

United States Department of the Interior
Bureau of Land Management
Las Cruces District Office
1800 Marquess Street
Las Cruces, NM 88005

Draft

Environmental Assessment for
January 2014 COMPETITIVE OIL AND GAS LEASE SALE
Otero County, New Mexico
DOI-BLM-NM-L000-2013-0113-EA

Signature and Title of Project Lead

Date

Signature of Planning & Environmental Coordinator

Date



**DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT OFFICE**

Project: January 2014 Competitive Oil and Gas Lease Sale

EA Log Number: DOI-BLM-NM-L000-2013-0113-EA

Location: Otero County, New Mexico

Finding of No Significant Impact

Based on the analysis of potential environmental impacts contained in the attached Environmental Assessment (EA), I have determined the Preferred Alternative is not expected to have significant impacts on the environment.

The impacts of leasing the fluid minerals estate in the areas described within this EA have been previously analyzed in the White Sands RMP (1986), as amended and the lease stipulations that accompany the tracts proposed for leasing would mitigate the impacts of future development on these tracts. Therefore, preparation of an Environmental Impact Statement (EIS) is not warranted.

Prepared by:

_____ Date: _____

Joseph Navarro, Environmental Protection Specialist

Reviewed by:

_____ Date: _____

Bill Childress
District Manager, Las Cruces District Office

Approved by:

_____ Date: _____

Jesse Juen
State Director, New Mexico

**BUREAU OF LAND MANAGEMENT
LAS CRUCES DISTRICT OFFICE**

**ENVIRONMENTAL ASSESSMENT FOR
January 2014 COMPETITIVE OIL AND GAS LEASE SALE
DOI-BLM-NM-L000-2013-0113-EA**

1 INTRODUCTION

It is the policy of the Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920, as amended [30 U.S.C. 181 *et seq.*] and the Federal Land Policy and Management Act of 1976 (FLPMA) as amended, to make mineral resources available for disposal and to manage for multiple resources which include the development of mineral resources to meet national, regional and local needs.

The BLM New Mexico State Office (NMSO) conducts a competitive quarterly lease sale to offer available oil and gas lease parcels in New Mexico, Oklahoma, Texas, and Kansas. A Notice of Competitive Lease Sale (NCLS), which lists lease parcels to be offered, is published by the NMSO at least 90 days before the auction is held. Lease stipulations applicable to each parcel are specified in the Sale Notice. The decision as to what public land and minerals are open for leasing and what leasing stipulations may be necessary, based on information available at the time, is made during the land use planning process. Surface management of non-BLM administered land overlaying Federal minerals is determined by BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale the NMSO sends a draft parcel list to any Field Offices in which parcels are located. Field Office staff then review legal descriptions of the parcels to determine if they are in areas open to leasing; if appropriate stipulations have been included; if new information has become available which might change any analysis conducted during the planning process; if appropriate consultations have been conducted; what appropriate stipulations should be included; and if there are special resource conditions of which potential bidders should be made aware. The parcels nominated for this sale, and the appropriate stipulations from the RMP, are posted online for a two week public scoping period. Comments received are reviewed and incorporated into the Environmental Assessment (EA).

Once the draft parcel review is completed and returned to the NMSO, a list of available lease parcels and stipulations is made available to the public through the NCLS. On rare occasions, additional information obtained after the publication of the NCLS may result in deferral of certain parcels prior to the day of the lease sale.

This EA documents the Las Cruces District Office (LCDO) review of the 27 parcels nominated for the January 2014 Competitive Oil and Gas Lease Sale that are under the administration of the LCDO. It serves to verify conformance with the approved land use plan and provides the rationale for deferring or dropping parcels from a lease sale as well as providing rationale for attaching additional lease stipulations to specific parcels.

The act of leasing does not authorize any development or use of the surface of lease land without further application and approval by the BLM.

The BLM may receive future Applications for Permit to Drill (APDs) for those parcels that are leased. When those APDs are received, additional site-specific NEPA analysis will be conducted.

The parcels and applicable stipulations were posted online for a two-week public scoping period beginning on July 22, 2013. No public comments were received. In addition, this EA will be made available for public review and comment for 30 days beginning on August 26th, 2013 and ending on September 24th, 2013.

1.1 Purpose and Need

The purpose is to consider opportunities for private individuals or companies to explore for and develop oil and gas resources on public land through a competitive leasing process.

The need of the action is established by the BLM's responsibility under the Mineral Leasing Act of 1920 (MLA), as amended, to promote the exploration and development of oil and gas on the public domain. The MLA also establishes that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under the rules and regulations prescribed by the Secretary of the Interior, where consistent with the FLPMA, the National Environmental Policy Act (NEPA) of 1969, as amended (Public Law 91-90, 42 USC 4321 iet seq.), and other applicable laws, regulations, and policies.

The BLM will decide whether or not to lease these nominated parcels and, if so, under what terms and conditions.

1.2 Conformance with Applicable Land Use Plan and Other Environmental Assessments

The applicable land use plan for this action is the 1986 White Sands Resource Management Plan (RMP) Oil & Gas Leasing pp.18-27. The RMP designated approximately 1,729,292 acres of Federal minerals open for continued oil and gas development and leasing under Standard Terms and Conditions. The RMP also describes specific stipulations that would be attached to new leases offered in certain areas. Therefore, it is determined that the alternatives considered conform to fluid mineral leasing decisions in the 1986 White Sands RMP consistent with the goals and objectives for natural and cultural resources.

Pursuant to 40 Code of Federal Regulations (CFR) 1508.28 and 1502.21, this EA is tiered to and incorporates by reference the information and analysis contained in the 1986 White Sands Resource Management Plan (RMP) and Final Environmental Impact Statement. The Final Resource Management Plan was approved by the Record of Decision (ROD) signed October 1986.

The 1986 White Sands RMP is currently being revised by what has been named the TriCounty RMP. The Draft RMP/EIS for the TriCounty RMP was published on April 12, 2013. While the TriCounty Draft RMP/EIS is a comprehensive planning document for most all resources, decisions relating to oil and gas leasing are not currently included in the document. In 2005, the BLM completed an RMP Amendment for fluid mineral leasing and development in Sierra and Otero Counties. The BLM intended to carry the management decisions in that plan amendment into the TriCounty RMP for these two counties. However, the District Court decision *New Mexico v. BLM*, 565 F.3d 683 (10th Cir. 2009) and *New Mexico ex rel. Richardson v. BLM*, 459 F. Supp. 2d 1102 (D.N.M. 2006) set aside the RMP Amendment (RAMPA) nullifying the decisions in the RMPA plan. Consequently, management of oil and gas leasing reverted back to the decisions made in the White Sands RMP. These decisions will be incorporated into the TriCounty RMP/EIS through an RMP amendment, to be initiated after signature of the Record of Decision. At this point, because no fluid minerals decisions exist in the current TriCounty Draft

RMP/EIS, the 1986 White Sands RMP is still the applicable land use plan, and decisions made under that plan are properly applied to the parcels nominated in this lease sale.

FLPMA established guidelines to provide for the management, protection, development, and enhancement of public land (Public Law 94-579). Section 103(e) of FLPMA defines public land as any land and interest in land owned by the United States. For split-estate land where the mineral estate is an interest owned by the United States, the BLM has no authority over use of the surface by the surface owner; however, the BLM is required to declare how the federal mineral estate will be managed in the RMP, including identification of all appropriate lease stipulations. (43 CFR 3101.1 and 43 CFR 1601.0-7(b); BLM Manual Handbook 1601.09 and 1624-1).

1.3 Federal, State or Local Permits, Licenses or Other Consultation Requirements

Purchasers of oil and gas leases are required to comply with all applicable Federal, state, and local laws and regulations including obtaining all necessary permits required should lease development occur.

Potential for effects to threatened and endangered (T&E) species of oil and gas lease sales were analyzed at the Land Use Plan level in the 1986 White Sands Resource Management Plan (WSRMP). Stipulations would be assigned to any parcels leased that would require consultation with the United States Fish and Wildlife Service should potential impacts to Federally listed Threatened or Endangered Species be identified at the Application for Permit to Drill phase. The result of such a consultation could result in restrictions to the temporal or spatial aspects of lease development.

Compliance with the provisions of the 2009 Paleontological Resources Protection Act (PRPA; Public Law 111-011) requires that the Department of the Interior consider the potential impacts of development plans on significant fossil resources and allow for the implementation of mitigation measures where necessary. Initial compliance is an internal process where the potential for significant paleontological resources present are established by a review of the Potential Fossil Yield Classification System (PFYC) for the Area of Potential Effects (APE). Numerical ranking of the associated geological formations under the PFYC system in terms of fossil potential dictates the direction of additional compliance measures. These may range from a determination of no effect to the requirement that a paleontological survey be conducted by appropriate specialists and that further action adheres to any subsequent recommendations.

Compliance with Section 106 responsibilities of the National Historic Preservation Act are adhered to by following the Protocol Agreement between New Mexico Bureau of Land Management and New Mexico State Historic Preservation Officer (Protocol Agreement), which is authorized by the National Programmatic Agreement between BLM, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers, and other applicable BLM handbooks.

Native American consultation is conducted by certified mail regarding each lease sale activity. If Traditional Cultural Properties (TCP) or heritage-related issues are identified, such parcels are withheld from the sale while letters requesting information, comments, or concerns are sent to the Native American representative. If the same draft parcels appear in a future sale, a second request for information is sent to the same recipients and the parcels will be held back again. If no response to the second letter is received, the parcels are allowed to be offered in the next sale. If responses are received, BLM cultural resources staff will discuss the information or issues of concern with the Native American representative to determine if all or portions of a parcel need to be withdrawn from the sale, or if special stipulations need to be attached as lease stipulations. In Section 1835 of the Energy Policy Act of 2005 (43 U.S.C. 15801), Congress directed the Secretary of the Interior to review current policies and practices with respect to management of federal subsurface oil and gas development activities and their effects on the privately owned surface. The Split Estate Report, submitted in December 2006, documents the findings resulting

from consultation on the split estate issue with affected private surface owners, the oil and gas industry, and other interested parties.

In 2007, the Legislature of the State of New Mexico passed the Surface Owners Protection Act. This Act requires operators to provide the surface owner at least five business days notice prior to initial entry upon the land for activities that do not disturb the surface; and provide at least 30 days notice prior to conducting actual oil and gas operations. At the New Mexico Federal Competitive Oil and Gas Lease Sale conducted on October 17, 2007, the BLM announced the implementation of this policy. Included in this policy is the implementation of a Notice to Lessees (NTL), a requirement of lessees and operators of onshore federal oil and gas leases within the State of New Mexico to provide the BLM with the names and addresses of the surface owners of land where the Federal Government is not the surface owner, not including lands where another federal agency manages the surface.

The BLM NMSO office would then contact the surface owners and notify them of the expression of interest and the date the oil and gas rights would be offered for competitive bidding. The BLM would provide the surface owners with its website address so they may obtain additional information related to the oil and gas leasing process, the imposition of any stipulations on that lease parcel, federal and state regulations, and best management practices. The surface owners may elect to protest the leasing of the minerals underlying their surface.

If the BLM receives a protest, the parcel would remain on the lease sale; however, the BLM would resolve any protest prior to issuing an oil and gas lease for that parcel. If the protest is upheld, the BLM would return the payments received from the successful bidder for that parcel. After the lease sale has occurred, the BLM would post the results on its website and the surface owner may access the website to learn the results of the lease sale.

1.4 Identification of Issues

An internal review of the Proposed Action was conducted by an interdisciplinary team of the LCDO resource specialists beginning on July 8th to identify and consider potentially affected resources and associated issues.

The parcels included in the proposed Action along with the appropriate stipulations from the RMP were posted online at: http://www.blm.gov/nm/st/en/prog/energy/oil_and_gas/oil_and_gas_lease.html for a two week public scoping period beginning July 22nd through August 5th, 2013. Based on these aforementioned efforts, the following issues have been determined relevant to the analysis of this action so far:

- Would native fish and riparian systems be impacted by surface disturbance and drilling activities?
- Would Wildlife and Wildlife Habitat be impacted by leasing certain parcels?
- Would Special Status Plant and Animal Species be impacted by leasing certain parcels?
- Would relevance and importance criteria in the proposed Sacramento Mountains North Areas of Critical Environmental Concern (included in the Draft Tri-County Resource Management Plan) be affected by oil and gas development?
- How would Cultural Resources throughout the nominated parcels be best managed?
- Would existing BMPs be suitable for protecting Sensitive and Fragile soil of the Tularosa watershed?
- Would parcel leasing lead to impacts to a municipal water supply?

- Would lease parcels with high potential for Paleontological Resources be impacted? Would oil and gas development on leased parcels impact visual contrast in areas designated Visual Resource Management Class II?
- How would ranching operations be impacted by oil and gas development?
- Would Oil and gas leasing lead to the introduction and propagation of noxious weeds and other invasive, non-native species?
- Would Oil and Gas leasing disproportionately impact minority or low income populations?
- Would Air Resources be impacted by leasing and subsequent oil and gas development?
- What are the potential impacts from hydraulic fracturing associated with oil and gas operations?
- Would any leased areas have an impact on land with wilderness characteristics?

Several issues were considered during project scoping but dismissed from detailed analysis because there would be no potentially significant effects related to the issues resulting from any of the alternatives presented below. The following elements are determined by an interdisciplinary team of resource specialists, following their on-site visit and review of the RMP and other data sources, to not be present: Prime or Unique Farmlands, and Wild Horses and Burros.

2 DESCRIPTION OF PROPOSED ACTIONS AND ALTERNATIVES

2.1 Alternative A - No Action

The BLM NEPA Handbook (H-1790-1) states that 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 an expression of interest to lease (parcel nomination) would be denied or rejected, and the parcels would not be offered for lease during the January 2014 Competitive Oil and Gas Lease Sale. Surface management and any ongoing oil and gas development on surrounding Federal, private, and state leases would continue under current guidelines and practices. Selection of the no action alternative would not preclude these parcels from being nominated and considered in a future lease sale.

2.3 Alternative B – Proposed Action

The Proposed Action is to lease the 27 parcels of Federal minerals nominated by the public (Figures 2, and 3), covering approximately 31,743 acres administered by the LCDO, for oil and gas exploration and development. Standard terms and conditions as well as stipulations listed in the RMP would apply. A complete description of these parcels, including any stipulations, is provided in Section 2.4.

All development activities proposed under the authority of these leases within the 27 parcels would be subject to compliance with Section 106 of the National Historic Preservation Act (NHPA) and Executive Order 13007.

Once sold, the lease purchaser has the exclusive right to use so much of the leased land 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). Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or gas is produced in paying quantities. If a lease holder 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, exclusive right to develop the leasehold reverts back to the federal government and the lease can be reoffered in another lease sale.

Drilling of wells on a lease would not be permitted until the lease owner or operator meets the site specific requirements specified in 43 CFR 3162.

Future potential development could include the use of hydraulic fracturing (HF) in the development of the wells.

2.4 Alternative C - Preferred Alternative

The Preferred Alternative is developed in response to the circumstances within these 27 lease parcels where further evaluation of specific issues is necessary before the BLM can assure an adequately informed decision can be made. Under this alternative, the BLM would offer for lease 23 of the original 27 nominated parcels with stipulations of Federal minerals covering 27,779.43 acres and recommend the remaining acres not be made available for leasing at this time. Four parcels are recommended for deferral due to additional resource concerns (i.e., Lands with Wilderness Characteristics surveys required and proposed ACEC designations in the Tri County RMP. In addition, two of the original parcels have been split; portions of these parcels will be deferred because they fall within a proposed ACEC designation; portions outside of the proposed ACEC designation will be offered for lease.

Parcel numbers, locations, stipulations and acreages for the recommended 23 leasable parcels are listed below. Lease stipulations (as required by Title 43 Code of Federal Registration 3101.3) would be added to the 23 parcels to address site specific concerns (See Appendix 1 for a summary of the lease stipulations).

Once sold, the lease purchaser has the exclusive right to use so much of the leased land as is necessary to explore and drill for all of the oil and gas within the lease boundaries, subject to the stipulations attached to the lease (Title 43 Code of Federal Registration 3101.1-2).

Oil and gas leases are issued for a 10-year period and continue for as long thereafter as oil or 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; exclusive right to develop the lease reverts back to the federal government and the lease can be reoffered in another lease sale. Drilling of wells on a lease is not permitted until the lease owner or operator secures approval of a drilling permit and a surface-use plan specified under Onshore Oil and Gas Orders listed in Title 43 Code of Federal Registration 3162. A permit to drill would not be authorized until site-specific NEPA analysis is conducted.

All development activities proposed under the authority of these leases within the 27 parcels are subject to compliance with Section 106 of the NHPA and Executive Order 13007. Standard terms and conditions, stipulations listed in the RMP, and any new stipulations developed through the parcel review and analysis process to address site specific concerns or new information not identified in the land use planning process would apply as appropriate to each lease. In addition, site specific mitigation measures and Best Management Practices (BMPs) identified in the BLM Gold Book, revised 2007 may be attached as Conditions of Approval (COAs) for each proposed exploration and development activity authorized on a lease.

Two new stipulations are being identified; refer to Appendix 2.

The first new pending CSU stipulation is to protect resources with fragile and erodible soil and slopes over 30% within areas that contain these characteristics. This stipulation would be applied to parcels 002, 003, 004, 006, 007, 008, 009, 010, 011, 012, 013, 014, 015, 016, 017, 022, 024, 025, 026, 027 and 028.

The second stipulation will be developed to protect paleontological resources. The stipulation will restrict vehicles to existing roads and trails, as well as require a pedestrian survey prior to any surface disturbing activity. This stipulation would be applied to parcels 003, 004, 006, 007, 008, 009, 010, 012, 013, 014, 015, 016, 017, 018, 019, 020, 021, 022, 023, 024, 025, 026, 027 and 028.

Table 1 is an overview of the acreages to be leased under Alternative B (Proposed Action) and Alternative C (Preferred Alternative).

Table 1. Lease sale parcels and parcels recommended for lease under the proposed action and preferred alternative

JANUARY 2014 LEASE SALE PARCELS - PROPOSED ACTION AND PREFERRED ALTERNATIVE			
Parcels	TOTAL ACRES	Alternative B – Proposed Action	Alternative C – Preferred Alternative
NMNM201401-002	1440.00	Propose for Lease	Propose for Lease
NMNM201401-003	2013.650	Propose for Lease	Propose for Lease
NMNM201401-004	1920.00	Propose for Lease	Propose for Lease
NMNM201401-005	442.880	Propose for Lease	Defer 442.880 acres
NMNM201401-006	2532.560	Propose for Lease	Propose for Lease
NMNM201401-007	2094.49	Propose for Lease	Propose for Lease
NMNM201401-008	320	Propose for Lease	Propose for Lease
NMNM201401-009	160	Propose for Lease	Propose for Lease
NMNM201401-010	2080	Propose for Lease	Propose for Lease
NMNM201401-011	1360	Propose for Lease	Propose for Lease
NMNM201401-012	1920	Propose for Lease	Propose for Lease
NMNM201401-013	360	Propose for Lease	Propose for Lease
NMNM201401-014	600	Propose for Lease	Propose for Lease
NMNM201401-015	2372.290	Propose for Lease	Propose for Lease
NMNM201401-016	1064.620	Propose for Lease	Propose for Lease
NMNM201401-017	40	Propose for Lease	Propose for Lease
NMNM201401-018	440	Propose for Lease	Defer 440 acres
NMNM201401-019	1985.040	Propose for Lease	Defer 1985.040 acres
NMNM201401-020	95.640	Propose for Lease	Defer 95.640 acres
NMNM201401-021	494.080	Propose for Lease	Propose for Lease
NMNM201401-022	626.300	Propose for Lease	Propose for Lease
NMNM201401-023	507.040	Propose for Lease	Propose for Lease
NMNM201401-024	2280	Propose for Lease	Defer 640 acres; Propose 1640 acres for

			Lease
NMNM201401-025	1156.820	Propose for Lease	Propose for Lease
NMNM201401-026	640	Propose for Lease	Defer 360 acres; Propose 280 acres for Lease
NMNM201401-027	1429.320	Propose for Lease	Propose for Lease
NMNM201401-028	1368.200	Propose for Lease	Propose for Lease
TOTAL	31,742.93	31,742.93	27,779.43

Hydraulic Fracturing of wells on BLM Lands

At the leasing stage, it is not known for certain if applications for permit to drill on leased parcels will be received, nor is it known whether any wells that are permitted will be hydraulically fractured. However, it is possible that this may occur on leased parcels.

Hydraulic fracturing 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 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 hydraulic fracturing 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. Because the fluid is composed mostly of water, large volumes of water are usually needed to perform hydraulic fracturing. However, in some cases, water is recycled or produced water is used.

To ensure that hydraulic fracturing 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, a BLM New Mexico geologist identifies all potential subsurface formations that would 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.

During drilling, the BLM is on location during the casing and cementing of the ground water protective surface casing and other critical casing and cementing intervals. Before hydraulic fracturing takes place, 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 would always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

Parcels recommended for leasing under the Preferred Alternative with stipulations are presented below.

Table 2. Proposed Parcels w/ Stipulations for the January 2014 Lease Sale recommended for Leasing -Total-27,779.43 Acres

Parcel	Stipulations	Acres
<p><u>NM-201401-002</u> T.0130S, R.0100E, NMPM, NM Sec. 013 ALL 014 N2NW, S2N2,S2; 024 NE, E2NW</p>	<p>LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation LCDO-CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)</p>	1440.00
<p><u>NM-201401-003</u> T.0130S, R.0100E, NMPM, NM Sec. 029 ALL 030 LOTS 1-12;E2 031 LOTS 1-12;E2</p>	<p>LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO- CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)</p>	2013.65
<p><u>NM-201401-004</u> T.0130S, R.0100E, NMPM, NM Sec. 033 ALL 034 ALL 035 ALL</p>	<p>LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO-CSU-: Presence of Sensitive & Fragile Soil/Slope (Pending) LC-52-CSU Riparian Zones, Streams & Springs</p>	1920.00
<p><u>NM-201401-006</u> T.0140S, R.0100E, NMPM, NM Sec. 003 LOTS 1-4; 003 S2N2, S2; 004 LOTS 1-4;</p>	<p>LC-7 NSO Recreational Opportunities (only applies to a portion of the lease) LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice</p>	2532.56

Parcel	Stipulations	Acres
004 S2N2, S2; 009 ALL; 010 N2, N2S2,S2SW,SWSE;	WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources LCDO- CSU-Stipulation: Presence of Sensitive & Fragile Soil/Slope (Pending) LC-52-CSU Riparian Zones, Streams & Springs	
<u>NM-201401-007</u> T.0140S, R.0100E, NMPM, NM Sec. 005 LOTS 1-4; 005 S2N2, S2; 006 LOTS 1-7; 006 S2NE, SENW, E2SW. SE; 008 ALL; 017 NE;	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO- CSU Presence of Sensitive & Fragile Soil/Slope (Pending)	2094.49
<u>NM-201401-008</u> T.0140S, R.0100E, NMPM, NM Sec. 011 W2NENWN2SW;	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO-CSU: Presence of Sensitive & Fragile Soil/Slope (Pending) LC-52-CSU Riparian Zones, Streams & Springs	320.00
<u>NM-201401-009</u> T.0140S, R.0100E, NMPM, NM Sec. 012 SENES2SWNWSE;	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO- CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	160.00
<u>NM-201401-010</u> T.0140S, R.0100E, NMPM, NM Sec. 13, N2NWS2 Sec. 14, NENES2NEW2SWSESWSWSE Sec. 23; ALL Sec. 24; ALL	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	2080.00
<u>NM-201401-011</u> T.0140S, R.0100E, NMPM, NM Sec. 015 N2NW,SWNWSE; 016 SENE2SWSE; 021 SE; 022 ALL	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	1360.00
<u>NM-201401-012</u> T.0140S, R.0100E, NMPM, NM Sec. 025 026 035	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources	1920.00

Parcel	Stipulations	Acres
	LC-52-CSU Riparian Zones, Streams & Springs LCDO-CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	
<u>NM-201401-013</u> T.0140S, R.0100E, NMPM, NM Sec. 027 N2N2,SWNW; 028 N2NE,SENEENW	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-2-NSO Monitoring Plot (only applies to a portion of the lease) LC-54 LN-Lease Notice LCDO-CSU-Stipulation: Presence of Sensitive & Fragile Soil/Slope (Pending)	360.00
<u>NM-201401-014</u> T.0140S, R.0100E, NMPM, NM Sec. 34,E2,NWNWE2W2W2SW	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs Pending LCDO-CSU-Stipulation: Presence of Sensitive & Fragile Soil/Slope (Pending)	600.00
<u>NM-201401-015</u> T.0150S, R.0100E, NMPM, NM Sec. 001; Sec 11; Sec.14;N2NE,W2,SWSE Sec. 15.	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO- CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	2372.29. 00
<u>NM-201401-016</u> T.0130S, R.0110E, NMPM, NM Sec. 017 ; W2 018 lots 1 thru 12	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LCDO-CSU-Stipulation: Presence of Sensitive & Fragile Soil/Slope (Pending)	1064.62
<u>NM-201401-017</u> T.0130S, R.0110E, NMPM, NM Sec. 027. NENW	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO-CSU-Stipulation: Presence of Sensitive & Fragile Soil/Slope (Pending)	40.00
<u>NM-201401-021</u> T.0140S, R.0110E, NMPM, NM Sec. 6. SESWW2SESESE Sec. 7, Lots 7 thru 11, NE	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO-	494.08.

Parcel	Stipulations	Acres
	CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	
<u>NM-201401-022</u> T.0140S, R.0110E, NMPM, NM Sec. 17, E2NE,SWNE,SW Sec. 18. Lots 7,8, 10 thru 12, NE	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO- CSU-Stipulation: Presence of Sensitive & Fragile Soil/Slope (Pending)	626.30.
<u>NM-201401-023</u> T.0140S, R.0110E, NMPM, NM Sec. 019. Lots 1 thru 11, W2NE, NWSE	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO- CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	507.04
<u>NM-201401-024</u> T.0140S, R.0110E, NMPM, NM Sec. 020, S2NE,SENW,S2 Sec. 021, E2,NENW, SWNW,SW; Sec. 29	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	1640.00
<u>NM-201401-025</u> T.0140S, R.0110E, NMPM, NM Sec. 030, lots 6,7, and 12, E2 Sec. 31, lots 1,2,4 thru 12, E2	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	1156.82
<u>NM-201401-026</u> T.0140S, R.0110E, NMPM, NM Sec. 033, SW,E2SE, and the SESE	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	280.00
<u>NM-201401-027</u> T.0150S, R.0110E, NMPM, NM Sec. 5; Sec.6	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	1430.32
<u>NM-201401-028</u> T.0150S, R.0110E, NMPM, NM	LC-14 CSU Threatened & Endangered Species Habitat LC-48 TCP Traditional Cultural Properties	1368.21

Parcel	Stipulations	Acres
Sec. 7, lots 13 thru 24 Sec. 18, lots 13 thru 24 W2,NE,SENESE	NM-11-LN Cultural Resource Lease Notice WO-ESA-7 Endangered Species Act Consultation NMSO-CSU-Paleontological Resources (Pending) LC-52-CSU Riparian Zones, Streams & Springs LCDO CSU: Presence of Sensitive & Fragile Soil/Slope (Pending)	

3 AFFECTED ENVIRONMENT

This section describes the environment that could be affected by implementation of each of the alternatives described in Chapter 2.

The offered lease parcels are located in Otero County, New Mexico. Otero County encompasses nearly 4.3 million acres of which 89% is in public ownership and Tribal land. The BLM manages 22% of the surface and 36% of the mineral estate in Otero County. The lease parcels are along the Tularosa Watershed and the Tularosa Basin. The Tularosa Watershed drains the Sacramento Mountains to the west, emptying into the closed Tularosa Basin and the small agricultural village of Tularosa. Desert grasslands, Chihuahuan Desert Scrub, and Piñon-Juniper Savanna are the primary vegetation communities. The lease parcels are found on the basin floor, approximately 4,000 feet in elevation, as well as the flank of the Sacramento Mountain Range, up to approximately 6,000 feet in elevation.

3.1 Air Resources

Air quality and climate are components of air resources which may be affected by BLM applications, activities, and resource management. Therefore, the BLM must consider and analyze the potential effects of BLM and BLM-authorized activities on air resources as part of the planning and decision making process. Much of the information referenced in this section is incorporated from the Air Resources Technical Report for BLM Oil and Gas Development in New Mexico, Kansas, Oklahoma, and Texas (herein referred to as Air Resources Technical Report, BLM DOI 2013). This document summarizes the technical information related to air resources and climate change associated with oil and gas development.

3.1.1 Air Quality

The Clean Air Act (CAA) is the primary authority for regulation and protection of air quality in the United States. The Federal Land Policy and Management Act (FLPMA) also charges BLM with the responsibility to protect air and atmospheric values.

The Air Resources Technical Report describes the types of data used for description of the existing conditions of criteria pollutants (USDI BLM 2013), how the criteria pollutants are related to the activities involved in oil and gas development (USDI BLM 2013), and provides a table of current National and state standards. EPA's Green Book web page (EPA, 2010a) reports that Otero County, where all the proposed leases are located, is in attainment of all National Ambient Air Quality Standards (NAAQS) as defined by the Clean Air Act. The area is also in attainment of all state air quality standards (NMAAQs). There are currently no air quality monitors in Otero County which reflects the fact that there are few

major sources of air pollutants. The closest monitor is in Las Cruces, approximately 70 miles west of Tularosa.

Regional air quality is influenced by a combination of factors including climate, meteorology and the magnitude and spatial distribution of local and regional air pollution sources and chemical properties of emitted pollutants. Within the lower atmosphere, regional and local scale air masses interact with regional topography to influence atmospheric dispersion and transport of pollutants.

Current Pollution Concentrations

There is no monitoring conducted for lead, sulfur dioxide and carbon monoxide in the region; however concentrations of these pollutants are expected to be low in rural areas and are therefore not monitored. There is no data for the 1-hour nitrogen dioxide NAAQS due to incomplete data collection.

“Design Concentrations” are the concentrations of air pollution at a specific monitoring site that can be compared to the NAAQS. The 2011 design concentrations of criteria pollutants are listed below.

Table 3. 2011 Design Concentrations of Criteria Pollutants in Las Cruces, NM (EPA, 2012)

Pollutant	Design Concentration	Averaging Period	NAAQS	NMAAQS
PM _{2.5}	11.9 µg/m ³	Annual	12.0 µg/m ^{3,1}	
PM _{2.5}	38 µg/m ³	24-hour	35 µg/m ^{3,2}	
PM ₁₀	11 exceedances	24-hour	150 µg/m ^{3,3}	
O ₃	0.069 ppm	8-hour	0.075 ppm ⁴	
NO ₂	8 ppb	Annual	53 ppb ⁵	50 ppb
NO ₂	Not Available	1-hour	100 ppb ⁶	

¹ Annual mean, averaged over 3 years

² 98th percentile, averaged over 3 years

³ Not to be exceeded more than once per year on average over 3 years

⁴ Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years

⁵ Annual Mean

⁶ 98th percentile, averaged over 3 years

Air quality in a given region can be measured by its Air Quality Index value. The air quality index (AQI) is reported according to a 500-point scale for each of the major criteria air pollutants, with the worst denominator determining the ranking. For example, if an area has a CO value of 132 on a given day and all other pollutants are below 50, the AQI for that day would be 132. The AQI scale breaks down into six categories: good (AQI<50), moderate (50-100), unhealthy for sensitive groups (100-150), unhealthy (>150), very unhealthy and hazardous. The AQI is a national index, the air quality rating and the associated level of health concern is the same everywhere in the country. The AQI is an important

indicator for populations sensitive to air quality changes.

Mean AQI values for the region were generally (60% of days) in the moderate range (AQI between 50 and 100) in 2011. Thirty-one percent of days were classified as “good”. During 2011, 19 days were classified as “unhealthy for sensitive groups”, 6 days were classified as “unhealthy” and 7 days were classified as “very unhealthy”. The median AQI was 58 (moderate) and the maximum AQI was 786 (very unhealthy).

Although the AQI in the region has reached the level considered unhealthy and very unhealthy several times in the last decade, there are no patterns or trends to the occurrences (EPA, 2013**Error! Reference source not found.**).

Table 4. Number of Days classified as “unhealthy” or “very unhealthy” in Doña Ana County (AQI >150) (EPA, 2012)

2002	2003	2004	2005	2006	2007	2008	2009	2010
2	8	7	1	10	3	12	1	5

3.1.2 Hazardous Air Pollutants

The Air Resources Technical Report discusses the relevance of hazardous air pollutants (HAPs) to oil and gas development and the particular HAPs that are regulated in relation to these activities (USDI BLM 2013). The EPA conducts a periodic National Air Toxics Assessment (NATA) that quantifies HAP emissions by county in the U.S. The purpose of the NATA is to identify areas where HAP emissions result in high health risks and further emissions reduction strategies are necessary. A review of the results of the 2005 NATA shows that cancer, neurological and respiratory risks in Otero County are well below statewide and national levels (EPA, 2011a).

3.1.3 Climate

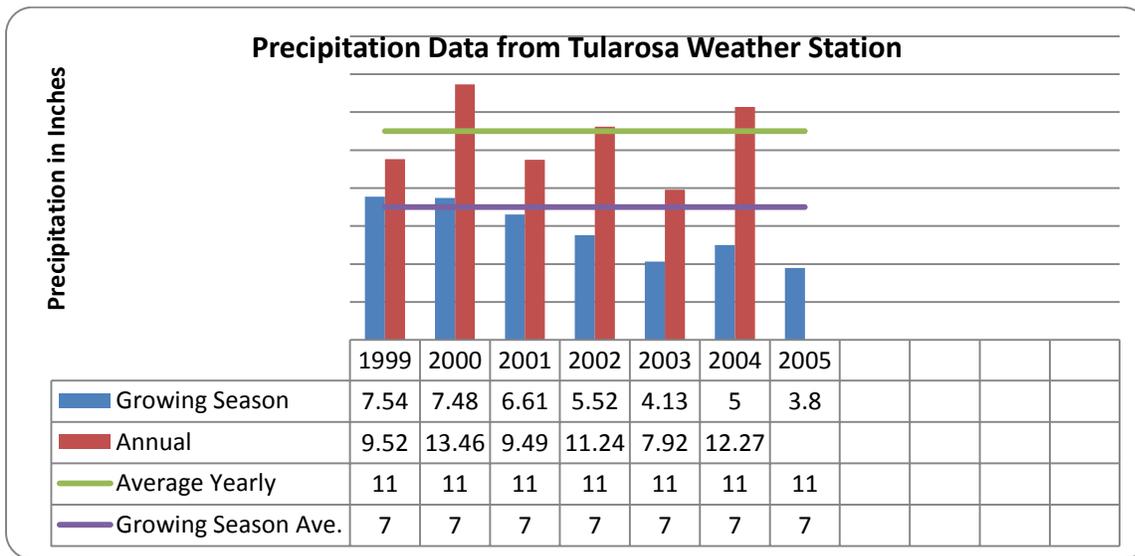
The project area has a climate that is arid to semi-arid continental. Average annual precipitation ranges from 8 to 11 inches in the basin and from 12 to 18 inches at the higher elevations. The main source of moisture in the rainy season is moist air from over the Gulf of Mexico in the general circulation about the Bermuda high pressure area, which shifts westward in the summer. Summer monsoon moisture also occurs as a result of northeasterly movement of moist air from the La Niña current off the west coast of Mexico. When the El Niño current prevails in the Pacific Ocean off the west coast of Mexico, monsoonal moisture from both the Pacific and Atlantic oceans is limited. Mountains east of the area receive more precipitation than the basin, somewhat reducing the amount that reaches the Tularosa Basin. About 60 percent of the annual precipitation falls from July to October, most from brief, but sometimes heavy, thunderstorms. There is an average of 45 thunderstorms a year. Prolonged rainy periods are practically unknown, and most of the area is arid. The main source of moisture in the winter is eastward-moving storms over the Pacific Ocean. Much of the moisture in these storms is lost over the mountains west of New Mexico, and winter and spring average one-half inch of rain per month. Precipitation varies greatly from year to year and month to month.

Snow may fall from November through March. Total annual snowfall ranges from 3 to 5 inches in the basin and from 12 to 25 inches at higher elevations. Snow seldom stays on the ground more than a day in the basin. Mean annual temperature ranges from 58 to 62 degrees. Most days from mid-May to mid-September have a temperature of 90 degrees or higher. The average number of days with freezing temperatures range from 80 to 100 per year, mostly between mid-November and mid-March. The freeze free period averages 7 months, from early April to early November (Figure 1).

Table 5. 1981-2010 Climate Normals for Tularosa

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Precip (inches)	0.55	0.56	0.37	0.34	0.52	0.78	1.81	2.11	1.63	1.22	0.65	0.98
Min. Temp. (F)	29.2	33.3	38.1	44.9	53.5	61.5	65.0	63.9	57.8	47.5	36.4	29.2
Avg. Temp. (F)	42.8	47.4	53.2	60.9	69.4	77.5	79.2	77.4	71.8	61.8	37.9	50.4
Max. Temp. (F)	56.4	61.5	68.3	76.9	85.4	93.5	93.4	91.0	85.7	76.1	54.5	64.3

Figure 1. Precipitation Data from NOAA Tularosa Weather Station



The Air Resources Technical Report summarizes information about greenhouse gas emissions from oil and gas development and their effects on national and global climate conditions. While it is difficult to determine the spatial and temporal variability and change of climatic conditions; what is known is that increasing concentrations of GHGs are likely to accelerate the rate of climate change.

3.2 Areas of Critical Environmental Concern

Parcels 18 and 19, are located within the proposed Sacramento Mountain ACEC currently being considered under the TriCounty Draft RMP/EIS. The proposed Sacramento Mountains ACECs met the relevance and importance criteria to be nominated an ACEC. The proposed ACEC would be designated and managed, in part for the protection of Federally Threatened or Endangered species, other Special Status species and ecological resources

3.3 Paleontology

An internal base-line assessment was conducted to address the potential for significant paleontological resources to be affected by proposed lease sale developments. This assessment was derived through the application of the Potential Fossil Yield Classification system (PFYC) which provides for the numerical ranking of geological formations in a map overlay format. The overlay for the proposed lease sale area ranks this region as Class 1-3. This designation identifies the presence of fossiliferous geologic formations where fossil content varies in significance, abundance, and predictable occurrences, or where sedimentary rocks are present for which an adequate assessment of fossil potential has not yet been determined. This assessment determines that additional consultation with the Regional Paleontologist or with a qualified specialist may be necessary to evaluate site specific fossil potential and significance.

The following parcels intersect with the PFYC class 3: 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 21, 22, 23, 24, 25, 26, 27 and 28. These parcels nominated for lease are wholly or in part underlain by geological formations with a Potential Fossil Yield Classification (PFYC) of 3. A PFYC of three represents management concern for paleontological resources that need to be evaluated on a case-by-case basis for the need to mitigate ground disturbing activities.

There are no documented vertebrate fossil discoveries in the lease area, and few invertebrate locations in the vicinity of the lease parcels. However, the Abo Formation (present in the majority of the PFYC 3 parcels) has proven to be a productive host for a variety of Permian age vertebrate fossils.

3.4 Cultural Resources

The Tularosa Valley has been inhabited for at least 12,000 years, and prehistoric archaeological remains here are included within the Jornada Mogollon cultural region (U.S. Army 2000). This immense span of prehistory is subdivided into three traditions: Paleo-Indian (ca. 10,000-6000 B.C.), Archaic (ca. 6000 B.C.-A.D. 250) and Formative (ca. A.D. 250-1475). This sequence marks the local development of human societies from highly mobile, hunting-and-gathering peoples who lived in small-scale, informal societies, to farmers who constructed adobe pueblos, maintained more complex societies, and participated in long-distance exchange networks. Following the abandonment of the Tularosa Valley by Formative tradition peoples, nomadic groups re-occupied the area, most significantly the Mescalero Apache, who were present in the area by the seventeenth century, and horse-mounted Comanche, who ranged throughout the area from the 1700s until the mid-nineteenth century (Railey and Holmes 2002:17-67).

The Euro-American history of the region began with the arrival of Spanish explorers in the sixteenth century, although the earliest explorers tended to bypass the Tularosa Valley, traveling along the Rio Grande to the west and the Pecos River to the east. The Spanish began exploiting the natural salt resources in the Tularosa Valley in the 1600s, but the area north of El Paso remained unsettled by Euro-Americans until the late nineteenth century, in part because of threats from the Mescalero Apache and Comanche. Once the threat of raiding had subsided, ranching quickly expanded into the Tularosa Valley, and the 1880s saw a cattle boom. Mining activity also began to flourish in the area in the late nineteenth century, and irrigation-based farms sprang up along the eastern margin of the valley. With the construction of the El Paso and Northeastern Railroad in 1897-1898, economic development and

population growth increased rapidly, and the City of Alamogordo was founded. In the twentieth century, ranching activities diminished as the environment was degraded by over-grazing, and mining activities dissipated as mineral resources played out or failed to deliver on initial production promises and hopes. During this same century, the expansion of the Fort Bliss Military Reservation and establishment of the WSMR refocused much of Alamogordo’s economy on military-related activities and support services, and these remain important economic sources in the area (Railey and Holmes 2002:67-78).

3.5 Environmental Justice

Executive Order 12898 requires Federal agencies to assess projects to ensure there is no disproportionately high or adverse environmental, health, or safety impacts on minority and low-income populations. This resource topic refers specifically to the demographic and economic characteristics of the human population that could experience adverse effects from implementation of the proposed project which includes the residents of Tularosa, Alamogordo and surrounding areas of Otero County. Three environmental justice parameters were represented on EPA maps for the 1990 and 2000 U.S. Censuses in Otero County:

- Economic Status-Degree of Vulnerability (DVECO)
- Minority Status-Degree of Vulnerability (DVMAV)
- Potential Environmental Justice Index (EJ Index)- derived from the formula that multiplies the DVECO, DVMAV and the total population ranking (PF) in this survey area.

The EJ Index is used as a demographic correlation variable to measure sociological equity for project permitting. This information given in the EPA environmental justice report does not represent the final analysis of a site with regard to environmental justice. Rather, the indices and raw data reported are indicators of vulnerability for subgroups of people to other stressors (EPA 2005b).

Table 6. Environmental Justice Value and Population Vulnerability.

Alamogordo Survey Sites	EJ Index Value		Population Vulnerability	Comments
	1990	2000		
Site 1	1	2	Low	Includes the northwest side of the city of Alamogordo
Site 2	3	2	Low	Includes the Village of Tularosa
Site 3	6	2	Low	Includes the village of Tularosa-significant decrease in percentage of economically stressed individuals between census years contributed to drop in EJ Index value
Site 4	1	1	Low	Significant drop in total population in this survey area, from 55 in 1990 down to 10 in 2000
Site 5	1	4	Low	Total EJ value in the survey area is extremely low (12 in 1990, down to 5 in 2000); 50 percent were economically stressed in 2000, which contributed to the higher EJ Index value; also, project features in this survey grid are completely within federal and state land ownership, with no private residents in the immediate vicinity

Note: 2000 US Census, based on a 50-square mile survey area

3.6 Invasive, Non-native Species

Once the decision is made by the lessee to develop a lease, an area specific Invasive and Non- native species (Weed) inventory review would be completed to determine if there is a need for a weed inventory of the areas to be affected by surface disturbing activities. Generally, an Invasive and Non-native species (Weed) inventory would be required. There are no known populations of invasive or non-native species within the proposed parcels. African rue (*Peganum harmala*) is a widespread invasive noxious plant that rapidly colonizes disturbed soil in the area and is difficult to eradicate.

3.7 Special Status Species

3.7.1 Special Status Plant Species

Presence of special status plant species and their habitats in Otero County was considered using LCDO species occurrence/habitat records and New Mexico Natural Heritage Program species records. Species descriptions and distributions were derived from LCDO office records and New Mexico Rare Plant Technical Council [NMRPTC. 1999. New Mexico Rare Plants. Albuquerque, NM: New Mexico Rare Plants Home Page. <http://nmrareplants.unm.edu> (Latest update: 18 January 2006)]. Based on evaluation of the above information, of the 40 special status plant species known to occur in Otero County, twelve species and/or habitats could occur in the proposed lease parcels and are listed in Figure 10.

Table 7. Special Status Plant Species expected that may occur in the proposed lease parcels

Species	Status
Alamo beardtongue	BLM and USFS Sensitive, State and USFWS Species of Concern
Arizona crested coralroot	State Endangered, USFWS and USFS Species of Concern
Chapline’s columbine	BLM Special Status, State Species of Concern
Cliff nama	State and USFWS Species of Concern
Gray sibara	BLM Special Status, State and USFWS Species of Concern
Hairy muhly	State and USFWS Species of Concern
Mescalero pennyroyal	State, USFWS Species of Concern
New Mexico rock daisy	BLM Special Status, State and USFWS Species of Concern
Todsen’s Pennyroyal	Federally Endangered, State Endangered
Villard pincushion cactus	State Endangered, BLM Special Status, USFWS Species of Concern
Wooton’s wild buckwheat	USFWS, State Species of Concern
Wright’s marsh thistle	State Endangered, USFWS Species of Concern

Alamo beardtongue (*Penstemon alamosensis*) This perennial forb grows in sheltered rocky areas, canyon sides, and canyon bottoms, on limestone between 4,300 and 5,300 feet elevation.

Arizona crested coralroot (*Hexalectris spicata* variety *arizonica*) This orchid grows in heavy leaf litter in oak, pine, or juniper woodlands over limestone.

Chapline’s columbine (*Aquilegia chaplinei*) This perennial herb grows in limestone seeps and springs and riparian areas in montane scrub and canyon bottoms from 4,700’ to 5,500’.

Cliff nama (*Nama xylopodum*) This herbaceous perennial grows in partly shaded limestone cliffs in mountain shrub and pinyon-juniper habitats from 4,500 to 6,500 feet elevation.

Gray Sibara (*Sibara grisea*) This annual forb grows in crevices and limestone cliffs in shrubby and pinion-Juniper habitats from 4,500-6,000 feet. Livestock grazing is not believed to be a threat to this species.

Hairy muhly (*Muhlenbergia villiflora* variety *villosa*) This rhizomatous perennial grass grows in open desert grassland in alkaline to calcareous soils from 4,800 to 5,200 feet elevation.

Mescalero pennyroyal (*Hedeoma pulcherrimum*) This perennial forb grows on steep hillsides in pinion-juniper and conifer forests from 5,000 to 9,000 feet elevation.

New Mexico rock daisy (*Perityle staurophylla* variety *staurophylla*) This perennial forb grows in crevices in limestone cliffs and boulders, usually on protected north and east exposures, from 4,900 to 7,000 feet.

Todsens's Pennyroyal (*Hedeome todsenii*) This perennial forb grows in loose, gypsiferous limestone soils of the Permian Yeso formation on steep north or east-facing slopes in Pinyon-Juniper woodland from 6,200 to 7,400 feet

Villard pincushion cactus (*Escobaria villardii*) This small cactus grows in loamy soils in desert grass/shrub types on limestone benches from 4,500 to 6,500 feet elevation.

Wooton's wild buckwheat (*Eriogonum wootonii*) This perennial forb grows on mountain slopes and in forest openings from 6,000 to 11,500 feet

Wright's marsh thistle (*Cirsium wrightii*) This biennial to perennial forb grows in wet, alkaline spoils in spring seeps from 3,450 to 8,500 feet elevation.

3.7.2 Special Status Animal Species

Special Status animal species lists for Otero County were compiled from: www.wildlife.state.nm.us/conservation/threatened_endangered_species/index.htm and http://www.fws.gov/southwest/es/newmexico/SBC_view.cfm?spcnty=Otero . These lists are on file in the Las Cruces District Office.

Known geographic distribution and habitat requirements were considered for each species in comparison with habitat types on the proposed lease parcels. The analysis determined that 11 species (FWS-species of concern or BLM-Sensitive species) are considered to have potential habitat within these nominated parcels in Otero County. These species are listed in Table 8.

Table 8. Special Status Wildlife Species

Species	Status
Aplomado falcon	FP
Common ground dove	NME
Loggerhead shrike	BLMS, FWSS
Burrowing owl	BLMS, FWSS
Gray vireo	NMT
Baird's sparrow	NMT, BLMS, FWSS
Piñon jay	BLMS

Meadow jumping mouse	BLMS
Spotted bat	NMT, BLMS, FWSS
Townsend's big-eared bat	BLMS, FWSS
Western red bat	BLMS
FT=FEDERAL THREATENED, FWSS=NEW MEXICO SPECIES OF CONCERN, NMT=NEW MEXICO THREATENED, NME=NEW MEXICO ENDANGERED, FP=FED. PROPOSED, BLMS=BLM SENSITIVE, FE=FEDERAL ENDANGERED	

Habitat descriptions for these special status wildlife species are available from the Bureau of Land Management, Las Cruces District Office.

3.8 Wastes, Hazardous or Solid

The Resource Conservation and Recovery Act (RCRA) of 1976 established a comprehensive program for managing hazardous wastes from the time they are produced until their disposal. The EPA regulations define solid wastes as any “discarded materials” subject to a number of exclusions. On January 6, 1988, EPA determined that oil and gas exploration, development and production wastes would not be regulated as hazardous wastes under RCRA. The Comprehensive Environmental Response Compensation and Liability Act (CERCLA) of 1980, deals with the release (spillage, leaking, dumping, accumulation, etc.), or threat of a release of hazardous substances into the environment. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA exempt contaminants could be subject to regulations as hazardous substances under CERCLA.

No hazardous or solid waste materials are known to be present on any of the proposed lease parcels.

On leased parcels that could have subsequent proposed surface disturbing projects from proposed and approved APDs, no waste material would be removed from the project areas and upon reclamation of the surface disturbed activities, such as the reserve pit areas for example, the more stringent New Mexico Oil Conservation Division pit reclamation guidelines would be imposed where applicable.

3.9 General Topography/Surface Geology

The western portion of the project area is generally flat land in the Tularosa Basin, between 3,623 and 5,000 feet in elevation. The eastern portion of the project area is more mountainous with peaks at 6,000 to 7,450 feet. Horizontal strata of the leasable areas have small mountains, plateau escarpments and other topographical features that are etched out by weathering. Topographic details of land in this lease sale are dependent upon differences in rock structure, texture, and altitude that give rise to prominences of semi-arid desert type surface features. The eastern portion of the project area is land that is generally steeper, hilly, highly erodible and dissected by arroyos and drainages. The western portion of the project area is land that is generally flat lowlands with little relief.

To the east of the parcels are the Sacramento Mountains which consist of three major Permian rock formations in the local area; The San Andres, Yeso, and Abo formations. The area encompassing the parcels is piedmont alluvial deposits (Holocene to lower Pleistocene) and includes deposits of higher gradient tributaries bordering major stream valleys, alluvial veneers of piedmont slope, and alluvial fans. Directly west of the lease area are Gypsiferous eolian deposit (New Mexico Bureau of Geology and

Mineral Resources, 2003, Geologic Map of New Mexico, 1:500,000: New Mexico Bureau of Geology and Mineral Resources.).

3.10 Soil Resources

The proposed lease parcels cover a large variety of soil types and conditions ranging from high elevation moist, cold soil in the eastern area of higher elevation of the proposed lease to lower elevation dry, warmer soil in the west area. This soil and associated topography varies in its suitability for use as roads, fill and related infrastructure during subsequent exploration and production of the lease.

The Soil Survey of Otero County, New Mexico, (USDA -Soil Conservation Service 1981) was used to describe and analyze impacts to soil from this proposed action. The Otero area is generally flat land in the Tularosa Basin, between 3,623 and 5,000 feet in elevation, and the low mountains in the southeastern part with peaks at 6,000 to 7,450 feet. The climate is arid to semi-arid continental. Average annual precipitation ranges from 8 to 11 inches in the basin and from 12 to 18 inches at higher elevations. Mean annual temperatures ranges from 58 to 62 degrees.

The five principal factors of soil formation include parent material, climate, relief, living organisms or biological activity, and time. In the project area, soil differences are primarily a result of the relative importance or dominant influence of the various soil formation factors. The main soil forming factors affecting soil formation are topography and parent material in this area with climate factor. Topographic conditions such as slope gradient, configuration and aspect affect soil development. These features influence the amount of water that reaches the soil, the amount of water that is retained by the soil and the amount of water that runs off the soil. Topographic conditions also influence soil development by the amount of alluvium sediment deposition that occurs onto some soils. Geologic or accelerated erosion, soil temperature and wind movement are also affected by topographic relief.

The 27 nominated parcels have soil that is so intermingled that in many cases could not be separated. The landscape is either steep or located on side slopes of pediments that have been dissected by many deep, narrow drainage ways. The majority of the soil map unit is gypsiferous soil and is: Alamogordo - Gypsum land-Aztec complex, 15 to 50 percent slopes (AGE). This complex consists of areas of deep, well-drained soil and areas of exposed gypsum. The landscape is mainly severely dissected, partially truncated side slope of pediments. Aztec - Rock outcrop-Lozier complex, 20 to 65 percent slopes (AZF). This complex consists of areas of deep and shallow, well-drained soil and limestone outcrop. These areas are so intermingled that they could not be separated on the low detail map. The landscape is steep, limestone-controlled side slopes, hill crests, and ridges on the west face of mountain escarpments. Pena-Aztec Variant association, strongly sloping (PAE). This association consists of areas of deep, well-drained soil. This soil occurs on side slopes of pediments that have been dissected by many deep, narrow drainage ways. Deama-Rock outcrop-Holloman Variant complex, 15 to 65 percent slopes (DSF). This map unit is shallow, well drained, and nearly level to very steep soil on limestone hills and mountains, rock outcrop. The Deama soil is mixed with the Rock outcrop on uplands. Pena-Aztec Variant association, strongly sloping (PAE). This association consists of areas of deep, well-drained soil. This soil occurs in a regular and repeating pattern mainly on side slopes of pediments that have been dissected by many deep, narrow drainage ways. Other soil is: Alamogordo-Gypsum land complex (AGE). MccCullough sandy-loam (McB). Aztec-Rock outcrop-Lozier complex, 20 to 65 percent slope (AZF). Dema-Rock outcrop-Holloman Variant complex, 15 to 65 percent slope (DSF). Badland (BAF) this map unit encompasses large area in this group. Complete descriptions of this soil have been compiled by the NRCS, and can be found at their website, <http://websoilsurvey.nrcs.usda.gov/app/>

3.11 Water Resources

3.11.1 Wetlands and Floodplains

Several of the nominated lease parcels are located in the 100-year floodplain. For administrative purposes, the 100-year floodplain serves as a basis for floodplain management on public land. It is based on Flood Insurance Rate Maps prepared by the Federal Emergency Management Agency (1983) which describes a “Zone A” as the “Area of the 100-year flood.” Current development on the floodplain consists of two-track roads and several miles of boundary fence in the area. The following table describes the acreage of Zone A areas within each parcel (Table 9).

Table 9. Zone A of the 100 year flood (FEMA 1983).

Lease Parcel #	11	14	15	
Acres in Zone A	23	10	185	

The following parcels which are deferred: 005, 18, 19 and 020 do not contain Zone A floodplains, however some portion of the boundaries are located within 200 meters of the 100 year floodplains boundaries.

3.11.2 Water Quality and Quantity – Surface/Ground

In reports submitted by the NM Water Quality Control Commission (NMWQCC) to Congress, as required by Section 305(b) of the CWA, 10.2 miles of the Tularosa Creek from the town of Tularosa to the headwaters are assessed. Tularosa Creek is a stream that has been listed as impaired on the State of New Mexico CWA Sections 303(d)/305(b) Integrated List (Integrated List). Several assessments of the creek have been completed since 1994. Primarily, analysis has classified the creek as “Partially Supporting” or “Not Supporting Designated Uses”. The Designated uses not supported have included warm water fisheries and cold water fisheries. Aluminum and mercury were listed as toxic at chronic levels in 1994. Since 1994, additional probable causes for these impairments have included sedimentation, aluminum, mercury, removal of riparian vegetation, and stream bank modification and destabilization. BLM is awaiting the results of the most current 2012-2014 State of New Mexico CWA 303(d)/305(b) Integrated List (Integrated List). The water quality of springs and seeps in the area can range from fresh to brackish suggesting variable geology, aquifers, water mixing zones, water source, or a combination of these. Additional water quality information for the springs is unknown at this time.

Groundwater quantity and quality within this area varies both laterally and vertically; and is largely controlled by type and extent of the underlying geologic formations and basin-fill deposits. Varying salinities of the groundwater is primarily due to soluble minerals in the aquifer sediments, recharge from surface water, and groundwater flowing through sedimentary rocks rich in sulfate materials. The quality of existing water resources for the village of Tularosa ranges from about 300 mg/L TDS from Bonito Lake to as much as 1,400 mg/L TDS from groundwater pumped from the La Luz well field (Livingston 2003b). The average TDS value of water in the distribution system is around 800 mg/L in the wintertime, rising to about 1,100 mg/L during the summer months when the wells are being pumped extensively.

3.11.3 Watershed

Tularosa Creek originates from two major drainages on the Mescalero Apache reservation and flows westward joining near the community of Mescalero, and then continues westward for approximately 16

miles. Tularosa creek passes through the community of Bent and the Village of Tularosa before infiltrating into playas in the Tularosa basin. Major uses in the Tularosa creek watershed include the primary municipal water supply for the Village of Tularosa, irrigated agriculture, livestock grazing, timber production and harvesting, recreation and urban development. The Tularosa Creek HUC 10 watershed encompasses around 114,298 acres. BLM controls approximately 12,300 surfaces acres within this watershed. The Village of Tularosa and the City of Alamogordo have historically relied on existing surface water flowing from the perennial streams of the Sacramento Mountains. The communities have had to look to supplemental groundwater for future water supplies. The USGS stream-gauging records for Tularosa Creek over the past 10 years indicate a 30 percent decline in discharge (USGS 2005). The Tularosa Creek stream bed and associated floodplains has been eroded approximately 3-12 feet below the original grade. Judging by the dominant age of cottonwood trees present on the current floodplain of the creek, it is inferred that the majority of this erosion has occurred within the past 15-30 years. Currently, man-made structures such as bridge foundations, fish habitat structures, and stream gauge dams act as gradient stabilization structures along the BLM portion of the Tularosa Creek. These structures help to lower the energy and thus velocity of the water, thereby slowing further down-cutting of the stream bed. Additionally, tributaries of the Tularosa Creek and others adjacent to the Tularosa Creek watershed within the project area display equal amounts of erosion and down-cutting. These erosion features of the watershed are most likely attributed to easily eroded soil, slope of topography, and a substantial drop in the shallow groundwater table. Erosion of this magnitude has reduced groundwater recharge, segregated overland water flow and increased sediment transport. Several spring-fed riparian zones occur within these parcels.

Parcels located on the east side of Highway 54 are dissected by arroyos and gullies. The larger arroyos are generally well defined with steep banks and display excessive erosion features. Additionally, immature well-defined gullies can be present inferring a relatively recent mobilization of soil and channelized flows. Erosion on these parcels is likely enhanced from high flows draining from the steeper slopes to the east.

The basin-fill deposits represent the most productive aquifers in the area in terms of the quantity of water available, achievable production rates, and degree of historic development. Groundwater in the basin-fill aquifers generally originates in the mountains as precipitation then moves into coarser material in the basin. The project area likely contains multiple vertically stack aquifers separated by less permeable confining layers. Basin-fill deposits are typically thicker and have higher water holding capacities toward the center of the basin.

3.12 Vegetation

The vegetation types found in the 27 nominated parcels include Creosote, Mesquite, Mid Grass, Mixed Desert Shrub, Mixed Mountain Shrub, and Piñon-Juniper. These ecological sites are located within the Southern Desertic Basins, Plains, and Mountains (number 42) Major Land Resource Area, and SD-2 sub-resource area. Complete descriptions can be found on the NRCS website, <http://www.nm.nrcs.usda.gov/technical/fotg/section-2/esd.html>

3.13 Livestock Grazing

The parcels proposed in this lease sale cover portions of 11 grazing allotments (Table 10.. These allotments are authorized for yearlong grazing and are generally cow/calf operations. The 17 grazing allotments are as follows:

Table 10. Grazing Allotments within the proposed Lease Sale Parcels

Allotment No	Allotment Name	Allotment No.	Allotment Name
07005	Upper Labrocita		
07013	Apache		
07018	Fletcher Spring		
07022	Salado Creek		
07030	Domingo Springs Ranch	07020	Tularosa Creek Lease
07031	Laborcita		
07050	Black Ledge		
07053	Utter Estate		
07056	Nogal Canyon		
07065	Domingo Spring		
07066	Tecolote Canyon		

A range monitoring plot is associated with parcel NM-201401-034 within allotment number 07030. All of these proposed lease sale parcels contain range improvements that may include vegetation treatments, fences, pipelines, water troughs and/or storage tanks.

3.14 Wildlife and Fisheries

3.14.1 Wildlife Habitat

The distribution and quality of wildlife habitats in this area reflects impacts from many decades of livestock grazing. As a result, the existing abundance and distribution of wildlife species reflects the capability of habitats in these allotments to support wildlife on a grazed landscape.

The BLM conducted an inventory of wildlife habitats in Otero County using the Integrated Habitat Inventory and Classification System (IHICS) in 1982. Standard Habitat Sites (SHS) occurring in the proposed lease sale parcels as of 1982 include:

- Creosote Rolling Upland
- Creosote Hill
- Mesquite Rolling Upland
- Grass Flat
- Grass Rolling Upland
- Grass Hill
- Grass Mountain
- Mixed Shrub Rolling Upland
- Mixed Shrub Mountain
- Piñon-Juniper/Grass Mountain
- Pseudoriparian (Arroyo)
- Riparian

Standard Habitat Site descriptions can be found starting on page 3-21 of the White Sands Resource Area Draft Resource Management Plan/Environmental Impact Statement (1986). These Standard Habitat Sites provide habitat for approximately eight species of amphibians, 41 species of reptiles, 55 species of

mammals, and 140 species of birds. Tables of wildlife found in Otero County, by habitat type, are available from the Bureau of Land Management, Las Cruces District Office.

3.14.2 Fisheries and Aquatic Habitats

Tularosa Creek is a small to moderate size stream (avg. 14cfs) flowing from two springs on the Mescalero Apache Indian Reservation. It flows down the west slope of the Sacramento Mountains through the proposed action area. BLM lands cover approximately 1.5 miles of stream starting near Bent, NM, under HWY 70 and ending approximately above the bridge at Gato Road. HWY 70 makes a man-made break in the stream thus creating upper and lower reaches. The stream begins as a G3c Rosgen type stream (Rosgen 1996) with a slope of less than 2%. It then, accordingly drops to a G3-G4 (Rosgen 1996) as the slope increases above 2%. The head-cut begins upstream of public land and becomes more severe as the stream flows downhill. The upper reach is more sinuous and has a flatter slope than the lower reach. The stream has a diverse and rich riparian vegetation community. The floodplain is small and immature throughout most of the stream.

The fish of Tularosa Creek include native longnose dace (*Rynichthys cataractae*) and other non-native, introduced sport fish such as brown and rainbow trout (Sublette, et. Al. 1990). Aquatic and riparian invertebrate species are unknown at this time, but a study is underway to characterize the community. A thorough understanding of the distribution of riparian vegetation and other flora and fauna of the riparian zone are unknown at this time. Further studies need to be instituted in order to characterize the riparian zone assemblage.

In addition, given that Tularosa Creek has been disconnected from any other stream system for millennia, the native fish fauna could lend itself to having a taxonomically distinct population segment or more importantly, a new sub-species of Rio Grande sucker (*Catostomus plebeius*) and/or longnose dace in the creek. If either is found it is possible the population may become a BLM sensitive, a state listed species and possibly a federally listed species, as well. Without further surveys and genetic and morphological analysis it is unknown if this is the case. However, morphological and genetic analysis will need to be performed.

An ongoing project of in-stream structures has been underway for several years and will continue annually. The structures are important to the aquatic ecosystem in that they create fish and invertebrate habitat. Through recent electro-shocking, both the native and non-native species appear to be taking advantage of the pools created by the in-stream structures. They provide resting and rearing habitat as well as gravels for reproduction for the fishes. Just as important, the structures have captured copious amounts of sediment deposited in the stream from the uplands surrounding Tularosa Creek. In doing so, the structures have promoted stream recovery. The stream is down-cut along most its water course, but by instituting a program of installation of in-stream structures, water quality has and will continue to improve. Also, stream bed aggradation is occurring and thus aquatic species habitat is greatly improved.

It is posited that there is a multitude of aquatic and terrestrial invertebrate species in Tularosa Creek and the surrounding riparian zone. These species serve many ecosystem functions including being food source for the fishes. Currently, a study of the aquatic invertebrates of Tularosa Creek is underway. Up to this point only a late spring survey has been completed. In 2013, a post monsoonal survey will be performed. After the data has been analyzed, the richness and diversity of the aquatic invertebrates will be known. Assessing the function of the invertebrates will take some time. Additionally, no surveys to date have been performed on the terrestrial invertebrates in the riparian zone. In order to ascertain the faunal

assemblage of the riparian zone, surveys must be performed. These studies will also determine if there are endemic, native species in Tularosa Creek. Both aquatic and terrestrial invertebrates are strong indicators of stream and riparian health. It is imperative to have baseline knowledge of the invertebrate community in order to better manage BLM land surrounding the stream.

3.15 Visual Resources

Visual Resource Management (VRM) on public land is conducted in accordance with BLM Handbook 8410 and BLM Manual 8411. Visual Resource Management (VRM) classes are used as minimum management objectives for identified visual management units. Each VRM class describes differing degrees of modification allowable in basic landscape elements. The primary character of the landscape would be retained regardless of the degree of modification. Class II management objectives are to retain the existing character of the landscape, where the level of change should be low. Management activities may be seen, but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features characteristic of the landscape. The VRM Class III objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. VRM Class IV objective is to provide for management activities which allow major modification of the existing landscape character. Every attempt, however, should be made to reduce or eliminate activity impacts through careful location, minimal disturbance, and repeating the basic landscape elements.

The VRM ratings found within these parcels are Class II, III and IV.

3.16 Recreation

Lease areas are primarily used by recreational visitors engaged in hunting, caving, sight-seeing, driving for pleasure, off-highway vehicle use, and other recreational activities. Non-recreation visitors include ranchers.

Tularosa Creek is a riparian area with aquatic resources that would be primarily managed for dispersed recreation activities. Approximately 120 acres along Tularosa Creek are identified in the White Sands RMP as a recreation area. In the forthcoming TriCounty RMP, 230 acres in the same vicinity are analyzed as a Special Recreation Management Area.

3.17 Lands & Realty

Most of the nominated lease parcels are accessible by existing roads. However, legal access for some parcels may not exist. There are several existing ROWs on some of the nominated parcels, including power lines, roads, and gas pipelines.

3.18 Cave/Karst

Karst refers to a geomorphic landscape created by the dissolution of a layer or layers of soluble bedrock; usually carbonate rock such as limestone. Characteristic landforms in karst regions can include caves,

springs, sinkholes, blind valleys, disappearing streams and cenotes. In New Mexico, karst landforms are most commonly associated with near-surface outcrops of limestone, dolomite or other soluble sedimentary rocks. Geologic mapping of the subject parcels (Scholle, 2003) indicates that undifferentiated Pennsylvanian-Permian carbonate bedrock outcrops in limited portions (500 acres or less) of nominated parcels 20 and 21. The potential for karst resources is considered low; however, field verification may be necessary for specific surface disturbing proposals.

3.19 Lands with Wilderness Characteristics

Lands with Wilderness Characteristics are areas that are determined to be over 5,000 acres in size, contain areas of naturalness and outstanding opportunity for solitude or outstanding opportunity for a primitive and unconfined type of recreation. Nominated lease parcels 005, and 020 have been inventoried and have been found to have wilderness characteristics. All the other nominated lease parcels have been found not to meet the 5,000 acres criteria or are split estate and therefore would not be eligible for lands with wilderness characteristic status. Refer to Appendix 3. for the most recent survey findings for LWC.

4 ENVIRONMENTAL IMPACTS

Environmental Consequences and Proposed Mitigation Measures

4.1 Assumptions for Analysis

The analysis will include potential impacts from leasing on all parcels under both the Proposed Action and the Preferred Alternative.

If the parcels offered for lease are leased and a development proposal such as an application for permit to drill is received, additional site-specific environmental analysis would be conducted at that time. If lease parcels were developed, short-term impacts would be stabilized or mitigated within 5 years and long-term impacts are those that would substantially remain for more than 5 years. Potential impacts and mitigation measures are described below.

Cumulative impacts include the combined effect of past projects, planned projects and other reasonably foreseeable future actions such as other infield wells being located within these leases. Potential cumulative effects may occur should an oil and gas field be discovered if these parcels are drilled and other infield wells are drilled within these leases or if these leases become part of a new unit. All actions, not just oil and gas development may occur in the area, including foreseeable non-federal actions.

Oil and gas development in the LCDO has mostly been exploratory in nature. However estimates of total surface disturbance for this lease sale action are based on full field development. Based upon the nominated 31,743 acres with a 40 acre spacing per well and well pad, an estimated total of potentially 793 wells could be developed assuming full field development of every spacing unit having a total complement of roads, pads, power lines, gravel sources and pipelines. Exploration and development of hydrocarbon resources outside of well-developed areas increases the distance required for roads, pipelines and power lines. The parcels offered are not within or near well-developed fields. Surface disturbance assumptions shown by the following bullets are examples of standard impacts associated with oil and gas exploration and development drilling activities in these areas.

- Access Roads: 14 foot wide travel way, 3.0 acres disturbance per access road

- Drill Pads: 1.4 acres disturbance per average well pad (250 feet x 250 feet)
- Pipelines: 3.6 acres initial disturbance per producing well (30 feet right-of-way width)
- Power lines: 1.0 acre initial disturbance per producing well
- **Total Surface disturbance: 9 acres per well**

4.2 Effects from the No Action Alternative

Under the No Action Alternative, the proposed parcels would not be leased. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities. The No Action Alternative would result in the continuation of the current land and resource uses in the proposed lease areas. The No Action Alternative is also used as the baseline for comparison of alternatives.

An assumption is that the No Action Alternative (no lease option) may result in a no growth in domestic production of oil and gas. There may be potential for Federal land minerals to be extracted by wells on adjacent private or state land. Oil and gas consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. If the BLM were to forego its leasing decisions and potential development of those minerals, the assumption is that the public's demand for the resource would not be expected to change. Instead, the resource foregone would be replaced in the short and long-term by other sources that may include a combination of imports, using alternative energy sources (e.g. wind, solar), and other domestic production. This offset in supply would result in a no net gain for oil and gas domestic production.

4.3 Analysis of the Action Alternatives

4.3.1 Air Resources

While the act of leasing a tract would produce no impacts, subsequent development of the lease would potentially impact air resources such as air borne soil particle emissions from new well pads or roads, exhaust emissions from drilling equipment, compressor engines, vehicles, flares, dehydration and separation facilities, and volatile organic compounds during drilling or production activities.

Although the hydraulic fracturing of wells within a lease parcel is hard to predict, it is anticipated that with more wells being drilled, there will be an increase in the amount of wells being hydraulically fractured and completed. There is a higher probability of dust particulates in the atmosphere from the increase in vehicular traffic due to the increase in the number of wells hydraulically fractured. There are three phases in the development of a well that result in different levels of emissions. The first phase occurs during the first year of development and may include pad construction, drilling, completion, interim reclamation, and operation of the completed well. The first year results in the highest level of emissions due to the large engines required during the construction and drilling, and the potential release of natural gas to the atmosphere during completion.

The second phase of the well begins after the well is completed and is put on-line for production. Emissions during the production phase may include vehicle traffic, engines to pump oil if necessary, compressor engines to move gas through a pipeline, venting from storage tanks, and storage tank heaters. A work-over of the well may occasionally be required, but the frequency of work-overs is not predictable. The final phase is to plug and abandon the well and rehab the pad.

Potential Mitigation: The BLM encourages industry to incorporate and implement “Best Management Practices” (BMPs) and following the BLM-Gold Book, which are designed to reduce impacts to air quality by reducing emissions, surface disturbances, and dust from field production and operations. Typical measures include: adhere to BLM’s Notice to Lessees’ (NTL) 4(a) concerning venting and flaring of gas on Federal leases for natural gas emissions that cannot be economically recovered, flare hydrocarbon gases at high temperatures in order to reduce emissions of incomplete combustion; water dirt roads during periods of high use in order to reduce fugitive dust emissions; co-locate wells and production facilities to reduce new surface disturbance; implement directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores; require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; and perform interim reclamation to re-vegetate areas of the pad not required for production facilities and to reduce the amount of dust from the pads.

An application for permit to drill (APD) is required for each proposed well to develop a lease. Onshore Oil and Gas Order No. 1 issued under 43 CFR 3160 authorizes BLM to attach Conditions of Approval (COA) to APDs during permitting. Additional analysis will be done at such time as an APD is requested and a determination will be made on the need for mitigation based on the estimated level of emissions.

Any subsequent activity authorized after APD approval could include soil disturbances resulting from the construction of well pads, access roads, pipelines, power lines, and drilling. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM10 and PM2.5) in the project area and immediate vicinity. Particulate matter, mainly dust, may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses.

In October 2012, USEPA promulgated air quality regulations for completion of hydraulically fractured gas wells. These rules require air pollution mitigation measures that reduce the emissions of volatile organic compounds during gas well completions.

Greenhouse Gases

Information about (GHGs) and their effects on national and global climate is presented in the Air Resources Technical Report (USDI BLM 2013). Only the GHG emissions associated with exploration and production of oil and gas will be evaluated here because the environmental impacts of GHG emissions from oil and gas consumption, such as refining and emissions from consumer-vehicles, are not effects of the proposed action as defined by the Council on Environmental Quality because they do not occur at the same time and place as the action. Thus, GHG emissions from consumption of oil and gas do not constitute a direct effect that is analyzed under NEPA. Nor is consumption an indirect effect of oil and gas production because production is not a proximate cause of GHG emissions resulting from consumption. However, emissions from consumption and other activities are accounted for in the cumulative effects analysis.

The two primary GHGs associated with the oil and gas industry are carbon dioxide (CO₂) and methane (CH₄). Because methane has a global warming potential that is 21-25 times greater than the warming potential of CO₂, the EPA uses measures of CO₂ equivalent (CO₂e) which takes the difference in warming potential into account for reporting greenhouse gas emissions. Emissions will be expressed in metric tons of CO₂ equivalent in this document.

Oil and Gas production in New Mexico is concentrated in the San Juan Basin and the Permian Basin. Production in the San Juan Basin is mostly natural gas while production in the Permian Basin is mostly oil. Production statistics developed from EPA and New Mexico Oil Conservation Division for 2010 are shown in Table 11 12 for the US, New Mexico and for wells on federal leases in each basin while Table 12 shows an estimate of greenhouse gas emissions for oil and gas field production based on the assumption that emission are proportional to production. There are currently no producing wells in Otero County, therefore it is impossible to quantify emissions based on potential production but it can be concluded that any GHG emissions would be very small compared to the more active production areas in New Mexico which each account for only 0.01% of US GHG emissions.

Because oil and gas leaves the custody and jurisdiction of the BLM after the production phase and before processing or refining, only emissions from the production phases are considered here. It should also be remembered that following EPA protocols, these numbers do not include fossil fuel combustion which would include such things as truck traffic, pumping jack engines, compressor engines and drill rig engines. Nor does it include emissions from power plants that generate the electricity used at well sites and facilities. Note that units of metric tons CO₂e have been used in Table 12 to avoid very small numbers. For comparison one million metric tons is equal to one teragram.

Table 11. 2010 Oil and Gas Production

	Oil Barrels (bbl.)	% U.S. Total	Gas (MMcf)	% U.S. Total
United States	1,999,731,000	100	26,836,353	100
New Mexico	65,380,000	3.327	1,341,475	5.00
Federal leases in New Mexico	31,533,000	1.58	824,665	3.07
San Juan Basin	1,468,000	0.07	630,060	2.35
Permian Basin	30,065,000	1.5	194,065	0.73

Table 12. 2008 Oil and Gas Field Production Emissions

	Oil		Gas		Total O&G Production	%U.S. Total GHG emissions
	CO₂	CH₄	CO₂	CH₄		
(Metric Tons CO ₂ e)						
United States	300,000	30,600,000	10,800,000	126,000	167,700,000	2.6
New Mexico	9,810	1,000,620	540,000	6,300,000	7,850,430	0.12
Federal leases in New Mexico	4,740	483,480	331,560	3,868,200	4,687,980	0.07
San Juan Basin	210	21,420	253,800	2,961,000	3,236,430	0.05
Permian Basin	4,500	459,000	78,840	919,800	1,462,140	0.03

Table 12. provides an estimate of direct emissions that occur during exploration and production of oil and gas. This phase of emissions represents a small fraction of overall emissions of GHGs from the life cycle

of oil and gas. For example, acquisition (drilling and development) of petroleum is responsible for only 8% of the total lifecycle GHG emissions, whereas transportation of the petroleum to refineries represents about 10% of the emissions, and final consumption as a transportation fuel represents fully 80% of emissions (U.S.DOE, NETL, 2008).

To estimate the potential emissions from the proposed lease sale, an estimate of emission per well is useful. To establish the exact number of federal wells in New Mexico is problematic due to the ongoing development of new wells, the abandonment of unproductive wells, land sales and exchanges, and incomplete or inaccurate data bases. To determine the most transparent and publicly accessible method of estimating the number of active federal wells in New Mexico, LCDO utilized BLM New Mexico Geographic Information System (GIS) and the New Mexico Conservation Division ONGARD Data Search Page. ONGARD was searched for all active, new, and temporarily abandoned wells in NM.

The table below shows estimated total emissions from 2010 New Mexico federal leases at 7,850,430 metric tons CO₂e. Therefore, the estimate of emission per well is 289.2 metric tons CO₂e annually.

Table 13. Potential Greenhouse Gas Emissions Resulting from Proposed Lease Sale

Referenced to Latest Available Estimates from 2010

Total U.S. GHG Emissions From All Sources	6,372,900,000 metric tons	100.00 %
Total U.S. GHG Emissions From Oil & Gas Field Production	167,700,000 metric tons	2.6%
Total New Mexico Emissions From Oil & Gas Field Production (27,145 wells)	7,850,430 metric tons	.12%
Total Potential GHG Emissions From Oil & Gas Field Production at Full Development For Preferred Action (xx Wells)	(289.2 x number of wells) metric tons	(answer in box to left/6372900000)x100 %

Potential Mitigation: The EPA’s inventory data describes “Natural Gas Systems” and “Petroleum Systems” as the two major categories of total US sources of GHG gas emissions. The inventory identifies the contributions of natural gas and petroleum systems to total CO₂ and CH₄ emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other greenhouse gases). Within the larger category of “Natural Gas Systems”, the EPA identifies emissions occurring during distinct stages of operation, including field production, processing, transmission and storage, and distribution. “Petroleum Systems” sub-activities include production field operations, crude oil transportation and crude

oil refining. Within the two categories, the BLM has authority to regulate only those field production operations that are related to oil and gas measurement, and prevention of waste (via leaks, spills and unauthorized flaring and venting).

The BLM encourages industry to incorporate and implement “Best Management Practices” (BMPs), which are designed to reduce impacts to GHG emissions from field production and operations. Typical measures include: adhere to BLM’s Notice to Lessees’ (NTL) 4(a) concerning the venting and flaring of gas on Federal leases; for natural gas emissions that cannot be economically recovered, flare hydrocarbon gases at high temperatures in order to reduce emissions of incomplete combustion; implement directional drilling and horizontal completion technologies whereby one well provides access to petroleum resources that would normally require the drilling of several vertical wellbores; and require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored.

The EPA data show that improved practices and technology and changing economics have reduced CO₂ emissions from oil and gas exploration and development (Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2010 (EPA, 2012b)). One of the factors in this improvement is the adoption by industry of the BMPs proposed by the EPA’s Natural Gas Energy Star program. The Field Office will work with industry to facilitate the use of the relevant BMPs for operations proposed on Federal mineral leases where such mitigation is consistent with agency policy. While EPA data shows that methane emissions increased from oil and gas exploration and development from 1990-2010, reductions in methane emissions from oil and gas exploration and development should occur in future years as a result of EPA’s recently finalized oil and gas air emissions regulations.

4.3.2 Areas of Critical Environmental Concern

4.3.3 Cultural and Paleontological Resources

Subsequent development of the lease could have impacts on archaeological and paleontological resources. Required archaeological surveys would be conducted upon all subsequent actions that are expected to occur from the lease sale to avoid disturbing cultural and/or paleontological sites.

Consequential project construction has the potential to impact cultural and paleontological resources.

Potential Mitigation: Avoidance measures would be imposed where ever cultural and/or paleontological resources are impacted. There are very high site-densities in areas outside of the proposed lease parcels and it can be expected that these high site-densities may carry over into the parcels. The approach to cultural resource survey in all of the proposed parcels is complete survey of any parcel in which development of the lease is proposed. This approach to survey would serve two purposes.

The first and most important of these for the lessee is a knowledge base from which to make informed decisions about how and where to proceed with development in that parcel. Subsequent costs can be avoided or curtailed by selection of areas without sites or with sites that can be relatively inexpensively mitigated. Planning in subsequently developed parcels can be partially informed from the ongoing collection of information about sites in the immediate area.

The second advantage accrues to the agency and provides information about the resource that is not currently available.

4.3.4 Socio-Economics and Environmental Justice

No minority or low income populations would be directly affected in the vicinity of the proposed lease parcels. Indirect impacts could include impacts due to overall employment opportunities related to the oil and gas and service support industry in the region, as well as the economic benefits to State and County governments related to royalty payments and severance taxes. Other impacts could include a small increase in activity and noise disturbance in areas used for agriculture and recreational activities. However, these impacts would apply to all land users in the area. In addition, any nearby residents may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks.

Potential Mitigation: Mitigation is deferred to site-specific development at the APD stage.

4.3.5 Invasive, Non-native Species

While the act of leasing Federal minerals produces no impacts, subsequent development produces impacts in the form of surface disturbance. Construction of an access road and well pad may unintentionally contribute to the establishment and spread of noxious weeds. Noxious weed seed could be carried to and from the project areas by construction equipment, drilling rig and transport vehicles. African rue is an invasive noxious weed that is widespread in Otero County and would be expected to rapidly invade disturbed areas associated with oil and gas development.

The main mechanism for seed dispersion on the road and well pad is by equipment and vehicles that were previously used and or driven across or through noxious weed infested areas. Potential for dissemination of invasive and noxious weed seed may be elevated by the use of construction equipment typically contracted out to companies that may be from other geographic areas in the region. Washing and decontaminating the equipment prior to transporting onto exiting construction areas would minimize this impact.

Impacts by noxious weeds would be minimized due to requirements for the company to eradicate the weeds upon discovery. Multiple applications may be required to effectively control the identified populations.

Potential Mitigation: In the event noxious weeds are discovered during construction of any access roads and well pads, mitigation would be deferred to the site specific development at the APD stage. Best management practices (BMPs) would be incorporated into the conditions of approval (COAs) of an approved APD. Even with implementation of BMPs, oil and gas development would be anticipated to exacerbate the spread of African rue and possibly other noxious weeds in the area.

4.3.6 Special Status Species, Wildlife, and Wildlife Habitat, and Fisheries

4.3.6 .1 Special Status Species

Exploration and development of the proposed parcel may produce impacts to special status species. Surface disturbance from the development of well pads, access roads, pipelines, and utility lines can result

in destruction and fragmentation of wildlife habitat. Destruction occurs from road and pad development and other surface disturbing activities. Fragmentation occurs as linear disturbances cut through habitat, leaving patches on each side. Noise and human presence cause a temporal disturbance of habitat for special status species.

The potential for direct and indirect impacts to Special Status Species can't be analyzed until the site specific APD stage of development. All of the parcels have habitat that may support federally listed and/or BLM sensitive species. Site-specific biological surveys would be required at the APD stage and development proposals may require Section 7 consultation under ESA.

In addition, special status species may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks.

The Tri-county Draft Resource Management Plan and Environmental Impact Statement includes a proposal to designate the Northern Sacramento Escarpment Area of Critical Environmental Concern to protect Endangered and special status plants as well as Visual Resources (scenic quality). This proposal stems from an analysis that shows the area to meet the Relevance and Importance Criteria included in the BLMs ACEC Regulations and Policy from 43 CFR 1610.7-2. BLM Handbook 1601-1 Appendix C includes Program/Resource-Specific Decision Guidance, with Part III addressing Special Designations, and Subpart B providing the following guidance for Administrative Designations:

Subject to valid existing rights, avoid approval of proposed actions that could degrade the values of potential special designations. Proposed actions will be reviewed on a case-by-case basis and impacts to an area's values will be assessed. The standard for this review is the protection of the area's resources and values so that the area will not be disqualified from designation. Subject to valid existing rights, proposed actions that cannot meet this standard should be postponed, relocated, mitigated, or denied until the planning for the area is completed.

Leasing these parcels would be an irreversible and irretrievable commitment of resources that would establish a new valid existing right while the Draft RMPP/EIS is out for public review, and could preclude the BLMs ability to protect the identified significant native plant resources for which the ACEC is being proposed.

Potential direct and indirect impacts can't be analyzed until site-specific proposals are analyzed at the APD stage of development.

Potential Mitigation: General mitigation includes attaching protective stipulation WO-ESA-7, which states that consultation with USFWS may be needed, would be attached to all proposed parcels since Federally protected species or their habitat may be in or near the proposed parcel either now or in the future. Controlled Surface Use can be used to direct development to a portion of the lease parcel where negative impacts to special status species would be avoided or minimized. Specific mitigation measures are deferred to site-specific development at the APD stage.

4.3.6.2 Wildlife and Wildlife Habitat

While the act of leasing a parcel would produce no immediate impacts to wildlife and wildlife habitats, subsequent development of the lease would result in both short and long-term impacts. Exploration and development of the proposed parcel may produce impacts to wildlife and wildlife habitat. Surface disturbance from the development of well pads, access roads, pipelines, and utility lines can result in destruction and fragmentation of wildlife habitat. Fragmentation occurs as linear disturbances cut through habitat, leaving patches on each side. Noise and human presence cause a temporal disturbance of wildlife habitat. In addition, wildlife may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks.

Mechanisms through which oil and gas development impact wildlife and wildlife habitats include:

- Altered vegetation structure
- Altered fire regime
- Structural habitat
- Alteration of soil structure
- Alteration of water regimes
- Change in water quality
- Noise Impacts
- Physical disturbance by vehicles and human activity
- Physical and chemical hazards to wildlife

Long-term direct and indirect impacts to wildlife and habitats would continue for the life of wells, and would decrease once all well pads and road surfacing material has been removed and reclamation of well pads, access roads, pipelines and power lines has taken place. Although reclamation and restoration efforts for surface disturbance could provide for the integrity of other resources, these efforts may not always provide the same habitat values (e.g. structure, composition, cover, etc.) in the short or in some instance, the long-term in complex vegetative community types (e.g., shrub oak communities).

Potential Mitigation: The BLM would require oil and gas lessees to operate in a manner that would minimize adverse impacts to wildlife and apply reasonable measures to all oil and gas exploration/development activities. Measures would be taken to prevent, minimize, or mitigate impacts to fish and wildlife animal species from exploration and development activities, including specific mitigation measures (i.e. rapid re-vegetation, noise restriction, project relocation, pre-disturbance surveys, etc.) unique to the proposed development site, but would be deferred until the APD process.

Wildlife COAs are generally included in all approved APDs and the use of standard BMPs provide extra measures of protection to wildlife populations and habitats in the area. Impacts to the wildlife resource component of the environment can be avoided or minimized by adopting the COAs and BMPs..

4.3.6.3 Fisheries and Aquatic Fauna

Development of the surrounding watershed would impact the stream directly and indirectly. Directly the stream and fisheries habitat would be affected if development or production fluids spill and reach the stream either directly or from precipitation. This in turn could kill all in-stream fauna including fish and invertebrates and severely curtail the health of the riparian ecosystem. Stream function could be severely

affected and unknown how long it would take to return to its current state. Riparian vegetation too would be affected similarly. This in turn would impact terrestrial invertebrates and wildlife who depend on riparian areas and streams for part of their life cycle. Construction activities and other development actions could impact the stream indirectly, as well, through nonpoint sources of pollution such as sediment and down-cutting. This in turn would affect the fishery through depleted oxygen and increased sediment load. Fish production would be negatively affected. Native and non-native (e.g. sport) fish would be negatively impacted with the development of oil and gas production.

Potential Mitigation: . Features such as leak detection systems, spill proof barriers, containment berms, and rapid response plans can be implemented to mitigate a spill. Sediment retention features and erosion control structures could be implemented to reduce impacts from sediment movement. The application of the Riparian Zone, Streams and Springs Stipulation will prohibit surface disturbance within 200 meters of a floodplain in order to protect water resources.

4.3.7 Wastes, Hazardous or Solid

Exploration and development of the proposed lease could result in the introduction of hazardous and non-hazardous substances to the site. Hazardous substances may be produced, used, stored, transported or disposed of as a result of the project. Properly used, stored, and disposed of hazardous and non-hazardous substances greatly decreases the potential for any impact on any environmental resources. One way operators and the BLM ensure hazardous and non-hazardous substances are properly managed in through the preparation of a Spill Prevention, Control, and Countermeasure (SPCC) plan.

Potential Mitigation: These lease sale parcels are regulated under the Resource Conservation and Recovery Act (RCRA) Subtitle C regulations which are extremely stringent. As well as, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) that provides for the exclusion of petroleum, including crude oil or any fraction thereof from the definition of hazardous substance, pollutant, or contaminant. The mitigation would include the stringiest regulation of waste containment within the project areas.

Specific mitigation is deferred to the APD process. The following measures are common to most projects: all trash would be placed in a portable trash cage and hauled to an approved landfill, with no burial or burning of trash permitted; chemical toilets would be provided for human waste; fresh water zones encountered during drilling operations would be isolated by using casing and cementing procedures; a berm or dike would enclose all production facilities if a well is productive; and all waste from all waste streams on site would be removed to an approved disposal site.

4.3.8 General Topography /Surface Geology

General topography and surface geology of the lease parcels are generally impacted by the construction projects that are permitted as a result of subsequent APD actions after parcels are leased.

The direct impact from a lease sale is that land involved could fall within an environmentally sensitive area and subsequent lease actions could impact the issues of environmental concern. Split estate is an issue of concern on a lease sale when and if a private surface landowner is not in agreement with the proposed project which could create an environmentally sensitive area until issues are resolved with the surface owner. Indirectly, proposed projects could fall within protected areas that would require changing spacing requirements of a well by moving locations or roads.

The nominated parcels are in an area with very little oil and gas development, with only one well drilled into Federally-administered minerals (Yselanto #1), though the LCDO has recently received an application for a second well. The Yselanto #1 was drilled in the 1990s and has been shut-in since then. The well has not produced hydrocarbons in payable quantities, though it may be capable of doing so. Oil and gas in the area of the nominated parcels is exploratory in nature.

Oil and gas operators use various methods to stimulate production of hydrocarbons from well bores. 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 hydraulic fracturing, acidizing, and other mechanical and chemical treatments often used in combination. The results from different treatments are additive and complement each other.

Fracking on BLM New Mexico Well Sites

One stimulation method, 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 is a 60-year-old process that is now being used more commonly as a result of advanced technology.

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.

To ensure that hydraulic fracturing 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 land. Operators must submit Applications for Permit to Drill (APDs) to the agency. Prior to approving an APD, a BLM New Mexico geologist identifies all potential subsurface formations that would 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.

During drilling, the BLM is on location during the casing and cementing of the ground water protective surface casing and other critical casing and cementing intervals. Before hydraulic fracturing takes place, 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 would always be onsite during those operations as well as when abnormal conditions develop during the drilling or completion of a well.

Potential Mitigation: Parcels included in this lease sale, if leased, could have mitigation measures imposed on the proposed subsequent action (such as an APD) when and if the concern involves issuance of such mitigation measures that are deemed necessary to resolve environmental predicaments.

4.3.9 Soil Resources

While the act of leasing a tract would produce no impacts, subsequent development of the lease would physically disturb the topsoil and would expose the substratum soil on subsequent project areas. Direct impacts resulting from the oil and gas construction of well pads, access roads, and reserve pits include removal of vegetation, soil exposure, mixing of horizons, compaction, loss of top soil productivity and susceptibility to wind and water erosion. Wind erosion would be expected to be a minor contributor to soil erosion with the possible exception of dust from vehicle traffic. These impacts could result in increased indirect impacts such as runoff, erosion and off-site sedimentation. Activities that could cause these types of indirect impacts include construction and operation of well sites, access roads, gas pipelines and facilities.

Contamination of soil from drilling and production wastes mixed into soil or spilled on soil surfaces could cause a long-term reduction in site productivity. Some of these direct impacts can be reduced or avoided through proper design, construction and maintenance and implementation of best management practices.

Additional soil impacts associated with lease development would occur when heavy precipitation causes water erosion damage. When water saturated segment(s) on the access road become impassable, vehicles may still be driven over the road. Consequently, deep tire-ruts would develop. Where impassable segments are created from deep rutting, unauthorized driving may occur outside the designated route of access roads.

Sensitive and Fragile Soil

Fragile soil is soil listed as highly or severely erodible by wind or water by the NRCS soil surveys or in areas with soil texture characteristics that make soil prone to erosion (such as soil with less than 20 inches to bedrock; and has surface texture of sand, loamy sand, very fine sandy loam, fine sandy loam, silty clay, or clay), soil with an erosion potential rated as poor indicated by an erosion potential factor (K) greater than 0.32, and where these soils are also located on natural slopes greater than 30 percent. Applying CSU stipulations to limit disturbance of fragile soil would help maintain fragile soils by encouraging planning or design measures to limit accelerated erosion, by shifting disturbance to less-sensitive areas, and/or by requiring engineering/reclamation plans for disturbance. Fragile soil is a subset of soil on slopes greater than 30 percent; therefore, there is more potential disturbance that would be allowed under Alternative B&C for soil on steep natural slopes not included in the fragile soil as compared to Alternatives A. Table 14 below presents parcel number, acreages and associated slope percent for all parcels. It shows that every parcel has certain percent of high slope vales, and some parcel has 75% of the parcel of high slope.

Table 14. Slope percent, parcel number and acreage for proposed lease.

Slope %	Parcel number	Acres	Slope Acres	Parcel % in Slope
10	2	1440	197	13.65
15	2	1440	177	12.28
20	2	1440	290	20.14
30	2	1440	403	28.01
10	3	2014	245	12.16
15	3	2014	163	8.08
20	3	2014	203	10.10
30	3	2014	241	11.94
10	4	1920	255	13.29
15	4	1920	142	7.41
20	4	1920	166	8.66
30	4	1920	147	7.64
10	5	443	67	8.79
15	5	443	29	3.78
20	5	443	36	4.74
30	5	443	40	5.21
10	6	2533	379	14.95
15	6	2533	211	8.35
20	6	2533	241	9.52
30	6	2533	239	9.43
10	7	2094	146	6.98
15	7	2094	92	4.41
20	7	2094	116	5.56
30	7	2094	143	6.83
10	8	319	13	4.16
15	8	319	10	3.08
20	8	319	6	2.00
30	8	319	4	1.35
10	9	160	22	13.73
15	9	160	15	9.62
20	9	160	15	9.45
30	9	160	9	5.54
10	10	2080	318	15.29
15	10	2080	195	9.38
20	10	2080	248	11.91
30	10	2080	140	6.71
10	11	1360	196	14.40
15	11	1360	112	8.23
20	11	1360	103	7.58

30	11	1360	64	4.73
10	12	1920	215	11.21
15	12	1920	97	5.05
20	12	1920	77	4.01
30	12	1920	43	2.26
10	13	360	53	14.59
15	13	360	36	10.00
20	13	360	39	10.77
30	13	360	24	6.61
10	14	600	108	18.03
15	14	600	68	11.34
20	14	600	78	13.03
30	14	600	65	10.89
10	15	2372	218	9.18
15	15	2372	138	5.80
20	15	2372	185	7.78
30	15	2372	333	14.02
10	16	1065	92	8.62
15	16	1065	96	9.06
20	16	1065	172	16.13
30	16	1065	592	55.62
10	17	40	7	17.88
15	17	40	8	18.87
20	17	40	10	24.66
30	17	40	6	14.39
10	18	440	35	8.02
15	18	440	42	9.61
20	18	440	89	20.15
30	18	440	236	53.75
10	19	1985	172	8.68
15	19	1985	139	7.00
20	19	1985	243	12.26
30	19	1985	1156	58.26
10	20	96	6	5.83
15	20	96	1	0.62
20	20	96	1	0.60
30	20	96	1	0.60
10	21	494	85	17.24
15	21	494	48	9.67
20	21	494	43	8.62
30	21	494	22	4.43

10	22	626	92	14.70
15	22	626	73	11.70
20	22	626	128	20.41
30	22	626	131	20.93
10	23	507	115	22.78
15	23	507	76	14.96
20	23	507	61	12.01
30	23	507	15	3.05
10	24	2280	351	15.41
15	24	2280	248	10.87
20	24	2280	317	13.91
30	24	2280	926	40.63
10	25	1157	178	15.41
15	25	1157	115	9.92
20	25	1157	179	15.44
30	25	1157	189	16.35
10	26	640	32	5.00
15	26	640	39	6.04
20	26	640	68	10.55
30	26	640	482	75.27
10	27	1429	184	12.89
15	27	1429	143	9.99
20	27	1429	239	16.75
30	27	1429	459	32.11
10	28	1368	222	16.24
15	28	1368	171	12.50
20	28	1368	237	17.34
30	28	1368	289	21.13

Indirect impacts from oil and gas development would include changes in the hydrologic function of soil on a landscape scale can increase the peak flow of storm events. This higher volume of surface runoff over shorter time periods would reduce soil stability, on hillsides, in channels, and other areas with sensitive or fragile soil. The new construction of access roads on soil would increase accessibility to areas that are currently only accessible by foot or horse which may increase vehicle use for recreation in the leased Area. The indirect impact of increased user created routes and would likely result in additional soil disturbance, erosion and lost soil productivity in some areas. Impacts would be more pronounced if the increased development corresponds to fragile soil or steep slopes.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location. If chemicals being used during the hydraulic fracturing process were spilled on the

location potential to pollute or change the soil chemistry could exist. A more site specific analysis would take place during the APD review and subsequent NEPA analysis. There also is the additional surface disturbance to the soils associated with the increase in hydraulic fracturing equipment.

Potential Mitigation: The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation of the well pads. Soil impacts would be remedied upon reclamation of well pads when this stockpiled soil that was specifically conserved to establish a seed-bed is spread over well pads and vegetation re-establishes.

Reserve pits would be re-contoured and seeded. Upon abandonment of wells and/or when access roads are no longer in service the Authorized Officer would issue instructions and/or orders for surface reclamation/restoration of disturbed areas

Road construction requirements and regular maintenance would alleviate potential impacts to access roads from water erosion damage. It is recommended to use chemical to suppressants dust, and implementing the golden book direction on BMP methods. Conditions of approval would be attached to APDs to limit use of roads by the operator during wet and muddy periods.

4.3.10 Water Resources

4.3.10.1 Floodplains

The act of leasing Federal minerals produces no impacts to floodplains. However, the subsequent development of parcels will produce impacts in the form of surface disturbance. Surface disturbance from development of well pads, access roads, pipelines and power lines can result in impairment of floodplain values from removal of vegetation, wildlife habitat, impairment of water quality, decreased flood water retention and ground water recharge. Further, any impairment to the floodplains would likely affect the riparian and stream function.

Potential Mitigation: Stipulation LC-52 CSU is applied to certain parcels to protect resources such as 100 year floodplains within areas that contain these features. The stipulation would prohibit surface disturbance within up to 200 meters of the outer edge of a 100-year floodplain, to protect the ecological and physical integrity of those floodplains. Other potential mitigation measures include: The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation of the well pads. Reserve pits would be re-contoured and seeded. Upon abandonment of the wells and/or when access roads are no longer in service the Authorized Officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas

4.3.10.2 Water Quality: Surface and Groundwater

While the act of leasing a parcel would produce no impacts, subsequent development would lead to surface disturbance. Construction of well pads, access roads, pipelines, and power lines can result in degradation of surface water quality and groundwater quality from non-point source pollution, increased soil losses, and increased gully erosion.

Surface Water: Potential direct impacts that could occur due to construction of well pads, access roads, pipelines, and power lines include increased surface water runoff and off-site sedimentation as a result of soil disturbance: increased salt loading and potential water quality impairment of surface waters;

channel morphology changes due to road and pipeline crossings; and possible contamination of surface waters by produced water and/or petroleum products. The magnitude of these impacts to water resources would depend on the volume of pollutants, proximity of the disturbance to the drainage channel and playas, slope, aspect and gradient, degree and area of soil disturbance, soil character, duration and time within which construction activity would occur and the timely implementation and success or failure of mitigation measures.

Direct impacts would likely be greatest shortly after the start of construction activities and would decrease in time due to natural stabilization, and reclamation efforts. Construction activities would occur over a relatively short period; therefore, the majority of the disturbance would be intense but short lived. Direct impacts to surface water quality for parcels located outside the Tularosa Creek Watershed would be minor and would primarily occur during storm flow events. These impacts could be mitigated by the implementation of Best Management Practices (BMP) that would design facilities with temporary runoff control measures that would slow down runoff and capture sediment and contain any spills. These BMP's would be included at the APD stage to address site specific conditions based on submitted Surface Use and Drilling Plans. Chemicals, or other fluids, accidentally spilled or leaked during the development process could result in the contamination of both ground and surface waters if BMPs are not successful.

For Parcels 5, 8, 9, 10, 11, 17, 18, 19, 20, 21, and 22 that are located within the Tularosa Creek Watershed, surface disturbance from construction activities could increase sediment loads to the Tularosa Creek during storm events. This could impair water quality in the creek itself for a relatively short period of time. However, the impacts to water quality from increases in storm produced sediments could be more significant to the water supply of the Village of Tularosa. A spill from a well pad located within these parcels would significantly impact water quality if the spilled material reached the Creek, which could kill aquatic species and riparian vegetation in the Tularosa Creek as well as pollute a municipal water supply for the Village of Tularosa. Dependent upon the type, location and volume of the spill; contamination of the Tularosa Creek may be immediate or occur over a longer period of time through high rainfall events and erosion. While BMPs could decrease the likelihood for off-site migration of sediments and spills, a failure of the mitigation measures would be detrimental to aquatic species, riparian habitat, and a municipal water supply. Landscape characteristics such as slope, soil type, and a high number of tributaries of Tularosa Creek increase the likelihood that a spill would contaminate the creek. Authorization of development projects would be further analyzed at the APD stage and require full compliance with BLM directives and stipulations that relate to surface and groundwater protection.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location. If the well location was within close proximity to water sources a potential impact to the waters could arise due to the chemicals being used during the hydraulic fracturing process. A more site specific analysis would take place during the APD review and subsequent NEPA analysis. There also is the potential for illegal dumping of waste products into fresh water pits used during the hydraulic fracturing purposes. If this illegal dumping was to occur there is the potential to impact migratory birds and other wildlife species.

Groundwater: 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 and drilling fluids used in drilling activities to be introduced into the water producing formations without proper casing and cementing of the well bore. Site specific conditions and drilling practices determine the probability of this occurrence and determine the groundwater resources that could be impacted. Additionally, hydraulic

fracturing of oil and gas wells could result in new fractures connecting with established natural fractures, faults, or improperly plugged dry or abandoned wells, forming a pathway for gas or contaminants to migrate underground which would potentially pose a risk to water quality and likely contaminate ground water. 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 could also introduce chemical additives into the producing formations, thus changing the chemical properties of the formation. 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 would 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 fresh ground water resources is less likely. Casing along with cement is extended well beyond fresh-water zones for the purpose of significantly increasing the likelihood that drilling and hydraulic fracturing fluids remain within the well bore and do not enter groundwater. Potential impacts to ground water quality at site specific locations would be analyzed through the NEPA review process at the development stage when an APD is submitted. This process includes geologic and engineering reviews to ensure that cementing and casing programs are adequate to protect all down hole resources, and that all water use would to comply with New Mexico state water rights regulations. A source of water would need to be secured by industry that would not adversely impact other resources. Impacts to water quantity would be analyzed in a NEPA analysis when an APD is submitted. In addition, BLM inspectors witness all drilling completions to ensure that well bores and constructed and cemented properly. This greatly limits the possibility of contamination.

The water used for hydraulic fracturing generally comes from permitted groundwater wells. Because large volumes of water are needed for hydraulic fracturing, the use of groundwater for this purpose might contribute to the drawdown of groundwater aquifer levels. Groundwater use is permitted and managed by the New Mexico Office of the State Engineer, and these water rights have already been designated. In addition, the use of water for hydraulic fracturing is one of many uses of groundwater. Other uses include irrigation, industrial mining operations, and domestic and livestock use.

Potential Mitigation: Use of plastic-lined reserve pits would reduce or eliminate seepage of drilling fluid into the soil and eventually reaching groundwater. Spills or produced fluids (e.g., saltwater, oil, and/or condensate in the event of a breach, overflow, or spill from storage tanks) would be cleaned up immediately via excavation or other means. Casing and cementing requirements imposed on proposed wells, along with BLM enforcement of these requirements through the inspection and enforcement program would reduce or eliminate the potential for groundwater contamination from drilling muds and other surface sources. All appropriate standards and guidelines outlined in the BLM- Gold Book (2007) would be followed.

4.3.10.3 Watershed

While the act of leasing a parcel would produce no impacts, subsequent development parcels would result in long and short-term alterations to the hydrologic regime. Surface flows of ephemeral streams would be directly affected by an increase in impervious surfaces resulting from the construction of the well pad and road. Potential hydrologic effects to peak flow is reduced infiltration where surface flows can move

quickly during overland flow and to ephemeral streams, causing peak flow to occur earlier and to be larger. Increased magnitude and volume of peak flow can cause bank erosion, rill and gully formation, channel widening, downward incision, and disconnection from the floodplain.

For Parcels 5, 8, 9, 10, 11, 17, 18, 19, 20, 21, and 22 that are located within the Tularosa Creek Watershed, surface disturbance from construction activities could increase sediment loads to the Tularosa Creek during storm events. This could impair water quality in the creek itself for a relatively short period of time. However, the impacts to water quality from increases in storm produced sediments could be more significant to the water supply of the Village of Tularosa. A spill from a well pad located within these parcels would significantly impact water quality if the spilled material reached the creek, which could kill aquatic species and riparian vegetation in the Tularosa Creek as well as pollute a municipal water supply for the Village of Tularosa. Dependent upon the type, location and volume of the spill; contamination of the Tularosa Creek may be immediate or occur over a longer period of time through high rainfall events and erosion. While BMPs could decrease the likelihood for off-site migration of sediments and spill material, a failure of the mitigation measures would be detrimental to aquatic species, riparian habitat, and a municipal water supply. Landscape characteristics such as slope, soil type, and a high number of tributaries of Tularosa Creek increase the likelihood that a spill would contaminate the creek.

Depending upon the water source, extraction of large quantities of water necessary for well drilling and hydraulic fracturing could negatively impact other domestic wells, springs and seeps, and riparian zones. Additionally, if groundwater is extracted within or near these parcels, the groundwater table could be lowered. This could induce further down-cutting of the arroyos, form new channels, and increase dissection of overland flows; which would decrease soil moisture and hinder vegetative growth.

Long-term direct and indirect impacts to the watershed and hydrology would continue for the life of wells and would decrease once all well pads and road surfacing material has been removed and reclamation of well pads, access roads, pipelines and power lines has taken place. Short-term direct and indirect impacts to the watershed and hydrology from access roads that are not surfaced with material would occur and would likely decrease in time due to reclamation efforts.

Potential Mitigation:

Stipulation LC-52-CSU (Controlled Surface Use: Streams, Rivers, and Floodplains) will be attached to parcels 004, 006, 008, 010, 012, 014, 017, 021, 022, 023, 024, 025, 026, 027 and 028, to protect water resources and landscape features dependent upon water resources. This stipulation would prohibit surface disturbance within 200 m of the outer edge of ephemeral channels which are tributaries of perennial waters, springs and wetland/riparian zones.

Other potential mitigation measures include:

The operator would stockpile the topsoil from the surface of well pads which would be used for surface reclamation of the well pads. Reserve pits would be re-contoured and seeded. Upon abandonment of the wells and/or when access roads are no longer in service the Authorized Officer would issue instructions and/or orders for surface reclamation/restoration of the disturbed areas.

4.3.11 Vegetation

There would be no direct effects to vegetative resources from the sale of the lease parcels. Subsequent exploration/development of the proposed leases would have indirect impact to vegetation and would depend on the vegetation type, the vegetative community composition, soil type, hydrology, and the topography of the parcels. Oil and gas development surface-disturbing activities could affect vegetation

by destroying the vegetation, churning soils, loss of substrates for plant growth, impacting biological crusts, disrupting seed banks, burying individual plants, reduction of germination rates, covering of plants with fugitive dust, and generating sites for undesirable weedy species. In addition, development could reduce available forage or alter livestock distribution leading to overgrazing or other localized excess grazing impacts to palatable plant species. If these impacts occurred after seed germination but prior to seed set, both current and future generations could be affected.

Vegetation would be lost within the construction areas of pads, roads, and rights-of-ways. Those areas covered in caliche, such as pads and roads, would have no vegetation for the life of the well. Rights-of-ways could re-vegetate in one to two years with proper reclamation and adequate precipitation. Inadequate precipitation over several growing seasons could result in loss of vegetative cover, leading to weed invasion and deterioration of native vegetation.

Infestations of noxious weeds could have a significant impact on biodiversity and natural ecosystems. Noxious weeds affect native plant species by out-competing native vegetation for light, water and soil nutrients. Furthermore, noxious weeds can negatively affect livestock by making forage either unpalatable or toxic, thus decreasing livestock productivity and potentially increasing producers' feed and animal health care costs. Noxious weeds also affect recreational uses, and reduce realty values of both the directly impacted and adjacent properties.

Potential impacts from the hydraulic fracturing of a well could arise from the chemicals that are used at the well pad location. If chemicals being used during the hydraulic fracturing process were spilled on the location or nearby vegetation it could potentially pollute or damage the nearby vegetation. A more site specific analysis would take place during the APD review and subsequent NEPA analysis.

Potential Mitigation: Mitigation is primarily deferred to site-specific development at the APD stage. If potential wells are productive disturbed areas not needed for the production facility would be reclaimed. In the case of non-productive wells, all disturbed areas should be reclaimed through seeding or vegetative cover reestablishment. BMPs identified in BLM guidance documents such as the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development: The Gold Book (USDI, 2007) recommends areas to be restored with native vegetation in regards to both species and structure.

4.3.12 Livestock Grazing

While the act of leasing Federal minerals would produce no direct impacts to livestock grazing, subsequent development of a lease may produce impacts. Oil and gas development could result in a loss of vegetation for livestock grazing (e.g., direct removal, introduction of unpalatable plant species, etc.), decrease the palatability of vegetation due to fugitive dust, disrupt livestock management practices, impact existing range improvements (fences, pipelines, troughs, storage tanks), involve vehicle collisions, and decrease grazing capacity. 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.

Potential impacts from the hydraulic fracturing of a well could impact grazing allotments if the grazing permittee chose to sell fresh water to the operator of an oil and gas well and they did not have enough water present to water their livestock. A more site specific analysis would take place during the APD review and subsequent NEPA analysis.

Potential Mitigation: Mitigation would be addressed at the site-specific APD stage of exploration and development. 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 could potentially include controlling livestock movement by maintaining fence line integrity, fencing of facilities, re-vegetation of disturbed sites, installation of cattle guards, repair and or replacement of existing range improvements, and fugitive dust control.

4.3.13 Visual Resources

Visual resource management is broken into four VRM classes. VRM classes for the nominated parcels are Classes II, III and IV.

The VRM Class III objective is to partially retain existing landscape character. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate a casual observer's view. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. Facilities, such as produced water, condensate or oil storage tanks that rise above eight feet, would provide a geometrically strong vertical and horizontal visual contrast in form and line to the characteristic landscape and vegetation, which have flat, horizontal to slightly rolling form and line. The construction of an access road, well pad and other ancillary facilities, other than facilities greater in height than eight feet, would slightly modify the existing area visual resources. Facilities, such as condensate and produced water or oil storage tanks that rise above eight feet, would provide a geometrically strong vertical and horizontal visual contrast in form and line to the characteristic landscape and vegetation, which have flat, horizontal to slightly rolling form and line. Under visual resource Class III, the method for repeating the basic elements would be to remove strong vertical and horizontal contrast through use of low-profile facilities as reflected in the Mimbres RMP. Depending on the production nature of the well site, multiple low-profile condensate and/or oil or produced water tanks would be necessary to accommodate the project. Through color manipulation, by painting well facilities to blend with the rolling to flat vegetative and/or landform setting with a flat gray-green color, the view is expected to favorably blend with the form, line, color and texture of the existing landscape. The flat color Olive Drab from the supplemental environmental colors also closely approximates the gray green color of the setting. All facilities, including the meter building, would be painted this color. Cumulative adverse visual impacts can be avoided by gradually moving into a more appropriate vegetative/landform setting color scheme. Facilities with low-profile horizontal line and form would facilitate favorable blending as older facilities go out of production and are removed.

The VRM Class IV objective is to provide for management activities which require major modification of the existing landscape character. Every attempt, however, should be made to reduce or eliminate activity impacts through careful location, minimal disturbance, and repeating the basic landscape elements. Facilities, such as condensate and produced water or oil storage tanks that rise above eight feet, would provide a geometrically strong vertical and horizontal visual contrast in form and line to the characteristic landscape and vegetation, which have flat, horizontal to slightly rolling form and line. The construction of an access road, well pad and other ancillary facilities would slightly modify the existing area visual resources. Through color manipulation, by painting well facilities to blend with the rolling to flat vegetative and/or landform setting with a gray-green color. The view is expected to favorably blend with the form, line, color and texture of the existing landscape. The flat Olive Drab from the supplemental environmental colors also closely approximates the gray green color of the setting. All facilities, including the meter building, would be painted this color. Cumulative adverse visual impacts can be avoided by gradually moving into a more appropriate vegetative/landform setting color scheme.

Through color manipulation, by painting well facilities to blend with the rolling to flat vegetative and/or landform setting with a gray-green view is expected to favorably blend with the form, line, color and texture of the existing landscape

Potential Mitigation: The authorized officer will determine what color from the Standard Environmental Colors Chart is to be used on all facilities to closely approximate the vegetation within the setting. All facilities, including the meter building, would be painted this color. If the proposed area is in a scenic corridor a low profile tank less than eight feet in high may be recommended for the proposed action.

4.3.14 Recreation

While the act of leasing Federal minerals produces no impacts, subsequent development of a lease would generate impacts to recreation activities. Public land that is small or land-locked by private or state land, potential recreation opportunities would be limited or non-existent due to land patterns. In isolated tracks of public land that generally do not have access through state land or county or state roads, oil and gas activities would have little or no effect on recreational opportunities in this area, except displacing wildlife and degrading hunting quality in the area. In larger blocks of public land, recreation activities that could occur are limited to access from BLM land, county roads or through state land during hunting seasons.

In addition, any recreationists in the area may be disturbed while hydraulic fracturing or other completion and stimulation operations are occurring, as these activities involve many vehicles, heavy equipment, and a workover rig. These impacts would be limited to the timeframe during which drilling operations associated with hydraulic fracturing occur, typically several weeks.

Potential Mitigation: Mitigation would be addressed at the site-specific APD stage of exploration and development. Measures would be taken to prevent, minimize, or mitigate impacts to recreation from exploration and development activities.

4.3.15 Lands & Realty Impacts

Leasing of these nominated parcels would create a need for legal access in order for the operator to conduct exploration and drilling processes.

Potential Mitigation: The operator would be required to apply for and obtain a right-of-way over public land for legal access on lands outside of the oil and gas lease. Site-specific information on access roads would be analyzed during an APD process. A ROW application would be required to be filed with the Las Cruces District Office. Special ROW stipulations would apply.

4.3.16 Cave/Karst

Tracts proposed for leasing may be located in a low, medium or high karst potential area. If the lease is in a low karst potential area there may be very little challenges in producing petroleum products from this location. If the proposed lease is in a medium or high karst potential area there could be the potential of adverse impact to known cave entrances or karst features present within the lease area. Leasing does not in and of itself cause an impact to a cave or karst.

Potential Mitigation: Mitigation would be addressed at the site-specific APD stage of exploration and development if caves or karst features exist. Measures would be taken to prevent, minimize, or mitigate impacts to caves and karst features from exploration and development activities.

4.3.17 Lands with Wilderness Characteristics

Although leasing does not in and of itself cause impacts to wilderness characteristics, tracts for leasing may be located in areas with potential to have wilderness characteristics. If wilderness characteristics are found to be present, there would be potential for these characteristics to be impacted. An updated and sufficient inventory of these areas is necessary before leasing any parcel

Potential Mitigation: Mitigation measures would be required if the proposed alternative is selected. Mitigation measures would be addressed at the site-specific APD stage of exploration and development, if wilderness characteristics exist. Measures may be taken to prevent, minimize, or mitigate impacts to the wilderness characteristics from exploration and development activities

4.4 Cumulative Impacts

The NMSO manages approximately 41 million acres of Federal mineral estate. Of the 41 million acres, 35 million acres are available for oil and gas leasing. Approximately 16% of the 35 million acres is currently leased (73% of the leases are in production and 63% of the lease acres are in production). The NMSO received 236 parcel nominations (178,793 acres) for consideration in the January 14, 2013 Oil & Gas Lease Sale, and is proposing to lease 106 (73,642 acres) of the 236 parcels. If these 106 parcels were leased, the percentage of Federal minerals leased would change by 1%. The Carlsbad, Farmington, Las Cruces, Oklahoma (Kansas, Texas and Oklahoma) Rio Puerco and Roswell Field Office parcels are analyzed under separate EAs.

Table 5A. Actual - Acres of Federal Minerals/Acres Available/Acres Leased:

State	Federal O&G Mineral Ownership	Acres Available	Acres Leased	Percent Leased
KS	744,000	614,586	125,091	20%
NM	34,774,457	29,751,242	4,839,255	16%
OK	1,998,932	1,668,132	324,072	19%
TX	3,404,298	3,013,207	425,511	14%
Totals/Average	40,921,687	35,058,167	5,713,929	16%

Table 5B. Parcels Nominated & Offered in the January 2014 Oil & Gas Lease Sale:

Field Office	No. of Nominated Parcels	Acres of Nominated Parcels	No. of Parcels to be Offered	Acres of Parcels to be Offered
Carlsbad	34	12,302	20	4,981
Farmington	38	19,103	4	1,200
Kansas	1	120	1	120
Las Cruces	27	31,743	23	27,779
Oklahoma	11	657	10	617

Rio Puerco	76	74,650	0	0
Roswell	5	4,926	5	4,926
Texas	44	35,292	43	34,019
Totals	236	178,793	106	73,642

Table 5C. Foreseeable - Acres of Federal Minerals/Acres Available/Acres Leased:

State	Federal O&G Mineral Ownership	Acres Available	Acres Leased	Percent Leased
KS	744,000	614,586	125,211	20%
NM	34,774,457	29,751,242	4,878,141	16%
OK	1,998,932	1,668,132	324,689	19%
TX	3,404,298	3,013,207	459,530	15%
Totals/Average	40,921,687	35,067,167	5,787,571	17%

4.5.1 Cumulative Effects on Air Resources

The following analysis of cumulative impacts of the proposed action on air quality would be limited to Otero County, New Mexico. The cumulative impacts of GHG emissions and their relationship to climate change are evaluated at the national and global levels in the Air Resource Technical Report (USDI BLM 2011).

4.5.2 Effects of Other Past, Present, and Reasonably Foreseeable Actions on Air Resources

The primary activities that contribute to air pollution and GHG emissions in Otero County include vehicle travel and non-road mobile equipment (EPA, 2011). The Air Resources Technical Report includes a description of the varied sources of national and regional emissions that are incorporated here to represent the past, present and reasonably foreseeable impacts to air resources (USDI BLM 2013). It includes a summary of emissions on the national and regional scale by industry source. Sources that are considered to have notable contributions to air quality impacts and GHG emissions include electrical generating units, fossil fuel production (nationally and regionally) and transportation.

4.5.3 Cumulative Effects of the Proposed Action on Air Resources

4.5.3.1 Cumulative Effects of the Proposed Action on Air Quality

The very small increase in emissions that could result from approval of the proposed action would not result in any locations in Otero County exceeding the NAAQS for any criteria pollutants. The applicable regulatory threshold for HAPs is the oil and gas industry National Emissions Standards for Hazardous Air Pollutants, which are currently under review by the EPA. The emissions from the proposed well are not expected to impact any criteria pollutant concentrations in Otero County.

4.5.3.2 Cumulative Effects of the Proposed Action on Climate Change

The very small increase in GHG emissions that could result from approval of the proposed action would not produce climate change impacts that differ from the No Action Alternative. This is because climate change is a global process that is impacted by the sum total of GHGs in the Earth's atmosphere. The incremental contribution to global GHGs from the proposed action cannot be translated into effects on

climate change globally or in the area of this site-specific action. It is currently not feasible to predict with certainty the net impacts from the proposed action on global or regional climate.

The Air Resources Technical Report (USDI BLM, 2013) discusses the relationship of past, present and future predicted emissions to climate change and the limitations in predicting local and regional impacts related to emissions. It is currently not feasible to know with certainty the net impacts from particular emissions associated with activities on public lands.

5 Consultation/Coordination

This section includes individuals or organizations from the interdisciplinary team that were contacted during the development of this document.

6 List of Preparers

Joseph Navarro, Environmental Protection Specialist
Kendrah Penn, Realty Specialist
Corey Durr, Hydrologist
Jennifer Montoya, Planning and Environmental Coordinator
Lisa Phillips, Rangeland Management Specialist
David Legare, Archaeologist
Mohammad Nash, Soil Scientist/Hydrologist
Oswaldo Gomez, Outdoor Recreation Planner
Joe Sanchez, Natural Resource Specialist
Kathryn Lloyd-Wilderness
John Thacker-Paleontological Coordinator
Vanessa Duncan, Hazardous Materials
Patrick Moran, Geologist
Mark Hakkila, Wildlife Biologist
Ray Hewitt, GIS Specialist
Donald Maki, GIS Specialist
Mary Uhl, NMSO Environmental Protection Specialist – Air Resources

8 Public Involvement

The parcel and applicable stipulations were posted online for a two-week public scoping period beginning on July 22, 2013. In addition, this EA will be made available for public review and comment for 30 days beginning on September 3, 2013.

A State Director Parcel Review was held at the New Mexico State Office in Santa Fe on July 31st 2013. In attendance was Deputy State Director Aden Seidlitz, Rebecca Hunt, Sarah Scott, Gloria Baca, Anna Rudolph, Jay Spielman, Melanie Barnes, and Dave Goodman. In attendance from the LCDO was Assistant District Manager David Wallace, Dony Maki, Corey Durr, Mohammad Nash and Joseph Navarro.

9 References

Environmental Protection Agency. 2013. Air Data: Air Quality Index Report. http://www.epa.gov/airdata/ad_rep_aqi.html

Environmental Protection Agency. 2011. Technology Transfer Network: Clearinghouse for Inventories and Emissions Factors. <http://www.epa.gov/ttn/chief/einformation.html>.

Environmental Protection Agency. 2011a. 2005 National-Scale Air Toxics Assessment. Summary of Results. <http://www.epa.gov/ttn/atw/nata2005>.

Environmental Protection Agency. 2010a. The Green Book Non Attainment Areas for Criteria Pollutants. <http://www.epa.gov/airquality/greenbk/> (Accessed 3/03/2011).

Environmental Protection Agency, Washington, D.C., EPA Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006.

EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2008. EPA 430-R-10-006, <http://www.epa.gov/climatechange/emissions/usinventoryreport.html>.

Environmental Protection Agency, Washington, D.C., Natural Gas Star Program (2006 data) at: <http://www.epa.gov/gasstar/accomplish.htm>.

New Mexico Oil Conservation Division. 2010b. Statistics, Production Summary Report. Available at <http://www.emnrd.state.nm.us/ocd/statistics/Production/ProductionSummaryReport.aspx>

Peddie, W. A. 1993. New Mexico Vegetation: Past, Present and Future. University of New Mexico Press.

Railey & Holmes (2002)

Rustay and Norris (2007). New Mexico Bird Conservation Plan.

Scholle, P. A., 2003, Geologic Map of New Mexico, 1:500,000: New Mexico Bureau of Geology and Mineral Resources.

U.S. Department of the Interior, Bureau of Land Management. 1986. White Sands Approved Resource Management and Plan Record of Decision. Las Cruces, New Mexico.

USDI. BLM. 2013. Air Quality Technical Report. New Mexico State Office. http://www.blm.gov/nm/st/en/prog/more/air_resources/air_resources_technical.html.

9.1 Authorities

- Code of Federal Regulations (CFR) 3100
- 40 CFR All Parts and Sections inclusive Protection of Environment, Revised as of July 1, 2001.
- 43 CFR, All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2000.
- U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

Appendix 1. LAS CRUCES DISTRICT LEASE STIPULATION SUMMARY

Stipulation	Description/Purpose
LC-14-CSU	<p>CONTROLLED SURFACE USE – THREATENED & ENDANGERED SPECIES HABITAT</p> <p>The lease area contains special values, is needed for special purposes or requires special attention to prevent damage to surface resources. Surface use or occupancy within the lease will be strictly controlled.</p>
LC-48-TCP	<p>TRADITIONAL CULTURAL PROPERTIES</p> <p>The lease may 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. Ground disturbing activities will not be approved if they affect any such properties or resources until obligations under applicable requirements of the NHPA and other authorities have been completed.</p>
LC-52-CSU	<p>FLOODPLAINS , RIPARIAN ZONES, STREAMS AND SPRINGS</p> <p>No surface disturbance within up to 200 meters of the outer edge of a 100-year floodplains to protect the ecological and physical integrity of these features</p>
LC-54-LN	<p>RANGE MONITORING PLOT OCCURRENCE</p> <p>This lease contains rangeland monitoring plot(s) which may require avoidance from any surface disturbing activities.</p>
NM-LN-11	<p>LEASE NOTICE – CULTURAL RESOURCES</p> <p>All development activities proposed under the authority of this lease are subject to compliance with Section 106 of the National Historic Preservation Act and Executive Order 13007. Compliance could require intensive cultural resource inventories, Native American consultation and mitigation measures to avoid adverse effects.</p>
WO-ESA-7	<p>CONSULTATION STIPULATION</p> <p>The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. 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. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 <i>et seq.</i>, including completion of any required procedure for conference or consultation.</p>
LC-7-NSO	<p>No surface occupancy or other activity on the surface in order to protect recreational opportunities along the Tularosa River:</p>

Appendix 2. New Stipulations

LC-XX-CSU

CONTROLLED SURFACE USE

SENSITIVE AND FRAGILE SOIL AND SLOPES STIPULATION

Surface occupancy or use is subject to the following special operating constraints:

Surface disturbance will not be allowed on slopes over 30 percent. Exceptions will be considered for authorized mineral material extraction sites and designated OHV areas, for the installation of projects designed to enhance or protect renewable natural resources, or if a plan of operating and development which provides for adequate mitigation of impacts was approved by the Authorized Officer. Occupancy or use of soil or slope determined to be sensitive and/or fragile will be considered on a case-by-case basis.

On the land described below:

All Land in Lease.

For the purpose of:

Protecting slopes and fragile soil resources preserved in landscapes susceptible to accelerated erosion.
Bureau of Land Management

January 2014

Las Cruces District Office

CONTROLLED SURFACE USE STIPULATION

PALEONTOLOGY

Surface occupancy or use is subject to the following special operating constraints:

~ Restrict vehicles to existing roads and trails.

~ A pedestrian survey must be conducted for paleontological material, using a qualified paleontologist as identified in BLM Handbook 8270, prior to any surface disturbing activity. A report on the results of the paleontological survey must be submitted and approved by BLM as part of the permit application for the proposed lease activity. The survey and report will be used to determine the presence of paleontological material, and if necessary, the appropriate treatments such as avoidance and/or project re-design during all phases of the proposed lease activity.

The lessee shall immediately notify the BLM Authorized Officer of any paleontological resources discovered as a result of operations under this authorization. The lessee shall suspend all activities in the vicinity of such discovery until notified to proceed by the Authorized Officer and shall protect the discovery from damage or looting. The Authorized Officer will evaluate, or will have evaluated, such discoveries after being notified. Appropriate measures to mitigate adverse effects to significant paleontological resources will be determined by the Authorized Officer after consulting with the operator. Upon approval of the Authorized Officer, the operator will be allowed to continue construction through the site, or will be given the choice of either (1) following the Authorized Officer's instructions for stabilizing the fossil resource in place and avoiding further disturbance to the fossil resource, or (2) following the Authorized Officer's instructions for mitigating impacts to the fossil resource prior to continuing construction through the project area.

On the lands described below:

For the purpose of: Protecting paleontological resources.

If circumstances or relative resource value change or if it can be demonstrated that oil and gas operations can be conducted without causing unacceptable impacts, this stipulation may be waived, excepted, or modified by the BLM Authorized Officer, if such action is consistent with the provisions of the *Las Cruces District Office* Resource Management Plan as amended, or if not consistent, through a land use plan amendment and associated National Environmental Policy Act analysis document. If the BLM Authorized Officer determines that the waiver, exception, or modification is substantial, the waiver, exception, or modification will be subject to a 30-day public review period.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes.

Appendix 3. Lands with Wilderness Characteristics Survey

1. Is there existing BLM wilderness inventory information on all or part of this area?

No Yes (if more than one unit is within the area, list each name/number):

a) Inventory Source: Summary Wilderness Review New Mexico April 1979

b) Inventory Unit Name(s)/Number(s): NM-030-179

c) Map Name(s)/Number(s): Otero County Initial Inventory

d) BLM District(s)/Field Office(s): Las Cruces District Office

2. BLM inventory findings on record:

Existing inventory information regarding wilderness characteristics (if more than one BLM inventory unit is associated with the area, list each unit and answer each question individually for each inventory unit):

Inventory Source:

Unit #/ Name	Size (historic acres)	Natural Condition?	Outstanding Solitude?	Outstanding Primitive & Unconfined Recreation?	Supplemental Values?
		Y/N NA	Y/N NA	Y/N NA	Y/N NA

3. Documentation of changes to the area since previous inventory:

Have any of the following conditions changed in the public lands of the project area since the last wilderness inventory or inventory update?

- Acquisitions (surface)
- Road decommissioning or abandonment
- Reclamation to natural state (agency initiated or natural)
- Removal of substantially noticeable human made features
- Other change relevant to wilderness characteristics _____

Check all boxes that apply