ENVIRONMENTAL ASSESSMENT FOR BURLINGTON RESOURCES OIL & GAS COMPANY, LP HOUCK COM 2 AND HOUCK COM 2N WELL PAD, ACCESS ROAD, AND PIPELINE TIES

BLM EA No. NM-F010-2013-0005

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U.S. Department of the Interior
Bureau of Land Management
Farmington Field Office
San Juan County, New Mexico

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BUREAU OF LAND MANAGEMENT
FARMINGTON FIELD OFFICE

ENVIRONMENTAL ASSESSMENT
FOR

BURLINGTON RESOURCES OIL & GAS COMPANY, LP
HOUCK COM 2 AND HOUCK COM 2N WELL PAD, ACCESS ROAD, AND PIPELINE TIES

Chapter 1 – Introduction

Burlington Resources Oil & 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 two Blanco Mesaverde/Basin Dakota natural gas wells, the proposed Houck Com 2 and Houck Com 2N, and associated access road. Enterprise Field Services, LLC (Enterprise), has proposed construction and operation of the associated pipeline ties. These five actions constitute the Proposed Action. It is anticipated that if the APD is approved, construction of the proposed wells would commence following approval. The proposed wells would be drilled and located on federal mineral lease number USA NM-03717, issued November 1, 1946.

The proposed project area (PPA) is located in the north-central portion of the San Juan Basin in northwestern New Mexico. It is approximately 3.75 miles northeast of Bloomfield, New Mexico. In general, the PPA would be accessed south of New Mexico State Highway 575 from existing improved roads (Figure 1.1). The legal description for the location of the Houck Com 2 is 1,570 from north line (FNL) and 1,114 from west line (FWL) of Section 7, Township 29 North, Range 10 West. The legal description for the location of the Houck Com 2N is 1,518 FNL and 1,115 FWL of Section 7, Township 29 North, Range 10 West.

SWCA Environmental Consultants (SWCA) conducted a biological survey of the PPA and prepared a biological survey report (BSR) which is included in Appendix A. A complete set of survey plats, maps, and driving directions for the wells are included in Appendix B. Additionally, Aztec Archaeological Consultants (Aztec) prepared a cultural resources inventory for the well pad, which is on file with the BLM FFO.

This environmental assessment (EA) complies with the requirements of the National Environmental Policy Act of 1969 (NEPA) and federal regulations found in 40 Code of Federal Regulations (CFR) Chapter V. 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.

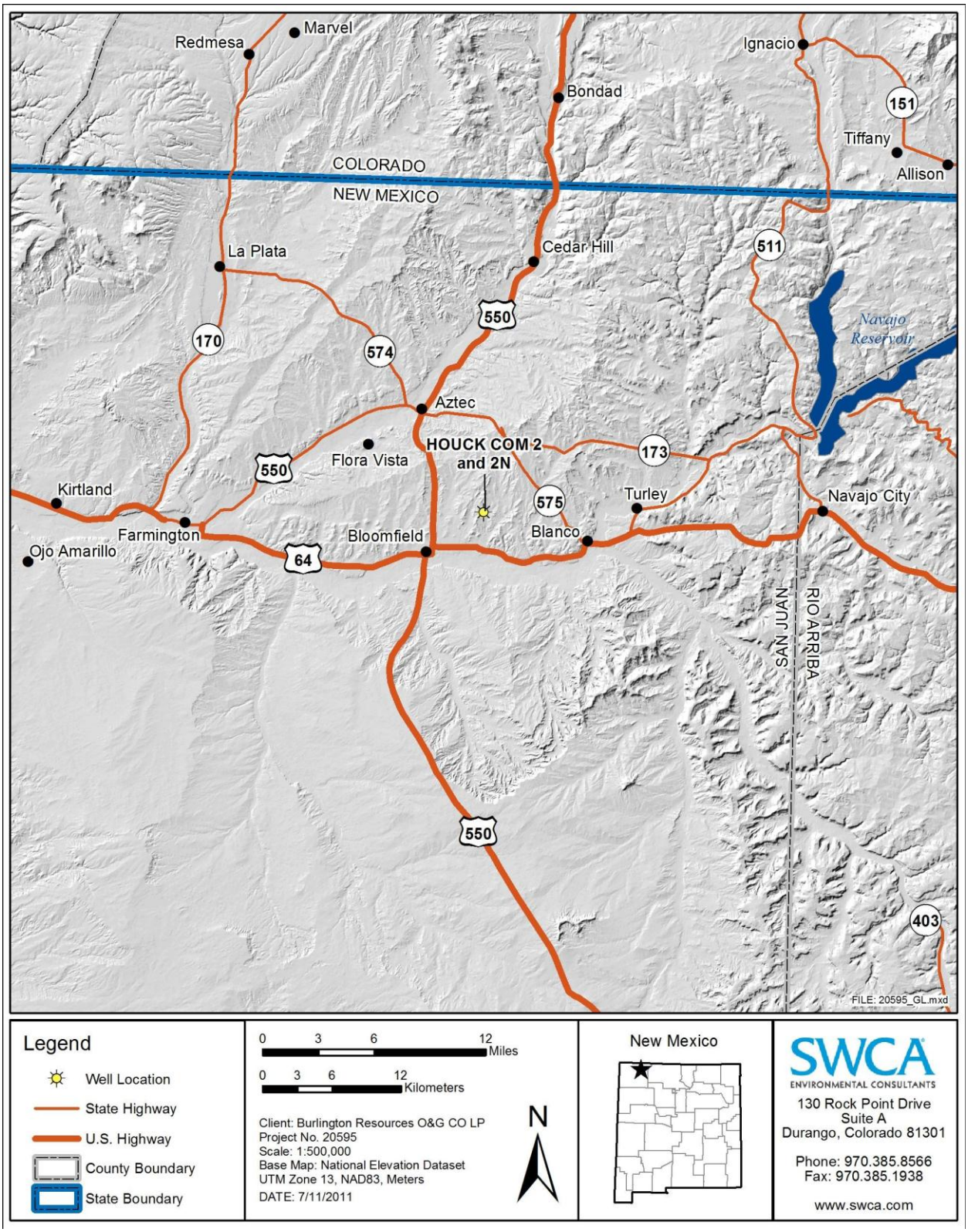

Figure 1.1. General location map.

1.1 Decision to be Made

The Onshore Oil and Gas Order 1 (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 plan must address 13 specific points concerning use of the 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 (EIS). 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.

1.2 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. The approved APD, issued by the BLM, would authorize Burlington to construct and drill the proposed wells and access road and install necessary facilities, and ultimately to abandon the endeavor responsibly. The associated pipeline ties, authorized by a right-of-way grant to Enterprise, would allow natural gas to be produced from the proposed well.

Federal oil and gas lease USA NM-03717 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 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.

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 FFO's *Farmington 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:2-1). 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-03717 was issued. In the Council on Environmental Quality (CEQ) regulations (40 CFR 1500.3), it states that parts 1500 through 1508 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 operator and right-of-way grant holder 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 FFO website. During the on-site inspection—attended by resource specialists who are familiar with the issues and resources of the area, including representatives from BLM, SWCA, 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.

1.5 Summary

This chapter 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 wells 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 National Environmental Policy Act Handbook H-1790-1* (BLM NEPA Handbook) 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 APDs, Burlington would retain its lease rights, and gas production in the area would continue at its current rate. If the APDs are not approved, natural gas would not be extracted from the proposed well, the associated surface disturbance would not occur, and current uses in the area would continue to occur. The construction of the wells, access road, and pipeline ties, production of natural gas from the well, and final abandonment of the well, access road, and pipelines 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 two directionally drilled Blanco Mesaverde/Basin Dakota natural gas wells, and an associated access road. Enterprise also proposes construction and operation of the associated pipeline ties. The PPA is located completely within San Juan County and on BLM lands with federal minerals administered by the BLM FFO. The center stakes are at 5,784 (Houck Com 2) and 5,788 (Houck Com 2N) feet above mean sea level (amsl).

The maximum surface disturbance associated with the Proposed Action would be 4.72 acres (Figure 2.1). The Houck Com 2 and Houck Com 2N proposed well pad would be 245 × 370 feet in size with a 50-foot-wide construction zone around the perimeter of the well pad for a 3.72-acre footprint. A new 866.51-foot-long access road and a collocated 958.4-foot-long buried pipeline would be constructed, connecting the Houck Com 2 to an existing main transport pipeline. The road and pipeline would create an additional 1.0 acre of new disturbance. A 50-foot-long pipeline would tie-in the Houck Com 2N and would be completely contained within the proposed well pad. The 50-foot buffer and portions of the well pad and access road not needed for production would be reclaimed after successful initiation of the well production phase.

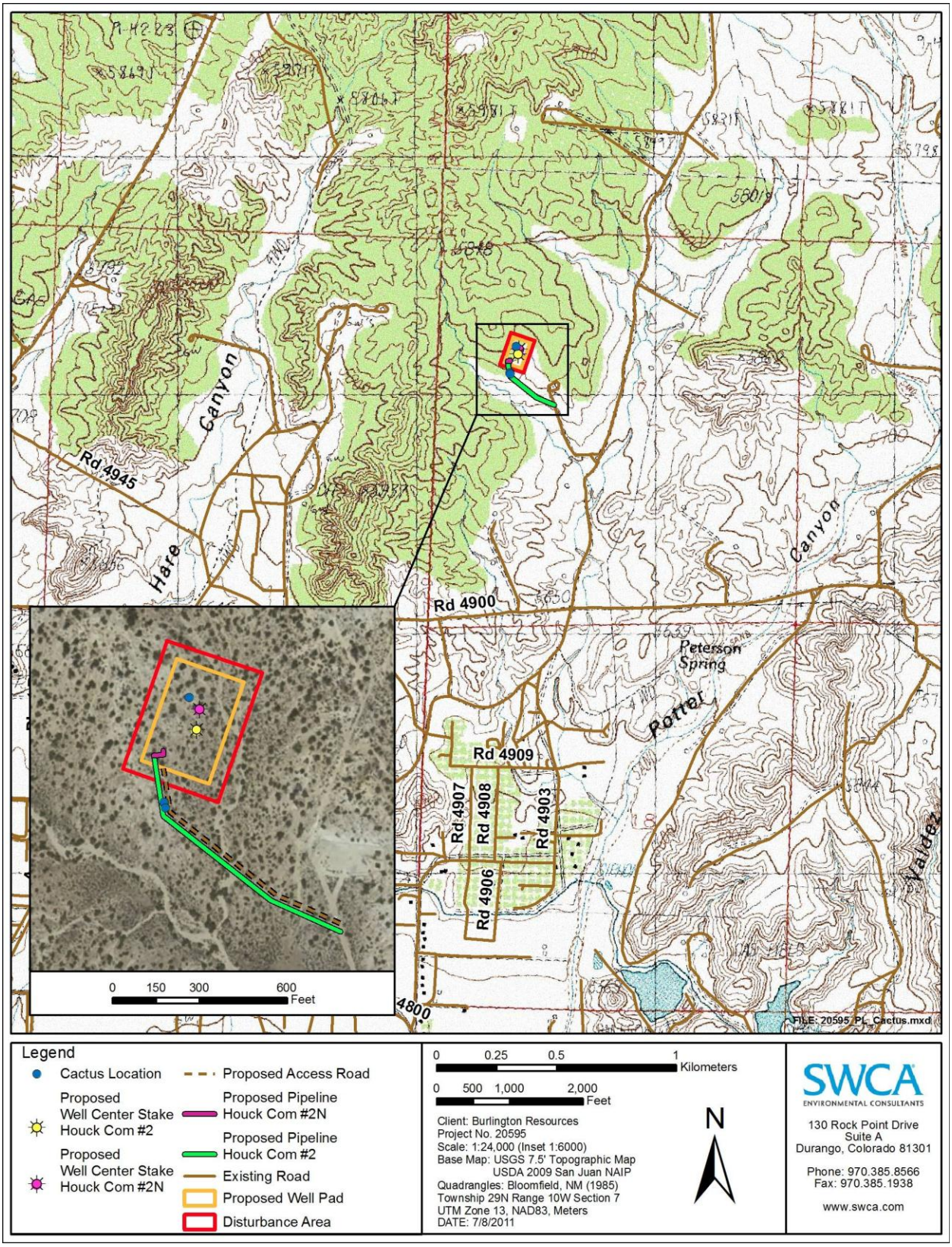

Figure 2.1. Project location map with aerial photograph inset.

Table 2.1 compares the site disturbance of both alternatives.

Table 2.1 Summary of New Disturbance from the Proposed Action

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
Access road	0.00	0.00	0.00
Pipeline	0.00	0.00	0.00
Total	**0.00**	**0.00**	**0.00**
Alternative B—Proposed Action			
Well pad	3.72	1.00*	0.00
Collocated Access road and pipeline	1.00	0.30*	
Total	**4.72**	**1.30**	**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). Access roads are reclaimed to a 15-foot driving surface width.

Project Construction

Under the Proposed Action, a 4.72-acre well pad and access road would be constructed using a D-8 bulldozer. It would be necessary to clear vegetation for the well pad and access road to provide space and a level surface for a drilling rig, completion rig, and other heavy equipment to safely access and drill the well. The cuts and fills and topsoil storage would be contained within the construction buffer. The pipelines trench would be dug using a backhoe or trencher. Mitigation measures recommended for the Proposed Action could be implemented as COAs attached to the approved APD. Similarly, recommended mitigation measures would be implemented as stipulations in the right-of-way grant. The Proposed Action includes 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 reclamation.
- All aboveground production facilities would be painted Juniper Green to blend with the surrounding environment.
- All disturbed areas not needed for production would be revegetated using a BLM-approved seed mixture.
- Culverts would be installed as necessary for proper drainage.
- Silt traps would be installed as necessary to reduce erosion.
- The reserve pit would be designed and operated as indicated on the well pad diagram (see Appendix B) and would be lined with an impervious 20 mil liner and then fenced. The

reserve pit would be constructed in accordance with the Pit Rule, and would be sited, fenced, revegetated, and marked as directed in that regulation.

- A diversion ditch would be designed and constructed as prescribed by the BLM.
- A compressor may also be required to pressurize gas for delivery to the transportation pipelines. 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 (NO_x) for engines with 300 horsepower (hp) or less.

After the well pad is constructed, a drilling rig would be moved to the location and assembled. Drilling into the Blanco Mesaverde/Basin Dakotas formations would require approximately 14 days (per well). After the wells have been drilled, completion would take approximately 14 additional days (per well). The entire construction and drilling process is anticipated to take between eight and twelve weeks. During the construction, drilling, and completion phases, both heavy equipment and light vehicles would use existing roads to access the PPA. Traffic would include drilling rigs, large tractor-trailers, construction equipment, water trucks, drilling and production equipment and supplies, tanks, and light pickup trucks.

Production Phase

If the wells prove productive, the portion of the pad not required for production equipment and vehicular access would be reclaimed and seeded with a BLM-approved seed mixture. Reclamation usually includes the portions of the pad outside the *teardrop*—the area needed for production operations, usually encircled by the access road. 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 wellheads, production separators, cathodic stations, a meter run with electronic telemetry, and one to two 500-barrel storage tanks per well. Compressors may also be required to pressurize gas for delivery to the transportation pipelines. 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 wells 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 wells produce 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 wells are no longer commercially viable, they would be plugged and abandoned in accordance with BLM regulations and as specified by the FFO in the COAs. Downhole well abandonment would be carried out under current BLM regulations for plugging of the wells. Surface equipment would be removed, except for an aboveground marker that would contain well identification information, including the location of the plugged holes. The underground pipeline ties are usually plugged and left in place. The well pad and access road, if not needed for

other purposes, would be recontoured and revegetated, as specified in the approved COAs and right-of-way grant stipulations. Final abandonment would be complete when successful reclamation of all disturbed areas is achieved to BLM Gold Book standards and guidelines.

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 NEPA Handbook, the agency "need only analyze alternatives that would have a lesser effect that the proposed action" (BLM 2008a:80). 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. Limitations of other nearby equipment, pipeliness, access, and safety are considered, as well as resource conflicts which may require mitigation, such as rotating the well pad to protect cultural sites.

The Houck Com 2 and Houck Com 2N are proposed in mapped habitat for BLM Special Management Species (SMS) Aztec gilia and Brack's cactus. During the biological survey on April 21, 2011 several Brack's cacti were identified within the disturbance area. In response to this resource conflict the BLM considered other locations in the area which could avoid the cacti but potentially still reach the bottom hole lease area. The nearby Jones #2 well pad was considered but eliminated as feasible due to the topography of the surrounding area and an existing pipeline corridor limiting the available size of the well pad. In addition, other locations for a new well pad were investigated, with the conclusion that no other location would be feasible. Please see Section 4.2.14 for impacts and mitigation for the SMS species discovered.

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 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 14 of the supplemental authorities listed in the BLM NEPA Handbook, have also been considered in preparing this EA (BLM 2008a:Appendix 1).

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 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 of 1966 (NHPA; 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 of 1990 (PL 101-601). 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 the 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-I-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 BLM NEPA Handbook the following discussion will be limited to those resources that could be impacted to a degree that detailed analysis is warranted (40 CFR 1502.15; BLM 2008a:96). However, certain elements of the human environment are required by statute, regulation, or executive order to be examined in all EAs.

3.1 Resources Eliminated from Detailed Analysis

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

***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 (NRCS 2009). No farmland occurs within the PPA or vicinity; therefore, farmlands (prime or unique) are 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 in areas under the jurisdiction of the BLM FFO, wild and scenic rivers are therefore eliminated from further analysis.

***Wild horses and burros*—**There are two BLM wild horses and burros 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 therefore 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 FFO. The Bisti/De-Na-Zin Wilderness Area is 20 miles south of Farmington, and is therefore not in the vicinity of the PPA. Wilderness areas, including wilderness study areas, 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 detailed analysis are listed below, along with supporting rationale.

3.1.1 Areas of Critical Environmental Concern

Section 202 of the Federal Land Policy and Management Act requires the BLM to give priority to designation and protection of any Area of Critical Environmental Concern (ACEC) 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 PPA is not within any ACEC. The nearest ACEC is the Twin Angels ACEC, which is approximately 11 miles south of the PPA. The Twin Angels site consists of four separate structures located on a steep cliff edge. As this ACEC is beyond the visual and auditory vicinity of the PPA, ACECs are therefore not analyzed for possible impacts in this EA.

3.1.2 Environmental Justice

Executive Order 12898 requires federal agencies to assess projects to ensure 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 portion of the population residing inside the boundaries of the BLM FFO's jurisdiction. The latest census data indicate that approximately 18.2% of San Juan County's population is considered to be below the poverty level (U.S. Census Bureau 2011).

The PPA is in an established oil and gas area with little residential land nearby, and no communities protected by Executive Order 12898 reside in the vicinity of the PPA. Therefore, the project would have no direct effect on any minority or low-income communities. 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.

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. Threatened, endangered, proposed, and candidate species identified by the USFWS for San Juan County are listed in Table 3.1. The USFWS lists eight species as

threatened or endangered and four species as proposed, experimental, or candidate that are known to occur, or have the potential to occur, in San Juan County (USFWS 2011).

SWCA conducted biological surveys of the Houck Com 2 and Houck Com 2N well pad on April 21, 2011. No USFWS-listed threatened or endangered species or their habitats were found in the PPA during the biological surveys. See Appendix A for detailed results of the biological survey. 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-I-389) conducted for the PRMP/FEIS (BLM 2003b). No further consultation with the USFWS is required.

3.2 Resources Analyzed in Detail

Resources that could be potentially 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

The proposed wells are located in San Juan County, New Mexico. Additional general information on air quality in the area is contained in Chapter 3 of the Farmington RMP/Environmental Impact Statement. In addition to the air quality information in the RMP cited above, new information about greenhouse gases (GHGs), and their effects on national and global climate conditions has emerged since this RMP was prepared. On-going 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 on 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 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 discussed ozone in the Baseline Air Quality and Impact Assessment sections. The National Ambient Air Quality Standard (NAAQS) at the time was 0.084 ppm. In March of 2008, the Environmental Protection Agency (EPA) announced a new primary 8-hour standard of 0.075 ppm.

Increased development in the Four Corners area including a proposed new coal fired power plant, increased oil and gas development, and population growth are all contributing to air quality concerns. Many residents are concerned with potential health impacts from other pollutants. An overall haze and plume of nitrogen oxides can often been seen in the skies, which impact visibility, and there are concerns for the ecosystem due to deposition of mercury and nitrogen.

In addition, the Environmental Protection Agency (EPA), on October 17, 2006, issued a final ruling on the lowering of the National Ambient Air Quality Standard (NAAQS) for particulate matter ranging from 2.5 micron or smaller particle size. This ruling became effective on December 18, 2006, stating that the 24-hour standard for PM2.5, was lowered to 35 ug/m³ from the previous standard of 65 ug/m³. This revised PM2.5 daily NAAQS was promulgated to better protect the public from short-term particle exposure.

This EA incorporates an analysis of the contributions of the Proposed Action to GHG emissions, and a general discussion of potential impacts to climate.

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 Environmental Protection Agency (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, dispersion meteorology and terrain, and 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. Greenhouse gases 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 of the Proposed Action is considered a Class II air quality area. A Class II area allows moderate amounts of air quality degradation. 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 wells is generally good and is not located in any of the areas designated by the Environmental Protection Agency as “non-attainment areas” for any listed pollutants regulated by the Clean Air Act. During the summers of 2000 through 2002, ozone levels in San Juan County were approaching non-attainment. Additional modeling and monitoring was 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 will not violate the ozone NAAQS through 2007 and that the trends in the 8-hr ozone values in the region will be declining in the future. At the present time, San Juan County is classified as in attainment with the revised federal ozone standard of 0.075 ppm. Rio Arriba County is unclassified because of there are no ozone monitors sited in Rio Arriba County.

Greenhouse gases, including carbon dioxide (CO_2) and methane (CH_4), and the potential effects of GHG emissions on climate, are not regulated by the EPA under the Clean Air Act. However, climate has the potential to influence renewable and non-renewable resource management. The EPA’s Inventory of US Greenhouse Gas Emissions and Sinks found that in 2007, total U.S.

GHG emissions were over 7 billion metric tons and that total U.S. GHG emissions have increased by 17% from 1990 to 2007. Emissions increased from 2006 to 2007 by 1.4% (99.0 Tg CO2 Eq.). The following factors were primary contributors to this increase: (1) cooler winter and warmer summer conditions in 2007 than in 2006 increased the demand for heating fuels and contributed to the increase in the demand for electricity, (2) increased consumption of fossil fuels to generate electricity and (3) a significant decrease (14.2%) in hydropower generation used to meet this demand (EPA 2009).

The levels of these GHGs are expected to continue increasing. The rate of increase is expected to slow as greater awareness of the potential environmental and economic costs associated with increased levels of GHG's result in behavioral and industrial adaptations.

3.2.1.2 Climate

Global mean surface temperatures have increased nearly 1.0°C (1.8°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. 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 US 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." 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. When compared to baseline information, periods between 1991 and 2005 show temperature increases in over 95% of the geographical area of New Mexico. Warming is greatest in the northwestern, central, and southwestern parts of the state.

3.2.2 Cultural Resources

The PPA is located within the archaeologically rich San Juan Basin of northwestern New Mexico. 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) and will not be reiterated here. Additional information is also included in the associated *Cultural Resources Technical Report* (Science Applications International Corporation [SAIC] 2002).

The 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 FFO's jurisdiction (BLM 2003b:3-88). The Houck Com 2 and Houck Com 2N is within the Upper San Juan cultural watershed (BLM 2007a). According to SAIC (2002:2-2), 2,350 sites representing 3,009 temporal/cultural components have been documented within the watershed (BLM 2003b:3-89). Of the 19 categories of sites defined based on temporal/cultural affiliation, 18 are represented in the watershed. Lacking in the watershed are sites attributed to Ute occupations. Thirty-two percent of the recorded sites are of unknown cultural affiliation. Prehistoric Ancestral Puebloan (Anasazi) Pueblo I period components (12%) and historic Navajo Dinétah/Gobernador period components (14%) are about equally represented (BLM 2003b:3-92). Prehistoric Pueblo I period components typically feature pit structures, as well as early aboveground architecture evidenced by jacal (burned adobe) and stone concentrations. Features common to historic Navajo Dinétah/Gobernador period components include conical forked-pole hogans, defensive stone masonry pueblitos, and elaborate ceremonially based rock art (BLM 2003b:3-70–3-80).

AAC conducted a BLM Class I literature review prior to the Class III cultural resources inventory of the PPA. There are no previously recorded sites within 0.25 mile of the project area. There are two previously recorded sites within 0.5 mile of the project area. Those sites will not be impacted by the Proposed Action (AAC 2011).

AAC conducted a Class III cultural resources inventory of the proposed Houck Com 2 and Houck Com 2N well pad on March 21, 2011, and prepared a positive report (AAC 2011) in accordance with *Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities* (BLM 2005). AAC surveyed a total of 11.56 acres including the well pad with a 50-foot-wide construction buffer, access road, and pipelines, and a 100-foot-wide cultural buffer. The survey resulted in the identification of site LA 170167 and one IO. The site was located partially within the southeastern portion of the well pad cultural buffer zone and partially within the northeastern portion of the originally proposed access road right-of-way. The access road was rerouted to avoid the site. The site is a Dinetah phase limited activity area with features. The site was recommended as NRHP eligible under criterion d—its information potential. The IO lacks the integrity to convey its significance; therefore, it was not recommended as NRHP eligible.

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 37 species that are classified as noxious weed species (NMDA 2009).

One regulated non-native weed species was observed in the PPA by an SWCA biologist on March 21, 2011: cheatgrass (*Bromus tectorum*). Cheatgrass is regulated as a Class C noxious weed by the State of New Mexico (NMDA 2009).

3.2.4 Livestock Grazing

There are currently 167 grazing allotments managed by the BLM FFO, with 351 grazing authorizations that permit cattle, sheep, and horse grazing within the resource area. Of the 351 grazing authorizations, 317 are permitted under section 3 of the Taylor Grazing Act. Of the 167 grazing allotments, there are four authorizations issued under section 15 of the Taylor Grazing Act to the Navajo Tribe that authorizes grazing on 35 allotments. There are an additional 30 section 15 authorizations that permit grazing on 30 allotments in the Lindrith, New Mexico, area (personal communication, Jeff Tafoya 2009).

The PPA is located within the BLM FFO Grazing Allotment Number 5031, permitted to Frank Florez for 40 cattle from November 1 thru April 18 annually at 91 percent federal range. Approximately 5,240 acres are within this allotment, including the 4.72-acre project area, with a total of 203 federal AUMs. During the well staking process, the grazing permittee is given the opportunity to voice any concerns about the proposed well pad 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. No permanent livestock water sources are within the immediate area of the PPA. Livestock may be present during construction of the Proposed Action and could be present during project operations.

3.2.5 Migratory Birds

The Migratory Bird Treaty Act of 1918, as amended, 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) *New Mexico Bird Conservation Plan* (NMPIF 2007) and the USFWS *Birds of Conservation Concern* (USFWS 2008). In addition, the BLM Instruction Memorandum released on February 22, 2010, establishes a consistent approach for addressing migratory bird populations and habitats when making project-level implementation decisions (BLM 2010a).

Review of these 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 six species that use piñon-juniper habitat (the dominant vegetation type in and surrounding the PPA) (Table 3.1).

Table 3.1 Priority Migratory Bird Species Identified for the BLM FFO

Species	Scientific Name	Habitat Type
Gray flycatcher	*Empidonax wrightii*	Piñon-juniper
Cassin's kingbird	*Tyrannus vociferans*	Piñon-juniper
Gray vireo	*Vireo vicinior*	Piñon-juniper
Pinyon jay	*Gymnorhinus cyanocephalus*	Piñon-juniper
Juniper titmouse	*Baeolophus ridgwayi*	Piñon-juniper
Black-throated gray warbler	*Dendroica nigrescens*	Piñon-juniper

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 wells 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. 2001). 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 property (TCP) is a term that has emerged in historic preservation management and the consideration of Native 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 has defined TCP as follows:

> A traditional cultural property can be defined generally as one (a property) that is eligible for inclusion in 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. (Parker and King 1998:1)

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, whereas others may only be known to a small group of traditional practitioners, or otherwise vaguely known.

There are several laws 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 (AIRFA; 42 USC 1996, PL 95-431 Stat. 469)
- Executive Order 13007 (May 1996)
- Native American Graves Protection and Repatriation Act of 1990 (NAGPRA; 25 USC 3001, PL 101-601)
- Archaeological Resources Protection Act of 1979 (ARPA; 16 USC 470, PL 96-95)

For the Proposed Action, identification of TCPs was limited to reviewing existing published and unpublished literature and the site-specific cultural resources inventory conducted for the Proposed Action. In addition, the BLM Archaeologist was contacted for information regarding the presence of TCPs identified through the BLM's tribal consultation. The PPA is not in the vicinity of any known TCPs (BLM 2011).

3.2.8 Noise

No background noise studies have been conducted for the PPA. However, ambient noise in the PPA includes vehicular traffic along area access roads, airplanes, windmills, pumpjacks, hunters, and oil and gas exploration and development activities. There is no residences located within in the vicinity of the PPA. Noise levels in the PPA would be 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 similar active and producing well sites attenuates with distance from the noise source (equipment), so that at less 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) system (BLM 2007b) 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 analyses 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 Nacimiento 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 which 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). The PPA is not within the vicinity of any paleontological SDAs. Based on local knowledge

of the area from numerous similar projects, the analyses 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 of the PPA.

3.2.10 Public Health and Safety

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

No residential dwellings are located near the PPA. A small number of seasonal recreation users (i.e., campers, picnickers, hunters, and off-highway vehicle [OHV] riders) may occasionally be in the vicinity of the PPA. However, these users are warned about possible hazardous conditions in the PPA through posted signs, have limited access to the PPA during construction (4–8 weeks), and are restricted 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, establishes 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 1) is 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 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 a release of hazardous substances into the environment. Despite many oil and gas constituent wastes being exempt from hazardous waste regulations, certain RCRA-exempt contaminants could be subject to regulations as hazardous substances under CERCLA. 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 for the well, and no sanitary wastes are expected during the production phase. Trash is generated during drilling and completion work (4–8 weeks) and is 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 lined reserve pit on location during completion work.

3.2.11 Recreation

The Farmington Field Office has set aside several areas for special use and manages them as Specially Designated Areas (SDA). Recreation SDA's are managed to accommodate a large variety of recreational uses and outdoor recreational experiences. Areas located outside of recreation SDAs are managed as Extensive Recreation Management Areas (ERMAs). Few recreation facilities or supervisory efforts exist on these lands and they are managed to maintain a freedom of recreation choice with limited regulatory constraints. The proposed action area would not be in a SDA for recreation. Dispersed recreational use of the areas may include occasional hunting during the hunting season, hiking, and wildlife viewing.

3.2.12 Socioeconomics

The PPA is located in San Juan County, New Mexico. According to the 2009 U.S. Census estimate, New Mexico had a population of 1,922,850, with 120,817 persons residing in San Juan County (up from 113,801 persons in 2000) (U.S. Census Bureau 2011). San Juan County, considered rural in character, is approximately 5,514 square miles in area, with an average of 21.9 persons per square mile. Only 6% of the land in the county is privately owned.

In 2009, San Juan County had a median household income of $45,361 and a per capita personal income of $20,029 (in 2009 inflation-adjusted dollars). This 2009 figure was 74% of the national average per capita income, which was $27,041, and 89.1% of the average per capita income for New Mexico, which was $22,461 (U.S. Census Bureau 2011).

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 with census data is Bloomfield, New Mexico (approximately 3.75 miles away), which had an estimated population of 6,111 in 2009 (U.S. Census Bureau 2011). According to the 2000 U.S. Census data, the average per capita income for Aztec was $19,789 (in 2009 inflation-adjusted 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, San Juan Dome to the north, 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 loamy sand and weathered and unweathered bedrock. The most prevalent soil type in the PPA is the Gypsiorthids-Badland-Stumble complex. The Stumble-Fruitland association is present along the southern and eastern edges of the PPA (NRCS 2010).

The Gypsiorthids-Badland-Stumble soil unit is found on hills, knolls, and breaks with slopes of 30% and in valleys. This unit is about 35% Gypsiorthids, 35% badlands, 15% Stumble loamy sand, and 15% other soil inclusions. The Gypsiorthids portions of this soil unit have variable attributes and may be very shallow to deep. Available water capacity is very low to high, runoff is slow to medium, and water erosion potential is slight to moderate. This soil is generally well drained and formed in material derived dominantly from gypsum. Badland consists of non-stony, barren shale uplands that are dissected by deep, intermittent drainageways and gullies. The Stumble soil is deep and somewhat excessively drained. It formed in alluvium derived dominantly from sandstone and shale. Typically, the surface layer is yellowish brown and pale brown loamy sand. Permeability is rapid, available water capacity is low, runoff is very slow, and the hazard of water erosion is slight. The potential plant communities in this soil unit include Indian ricegrass, giant dropseed (*Sporobolus giganteus*), alkali sacaton (*S. airoides*), and squirreltail (*Elymus elymoides*) (Soil Conservation Service [SCS] 1980).

The Stumble Fruitland Association consists of two components, the Stumble component described above, and the Fruitland component described here: The Fruitland component makes up 30 percent of the map unit. Slopes are 0 to 8 percent and this component is found on uplands and alluvial fans. 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 is moderate to a depth of 60 inches. Shrink-swell potential is low. This soil is not flooded or ponded. There is no zone of water saturation within a depth of 72 inches. Organic matter content in the surface horizon is about 0 percent (SCS 1980).

3.2.14 Special Management Species

In accordance with *BLM Manual 6840* (BLM 2008c), the BLM identifies special management species (not federally listed as threatened or endangered) for disturbance mitigation so that BLM-administered proposed 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 (SMS) (BLM 2008d). Of these, seven have the potential to occur in the PPA and surrounding area (Table 2). Areas within and surrounding the PPA provide potential foraging and nesting habitat for the American peregrine falcon (*Falco peregrinus anatum*), ferruginous hawk (*Buteo regalis*), golden eagle (*Aquila chrysaetos*), bald eagle (*Haliaeetus leucocephalus*), and prairie falcon (*Falco mexicanus*). Additionally, the PPA also supports intact cryptobiotic soils and is within mapped

potential habitat for BLM Special Status Species: Aztec gilia (*Aliciella formosa*) and Brack's cactus (*Sclerocactus cloveriae* var. *brackii*).

Table 3.2 BLM Special Management Species and their Potential to Occur in the PPA

Species	Habitat Associations	Potential to Occur in the PPA
Birds		
American peregrine falcon (*Falco peregrinus anatum*)	Found in a variety of habitats, mostly consisting of cliffs for nesting and open areas for foraging; uses large cities and nests on buildings. The nearest mapped American peregrine falcon nest is 9 miles to the east of the PPA.	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. There are no mapped ferruginous hawk nests within 10 miles of the PPA.	Yes
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. The nearest mapped golden eagle nest is 2.6 miles east of the PPA.	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. The San Juan River is 2.5 miles south of the PPA.	Yes
Burrowing owl (*Athene cunicularia hypugaea*)	Lives in dry, open areas with no trees and short grass, often in association with prairie dog towns. The nearest mapped prairie dog town is located approximately 1.1 miles northeast of the PPA.	No
Prairie falcon (*Falco mexicanus*)	Dry grasslands and prairies, locally alpine tundra; suitable breeding habitat usually requires cliffs for nest sites. The nearest mapped prairie falcon nest is 4.8 miles northeast of the PPA.	Yes
Mountain plover (*Charadrius montanus*)	Breeds on open plains at low to moderate elevations and agricultural lands, often associated with prairie dog colonies	No
Yellow-billed cuckoo (*Coccyzus americanus*)	Dense riparian thickets, willow stands, overgrown pastures and orchards	No
Plants		
Aztec gilia (*Aliciella formosa*)	Salt desert scrub communities in soils of the Nacimiento Formation; 5,000–6,400 feet amsl	Yes
Brack's cactus (*Sclerocactus cloveriae* var. *brackii*)	Sandy clay strata of the Nacimiento Formation in sparse shadscale scrub; 5,000–6,400 feet amsl	Yes

Source: BLM (2008d)

American Peregrine Falcon

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 nests are known for the PPA or vicinity, the nearest nest is mapped 9 miles from the PPA.

Ferruginous hawk

Ferruginous hawks typically nest on the top of trees (20–50 feet above ground) but sometimes nest as low as 6 feet 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; evidence of these mammals was detected during field reconnaissance (see the BSR, Appendix A). No nests are known to occur in the PPA, but the closest known nest location is 30 miles southwest of the PPA.

Golden eagle (*Aquila chrysaetos*)
Golden eagles typically nest on cliffs and may range miles during foraging bouts. Rabbits (such as *Sylvilagus* spp.), detected in the PPA during biological surveys, constitute a portion of their diet; thus, golden eagles may use the PPA and vicinity for hunting. No nests are known for the PPA. However, several nests are mapped in the area, the closest being 2.6 miles east of the PPA.

Bald eagle (*Haliaeetus leucocephalus*)
In New Mexico, bald eagles occur casually to occasionally in summer, and they migrate and winter almost statewide through New Mexico. Main wintering areas include the San Juan, upper Rio Grande, upper and middle Pecos, Canadian, San Francisco, Gila, and Estancia valleys (Hubbard 1978). The species is primarily water-oriented, and the majority of the populations occurring in New Mexico are found near streams and lakes. Additionally, there are some dryland areas where these eagles occur regularly. The bulk of a bald eagle's diet is fish; however, they will also feed on waterfowl, small mammals (especially rabbits), and carrion. The PPA could provide secondary foraging habitat, given its proximity to the San Juan River, approximately 2.5 miles to the south.

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 are known for the PPA; however, two nests have been mapped approximately 4.5 to 5 miles to the northeast.

Aztec gilia and Brack's cactus
Aztec gilia and Brack's cactus are found in soils of the Nacimiento Formation. Several individuals of Brack's cactus were found within the PPA on April 21, 2011. One individual with 3 stems, and two individuals with one stem each were found northwest of the Houck Com #2N center stake. Five more individuals were found in the proposed access road. GPS coordinates of these locations were collected and have been mapped (see Figure 2.1).

3.2.15 Vegetation

Vegetation within the PPA is comprised mainly of piñon-juniper woodland, at about 15 percent cover. The understory consists of patches of cliffrose (*Purshia stansburiana)*, big sagebrush (*Artemisia tridentata),* four-winged saltbrush *(Atriplex canescens),* and mountain mahogany (*Cercocarpus montanus*) with sparse cacti, forbs, and graminoids. The Colorado Plateau Mixed Bedrock Canyon and Tableland vegetation community exists within the extreme northwest corner of the PPA. A list of vegetation observed at the proposed well pad by an SWCA biologist on April 21, 2011 is located in Appendix C.

Colorado Plateau Piñon-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. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of piñon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system

vary in texture ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. Piñon 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, mountain mahogany, blackbrush (*Coleogyne ramosissima*), bitterbrush (*Purshia* spp.), Gambel oak (*Quercus gambelii*), blue grama (*Bouteloua gracilis*), and James' galetta (*Pleuraphis jamesii*).

Colorado Plateau Mixed Bedrock Canyon and Tableland

This system is comprised of barren and sparsely vegetated landscapes (generally <10% plant cover) of steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. Some eroding shale layers similar to Inter-Mountain Basins Shale Badland may be interbedded between the harder rocks. The vegetation is characterized by very open tree canopy or scattered trees and shrubs with a sparse herbaceous layer. Common species includes piñon pine (*Pinus edulis*), ponderosa pine (*Pinus ponderosa*), juniper (*Juniperus spp.*), little leaf mountain mahogany (*Cercocarpus intricatus*), and other short-shrub and herbaceous species, utilizing moisture from cracks and pockets where soil accumulates.

3.2.16 Visual Resources

Visual Resource Management (VRM) on public lands is conducted in accordance with *BLM Manual H-8410-1* (BLM 1986). The PPA is not within any special management area and is designated as VRM Class IV. 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 1986:7)

The PPA is located between Hare and Potter Canyons. The topographic pattern of the general area is varied, consisting of defined ridges, deep and relatively incised valleys and canyons, savannahs, and open meadows ranging from 5,000 to 6,500 feet above mean sea level (amsl). The elevation of the center stakes of the proposed Houck Com 2 and 2N wells are 5,784 feet amsl and 5,788 feet amsl, respectively. 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 piñon-juniper within the PPA. Photographs of the visual vegetation setting are provided in the BSR, Appendix A.

Land uses in the area generally consist of oil and gas development, 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 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 to 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 VRM IV objectives.

3.2.17 Water Quality – Surface and Ground

The PPA is within the upper San Juan watershed, Hydrologic Unit Code (HUC) 14080101, and is part of the larger San Juan River basin. The major river in the region is the San Juan River, which is approximately 2.5 miles south 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. The San Juan River drainage includes portions of northern New Mexico, southern Colorado, northeastern Arizona and southeastern Utah.

The New Mexico Environment Department/Surface Water Quality Bureau (NMED/SWQB) monitors river basins periodically and conducted an intensive surface water quality survey of the San Juan River basin in 2002, sampling and analyzing this watershed at four assessment units, including Navajo Reservoir (NMED/SWQB 2008). Data from that effort, combined with data from the 1990 monitoring performed by the U.S. Department of the Interior's National Irrigation Water Quality Program, provided for impairment determinations of New Mexico water quality standards. Impairment for fecal coliform and sedimentation/siltation was identified for the San Juan River within HUC 14080101, as well as at other locations within the watershed. For the Upper San Juan watershed, the EPA and SWQB have identified mercury, selenium, 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 was cited as one of 10 contributing sources of the overall impairment of the watershed. Additionally, portions of the San Juan River are listed on the New Mexico Fish Consumption Guidelines Due to Mercury Contamination (NMED/SWQB 2005).

Runoff from the PPA would head in a southerly direction, feeding into an Hare Canyon (an ephemeral drainage) and eventually draining into the San Juan River. Ephemeral flows are generally very poor-quality water as a result of the highly erosive and saline nature of the soils. Sparse vegetative cover, low water crossings, and unpaved roads contribute to the rapid runoff conditions that are characteristic of the area. Although ephemeral drainages are not assessed for water quality, they are tributaries to the San Juan River, which was designated as impaired for the relevant section in 2004 (assessment unit ID NM-2405_10) (NMED/SWQB 2005).

3.2.18 Wildlife

Priority wildlife management activities conducted by the BLM FFO include big game management and surveys to determine game population size and health. The protection and enhancement of wildlife habitat is accomplished through an aggressive program of habitat improvement projects, designations of SDAs with wildlife-friendly management prescriptions, and the application of mitigation measures on key wildlife lands where oil and gas reserves are being developed. The PPA is not within an SDA for wildlife. The nearest SDA for wildlife is the Rattlesnake Canyon Wildlife SDA, managed for wintering deer, which is approximately 10 miles northeast of the PPA.

The FFO's PRMP/FEIS contains a detailed description of wildlife species that are found within the entire planning area (BLM 2003b:3-40). Habitat utilization by elk (*Cervus elaphus*), cottontail (*Sylvilagus nuttallii)*, and coyote (*Canis latrans*) was observed by an SWCA biologist during surveys on April 21, 2011.

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 wells would not be drilled. There would be no new impacts from oil and gas production to the resources in the PPA. If the proposed wells are 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 APD, if the decision-maker determines they are necessary.

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 temporary 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 access road and 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 last ten years, the leasing of Federal oil and gas mineral estate in Farmington Field Office has resulted in an average total of approximately 450 to 500 wells drilled on federal leases annually. These wells would contribute an incremental increase to the total emissions (including GHGs) from oil and gas activities in New Mexico.

Potential impacts of development could include increased airborne soil particles blown from new well pads or roads, exhaust emissions from drilling equipment, compressors, vehicles, and dehydration and separation facilities, as well as potential releases of GHG, NOx and 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, the types of equipment needed if a well were to be completed successfully (e.g. compressor, separator, dehydrator), or what technologies may be employed by a given company for drilling any new wells. The degree of impact will also vary according to the characteristics of the geologic formations from which production occurs.

The reasonable and foreseeable development scenario developed for the Farmington RMP demonstrated 522 wells would be drilled annually for federal minerals. Current APD permitting trends within the field office confirm that these assumptions are still accurate. This level of exploration and production would contribute 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 wells would not have a measurable effect on climate change due to uncertainty and incomplete and unavailable information; therefore is not possible to determine the effects on climate change on a regional, national, or global scale.

Consumption of oil and gas developed from the proposed wells are expected to produce GHGs, NOx and VOCs. Consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demography, and weather or climate. Regional and global transportation, metropolitan traffic, fires (including wildfires, controlled burns and use of domestic fire places), and power plant emissions from the west are all parts of the equation. 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 PSD Class I Areas (Mesa Verde National Park and the Weminuche Wilderness Area) could occur at some 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 to 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 feasible to know with certainty the net impacts from the proposed action on climate. The inconsistency in results of scientific models used to predict climate change at the global scale coupled with the lack of scientific models designed to predict climate change on regional or local scales, limits the ability to quantify potential future impacts of decisions made at this level. 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 been a participant of the Four Corners Air Quality Task Force (FCAQTF) since its inception back 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 Corners region. The FCAQTF is comprised of a broad base of representatives including federal, state, Indian, and local governments, as well as industry, interest groups, and concerned community members. The FCAQTF has several working groups, which worked on the development of a mitigation options report (completed December 2007), to serve 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 2003 FEIS/RMP and provisions in the ROD for the FEIS/RMP 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 grams per horsepower hour of N_2O for engines of 300 horsepower or less. The FFO has complied with this directive through a condition of approval (COA) which has been in effect since August 1, 2005. To date, NMAQB has made no other such requests.

Currently, development on Federal minerals in New Mexico's San Juan Basin is at a lower level than forecast in the Reasonable Foreseeable Development (RFD) Scenario prepared in 2001 for the FFO EIS/RMP. The impacts forecast by the RFD are still valid. At the time the 2003 EIS/RMP was written, ozone readings did not represent a violation of the NAAQS for this pollutant. The New Mexico Environment Department Air Quality Bureau has determined that the 2007–2009 ozone design value for San Juan County is 0.070 ppm. The design value for the county must be greater than the revised 8-hour ozone standard of 0.075 ppm for a nonattainment designation.

The EPA's inventory data describes "Natural Gas Systems" and "Petroleum Systems" as the two major categories of total US sources of GHG gas emissions. The inventory identifies the contributions of natural gas and petroleum systems to total CO2 and CH4 emissions (natural gas and petroleum systems do not produce noteworthy amounts of any of the other greenhouse gases). Within the larger category of "Natural Gas Systems", the EPA identifies emissions occurring during distinct stages of operation, including field production, processing, transmission and storage, and distribution. "Petroleum Systems" 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: flare hydrocarbon and gases at high temperatures in order to reduce emissions of incomplete combustion; require that vapor recovery systems be maintained and functional in areas where petroleum liquids are stored; placement of compressors engines 300 horsepower or less must have NOx emissions limited to 2 grams per horsepower hour; revegetate areas of the pad not required for production facilities to reduce the amount of dust from the pads; and water dirt roads during periods of high use in order to reduce fugitive dust emission. The significant threshold for particulate matter of 35 ug/m³ daily PM2.5 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 (Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2006). One of the factors in this improvement is the adoption by industry of the BMPs proposed by the EPA's Natural Gas Energy Star program. The Farmington Field Office 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 4.72 acres of new and existing surface disturbance. Direct impacts normally include alterations to the physical integrity of a cultural resource. If a cultural resource is significant for other than its scientific information, direct impacts may also include the introduction of audible, atmospheric, or visual elements that are out of character for the cultural site. A potential indirect effect from the Proposed Action is the increase in human activity or access to the area with the increased potential of unauthorized removal or other alteration to cultural resources in the area. A beneficial impact to cultural resources from the Proposed Action is the added information and knowledge provided by the site-specific survey and inventory, and the updating of official records.

Based on a review of the archaeological reports and the assessment of the undertaking in the PPA, the BLM cultural resources staff has determined that provided the mitigation measures are properly implemented, the Proposed Action would have no effect on cultural resources (BLM

2011). This determination will be included with the BLM FFO cultural resources stipulations attached to the APD.

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 Houck Com 2 and Houck Com 2N Proposed Action, the BLM is requiring site protection through erection of a temporary fence, employee education, and monitoring during construction (BLM 2011). 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., eligible for listing on the National Register of Historic Places, or under the purview of NAGPRA or 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 4.72 acres would be cleared and bladed. After construction, and for the life of the well, long-term disturbance would affect approximately 1.30 acre (see Table 2.1). 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.

One regulated non-native species was observed in the PPA (see Section 3.2.3). Implementation of the mitigation measures 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, BLM FFO requires reasonable steps to prevent the spread of noxious weeds. A BLM-approved weed management program may be required in the COAs of the APD. In accordance with the State of New Mexico's noxious weed list memorandum (NMDA 2009), the operator would be responsible for pretreating the PPA to control the spread of noxious weeds. Also, the operator would be responsible for weed control for the life of the proposed wells and would be required to use weed seed–free hay, mulch, and

straw in erosion control (personal communication, Stan Dykes 2008). No other mitigation has been recommended other than that included in the Proposed Action, which states that all disturbed areas not needed for production equipment and vehicular access would be revegetated using a BLM FFO–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 Grazing Allotment Number 5031, which allows 203 AUMs on 5,240 acres. The Proposed Action would disturb 4.72 acres (0.01%) of potential rangeland on this allotment. Approval of the Proposed Action would result in a short-term reduction of 0.18 AUM. In the long term, upon successful revegetation, impacts to AUMs 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
Under the No Action alternative, existing habitat required by migratory birds would not be affected 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 possible foraging and nesting habitat for migratory birds, as the proposed disturbance of 4.72 acres of possible habitat 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, along with eggs and juveniles, may be directly impacted during construction and removal of vegetation. The primary vegetation that would be impacted by the Proposed Action would be 4.72 acres of piñon-juniper and sagebrush. Because of the abundance of similar habitat in the surrounding area, the impact to the populations of the bird species that utilize these habitats would be low.

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 (possibly three months or less). 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, including priority species, 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. Six migratory bird species have the potential to occur in piñon-juniper habitat (Table 4.1).

Table 4.1 Anticipated Impacts to Priority Migratory Bird Species

Species	Habitat Type	Potential Effects	Impact Rating – Low/Moderate/High
Gray flycatcher (*Empidonax wrightii*)	Piñon-juniper	Some reduction of possible nesting habitat	Low
Cassin's kingbird (*Tyrannus vociferans*)	Piñon-juniper	Some reduction of possible nesting habitat	Low
Gray vireo (*Vireo vicinior*)	Piñon-juniper	Some reduction of possible nesting habitat	Low
Pinyon jay (*Gymnorhinus cyanocephalus*)	Piñon-juniper	Some reduction of possible nesting habitat	Low
Juniper titmouse (*Baeolophus ridgwayi*)	Piñon-juniper	Some reduction of possible nesting habitat	Low
Black-throated gray warbler (*Dendroica nigrescens*)	Piñon-juniper	Some reduction of possible nesting habitat	Low

4.5.2 Potential Mitigation

Project mitigation measures are designed to minimize effects on migratory birds and other wildlife. These measures include netting of any permanently open pits and placement of 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 Blanco Mesaverde/Basin Dakota 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.

4.7 Native American Religious Concerns

4.7.1 Direct and Indirect Impacts

Alternative A
Under the No Action alternative there would be no impact to Native American religious concerns because if the project is not approved, no TCPs could be affected.

Alternative B
The Proposed Action would not directly impact any land near a TCP, as no TCPs have been identified in the vicinity. 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. There are currently no known remains that fall within the purview of NAGPRA or ARPA. Although none have been identified, any heretofore unidentified effect of the Proposed Action to Native American religious concerns is expected to be negligible in both the short and long term.

4.7.2 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 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, which is not accessible to the general public. Oil and gas workers wear ear protection to minimize noise impacts. Most noise impacts would terminate or decrease substantially after the wells are 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).

Indirect impacts to wildlife as a result of increased noise could last for 20 to 30 years. Because the PPA is not a destination for recreationists, the Proposed Action would generally not affect any visitors looking for a quiet experience. 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 and surrounding area were assessed through the RMP, and are individually evaluated based on the BLM's PFYC system, known paleontological locality information, experience with numerous similar oil and gas projects in the surrounding area, and existing reports and data for the vicinity of the PPA. The PPA is not within a BLM-identified SDA for paleontological resources. The likelihood of significant paleontological resources in this area is low. However, paleontological resources may be present within the PPA, and impacts to paleontological resources could occur.

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

No site-specific mitigation has been identified, as the PPA is not within a BLM FFO–designated SDA for paleontological resources. All necessary BLM FFO paleontological resources stipulations would be followed as indicated in the 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.

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 would not be necessary.

Alternative B
Burlington proposes the construction and operation of a natural gas well, access road, and pipeline ties, which present potential public health and safety hazards. The PPA is approximately 3.75 miles from the town of Bloomfield, New Mexico. Safety measures, including ensuring adequate dimensions and lining of the reserve pit, constructing protective fencing, and restricting access, help minimize public health and safety concerns.

The construction, drilling, and operation of the proposed wells 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 wells would be routinely monitored by Burlington for safety until the wells have 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 pipeliness, no increase in produced hydrocarbons, and no fluids produced as a result of drilling; therefore, no reserve pit would be necessary.

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 would be emptied as necessary. All produced hydrocarbons would be put in tanks or in a lined reserve pit 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
As discussed in Section 3.2.11, the PPA is in an ERMA, which is managed for traditional dispersed recreational use of public lands. Under Alternative B, potential impacts to recreation users would be low and short term during construction and drilling as a result of increases in ambient noise levels, increased vehicle traffic and human activity during construction and on-site activities, and possible displacement of big game. However, as construction and drilling activities decrease, impacts would also lessen. Since existing wells in the vicinity of the PPA already incur maintenance activities, the impact from additional human activity and vehicle use on recreationists would be low in the long term. The Proposed Action would occur in an established oil and gas area, and current recreation use of the PPA is likely to be very minimal and would not be expected to change upon final completion of the proposed project.

4.11.2 Potential Mitigation

None required.

4.12 Socioeconomics

4.12.1 Direct and Indirect Impacts

Alternative A
Under the No Action alternative, there would be no additional beneficial impacts to socioeconomics associated with increasing the number of economic multipliers in the region surrounding the PPA.

Alternative B
This analysis does not focus on all aspects of economics within the PPA. Only the projected economic effects of Alternative B and economic statistics at the state, county, and local levels are considered, to describe the economic context of the Proposed Action.

It is expected that approval of Alternative B will bring some economic multipliers to the towns en route to the PPA. Construction crews would likely patronize local businesses for supplies such as fuel, food, and refreshments. The Proposed Action would also 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 (20–30 years), as the PPA would be visited once a week (or more often as necessary) for maintenance. Workers might stop in local towns for incidentals. These economic benefit multipliers would be low.

4.12.2 Potential Mitigation

None required.

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 4.72 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. Loss of vegetation cover would indirectly result in increased erosion and sedimentation of adjacent areas.

Construction of the proposed well pad and access road would indirectly cause an undetermined amount of alluvial 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 bore 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-approved seed mixture.

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.

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 possible foraging and nesting habitat for special management species. Direct impacts to special management species related to 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 because of the presence of suitable foraging and roosting habitat: American peregrine falcon, prairie falcon, ferruginous hawk, and golden eagle. Total habitat disturbance associated with the Proposed Action would be approximately 4.72 acres, which represents a small portion of suitable habitat for these species. Although the area constitutes suitable 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.

In addition, habitat is present for special management plant species Aztec gilia and Brack's cactus. Several individuals of Brack's cactus were discovered in the PPA on April 21, 2011. Also, 4.72 acres of suitable habitat will be destroyed by implementation of the Proposed Action.

4.14.2 Potential Mitigation

The Brack's cactus specimens will be transplanted under the supervision of the BLM, to an area identified by BLM biologists. A transplantation report will be prepared. BMPs will be used to prevent impacts to potential habitat outside of, and surrounding, the PPA.

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 4.72 acres of vegetation would be disturbed or removed in conjunction with the completion of the Proposed Action. 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 attributable to road/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 of the teardrop is required at producing well sites. Complete reclamation would occur after the wells are 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 FFO–approved seed mixture. The remaining long-term disturbance would be reclaimed according to BLM-approved BMPs as part of the COAs attached to the approved APD.

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 (4.72 acres), and if the well becomes productive, 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 and painted Juniper Green to blend with the surrounding environment.

If the well becomes productive, 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 vs. the horizontal plain 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 expectation, as the proposed wells are in an area known for oil and gas production, and the activities may attract

attention but would not dominate the view of the casual observer. Therefore, the Proposed Action meets VRM Class IV management objectives.

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 surface waters would 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, constructing a diversion ditch, and maintaining the surface of the existing access road to handle increased traffic. Additionally, lining the reserve pit with a 20 mil impervious liner 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 use of BMPs and pollution prevention measures, as required by federal and state regulations, would help minimize impacts to water quality. 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.

4.17.2 Potential Mitigation

BLM-approved BMPs and pollution prevention measures may be required as part of the COAs in the approved APD.

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 of the 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 changes to habitat and disturbance. 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, pipeliness, and other associated infrastructure, as well as disturbance associated with 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, 4.72 acres of direct habitat loss would occur. Once the wells are completed, the areas 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 wells are 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 4.72 acres of total surface disturbance (0.01%) within the San Juan Basin as analyzed in the PRMP/FEIS. Therefore, the Proposed Action'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 a spreading out of 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 on-going 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 will 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 application for permit to drill. A general assumption, however, can be made: drilling these wells 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/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 turn, could impact water resources and species dependant on historic water conditions. Forests at higher elevations in New Mexico, for example, have been exposed to warmer and drier conditions over a ten-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, pipeliness, 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 will be a beneficial impact, providing a more diverse plant community.

Chapter 5 – Consultation and Coordination

SWCA has prepared this EA to comply with the requirements and guidelines prescribed by the BLM FFO. Selected portions of this document were specifically written by the BLM FFO. The following agencies, organizations, and individuals contributed to the preparation of this document.

Table 5.1 Contributors to this EA

ID Team Member	Organization	Present at On-site Visit
Mike Flaniken	BLM FFO	Yes
John Hansen	BLM FFO	
John Kendall	BLM FFO	
Jeff Tafoya	BLM FFO	
Barney Wegener	BLM FFO	
Steven Merrell	Daggerpoint Construction, on behalf of Burlington Resources Oil & Gas Company, LP	Yes
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Chapter 6 – Literature Cited

Aztec Archaeological Consultants (AAC). 2011. *A Cultural Resource Inventory for the Proposed Burlington Resources Houck 2 and 2N Well Pad, Access Road, and Enterprise Field Services Pipeline in San Juan County, New Mexico*. AAC Report Number 2011-007. Aztec, New Mexico.

Bureau of Land Management (BLM). 1986. *Manual H-8410-1—Visual Resource Inventory*. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management. Available at: http://www.blm.gov/nstc/VRM/8410.html. Accessed December 2009.

———. 1988. Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; Onshore Oil and Gas Order No. 2 – Drilling Operations. *Federal Register* 53(223). Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wy/programs/energy/og/ogdocs.Par.43912.File.dat/onshoreorder2.pdf. Accessed May 8, 2009.

———. 1993. Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; Onshore Oil and Gas Order No. 7 – Disposal of Produced Water. *Federal Register* 58(172). Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wy/programs/energy/og/ogdocs.Par.68709.File.dat/onshoreorder7.pdf. Accessed May 8, 2009.

———. 2003a. *Farmington Resource Management Plan with Record of Decision*. Farmington, New Mexico: U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office.

———. 2003b. *Farmington Proposed Resource Management Plan and Final Environmental Impact Statement*. Farmington, New Mexico: U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office.

———. 2005. *Procedures for Performing Cultural Resource Fieldwork on Public Lands in the Area of New Mexico BLM Responsibilities—New Mexico, Oklahoma and Texas*. BLM Manual Supplement H-8100-1. Santa Fe: U.S. Department of the Interior, Bureau of Land Management, New Mexico State Office.

———. 2007a. Farmington Field Office watershed data GIS layers. Unpublished data on file at the U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

———. 2007b. *Instruction Memorandum No. IM-2008-009.* U.S. Department of the Interior, Bureau of Land Management. Washington, D.C. Available at: http://www.blm.gov/wo/st/en/info/regulations/Instruction_Memos_and_Bulletins/national_instruction/20080/im_2008-009.html. Accessed December 2009.

———. 2008a. *BLM National Environmental Policy Act Handbook H-1790-1*. Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management, National Environmental Policy Act Program.

———. 2008b. Potential Fossil Yield Classification Map of New Mexico. Unpublished GIS data prepared by the BLM New Mexico Regional Paleontologist (scale 1:500,000).

———. 2008c. *Manual 6840—Special Status Species Management.* Washington, D.C.: U.S. Department of the Interior, Bureau of Land Management. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Information_Resources_Management/policy/blm_manual.Par.43545.File.dat/6840.pdf. Accessed December 2009.

———. 2008d. *Instruction Memorandum No. IM-NM-200-2008-001*. Farmington, New Mexico: U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office.

———. 2010. *Instruction Memorandum No. NM-F00-2010-001*. Farmington, New Mexico: U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office. Expires September 30, 2012.

———. 2011. *Cultural Resource Record of Review*. Project Name Houck 2 and 2N wells, access, pipes. Project Sponsor: Burlington. BLM Report Number: 2011(III) 066F. U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office. Reviewer: Michael Dussinger.

Bureau of Land Management (BLM) and U.S. Forest Service (USFS). 2006. *Final Environmental Impact Statement – Northern San Juan Basin Coal Bed Methane Project*. Durango, Colorado: U.S. Department of the Interior, Bureau of Land Management, San Juan Field Office, and U.S. Department of Agriculture, Forest Service, San Juan National Forest. Available at: http://www.fs.fed.us/r2/sanjuan/projects/ea/nsjb/feis/feis.shtml. Accessed May 2011.

Chavez, Virgil. 2008. Construction Superintendent, Burlington San Juan Basin Unit. Farmington, New Mexico. Written communication, December 30, 2008.

Dykes, Stan. 2008. Range Management Specialist, BLM Farmington Field Office. Farmington, New Mexico. Verbal communication with Jana Sterling, Project Manager, SWCA Environmental Consultants, Durango, Colorado.

Engler, T.W., B.S. Brister, H. Chen, and L.W. Teufel. 2001. *Oil and Gas Resource Development for San Juan Basin, New Mexico: A 20-year, Reasonable Foreseeable Development (RFD) Scenario Supporting the Resource Management Plan for the Farmington Field Office, Bureau of Land Management*. Farmington, New Mexico: U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office.

Enquist, C., and D. Gori. 2008. *Implications of Recent Climate Change on Conservation Priorities in New Mexico.* Santa Fe: The Nature Conservancy; New York: Wildlife Conservation Society. Available at: http://nmconservation.org/dl/NMClimateChange_report1_527.pdf. Accessed December 2009.

Goddard Institute for Space Studies. 2007. Annual mean temperature change for three latitude bands. Datasets and images. GISS surface temperature analysis, analysis graphs and plots. Available at: http://data.giss.nasa.gov/gistemp/graphs/Fig.B.lrg.gif. Accessed December 2009.

Hubbard, J.P. 1978. *Revised Checklist of the Birds of New Mexico*. New Mexico Ornithological Society Publication No. 6.

Intergovernmental Panel on Climate Change (IPCC). 2007. *Climate Change 2007, Synthesis Report: A Report of the Intergovernmental Panel on Climate Change*. R.K. Pachauri and A. Reisinger, eds. Geneva, Switzerland: Intergovernmental Panel on Climate Change.

National Academy of Sciences. 2006. *Understanding and Responding to Climate Change: Highlights of National Academies Reports.* Washington, D.C.: National Academy of Sciences, Division on Earth and Life Studies. Available at: http://dels.nas.edu/basc/climate-change/basics.shtml. Accessed December 2009.

Natural Resources Conservation Service (NRCS). 2009. *Understanding Soil and Cultural Resource Eligibility Criteria: Prime, Unique and Statewide Importance Soils and Lands in New Mexico.* U.S. Department of Agriculture, Natural Resources Conservation Service. Available at: http://www.nm.nrcs.usda.gov/Programs/grp/frpp/nm-frpp-soils-cult-res-criteria.html. Accessed April 2011.

———. 2010. Soil Survey Geographic (SSURGO) of San Juan County, New Mexico, Eastern Part. Available at: http://soildatamart.nrcs.usda.gov/Survey.aspx?County=NM045. Accessed on April 2011.

New Mexico Department of Agriculture (NMDA). 2009. Memorandum: New Mexico Noxious Weed List Update. Las Cruces: New Mexico Department of Agriculture, Office of the Director/Secretary. Available at: http://www.nmda.nmsu.edu/animal-and-plant-protection/noxious-weeds/weed_memo_list.pdf. Accessed May 2011.

New Mexico Environment Department/Surface Water Quality Bureau (NMED/SWQB). 2005. *Final Approved Total Maximum Daily Load for the San Juan River Watershed (Part One).* Santa Fe. Available at: http://www.nmenv.state.nm.us/swqb/Projects/SanJuan/TMDL1/Intro-TOC.pdf. Accessed May 2011.

———. 2008. *Water Quality Survey Summary for the San Juan River Watershed 2002*. Santa Fe. Available at: ftp://ftp.nmenv.state.nm.us/www/swqb/MAS/Surveys/SanJuanStudySummary.pdf. Accessed May 2011.

New Mexico Partners in Flight (NMPIF). 2007. *New Mexico Bird Conservation Plan.* Version 2.1. C. Rustay and S. Norris, compilers. Albuquerque: New Mexico Partners in Flight. Available at: http://www.nmpartnersinflight.org/bcp.html. Accessed April 2011.

Parker, P.L., and T.F. King. 1998. *National Register Bulletin—Guidelines for Evaluating and Documenting Traditional Cultural Properties.* National Register Bulletin 38. Washington, D.C.: U.S. Department of the Interior, National Park Service. Originally published 1990. Available at: http://www.nps.gov/history/NR/publications/bulletins/nrb38/. Accessed May 2011.

Science Applications International Corporation (SAIC). 2002. Cultural Resources Technical Report. Unpublished report on file at U.S. Department of the Interior, Bureau of Land Management, Farmington Field Office, Farmington, New Mexico.

Soil Conservation Service.1980. *Soil Survey of San Juan County, New Mexico, Eastern Part*. U.S. Department of Agriculture Soil Conservation Service, in cooperation with U.S. Department of the Interior Bureau of Indian Affairs and Bureau of Reclamation, and the New Mexico Agricultural Experiment Station. Available at: http://soildatamart.nrcs.usda.gov/manuscripts/NM618/0/sanjuan.pdf. Accessed January 2010.

SWCA Environmental Consultants (SWCA). 2009. Memorandum: decibel readings at a typical producing natural gas well site using an Extech Instruments Model 407736 handheld digital sound level meter. March 20.

Tafoya, Jeff. 2009. Rangeland Management Specialist, BLM Farmington Field Office. Farmington, New Mexico. Written communication, May 1, 2009.

U.S. Census Bureau. 2011. American FactFinder. 2005–2009 American Community Survey 5-Year Estimates. Available at: http://factfinder.census.gov/servlet/SAFFPopulation. Accessed April 5, 2011.

U.S. Environmental Protection Agency (EPA). 2008a. Executive Order 12898, February 11, 1994. Federal actions to address environmental justice in minority populations and low-income populations. *Federal Register* 1994. Available at: http://www.epa.gov/federalregister/eo/eo12898.htm. Accessed December 2010.

———. 2008b. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2006.* EPA #430-R-08-005. Washington, D.C.: U.S. Environmental Protection Agency. Available at: http://www.epa.gov/climatechange/emissions/usgginv_archive.html. Accessed December 2010.

———. 2009. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2007*. Washington, D.C.: U.S. Environmental Protection Agency. Available at: http://www.epa.gov/climatechange/emissions/usinventoryreport.html. Accessed March 2011.

U.S. Fish and Wildlife Service (USFWS). 2008. *Birds of Conservation Concern 2008*. Arlington, Virginia: U.S. Department of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management. Available at: http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf. Accessed December 2010.

———. 2011. Endangered species list for San Juan County, New Mexico. Available at: http://www.fws.gov/southwest/es/newmexico/SBC.cfm. Accessed June 20, 2011.

U.S. Geological Survey (USGS). 2004. National Gap Analysis Program, provisional digital land cover map for the southwestern United States, version 1.0. RS/GIS Laboratory, College of Natural Resources, Utah State University, Logan, Utah. Available at: http://earth.gis.usu.edu/swgap/landcover.html. Accessed October 2010.

———. 2011. USGS topographic maps, map locator. Available at: http://topomaps.usgs.gov/ordering_maps.html. Accessed February 2011.

U.S. Government Accountability Office (GAO). 2007. *Climate Change—Agencies Should Develop Guidance for Addressing the Effects on Federal Land and Water Resources*. GAO-07-863. Available at: http://www.gao.gov/new.items/d07863.pdf. Accessed December 2010.

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 (CAA) of 1970, as amended	Air quality, air emissions	New Mexico Environment Department
Clean Water Act (CWA) of 1977, as amended; Section 401	Discharges from point sources into jurisdictional waters	New Mexico Water Quality Control Commission
Clean Water Act (CWA) of 1977, as amended; Section 402: Stormwater Pollution Prevention Plan (SWPPP)	Discharges from stormwater runoff into jurisdictional waters	U.S. Environmental Protection Agency (EPA)
Clean Water Act (CWA) of 1977, as amended; Section 404	Surface jurisdictional waters of the U.S.	U.S. Army 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 12898	Environmental and health conditions in minority and low-income communities	All agencies
Farmland Protection Policy Act of 1994	Prime and unique farmlands	Natural Resource Conservation Service
Federal Land Policy and Management 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 1920, as amended; Associated Onshore Orders	Federal oil and gas leases and related transportation pipeliness	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