ENVIRONMENTAL ASSESSMENT FOR BURLINGTON RESOURCES OIL AND GAS COMPANY, LP Atlantic C 2C Well Pad and Pipeline Tie

BLM EA No. NM 2011-144

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Bureau of Land Management
Farmington Field Office
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BUREAU OF LAND MANAGEMENT
FARMINGTON FIELD OFFICE

ENVIRONMENTAL ASSESSMENT
FOR

BURLINGTON RESOURCES OIL AND GAS COMPANY, LP
ATLANTIC C 2C WELL PAD AND PIPELINE TIE

Chapter I – Introduction

Burlington Resources Oil and Gas Company, LP (Burlington), has filed an Application for Permit to Drill (APD) with the Bureau of Land Management (BLM) Farmington Field Office (FFO) for the construction, drilling, production, and final abandonment of a Blanco Mesaverde natural gas well, the proposed Atlantic C 2C. Enterprise Field Services, LLC (Enterprise), has proposed construction and operation of the associated pipeline tie. These two components constitute the Proposed Action. It is anticipated that upon approval of the APD, construction of the proposed well would commence. The proposed well would be drilled on private surface lands, with federal mineral rights leased under USA NM-0607, issued May 1, 1950.

The proposed project area (PPA) is located in the east-central portion of the San Juan Basin in San Juan County, northwestern New Mexico. It is approximately 8.3 miles northeast of the town of Aztec, New Mexico, 13.5 miles west of Navajo Dam, and 9.7 miles south of the Colorado-New Mexico state border (Figure 1.1). In general, the PPA would be accessed east of U.S. Highway 550 using existing improved roads branching from County Road 2770. The legal description of the proposed well is Section 35, Township 31 North, Range 10 West.

SWCA Environmental Consultants (SWCA) prepared a biological survey report (BSR) for the proposed well location, included in Appendix A. A complete set of survey plats, maps, and driving directions for the well are included in Appendix B. Additionally, Western Cultural Resource Management (WCRM) prepared a cultural resources inventory (CRI) report, which is on file with the BLM FFO and incorporated by reference.

This environmental assessment (EA) complies with the requirements of the National Environmental Policy Act (NEPA) of 1969 and federal regulations found in 40 Code of Federal Regulations (CFR), Chapter V, and 43 CFR 4.413. The project record contains an interdisciplinary analysis to support the findings in this document and is located at the BLM FFO. This EA analyzes the site-specific impacts associated with the Proposed Action and its alternatives, identifies mitigation measures to potentially reduce or eliminate those impacts, and provides agency decision-makers with detailed information upon which to approve or deny the Proposed Action or an alternative.

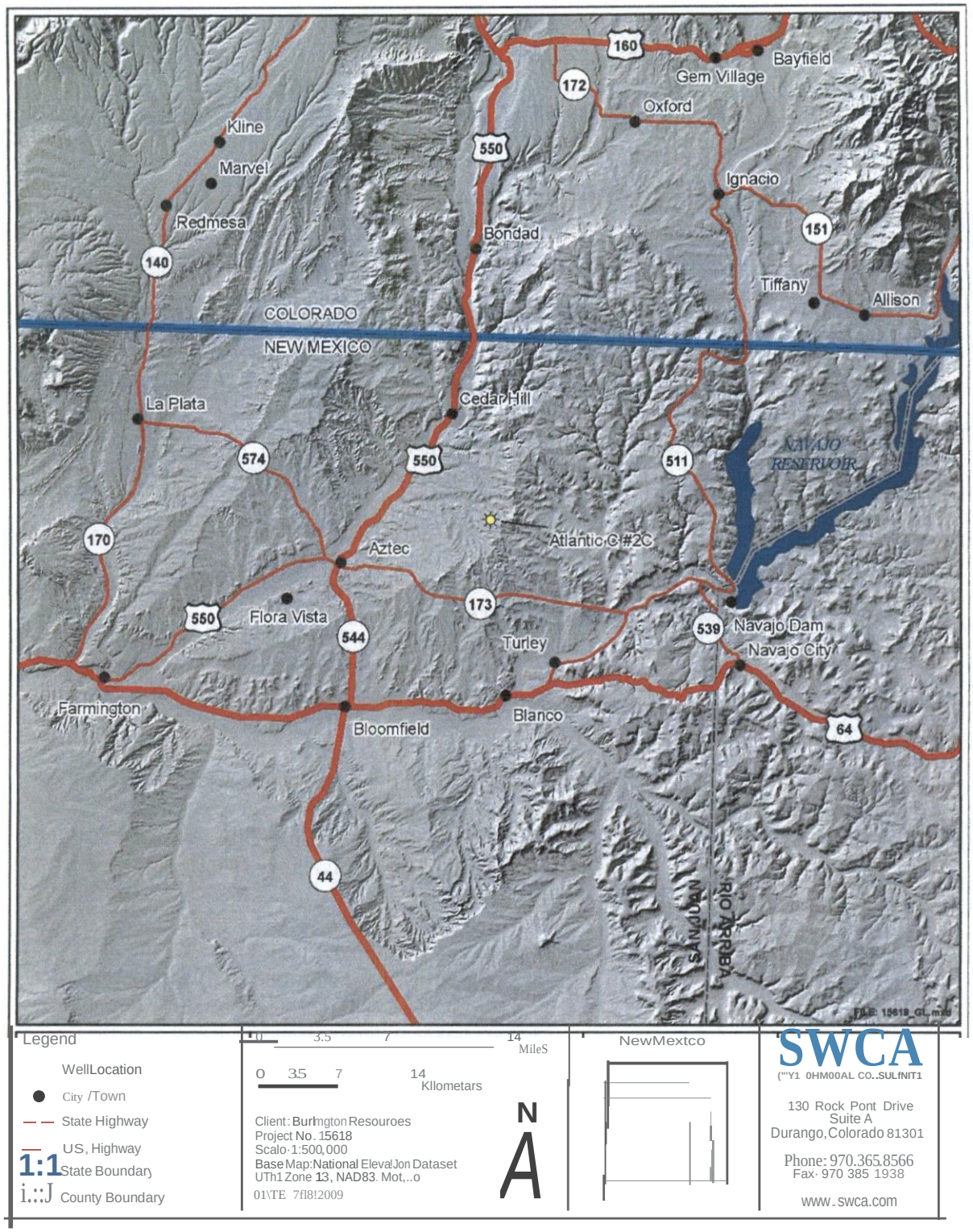

Figure 1.1. General location map.

I.I Decision to be Made

The Onshore Oil and Gas Order I (specifically 43 CFR Part 3160 subpart 3161.2) requires the BLM Responsible Official to approve, inspect, and administer operations subject to the regulation, and to require that all such operations, among other requirements, "be conducted in a manner which protects other natural resources and the environmental quality." This regulation establishes procedures for obtaining approval of an APD on existing onshore federal and Indian oil and gas leases and requires a specific Surface Use Plan of Operations (SUPO) for each APD submitted for approval. The SUPO must address 13 specific points concerning use ofthe surface (43 CFR Part 3160).

The analyses contained in this EA will provide information needed by the BLM Manager as the Responsible Official to determine whether the Proposed Action may have significant impacts and would require an environmental impact statement (ElS). If it is determined that the impacts would not be significant, the Responsible Official will decide what Conditions of Approval (COAs) will be required with the proposed SUPO. The Responsible Official must also determine whether the decision is in conformance with the BLM FFO's 2003 Resource Management Plan (RMP) (as amended) (BLM 2003a).

The BLM Responsible Official will decide:

- to approve the APD as submitted using the mitigation contained in the SUPO; or
- to approve the APD with additional modifications, mitigation, and COAs; or
- to not approve the APD and to analyze the effects in an EIS.

I.2 Purpose and Need

The BLM is considering approval of exploration and production of the subject lease because the activity is an integral part of the BLM's oil and gas leasing program under authority of the Mineral Leasing Act of 1920 (as amended), Federal Land Policy and Management Act of 1976, and Federal Onshore Oil and Gas Leasing Reform Act of 1987. An approved APD, issued by the BLM, would authorize Burlington to construct and drill the proposed well and install necessary facilities and ultimately to abandon the endeavor responsibly. The associated pipeline tie, authorized by the landowner through a surface-user agreement with Enterprise, would allow natural gas to be produced from tt"te proposed well.

Federal oil and gas lease USA NM-0607 conveys the right to use, in an environmentally responsible manner, the portion of the surface necessary to efficiently develop the leased federal minerals. The purpose of and need for the Proposed Action are to allow for development of the existing lease rights while protecting the surface resources to the maximum extent possible. The Proposed Action could help meet the public's increasing demand for oil and gas resources and would exercise Burlington's existing right to drill for, extract, remove, and market natural gas produced from the proposed well. As part of these valid existing rights, Burlington must also reclaim disturbed areas and strive to minimize impacts to other resources.

The Mineral Leasing Act of 1920, as amended, authorizes the BLM to issue federal oil and gas leases for mineral extraction. A federal lease is a binding legal contract that allows the leaseholder to develop the federal mineral estate, subject to the terms and stipulations of the lease

instrument and current laws and regulations. Oil and gas exploration and development are recognized as an appropriate use of public lands by the BLM FFO's 2003 RMP (BLM 2003a), which provides management direction for the leased area. The BLM will consider approval of the proposed drilling in a manner that avoids or reduces impacts to other resources, is consistent with the lease rights granted to the applicant, and prevents unnecessary or undue degradation of public lands, and protects the private surface as prescribed in the surface owner agreement.

1.3 Conformance with Applicable Land Use Plan

This EA addresses the resources and impacts on a site-specific basis as required by NEPA. Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific EA tiers to the information and analysis contained in the BLM FFO's Proposed Resource Management Plan and Final Environmental Impact Statement (PRMP/FEIS) (BLM 2003b). In particular, the cumulative impact analysis contained in the PRMP/FEIS, coupled with the level of development proposed by the Reasonably Foreseeable Development (RFD) scenario developed for the 2003 RMP, accounts for the broader impacts of oil and gas development (Engler et al. 2001). Tiering to a NEPA document that contains broader impact analysis allows the BLM to consider a more defined range of alternatives for the Proposed Action. Scoping conducted during the development of the RMP is also brought forward as it allows the BLM to focus on the site-specific issues or concerns of the Proposed Action.

The Proposed Action conforms to the objectives of the PRMP/FEIS, which states that it is "the policy of the BLM to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs" (BLM 2003b:2-l). The BLM FFO completed the RMP by signing the Record of Decision on September 29, 2003 (BLM 2003a). The RMP provides for the integrated multiple use and sustained yield of resources for the planning area.

By federal law, the government must abide by the terms, conditions, and provisions agreed to when federal lease USA NM-0607 was issued. The Council on Environmental Quality (CEQ) regulations (40 CFR 1500.3) state that parts 1500 through I 508 of this title provide regulations applicable to and binding for all federal agencies for implementing the procedural provisions of NEPA, "except where compliance would be inconsistent with other statutory requirements."

Recent changes in New Mexico Oil Conservation Division (NMOCD) regulations that were not in effect for consideration during the 2003 RMP process must also now be included in the analysis of natural gas development projects. Most relevant, 19.15.17 New Mexico Administrative Code (the "Pit Rule") regulates permitting, construction, operation, and subsequent closure of temporary pits within NMOCD District 3. The Proposed Action analyzed in this EA would be consistent with the Pit Rule and the applicable Memorandum of Understanding between the BLM FFO and NMOCD, signed May 5, 2009.

Additionally, the APD operators are required to:

> comply with all applicable federal, state, and local laws and regulations (a listing of selected federal laws and regulations applicable to the Proposed Action can be found in Appendix C);

obtain the necessary permits for the drilling, completion, and production of this well, including water rights appropriations, permits for the installation of water management facilities, water discharge permits, and relevant air quality permits; and

implement the Proposed Action in a way that is as consistent as possible with local, county, or state plans.

1.4 Scoping and Issues/Concerns

Appropriate scoping helps identify resources that could be impacted, reducing the chances of overlooking a potentially significant issue or reasonable alternative. The BLM has extensive experience with similar projects in the general vicinity of the PPA. Because extensive external scoping was completed during the PRMP/FEIS process, additional external scoping has not been conducted for this Proposed Action. Public involvement to raise any site-specific concerns for this Proposed Action has been initiated by posting the legal description of the PPA on the BLM FFO website. During the on-site inspection, attended by resource specialists familiar with the issues and resources of the area, including the landowner and representatives from BLM, SWCA, Enterprise, and Burlington, any relevant issues or concerns were discussed and subsequently brought forward for detailed analysis in this EA.

The following resources will be discussed in detail: air resources, cultural resources, invasive and non-native plant species, livestock grazing, migratory birds, mineral resources, Native American religious concerns, noise, paleontological resources, public health and safety, recreation, socioeconomics, soils, special management species, vegetation, visual resources, water quality (surface and ground), and wildlife. Required resource inventories for threatened and endangered species and cultural resources have been completed in support of this EA (see Appendix A).

1.5 Summary

This ohapter has presented the purpose of and need for the Proposed Action, as well as the relevant issues, i.e., those elements of the human environment that could be affected by the implementation of the Proposed Action. In order to meet the purpose and need in a way that resolves the relevant issues, the BLM has worked with the proponent to develop a Proposed Action alternative that already incorporates much of the necessary mitigation. This alternative and the No Action alternative are presented in Chapter 2. Chapter 3 presents the affected environment, but is limited to the discussion necessary to understand the effects of the alternatives. The potential environmental impacts or consequences resulting from the implementation of each alternative are then analyzed in Chapter 4.

Chapter 2 – Alternatives, Including the Proposed Action

The BLM has rigorously explored and objectively evaluated all reasonable alternatives that meet the underlying need for the Proposed Action and resolve any resource conflicts. The following discussion includes two alternatives: Alternative A – No Action, and Alternative B – Proposed Action. Under Alternative A, the proposed well would not be approved by the BLM; therefore, current uses in the PPA would continue. As such, this alternative provides baseline data and serves as the basis for analysis of potential resource impacts from Alternative B. Alternative B is Burlington's Proposed Action and includes several built-in mitigation measures, based upon experience with similar projects in the area.

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 activity would not be approved (BLM 2008a:52). This option is provided in 43 CFR 3162.3-1 (h)(2). Under this alternative, the BLM would deny the approval of the proposed APD, Burlington would retain its lease rights, and gas production in the area would continue at its current rate. If the APD is not approved, natural gas would not be extracted from the proposed well, the associated surface disturbance would not occur, and livestock grazing, hunting, and off-highway vehicle (OHV) uses in the area would continue to occur. The construction of the well and pipeline tie, production of natural gas from this well, and final abandonment of the well and pipeline would not occur. The No Action alternative is presented for baseline analysis of resource impacts.

2.2 Alternative B – Proposed Action

Project Description

Burlington proposes the drilling, production, and final abandonment of a Blanco Mesaverde gas well. Enterprise proposes construction and operation of the associated pipeline tie. The proposed well would be twinned on the existing Atlantic C 200 well pad (Figure 2.1). The proposed well location can be found on the Turley, New Mexico (1985) U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle map (USGS 2009). The PPA is located completely within San Juan County and on private surface lands with federal minerals administered by the BLM FFO. The surface location for Alternative B would be 1,426 feet from north line and 1,457 feet from east line of Section 35, Township 31 North, Range 10 West. The well pad (center stake) is at 6,425 feet above mean sea level (amsl). See Appendix B for a complete set of survey plats and maps for the Proposed Action.

The maximum disturbance associated with the Proposed Action would be approximately 2.82 acres. The proposed Atlantic C 2C well pad would be 230 x 300 feet in size with a 50-foot-wide construction zone around the perimeter of the well pad (no construction zone on rounded comer 2, see Figure 2.1), for a total of approximately 2.82 acres. Much of the new disturbance would overlap existing disturbance associated with the Atlantic C 200 well and facilities. The existing *teardrop-the* area currently in use for production of the Atlantic C 200 well— is approximately
1.0 acre. Therefore total new disturbance associated with the Proposed Action is approximately 1.82 acres. The 50-foot buffer and portions of the well pad not needed for production would be reclaimed after successful initiation of the well production phase. A new access road to the proposed well would not be required, due to its proximity to an existing road.

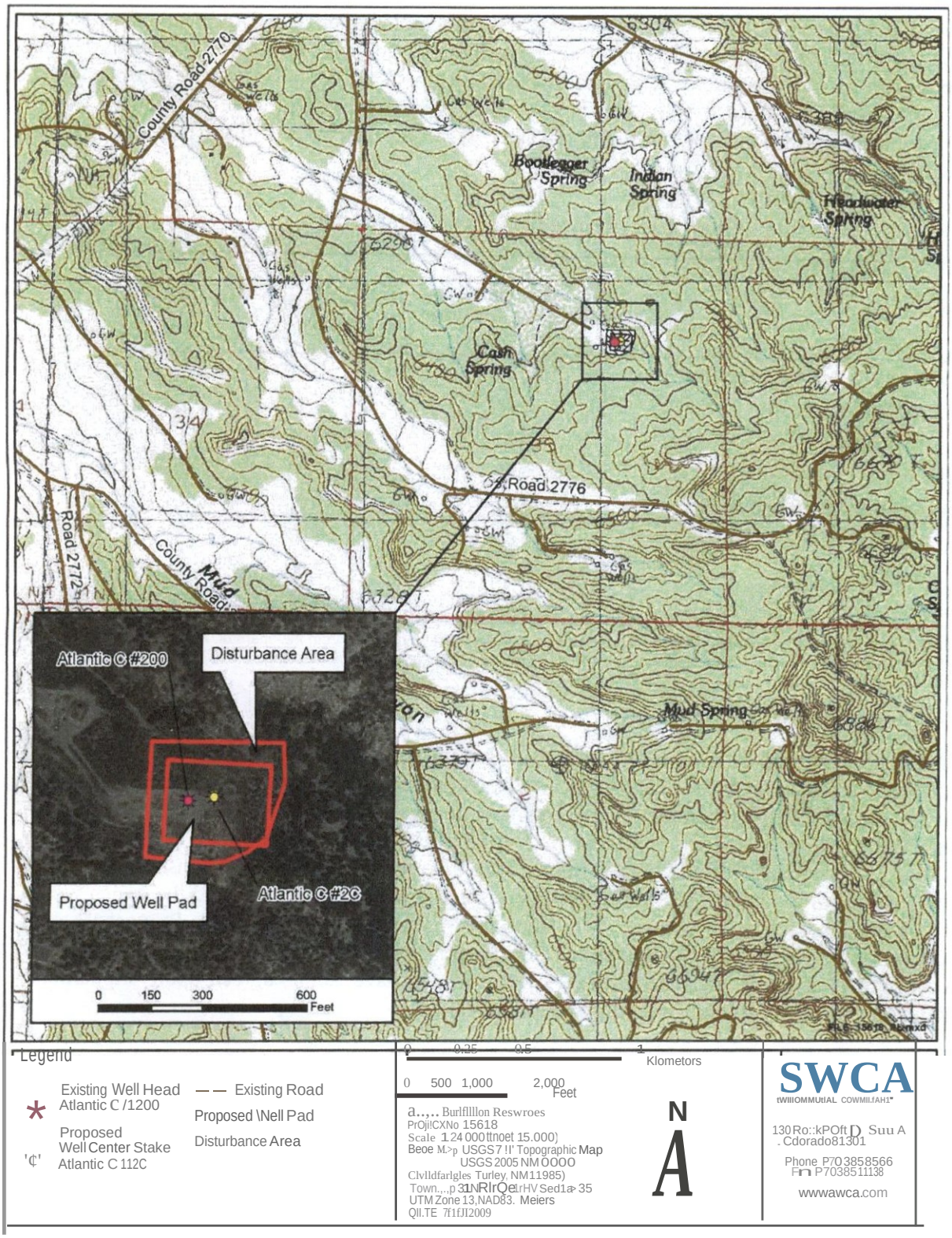

Figure 2.1. Project location map with aerial photograph inset.

Once the proposed Atlantic C 2C natural gas well is completed, an associated 59.04-foot buried pipeline would be constructed, connecting the proposed Atlantic C 2C well to an existing main transport pipeline. The proposed pipeline would be completely contained within the maximum disturbance area associated with the proposed well pad. Therefore, no new disturbance would occur during construction of the pipeline. Table 2.1 compares the site disturbance from both alternatives.

Table 2.1. Summary of New Disturbance from Each Alternative

Facility	Total Acres Immediately Disturbed	Acres of Disturbance After Initial Reclamation	Acres of Disturbance Following Final Abandonment
Alternative A – No Action			
Well pad	0.00	0.00	0.00
Pipeline tie	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**
Alternative 8 – Proposed Action			
Well pad	2.82	1.00*	0.00
Pipeline tie	0.00	0.00	0.00
Total	**2.82**	**1.00**	**0.00**

* Total area disturbed after initial reclamation is based on an industry *average* obtained from the operator. Actual disturbance of the well pad following successful initial reclamation *may* be less than 1.00 acre (personal communication. Virgil *Chavez* 2008).

Project Construction

Under the Proposed Action, a 300 x 230-foot well pad would be constructed using a D-8 bulldozer. It would be necessary to clear vegetation for the well pad to provide space and a level surface for a drilling rig, completion rig, and other heavy equipment to safely access and drill the well. All existing equipment would be removed from the well pad and then re-installed after drilling. The cuts and fills and topsoil storage would be contained within the construction buffer. The pipeline would be located within the existing and proposed well pads, and the trench would be dug using a backhoe or trencher. Mitigation measures recommended for the Proposed Action would be implemented as COAs attached to the approved APD. The surface-owner agreement between the operator and the surface owner would have some agreed-upon stipulations, including the following built-in mitigation measures:

- The top 6 inches of topsoil on the proposed well pad would be stockpiled on-site for redistribution during well pad reclamati9n.

  All aboveground production facilities would be standard equipment and painted Juniper Green to blend with the surrounding environment.

  All disturbed areas not needed for production would be revegetated using a BLM- and private landowner–approved seed mixture.

  Culverts would be installed as necessary for proper drainage.

- Silt traps would be installed as necessary to reduce erosion.

A reserve pit would not be developed; instead a closed-loop system for fluids would be used because of the unnamed drainage that crosses the eastern boundary of the PPA.

All necessary pits would be constructed to meet NMOCD pit guidelines and requirements, and would be sited, fenced, revegetated, and marked in accordance with rule 19.15.17 New Mexico Administrative Code, the 2009 Pit Rule.

A diversion ditch would be designed and constructed as prescribed by the BLM and the surface owner.

The operator would be responsible for control of invasive species and noxious weeds within the reclaimed areas ofthe well pad and access road.

- A compressor may also be required to pressurize gas for delivery to the transportation pipeline. If required, the compressor would conform to BLM FFO Noise Notice to Lessees (NTL) standards.
- Compressor emissions would be limited to no more than 2 grams (g) per horsepower-hour of nitrogen oxides (NOx) for engines with 300 horsepower (hp) or less.

Corner 2 of the proposed well pad and construction zone would be rounded to avoid excessive cut.

After the well pad is constructed, a drilling rig would be moved to the location and assembled. Drilling into the Basin Dakota and Blanco Mesaverde formations would require approximately 14 days. After the well has been drilled, completion would take approximately 14 additional days. The entire construction and drilling process is anticipated to take between four and eight weeks. Traffic would include drilling rigs, large tractor-trailers, construction equipment, water trucks, drilling and production equipment and supplies, tanks, and various light pickup trucks.

Production Phase

If the well proves productive, the portion of the pad not required for production equipment and vehicular access would be reclaimed and seeded with a BLM-approved seed mix, which is consistent with the surface owner agreement. Reclamation usually includes the portions of the pad outside the teardrop. The teardrop area would not be reclaimed until final abandonment of the well. Typical production equipment would be assembled on the well pad, such as a wellhead, production separator, a cathodic station, a meter run with electronic telemetry, and one to two 500-barrel storage tanks. A compressor may also be required to pressurize gas for delivery to the transportation pipeline. The compressor size would be dependent on production.

After production begins, normal maintenance would be required and would consist of one pickup truck visiting the well approximately every other day during the work week to check on production and resolve any problems that may occur at the well. Trucks would be used to remove wastewater stored in tanks on-site. The frequency of water hauling would depend on the amount of water the well produces and may vary from once a day to once a month. A work-over rig could occasionally be required for downhole maintenance. Surface impacts of a work-over rig would be similar to the effects described for drilling, although usually to a lesser degree. The estimated production phase is expected to last 20 to 30 years.

Abandonment Phase

When the well is no longer commercially viable, it would be plugged and abandoned in accordance with BLM regulations and as specified by the BLM FFO in the COAs and surface owner agreement stipulations. Downhole well abandonment would be carried out under current BLM regulations for plugging of the well. Surface equipment would be removed, except for an aboveground marker that would contain well identification information, including the location of the plugged hole. The underground pipeline tie is usually plugged and left in place. The well pad, if not needed for other purposes, would be recontoured and revegetated, as specified in the COAs. Final abandonment would be complete when successful reclamation of all disturbed areas is achieved to BLM Gold Book standards and guidelines and consistent with the surface owner agreement.

2.3 Alternatives Considered but not Analyzed in Detail

Alternatives to the Proposed Action are developed to explore different ways to accomplish the purpose and need while minimizing environmental impacts and resource conflicts and meeting other objectives of the RMP. Consistent with the BLM's NEPA Handbook (BLM 2008a), only alternatives that would have a lesser effect than the Proposed Action were considered. Those with greater adverse resource impacts are not considered for this analysis. Alternative locations are generally considered at the BLM on-site visit with the operator and the surface owner. Limitations of other nearby equipment, pipelines, access, and safety are considered, as well as resource conflicts that may require mitigation, such as rotating the well pad to protect cultural sites.

The Proposed Action is a twinned location on private surface. Therefore, other locations are not analyzed in this EA. The Proposed Action is consistent with the goals and objectives of the RMP, which states that "dual completion, re-completion and commingling (both downhole and at the surface) will be encouraged and permitted in order to reduce the number of new well pads and consequent surface disturbance. This in turn, will reduce impacts to soils and vegetation, reduce air impacts caused by fugitive dust, reduce habitat fragmentation and offer less opportunity for the spread of noxious weeds" (BLM 2003a:4). No issues or concerns were identified by the surface owner or the BLM to necessitate an additional alternative, and as such only the No Action and Proposed Action alternatives were brought forward for detailed analysis.

2.4 Consistency with Other Authorities

In addition to NEPA, other authorities have procedural requirements regarding the treatment of elements of the environment when the BLM is considering a federal action. Program-specific orders and Executive Orders, including the 14 listed in the BLM's NEPA Handbook (BLM 2008a), Appendix I, have also been considered in preparing this EA. Particularly relevant and supporting authorities are discussed below.

2.4.1 Clean Air Act

The Clean Air Act of 1970, as amended, establishes National Ambient Air Quality Standards (NAAQS) to control air pollution. The New Mexico Air Quality Bureau (NMAQB) oversees air quality regulations and standards for stationary sources of air pollution. Impacts to air quality from oil and gas exploration and development are controlled by mitigation measures developed

on a case-by-case basis. As part of the planning and decision-making process, the BLM must consider and analyze the potential effects of its activities on air resources. This EA discusses the contributions of the Proposed Action to regulated air pollutants and greenhouse gas (GHG) emissions and includes a general discussion of potential impacts. Additional general information on air quality in the area is contained in Chapter 3 of the PRMP/FEIS (BLM 2003b).

2.4.2 National Historic Preservation Act

Heritage resources are protected by the National Historic Preservation Act (NHPA) of 1966 (Public Law [PL] 89-665), as amended, and its implementing regulations (36 CFR 800) and other legislation, including NEPA (PL 91-852) and its implementing regulations (40 CFR 1500-1508). Other relevant laws include the Antiquities Act of 1906 (PL 52-209), Archaeological and Historical Conservation Act of 1974 (PL 93-291), Archaeological Resources Protection Act of 1979 (PL 96-95) and its regulations (36 CFR 296), American Indian Religious Freedom Act (42 United States Code [USC] 1996), and Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (PL 101-60 I). Executive Order 11593 of 1971 also requires that cultural resources be protected. Compliance with Section 106 responsibilities of the NHPA is achieved by following the BLM–New Mexico State Historic Preservation Office protocol agreement, which is authorized by the National Programmatic Agreement between the BLM, Advisory Council on Historic Preservation, and National Conference of State Historic Preservation Officers.

2.4.3 Endangered Species Act

Threatened and endangered flora and fauna are protected under the Endangered Species Act of 1973 (ESA), as amended (PL 94-325). Additionally, the Migratory Bird Treaty Act (16 USC 703–712), Executive Order 121186 for migratory bird protection, and the Bald and Golden Eagle Protection Act (16 USC 668–668d) protect other sensitive wildlife species that could occur in the PPA. BLM FFO staff has reviewed the Proposed Action and determined it would be in compliance with threatened and endangered species management guidelines outlined in the September 2002 Biological Assessment (Consultation No. 2-22-01-1-389) conducted for the PRMP/FEIS (BLM 2003b). No further consultation with the U.S. Fish and Wildlife Service (USFWS) is required.

2.4.4 Clean Water Act

The Federal Water Pollution Control Act, commonly known as the Clean Water Act (codified at 40 CFR Part 112), protects surface water resources from pollution. Under Section 402 of the Clean Water Act (as amended), the U.S. Environmental Protection Agency (EPA) was directed to develop a phased approach to regulate stormwater discharges under the National Pollutant Discharge Elimination System (NPDES) program. Industrial activities that disturb land may require an NPDES permit for stormwater discharge. Depending on the acreage disturbed, either a Phase I industrial activity (5 or more acres of disturbance) or a Phase II small construction activity (between 1 and 5 acres of disturbance) permit may be required. Additionally, a U.S. Army Corps of Engineers Section 404 permit for the discharge of dredged and fill materials may also be required. Operators are required to obtain all necessary permits and approvals prior to any disturbance activities.

2.4.5 Executive Order 12898

Executive Order 12898 of 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires federal agencies to ensure that proposed projects under their jurisdictions do not cause a disproportionate environmental impact that would affect any group of people because of a lack of political or economic strength. Environmental justice requires "the fair treatment of people of all races, cultures, incomes, and educational levels with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA 2008a).

Chapter 3 – Description of Affected Environment

This chapter describes the environment that would be affected by implementing the alternatives described in Chapter 2. For the purposes of providing baseline data for the affected environment and identifying potential impacts (see Chapter 4), a project area for each resource was delineated, as appropriate.

Aspects of the affected environment described in this chapter focus on the relevant major resources or issues/concerns. NEPA requires that the discussion of issues and concerns are commensurate with the potential impacts:"1500.4 (c) Impacts shall be discussed in proportion to their significance." Other CEQ regulations make it clear that discussion of all resources is not necessary, only those that are significant: "1501.7 (3) Identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3), narrowing the discussion of these issues in the statement to a brief presentation of why they will not have a significant effect."

On the basis of CEQ guidance and the January 2008 edition of the BLM NEPA Handbook (BLM 2008a), the following discussion will be limited to those resources that could be impacted to a degree that detailed analysis is warranted. However, certain elements of the human environment are required by statute, regulation, or executive order to be examined in all EAs (BLM 2008a:Appendix I).

3.1 Resources Eliminated from Detailed Analysis

Several resources are not present within the PPA and have not been brought forward for detailed analysis.

Prime and unique farmlands – According to the Natural Resources Conservation Service (NRCS), because of New Mexico's arid climate in agricultural areas, no lands within the state qualify as prime farmland unless they are irrigated with a dependable supply of irrigation water, which does not occur within the PPA (NRCS 2009a). Farmlands (prime or unique) are therefore eliminated from further analysis.

Wild and scenic rivers – There are two designated sections of wild and scenic rivers in New Mexico, both under the jurisdiction of the BLM Taos Field Office – One on the Rio Chama and one on the Rio Grande. As there are no designated rivers under the jurisdiction of the BLM FFO, wild and scenic rivers are eliminated from further analysis.

Wild horses and burros- There are two BLM wild horse and burro herd areas in New Mexico; one is west of Dulce on Carracas Mesa, and one is between White Sands and Socorro, well south of Albuquerque. Because there are no herd areas under the jurisdiction of the BLM FFO, wild horses and burros are eliminated from further analysis.

Wilderness areas- There are four designated wilderness areas on BLM land in New Mexico: three are under the jurisdiction of the Rio Puerco Field Office in Albuquerque, and one, the Bisti/De-Na-Zin, is under the jurisdiction of the BLM FFO. The Bisti/De-Na-Zin Wilderness Area is 20 miles south of Farmington and is therefore not within the vicinity of the PPA.

Wilderness areas, including wilderness study areas, are therefore eliminated from further analysis.

Floodplains, wetlands, and riparian zones – The location of floodplains, wetlands, and riparian zones would be clearly identified during the staking and scoping process and specifically located during on-site visits. These areas are to be avoided during drilling projects, are not located in the vicinity of the PPA, and are therefore eliminated from further analysis.

Other resources with the potential to occur within the vicinity of the PPA that have not been brought forward for analysis are listed below, along with supporting rationale.

3.1.1 Areas of Critical Environmental Concern

The PPA is on private land and not within any ACEC. The nearest ACEC is the Cedar Hill cultural ACEC, approximately 8 miles northwest of the PPA.

Section 202 of the Federal Land Policy and Management Act requires the BLM to give priority to designation and protection of ACECs during the land-use planning process. An ACEC is an area within public lands where special management attention is required to protect and prevent irreparable damage to important resources or other natural systems or processes and protect life and safety from natural hazards. ACECs differ from other special management designations, such as wilderness areas, in that the ACEC designation, by itself, does not automatically prohibit other uses in the area. The ACEC designation is an administrative designation and is accomplished through the land use planning process.

3.1.2 Environmental Justice

Executive Order 12898 requires federal agencies to assess projects to ensure that there are no disproportionately high or adverse environmental, health, or safety effects on minority and low-income populations. Minorities, predominantly Native Americans and Hispanics, constitute a large proportion of the population residing inside the boundaries of the BLM FFO's jurisdiction. The latest census data indicate that approximately 22.5 percent (%) of San Juan County's population is considered low income (U.S. Census Bureau 2007).

There are no minority or low-income populations in the vicinity of the PPA; therefore, the Proposed Action would have no direct effect on any communities protected by Executive Order 12898. The project may have beneficial indirect effects, such as increased overall employment opportunities related to the oil and gas and service support industry in the region, as well as economic benefits for state and county governments from royalty payments and severance taxes. Any effects related to environmental justice would apply to all public land users in the PPA, not just low-income or minority populations. The Proposed Action would have no disproportionately significant impact to any minority or low-income populations; therefore, this resource is not analyzed in detail in this document.

3.1.3 Threatened and Endangered Species

Under Section 7 of the ESA, as amended, the BLM is required to consult with the USFWS on any proposed action that may affect federally listed threatened or endangered species or species proposed for listing. The USFWS lists eight species as threatened or endangered and one species

as a candidate that are known to, or have the potential to, occur in San Juan County (USFWS 2009).

SWCA conducted a biological survey of the PPA on July 21, 2009. Detailed results of this survey, and the list of USFWS-protected species, are included in the BSR (see Appendix A). No USFWS-listed threatened or endangered species or their habitats were found in the PPA during the biological survey. Based on these results, the BLM recommends the Proposed Action would have no significant impact to any federally listed threatened or endangered species. As there is no significant impact and the attached BSR gives this resource further consideration, no further analysis is conducted in this document.

3.2 Resources Analyzed in Detail

Resources that could potentially be affected by the alternatives include: air resources, cultural resources, invasive and non-native plant species, livestock grazing, migratory birds, mineral resources, Native American religious concerns, noise, paleontological resources, public health and safety, recreation, socioeconomics, soils, special management species, vegetation, visual resources, water quality (surface and ground), and wildlife. These resources are discussed in detail below.

3.2.1 Air Resources

Air quality and climate are the components of air resources, which include applications, activities, and management of the air resource. 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.

The proposed well is located in San Juan County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the PRMPIFEIS (BLM 2003b), which is incorporated by reference. In addition to the air quality information in the FEIS, new information about GHGs and their effects on national and global climate conditions has emerged since the 2003 RMP was prepared. Ongoing scientific research has identified the potential impacts of GHG emissions, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), water vapor, and several trace gases, to global climate. Through complex interactions on a global scale, GHG emissions may cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), industrialization and the burning of fossil carbon sources have caused GHG concentrations to increase measurably and may contribute to overall climatic changes, typically referred to as global warming.

The 2003 RMP discusses ozone (O_3) in the Baseline Air Quality and Impact Assessment sections. The NAAQS in 2003 was 0.084 part per million (ppm). In March 2008, the EPA announced a new primary 8-hour standard of 0.075 ppm.

Increased development in the Four Corners area, including a proposed coal-fired power plant, increased oil and gas development, and population growth, is contributing to air quality concerns. Many residents are concerned with potential health impacts from other pollutants. An

overall haze and plume of NO_x can often be seen in the skies, which impacts visibility, and there are concerns about the ecosystem as a result of deposition of mercury and nitrogen.

In addition, on October 17, 2006, the EPA issued a final ruling on the lowering of the NAAQS for particulate matter (PM) ranging from 2.5 microns or smaller particle size ($PM_{2.5}$). This ruling became effective on December 18, 2006, and stated that the 24-hour standard for $PM_{2.5}$ was lowered to 35 micrograms per cubic meter (J.!g/m^3) from the previous standard of 65 J.!g/m^3. This revised $PM_{2.5}$ daily NAAQS was promulgated to better protect the public from short-term particle exposure. This EA presents an analysis of the contributions of the Proposed Action to GHG emissions and a general discussion of potential impacts to climate.

The EPA has the primary responsibility for regulating air quality, including seven nationally regulated ambient air pollutants. Regulation of air quality is also delegated to some states, of which New Mexico is one. Air quality is determined by atmospheric pollutants and chemistry, as well as dispersion meteorology and terrain; it also includes applications of noise, smoke management, and visibility. Climate is the composite of generally prevailing weather conditions of a particular region throughout the year, averaged over a series of years. GHGs and the potential effects of GHG emissions on climate are not regulated by the EPA; however, climate has the potential to influence renewable and non-renewable resource management.

3.2.1.1 **Air Quality**

The area surrounding and including the PPA is considered a Class II air quality area. A Class II area allows a moderate amount of degradation of air quality. The primary sources of air pollution are dust from blowing wind on disturbed or exposed soil and exhaust emissions from motorized equipment.

Air quality in the area near the proposed well does not exceed EPA levels for pollutants and is not located in any of the areas designated by the EPA as "non-attainment areas" for any listed pollutants regulated by the Clean Air Act. During the summers of 2000 through 2002, O_3 levels in San Juan County were approaching non-attainment. Additional modeling and monitoring were conducted by Alpine Geophysics, LLC, and Environ International Corporations, Inc., in 2003 and 2004. Results of the modeling suggest the episodes recorded in 2000 through 2002 were attributable to regional transport and high natural biogenic source emissions. The model also predicted that the region would not violate the O_3 NAAQS through 2007 and that the trends in the 8-hour O_3 values in the region would decline in the future. At the present time, San Juan County is classified as being in attainment with the revised federal O_3 standard of 0.075 ppm.

The EPA found that in 2006, total U.S. GHG emissions were over 6 billion metric tons and that total U.S. GHG emissions increased by 14.1% from 1990 to 2006 (EPA 2008b). The report also noted that GHG emissions fell by 1.5% between 2005 and 2006. This decrease was in part attributed to the increased use of natural gas and other alternatives to burning coal in electric power generation. The levels of these GHGs are expected to continue increasing; however, the rate of increase is expected to slow because greater awareness of the potential environmental and economic costs associated with increased levels of GHGs may result in behavioral and industrial adaptations.

3.2.1.2 **Climate**

Global mean surface temperatures have increased nearly 1.0 degree Celsius (^{O}C) (1.8 degrees Fahrenheit [°F]) from 1890 to 2006 (Goddard Institute for Space Studies 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2007, the Intergovernmental Panel on Climate Change (IPCC) predicted a warming of about 0.2°C per decade for the next two decades, and then a further warming of about 0.1°C per decade (IPCC 2007). The National Academy of Sciences (2006) supports these predictions but has acknowledged that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures are more likely than increases in daily maximum temperatures.

A 2007 U.S. Government Accountability Office (GAO) report on climate change found that

> federal land and water resources are vulnerable to a wide range of effects from climate change, some of which are already occurring. These effects include, among others: 1) physical effects such as droughts, floods, glacial melting, and sea level rise; 2) biological effects, such as increases in insect and disease infestations, shifts in species distribution, and changes in the timing of natural events; and 3) economic and social effects, such as adverse impacts on tourism, infrastructure, fishing, and other resource uses. (GAO 2007)

It is not, however, possible to predict with any certainty regional or site-specific effects on climate relative to the Proposed Action and subsequent actions.

In New Mexico, a recent study indicated that the mean annual temperatures have exceeded the global averages by nearly 50% since the 1970s (Enquist and Gori 2008). Similar to trends in national data, increases in mean winter temperatures in the Southwest have contributed to this rise. Compared with baseline information, the period between 1991 and 2005 shows temperature increases in more than 95% of the geographic area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts ofthe state.

3.2.2 Cultural Resources

The PPA is located within the archaeologically rich San Juan Basin. The prehistory of the San Juan Basin can be divided into five major periods: Paleoindian (ca. 10,000 B.C. to 5500 B.C), Archaic (ca. 5500 B.C. to A.D. 400), Basketmaker II–III and Pueblo I–IV periods (A.D. 1 to A.D. 1540), and the historic (A.D. 1540 to present), which includes Native American as well as later Hispanic and Euro-American settlers. Detailed descriptions of these various periods, and the select phases within each period, are provided in the BLM FFO's PRMP/FEIS (BLM 2003b).

The BLM FFO has categorized variability in archaeological sites by major time period, cultural affiliations/components, average size, and occurrence of features in each of the 20 watersheds within the BLM FFO's jurisdiction (BLM 2003b:3-88). The Atlantic C 2C well is within the

Animas watershed (BLM 2007a). Based on the PRMP/FEIS, 965 sites representing 1,376 temporal/cultural components have been documented within the watershed (Science Applications International Corporation 2002:2-2; BLM 2003b:3-89). Of the 19 categories of sites defined based on temporal/cultural affiliation, 17 are represented in the watershed. Lacking in the watershed are sites attributed to Ute and Pueblo occupations. The most frequently occurring sites with identifiable cultural affiliations recorded are likely either prehistoric Ancestral Puebloan (Anasazi) Pueblo I period components (20%) or historic Navajo Dinetah/Gobemador period components (16%) (BLM 2003b:3-91).

The BLM FFO requires site-specific surveys in advance of oil and gas-related ground-disturbing activities. Using available geographic information systems (GIS) data from the New Mexico Laboratory of Anthropology (LA) Archaeological Records Management Section (ARMS), it appears that within a 1-mile radius of the PPA, approximately 104 acres (or approximately 5% of the total area) have been subject to archaeological survey, with approximately 13 sites having been documented (LA ARMS 2009). No previously recorded sites are located within 0.25 mile of the PPA. The figures are most likely higher because not all known surveys have been electronically captured in a GIS environment.

The entire area of potential affect for the Proposed Action was surveyed by Western Cultural Resources Management (WCRM) at a BLM Class III level (100%) and an inventory report was prepared and submitted to the BLM [WCRM(F)848; BLM 2010(1)002F] in accordance with the *Procedures for Performing Cultural Resources Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM 2005). BLM cultural resources staff field checked the project on October 5, 2009. No cultural resource sites were identified by the inventory.

3.2.3 Invasive and Non-native Plant Species

Noxious weeds are officially designated as non-native plant species that are invasive and/or can become monocultures and cause harm to land value, native ecology, agricultural interests, wildlife habitat, livestock forage, riparian resources, and aesthetic and visual values of land. The New Mexico Department of Agriculture (NMDA) has adopted a list of 32 species that are classified as noxious weed species (NMDA 1999).

An SWCA biologist identified two invasive, non-native weed species that are not listed or regulated by the NMDA during the field survey on July 21, 2009. Cheatgrass *(Bromus tectorum)* and Russian thistle *(Sa/sola tragus)* were observed throughout the previously disturbed and reclaimed portion of the PPA and access road. Treatment of these weeds would be consistent with the surface owner agreement.

3.2.4 Livestock Grazing

The PPA is located within the privately held Hart Springs Allotment Number 5046, owned by Hart Canyon Ranch. This allotment contains 3,242.96 acres. As the allotment is privately held, there are no designated federal Animal Unit Months (AUMs). During the well-staking process, the grazing permittee is given the opportunity to voice any concerns about the proposed well location by responding in writing or in person and is invited to attend the staking and on-site meetings. The grazing permittee has not brought any issues or concerns forward, and any special stipulations are addressed in the surface owner agreement between the operator and surface

owner. Livestock may be present during construction of the proposed project and could be present during project operations.

3.2.5 Migratory Birds

The Migratory Bird Treaty Act has established protections for migratory birds and their parts (e.g., eggs, nests, and feathers) from taking, hunting, capture, transport, sale, or purchase. The BLM FFO has developed a list of priority species of concern with the potential to occur in the PPA, based on the New Mexico Partners in Flight (NMPIF) Landbird Conservation Plan (NMPIF 2007) and the USFWS Birds of Conservation Concern (USFWS 2002). Review ofthese documents, specifically as they pertain to the Colorado Plateau physiographic area, indicates that priority migratory bird species with a known range of distribution in the BLM FFO area include seven species that use Great Basin Desert Shrub (sage/grass) habitat and six species that use Pinon-Juniper Woodland (pinon-juniper) habitat (Table 3.1).

Table 3.1 Priority Migratory Bird Species Identified for the BLM FFO

Species	Scientific Name	Habitat Type
Burrowing owl	*Athene cunicu/aria*	Sage/grass
Gray flycatcher	*Empidonax wrightii*	Piflon-juniper
Ash-throated flycatcher	*Myiarchus cinerascens*	Sage/grass
Cassin's kingbird	*Tyrannus vociferans*	Piflon-juniper
Loggerhead shrike	*Lanius /udovicianus*	Sage/grass
Gray vireo	*Vireo vicinior*	Piflon-juniper
Pinyon jay	*Gymnorhinus cyanocephalus*	Piflon-juniper
Juniper titmouse	*Baeolophus ridgwayi*	Piflon-juniper
Sage thrasher	*Oreoscoptes montanus*	Sage/grass
Bendire's thrasher	*Toxostoma bendirei*	Sage/grass
Black-throated gray warbler	*Dendroica nigrescens*	Pit'\on-juniper
Black-throated sparrow	*Amphispiza bilineata*	Sage/grass
Sage sparrow	*Amphispiza belli*	Sage/grass

Sources: NMPIF (2007); USFWS (2002).

3.2.6 Mineral Resources

The PPA is located on private surface with federal mineral rights managed by the BLM FFO. The PPA is in an area known to contain hydrocarbon-bearing formations and has established successful wells. The proposed well would be drilled into the Basin Dakota and Blanco Mesaverde formations. The Basin Dakota gas pool includes the Dakota Sandstone in the Basin Dakota Formation, which is the primary stratigraphic gas reservoir and is closely linked to the Mancos Shale hydrocarbons (Engler et al. 200 I). The Basin Dakota pool was created in 1960 by consolidating numerous small Dakota reservoirs, and production has been attributed to reservoir heterogeneity, improved fracture stimulation techniques, or a combination of both. In addition, the PPA is located in the northern portion of the Blanco Mesaverde gas pool, separated on the basis of the "Chacra line" (Engler et al. 2001). A range of reservoir characteristics is possible for the Blanco Mesaverde reservoir, depending on location. In the northern portion, the Blanco Mesaverde reservoir includes the lower part of the Lewis Shale, Menefee Formation, Point

Lookout Sandstone, and a portion of Mancos Shale. The Blanco Mesaverde reservoir was discovered in 1927 and is a likely target for commingling or dual completions, thereby reducing the impact of this development.

3.2.7 Native American Religious Concerns

Traditional cultural properties (TCPs) is a term that has emerged in historic preservation management and the consideration ofNative American religious concerns. TCPs are places that have cultural values that transcend, for instance, the values of scientific importance that are normally ascribed to cultural resources such as archaeological sites. The National Park Service (Parker and King 1998: I) has defined TCPs as follows:

> A traditional cultural property can be defined generally as one (a property) that is eligible for the National Register because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community. (National Register Bulletin 38)

Native American cultural associations are the "communities" most likely to identify TCPs, although TCPs are not restricted to this group. Some TCPs are well known, while others may only be known to a small group of traditional practitioners, or otherwise vaguely known.

There are several pieces of legislation or Executive Orders that should be considered when evaluating Native American religious concerns. These govern access and use of sacred sites, possession of sacred items, protection and treatment of human remains, and the protection of archaeological resources ascribed with religious or historic importance. These include the following:

- American Indian Religious Freedom Act of 1978 (42 USC 1996, PL 95-431 Stat. 469).
- Executive Order 13007 (May 24, 1996).
- NAGPRA of 1990 (25 USC 3001, PL 101-601).
- Archaeological Resources Protection Act of 1979 (16 USC 470, PL 96-95).

For the Proposed Action, identification of TCPs were limited to reviewing existing published and unpublished literature (e.g. VanValkenburgh 1941, 1974; Brugge 1993), and the site-specific cultural resources survey report conducted for the Proposed Action. In addition, the BLM's cultural resources program was contacted for information regarding the presence of TCPs identified through ongoing BLM tribal consultation efforts. The PPA is not in the vicinity of any known TCPs.

3.2.8 Noise

No background noise studies have been conducted for the PPA. However, ambient noise in the PPA could include vehicular traffic along area access roads, airplanes, windmills, pumpjacks, hunters, and oil and gas exploration and development activities. There are residences located approximately 220–240 yards from the PPA. Noise levels in the PPA are generally low (40-50 decibels [dB]), intermittent, and fluctuate with variations in weather conditions, including temperature, wind, humidity, and the general topography of the area. The noise level at nearby active and producing well sites attenuates with distance from the noise source (equipment), so that at Jess than 0.25 mile the noise level is often low (30-40 dB) (SWCA 2009).

3.2.9 Paleontological Resources

The PPA is located within the paleontologically rich area of the San Juan Basin of northern New Mexico. The BLM's Potential Fossil Yield Classification (PFYC) (BLM 2007b) system is a predictive modeling tool that was developed to provide baseline guidance for assessing and mitigating paleontological resources. It is intended to be used at an intermediate point in analysis and should be used to assist in determining the need for further mitigation assessment or actions. The PFYC system is based on the fact that occurrences of paleontological resources are often closely tied to the geologic units that contain them. However, it is understood that local differences must be taken into account. Using the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts.

The PPA is within the San Jose Formation, a geologic unit ranked as PFYC Class 5 for very high paleontological sensitivity (BLM 2008b), which could entail project-specific assessments. During the planning process that resulted in the current RMP, the BLM FFO recognized nine Specially Designated Areas (SDAs) (totaling more than 135,000 acres) in order to preserve important paleontological resources for scientific study and other public benefits (BLM 2003b:4-117). Based on local knowledge of the area from numerous similar projects, the analysis conducted for the 2003 RMP, and the fact that the PPA is not located within an SDA for paleontology, there are few paleontological resources assumed to be in the PPA and the BLM does not require a site-specific paleontological survey ofthe PPA.

3.2.10 Public Health and Safety

The Proposed Action would be located in an area with established oil and gas exploration and development operations with the accompanying transmission pipelines, drilling rigs, pumpjacks, traffic, and other related activities. In addition, welding equipment, heavy machinery, and deep trenches may exist during construction of the proposed project. These physical hazards could pose a threat to public health and safety.

There are residential dwellings near the PPA. The PPA is not on federal land open to the public, therefore, it is not expected that the PPA would be used by recreationists or the general public. Any visitors to the area would be warned about possible hazardous conditions in the PPA through posted signs and have limited access during construction (4-8 weeks) and from the producing rigs during operation.

3.2.10.1 Hazardous and Solid Waste Materials

The Resource Conservation and Recovery Act (RCRA), passed in 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. A "hazardous waste" is a solid waste that is I) listed by the EPA as a hazardous waste, 2) exhibits any of the characteristics of hazardous wastes (ignitability, corrosivity, reactivity, or toxicity), or 3) is a mixture of solid and hazardous waste.

A 1980 amendment to the RCRA conditionally exempted from regulation as hazardous wastes "drilling fluids, production waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas." On July 6, 1988, the EPA determined

that oil and gas exploration, development and production wastes would not be regulated as hazardous wastes under the RCRA. A simple rule of thumb was developed to determine whether exploration, development, and production waste is likely to be considered exempt or non-exempt from RCRA regulations. If 1) the waste came from downhole, or if 2) the waste was generated by contact with the oil and gas production stream during removal of produced water or other contaminants, the waste is most likely to be considered exempt by the EPA.

The Comprehensive Environmental Response Compensation and Liability Act (CERCLA), passed in 1980, deals with the release (spillage, leaking, dumping, accumulation, etc.) or threat of 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. The NMOCD administers hazardous waste regulations for oil and gas activities in New Mexico.

Typical wastes associated with the Proposed Action include trash, sanitary wastes, produced water, and produced hydrocarbons. Based on the discussion above, these are generally exempt from the RCRA. Sanitary wastes would come from 15 to 20 people working for four to eight weeks, and no sanitary wastes are expected during the production phase. Trash would be generated during drilling and completion work (4-8 weeks) and would be stored in containers so that debris does not get scattered by wind or small animals. During drilling and completion, a trash receptacle and a chemically treated portable toilet would be on location for trash and sanitary waste disposal. No garbage containers would be located on-site during the production phase. Drilling fluids, production waters, and other wastes associated with the exploration, development, or production of crude oil or natural gas would be placed in tanks or in a closed-loop system on location during completion work.

3.2.11 Recreation

The PPA is located on private land and is not managed for public recreation. It is not designated by the BLM as an Extensive Recreation Management Area or Special Recreation Management Area.

3.2.12 Socioeconomics

The PPA is located in San Juan County, New Mexico. According to the 2007 U.S. Census estimate, New Mexico had a population of 1,969,915, with 122,427 persons residing in San Juan County (up from 113,801 persons in 2000) (U.S. Census Bureau 2007). San Juan County, considered rural in character, is approximately 5,514 square miles in area, with an average of 20.6 persons per square mile. Only 6% of the land in the county is privately owned.

In 2006, San Juan County had a median household income of $40,517, and a per capita personal income of $17,518 (in 2006 inflation-adjusted dollars). This 2006 figure was 69.4% of the national average per capita income, which was $25,257, and 83.8% of the average per capita income for New Mexico, which was $21,856 (U.S. Census Bureau 2007).

San Juan County is an integral part of the greater Four Corners region. Each community in this region is economically integrated with its surrounding communities. The nearest town to the PPA is Aztec, New Mexico, located approximately 8.3 miles away. Aztec has an estimated

population of 6,927 (U.S. Census Bureau 2007). According to the latest U.S. Census data, the average per capita income for Aztec was $14,750 (in 1999 dollars).

3.2.13 Soils

The PPA is in the San Juan Basin, a large depressed drainage basin in northwestern New Mexico and southwestern Colorado. The San Juan Basin is bordered by the Defiance Uplift and Chuska Mountains to the west, the San Juan Dome to the north, the Chaco Slope and Zuni Uplift to the south, and the Nacimiento Uplift to the east. In total, the San Juan Basin covers an area of approximately 4,600 square miles. The soils in the San Juan Basin were formed primarily from two kinds of parent material: alluvial sediment and sedimentary rock. The alluvial sediment is material that was deposited in river valleys and on mesas, plateaus, and ancient river terraces. The material has been mixed and sorted in transport and has a wide range of mineralogy and particle size. Sedimentary parent material consists mainly of sandstone and shale bedrock. These shale and resistant sandstone beds form prominent structural benches, buttes, and mesas bounded by cliffs. Soil compositions found in the PPA include contents of weathered and unweathered bedrock and silt loam. Soil compositions found in the PPA include contents of weathered and unweathered bedrock and loam. The most prevalent soil type in the PPA is the Rock outcrop--Travessilla–Weska complex, extremely steep, which comprises about 90% of the PPA. The Blancot–Fruitland association, gently sloping, makes up the remaining 10% (NRCS 2009b). The major components of these soil types are described below (rock outcrop is not considered a major soil component).

The Travessilla component is found on 30% to 40% slopes, on escarpments and uplands. The parent material consists of residuum weathered from sandstone. Depth to a root restrictive layer is 5 to 20 inches, and the natural drainage class is well drained. Water movement in the most restrictive layer is high, and available water to a depth of 60 inches is very low. Shrink–swell potential is low. This soil is not flooded or ponded, and there is no zone of water saturation within a depth of 72 inches. There is not a significant amount of organic matter in the surface horizon, and the soil does not meet hydric criteria (NRCS 2009b).

The Weska component is found on 30% to 40% slopes, on escarpments and uplands. The parent material consists of residuum weathered from shale. Depth to a root restrictive layer is 5 to 20 inches, and the natural drainage class is well drained. Water movement in the most restrictive layer is moderately high, and available water to a depth of 60 inches is very low. Shrink–swell potential is low. This soil is not flooded or ponded, and there is no zone of water saturation within a depth of 72 inches. There is not a significant amount of organic matter in the surface horizon, and this soil does not meet hydric criteria (NRCS 2009b).

The Blancot component is found on 0% to 5% slopes, on fan remnants and uplands. The parent material consists of fan alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches, and the natural drainage class is well drained. Water movement in the most restrictive layer is moderately high, and available water to a depth of 60 inches is high. Shrink–swell potential is moderate. This soil is not flooded or ponded, and there is no zone of water saturation within a depth of 72 inches. There is not a significant amount of organic matter in the surface horizon, and this soil does not meet hydric criteria (NRCS 2009b).

The Fruitland component is found on 0% to 8% slopes, on fan remnants and uplands. The parent material consists of fan alluvium derived from sandstone and shale. Depth to a root restrictive layer is greater than 60 inches, and the natural drainage class is well drained. Water movement in the most restrictive layer is high, and available water to a depth of 60 inches is moderate. Shrink–swell potential is low. This soil is not flooded or ponded, and there is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is approximately I%, and this soil does not meet hydric criteria (NRCS 2009b).

3.2.14 Special Management Species

In accordance with BLM Manual 6840, the BLM identifies special management species (not federally listed as threatened or endangered) for disturbance mitigation so that federal actions do not contribute to the need to list those species as threatened or endangered in the future. Included in this category are state-listed endangered species and federal candidate species, which receive no special protections under the ESA.

The BLM FFO has identified 10 species as special management species (BLM 2008c). Of these, four special management species have the potential to occur in the PPA and surrounding area (Table 3.2). Areas within and/or surrounding the PPA provide potential foraging and nesting habitat for golden eagle *(Aquila chrysaetos)* and prairie falcon *(Falco mexicanus)*, and potential foraging habitat for American peregrine falcon *(Falco peregrinus anatum)* and ferruginous hawk *(Buteo regalis)*. Raptor nest data from the FFO shows nests are present near the PPA; however, no nests or signs of nests (e.g., whitewash) were observed within or in the vicinity of the PPA during field reconnaissance. Several golden eagle nests have been mapped within a 6-mile radius of the PPA, the closest nest being 2.9 miles to the southeast. Additionally, two prairie falcon nests have been mapped 6 miles south of the PPA. Aztec gilia *(Aliciella formosa)* and Brack's cactus *(Sclerocactus cloveriae* var. *brackii)*, are not known to occur in the PPA and do not have the potential to occur because of geological requirements. The nearest mapped potential habitat is 2.3 miles west of the PPA. These species were not observed during field reconnaissance.

Table 3.2. BLM FFO Special Management Species with Potential to Occur in the PPA

Species	Habitat Associations	Potential to Occur in the PPA
Golden eagle *(Aquila chrysaetos)*	Generally open country, in prairies, tundra, open coniferous forest, and barren areas, especially in hilly or mountainous regions; nests on cliff ledges and in trees	Yes
American peregrine falcon *(Falco peregrinus anatum)*	Found in a variety of habitats, mostly consisting of cliffs for nesting and open areas for foraging; frequents large cities and nests on buildings	Yes
Ferruginous hawk *(Buteo regalis)*	Open country, primarily prairies, plains, and badlands; breeds in trees near streams or on steep slopes, sometimes on mounds in open desert	Yes
Prairie falcon *(Falco mexicanus)*	Dry grasslands and prairies, locally alpine tundra; suitable breeding habitat usually requires cliffs for nest sites	Yes
Bald eagle *(Haliaeetus leucocephalus)*	Forages mainly in rivers and large lakes; in open country, typically close to water; nests in tall trees or cliffs	No – no suitable habitat
Mountain plover *(Charadrius montanus)*	Breeds on open plains at low to moderate elevations and agricultural lands, often associated with prairie dog colonies	No – no suitable habitat

Species	Habitat Associations	Potential to Occur in the PPA
Yellow-billed cuckoo (*Coccyzus americanus*)	Dense riparian thickets, willow stands, overgrown pastures and orchards	No – no suitable habitat
Burrowing owl (*Athene cunicu/aria hypugaea*)	Lives in dry, open areas with no trees and short grass, often in association with prairie dog towns	No – no suitable habitat
Aztec gilia (*Aiiciella formosa*)	Salt desert scrub communities in soils of the Nacimiento Formation; 5,000-6,400 feet amsl	No – no suitable habitat
Brack's cactus (Sc/erocactus c/overiae var. *brackit*)	Sandy clay strata of the Nacimiento Formation in sparse shadscale scrub; 5,000-6,400 feet amsl	No – no suitable habitat

Source: BLM (2008c).

Golden eagle – Golden eagles typically nest on cliffs and may range miles during foraging bouts. No golden eagle nests occur within the PPA; however, two nests exist approximately 2.9 miles to the southeast ofthe PPA.

American peregrine falcon – Similar to golden eagles, peregrine falcons occupy cliff nest sites and range widely on foraging bouts. Peregrines, however, primarily prey on aerial bird species, so their occurrence in the PPA is likely to pertain only to flying over the site. No peregrine falcon nests exist within the PPA or vicinity.

Ferruginous hawk – Ferruginous hawks typically nest on the top of trees (20-50 feet above ground), but may nest as low as 6 feet above ground when available trees are relatively short. This species may also nest on cliffs or on the ground. Small- to medium-sized mammals make up the majority of their diet, thus, ferruginous hawks may use the PPA and vicinity for hunting. Rabbit (*Sylvilagus* sp.) scat was observed in the PPA. No ferruginous hawk nests exist within the PPA or vicinity.

Prairie falcon – Prairie falcons also nest on cliffs and conduct extensive foraging bouts. The species preys on rabbits, as well as other small mammals, and may use the PPA and vicinity for hunting. No nests occur within the PPA; however, two nests exist approximately 6 miles to the south of the PPA.

3.2.15 Vegetation

Approximately 60% of the PPA has been previously disturbed and revegetated. The revegetated portion is dominated by big sagebrush (*Artemisia tridentata*) and the canopy cover is open with only a few Utah junipers (*Juniperus osteosperma*). A list of species observed at the PPA by an SWCA biologist on July 21, 2009, is located in the BSR (see Appendix A).

One major land vegetation cover type has been mapped by the Southwest Regional Gap Analysis Program (SWReGAP) within and surrounding the PPA: Colorado Plateau Pinon-Juniper Woodland. A description of this vegetation cover type has been defined by the SWReGAP and is described in more detail below (USGS 2004). The SWReGAP description may differ somewhat from that defined by NMPIF for migratory bird habitat.

Colorado Plateau Pinon-Juniper Woodland

This ecological system occurs on dry mountains and foothills of the Colorado Plateau region from the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim, and east

into the northwest corner of New Mexico. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges and are typically found at elevations from about 4,900 to 8,000 feet amsl. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinon-juniper woodlands to relatively narrow elevational belts on mountainsides. Soils supporting this system vary in texture, ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. Pifion pine *(Pinus edulis)* and/or one-seed juniper *(Juniperus monosperma)* dominate the tree canopy in the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico. Understory layers are variable and may be dominated by shrubs and graminoids or may be absent. Associated species include manzanita *(Arctostaphylos* spp.), big sagebrush *(Artemisia tridentata),* blue grama *(Bouteloua gracilis),* mountain mahogany *(Cercocarpus montanus),* blackbrush *(Coleogyne ramosissima),* James' galetta *(Pleuraphis jamesii),* bitterbrush *(Purshia* spp.), and Gambel oak *(Quercus gambelii).*

3.2.16 Visual Resources

Visual Resource Management (VRM) on public lands is conducted in accordance with BLM Handbook 8410 (BLM 1986). The PPA is on private land which is not managed by designation of VRM classes. However, much of the surrounding area is BLM land designated as VRM Class IV (BLM 2003a). The objective of Class IV-designated lands is to

> provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention. However, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements. (BLM 1986:6)

The PPA is located on relatively flat tableland south of Hart Canyon and west of Hart Mountain. The topographic pattern of the general area is varied, consisting of relatively flat tableland, rolling hills, and incised valleys and canyons. Elevations range from approximately 5,900 to 6,500 feet amsl. The elevation of the center stake of the proposed well pad is 6,425 feet amsl. The visual inventory is described through patterns of landform, water, vegetation, and land use. Water features consist of streams and rivers at the bottom of canyons. The vegetation communities are characteristic of arid climates and predominantly include mixed forbs and grasses within the PPA. Photographs of the visual vegetation setting are provided in the BSR (see Appendix A).

Land uses in the area generally consist of oil and gas development, private and permitted livestock grazing, hunting, and OHV use. Colors and contrast in the landscape include a spectrum of greens and browns from the vegetation and ground. Human-made structures, such as houses, roads, reservoirs, and gas wells, are visible in the surrounding landscape. Roadways, pipelines, well pads, water impoundments, and cleared vegetation inevitably draw visual attention to modifications of the landscape. The industrial components are prevalent but do not dominate the landscape. The existing oil and gas infrastructure has been painted to blend with the surrounding vegetation and the well pads have been reseeded and reclaimed to a minimal surface area (i.e., the teardrop area encircled by the access road) after they were constructed. The Proposed Action would be consistent with existing infrastructure and modifications to the landscape.

3.2.17 Water Quality – Surface and Ground

The major river in the region is the San Juan River, which is approximately 19 miles southeast of the PPA. The smaller Animas River is located approximately 6.7 miles west of the PPA. The San Juan River basin occupies the northwestern corner of the state. Natural surface waters in the area are intermittent streams or ephemeral flow channels located in arroyos, washes, and canyons that feed the San Juan River.

Water quality data for ephemeral runoffs of the San Juan River is limited to only a few observations at sampling stations associated with the USGS coal hydrology program. Ephemeral flows are generally very poor-quality water as a result of the highly erosive and saline nature of the soils. Sparse vegetative cover and rapid runoff conditions are characteristic of the area. An unnamed drainage crosses near the eastern boundary of the PPA. Although this drainage has not been assessed for water quality, it does feed into the Animas River, which is a tributary to the San Juan River. The San Juan River was designated as impaired for the relevant section in 2004 (assessment unit 10 NM-2405_10) (New Mexico Environment Department/Surface Water Quality Bureau [NMED/SWQB] 2005).

The PPA is within the Animas watershed, Hydrologic Unit Code (HUC) 14080104, and is part of the larger San Juan River basin. No monitoring data is available from the NMED/SWQB at this time. However, the adjacent watershed HUC 14080101 has undergone formal study. The U.S. Department of the Interior monitored San Juan River water quality in 1990 as part of the National Irrigation Water Quality Program. The next thorough federal review of water quality in the San Juan River basin is scheduled for 2010. The NMED/SWQB monitors river basins periodically and conducted an intensive surface water quality survey of the San Juan River basin in 2002 (NMED/SWQB 2005). Data from that effort, combined with data from outside sources that met SWQB quality assurance requirements, provided for impairment determinations of New Mexico water quality standards. Impairment for fecal coliform and sedimentation/siltation was documented along the 21.44 miles of the San Juan River within HUC 14080101 (adjacent to HUC 14080104), as well as at other locations within the watershed. For the Upper San Juan watershed, the EPA has identified mercury, total fecal coliform, and sediment/siltation as the primary impairments to water quality. The BLM manages 31% of HUC 14080101, and oil and gas extraction is cited as one of 10 contributing sources of the overall impairment. Additionally, portions of the San Juan River are listed on the New Mexico Fish Consumption Guidelines Due to Mercury Contamination (NMED/SWQB 2005).

3.2.18 Wildlife

The PPA is on private land and not within an SDA for wildlife, and no special management actions are required, other than protection provided by non-discretionary law, regulation, or policy.

Chapter 4 – Environmental Impacts

This chapter describes the potential impacts and potential mitigation for the resources described in Chapter 3 that would result from implementing the alternatives described in Chapter 2.

Alternative A - No Action

Under the No Action alternative, the proposed well would not be drilled. There would be no new impacts from oil and gas production to the resources in the PPA. If the proposed well is not approved, there would be no new surface disturbance and no construction and production equipment on-site and therefore no new impacts to air resources, cultural resources, livestock grazing, migratory birds, mineral resources, Native American religious concerns, paleontological resources, public health and safety, recreation, socioeconomics, soils, special management species, vegetation, visual resources, water quality, and wildlife as a result of those activities. Additionally, there would be no impacts to resources from the project due to increased noise or increased potential to spread invasive and non-native plant species. The No Action alternative would result in the continuation of the current land and resource uses in the PPA and is being used as the baseline for comparison of alternatives.

Alternative B – Proposed Action

A description of potential effects on individual resources as a result of approving the Proposed Action is presented in the following text. Also described are potential mitigation measures that could be incorporated by the BLM as COAs attached to the permit if the decision-maker determines they are necessary. Potential COAs would be consistent with the surface owner agreement.

4.1 Air Resources

4.1.1 Direct and Indirect Impacts

4.1.1.1 Air Quality

Alternative A

Under the No Action alternative, there would be no additional impacts to air quality levels within the PPA because there would be no additional surface disturbance or travel on existing roads related to construction or maintenance of the Proposed Action. If the Proposed Action is not approved, there would be no use of a drill rig, compressors, separators, or dehydrators and therefore no impact to the air quality.

Alternative B

Air quality would temporarily be directly impacted with pollution from exhaust emissions, chemical odors, and dust that would be caused by the motorized equipment used to construct the well pad, and by the drilling rig that would be used to drill the well. Dust dissemination would discontinue upon completion of the construction phase of the well pad. Air pollution from the motorized equipment would discontinue at the completion of the drilling phase of the operations. The winds that frequent the northwestern part of New Mexico generally disperse the odors and emissions. The impacts to air quality would be greatly reduced as the construction and drilling phases are completed. Other factors that currently affect air quality in the area include dust from

livestock herding activities, dust from recreational use, and dust from use of roads for vehicular traffic.

Over the past 10 years, the leasing of federal oil and gas mineral estate in lands managed by the FFO has resulted in the drilling of, on average, approximately 450 to 500 wells annually on federal leases. These wells contribute an incremental increase to the total emissions (including GHGs) from oil and gas activities in New Mexico.

Potential impacts of development include increased airborne soil particles blown from new well pads or roads, and exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as the potential release of GHGs, NOx, and volatile organic compounds (VOCs) during drilling or production activities. The amount of increased emissions cannot be quantified at this time since it is unknown how many wells might be drilled, whether the wells would produce, the types of equipment that would be needed if a well were to be complete9 successfully (e.g., compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling new wells. The degree of impact will also vary, depending on the characteristics of the geologic formations from which production occurs.

The RFD scenario developed for the FFO RMP estimated 522 wells would be drilled annually for federal minerals. Current APD permitting trends within the FFO confirm that these assumptions are reasonably accurate. This level of exploration and production would contribute to a small incremental increase in overall hydrocarbon emissions, including GHGs, NOx, and VOCs released into the planet's atmosphere When compared to total national or global emissions, the amount released as a result of potential production from the proposed well would not have a measurable effect on climate change because of uncertainty and incomplete and unavailable information; therefore, is not possible to determine the effects of the Proposed Action on climate change on a regional, national, or global scale.

Consumption of oil and gas developed from the proposed well is expected to produce GHGs, NOx, and VOCs. Consumption is driven by a variety of complex, interacting factors, such as energy costs, energy efficiency, availability of other energy sources, economics, demographics, and weather or climate. Regional and global transportation, metropolitan traffic, fires (including wildfires, controlled burns, and use of domestic fireplaces), and power plant emissions from the west are all factors to consider. Regional air quality modeling conducted for the Northern San Juan Basin Coal Bed Methane FEIS Project in August 2006 determined that potential cumulative visibility impacts to federal Prevention of Significant Deterioration Class I Areas (Mesa Verde National Park and the Weminuche Wilderness Area) could occur at an unspecified time in the future.

The NAAQS are set for the most common and widespread pollutants. The standards are concentrations of air pollution above which the EPA has determined that serious health and welfare consequences could occur. If the concentrations are below the NAAQS, there are no expected adverse effects on humans and the environment.

4.1.1.2 **Climate**

Alternative A

Under the No Action alternative, there would be no additional impacts to GHG levels within the PPA because there would be no additional surface disturbance, traffic, or release of hydrocarbons from the PPA into the atmosphere. If the Proposed Action is not approved, there would be no use of a drill rig, compressors, separators, or dehydrators and therefore no impact to climate change.

Alternative B

The assessment of GHG emissions and climate change is in its formative phase. It is currently not possible to know with certainty the net impacts from the Proposed Action to climate. The inconsistency in results of scientific models used to predict climate change at the global scale, coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. When further information on the impacts to climate change is known, such information would be incorporated into the BLM's planning and NEPA documents as appropriate.

4.1.2 Potential Mitigation

The FFO has participated in the Four Corners Air Quality Task Force (FCAQTF) since its inception in 2002, when it was known as the Four Corners Ozone Task Force. Because of the unanswered questions raised by these modeling efforts, the FCAQTF has continued to look at air quality issues in the Four Comers region. The FCAQTF is composed of a broad base of representatives that includes federal, state, tribal, and local governments, as well as industry, interest groups, and concerned community members. The FCAQTF has several working groups that developed a mitigation options report (completed in December 2007), which serves as a resource and guide to the regulatory agencies. The responsible agencies may use the report as the basis for developing air quality management plans for the region. This may include developing new and revising existing regulations, supporting new legislation, developing new outreach and information programs, and developing and/or expanding voluntary programs for emission reductions.

Additional air quality modeling conducted since completion of the BLM's 2003 FEISIRMP and provisions in the Record of Decision for the FEISIRMP provide for applications of additional emission controls if requested by the NMAQB. Based on this modeling, the NMAQB issued an interim directive that all newly issued APDs limit compressor emissions to no more than 2 g per horsepower-hour of NOx for engines with 300 hp or less. The FFO has complied with this directive through a COA that has been in effect since August 1, 2005. To date, NMAQB has made no other such requests.

Currently, development of federal minerals in New Mexico's San Juan Basin is at a lower level than was forecast in the RFD scenario prepared in 2001 for the PRMP/FEIS. The impacts forecast by the RFD are still valid. At the time at which the 2003 PRMPIFEIS was written, O_3 readings did not represent a violation of the NAAQS for N_2O. The new preliminary 8-hour O_3 design value for Navajo Lake site (2006–2008) is at 0.075 ppm, and the other two federal regulatory design-value monitors in San Juan County are Substation (2006-2008) at 0.065 ppm,

and Bloomfield (2006–2008) at 0.071 ppm. A monitor design value must be greater than the revised 8-hour O_3 standard of0.075 ppm for a nonattainment designation.

The EPA's inventory data describe "natural gas systems" and "petroleum systems" as the two major categories of total U.S. sources of GHG gas emissions (EPA 2008b). The inventory identifies the contributions of natural gas and petroleum systems to total C02 and CH4 emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other GHGs). 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 subactivities 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's regulatory jurisdiction over field production operations has resulted in the development of best management practices (BMPs) designed to reduce impacts to air quality by reducing all emissions from field production and operations. Typical measures may include the following: flaring hydrocarbon and gases at high temperatures in order to reduce emissions of incomplete combustion; requiring that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; compressor engines with 300 hp or less must have NOx emissions limited to 2 g per horsepower-hour; revegetating areas of the pad that are not required for production facilities in order to reduce the amount of dust from the pads; and watering dirt roads during periods of high use in order to reduce fugitive dust emission. The significant threshold for particulate matter of 35 IJ.g/m^3 daily PM_2.s NAAQS is not expected to be exceeded under the Proposed Action alternative.

The EPA data show that improved practices and technology and changing economics have reduced emissions from oil and gas exploration and development (EPA 2008b). One of the factors in this improvement is industry's adoption of the BMPs proposed by the EPA's Natural Gas Energy Star program. The FFO will work with industry and NMAQB to help facilitate the use of the relevant BMPs for operations proposed on federal mineral leases, where such mitigation is consistent with agency policy.

4.2 **Cultural Resources**

4.2.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to cultural resources in the PPA because there would be no additional surface disturbance or increase in vehicle and construction activities as a result of the Proposed Action.

Alternative B

Under Alternative B, there would be approximately 2.82 acres of surface disturbance. Surface activity would have no direct impacts to any cultural resource sites.. A beneficial impact to cultural resources from the Proposed Action is the added information and knowledge provided by the site-specific survey and inventory. After thorough review the BLM has determined that the Proposed Action would have no impact to any cultural resources (BLM 201O(I)002F).

4.2.2 Potential Mitigation

Project mitigation measures are designed as part of the Proposed Action in order to avoid adverse impacts to protected resources, including cultural resources. For the Atlantic C 2C project, no special stipulations are required by the BLM.

In the event of a discovery during construction, the project proponent will immediately stop all construction activities in the immediate vicinity of the discovery and immediately notify the archaeological monitor, if present, or the BLM. The BLM would then evaluate or cause the site to be evaluated. Should a discovery be evaluated as significant (e.g., National Register, NAGPRA, ARPA), it will be protected in place until mitigating measures can be developed and implemented according to guidelines set by the BLM.

4.3 Invasive and Non-native Plant Species

4.3.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to vegetation in the PPA from invasive and non-native species because there would be no additional surface disturbance or increase in vehicle and construction activities as a result of the Proposed Action.

Alternative B

Under Alternative B, approximately 2.82 acres would be cleared and bladed. After construction, and for the life of the well, long-term disturbance would affect approximately 1.0 acre. Where soils are disturbed and native vegetation is lost, there is an increased likelihood for non-native or invasive species to be introduced and become established. If non-native or invasive plant species are allowed to become established, direct impacts to vegetation from weed infestations in the PPA could be high; these could include reduced structural and species diversity, loss of wildlife habitat, and loss of rangeland productivity. Indirect impacts that result from weed infestations in the PPA could also be low; these could include changes in the fire cycle and increased economic costs from weed management efforts.

Two non-regulated noxious weed species were observed in the PPA (see Section 3.2.3). Implementation of the mitigation measure recommended below would reduce the potential for non-native and invasive species to affect the PPA in both the short and long term.

4.3.2 Potential Mitigation

For actions that involve surface disturbance, the BLM FFO requires reasonable steps to prevent the spread of noxious weeds. A weed management program may be required by the surface owner. Also, the operator would be responsible for weed control for the life of the proposed well and would be required to use weed seed–free hay, mulch, and straw in erosion control (personal communication, Stan Dykes 2008). All disturbed areas not needed for production equipment and vehicular access would be revegetated using a BLM-approved seed mixture.

4.4 **Livestock Grazing**

4.4.1 Direct and Indirect Impacts

Alternative A
Under the No Action alternative, there would be no additional impacts to livestock grazing in the PPA because there would be no new disturbance to rangeland as a result of well construction and there would be no increase in activity in the area when livestock might be present.

Alternative B
As discussed under Section 3.2.4, the PPA is located on private property identified as Hart Springs Allotment Number 5046. The Proposed Action would disturb 2.82 acres (approximately 0.0 I%) of potential rangeland on this allotment. No federal AUMs would be impacted by the Proposed Action. In the long term, upon successful revegetation, impacts to livestock grazing potential would be negligible. These potential impacts are considered low in both the short and long term, and no mitigation is recommended.

4.4.2 Potential Mitigation

No other mitigation has been recommended, other than that included in the Proposed Action.

4.5 **Migratory Birds**

4.5.1 Direct and Indirect Impacts

Alternative A
Existing habitat required by migratory birds would not be affected by the No Action alternative because there would be no increased equipment or vehicle use during construction and no drill rig or compressor use during production; therefore, no short- or long-term increase in ambient noise levels would result within the PPA. There would be no additional disturbance to potential foraging and nesting habitat for migratory birds, as the proposed disturbance of 2.82 acres would not occur. Accordingly, there would be no short- or long-term effects on migratory birds under the No Action alternative.

Alternative B
Adult migratory birds would not be directly harmed by the Proposed Action because of their mobility and ability to avoid areas of human activity. Any nests within the area of the PPA may be directly impacted, along with eggs and juveniles during construction and removal of vegetation; however, there is very little suitable nesting habitat within the PPA as a result of previous disturbance. The primary migratory bird habitat that would be impacted by construction of the Proposed Action would be big sagebrush, sand sagebrush *(Artemisia filifolia)*, rubber rabbitbrush *(Ericameria nauseosa)*, graminoids, and forbs. Canopy cover is open with only a few Utah junipers within the PPA.

The increased human presence, increased noise levels, and dust during construction, drilling, and reclamation activities may indirectly disturb or displace adults from nests and foraging habitats within and surrounding the PPA for a short period (approximately 4-8 weeks). Long-term production operations would result in only a slight increase in human activity in the immediate PPA. Effects on the population status of migratory birds are not anticipated. In consideration of

these factors, there would be minimal short-term effects and minimal long-term effects on migratory birds as a result of the Proposed Action (Table 4.1).

Table 4.1 Anticipated Impacts to Priority Migratory Bird Species

Species	Habitat Type	Potential Effects	Impact Rating- Low/Moderate/High
Burrowing owl (*Athena cunicu/aria)*	Sage/grass	Some reduction of potential nestina habitat	Low
Gray flycatcher (*Empidonax wrightit)*	Pinon-juniper	Little conflict anticipated	Low
Ash-throated flycatcher (*Myiarchus cinerascens)*	Sage/grass	Some reduction of potential nestina habitat	Low
Cassin's kingbird (*Tyrannus vociferans)*	Pinon-juniper	Little conflict anticipated	Low
Loggerhead shrike (*Lanius ludovicianus)*	Sage/grass	Some reduction of potential nesting habitat	Low
Gray vireo (*Vireo vicinior)*	Pinon-juniper	Little conflict anticipated	Low
Pinyon jay (*Gymnorhinus cyanocephalus)*	Pinon-juniper	Little conflict anticipated	Low
Juniper titmouse (*Baeolophus ridgwayt)*	Pinon-juniper	Little conflict anticipated	Low
Sage thrasher *Oreoscoptes montanus)*	Sage/grass	Some reduction of potential nesting habitat	Low
Bendire's thrasher (*Toxostoma bendiret)*	Sage/grass	Some reduction of potential nesting habitat	Low
Black-throated gray warbler (*Dendroica nigrescens*	Pinon-juniper	Little conflict anticipated	Low
Black-throated sparrow (*Amphispiza bilineata)*	Sage/grass	Some reduction of potential nesting habitat	Low
Sage sparrow (*Amphispiza be/lt)*	Sage/grass	Some reduction of potential nesting habitat	Low

4.5.2 Potential Mitigation

Project mitigation measures are designed to mmimize effects on migratory birds and other wildlife. These measures include netting of any permanently open pits and vent caps on all open pipes to prevent bird entry and nesting.

4.6 Mineral Resources

4.6.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to mineral resources within the PPA because no natural gas would be extracted during production of the proposed well.

Alternative B

Burlington proposes to extract natural gas from the Basin Dakota and Blanco Mesaverde formations. This would result in a direct, long-term impact as a result of the irretrievable

commitment of nonrenewable resources. Production of energy would have a direct, beneficial impact to the nation's need for energy development. Production of energy would have no impact to locatable or salable minerals, including gold, uranium, sand, and gravel, because sources for these resources are not located within the PPA.

4.6.2 Potential Mitigation

All downhole mitigation is ensured by the BLM's review of the proposed casing and cementing program as required by 43 CFR 3160 and the Onshore Oil and Gas Order No. 2, Drilling Operations: B. Casing and Cementing Requirements (BLM 1988).

4.7 Native American Religious Concerns

4.7.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to Native American religious concerns.

Alternative B

The proposed action is not known to physically threaten any TCPs, prevent access to sacred sites, prevent the possession of sacred objects, or interfere or otherwise hinder the performance of traditional ceremonies and rituals pursuant to AIRFA or EO 13007. There are currently no known remains that fall within the purview ofNAGPRA or ARPA. Potential Mitigation

No site-specific mitigation measures have been recommended for the Proposed Action.

4.8 Noise

4.8.1 Direct and Indirect Impacts

Alternative A

The No Action alternative would maintain ambient noise levels, and no additional noise impacts within the PPA would be anticipated because there would be no use of a drill rig or compressor during the drilling and production phase of the Proposed Action. There would be no increased equipment and vehicle use during construction and therefore no short-term increase in noise.

Alternative B

An increase in the ambient noise level within and near the PPA would occur during the drilling and construction phase. However, the impact to the background noise level would be moderate and short-term and would be loudest near the drilling equipment. Access to the drilling equipment is prohibited for the general public, and oil and gas workers wear ear protection to minimize noise impacts. Most noise impacts would terminate or decrease substantially after the well is drilled and completed (approximately 4–8 weeks).

A compressor may be required during the operation phase, which would add to the existing noise in the area. If a compressor is required during the operation phase, it could contribute to the long-term (20-30 years) noise levels in the area; however, a muffler could be used, which would mitigate the impact to a low level. Noise levels decrease to 30 to 40 dB for typical producing wells in the area (SWCA 2009). Because the PPA is on private land and not a destination for

Alternative B
Impacts associated with the Proposed Action are short-term and minor, as the built-in mitigation would handle wastes in an approved manner. Sewage would be contained within chemical toilets, and none would be released. Trash would be contained during construction in maintained trash bins that are emptied as necessary. All produced hydrocarbons would be put in tanks or in a closed-loop system on location during drilling and completion work. If the well becomes productive, any produced water would be placed in on-site tanks or pumped to an approved disposal well. In the event of a spill or release, the proper reporting and cleanup procedures would be followed. All waste would be disposed of in the proper manner as required by federal and state law and as described in the COAs.

When significant amounts of chemicals are stored on-site, governmental agencies would be notified as required under the Emergency Planning and Community Right to Know Act of 1986. The notification of releases such as natural gas, natural gas liquids, and petroleum outside the facility site is required under CERCLA and under Notice to Lessees and Operators of Onshore Federal and Indian Oil and Gas Leases (NTL-3A). The well location must have an informational sign, as directed under 43 CFR 3160.

4.10.2 Potential Mitigation

No additional mitigation is required beyond that already incorporated in the Proposed Action and discussed above.

4.11 Recreation

4.11.1 Direct and Indirect Impacts

Alternative A
Under the No Action alternative, there would be no additional impacts to recreation resources within the PPA. If the well is not approved, there would be no increase in vehicle and human activity and no noise impacts associated with the construction and production phases.

Alternative B
Under Alternative B, potential impacts to recreation users would be negligible; the PPA is on private surface lands and not managed for public recreation.

1.1.1 Potential Mitigation

None required.

4.12 Socioeconomics

4.12.1 Direct and Indirect Impacts

This analysis does not focus on all aspects of economics within the PPA but considers only the projected economic effects of Alternative B and economic statistics at the state, county, and local levels to describe the economic context of the project.

It is expected that approval of Alternative B would bring some economic multipliers to the towns en route to the PPA. Construction crews and other workers would likely patronize local businesses for supplies such as fuel, food, and refreshments. The Proposed Action would also

recreationists, the Proposed Action would generally not affect any visitors looking for a quiet experience. Potential impacts to inhabitants of nearby residences would include increased noise during construction and drilling; long term impacts would be similar to those incurred from the existing well. The residences are situated on a bluff above the well pad and more than 220 yards away, contributing to attenuation of the noise levels as potentially heard from the residences. Impacts are expected to be minor in the long term.

Indirect impacts to wildlife as a result of increased noise could last for 20 to 30 years. Wildlife could be initially impacted and move away from the area but could eventually habituate to the noise levels associated with production.

4.8.2 Potential Mitigation

No other mitigation has been recommended other than that included in the Proposed Action, which states that a compressor may also be required to assist in bringing fluids and gas to the surface. If required, the compressor would conform to BLM FFO Noise NTL standards, which could require a muffler to reduce noise to an acceptable level.

4.9 **Paleontological Resources**

4.9.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to paleontological resources within the PPA. If the project is not approved, soil would not be excavated, ground disturbance would not occur, and any subsurface fossil remains would not be disturbed because the pad location would not be constructed and graded.

Alternative B

The PPA is on private surface lands and not within a BLM-identified SDA for paleontological resources, and the likelihood of any significant paleontological resource existing in this area is low. However, paleontological resources may be present within the PPA, and impacts to paleontological resources could occur. The relatively small size of the proposed disturbance (much of the disturbance is proposed on an existing well pad) would make any such potential impacts low.

Surface disturbance within the PPA could have direct adverse impacts to paleontological resources as the result of breakage and crushing of fossil remains. Direct impacts to fossil localities could result from the disturbance of the stratigraphic context in which they are located. The Proposed Action could also create indirect impacts to areas by changing erosion patterns. An increase in human activity in the area could increase the possibility of unauthorized removal or other alterations to paleontological resources in the area. Potential impacts to paleontological resources as a result of the Proposed Action would be low and long-term.

4.9.2 Potential Mitigation

All necessary BLM FFO paleontological resource stipulations could be included as COAs, attached to the APD. These stipulations could include, but are not limited to, temporary or permanent fencing or other physical barriers, monitoring of earth-disturbing construction, PPA reduction and/or specific construction avoidance zones, and employee education. Based on the

BLM's on-site visit and other factors discussed above, a determination for final project clearance and stipulations would be issued by the BLM.

If previously undocumented paleontological sites are encountered during construction, all activities would stop in the vicinity of the discovery, and the BLM would be immediately notified. The site would then be evaluated. Mitigation measures, such as data recovery, may be required by the BLM to prevent impacts to newly identified paleontological resources. No site-specific mitigation has been identified, as the PPA is on private surface and not within a ELM-designated SDA for paleontological resources.

4.10 Public Health and Safety

4.10.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional public health and safety hazards within the PPA related to construction, drilling, or production of the proposed well. If the Proposed Action is not approved, there would be no increase in vehicle access during construction, large trucks would not be accessing the area, and waste fluids produced as a result of drilling would not be produced. Construction of a reserve pit or closed-loop system would not be necessary.

Alternative B

Burlington proposes the construction and operation of one natural gas well and pipeline tie, which present potential public health and safety hazards. The PPA is approximately 8.3 miles from Aztec, New Mexico, with few residential dwellings located in the immediate vicinity. In addition, the PPA is on private surface with limited access. Safety measures, construction of a closed-loop system for fluids, constructing protective fencing, and restricting access, help minimize public health and safety concerns.

The construction, drilling, and operation of the proposed well would meet all federal, state, and local health and safety requirements for waste handling and disposal. Drilling operations on federal and Indian oil and gas leases would be conducted in accordance to the BLM's Onshore Oil and Gas Order No. 2 (BLM 1988). Disposal of produced water would be handled pursuant to the BLM's Onshore Oil and Gas Order No.7 (BLM 1993). In addition, the proposed well would be routinely monitored by Burlington for safety until the well has been plugged and officially abandoned.

4.10.1.1 Hazardous and Solid Waste Materials

Alternative A

Under the No Action alternative, there would be no additional impacts from hazardous wastes within the PPA related to construction, drilling, or production of the proposed well. If the Proposed Action is not approved there would be no increase in construction activities with the potential to disturb existing pipelines, no increase in produced hydrocarbons, and no fluids produced as a result of drilling; therefore, no reserve pit or closed-loop system would be necessary.

provide socioeconomic benefits in the form of the production of natural gas used for heating and other energy needs in the greater southwestern United States. Therefore, approval of the Proposed Action would result in low beneficial impacts in the short term (4-8 weeks) and low beneficial impacts in the long term, as the well would be visited once a week (or more often as necessary) for maintenance. These economic benefit multipliers would be low.

4.12.2 Potential Mitigation

No other mitigation has been recommended, other than that included in the Proposed Action.

4.13 Soils

4.13.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to soils within the PPA. If the project is not approved, additional vegetation would not be cleared, soil would not be excavated, topsoil would not be stockpiled, culverts would not be installed, and silt fencing would not be necessary because the pad location would not be constructed and graded.

Alternative B

Under Alternative B, well pad construction and drilling would have a direct impact to soils through physical disturbances. This would be limited to those areas where vegetation is removed or destroyed. The impacts would be of three types: the physical removal, mixing, or burying of surface soils; the damage or destruction of soil properties in place; and the mixing of drilling and production wastes into the soil. During construction of the proposed well pad, approximately 2.82 acres of soil would be disturbed. Vegetation would be cleared from the pad location, and surface soils would be removed to a maximum depth of 6 inches and stockpiled for later use during reclamation. The pad location would then be graded and the soil compacted. Surface runoff from existing roads is not anticipated to deviate from current conditions.

Construction of the proposed well pad would indirectly cause an undetermined amount of water erosion, with the loss of surface soils, which would reduce viability for plant regeneration. Impacts from the sedimentation, runoff, and erosion are expected to be relatively low for the life of the project. After productive service and during abandonment procedures, the well would be reclaimed by removing surface equipment, the well bores plugged per industry standards, the well pad site recontoured to preconstruction conditions, and topsoil distributed to emulate preconstruction conditions. Following reclamation earthwork, the site would be seeded with a BLM- and surface owner–approved seed mixture. In turn, loss of vegetation cover would indirectly result in increased erosion and sedimentation of adjacent areas.

4.13.2 Potential Mitigation

No other mitigation has been recommended, other than that included in the Proposed Action, which states that drainage from the well pad area would be controlled as detailed in the well pad diagram (see Appendix B) to minimize off-site migration of disturbed soils. Additional soil erosion measures and BLM-approved BMPs may be required as part of the COAs in the APD and would be consistent with the surface owner agreement.

4.14 Special Management Species

4.14.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to special management species in the PPA. If the Proposed Action is not approved, there would be no additional disturbance to potential foraging and nesting habitat for special management species. Direct impacts to special management species related to the increased vehicle access during construction would not occur.

Alternative B

Four BLM FFO special management species have the potential to occur in the PPA and surrounding area: golden eagle, American peregrine falcon, ferruginous hawk, and prairie falcon (because of the presence of potential foraging and nesting habitat).

Total habitat disturbance associated with the Proposed Action would be 1.82 acres, which represents a small portion of potential habitat for the four special management species listed above. Although the area constitutes potential habitat for these species, the site-specific surveys conducted by an SWCA biologist did not find any nests or observe any of these species in the PPA and surrounding area. These four species show no special affinity for the PPA; as such, impacts are anticipated to be low.

4.14.2 Potential Mitigation

No other mitigation has been recommended, other than that included in the Proposed Action, which states that BLM-approved BMPs may be required as part of the COAs in the APD.

4.15 Vegetation

4.15.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to vegetation within the PPA because no additional surface disturbance would occur. In the long term, new vegetation from the BLM-approved seed mix would not be introduced, and the vegetation community would continue to progress naturally.

Alternative B

Approximately 1.82 acres of vegetation would be disturbed and/or removed in conjunction with the completion of Alternative B. The direct impacts of vegetation removal include short-term loss of vegetation, including the modification of vegetation structure, plant species composition, and areal extent of cover types. Removing vegetation results in increased soil exposure, loss of wildlife habitat, reduced plant diversity, and loss of livestock forage. Indirect impacts include the increased potential for non-native and noxious plant establishment and introduction, accelerated wind and water erosion, changes in water runoff due to facility construction, soil impacts that affect plant growth (soil erosion or siltation), shifts in species composition, changes in vegetative density away from desirable conditions, and changes in visual aesthetics.

Stripped topsoil and vegetation (seed source) would be temporarily stockpiled for future reclamation. Reclamation of disturbed areas outside the teardrop is required at producing well sites. Complete reclamation would occur after the well is no longer economically productive. The well pad would be recontoured and seeded upon being plugged and abandoned. The impacts to vegetation would be moderate and short-term during drilling. When the well pad is reclaimed and seeded, long-term impacts would be reduced to low.

4.15.2 Potential Mitigation

No other mitigation has been recommended other than that included in the Proposed Action, which states that following construction of the proposed well, all disturbed areas not needed for production would be revegetated using a BLM-approved seed mixture. The remaining long-term disturbance would be reclaimed according to BLM-approved BMPs as part of the COAs in the approved APD and would be consistent with the surface owner agreement.

4.16 **Visual Resources**

4.16.1 Direct and Indirect Impacts

Alternative A

Under the No Action alternative, there would be no additional impacts to visual resources within the PPA because there would be no additional surface disturbance and no aboveground production facilities would be constructed. There would be no short-term impacts to visual resources resulting from the dust plumes of vehicles accessing the PPA.

Alternative B

Under Alternative B, impacts to the immediate foreground would include a short-term visual impact because of the loss of vegetation (1.82 acres), and if the well becomes a producer, a long-term impact as a result of the construction of other human-made structures associated with natural gas extraction, including the wellhead, dehydrator, tank, and meter run. However, under this alternative, all aboveground production facilities would be low profile (less than 14 feet in height) and painted Juniper Green to blend with the surrounding environment. Existing equipment would be replaced with low-profile equipment and also painted Juniper Green.

If the well becomes a producer, facilities— including the wellhead, dehydrator, and the meter run-would remain on-site, adding a low visual impact in the immediate foreground of the existing well pad. The Proposed Action would cause visual impacts from contrasts in the landscape created from the smooth texture of the tank surfaces; the height of on-site tanks versus the horizontal plane of the landscape; the removal of vegetation, altering the texture and color of the ground surface; and the simplification of the vegetative community, reducing the roughness and complexity of the surface. Construction activities would result in additional moderate, short- term impacts to visual resources from dust, increased traffic, increased human presence and activity, and the presence of drilling equipment. After construction and completion, well production equipment (e.g., dehydrator) would remain on-site, resulting in a negligible long-term visual impact. After the successful reclamation of the area outside the teardrop, the overall contrast would minimize over time. The Proposed Action is congruent with viewer expectations and similar to the existing facilites; the objectives of VRM Class IV would be met as the proposed well is in an area known for oil and gas production.

4.16.2 Potential Mitigation

No other mitigation has been recommended, other than that included in the Proposed Action.

4.17 **Water Quality- Surface and Ground**

4.17.1 Direct and Indirect Impacts

Alternative A
Under the No Action alternative, there would be no additional impacts to water quality within the PPA because if the project is not approved, the pad location would not be constructed and graded. The soil would therefore not be excavated, topsoil would not be stockpiled, culverts would not be installed, and diversion ditches would not be necessary. There would be no additional mobilization or dispersal of sediments as a result of excavation work.

Alternative B
No permanent surface waters would potentially be affected by the Proposed Action. Impacts to water quality are expected to be low because the Proposed Action includes mitigation measures to reduce the potential for impacts from sedimentation, runoff, and erosion, such as stockpiling the top 6 inches of topsoil on-site for redistribution during well pad reclamation, installing culverts for proper drainage, installing silt fences, and constructing a diversion ditch. Additionally, the closed loop system instead of the reserve pit would prevent seepage into surface or shallow groundwater.

Removal of vegetation and soil disturbance for the Proposed Action may result in an increase in sedimentation, runoff, and erosion. These impacts are expected to be relatively low for the life of the project. The increase in the amount of sedimentation would depend on wind and water events in relation to surface disturbance, the timing and success of reclamation, and erosion control measures. The use of BMPs and pollution prevention measures, as required by federal and state regulations, would help minimize impacts to water quality.

4.17.2 Potential Mitigation

BLM-approved BMPs and pollution prevention measures may be required as part of the COAs in the approved APD. For the Atlantic C 2C, corner 2 of the proposed well pad would be rounded to avoid impact to the unnamed drainage on the eastern boundary of the PPA. In addition, a closed-loop system for fluids, instead of a lined reserve pit, would be used.

4.18 **Wildlife**

4.18.1 Direct and Indirect Impacts

Alternative A
Under the No Action alternative, there would be no additional impacts to wildlife in the PPA because there would be no alterations to habitat as a result of surface disturbance associated with construction ofthe proposed well. If the project is not approved, direct impacts to wildlife related to the increased vehicle access during construction would not occur.

Alternative B
Impacts to wildlife would result from actions that alter wildlife habitats, including change, disturbance, and habitat loss. Altering wildlife habitat in ways that would be considered adverse

may occur directly (through habitat loss from surface disturbance) or indirectly (through the reduction in habitat quality caused by increased noise levels and increased human activity). Gas development includes both direct and indirect impacts to wildlife associated with ground disturbances caused by drilling, constructing road networks, and installing well pads, pipelines, and other associated infrastructure, as well as disturbance related to ongoing maintenance.

Oil and gas development, as well as other ground-disturbing activities throughout the San Juan Basin, have the potential to affect wildlife through alterations in habitat. Species that have limited mobility or that are specialists for certain habitats could be negatively impacted from activities that disturb their habitat. A majority of wildlife species in the area would likely move into available habitat surrounding the PPA.

Under Alternative B, 1.82 acres of direct habitat loss would occur (approximately 1.0 acre of the PPA occurs on an existing well pad without vegetation). Once the well is completed, the area not needed for operations and maintenance would be revegetated using a BLM-approved seed mixture. Upon final abandonment of the well, the remaining disturbance would be reclaimed as outlined in the COAs. As a result, direct and indirect impacts to wildlife would be low.

4.18.2 Potential Mitigation

No other mitigation has been recommended, other than that included in the Proposed Action.

4.19 **Cumulative Impacts**

This EA addresses the resources and impacts on a site-specific basis as required by NEPA. Pursuant to 40 CFR 1508.28 and 1502.21, this site-specific EA tiers to the information and analysis contained in the PRMP/FEIS (BLM 2003b). In particular, the cumulative impact analysis contained in the PRMP/FEIS, coupled with the level of development proposed by the RFD for oil and gas, accounts for the broader impacts of oil and gas development. The past, present, and reasonably foreseeable future environmental disturbances within this overall project area are oil and gas development, grazing, hunting, and OHV use.

The PPA and surrounding vicinity have been industrialized with oil and gas well development. The surface disturbance for each project has contributed to a fragmented land use pattern. Cumulative impacts fluctuate with the gradual reclamation of old wells and the creation of new access roads and well pads. The ongoing process of restoration and creating new disturbances continues as minerals are extracted from the land. Reducing disturbed areas and applying appropriate mitigation measures would minimize cumulative impacts.

Analysis of cumulative impacts for the RFD of 9,942 new oil and gas wells on public lands in the San Juan Basin was presented in the PRMP/FEIS (BLM 2003b). This total reflects 28 wells that would be inaccessible as a result of No Surface Occupancy constraints; these were subtracted from the total of 9,970 that was presented in the RFD. The total also reflects the anticipated commingling of future wells (BLM 2003b). The proposed well is included in the total analyzed. Total surface disturbance projected by the plan was 18,577 acres, with 805 miles of new roads. Alternative B would account for 2.82 acres of total surface disturbance (0.01%) within the San Juan Basin as analyzed in the PRMP/FEIS. Therefore, the proposed well's contribution to the cumulative impact of oil and gas development is minimal.

4.19.1 Air Resources

The leased area of the Proposed Action has been industrialized with oil and gas well development. The surface disturbance for each project that has been permitted has created increased land use fragmentation. The cumulative impacts fluctuate with the gradual reclamation of well abandonments and the creation of new additional surface disturbances in the construction of new access roads and well pads. The ongoing process of restoration of abandonments and creating new disturbances for drilling new wells gradually accumulates as the minerals are extracted from the land. Preserving as much land as possible and applying appropriate mitigation measures would alleviate the cumulative impacts.

Due to the absence of regulatory requirements to measure GHG emissions and the variability of oil and gas activities on federal minerals, it is not possible to accurately quantify potential GHG emissions in the affected areas as a result of approving this APD. A general assumption, however, can be made: drilling this well may contribute to GHG emissions.

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to natural resources and plant and animal species due to climate change are likely to be varied, including those in the southwestern United States. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts could occur due to increased windblown dust from drier and less stable soils. Cool-season plant species' spatial ranges are predicted to move north and to higher elevations, and extinction of endemic threatened and/or endangered plants may be accelerated.

Due to loss of habitat or competition from other species whose ranges may shift northward, the population of some animal species may be reduced or increased. Less snow at lower elevations would likely impact the timing and quantity of snowmelt, which, in tum, could impact water resources and species dependent on historic water conditions. Forests at higher elevations in New Mexico, for example, have been exposed to warmer and drier conditions over a 10-year period. Should the trend continue, the habitats and identified drought-sensitive species in these forested areas and higher elevations may also be more affected by climate change.

4.19.2 Wildlife

Oil and gas development throughout the San Juan Basin has the potential to affect wildlife through alterations in habitat. Wildlife habitat alteration includes modification of the vegetation type on the disturbed areas and, on a larger scale, habitat fragmentation for some species, along with noise and visual intrusion into the area during various phases of the project. Oil and gas development includes adverse direct and indirect impacts to wildlife associated with ground disturbances caused by constructing road networks, drilling, and installing well pads, pipelines, and other associated infrastructure. There are also impacts from ongoing maintenance for approximately 20 to 30 years.

In the short term, through construction and production, cumulative impacts are largely associated with the overall habitat fragmentation from well pads and other developments. In the long term, after abandonment and reclamation, the mosaic of plant types would be a beneficial impact, providing a more diverse plant community.

Chapter 5 – Consultation and Coordination

The following agencies, organizations, and individuals contributed to the preparation of this document:

Table 5.1. Contributors to this EA

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Appendix A – Biological Survey Report

Appendix B – Plats, Maps, and Driving Directions for Alternative B

Appendix C – Selected Laws and Regulations Governing Federal Oil and Gas Development

Table C-1. Selected Laws and Regulations Governing Federal Oil and Gas Development

LAW/REGULATION	RESOURCE CONSIDERATION	AUTHORITY
American Indian Religious Freedom Act of 1978	Native American religious concerns	All agencies
Bald and Golden Eagle Protection Act of 1940, as amended	Bald and golden eagles	U. S. Fish and Wildlife Service (USFWS)
Bureau of Land Management Instruction Memoranda, national and state	Sensitive species and habitat	Bureau of Land Management (BLM)
Clean Air Act (CM) of 1970, as amended	Air quality, air emissions	New Mexico Environment De artment
Clean Water Act (CWA) of 1977, as amended; Section 401	Discharges from point sources into surface jurisdictional waters of the U.S.	New Mexico Water Quality Control Commission; Navajo Nation Environmental Protection Agency
Clean Water Act (CWA) of 1977, as amended; Section 402: Stonnwater Pollution Prevention Plan (SWPPP)	Discharges from stonnwater runoff into surface jurisdictional waters of the U.S.	U.S. Environmental Protection Agency (EPA)
Clean Water Act (CWA) of 1977, as amended; Section 404	Discharge of dredge/fill material into surface jurisdictional waters of the U.S.	U.S. Anny Corps of Engineers
Colorado River Salinity Control Act of 1974, as amended	Colorado River Basin	BLM
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, as amended	Use and disposal of listed hazardous materials	EPA
Endangered Species Act (ESA) of 1973, as amended; Section 7	Threatened and endangered plant and animal species	USFWS
Executive Order 11988, as amended	Floodplains	All agencies
Executive Order 22898	Environmental and health conditions in minority and low-income communities	All agencies
Fannland Protection Policy Act of 1994	Prime and unique farmlands	Natural Resource Conservation Service
Federal Land Management and Policy Act (FLPMA) of 1976	Areas of Critical Environmental Concern; Wilderness areas	BLM
Federal Noxious Weed Act of 1974, as amended; Executive Order 13112	Noxious weeds	All agencies
Migratory Bird Treaty Act (MBTA) of 1918, as amended; Executive Order 131186	Migratory birds, nests, and eggs	USFWS
Mineral Leasing Act (MLA) of 1929, as amended; Associated Onshore Orders	Federal oil and gas leases and related transportation pipelines	BLM
National Environmental Policy Act (NEPA) of 1969	Human environment, under federal actions	All agencies
National Historic Preservation Act (NHPA) of 1966, as amended; Section 106	Cultural resources	All agencies
Native American Graves Protection and Repatriation Act (NAGPRA) of 1990	Native American human remains, funerary objects, sacred objects, and objects of cultural patrimony	All agencies
New Mexico Noxious Weed List	Noxious weeds in the state of New Mexico	New Mexico Department of Agriculture
Resource Conservation and Recovery Act (RCRA) of 1976	Use of hazardous materials	EPA
Wild and Scenic Rivers Act of 1968, as amended	Wild and scenic rivers	All agencies