasonably Foreseeable Development Scenario (RFD) Summary

At this stage of the leasing process, the act of leasing parcels would not result in any ground-disturbing activity that might affect various resources. Even if parcels are leased, it remains unknown whether development would actually occur, and if so, where specific wells would be drilled and where facilities would be placed. This would not be determined until the BLM receives an APD in which more detailed information about proposed wells and facilities would be provided for particular leases. Therefore, this EA discusses potential effects that could occur in the event of development.

Upon receipt of an APD, the BLM would initiate a more site-specific NEPA analysis to more fully analyze and disclose site-specific effects of specifically identified activities. In all potential exploration and development scenarios, the BLM would require the use of best management practices (BMPs) documented in "Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development" (USDI and USDA 2007), also known as the "Gold Book." The BLM could also identify APD Conditions of Approval (COAs), based on site-specific analysis that could include moving the well location, restrict timing of the project, or require other reasonable measures to minimize adverse impacts (43 CFR 3101.1-2 Surface use rights; Lease Form 3100-11, Section 6) to protect sensitive resources, and to ensure compliance with laws, regulations, and land use plans.

For split-estate leases, the BLM would notify the private landowners that oil and gas exploration or development activities are proposed on their lands and they are encouraged to attend the onsite inspection to discuss the proposed activities. In the event of activity on such split estate leases, the lessee and/or operator would be responsible for adhering to BLM requirements as well as reaching an agreement with the private surface landowners regarding access, surface disturbance, and reclamation.

Environmental consequences are discussed below by alternative to the extent possible at this time for the resources described in Chapter 3. As per NEPA regulations at 40 CFR 1502.14(f), 40 CFR 1502.16(h), and 40 CFR 1508.20, mitigation measures to reduce, avoid, or minimize potential impacts of the proposed action are identified by resource below.

The RFD for this EA is based on information contained in the RFD developed in 2009 and revised in 2011 for the NDFO RMP. The RFD prepared for the NDFO RMP contains the number of possible oil and gas wells that could be drilled and produced in the NDFO area and used to analyze the possible number of wells drilled for the 36 nominated parcels. These well numbers are only an estimate based on historical drilling and geologic data.

4.1.1 Alternative B Assumptions

The following assumptions are from the RFD developed for the NDFO RMP revision http://www.blm.gov/mt/st/en/fo/north_dakota_field/rmp/RFD.html.) The BLM administers approximately 324,269 acres of federal minerals (for fluid minerals) within the NDFO. The

RFD forecasts and maps the oil and gas development potential in the North Dakota planning area.
A version of this map is reproduced with this EA as **Map 4.1.1**. For the RFD, very high potential forecasts more than 20 well pads per township; high potential forecasts 10 to 20 well pads per township; moderate potential forecasts two to 10 well pads per township; low potential forecasts one to two well pads per township; and very low potential forecasts less than one well per township over the life of the plan.

A coalbed natural gas (CBNG) play is assumed in the planning area in the Williston Basin. Pilot projects would contain 16 to 25 wells. A total of 150 wells are forecasted allowing for some exploration activity and preliminary development.

Directional and horizontal drilling has, in the past several years, become important in the planning area. Drilling depths (measured depth) are from 4,413 to 21,727 feet for oil wells and 4,173 to 19,954 feet for gas wells. However, most of the oil wells have a measured depth of between 13,000 and 16,000 feet, and the measured depths of gas wells are typically within the 13,000 to 16,000 foot range.

The majority of the oil and gas wells in the planning area have historically been drilled vertically. However, of the 2,983 wells spud in the planning area between January 1998 and December 2007, only 787 were vertical wells. Vertical well depths in North Dakota range from a few hundred feet in the northeast part of the study area to over 15,000 feet in the central Williston Basin. Disturbance projections from the RFD are presented in Tables 4.1.1 and 4.1.2. Measured depths in the southwest part of the state range from 1,300 feet to 9,500 feet.

Map 4.1.1. RFD Scenario for Development Potential

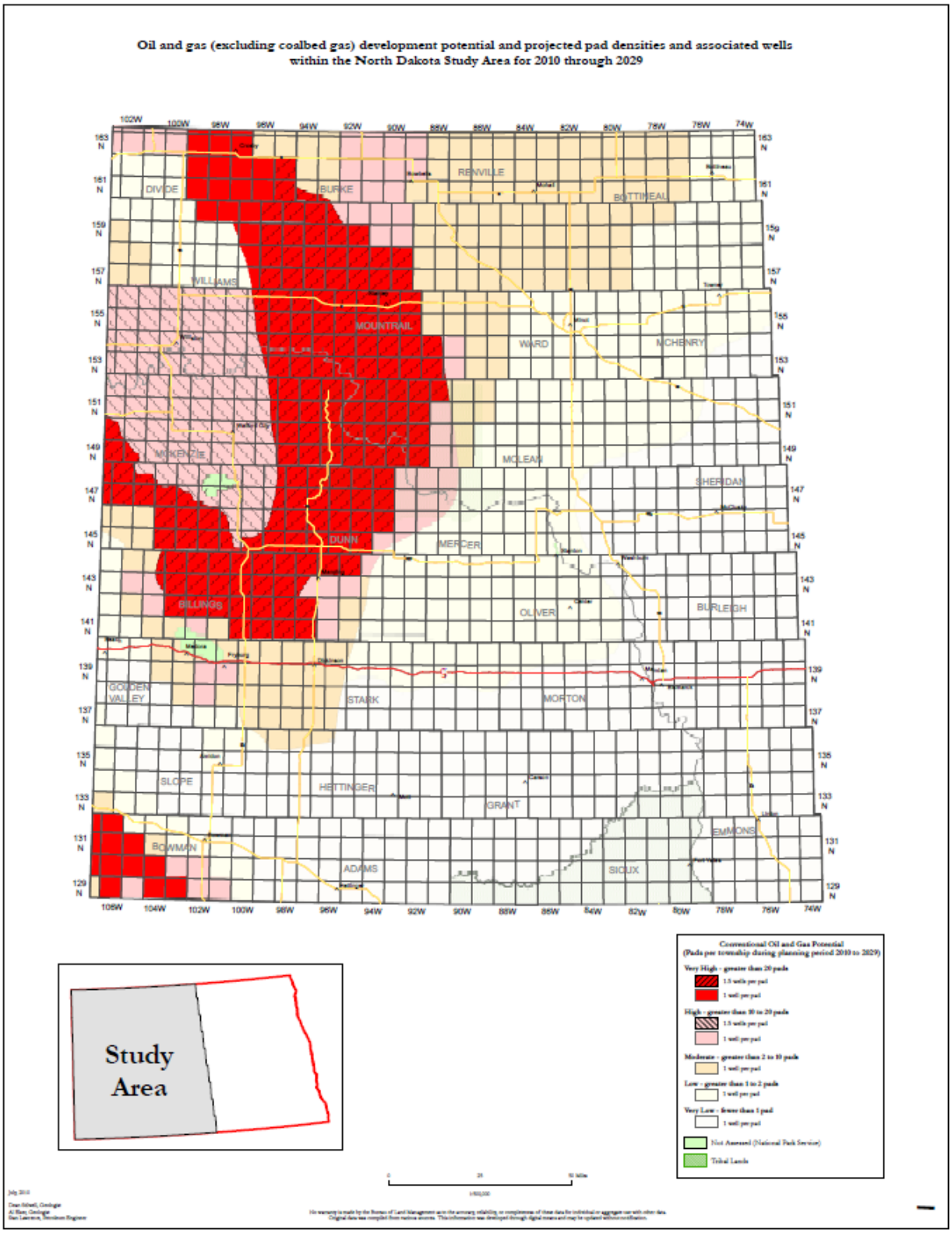


Table 4.1.1. Disturbance Associated With Existing Well Pads and Projected Active Well Pads for the Baseline Scenario (Short-Term Disturbance)

Well Pads			Acres of Surface Disturbance			
Type	**Total**	**BLM Managed**	**Access Roads**	**Well Pad**	**Total**	**BLM Managed**
New Exploratory and Development Coalbed Gas Well Pads (2010-2029)	150	7	0.6	0.5	165	8
New Exploratory and Development Gas Well Pads (2010-2029)	315	34	0.6	0.5	347	40
New Exploratory and Development Oil Well Pads; 1.5 wells/pad (2010-2029)	3,691	402	2.9	4.2	26,206	2,945
New Exploratory and Development Oil Well Pads 1.0 wells/pad (2010-2029)	2,609	284	2.9	4	18,002	2,023
Total New Exploratory and Development Well Pads	***6,765***	***727***			***44,720***	***5,017***
Existing Active Gas Well Pads (as of August 2010)	211	121	0.3	0.25	116	71
Existing Active Oil Well Pads (as of August 2010)	6,760	851	1.5	1.75	21,970	2,857
Total Existing and Projected Well Pads	***6,971***	***972***			***22,086***	***2,928***
Total Well Pads	**13,736**	**1,699**	**Total Short-Term Disturbance**		**66,806**	**7,945**

Table 4.1.2. Disturbance Associated With Existing Well Pads and Projected Producing Well Pads for the Baseline Scenario (Long-Term Disturbance)

Well Pads			Acres of Surface Disturbance			
Type	Total	BLM Managed	Access Roads	Well Pad	Total	BLM Managed
New Producing Coalbed Gas Well Pads (2010-2029)	135	6	0.3	0.25	74	4
New Producing Gas Well Pads (2010-2029)	293	21	0.3	0.25	161	12
New Producing Oil Well Pads; 1.5 wells/pad (2010-2029)	3,248	353	1.5	1.75	10,556	1,186
New Producing Oil Well Pads; 1.0 wells/pad (2010-2029)	2,035	221	1.5	1.75	6,614	743
Total New Producing Well Pads	*5,711*	*602*			*17,405*	*1,945*
Existing Active Gas Well Pads (as of August 2010)[1]	203	116	0.3	0.25	111	68
Existing Active Oil Well Pads (as of August 2010)[1]	5,881	740	1.5	1.75	19,114	2,486
Total Existing and Projected Well Pads	*6,084*	*857*			*19,225*	*2,554*
Total Well Pads	11,795	1458	Total Long-Term Disturbance		36,631	4,499
[1]minus abandonments during August 2010-December 2029 period						

New oil and gas wells projected to be drilled in the NDFO RFD from 2010 through 2029 total as many as 8,460 in the planning area. Up to 150 of these wells could be coalbed gas wells. Of the other remaining wells (those drilled in areas of very high, high or moderate potential areas) the

majority are projected to be drilled in and around existing fields in the deeper portion of the Williston Basin and along the Cedar Creek anticline. Those wells drilled in areas of low or very low potential are projected for areas generally not proven productive by historical drilling, but which still may contain hydrocarbons based on U.S. Geological Survey assessment data. The BLM component of oil and conventional gas activity within the RFD is expected to be approximately 11.4 percent of all activity.

No surface disturbance would occur as a result of issuing leases. For analysis purposes, the potential number of acres disturbed by exploration and development activities is shown in Tables 4.1.1 and 4.1.2. The potential acres of disturbance reflect acres typically disturbed by construction, drilling, and production activities, including infrastructure installation throughout the NDFO. Typical exploration and development activities and associated acres of disturbance were used as assumptions for analysis purposes in the EA. (Note: The assumptions were not applied to Alternative A because the lease parcels would not be offered for lease; therefore, no wells would be drilled or produced on the lease parcels, and no surface disturbance would occur on those lands from exploration and development activities).

The context of alternatives considered in this EA relative to these assumptions is described below.

4.1.1.1 Alternative A – No Action

Under the No Action Alternative, the proposed parcels would not be leased. There would be no new impacts from oil and gas production on the parcel lands. No additional natural gas or crude oil would enter the public markets, and no royalties would accrue to the federal or state treasuries. The No Action Alternative would result in the continuation of the current land and resource uses on the parcels.

Unless specifically indicated by resource area, no further analysis of the No Action Alternative is presented in the following sections.

4.1.1.2 Alternative B – Proposed Action

By itself, the act of leasing the parcels would have no impact on any natural resources in the area administered by the NDFO. Standard terms and conditions as well as special stipulations would apply to the lease parcels. All impacts would link to as yet undetermined future levels of lease development.

If the lease parcels are developed, short-term impacts would be stabilized or mitigated rapidly (within two to five years). Long-term impacts are those that would substantially remain for more than five years. The 43 parcels are located in Bottineau, Bowman, Burke, Divide, Dunn, Golden Valley, McKenzie, Mountrail, and Williams counties.

All parcels are within that portion of the NDFO where a hypothetical CBNG play could occur according to the RFD projection. The RFD assumes a total projection of 150 CBNG wells for the entire planning area, primarily for exploration purposes.

Eighteen parcels (915.72 acres) are located in an area of very high potential. Projected development within the very high potential area is greater than 20 well pads per year. Fifteen parcels (597.04 acres) are located in an area of high potential. Projected development within the high potential area is 10 to 20 well pads per year.

One parcel (320.0 acres) is located in an area of moderate potential. Projected development within the moderate potential area is 2 to 10 well pads per year.

Nine parcels (1,040.24 acres) are located in an area of low potential. Projected development within the low potential area is 1 to 2 well pads per year.

For the purposes of this EA and based on the location of these parcels in the Williston Basin, any future development activity that would occur would probably be oil production. Short-term disturbance would be 2.9 acres for access roads and flow lines and four acres per well pad. Long-term disturbance would be 1.5 acres for access roads and 1.75 acres per well pad. Many of the parcels would probably require the formation of a communitization agreement (CA) to facilitate development. A CA provides for the pooling of federal and/or Indian lands, with other lands, when separate tracts under such federal and Indian lands cannot be independently developed and operated in conformity with an established well-spacing program. Actual well drilling and surface disturbance activity may occur on fee or state lands, not on the federal lease parcels.

4.2 Air Resources

4.2.1 Direct and Indirect Effects

4.2.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to air resources.

4.2.1.2 Alternative B – Proposed Action

Leasing the subject parcels would have no direct impacts on air quality. Any potential effects on air quality from activities on these lease parcels would occur if and when the leases were developed.

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads; exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHGs and VOCs during drilling and production activities. Increased emissions cannot be precisely quantified at this time since it is not known for certain how many wells might be drilled, the types of equipment needed if a well were to be completed successfully (e.g., compressor, flare, separator, gas dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact would also vary according to the characteristics of the geologic formations from which production occurs, as well as the scope of specific activities proposed in an APD.

Current monitoring data show that criteria pollutant concentrations are below applicable air quality standards, indicating good air quality. The potential level of development and mitigation described below is expected to maintain this level of air quality by limiting emissions. In addition, pollutants would be regulated through the use of state-issued air quality permits or air quality registration processes developed to maintain air quality.

4.2.2 Greenhouse Gas Emissions at the NDFO and Project Scales

4.2.2.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to climate change.

4.2.2.2 Alternative B – Proposed Action

Sources of GHGs associated with development of lease parcels could include construction activities, operations, and facility maintenance in the course of oil and gas exploration, development, and production. Estimated GHG emissions are discussed for these specific aspects of oil and gas activity because the BLM has direct involvement in these steps. However, the current proposed activity is to offer parcels for lease. No specific development activities are currently proposed or potentially being decided upon for any parcels being considered in this EA. Potential development activities would be analyzed if the BLM receives an APD on any of the parcels considered here.

Anticipated GHG emissions presented in this section are taken from the Climate Change SIR (BLM 2010). Data are derived from emission calculators developed by air quality specialists at the BLM National Operations Center in Denver, Colorado, based on methods described in the Climate Change SIR (BLM 2010). Table 4.2.2.2 discloses projected annual GHG source emissions from BLM-permitted activities on non-tribal mineral estate associated with the RFD for the entire NDFO.

Table 4.2.2.2. BLM Projected Annual GHG Emissions Associated with Oil and Gas Exploration and Development Activity in the NDFO.

Source	BLM Long-Term GHG Emissions in tons/year				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	CO_2e	CO_2e
Conventional Natural Gas	563	117	0.01	3,016	2,737
Coal Bed Natural Gas	3822	49	0.07	4,877	4,425
Oil	547,165	1,132	7.4	573,247	520,188
Total	**551,550**	**1,298**	**7.5**	**581,140**	**527,350**

To estimate GHG emissions associated with the action alternatives, the following approach was used:

1. The proportion of each alternative relative to the total RFD was calculated based on total acreage of parcels under consideration for leasing relative to the total acreage of federal mineral acreage available for leasing in the RFD.
2. This ratio was then used as a multiplier with the total estimated GHG emissions for the entire RFD (with the highest year emission output used) to estimate GHG emissions for that particular alternative.

Under Alternative B, approximately 2,873 acres of lease parcels with federal minerals would be leased. These acres constitute approximately 0.29 percent of the total federal mineral estate of approximately 986,324 acres identified in the NDFO RFD. Therefore, based on the approach described above to estimate GHG emissions, 0.29 percent of the RFD for this EA total estimated BLM emissions of approximately 527,350 metric tons/year would be approximately 1,536 metric tons/year of CO_2e if the parcels within Alternative B were to be developed.

The assessment of GHG emissions and climate change is in its formative phase. As summarized in the Climate Change SIR (BLM 2010), climate change impacts can be predicted with much more certainty over global or continental scales. Existing models have difficulty reliably simulating and attributing observed temperature changes at small scales. On smaller scales, natural climate variability is relatively larger, making it harder to distinguish changes expected due to external forcings (such as contributions from local activities to GHGs). Uncertainties in local forcings and feedbacks also make it difficult to estimate the contribution of GHG increases to observed small-scale temperature changes (BLM 2010).

It is currently not possible to know with certainty the net impacts from lease parcel development on climate. The inconsistency in results of scientific models used to predict climate change at the global scale, coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. It is therefore beyond the scope of existing science to relate a specific source of GHG emission or sequestration with the creation or mitigation of any specific climate-related environmental effects. Although the effects of GHG emissions in the global aggregate are well-documented, it is currently impossible to determine what specific effect GHG emissions resulting from a particular activity might have on the environment. For additional information on environmental effects typically attributed to climate change, please refer to the cumulative effects discussion below.

While it is not possible to predict effects on climate change of potential GHG emissions discussed above in the event of lease parcel development for alternatives considered in this EA, the act of leasing does not produce any GHG emissions in and of itself. Releases of GHGs could occur at the exploration/development stage.

4.2.2.2.1 Mitigation

The BLM encourages industry to incorporate and implement BMPs to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Measures would also be required as COAs on permits by the BLM or by the applicable state air quality regulatory agency. The BLM also manages venting and flaring of gas from federal wells as described in the provisions of Notice to Lessees (NTL) 4A, Royalty or Compensation for Oil and Gas Lost.

Some of the following measures could be imposed at the development/APD stage:

- flare or incinerate hydrocarbon gases;
- operate emission control equipment with minimum 95 percent volatile organic compound (VOC) control efficiency on petroleum storage tank batteries;
- operate low-emitting drill rig engines, such as Tier 4 diesel engines or natural gas or electric drill rig engines;
- operate gas or electric turbines for natural gas compression rather than internal combustion engines;
- replace older internal combustion engines with low-emitting engines that meet EPA New Source Performance Standards;
- apply water or chemical suppressants to dirt and gravel roads during periods of high use and control speed limits to reduce fugitive dust emissions;
- perform interim reclamation to re-vegetate areas of well pads not required for ongoing production facilities.
- construct multiwall pads using directional drilling and horizontal completion technologies to reduce surface disturbance and traffic;
- replace diesel-fired pump jack engines with electrified engines;
- reinject CO_2 and methane into no-producing wells or other underground formations; and
- use forward looking infrared (FLIR) technology to detect fugitive VOC and methane emissions and repair leaking equipment quickly.

More specific to reducing GHG emissions, Section 6 of the Climate Change SIR identifies and describes in detail commonly used technologies to reduce methane emissions from natural gas, coal bed natural gas, and oil production operations. Technologies discussed in the Climate Change SIR and as summarized below in Table 4.2.2.3.1 (reproduced from Table 6-2 in Climate Change SIR) display common methane emission technologies reported under the USEPA Natural Gas STAR Program and associated emission reduction, cost, maintenance and payback data.

Table 4.2.2.3.1. Selected Methane Emission Reductions Reported Under the USEPA Natural Gas STAR Program[1]

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Wells					
Reduced emission (green) completion	7,000 [2]	$1K – $10K	>$1,000	1 – 3 yr	$3
Plunger lift systems	630	$2.6K – $10K	NR	2 – 14 mo	$7
Gas well smart automation system	1,000	$1.2K	$0.1K – $1K	1 – 3 yr	$3
Gas well foaming	2,520	>$10K	$0.1K – $1K	3 – 10 yr	NR
Tanks					
Vapor recovery units on crude oil tanks	4,900 – 96,000	$35K – $104K	$7K – $17K	3 – 19 mo	$7
Consolidate crude oil production and water storage tanks	4,200	>$10K	<$0.1K	1 – 3 yr	NR
Glycol Dehydrators					
Flash tank separators	237 – 10,643	$5K – $9.8K	Negligible	4 – 51 mo	$7
Reducing glycol circulation rate	394 – 39,420	Negligible	Negligible	Immediate	$7
Zero-emission dehydrators	31,400	>$10K	>$1K	0 – 1 yr	NR
Pneumatic Devices and Controls					
Replace high-bleed devices with low-bleed devices					
End-of-life replacement	50 – 200	$0.2K – $0.3K	Negligible	3 – 8 mo	$7
Early replacement	260	$1.9K	Negligible	13 mo	$7
Retrofit	230	$0.7K	Negligible	6 mo	$7
Maintenance	45 – 260	Negl. to $0.5K	Negligible	0 – 4 mo	$7
Convert to instrument air	20,000 (per facility)	$60K	Negligible	6 mo	$7
Convert to mechanical control systems	500	<$1K	<$0.1K	0 – 1 yr	NR

Source Type / Technology	Annual Methane Emission Reduction [1] (Mcf/yr)	Capital Cost Including Installation ($)	Annual Operating and Maintenance Cost ($)	Payback (Years or Months)	Payback Gas Price Basis ($/Mcf)
Valves					
Test and repair pressure safety valves	170	NR	$0.1K – $1K	3 – 10 yr	NR
Inspect and repair compressor station blowdown valves	2,000	<$1K	$0.1K – $1K	0 – 1 yr	NR
Compressors					
Install electric compressors	40 – 16,000	>$10K	>$1K	>10 yr	NR
Replace centrifugal compressor wet seals with dry seals	45,120	$324K	Negligible	10 mo	$7
Flare Installation	2,000	>$10K	>$1K	None	NR

Source: Multiple USEPA Natural Gas STAR Program documents. Individual documents are referenced in Climate Change SIR (BLM 2010).

[1] Unless otherwise noted, emission reductions are given on a per-device basis (e.g., per well, per dehydrator, per valve, etc).
[2] Emission reduction is per completion, rather than per year.

K = 1,000
mo = months
Mcf = thousand cubic feet of methane
NR = not reported
yr = year

In the context of the oil sector, additional mitigation measures to reduce GHG emissions include methane reinjection and CO_2 injection. These measures are discussed in more detail in Section 6.0 of the Climate Change SIR (BLM 2010).

In an effort to disclose potential future GHG emission reductions that might be feasible, the BLM estimated GHG emission reductions based on the RFD for the Miles City Field Office (MCFO), which abuts the western boundary of the NDFO. For emission sources subject to BLM (federal) jurisdiction, the estimated emission reductions represent approximately 51 percent reduction in total GHG emissions compared to the estimated MCFO federal GHG emission inventory (BLM 2010, Section 6.5 and Table 6-3). The emission reductions technologies and practices are identified as mitigation measures that could be imposed during development.

4.3 Soil Resources

4.3.1 Direct and Indirect Effects

At this stage (lease sale), there are no impacts on soil resources. Impacts (both direct and indirect) could occur if and when the lease is developed in the future. The potential

Leasing the parcels would have no direct impacts on soil resources. Any potential effects from the sale of leases could occur at the time the leases are developed.

4.3.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to soil resources.

4.3.1.2 Alternative B – Proposed Action

Surface use activities associated with oil and gas exploration and development could cause surface disturbances. Such acts result in reduced ground cover, soil mixing, compaction, or removal, exposing soils to accelerated erosion by wind and water, resulting in the irretrievable loss of topsoil and nutrients and potentially resulting in mass movement or sedimentation. Surface disturbances also change soil structure, heterogeneity (variable characteristics), temperature regimes, nutrient cycling, biotic richness, and diversity. Along with this, mixed soils have decreased bulk density, and altered porosity, infiltration, air-water relationships, salt content, and pH (Perrow and Davy, 2003; Bainbridge 2007). Soil compaction results in increased bulk density, and reduced porosity, infiltration, moisture, air, nutrient cycling, productivity, and biotic activity (Logan 2001; 2003; 2007). Altering such characteristics reduces the soil system's ability to withstand future disturbances (e.g., wildfire, drought, high precipitation events, etc.). The probability and magnitude of these effects are dependent upon local site characteristics (e.g., reclamation suitability), climatic events, and the specific mitigation applied to the project.

4.3.1.2.1 Mitigation

Measures would be taken to reduce, avoid, or minimize potential impacts to soil resources from exploration and development activities. Prior to authorization, proposed actions would be evaluated on a case-by-case basis and would be subject to mitigation measures in order to maintain the soil system. Mitigation would include avoiding areas poorly suited to reclamation, limiting the total area of disturbance, rapid reclamation, erosion/sediment control, soil salvage, decompaction, revegetation, weed control, slope stabilization, surface roughening, and fencing. Areas poorly suited to reclamation would require unconventional and/or site-specific reclamation measures.

4.4 Water Resources

4.4.1 Direct and Indirect Effects

4.4.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to soil resources.

4.4.1.2 Alternative B – Proposed Action

Leasing the parcels would have no direct impacts on water resources. Any potential effects from sale of lease parcels could occur at the time the leases are developed.

The magnitude of potential impacts from exploration and development of oil and gas to water resources would be dependent on the specific activity, season, proximity to waterbodies, location in the watershed, upland and riparian vegetation condition, effectiveness of mitigation, and the time until reclamation success. Surface disturbance effects typically are localized, short-term, and have the potential to be reduced through vegetation reestablishment. As acres of surface-disturbance increase within a watershed, so could the effects on water resources.

Oil and gas exploration and development of a lease parcel could cause the removal of vegetation, soil compaction, and soil disturbance in uplands within the watershed, 100-year floodplains of non-major streams, and non-riparian, ephemeral waterbodies. The potential effects from these activities could be accelerated erosion, increased overland flow, decreased infiltration, increased water temperature, channelization, and water quality degradation associated with increased sedimentation, turbidity, nutrients, metals, and other pollutants. Erosion potential can be further increased in the long term by soil compaction and low permeability surfacing (e.g. roads and well pads) which increases the energy and amount of overland flow by decreasing infiltration, which in turn changes flow characteristics, reduces groundwater recharge, and increases sedimentation and erosion (DEQ 2007).

Ground Water: The eventual drilling of the proposed parcels would most likely pass through useable groundwater. Potential impacts to groundwater resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process. It is possible for chemical additives used in drilling activities to be introduced into the water producing formations without proper casing and cementing of the well bore. Changes in porosity or other properties of the rock being drilled through can result in the loss of drilling fluids. When this occurs, drilling fluids can be introduced into groundwater without proper cementing and casing. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted. In addition to changing the producing formations' physical properties by increasing the flow of water, gas, and/or oil around the well bore; hydraulic fracturing can also introduce chemical additives into the producing formations. Types of chemical additives used in drilling activities may include acids, hydrocarbons, thickening agents, lubricants, and other additives that are operator and location specific. These additives are not always used in these drilling activities and some are likely to be benign such as bentonite clay and sand. Concentrations of these additives also vary considerably since different mixtures can be used for different purposes in oil and gas development and even in the same well bore. If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and residential wells that are sourced from the affected aquifers. Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones.

Known water bearing zones in the lease area are protected by drilling requirements and, with proper practices, contamination of ground water resources is highly unlikely. Casing along with cement is extended well beyond fresh-water zones to insure that drilling fluids remain within the well bore and do not enter groundwater. Potential impacts to ground water at site specific

locations are analyzed through the NEPA review process at the development stage when the APD is submitted. This process includes geologic and engineering reviews to ensure that cementing and casing programs are adequate to protect all downhole resources. All water used would have to comply with State of North Dakota water rights regulations and a source of water would need to be secured by industry that would not harm senior water rights holders.

4.4.1.2.1 Mitigation

Stipulations addressing waterbodies, streams, 100-year floodplains of major rivers, riparian areas, and wetlands would minimize potential impacts and would be included with the lease when necessary (Appendix A). In the event of exploration or development, measures would be taken to reduce, avoid, or minimize potential impacts to water resources including application of appropriate mitigation. Mitigation measures that minimize the total area of disturbance, control wind and water erosion, reduce soil compaction, maintain vegetative cover, control nonnative species, and expedite rapid reclamation (including interim reclamation) would minimize negative impacts to water resources.

Methods to reduce erosion and sedimentation could include: reducing surface disturbance acres; installing and maintaining adequate erosion control; proper road design, road surfacing, and culvert design; road/infrastructure maintenance; use of low water crossings; and use of isolated or bore crossing methods for waterbodies and floodplains. In addition, applying mitigation to maintain adequate, undisturbed, vegetated buffer zones around waterbodies and floodplains could reduce sedimentation and maintain water quality. Appropriate well completion, the use of Spill Prevention Plans, and Underground Injection Control regulations would mitigate groundwater impacts. Site-specific mitigation and reclamation measures would be described in the COAs.

4.5 Vegetation Resources

4.5.1 Direct and Indirect Effects

4.5.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to vegetation resources.

4.5.1.2 Alternative B – Proposed Action

At this stage (lease sale) there are no impacts to vegetation resources. Impacts (both direct and indirect) would occur when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis at the APD stage prior to development.

Although there are no direct or indirect impacts to vegetation resources at the leasing stage, the following assumptions can be made about potential future direct and indirect effects at the time of development.

Impacts to vegetation depend on the vegetation type/community, soil community, topography and the level of disturbance of the lease parcels. Disturbance to vegetation is of concern because protection of soil resources, maintenance of water quality, and conservation of wildlife habitat

could be diminished or lost over the long-term through direct loss of vegetation (including direct loss of both plant communities and specific plant species).

Other direct impacts, such as invasive species invasion, could result in loss of desirable vegetation. Invasive species and noxious weeds could also reduce wildlife habitat quality and native species diversity. In addition, invasive species are well known for changing fire regimes.

Additionally, surface disturbing activities directly affect vegetation by destroying habitat, churning soils, impacting biological crusts, disrupting seedbanks, burying individual plants, and generating sites for competitive species. In addition, other vegetation impacts could also be caused from soil erosion and result in loss of the supporting substrate for plants, or from soil compaction resulting in reduced germination rates. Impacts to plants occurring after seed germination but prior to seed set could be particularly harmful as both current and future generations would be affected.

Fugitive dust generated by construction activities and travel along dirt roads could affect nearby plants by depressing photosynthesis, disrupting pollination, and reducing reproductive success. Oil, fuel, wastewater or other chemical spills could contaminate soils as to render them temporarily unsuitable for plant growth until cleanup measures were fully implemented. If cleanup measures were less successful, longer term vegetation damage could be expected.

The lease parcels contain a combination of native prairie, riparian, agricultural lands, improved pastures, and woodland vegetation communities. Habitat disturbance in grasslands generally has less of an impact than disturbance in riparian-wetlands and woodlands. Since shrubs and trees take longer to reestablish, rehabilitation times are expected to be longer than those in grass-dominated areas. Riparian-wetlands can be very sensitive, but natural vegetation can reestablish very quickly as long as disturbances do not alter the structural and functioning components of the site. Agricultural, improved pastures, restored pastures, and other disturbed sites have all been manipulated and disturbed. To return these lands back to their current existing environment would be easier then restoring native vegetation communities. These areas are already seeded with plant species that are competitive in nature that were selected for their ability to establish effectively. Overall, the impacts associated with well pads and roads would be very site-specific and are not expected to significantly affect this vegetation at the community scale.

4.5.1.2.1 Mitigation

Mitigation would be addressed at the site specific APD stage of exploration and development. If needed, COAs would potentially include, but not limited to, revegetation with desirable plant species, soil enhancement practices, direct live haul of soil material for seed bank revegetation, reduction of livestock grazing, fencing of reclaimed areas, and the use of seeding strategies consisting of native grasses, forbs, and shrubs.

4.6 Special Status Species

At this stage (lease sale) there are no impacts to special status species. Impacts (both direct and indirect) could occur if and when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis at the APD stage prior to development.

The use of standard lease terms and stipulations on these lands (refer to Appendix A) would minimize, but not preclude impacts to wildlife. Oil and gas development which results in surface disturbance could directly and indirectly impact aquatic and terrestrial wildlife species. These impacts could include loss or reduction in suitability of habitat, improved habitat for undesirable (non-native) competitors, species or community shift to species or communities more tolerant of disturbances, nest abandonment, mortalities resulting from collisions with vehicles and power lines, electrocutions from power lines, barriers to species migration, habitat fragmentation, increased predation, habitat avoidance, and displacement of wildlife species resulting from human presence. The scale, location, and pace of development, combined with implementation of mitigation measures and the specific tolerance of the species to human disturbance all influence the severity of impacts to wildlife species and habitats, including Threatened, Endangered, Candidate, Proposed, and other special status species.

4.6.1 Direct and Indirect Effects

Although there are no direct or indirect impacts to wildlife resources at the leasing stage, the following assumptions can be made about potential future direct and indirect effects at the time of development.

4.6.1.1 Piping Plover/Least Turn

Critical habitats have been established in North Dakota for piping plovers. Lease parcels located along the Missouri River and Lake Sakakawea are all within these established critical habitats.

Existing stipulations from the North Dakota RMP (1988) requires a No Surface Occupancy (NSO) stipulation associated with all wetlands (for analysis purposes, Lake Sakakawea is viewed as a wetland by BLM). The stipulation would not allow surface disturbance/development activities to occur within 200 feet of known wetlands. The 200 feet could also be adjusted to accommodate site specific concerns at the APD stage. As a result of this stipulation, impacts are not expected to nesting habitats within these areas. Due to the NSO stipulation associated with wetlands and the identified critical habitats, issuing the proposed lease parcels would have no effect on piping plovers and least terns. Twenty-nine of the 43 nominated parcels are associated with designated critical habitat for plovers of which twenty-four are entirely located under the current lake level of Lake Sakakawea.

4.6.1.2 Pallid Sturgeon

Potential impacts from development could include: overland oil spills, underground spills from activities associated with horizontal drilling or other practices, spills from drilling mud or other extraction and processing chemicals, and surface disturbance activities that create a localized erosion zone. Oil spills and other pollutants from the oil extraction process could harm the endangered pallid sturgeon in two different ways. First, toxicological impacts from direct

contact could have immediate lethal effects to eggs, juveniles, and adults. Second, toxic effects to lower food web levels (e.g. aquatic macro-invertebrates) would indirectly affect the pallid sturgeon species by degrading water quality and degrading or eliminating food resources. Other aquatic species would experience the same type of direct and indirect impacts.

Currently, in the North Dakota RMP there are no stipulations specific to Pallid sturgeon habitat. However, a floodplain stipulation (NSO 11-39 and NSO 11-36, see Appendix A) would not allow surface occupancy in the 100-year floodplain boundary of the Missouri and Yellowstone Rivers, respectively. Additionally, Pallid Sturgeons would be protected by stipulation NSO 11-33 (see Appendix A) which would not allow surface disturbance/development activities to occur within 200 feet of known wetlands. BLM considers the Yellowstone and Missouri Rivers wetlands habitat.
BLM has determined that issuing leases for the parcels along the Missouri River and Lake Sakakawea will have no effect on the pallid sturgeon. If development were to occur, additional mitigation would be included as conditions of approval at the APD stage. These conditions could include the placement of earthen berms and oil skimmers (a culvert device placed in drainages which is intended to block oil from entering streams) which should help protect pallid sturgeon habitat in case of oil spills by greatly reducing the potential for spills to reach pallid sturgeon habitat.

4.6.1.3 Whooping Crane

The majority of the parcels occur in the whooping crane migratory corridor through central and western North Dakota. BLM has determined that the act of issuing leases within the whooping crane migration corridor will not affect the whooping crane. However, impacts to whooping cranes are possible from subsequent oil and gas development activities that would be permitted at the APD stage. At this time, stipulations are limited to protect any known whooping crane migration staging areas. Line strikes, collisions with vehicles, habitat fragmentation, and other anthropogenic activities can disturb, displace, or cause direct mortality of whooping cranes.

Therefore, if development of these leases in known whooping crane feeding/staging/resting areas is proposed, BLM would work with the USFWS pursuant to section 7(a)(2) of ESA. An outcome of the conferencing process may be that conditions of approval are attached to the permit or the permit may not be approved. Other BMP's would also be developed through consultation, including minimizing disturbance, adherence to Avian Powerline Interaction Committee (APLIC) guidelines, and others as deemed appropriate.

4.6.1.4 Dakota Skipper Butterfly

The majority of the parcels occur in counties where the Dakota Skipper (skipper) has been positively identified. Burke, Dunn, McKenzie, Mountrial, and Ward counties all have remaining native prairies required for the skipper to varying degrees. BLM has determined the act of issuing leases within these counties will not affect the skipper. However, impacts to skippers are possible from subsequent oil and gas development activities should the lease be developed, and would be analyzed at the APD stage. At this time, stipulations are limited to protect any known

skipper habitats. Drilling pads, roads, collisions with vehicles, habitat fragmentation, and other anthropogenic activities can disturb, displace, or cause direct mortality of skippers.

Therefore, if development of these leases in known skipper areas is proposed, BLM would work with the USFWS pursuant to section 7(a)(2) of ESA. An outcome of the conferencing process may be that conditions of approval are attached to the permit or the permit may not be approved. Other BMP's would also be developed through consultation, including minimizing disturbance, adherence to conservation plans and others as deemed appropriate.

4.6.1.5 Sprague's Pipit

Energy development (oil, gas, and wind) and associated roads and facilities increase the fragmentation of grassland habitat. A number of studies have found that Sprague's pipits appear to avoid non-grassland features in the landscape, including roads, trails, oil wells, croplands, woody vegetation, and wetlands (Dale et al. 2009, pp. 194, 200; Koper et al. 2009, pp. 1287, 1293, 1294, 1296; Greer 2009, p. 65; Linnen 2008, pp. 1, 9-11, 15; Sutter et al. 2000, pp. 112-114). Sprague's pipits avoid oil wells, staying up to 350 meters (m)[1148 feet (ft)] away (Linnen 2008, pp. 1, 9-11), magnifying the effect of the well feature itself. Oil and gas wells, especially at high densities, decrease the amount of habitat available for breeding territories. ([Federal Register: September 15, 2010 (Volume 75, Number 178)]

The leasing action will have no effect on the pipit, however potential suitable habitat exists for the Sprague's pipit across the entire lease area, excluding those parcels inundated by Lake Sakakawea; however, inventories have not been conducted within the parcels. Therefore, wildlife inventories would need to be conducted at APD stage of development to determine the presence or absence of Sprague's pipits. The ESA Section 7 Stipulation (16-3) and lease notice is issued with those leases and would be applied if Sprague's pipits are found in the area. If Sprague's pipits are found in the proposed development area, informal consultation with USFWS would be initiated, and Conditions of Approval would be applied for the protection of habitat to ensure there would be no measurable direct negative effect to Sprague's pipits. Only two parcels T3 and TN have native prairie habitat associated with them that meets the minimum requirement in terms of unfragmented continuous habitats larger than 72 acres.

4.7 Fish and Wildlife

At this stage (lease sale), there are no impacts to fish and wildlife. Impacts (both direct and indirect) could occur if and when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis at the APD stage prior to development.

4.7.1 Direct and Indirect Effects

Should any or all of the nominated parcels be developed in the future, it is expected there would be limited impacts as stated in Section 4.6. However, the BLM would address applications for permits to drill on a case-by-case basis where clear, precise locations can be analyzed for potential impacts. Currently, special stipulations would be placed on the lease nominations where applicable to facilitate resource protection (refer to Appendix A).

4.8 Cultural Resources

4.8.1 Direct and Indirect Effects

At this stage (lease sale), there are no impacts to cultural resources. Impacts (both direct and indirect) could occur if and when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis at the APD stage prior to development.

4.8.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to cultural resources.

4.8.1.2 Alternative B – Proposed Action

Under the BLM Proposed Alternative B 43 (2,873 acres) lease parcels would be offered with RMP lease stipulations and/or lease notices as necessary (Appendix A) for competitive oil and gas lease sale and lease issuance.

Of the 43 parcels, 29 parcels contain known cultural sites. Of the 36 sites, 25 are potentially eligible for the National Register of Historic Places (NRHP) and will require further evaluation and testing, 10 sites have been recommended not eligible for the NRHP and will require no further testing and evaluation, and 1 site has been completely evaluated and is listed on the NRHP.

Lease parcels NJ, TU, QT, YB, TY, NG, R9, TG, YF, YH, YL, YP, YQ, YG, YK, YJ, YM, YN, MX, WN, TK, ML, MM, QV, AR, M4, YC, QW, TM (1567 acres) contain 25 sites (32MZ00819, 32MZ01107, 32MZ01174, 32WI00276, 32MZ01908, 32MZ01909, 32WI01367, 32DU00406, 32MN00141, 32MZ01900, 32WI00481, 32WI01281, 32MN00395, 32MN00091, 32MN00096, 32MN00097,32MN00010, 32MN0010 historic, 32MN00017, 32MN00090, 32MN00100, 32,MN00397, 32MN00153, 32MN00494, 32MN01015) that are potentially eligible for the NRHP and must remain undisturbed and avoided by any construction activities (refer to Cultural Resources Lease Stipulation 16-1). There must be no ground disturbance of any kind within or up to 100 feet of the above mentioned 25 sites until they are fully tested and evaluated for the NRHP. Any of the above mentioned sites (32WI00276, 32MZ01909, 32WI01281, 32MZ01900) that contain a prehistoric archeological component consisting of stone circles, rock cairns, earthlodge depressions, or any other stone features must be avoided by at least 300 feet by all ground disturbing activities until further consultation can take place with any Tribal Historic Preservation Office that is interested in the site, and considers the site within their traditional territory. If a cultural site is within the boundary of the Fort Berthold Indian Reservation then consultation will be limited to the MHAN.

Site 32MZ00820 is the Fairview Lift Bridge, located within Lease Parcel M41 (10.75 acres), and it is listed on the NRHP. This site is a through-truss type bridge, and is the only lift bridge in North Dakota. It is eligible under Criteria A and listed on the NRHP on 3/14/1997. This site must remain avoided and undisturbed by all construction and ground disturbing activities. Further consultation and mitigation may need to take place if construction for oil and gas development is within the view shed of this site.

Site 32MN01015 is the Old Sanish Town Site, established on the east bank of the Missouri river in 1915, and abandoned in 1953 due to the formation of Lake Sakakawea. The majority of the site is underwater, with only a small portion of the site visible during low water levels. This site needs to be further tested and evaluated for the NRHP. It has been recommended potentially eligible under Criteria A due to the very large and popular Sanish Rodeo held annually before the site's abandonment; and Criteria D due to the potential of having substantial buried cultural deposits. Past research and investigations suggest the site is unlikely to be potential for the NRHP under criteria B or C. The site is unlikely to be disturbed by oil and gas construction activates due to the majority of the site is located under water, or just along the edge of Lake Sakakawea, down a very steep cut bank. The site is also within the boundary of the Fort Berthold Indian Reservation, and consultation will take place with the MHAN THPO for any future APD development within the site's area of potential effect (APE).

4.8.1.2.1 Mitigation

Specific mitigation measures, including but not limited to, site avoidance, excavation or data recovery would have to be determined when site-specific development proposals are received. However, in most surface-disturbing situations cultural resources would be avoided by project redesign or relocation. Should a cultural property be unavoidable, adverse impacts to significant properties would be mitigated prior to implementation of ground disturbing activities.

Measures can be implemented to avoid these areas where current and future Class III cultural investigations identify large concentrations of cultural resources and important archaeological sites along the river banks and bluff tops adjacent to the Missouri and Little Missouri Rivers, Garrison Reservoir, and Lake Sakakawea The use of directional and horizontal drilling techniques could provide the ability to locate surface facilities away from the shoreline and would reduce impacts to these resources.

Based on topography in and surrounding the nominated lease parcels, and known cultural summary information, it was determined that inventory considerations could be deferred until a specific development is proposed. A professional assessment of the lease parcels' potential for cultural resources eligible to the NRHP will be conducted during on-the-ground inventories of proposed developments prior to issuance of a permit for development. In all cases, the standard lease notice (LN14-2) and the following cultural resources lease stipulation (CR 16-1) should be attached to the leases:

> This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or

disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

4.9 Native American Religious Concerns

4.9.1 Direct and Indirect Effects

At this stage (lease sale), there are no impacts to Native American religious practices and Traditional Cultural Properties (TCPs). Impacts (both direct and indirect) could occur if and when the lease is developed in the future. The potential impacts would be analyzed on a site-specific basis at the APD stage prior to development.

The BLM WO IM-2005-003 notes that while a lease does not authorize specific on-the-ground activities, and no ground disturbance can occur without further authorization from BLM and the surface management agency, but unless proscribed by stipulation, lessees can expect to drill somewhere on a lease unless precluded by law. A lease sale would not interfere with the performance of traditional ceremonies and rituals pursuant to the American Indian Religious Freedom Act (AIRFA) or EO 13007. It would not prevent tribes from visiting sacred sites or prevent possession of sacred objects.

A review of the lease parcels in Appendix A indicates that no previously reported TCPs would be directly or indirectly impacted. However, thirteen of the lease parcels (YC, YF, YH, YL, YP, YQ, YG, YK, YJ, YM, YN, QW, and QV) are located inside the exterior boundary of the Fort Berthold Indian Reservation. Information pertaining to TCP's and culturally sensitive areas was requested for parcels that are located inside the boundary of the reservation. To this date no TCPs have been brought to the attention of the BLM by any of the six Tribal Nations to whom consultation packets were sent, including the MHAN.

For each site-specific development pertaining to an APD a complete Class III cultural resource will be conducted. If any of these Class III survey reports contained newly discovered or previously recorded stone features or rock alignments that may be considered TCPs by various tribes; then further consultation will take place with any tribal nation who consider the proposed ADP site to be within their traditional territory. A formal cover letter as well as a copy of the Class III Archeological inventory will be sent to the THPO of each tribe. If the proposed APD development site is within the boundary of the Fort Berthold Indian Reservation then consultation will be limited to the MHAN.

No action to lease these parcels would be taken; therefore, there would be no effects in Alternative A.

Direct and indirect impacts would further analyzed for Alternative B, based on the recommendations brought forward by any of the six Tribal Historic Preservation Offices during consultation on project specific site development for future APDs.

4.10 Paleontology

4.10.1 Direct and Indirect Effects

The surface disturbances associated with oil and gas exploration and development activities could have direct and indirect effects to paleontological resources primarily expected in areas classified as Potential Fossil Yield Classification (PFYC) 3 to 5. Mitigation will be a consideration for all surface-disturbing activities. Those geologic formations identified to be associated with lease parcels (Coleharbor, Golden Valley, Sentinel Butte, Bullion Creek, Ludlow, and Cannonball formations) are known to occasionally produce significant fossils in North Dakota. Isolated significant finds can also occur in most of the geologic formations or units in the state; however, these finds are typically rare.

As a section of the Omnibus Public Lands Act (March 30, 2009), the Paleontological Resources section of the Act (Title VI, Subtitle D) specifically addressed management of paleontological resources on public lands. As a result of this act, a map of the planning area which shows the area according to its potential fossil yield was developed to provide a tool for predicting the potential management areas have for fossil locales. The BLM PFYC classification system outlines BLM's approach to assessment and mitigation of paleontological resources. The PFYC system uses five classes for geologic units: Class 1: Very Low; Class 2, Low; Class 3, Moderate (3a), or Unknown (3b); Class 4, High; and Class 5, Very High. This classification approach is meant to reflect the probability of impacting significant fossils. The intent of the classification system is to eliminate or reduce adverse impacts to paleontological resources from authorized actions.

4.10.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to Paleontological resources.

4.10.1.2 Alternative B – Proposed Action

Of the 43 nominated lease parcels, 23 parcels are in areas classified as moderate/unknown (3) to very high (5) fossil potential according to the PFYC system map. The remaining nominated parcels are located in areas considered to have lower fossil potential. Presently, there are known localities of previous research areas for significant fossil or paleontological resources inside or adjacent to these nominated parcels; therefore, the potential for direct or indirect affects to paleontological resources is high.

4.10.1.2.1 Mitigation

Specific mitigation measures could include, but are not limited to, site avoidance or clearance of fossil resources. These measures would be determined when site-specific development proposals are received. For known highly significant paleontological resources, the act of leasing a nominated parcel would not impact paleontological resources; however, subsequent development could have impacts on those resources. For areas known to contain or have the potential to contain paleontological resources a preconstruction survey should be conducted by a BLM-permitted paleontologist and a mitigation plan should be created when a specific development may impact those resources.

Each of the nominated lease parcels have one of two standard lease notices attached (refer to Lease Notice 14-3 and Lease Notice 14-12 for the standard paleontological lease notices).

Additional guidance related to paleontology resources can be found in Washington Office Instruction Memorandums (IM) 2008-009, 10/15/2007 and 2009-011, 10/10/2008

4.11 Minerals

4.11.1 Fluid Minerals

4.11.1.1 Direct and Indirect Effects

Hydraulic fracturing (known as "fracking" in the oil and gas industry) is a process that uses high pressure pumps to develop pressure at the bottom of a well to crack the hydrocarbon formation. This aids extraction of oil and gas deposits that might be left behind by conventional oil and gas drilling and pumping technology. Hydraulic fracturing (HF) is a 60-year-old process that is now being used more commonly as a result of advanced technology. Wells are often treated during completion to improve the recovery of hydrocarbons by increasing the rate and volume of hydrocarbons moving from the natural oil and gas reservoir into the wellbore. These processes are known as well-stimulation treatments, which create new fluid passageways in the producing formation or remove blockages within existing passageways. They include fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other. This makes it possible to introduce fluids carrying sand, walnut hulls, or other small particles of material into the newly created crevices to keep the fractures open when the pressure is relieved. This process increases the flow rate and volume of reservoir fluids that move from the producing formation into the wellbore. The fracking fluid is typically more than 99 percent water and sand, with small amounts of readily available chemical additives used to control the chemical and mechanical properties of the water and sand mixture.

North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Division, is responsible for the **e**nforcement of laws, rules, and regulations dealing with conservation of oil and gas. In the North Dakota Century Code, (effective April 1, 2012) NDCC 38-08-04, chapter 43-02-03, it states the commission, its agents, representatives, and employees are charged with the duty and obligation of enforcing all rules and statutes of North Dakota relating to the conservation of oil and gas.

Regarding HF stimulation, at chapter 43-02-03-27.1 there is a detailed discussion of HF stimulation performed through a frac string run inside the intermediate casing string. It outlines the depth at which the frac string must stung or run, pressurization and monitoring during frac operations; pressure relief valves on the treating line to limit the volume of flowback fluid; diversion lines from intermediate casings to a pit or containment vessel in case of frac string failure; remote operated frac valve between the treating line and the wellhead; posting on fracfocus chemical disclosure registry website.

The chapter continues with a discussion of HF stimulation performed through an intermediate

casing string and gives criteria when a frac string must by run inside the intermediate casing. It details the maximum treating pressure; depth for verification of wall thickness of the intermediate casing and visual inspection with photographs of the top joint of the intermediate casing and wellhead flange; depth for verification of cementing of the intermediate casing; depth, duration, and criteria of pressure testing; criteria when a wellhead and blowout preventer system must be used; pressure relief valves on the treating line to limit the volume of flowback fluid; diversions lines from intermediate casings to a pit or containment vessel in case of frac string failure; remote operated frac valve between the treating line and the wellhead; posting on fracfocus chemical disclosure registry website.

Finally, the chapter discusses the measuring the pressure in the intermediate casing-surface casing annulus. If the pressure exceeds three hundred fifty pounds per square inch, the owner or operator notifies the director as soon as practicable following the incident.

To ensure that HF is conducted in a safe and environmentally sound manner, the BLM approves and regulates all drilling and completion operations, and related surface disturbance on Federal public lands. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, the BLM identifies all potential subsurface formations that will be penetrated by the wellbore. This includes all groundwater aquifers and any zones that would present potential safety or health risks that may need special protection measures during drilling, or that may require specific protective well construction measures.

Once the geologic analysis is completed, the BLM reviews the company's proposed casing and cementing programs to ensure the well construction design is adequate to protect the surface and subsurface environment, including the potential risks identified by the geologist and all known or anticipated zones with potential risks.

Before HF takes place, (in accordance with State of North Dakota law) all surface casing and some deeper, intermediate zones are required to be cemented from the bottom of the cased hole to the surface. The cemented well is pressure tested to ensure there are no leaks and a cement bond log is run to ensure the cement has bonded to the casing and the formation. If the fracturing of the well is considered to be a "non-routine" fracture for the area, the BLM will always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

Stipulations applied to various areas with respect to occupancy, timing limitation, and control of surface use would have the greatest effects on oil and gas exploration and development. Leases issued with major constraints such as no surface occupancy may decrease some lease values, increase operating costs, and, to a lesser extent, require relocation of well sites and modification of field development. Leases issued with moderate constraints such as timing limitations and controlled surface use stipulations may result in similar but reduced impacts and delays in operations and uncertainty on the part of operators regarding restrictions.

Under the Proposed Action, all of the lease parcel areas would be recommended for oil and gas leasing at this time. Approximately 99 percent of the areas would be offered for lease subject to major constraints. Approximately 1 percent would be offered for lease subject to moderate constraints. No parcels would be offered for lease subject only to standard terms and conditions.

If areas are deferred, some development plans could be delayed, relocated, or completely dropped because of the need to include federal acreage as part of an exploration or development plan.

4.11.2 Solid Minerals
4.11.2.1 Direct and Indirect Effects
4.11.2.1.1 Salables
Salable minerals will be dealt with at the APD stage. However, disposal of salable minerals is a discretionary decision of the authorized officer and thus future potential resource development conflicts would be avoided either by not issuing sales contracts in oil and gas development locations or conditioning the APD or sand and gravel contract to avoid conflicts between operations.

4.12 Visual Resources
4.12.1 Direct and Indirect Effects
4.12.1.1 Alternative A – No Action
No action to lease these parcels would be taken; therefore, there would be no effects to visual resources.

4.12.1.2 Alternative B – Proposed Action
Leasing the parcels would have no direct impacts on visual resources. Any potential effects from the sale of leases would occur at the time the leases are developed.

While the act of leasing federal minerals produces no visual impacts, development of a lease parcel could result in some level of modification to the existing landscape at the time of development.

4.12.1.2.1 Mitigation
All new oil and gas development would implement, as appropriate for the site, BLM Best Management Practices for Visual Resource Management (VRM), regardless of the VRM class. This includes, but would not be limited to, proper site selection, reduction of visibility, minimizing disturbance, selecting color(s)/color schemes that blend with the background and reclaiming areas that are not in active use. Repetition of form, line, color and texture when designing projects would reduce contrasts between landscape and development. Wherever practical, no new development would be allowed on ridges or mountain tops. Overall, the goal would be to maintain the visual qualities or scenic value that currently exists.

4.13 Recreation and Travel Management

4.13.1 Direct and Indirect Effects

4.13.1.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, there would be no effects to recreation and travel management. Existing recreational uses would continue in the project area without increased traffic due to the Proposed Action.

4.13.1.2 Alternative B – Proposed Action

Leasing the parcels would have no direct impacts on Recreation and Travel Management. Any potential effects from the sale of the leases would occur at the time the leases are developed.

Over the life of the leases, natural gas wells, equipment, and facilities could minimally alter the general solitude (space and noise) and scenic value of the area, both of which currently exist as important attributes of quality recreation opportunities. Industrial activity would concentrate around well pads, roads, and centralized facilities. Disturbance attributed to well pads would be reduced somewhat by interim reclamation.

Recreation impacts may exist where oil and gas development and recreational user conflicts may occur. In areas where a high level of oil and gas development is likely, there may be user conflicts between motorized recreationists (OHV activities), hunting, target shooting, camping, fishing, picnicking, and winter activities such as snowmobiling and the oil and gas/industrial activities. The intensity of these impacts is moderate and could exist in both the short-term (exploration and construction phases of oil and gas development) and in the long-term (producing wells, maintenance of facilities, etc.).

Where there are other land use activities occurring, including oil and gas development, in areas frequented by recreationists, the public may perceive these areas as inaccessible or unavailable because of the facilities or recreationists may use lease roads to access areas for recreational activities. Potential public safety hazards/risks include: moving equipment, operator vehicles, transport vehicles for oil and gas, oil and gas wells, etc. However, this will be addressed in more detail at the development stage.

As oil and gas development occurs, new routes may be created which often attract recreationists seeking additional or new areas to explore for motorized recreational opportunities. Motorized recreational opportunities could be enhanced through the additional opportunities to explore; however, user conflicts and public safety issues could result from the use of the new travel routes. The creation of routes from oil and gas activities could lead to a proliferation of user-created motorized routes, resulting in adverse impacts to the scenic qualities of the area and increased level of surface disturbance. These impacts would be isolated to BLM-administered public lands and could be minimized and avoided through mitigation and reclamation of industrial routes when no longer needed.

Foreseeable changes in recreation use levels include demand for recreational use of public land to increase. Increases could be expected in, but not limited to, hunting, fishing, hiking, camping,

and wildlife viewing, and dispersed recreational uses. This could increase the incidence of conflict between recreationists involved in motorized activities and non-motorized activities.

4.13.1.2.1 Mitigation

All new oil and gas development would implement, as appropriate for the site, BLM Best Management Practices for Recreation and Travel Management. This includes, but would not be limited to, warning signs should be posted on access roads to alert recreationists and project personnel to each other's presence and to promote the avoidance of accidents. Additional signage should be posted to promote consideration by personnel for recreational uses of the land. Construction timing should be coordinated with area outfitters, landowners and the public especially during hunting season to determine important dispersed recreation sites and develop ways to avoid conflicts with users.

4.13.2 Noise

4.13.2.1 Alternative A – No Action

No action to lease these parcels would be taken; therefore, the noise level would not change from the current condition.

4.13.2.2 Alternative B – Proposed Action

Leasing the parcels would have no direct impacts on noise. Any potential effects from the sale of the leases would occur at the time the leases are developed.

4.13.2.2.1 Mitigation

As oil and gas development occurs, there would be a short-term increase in noise levels from the new oil and gas development while drilling would occur. The distance to existing roads, the temporary nature of the road construction and maintenance, and the use of quiet electronic motors and well lubricated pumpjacks would limit any harmful effects of noise. Suitable mufflers should be installed on all internal combustion engines and certain compressor components. Other noise reduction techniques to consider include: constructing engineered sound barriers or sound-insulated buildings.

4.14 Livestock Grazing

4.14.1 Direct and Indirect Effects

Leasing the parcels would have no direct impacts on livestock grazing. Any potential effects from the sale of leases would occur at the time the leases are developed.

Oil and gas development could result in a loss of vegetation for livestock grazing (e.g., direct removal, introduction of unpalatable plant species, thus reducing animal unit months, etc.), decrease the palatability of vegetation due to fugitive dust, disrupt livestock management practices, involve vehicle collisions, and decrease grazing capacity. Direct losses of forage could also result from construction of roads, well pads and associated infrastructure and would vary depending on the extent of development. These impacts could vary from short-term impacts to long-term impacts depending on the type of exploration or development, the success of reclamation, and the type of vegetation removed for the oil and gas activities.

Oil and gas development activity would reduce BLM's ability to manage livestock grazing while meeting or progressing towards meeting the Standards of Rangeland Health. Development and associated disturbances would reduce available forage or alter livestock distribution which could lead to overgrazing or other localized excess grazing impacts. Construction of roads, especially in areas of rough topography can improve livestock distribution throughout an allotment.

4.14.2 Mitigation

Measures would be taken to prevent, minimize, or mitigate impacts to livestock grazing from exploration and development activities. Prior to authorization, activities would be evaluated on a case-by-case basis, and the project would be subject to mitigation measures. Mitigation would be deferred to the site specific APD stage of development. BMPs would be incorporated in to COAs. Mitigation could potentially include controlling livestock movement by maintaining fence line integrity, fencing of facilities, revegetation of disturbed sites, and fugitive dust control.

4.15 Economic Conditions

4.15.1 Direct and Indirect Effects

4.15.1.1 Alternative A – No Action

The economic contributions of the oil and gas industry to the local economy were discussed earlier in the Affected Environment section. These contributions were measured by estimating the employment and labor income generated by 1) payments to counties associated with the leasing and rent of federal minerals, 2) royalty payments associated with production of federal oil and gas, and 3) economic activity generated from drilling and associated activities. Activities related to oil and gas leasing, exploration, development, and production stimulate economic activity and brings money into the region and creates jobs in various industrial sectors. The economic impacts of changing the level of oil and gas activities in the region will depend on the number of acres leased, rents paid, and level of production. Table Econ.2 summarizes changes in local revenues, employment, income, population, and households.

Under Alternative A, none of the nominated parcels would be leased. Consequently, local revenues, employment, and wages would remain at current levels described in the Affected Environment section. Alternative A would not generate any additional revenue from leasing, rents, or royalties associated with production, and would not support any additional jobs or income in the region.

Table 4.15.2 Econ. 2. Summary Comparison of Estimated Average Annual Economic Impacts

Alternative	Additional Acres Leased	Change in Average Annual Local Revenue to Counties	Change in Total Employment (full and part-time jobs)	Change in Total Labor Income ($1,000)	Change in Population	Change in Number of Households

A	0	0	0	0	0	0
B	2,873	$ 553,736	33	2,249	40	18

4.15.1.2 Alternative B – Proposed Action

Total average annual federal revenues related to leasing an additional 2,873 acres of federal minerals and associated annual rent and royalty revenues related to average annual production of federal minerals would increase by an estimated $2.2 million (Table Econ. 2). Of this, an estimated $839,000 would be disbursed back to the state, and nearly $554,000 would be distributed to the nine counties with nominated parcels.

The estimated combined total average annual employment would likely increase from current levels by an estimated 33 jobs and income would increase by about $2.2 million within the 13-county local economy (IMPLAN, 2010). There would also be an increase in local population (40 people) and households (18).

The economic effects would be spread unevenly among the counties. Alternative B would provide additional funds (about $554,000) for county functions such as enforcing laws, administering justice, collecting and disbursing tax funds, providing for orderly elections, maintaining roads and highways, providing fire protection, and keeping records. Other county functions that could be funded include operating clinics/hospitals, county libraries, county airports, local landfills, and county health systems. Local education would continue to receive the largest share of these funds. Demand for these services would also increase.

Leasing approximately 2,873 acres and anticipated exploration, development, and production would change local economic diversity (as indicated by the number of economic sectors), economic dependency (where one or a few industries dominate the economy), and economic stability (as indicated by seasonal unemployment, sporadic population changes and fluctuating income rates) very little across the 13-county area because oil and gas exploration, development, and production is well established in the local economy.

4.16 Social Conditions and Environmental Justice

4.16.1 Direct and Indirect Effects

No alternative would affect the demographics, social trends, or social organization in the area.

4.16.1.1 Alternative A – No Action

The No Action alternative would result in the continuation of the current land and resource uses and would cause no additional social or environmental justice impacts.

4.16.1.2 Alternative B – Proposed Action

While the act of leasing federal minerals itself would result in no social impacts, subsequent development of a lease may generate impacts to people living near or using the area in the vicinity of the lease.

Oil and gas exploration, drilling, or production could create additional inconvenience to these people due to increased traffic and traffic delays, noise and visual impacts. This could be most noticeable in rural areas where oil and gas development has been minimal. The amount of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, length of time, and season these activities occurred, etc. Creation of new access roads into an area could allow increased public access and exposure of private property to vandalism. For leases where the surface is privately owned and the subsurface is federally owned, surface owner agreements, standard lease stipulations, and BMPS could address many of the concerns of private surface owners.

An anticipated increase in local employment would also cause increases in local population and demand for housing. These local impacts would be spread over a 13-county area. While the increased population would also increase demand for additional housing, increase traffic, increase infrastructure pressures, and may decrease the quality of life within local communities, all these effects would also be spread over a 13-county area. New employment, additional population, and associated social impacts may be noticed in smaller communities, if it is noticed at all. See Direct and indirect Effects to Economic Conditions.

There would be no disproportionate effects to low income or American Indian populations from the sale of leases.

4.17 Cumulative Impacts

Cumulative impacts are those impacts resulting from the incremental impact of an action when added to other past, present, and reasonably foreseeable actions regardless of what agency or person undertakes such other actions (40 CFR 1508.7). This section describes cumulative impacts associated with this project on resources. The ability to assess the potential cumulative impacts at the leasing stage for this project is limited for many resources due to the lack of site-specific information for potential future activities. Upon receipt of an APD for any of the lease parcels addressed in this document, more site-specific planning would be conducted in which the ability to assess contributions to cumulative impacts in a more detailed manner would be greater due to the availability of more refined site-specific information about proposed activities.

4.17.1 Past, Present and Reasonably Foreseeable Future Actions

Past, present, or reasonably foreseeable future actions that have or could affect the same components of the environment as the Proposed Action in project area include mineral exploration and development, road construction, agriculture, recreational activities, subdivision of private lands, energy/utility infrastructure development, vehicle travel, wild and prescribed fire activities and water flow alterations and diversions. Much of this activity has, and is

expected to continue, occurred on private surface lands, which comprise a majority of the total land ownership in the project area.

4.17.2 Cumulative Impacts by Resource

4.17.2.1 Air Resources

4.17.2.1.1 Air Quality

Air pollutant emissions from oil and gas development resulting from BLM-authorized leases would be small in comparison to total emissions in the NDFO, which include oil and gas emissions from private mineral estate and emissions from all other activities occurring in the area. As discussed in Chapter 3, the largest categories of non-SO_2 emission sources were biogenic sources (including soil) and agricultural sources according to the USEPA's 2008 National Emission Inventory (NEI). For SO_2, oil and gas production was the largest emission source in the relevant counties. Given the good air quality described in Chapter 3, incremental emissions from BLM-authorized oil and gas activity are not expected to cause exceedances of NAAQS.

4.17.2.1.1.1 Greenhouse Gas Emissions and Cumulative Impacts on Climate Change

The cumulative effects analysis area for GHG emissions and climate change is the NDFO, with additional discussion at statewide, national, and global scales for GHG and climate change.

This section incorporates an analysis of the contributions of the Proposed Action to GHG emissions, followed by a general discussion of potential impacts to climate change. Potential emissions relate to those derived from potential exploration and development of fluid minerals. Additional emissions beyond the control of the BLM, and outside the scope of this analysis, would also occur during any needed refining processes as well as the end uses of final products.

Projected GHG emissions for this project and the NDFO RFD are compared below with recent, available inventory data at the state, national, and global scales. GHG emissions inventories can vary greatly in their scope and comprehensiveness. State, national, and global inventories are not necessarily consistent in their methods or in the variety of GHG sources that are inventoried (BLM 2010). However, comparisons of emissions projected by the BLM for its oil and gas production activities are made with those from inventories at the state and national level provide a context for the potential contributions of GHGs associated with this project.

As discussed in the Air Quality section of Chapter 4, total long-term projected BLM GHG emissions from the RFD are 527,350 metric tons/year CO_2e. Potential emissions under Alternative B would be approximately 0.29 percent of this total. Table 4.17.2.1 displays projected GHG emissions from non-BLM activities included in the NDFO RFD. Total projected emissions of non-BLM activities in the RFD are 4,369,454 metric tons/year of CO_2e. When combined with projected annual BLM emissions, this totals 4,371,036 metric tons/year CO_2e. Potential GHG emissions under Alternative B would be 0.04 percent of the estimated emissions for the combined federal and non-federal RFD. Potential incremental emissions of GHGs from exploration and development of fluid minerals under Alternative B would be minor in the context of projected GHG contributions from the entire RFD for the NDFO.

Table 4.17.2.1. Projected Non-BLM GHG Emissions Associated with the NDFO Reasonably Foreseeable Development Scenario for Fluid Mineral Exploration and Development.

Source	Non-BLM Long-Term Greenhouse Gas Emissions in tons/year				Emissions (metric tons/yr)
	CO_2	CH_4	N_2O	Co_2e	CO_2e
Conventional Natural Gas	4,273	851	0.05	22,156	20,106
Coal Bed Natural Gas	32,407	412	0.58	41,243	37,426
Oil	4,538,510	17,153	52.69	4,751,739	4,311,922
Total	**4,575,190**	**18,416**	**53.32**	**4,815,138**	**4,369,454**

4.17.2.1.1.2 North Dakota's Contribution to U.S. and Global Greenhouse Gases (GHGs)
While the state of North Dakota has not completed a GHG inventory, the Congressional Research Service Report for Congress entitled "State Greenhouse Gas Emissions Comparison and Analysis" estimates that North Dakota emissions are 57 million metric tons of carbon equivalent ($MMTCO_2e$).

The USEPA published an inventory of U.S. GHG emissions that indicated gross U.S. 2010 emissions of 6,822 million metric tons and net emissions of 5,747 million metric tons (when CO_2 sinks were considered) of CO_2e (USEPA 2012b). Potential annual BLM-authorized emissions under Alternative B would amount to approximately 0.00002 percent of gross U.S. total emissions. Global GHG emissions for 2004 (IPCC 2007) indicated approximately 49 gigatonnes (10^9 metric tons) of CO_2e emitted. Potential annual emissions under Alternative B would amount to approximately 0.000003 percent of this global total.

As indicated in the Air Quality section of Chapter 4 above, although the effects of GHG emissions in the global aggregate are well-documented, it is currently not credibly possible to determine what specific effect GHG emissions resulting from a particular activity might have on climate or the environment. If exploration and development occur on the lease parcels considered under Alternative B, potential GHG emissions described above would incrementally contribute to the total volume of GHGs emitted to the atmosphere, and ultimately to climate change.

Mitigation measures identified in the Air Quality section of Chapter 4 above may be in place at the APD stage to reduce GHG emissions from potential oil and gas development as a result of this project. This is likely because many operators working in North Dakota are currently USEPA Natural Gas STAR Program Partners and new USEPA regulations will require GHG emission reductions from oil and gas production activities.

4.17.2.1.2 Cumulative Impacts of Climate Change

As previously discussed in section 4.1.1, climate change impacts on specific resources within the project area cannot be quantified. Some information and climate change impact projections are becoming increasingly available; however, they do not address the type of small localized GHG emission increases associated with Alternative B. Chapter 3 of the Climate Change SIR (BLM 2010) describes impacts of climate change at much larger scales. Effects of climate change on resources are described in Chapter 3 of this EA and in Climate Change SIR (BLM 2010).

4.17.2.2 Cumulative Impacts of Other Resources

Although impacts are discussed by pertinent resource below, the Proposed Action, when considered in combination with other past, present and reasonably foreseeable activities occurring on federal, state, and private lands, would not significantly contribute to any cumulative impacts. The ability to assess the potential cumulative impacts at the leasing stage for this project is limited for many resources due to the lack of site-specific information for potential future activities. Upon receipt of an APD for any of the lease parcels addressed in this document, more site-specific planning would be conducted in which the ability to assess contributions to cumulative impacts in a more detailed manner would be greater due to the availability of more refined site-specific information about proposed activities.

4.17.2.2.1 Fish and Wildlife

Generally speaking construction of roads, production well pads, and other facilities would result in long term (>5 years) loss of habitat and forage in the analysis area if the leases are developed. This would be in addition to acres disturbed, or habitats fragmented from various other adjacent activities. As new development occurs, direct and indirect impacts would continue to stress wildlife populations, most likely displacing the larger, mobile animals into adjacent habitat, and increasing competition with existing local populations. Non-mobile animals would be affected by increased habitat fragmentation and interruptions to preferred nesting habitats.

Certain species are localized to some areas and rely on very key habitats during critical times of the year. Disturbance or human activities that would occur in winter range for big game, nesting and brood-rearing habitat for grouse and raptors could displace some or all of the species using a particular area or disrupt the normal life cycles of species. Wildlife and habitat in and around the project would be influenced to different degrees by various human activities. Some species and/or a few individuals from a species group may be able to adapt to these human influences over time.

With the addition of various forms of stipulations, mitigation, and terms and conditions applied during the development stage, the assessed resources of concern are not expected to approach conditions where additional stresses associated with the proposed action and, past, present and future foreseeable actions will have consequential cumulative effects.

4.17.2.2.2 Cumulative Impacts of Economics

Since no action would be taken under Alternative A, cumulative economic impacts would be the same as those described for the affected environment in chapter 3. Without leasing additional

parcels, oil and gas activities in the region are expected to remain at current levels. The contributions of current oil and gas development were discussed in the Affected Environment section above. Tables Econ.3 and Econ.4 summarize the cumulative federal mineral leasing, exploration, development and production within the local economy for alternatives A and B.

Table 4.17.2.2.2 Econ 3. Cumulative Annual Activity by Alternative

Activity	**Alternative**	
	A	**B**
Existing acreas leased within Field Office	231,088	231,088
Acres that would be leased based on this EA	0	2,873
Total acres leased	231,088	233,961
Acres held by production	147,190	147,190
Total acres leased for which lease rents would be paid	83,898	86,771
Average annual oil production (bbl)	11,041,402	11,178,674
Average annual gas production (MCF)	0	0
Total average annual Federal Revenues	$123,479,282	$125,717,503
Total average annual revenue distributed to counties	$26,992,571	$27,481,846

Table 4.17.2.2.3 Econ 4. Summary Comparison of Employment and Income by Alternative

Industry	**Total Jobs Contributed**		**Total Income Contributed ($1,000)**	
	Alt. A	**Alt. B**	**Alt. A**	**Alt. B**
Impacts under the Alternatives	277	310	$10,546	$12,795

IMPLAN, 2010

As highlighted in the tables above, additional leasing under Alternative B would increase development and production in the region and generate greater federal, state, and local revenues. Under Alternative B, oil and gas related activities would support 310 jobs and $12.8 million in employee wages and proprietors income across the 13 counties. While Alternative B is anticipated to increase employment and income in the region, this alternative is unlikely to alter the underlying economic structure of the region which may affect business patterns and demographics in the region.

Disclosure of the direct, indirect, and cumulative effects of GHG emissions provides information on the potential economic effects of climate change including effects that could be termed the "social cost of carbon" (SCC). The EPA and other federal agencies developed a method for estimating the SCC and a range of estimated values (EPA 2013b). The SCC estimates economic damages associated with climate change impacts to net agricultural productivity, human health, property damage, and ecosystems. Using a 3 percent average discount rate and year 2020 values, the incremental SCC is estimated to be $46 per metric ton of annual CO2e increase. Based on the GHG emission estimate provided in Section 4.17.2.4, the annual SCC associated with potential development on lease sale parcels is $? (in 2011 dollars). Estimated SCC is not directly comparable to economic contributions reported above, which recognize certain economic contributions to the local area and governmental agencies but do not include all contributions to private entities at the regional and national scale. Direct comparison of SCC to the economic contributions reported above is also not appropriate because costs associated with climate change are borne by many different entities.

5.0 CONSULTATION AND COORDINATION:

5.1 Persons, Agencies, and Organizations Consulted

A packet that included a formal cover letter, an official list and maps of the lease parcels, and Class I site and survey information for each lease parcel were sent certified mail to the tribal historic preservation officer (THPO) and tribal chairmen for each of the Turtle Mountain Band of the Chippewa (TMBC) Tribe; the Standing Rock Sioux Tribe (SRST); the Mandan Hidatsa, and Arikara Nation (MHAN); the Spirit Lake Tribe of Fort Totten, ND; the Northern Cheyenne Tribe, of Lamedeer MT; and the Lower Sioux Indian Community of Morton, MN .

Table 5.1.1 lists persons, agencies, and organizations that were consulted or coordinated with during development of this EA along with the findings and conclusions associated with consultations.

Table 5.1.1. List of individuals, agencies and organizations consulted or coordinated with regarding on this EA

Name	Purpose & Authorities for Consultation or Coordination	Findings & Conclusions
Bureau of Reclamation	BOR Surface - SME	Stipulation Recommendations
U.S. Army Corps of Engineers	COE Surface – SME	Stipulation Recommendations
U.S. Fish and Wildlife Service	T&E Species	Addressed with 2006 "backlog" consultation and 1988 (RMP) Section 7 consultation. Further comments to be addressed during comment period.
National Park Service	Fort Union Trading Post	To be addressed during comment period
North Dakota Game and Fish Department	Resident species and habitats	To be addressed during comment period
Tribal Historic Preservation Officer, and Review and Compliance Officer for the Mandan, Hidatsa, and Arikara Nation	National Historic Preservation Act, Section 106 Reference (36 CFR 800)	To this date no TCP's have been brought to the attention of the BLM.
Tribal Historic Preservation Officer from the Turtle Mountain Band of Chippewa Indians	National Historic Preservation Act, Section 106 Reference (36 CFR 800)	To this date no TCP's have been brought to the attention of the BLM.
Tribal Historic Preservation Officer from the Standing Rock Sioux Tribe	National Historic Preservation Act, Section 106 Reference (36 CFR 800)	To this date no TCP's have been brought to the attention of the BLM.
Tribal Chair Person Spirit Lake Sioux	National Historic Preservation Act, Section 106 Reference (36 CFR 800)	To this date no TCP's have been brought to the attention of the BLM.
Tribal Historic Preservation Officer Lower Sioux Indian Community (Minnesota)	National Historic Preservation Act, Section 106 Reference (36 CFR 800)	To this date no TCP's have been brought to the attention of the BLM.
Tribal Historic Preservation Officer Northern Cheyenne Tribe	National Historic Preservation Act, Section	To this date no TCP's have been brought to the attention of the BLM.

	106 Reference (36 CFR 800)	

5.2 Summary of Public Participation Scoping

Public scoping for this proposed leasing project was conducted through a 15-day scoping period advertised on the BLM Montana State Office website and posting on the NDFO website NEPA notification log. Scoping was initiated on July 1, 2013. Surface owner notification letters were also distributed briefly explaining the oil and gas leasing process and planning process. The surface owner notification letter requested written comments regarding any issues or concerns that should be addressed in the environmental analysis. A total of 14 surface owner notification letters were distributed for the oil and gas leasing analysis process for the NDFO.

The BLM received two written comment letters and four phone/verbal comments. The written and verbal communication resulted in a total of six individual scoping comments received pertaining to oil and gas leasing in North Dakota.

Of the six total comments, three were comments from surface owners in support of leasing. Two comments had site specific concerns regarding the view-shed and noise disturbance. One comment had site specific concerns regarding the Lewis and Clark National Historic Trail along the Missouri River and Yellowstone River.

30 Day Comment Period (placeholder)

Table 5.1.2. List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
Justin Peters	Cultural Resources Specialist	Cultural Resources, Native American Religious Concerns, and Paleontology
Gregory Liggett	Paleontologist	Paleontology
Josh Halpin	Rangeland Management Specialist	Soil Resources
Shelly Gerhart	Natural Resources Specialist	Water Resources, Vegetation, Visual Resources, Recreation and Travel Management, Noxious Weeds, and EA Lead
Tim Zachmeier	Wildlife Biologist	Fish & Wildlife, Special Status Animal and Plant Species
Linda Gisvold	Realty Specialist	Lands & Realty
Allen Ollila	Petroleum Engineer	Fluid Minerals
John Thompson	Planning & Environmental Specialist	Economic Conditions
Susan Bassett	Air Resource Specialist	Air, Climate
Jessica Montag	Socioeconomic Specialist	Social Conditions
Jennifer Nagy	Natural Resources Specialist – GIS	GIS Support/Maps
Corrine Walter	IT Specialist	GIS Support/Maps

6.0 REFERENCES

Bald Eagle Protection Act of 1940 (16 U.S.C. 668-668d, 54 Stat. 250) as amended -- Approved June 8, 1940, and amended by P.L 86-70 (73 Stat. 143) June 25, 1959; P.L. 87-884 (76 Stat. 1346) October 24, 1962; P.L. 92-535 (86 Stat. 1064) October 23, 1972; and P.L. 95-616 (92 Stat. 3114) November 8, 1978.

Bainbridge, DA. 2007. A Guide for Dryland Restoration: New Hope for Arid Lands. Island Press. Washington, DC.

Bohnenkamp, S., Finken, A., McCallum, E., Putz, A., and Goreham, G., 2011. Concerns of the North Dakota Bakken Oil Counties: Extension Service and Other Organizations' Program Responses to These Concerns. A report prepared for Center for Community Vitality, NDSU Extension Service, North Dakota State University, Fargo. Available at: http://www.ag.ndsu.edu/ccv/documents/bakken-oil-concerns

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), andU.S. Fish and Wildlife Service, Albuquerque, New Mexico. 162 pp. http://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf

CCSP. 2008. The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States. U.S. Climate Change Science Program (CCSP). May.

CRS. 2007. State Greenhouse Gas Emissions: Comparison and Analysis. Congressional Research Service (CRS). December 5. http://assets.opencrs.com/rpts/RL34272_20071205.pdf

Dale, B.C., T.S. Wiens, and L.E. Hamilton. 2009. Abundance of three grassland songbirds in an area of natural gas infill drilling in Alberta, Canada. Pages 194-204 *in* T.D. Rich, C. Arizmendi, D.W. Demarest, and C. Thompson, editors. Proceedings of the 4th International Partners in Flight Conference. 13-16 February 2008. McAllen, Texas. http://www.partnersinflight.org/pubs/McAllenProc/index.cfm (9 July 2010).

Davis, S.K. 2004. Area sensitivity in grassland passerines: effects of patch size, patch shape, and vegetation structure on bird abundance and occurrence in southern Saskatchewan. Auk 121:1130-1145.

Dieni, J.S. and S.L. Jones. 2003. Grassland songbird nest site selection patterns in northcentral Montana. Wilson Bulletin 115:32-40.

Distribution of Mineral Royalty by County. (2010). Retrieved July 21, 2010 from Office of North Dakota State Treasurer: http://www.nd.gov/ndtreas/index.htm.

Dohms, K.M. 2009. Sprague's Pipit (*Anthus spragueii*) nestling provisioning and growth rates in native and planted grasslands. M.S. thesis, University of Regina, Regina, Saskatchewan, 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, North Dakota http://gf.nd.gov/conservation/cwcs.html (12 october 2006)

Higgins, K.F., D.E. Naugle, and K.J. Forman. 2002. A case study of changing land use practices in the Northern Great Plains, U.S.A.: an uncertain future for waterbird conservation. Waterbirds 25:Special Publication 2:45-50.

Holloran, M. J, and S. H. Anderson. 2005b. Spatial Distribution of Greater Sage-Grouse nests in Relatively Contiguous Sagebrush Habitats. *The Condor,* 107:742–752.

Holloran, M.J. 2005. Greater Sage Grouse (*Centrocercus urophasianus*) population response to natural gas field development in westernWyoming. Dissertation, University of Wyoming, Laramie, USA.

Holloran, M.J. 2005. Greater Sage-Grouse (*Centrocercus urophasianus*) Population Response to Natural Gas Development in Western Wyoming. December, 2005. (Doctoral Dissertation, University of Wyoming). Laramie, WY. Available at: http://www.uwyo.edu/wycoopunit/showthesis.asp?thesisid=182.

Holloran, M.J. and S.H. Anderson. 2005a. Greater sage-grouse population response to natural gas development in western Wyoming: are regional populations affected by relatively localized disturbances? In Wildlife Management Institute (Ed.), *Transactions from the 70th North American Wildlife and Natural Resources Conference* (March 16–19, 2005, Arlington, VA). Wildlife Management Institute.

Igl, L.D. and D.H. Johnson. 1997. Changes in breeding bird populations in North Dakota: 1967-1992-93. Auk 114:74-92.

IMPLAN, 2010. Minnesota IMPLAN Group 2010.

IMPROVE 2011. *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V*. Interagency Monitoring of Protected Visual Environments (IMPROVE). June 2011.

Independent Petroleum Association of America, The Oil and Gas Producing Industry in Your State 2011-2012, ND, pp. 80-81.IPCC. 2007. *Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report: Climate Change 2007.* http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml

Koper, N., D.J. Walker, and J. Champagne. 2009. Nonlinear effects of distance to habitat edge on Sprague's pipits in southern Alberta, Canada. Landscape Ecology 24: 1287-1297.

Linnen, C.G. 2008. Effects of oil and gas development on grassland birds. Unpublished report, prepared for Petroleum Technology Alliance Canada. Saskatoon, Saskatchewan, Canada.

Logan R. 2001. Water Quality BMPs for Montana Forests. Montana State University Extension Service. Bozeman, MT.

Mackie, R.J., D. Pac, K. Hamlin, and G. Dusek. 1998. Ecology and Management of Mule Deer and White-tailed Deer in Montana. Fed. Aid in Wildlife Restor. Proj. W-120-R. Mont. Dept. Fish, Wildl. And Parks, Helena. 180 pgs.

McMaster. D.G., J.H., and S.K. Davis. 2005. Grassland birds nesting in haylands of southern Saskatchewan: landscape influences and conservation priorities. Journal of Wildlife Management 69:211-221.

Migratory Bird Treaty Act of 1918 (16 U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755) as amended by: Chapter 634; June 20, 1936; 49 Stat. 1556; P.L. 86-732; September 8, 1960; 74 Stat. 866; P.L. 90-578; October 17, 1968; 82 Stat. 1118; P.L. 91-135; December 5, 1969; 83 Stat. 282; P.L. 93-300; June 1, 1974; 88 Stat. 190; P.L. 95-616; November 8, 1978; 92 Stat. 3111; P.L. 99-645; November 10, 1986; 100 Stat. 3590 and P.L. 105-312; October 30, 1998; 112 Stat. 2956.

Minerals Management Service (MMS). (2010). Retrieved July 21, 2010 from Total Reported Royalty by Revenues, North Dakota, FY2009: http://www.mms.gov/index.htm.

Morrisssette, Joe, North Dakota Office of Management and Budget, 7/8/2010

Natural resources Conservation Service (NRCS), United States Department of Agriculture (USDA). 2012. Web Soil Survey. <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>. (accessed August 1, 2012).

Natural Resources Conservation Service (NRCS), United States Department of Agriculture (USDA). 2012. Ecological Site Descriptions. <http://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD> (accessed August 1, 2012).

Natural Resources Conservation Service (NRCS). United States Department of Agriculture (USDA). 2012. Soils Data Mart. < http://soildatamart.nrcs.usda.gov/> (accessed August 1, 2012).

North Dakota Department of Mineral Resources (NDDMR) 2012. Historical Annual Oil Production. Oil and Gas Division

North Dakota Department of Mineral Resources (NDDMR) 2012. Historical Annual Oil Production. Oil and Gas Division

North Dakota Department of Mineral Resources (NDDMR) 2012. Historical Gas Production and Sales. Oil and Gas Division

North Dakota Office of the State Treasurer, 7/9/2010

North Dakota QuickFacts. (2010). Retrieved July 13, 2010 from U.S. Census Bureau: http://quickfacts.census.gov/qfd/index.html

North Dakota State Auditor's Office, Dennis Roller, 7/13/2010

North Dakota State Historic Preservation Office (NDSHPO), Archaeology and Historic Preservation Division. *HISTORIC PRESERVATION IN NORTH DAKOTA*, 2010-2015: *A Statewide Comprehensive Plan*, December 2009. State Historical Society of North Dakota, http://www.history.nd.gov/hp/plancopy.html.

Office of Natural Resources Revenue (ONRR), Total Reported Royalty Revenues, ND 2009, 2010

Office of Natural Resource Revenue, Lease Bonus and Rent Revenue, Production, and Royalties, 2013.

Owens, R.A., and M.T. Myers. 1973. Effects of agriculture upon populations of native passerine birds of an Alberta fecue grassland. Canadian Journal of Zoology 51:697-713.

Perrow, MR and AJ Davy. 2003. Handbook of Ecological Restoration: Vol. 1 Principles of Restoration. Cambridge University Press. New York, NY.

Sutter, G.C., S.K. Davis, and D.C. Duncan. 2000. Grassland songbird abundance along roads and trails in southern Saskatchewan. Journal of Field Ornithology 71:110-116.

Tack, J.D. 2010. Sage Grouse and the Human Footprint: Implications for Conservation of Small and Declining Populations. Thesis. University of Montana, Missoula, MT. USA.

U.S. Department of Commerce. 2012. Bureau of Economic Analysis, Regional Economic Information System, Washington, D.C. Table CA05N.

U.S. Department of the Interior Bureau of Land Management. 2008. Final Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans. U.S.

Department of the Interior, Bureau of Land Management, Miles City Field Office. MT

U.S. Department of the Interior Bureau of Land Management. 2010. Climate Change Supplementary Information Report for Montana, North Dakota, and South Dakota, Bureau of Land Management. October.

U.S Department of the Interior Bureau of Land Management, 2012. BLM LR2000, 2010, Authorized Leases/Leases Held by Production, June 18, 2013.

U.S Department of the Interior Bureau of Land Management, 2009. Instruction Memorandum No. MT-2009-039. 2009 Montana/Dakota's Special Status Species List.

U.S Department of the Interior Bureau of Land Management, Instruction Memorandum No. 2003-253, August 21, 2003.

U.S Department of the Interior Bureau of Land Management, 1988, North Dakota Resource Management Plan and Environmental Impact Statement, April 22, 1988.

U.S. Department of the Interior Bureau of Land Management, 2009, *Oil & Gas Reasonable Foreseeable Development (RFD) Scenario.* (2009). Retrieved from Bureau of Land Management Website : http://www.blm.gov/mt/st/en/fo/north_dakota_field/rmp/rfd.html.

U.S. Department of the Interior Bureau of Land Management,1987b, Riparian area management policy: national policy statement, January 22, 1987.

U.S. Department of the Interior Bureau of Land Management, June 2003, Record of Decision: Off-Highway Vehicle Environmental Impact Statement and Proposed Plan Amendment for Montana, North Dakota and South Dakota.

U.S. Department of the Interior Bureau of Land Management, 1992, Miles City District Oil and Gas RMP/EIS Amendment, December 1992.

U.S. Department of the Interior and United States Department of Agriculture. 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.

USDA, NRCS. 2010. The PLANTS Database (http://plants.usda.gov, 9 November 2010). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

U.S. Department of Mineral Management Service (MMS). 2008. Stacy Browne 2008.

USEPA. 2012a. AirData website. U.S. Environmental Protection Agency (USEPA). Accessed August 7, 2012. http://www.epa.gov/airdata/

USEPA. 2012b. The National Emissions Inventory (NEI), Version 2 updated April 10, 2012. U.S. Environmental Protection Agency (USEPA). Accessed August 7, 2012. http://www.epa.gov/ttn/chief/net/2008inventory.html

USEPA. 2012c. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2010. U.S. Environmental Protection Agency (USEPA). EPA 430-R-12-001. April 15. http://www.epa.gov/climatechange/ghgemissions/usinventoryreport.html

USEPA 2013a. AirData Website. U.S. Environmental Protection Agency (USEPA). Accessed August 6. http://www.epa.gov/airdata/ad_rep_aqi.html

U.S. Environmental Protection Agency (EPA). 2013b. The Social Cost of Carbon Website. (http://www.epa.gov/climatechange/EPAactivities/economics/scc.html). Accessed July 18, 2013.

U. S. Fish and Wildlife Service. 2010. Black-footed ferret website http://www.fws.gov/mountain-prairie/species/mammals/blackfootedferret/

U.S. Fish and Wildlife Service (USFWS) 2010. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC. FWS/OBS-79/31. http://www.fws.gov/wetlands/ USGS 2009. National Hydrography Dataset (NHD). http://nhd.usgs.gov/ accessed 11/2009.

U.S Fish and Wildlife Service (USFWS) 2010. Pallid Sturgeon species description and ESA status and review. http://www.fws.gov/mountain-prairie/missouririver/moriver_pallidsturgeon.htm

U.S. Fish and Wildlife Service. 1989. Black footed ferret survey guidelines for compliance with the Endangered Species Act. 15 pgs.

U.S. Fish and Wildlife Service. 2002. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Great Plains Breeding Population of the Piping Plover; Final Rule5 0 CFR Part 17. 57638 Federal Register / Vol. 67, No. 176. http://www.fws.gov/mountain-prairie/species/birds/pipingplover/.

U.S. Fish and Wildlife Service. 2010. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Sprague's Pipit as Endangered or Threatened throughout Its Range.

Walker, B. L., D, E. Naugle, K.E. Doherty. 2007. Greater Sage Grouse Population Response to Energy Development and Habitat Loss. Journal of Wildlife Management 71(8):2644-2654; 2007).

7.0 DEFINITIONS/ACRONYMS

IMPLAN: The IMPLAN Model is the most flexible, detailed and widely used input-output impact model system in the U.S. It provides users with the ability to define industries, economic relationships and projects to be analyzed. It can be customized for any county, region or state, and used to assess "multiplier effects" caused by increasing or decreasing spending in various parts of the economy. This can be used to assess the economic impacts of resource management decisions, facilities, industries, or changes in their level of activity in a given area. The current IMPLAN input-output database and model is maintained and sold by MIG, Inc. (Minnesota IMPLAN Group). The 2010 data set was used in this analysis.

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-TX	T. 130 N, R. 101 W, 5TH PM, ND SEC. 29 E2NE; BOWMAN COUNTY 80.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-TW	T. 141 N, R. 105 W, 5TH PM, ND SEC. 12 NW; GOLDEN VALLEY COUNTY 160.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-R7	T. 142 N, R. 105 W, 5TH PM, ND SEC. 29 NE; GOLDEN VALLEY COUNTY 160.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-QV	T. 147 N, R. 94 W, 5TH PM, ND SEC. 22 ACCR TO LOTS 2,3; DUNN COUNTY 20.27 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 79010-MR	T. 148 N, R. 95 W, 5TH PM, ND SEC. 30 FORMER LTL MO RVRBD RIPAR TO FORMER LOT 5 (4.40 AC); SEC. 31 FORMER LTL MO RVRBD RIPAR TO FORMER LOTS 1, 2,5-8 (40.28 AC); SEC. 32 FORMER LTL MO RVRBD RIPAR TO FORMER LOTS 4, 5,11 (13.45 AC); DUNN COUNTY 58.13 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 79010-AR	T. 148 N, R. 96 W, 5TH PM, ND SEC. 1 SENW; SEC. 24 NENE; DUNN COUNTY 80.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS	NONE
NDM 97300-M4	T. 151 N, R. 104 W, 5TH PM, ND SEC. 35 LOT 3; MCKENZIE COUNTY 10.75 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-36** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **BOR 17-1** (ALL BOR LANDS) **BOR 17-2** (ALL BOR LANDS	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-QW	T. 152 N, R. 91 W, 5TH PM, ND SEC. 32 POR S2NE (71.28 AC); SEC. 32 RR ROW IN NE (12.40 AC); SEC. 32 NENE,E2E2NWNE; MOUNTRAIL COUNTY 133.68 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-YC	T. 152 N, R. 93 W, 5TH PM, ND SEC. 13 RR ROW IN FORMER VILLAGE OF SANISH (4.85 AC); SEC. 13 STREETS, ALLEYS & SIDEWALKS IN FORMER VILLAGE OF SANISH (31.95 AC); SEC. 14 RR ROW IN FORMER VILLAGE OF SANISH (28.64 AC); SEC. 14 STREETS, ALLEYS & SIDEWALKS IN FORMER VILLAGE OF SANISH (86.74 AC); MOUNTRAIL COUNTY 152.18 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-YF	T. 152 N, R. 93 W, 5TH PM, ND SEC. 13 BLOCKS 1-4,23,24,51, 52,74,76-80; SEC. 14 BLOCKS 5-14,16,17,19, 20,29,30,35,36,40,71, 72,81; MOUNTRAIL COUNTY 53.05 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE
NDM 97300-YH	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 LOTS 1-17,19,20 BLK 15, LOTS 1-6,11 BLK 32, LOTS 1-6 BLK 33,LOTS 2-8,12-20 BLK 34,LOTS 1-7,10-12 BLK 37,LOTS 1-6,12 BLK 39,LOTS 1-14, 19,20 BLK 41,LOTS 2,4,8 BLK 42,LOTS 3-7 BLK 44, LOTS 5,6 BLK 59,LOTS 1-6 BLK 60,LOTS 1-3,9-20 BLK 61,LOTS 1-5,8 BLK 62, LOTS 3-6 BLK 65,LOTS 1-4, 6 BLK 66,LOTS 1-15 BLK 67,LOTS 1-6,8-12 BLK 68, LOTS 5-7 BLK 69,LOT 3 BLK 84; MOUNTRAIL COUNTY 26.98 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-YL	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 LOT 18 BLK 15,LOTS 7-10, 12 BLK 32,LOTS 7-12 BLK 33,LOT 1 BLK 34,LOTS 15-18 BLK 41,LOTS 1,3,5-7,9 BLK 42,LOTS 1,2,8,9 BLK 44,LOTS 1-3,7,8 BLK 59, LOTS 7-9 BLK 60,LOTS 4-6 BLK 61,LOTS 6,7,9-12 BLK 62,LOTS 1,2,4 BLK 64, LOTS 1,2 BLK 65,LOTS 5,7 BLK 66,LOTS 16,17 BLK 67,LOT 7 BLK 68,LOTS 1-4, 8-11 BLK 69,LOT 1 BLK 84; MOUNTRAIL COUNTY 10.95 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE
NDM 97300-YP	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 LOTS 1-6,9,10,12 BLK 18, LOTS 1-3,9,10,12 BLK 46, LOTS 2-6,9 BLK 47,LOTS 10-12 BLK 56,LOTS 9-12 BLK 58,LOTS 1,2,4 BLK 70, LOTS 1-3 BLK 82; MOUNTRAIL COUNTY 5.84 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-YQ	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 LOTS 7,8,11 BLK 18, LOTS 1,7,8,10-12 BLK 47, LOTS 4-6,9 BLK 56,LOTS 7-9,11,12 BLK 70,LOTS 4-6 BLK 82,LOTS 1-4 BLK 83; MOUNTRAIL COUNTY 4.38 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE
NDM 97300-YG	T. 152 N, R. 93 W, 5TH PM, ND SEC. 13 LOTS 1-9 BLK 21,LOTS 1-6, 10 BLK 22,LOTS 1-3 BLK 25, LOTS 1-6,8,11,12 BLK 26, LOTS 1,2,9,11 BLK 27,LOTS 2,11,12 BLK 28,LOTS 1-6, 8-12 BLK 48,LOTS 1,4-12 BLK 49,LOTS 7-12 BLK 50, LOTS 1-6,9-12 BLK 53,LOTS 8-10,12 BLK 54,LOTS 7,8 BLK 55,LOTS 3,7-12 BLK 73, LOTS 1,2,7-10 BLK 75; MOUNTRAIL COUNTY 14.56 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-YK	T. 152 N, R. 93 W, 5TH PM, ND SEC. 13 LOTS 10-12 BLK 21,LOTS 7-9,11,12 BLK 22,LOTS 4-6 BLK 25,LOTS 7,9,10 BLK 26, LOTS 3-8,10,12 BLK 27,LOTS 1,3-6,9,10 BLK 28,LOTS 2,3 BLK 49,LOTS 1-6 BLK 50, LOTS 7,8 BLK 53,LOTS 7,11 BLK 54,LOTS 1-6,9-12 BLK 55,LOTS 4-6 BLK 73,LOTS 3-6 BLK 75; MOUNTRAIL COUNTY 9.32 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE
NDM 97300-YJ	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 BLOCKS 31,43,63,85; MOUNTRAIL COUNTY 13.51 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-YM	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 POR LOTS 1-7 EXCL FORMER HWY BLK 38,POR LOTS 7,8 EXCL FORMER HWY BLK 39,E2 LOTS 7,9 BLK 45,POR LOTS 4-6 BLK 46, E2 LOT 4,W2 LOT 5 BLK 57,E2 LOT 5,POR LOTS 7,8 BLK 58; SEC. 14 LOTS 8-15 BLK 38,LOT 11 BLK 39,LOTS 1-6,10-12 BLK 45,LOTS 7,11 BLK 46,LOTS 1, 7,9-12 BLK 57,LOTS 1-3,6 BLK 58; MOUNTRAIL COUNTY 6.78 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE
NDM 97300-YN	T. 152 N, R. 93 W, 5TH PM, ND SEC. 14 FORMER HWY IN POR LOTS 1-7 BLK 38, FORMER HWY IN POR LOTS 7,8 BLK 39; SEC. 14 LOTS 9,10 BLK 39; MOUNTRAIL COUNTY **50% U.S. MINERAL INTEREST** 1.07 AC ACQ	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-MX	T. 152 N, R. 100 W, 5TH PM, ND SEC. 2 ACCR TO LOT 12 (28.80 AC); SEC. 3 ACCR TO LOT 7 (24.89 AC); SEC. 10 ACCR TO LOT 1 (12.71 AC); MCKENZIE COUNTY 66.40 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-TT	T. 152 N, R. 100 W, 5TH PM, ND SEC. 3 LOT 6; WILLIAMS COUNTY 17.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-WN	T. 152 N, R. 103 W, 5TH PM, ND SEC. 14 LOT 2; WILLIAMS COUNTY 13.00 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-TK	T. 152 N, R. 104 W, 5TH PM, ND SEC. 20 LOT 4; WILLIAMS COUNTY 8.10 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **NSO 11-40** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-ML	T. 152 N, R. 104 W, 5TH PM, ND SEC. 21 LOT 4; WILLIAMS COUNTY 11.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **NSO 11-40** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-MM	T. 152 N, R. 104 W, 5TH PM, ND SEC. 21 LOT 7; MCKENZIE COUNTY 17.50 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **NSO 11-40** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-QM	T. 153 N, R. 93 W, 5TH PM, ND SEC. 17 ACCR TO LOT 1 (1.44 AC); SEC. 17 POR LOT 1 (35.73 AC); SEC. 17 POR LOT 4 (2.55 AC); MOUNTRAIL COUNTY 39.72 AC ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-TE	T. 153 N, R. 93 W, 5TH PM, ND SEC. 20 LOTS 3-5; MOUNTRAIL COUNTY 93.40 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-TF	T. 153 N, R. 93 W, 5TH PM, ND SEC. 28 LOTS 5-8; SEC. 28 S2SW; MCKENZIE COUNTY 191.90 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-NJ	T. 153 N, R. 98 W, 5TH PM, ND SEC. 13 NWNE,N2NW; MCKENZIE COUNTY 120.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-TU	T. 153 N, R. 98 W, 5TH PM, ND SEC. 31 LOTS 1,4,6; SEC. 32 LOT 3; WILLIAMS COUNTY 84.89 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-QT	T. 153 N, R. 100 W, 5TH PM, ND SEC. 6 ACCR TO LOT 4; T. 154 N, R. 100 W, 5TH PM, ND SEC. 31 ACCR TO LOT 4; WILLIAMS COUNTY 24.00 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-YB	T. 153 N, R. 100 W, 5TH PM, ND SEC. 6 LOT 9; MCKENZIE COUNTY 20.70 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-LU	T. 153 N, R. 100 W, 5TH PM, ND SEC. 8 LOTS 2,3; MCKENZIE COUNTY 66.20 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-8** (ALL COE LANDS)	NONE
NDM 97300-TY	T. 153 N, R. 100 W, 5TH PM, ND SEC. 34 ACCR TO LOTS 2,3; MCKENZIE COUNTY 9.60 AC PD	**CR 16-1** (ALL LANDS) **CSU 12-5** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-NG	T. 153 N, R. 101 W, 5TH PM, ND SEC. 6 LOT 9; SEC. 7 LOT 2; WILLIAMS COUNTY 54.70 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-R9	T. 154 N, R. 101 W, 5TH PM, ND SEC. 35 LOTS 3-5; MCKENZIE COUNTY 73.20 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-3** (ALL LANDS) **NSO 11-33** (ALL LANDS) **NSO 11-39** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **COE 18-1** (ALL COE LANDS) **COE 18-2** (ALL COE LANDS) **COE 18-7** (ALL COE LANDS)	NONE
NDM 97300-TL	T. 158 N, R. 99 W, 5TH PM, ND SEC. 3 SE; WILLIAMS COUNTY 160.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-TM	T. 159 N, R. 101 W, 5TH PM, ND SEC. 18 S2NE,N2SE,SESE; WILLIAMS COUNTY 200.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** SEC. 18 NESE,SENE; **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-TN	T. 159 N, R. 101 W, 5TH PM, ND SEC. 24 NENE; WILLIAMS COUNTY 40.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE

APPENDIX A			
PARCEL NUMBER	**PARCEL DESCRIPTION**	**PROPOSED FOR LEASING ALTERNATIVE B**	**PROPOSED FOR DEFERRAL – NO LEASING**
NDM 97300-T3	T. 161 N, R. 100 W, 5TH PM, ND SEC. 4 LOTS 1,2; SEC. 4 S2NE; DIVIDE COUNTY 160.24 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **LN 14-15** (ALL LANDS) **NSO 11-33** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS) **TL 13-15** (ALL LANDS)	NONE
NDM 97300-YD	T. 163 N, R. 76 W, 5TH PM, ND SEC. 5 NESW; BOTTINEAU COUNTY 40.00 AC PD	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-YE	T. 163 N, R. 76 W, 5TH PM, ND SEC. 5 NWSE; BOTTINEAU COUNTY 40.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE
NDM 97300-TG	T. 163 N, R. 94 W, 5TH PM, ND SEC. 32 NE,E2NW,N2SW; BURKE COUNTY 320.00 AC **50% U.S. MINERAL INTEREST** ACQ	**CR 16-1** (ALL LANDS) **LN 14-2** (ALL LANDS) **LN 14-12** (ALL LANDS) **NSO 11-33** (ALL LANDS) **STANDARD 16-3** (ALL LANDS) **TES 16-2** (ALL LANDS)	NONE

APPENDIX B- Stipulations Key

Stipulation Number	Stipulation Name/Brief Description
Bureau of Land Management	
CR 16-1	**CULTURAL RESOURCES LEASE STIPULATION** This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O. 13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.
CSU 12-5	**CONTROLLED SURFACE USE STIPULATION** Surface occupancy or use is subject to the following special operating constraint: No disturbance of riparian areas of wetlands, intermittent, ephemeral, or perennial streams and rivers would be allowed except for essential road and utility crossings.
LN 14-2	**LEASE NOTICE** The Surface Management Agency is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures. This notice would be consistent with the present Montana State Office guidance for cultural resource protection related to oil and gas operations (NTL-MSO-85-1).
LN 14-3	**LEASE NOTICE** The lessee or operator shall immediately bring to the attention of the Surface Management Agency (SMA) any paleontological resources or any other objects of scientific interest discovered as a result of approved operations under this lease, and shall leave such discoveries intact and undisturbed until directed to proceed by the SMA.
LN 14-12	**LEASE NOTICE PALEONTOLOGICAL RESOURCE INVENTORY REQUIREMENT** This lease has been identified as being located within geologic units rated as being moderate to very high potential for containing significant paleontological resources. The locations meet the criteria for Class 3, 4 and/or 5 as set forth in the Potential Fossil Yield Classification System, WO IM 2008-009, Attachment 2-2. The BLM is responsible for assuring that the leased lands are examined to determine if paleontological resources are present and to specify mitigation measures. Guidance for application of this requirement can be found in WO IM 2008-009 dated October 15, 2007, and WO IM 2009-011 dated October 10, 2008. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or project proponent shall contact the BLM to determine if a paleontological resource inventory is required. If an inventory is required, the lessee or project proponent will complete the inventory subject to the following: • the project proponent must engage the services of a qualified paleontologist, acceptable to the BLM, to conduct the inventory. • the project proponent will, at a minimum, inventory a 10-acre area or larger to incorporate possible project relocation which may result from environmental or other resource considerations. • paleontological inventory may identify resources that may require mitigation to the satisfaction of the BLM as directed by WO IM 2009-011.
LN 14-15	**LEASE NOTICE SPRAGUE'S PIPIT** The lease area may contain habitat for the federal candidate Sprague's pipit. The operator may be required to implement specific measures to reduce impacts of oil and gas operations on Sprague's pipits, their habitat and overall population. Such measures would be developed during the application for permit

Stipulation Number	Stipulation Name/Brief Description
	to drill and environmental review processes, consistent with lease rights. If the U.S. Fish and Wildlife Service lists the Sprague's pipit as threatened or endangered under Endangered Species Act, the BLM would enter into formal consultation on proposed permits that may affect the Sprague's pipit and its habitat. Restrictions, modifications, or denial of permits could result from the consultation process.
NSO 11-33	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed within 200 feet of wetlands, lakes, and ponds.
NSO 11-36	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed in the floodplain of the Yellowstone River.
NSO 11-39	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed on lands within the floodplain of the Missouri River **.**
NSO 11-40	**NO SURFACE OCCUPANCY STIPULATION** No surface occupancy or use is allowed in a visible area within a 3.5 mile radius of the Fort Union Historic Site.
Standard 16-3	**STANDARD LEASE STIPULATION** **ESTHETICS**--To maintain esthetic values, all surface-disturbing activities, semipermanent and permanent facilities may require special design including location, painting and camouflage to blend with the natural surroundings and meet the intent of the visual quality objectives of the Federal Surface Managing Agency (SMA). **EROSION CONTROL**--Surface-disturbing activities may be prohibited during muddy and/or wet soil periods. **CONTROLLED OR LIMITED SURFACE USE STIPULATION** --This stipulation may be modified, consistent with land use documents, when specifically approved in writing by the Bureau of Land Management (BLM) with concurrence of the SMA. Distances and/or time periods may be made less restrictive depending on the actual onground conditions. The prospective lessee should contact the SMA for more specific locations and information regarding the restrictive nature of this stipulation. The lessee/operator is given notice that the lands within this lease may include special areas and that such areas may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Possible special areas are identified below. Any surface use or occupancy within such special areas will be strictly controlled, or **if absolutely necessary**, excluded. Use or occupancy will be restricted only when the BLM and/or the SMA demonstrates the restriction necessary for the protection of such special areas and existing or planned uses. Appropriate modifications to imposed restrictions will be made for the maintenance and operations of producing oil and gas wells. After the SMA has been advised of specific proposed surface use or occupancy on the leased lands, and on request of the lessee/operator, the Agency will furnish further data on any special areas which may include: • 100 feet from the edge of the rights-of-way from highways, designated county roads and appropriate federally-owned or controlled roads and recreation trails. • 500 feet, or when necessary, within the 25-year flood plain from reservoirs, lakes, and ponds and intermittent, ephemeral or small perennial streams: 1,000 feet, or when necessary, within the 100-year flood plain from larger perennial streams, rivers, and domestic water supplies. • 500 feet from grouse strutting grounds. Special care to avoid nesting areas associated with strutting grounds will be necessary during the period from March 1, to June 30. One-fourth mile from identified essential habitat of state and federal sensitive species. Crucial wildlife winter ranges during the period from December 1 to May 15, and in elk calving areas during the period from May 1 to June 30. • 300 feet from occupied buildings, developed recreational areas, undeveloped recreational areas receiving concentrated public use and sites eligible for or designated as National Register sites.

Stipulation Number	Stipulation Name/Brief Description
	• Seasonal road closures, roads for special uses, specified roads during heavy traffic periods and on areas having restrictive off-road vehicle designations. • On slopes over 30 percent or 20 percent on extremely erodible or slumping soils. **APPLICATIONS FOR PERMIT TO DRILL (APDs)**--The appropriate BLM field offices are responsible for the receipt, processing, and approval of APDs. The APDs are to be submitted by oil and gas operators pursuant to the requirements found in Onshore Oil and Gas Order No. 1 -- Approval of Operations on Onshore Federal and Indian Oil and Gas Leases (Circular No. 2538). Additional requirements for the conduct of oil and gas operations can be found in the Code of Federal Regulations Title 43, Part 3160. Copies of Onshore Oil and Gas Order No. 1, and pertinent regulations, can be obtained from the BLM field offices in which the operations are proposed. Early coordination with these offices on proposals is encouraged. **CULTURAL AND PALEONTOLOGICAL RESOURCES**--The SMA is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the SMA, shall: • Contact the appropriate SMA to determine if a site-specific cultural resource inventory is required. If an inventory is required, then: • Engage the services of a cultural resource specialist acceptable to the SMA to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the area of proposed disturbance to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the SMA for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted. • Implement mitigation measures required by the SMA. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as testing salvage and recordation. Where impacts to cultural resources cannot be mitigated to the satisfaction of the SMA, surface occupancy on that area must be prohibited. The operator shall immediately bring to the attention of the SMA any cultural or paleontological resources discovered as a result of approved operations under this lease, and not disturb such discoveries until directed to proceed by the SMA. **ENDANGERED OR THREATENED SPECIES**--The SMA is responsible for assuring that the leased land is examined prior to undertaking any surface-disturbing activities to determine effects upon any plant or animal species, listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species Act of 1973 by detrimentally affecting endangered or threatened species or their habitats. The lessee/operator may, unless notified by the authorized officer of the SMA that the examination is not necessary, conduct the examination on the leased lands at his discretion and cost. This examination must be done by or under the supervision of a qualified resources specialist approved by the SMA. An acceptable report must be provided to the SMA identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.
TES 16-2	**ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION** The lease area may now or hereafter contain plants, animals or their habitats determined to be threatened, endangered or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to proposed or listed threatened or endangered species or designated or proposed critical habitat. The BLM will not approve

Stipulation Number	Stipulation Name/Brief Description
	any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligation under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.
TL 13-15	**TIMING LIMITATION STIPULATION** No seismic exploration is allowed within 500 feet of waterfowl nesting habitat from March 1 through July 1 to protect nesting waterfowl. This stipulation does not apply to operation and maintenance of production facilities.
Bureau of Reclamation	
BOR 17-1	**BUREAU OF RECLAMATION** – Agency lease stipulations.
BOR 17-2	**BUREAU OF RECLAMATION** – Agency lease stipulations.
Corps of Engineers	
COE 18-1	**CORPS OF ENGINEERS** - Agency lease stipulations.
COE 18-2	**CORPS OF ENGINEERS** - Agency lease stipulations.
COE 18-7	**CORPS OF ENGINEERS** - Agency lease stipulations.
COE 18-8	**CORPS OF ENGINEERS** - Agency lease stipulations.

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Land Management
5001 Southgate Drive
Billings, Montana 59101-4669

OIL AND GAS LEASE STIPULATIONS

ESTHETICS--To maintain esthetic values, all surface-disturbing activities, semipermanent and permanent facilities may require special design including location, painting and camouflage to blend with the natural surroundings and meet the intent of the visual quality objectives of the Federal Surface Managing Agency (SMA).

EROSION CONTROL--Surface-disturbing activities may be prohibited during muddy and/or wet soil periods.

CONTROLLED OR LIMITED SURFACE USE STIPULATION --This stipulation may be modified, consistent with land use documents, when specifically approved in writing by the Bureau of Land Management (BLM) with concurrence of the SMA. Distances and/or time periods may be made less restrictive depending on the actual on-ground conditions. The prospective lessee should contact the SMA for more specific locations and information regarding the restrictive nature of this stipulation.

The lessee/operator is given notice that the lands within this lease may include special areas and that such areas may contain special values, may be needed for special purposes, or may require special attention to prevent damage to surface and/or other resources. Possible special areas are identified below. Any surface use or occupancy within such special areas will be strictly controlled, or **if absolutely necessary**, excluded. Use or occupancy will be restricted only when the BLM and/or the SMA demonstrates the restriction necessary for the protection of such special areas and existing or planned uses. Appropriate modifications to imposed restrictions will be made for the maintenance and operations of producing oil and gas wells.

After the SMA has been advised of specific proposed surface use or occupancy on the leased lands, and on request of the lessee/operator, the Agency will furnish further data on any special areas which may include:

100 feet from the edge of the rights-of-way from highways, designated county roads and appropriate federally-owned or controlled roads and recreation trails.

500 feet, or when necessary, within the 25-year flood plain from reservoirs, lakes, and ponds and intermittent, ephemeral or small perennial streams: 1,000 feet, or when necessary, within the 100-year flood plain from larger perennial streams, rivers, and domestic water supplies.

500 feet from grouse strutting grounds. Special care to avoid nesting areas associated with strutting grounds will be necessary during the period from March 1, to June 30. One-fourth mile from identified essential habitat of state and federal sensitive species. Crucial wildlife winter ranges during the period from December 1 to May 15, and in elk calving areas during the period from May 1 to June 30.

300 feet from occupied buildings, developed recreational areas, undeveloped recreational areas receiving concentrated public use and sites eligible for or designated as National Register sites.

Seasonal road closures, roads for special uses, specified roads during heavy traffic periods and on areas having restrictive off-road vehicle designations.

On slopes over 30 percent or 20 percent on extremely erodable or slumping soils.

See Notice on Back

NOTICE

APPLICATIONS FOR PERMIT TO DRILL (APDs)--The appropriate BLM field offices are responsible for the receipt, processing, and approval of APDs. The APDs are to be submitted by oil and gas operators pursuant to the requirements found in Onshore Oil and Gas Order No. 1 -- Approval of Operations on Onshore Federal and Indian Oil and Gas Leases (Circular No. 2538). Additional requirements for the conduct of oil and gas operations can be found in the Code of Federal Regulations Title 43, Part 3160. Copies of Onshore Oil and Gas Order No. 1, and pertinent regulations, can be obtained from the BLM field offices in which the operations are proposed. Early coordination with these offices on proposals is encouraged.

CULTURAL AND PALEONTOLOGICAL RESOURCES--The SMA is responsible for assuring that the leased lands are examined to determine if cultural resources are present and to specify mitigation measures. Prior to undertaking any surface-disturbing activities on the lands covered by this lease, the lessee or operator, unless notified to the contrary by the SMA, shall:

1. Contact the appropriate SMA to determine if a site-specific cultural resource inventory is required. If an inventory is required, then:

2. Engage the services of a cultural resource specialist acceptable to the SMA to conduct a cultural resource inventory of the area of proposed surface disturbance. The operator may elect to inventory an area larger than the area of proposed disturbance to cover possible site relocation which may result from environmental or other considerations. An acceptable inventory report is to be submitted to the SMA for review and approval no later than that time when an otherwise complete application for approval of drilling or subsequent surface-disturbing operation is submitted.

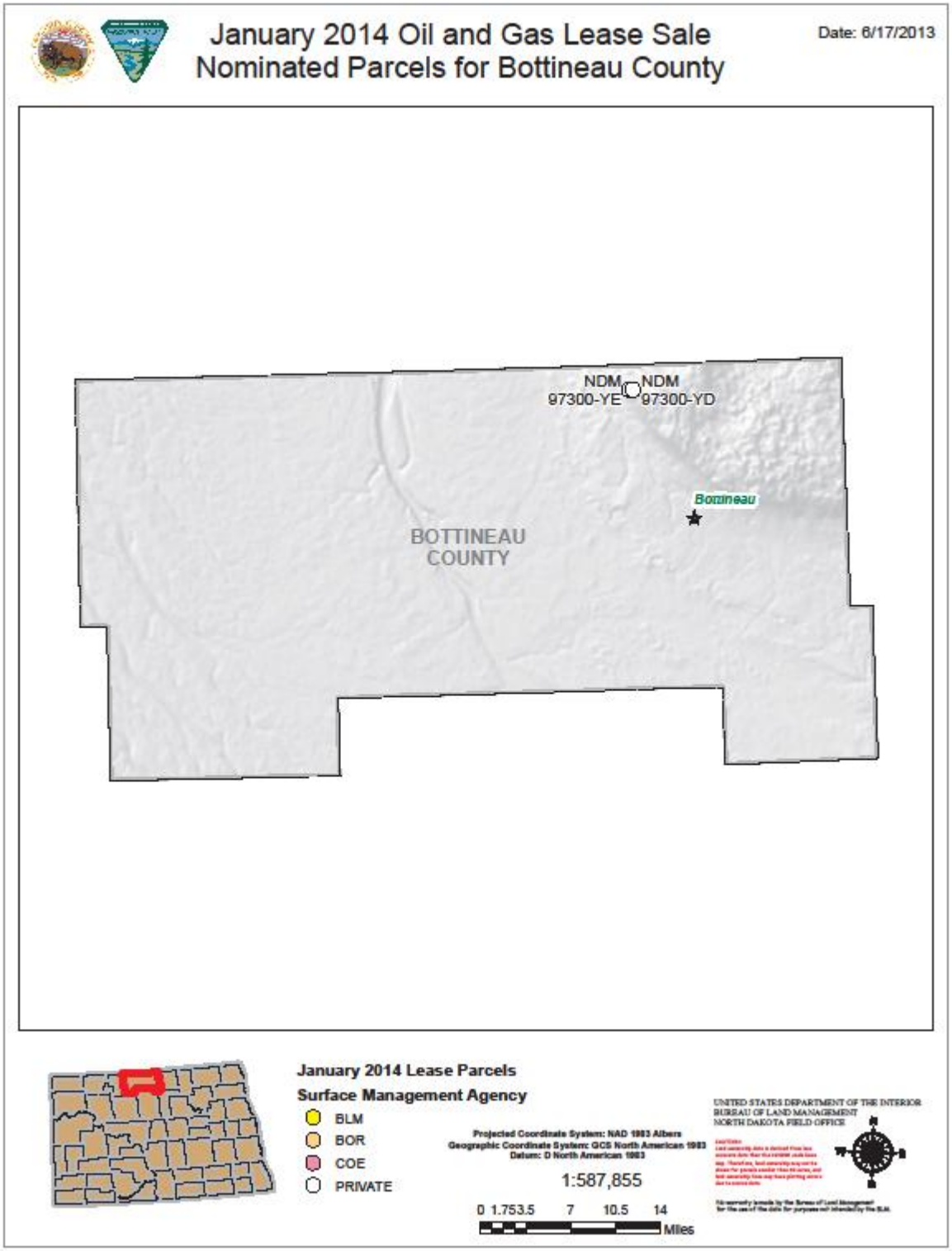
3. Implement mitigation measures required by the SMA. Mitigation may include the relocation of proposed lease-related activities or other protective measures such as testing salvage and recordation. Where impacts to cultural resources cannot be mitigated to the satisfaction of the SMA, surface occupancy on that area must be prohibited.

The operator shall immediately bring to the attention of the SMA any cultural or paleontological resources discovered as a result of approved operations under this lease, and not disturb such discoveries until directed to proceed by the SMA.

ENDANGERED OR THREATENED SPECIES--The SMA is responsible for assuring that the leased land is examined prior to undertaking any surface-disturbing activities to determine effects upon any plant or animal species, listed or proposed for listing as endangered or threatened, or their habitats. The findings of this examination may result in some restrictions to the operator's plans or even disallow use and occupancy that would be in violation of the Endangered Species Act of 1973 by detrimentally affecting endangered or threatened species or their habitats. The lessee/operator may, unless notified by the authorized officer of the SMA that the examination is not necessary, conduct the examination on the leased lands at his discretion and cost. This examination must be done by or under the supervision of a qualified resources specialist approved by the SMA. An acceptable report must be provided to the SMA identifying the anticipated effects of a proposed action on endangered or threatened species or their habitats.

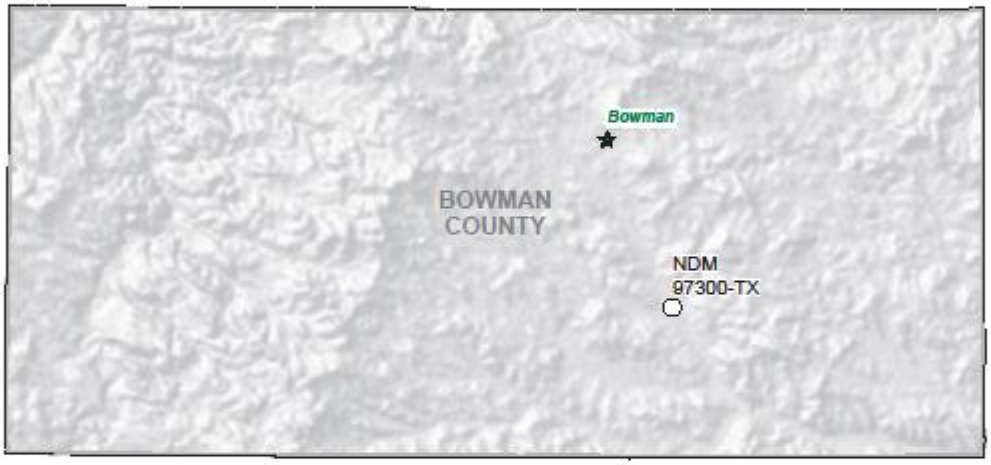
Standard 16-3

Appendix C—Parcel Maps by County



January 2014 Oil and Gas Lease Sale
Nominated Parcels for Bowman County

Date: 6/17/2013



January 2014 Lease Parcels

Surface Management Agency

PRIVATE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:470,922

0 1.252.5 5 7.5 10 Miles

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE

January 2014 Oil and Gas Lease Sale
Nominated Parcels for Burke County

Date: 6/17/2013

January 2014 Lease Parcels

Surface Management Agency

PRIVATE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

1:394,480

0 1 2 4 6 8 Miles

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE

January 2014 Oil and Gas Lease Sale
Nominated Parcels for Divide County

Date: 6/17/2013

January 2014 Lease Parcels

Surface Management Agency

PRIVATE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

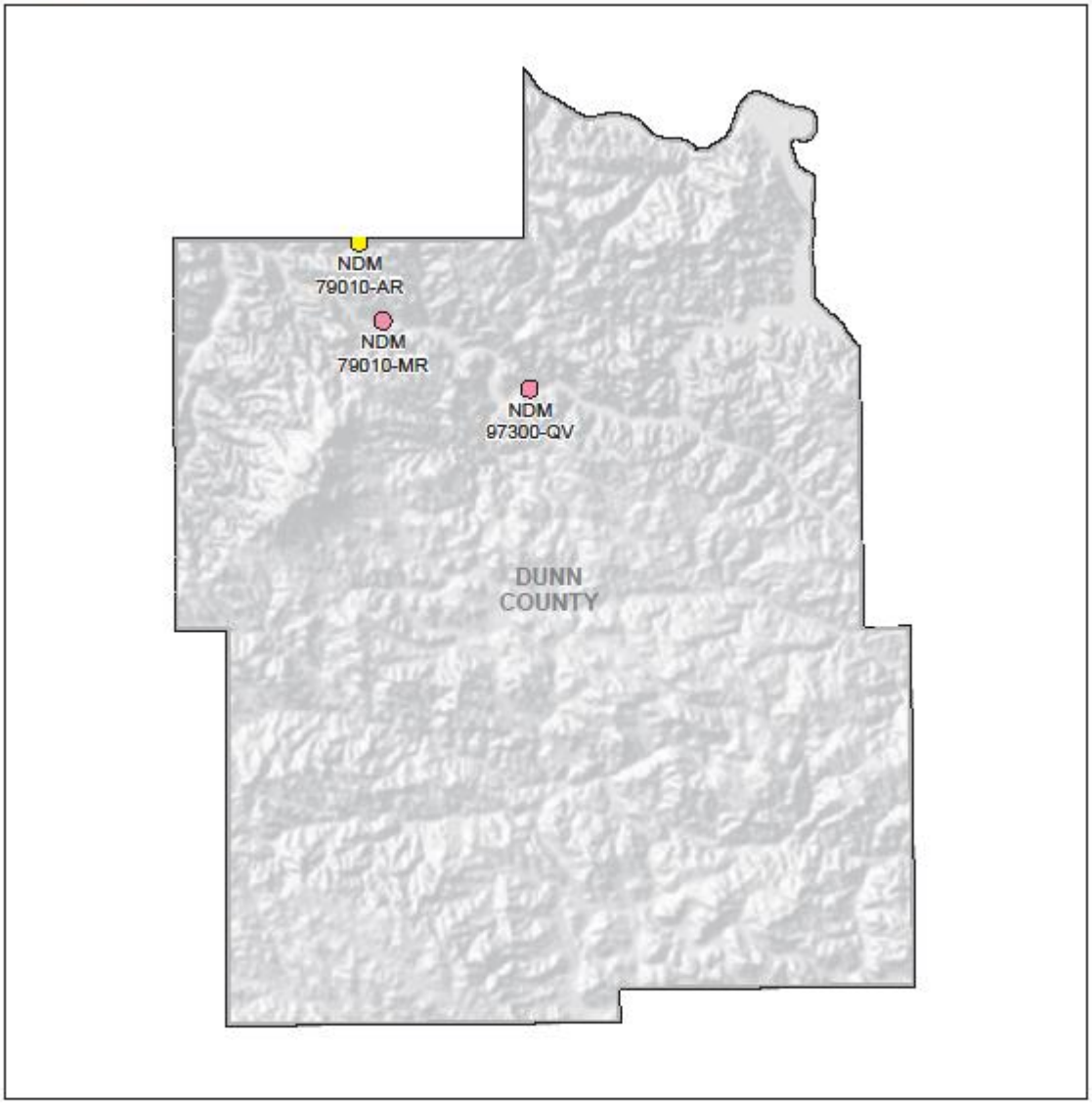
1:496,767

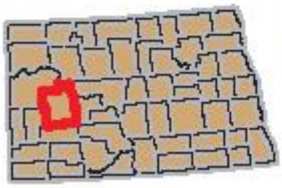
0 1.252.5 5 7.5 10
Miles

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE

January 2014 Oil and Gas Lease Sale
Nominated Parcels for Dunn County

Date: 6/17/2013





January 2014 Lease Parcels

Surface Management Agency

- BLM
- COE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

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0 1.5 3 6 9 12 Miles

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE

January 2014 Oil and Gas Lease Sale
Nominated Parcels for Golden Valley County

Date: 6/17/2013

January 2014 Lease Parcels

Surface Management Agency

PRIVATE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

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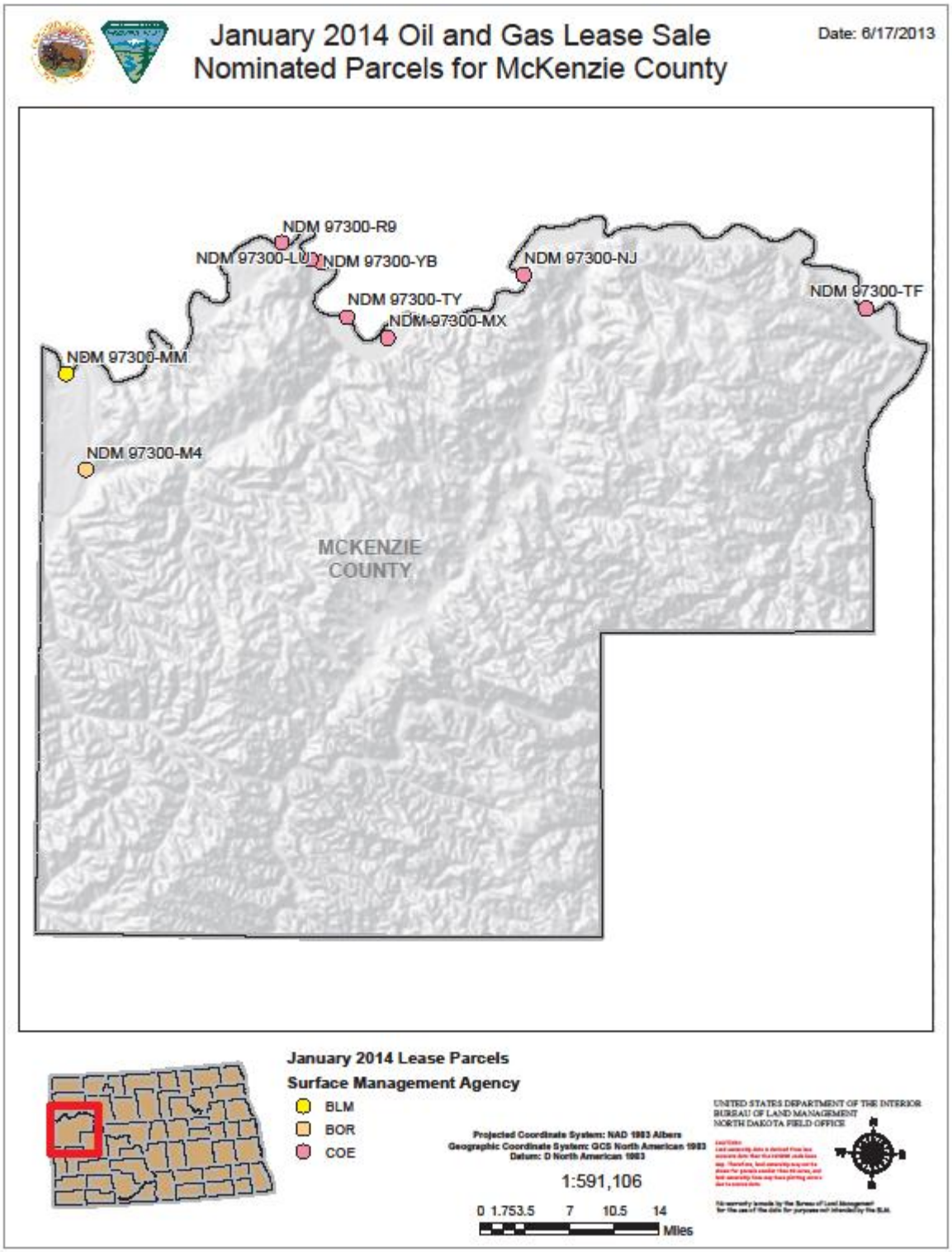
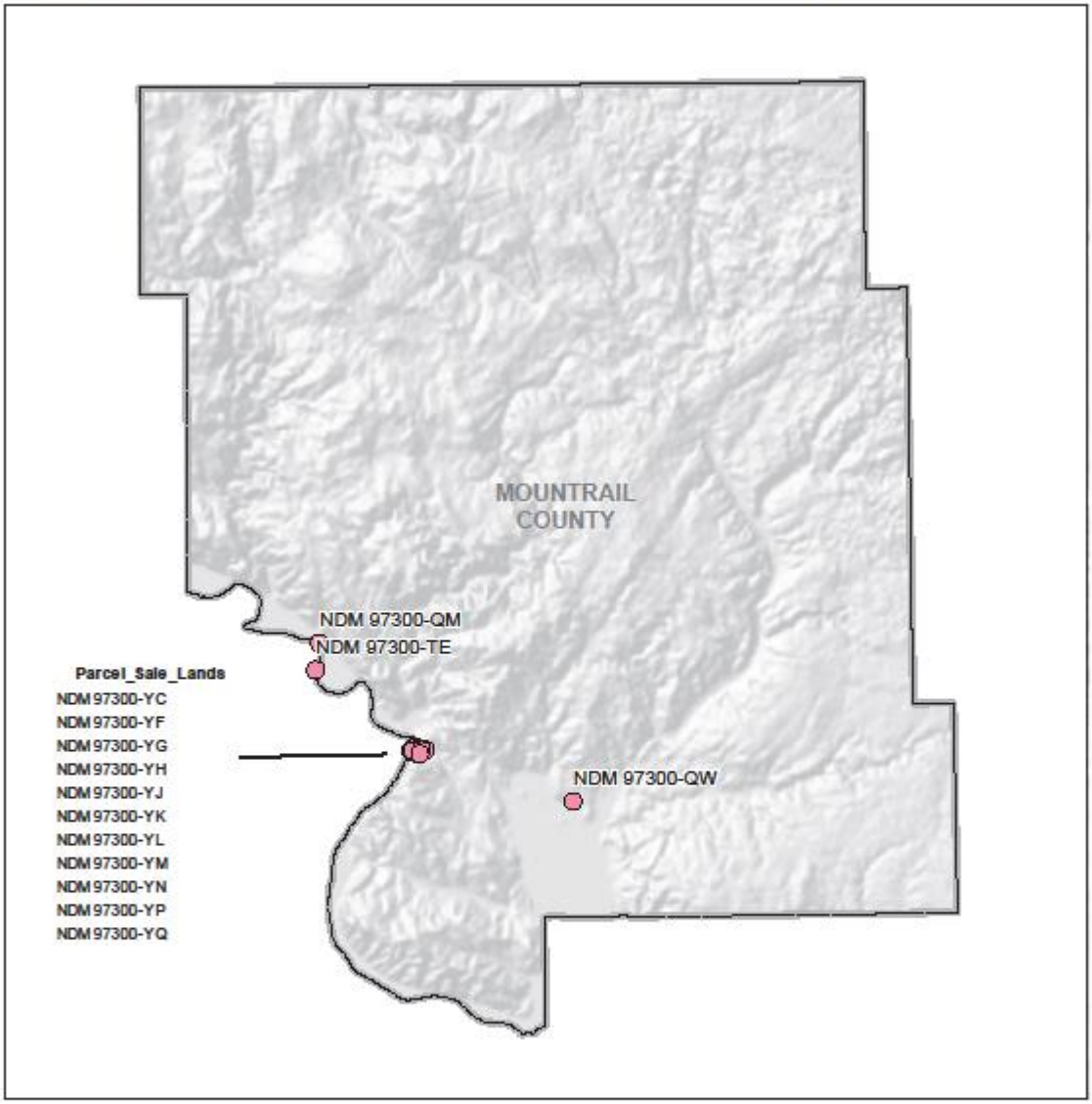
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE


January 2014 Oil and Gas Lease Sale
Nominated Parcels for McKenzie County
Date: 6/17/2013
NDM 97300-R9
NDM 97300-LU
NDM 97300-YB
NDM 97300-NJ
NDM 97300-TY
NDM 97300-MX
NDM 97300-TF
NDM 97300-MM
NDM 97300-M4
MCKENZIE COUNTY
January 2014 Lease Parcels
Surface Management Agency
BLM
BOR
COE
Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983
1:591,106
0 1.753.5 7 10.5 14
Miles
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE

January 2014 Oil and Gas Lease Sale
Nominated Parcels for Mountrail County

Date: 6/17/2013



January 2014 Lease Parcels

Surface Management Agency

COE

Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983

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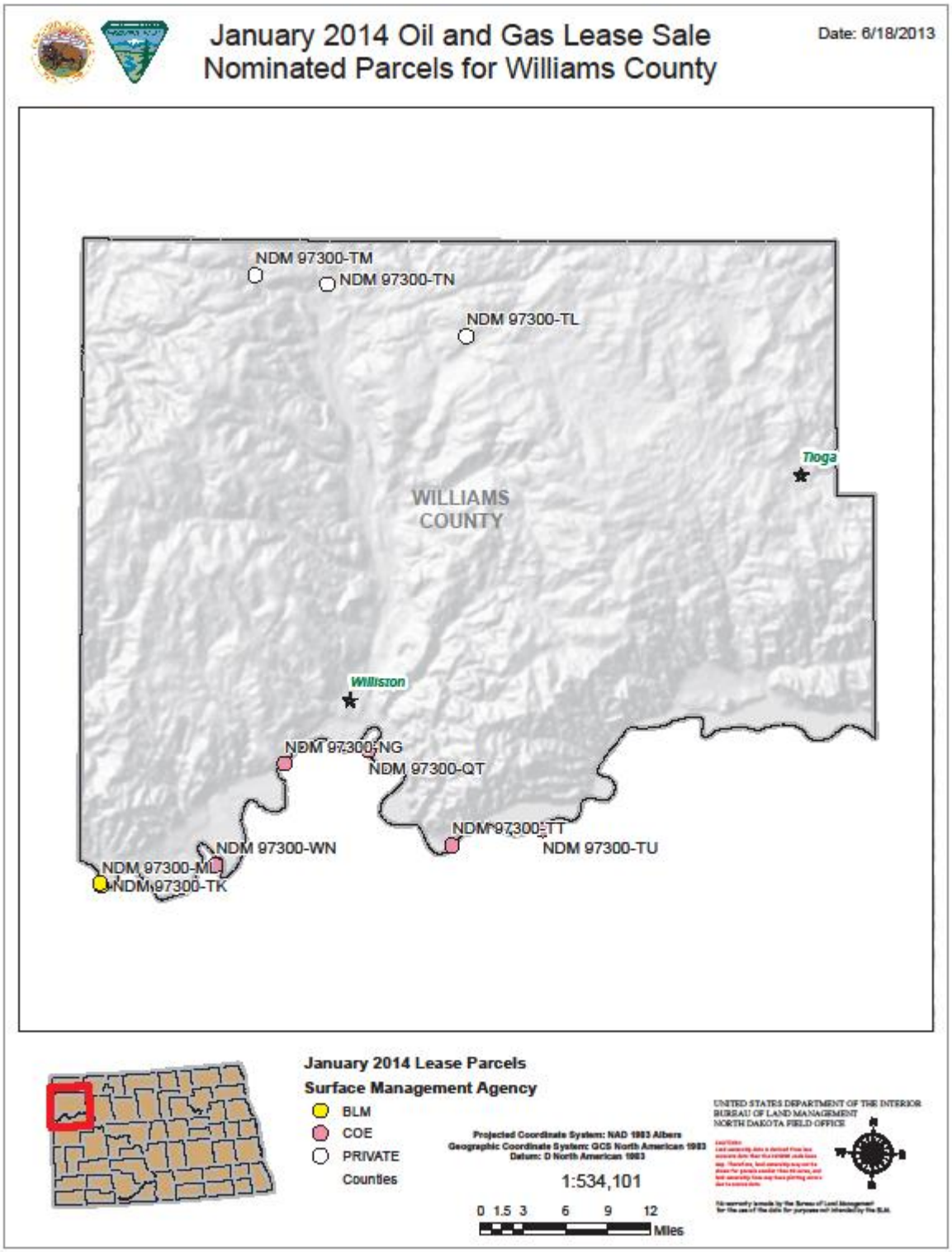
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE


January 2014 Oil and Gas Lease Sale
Nominated Parcels for Williams County
Date: 6/18/2013
NDM 97300-TM
NDM 97300-TN
NDM 97300-TL
Tioga
WILLIAMS COUNTY
Williston
NDM 97300-NG
NDM 97300-QT
NDM 97300-TT
NDM 97300-TU
NDM 97300-WN
NDM 97300-ML
NDM 97300-TK
January 2014 Lease Parcels
Surface Management Agency
BLM
COE
PRIVATE
Counties
Projected Coordinate System: NAD 1983 Albers
Geographic Coordinate System: GCS North American 1983
Datum: D North American 1983
1:534,101
0 1.5 3 6 9 12
Miles
UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
NORTH DAKOTA FIELD OFFICE