

CHAPTER 2 — ALTERNATIVES

2.1 PUBLIC PARTICIPATION AND IDENTIFICATION OF KEY ISSUES

2.1.1 Public Scoping

NEPA regulations (40 CFR 1500–1508) require the BLM to use an early scoping process to identify significant issues in preparation for impact analysis. The principal goals of scoping are to allow public participation and identify issues, concerns, and potential impacts that require detailed analysis in the EIS. Scoping was the primary mechanism used by the BLM to identify public interests and concerns about proposed development actions in the JIDPA.

To encourage early and improved public participation and agency cooperation, a number of meetings/announcements involving the BLM, Operators, various agencies, and the public have been held. On March 13, 2003, the BLM's Notice of Intent (NOI) appeared in the *Federal Register* and invited the public to comment or provide research information regarding the Operators' proposal to infill drill in the Jonah natural gas field. On March 26, 2003, copies of a scoping notice describing the Proposed Action and seeking comments were mailed to appropriate government offices, elected officials, public land users, groups, newspapers, and radio and television stations. A scoping meeting was held in Pinedale, Wyoming, on April 17, 2003. An additional public meeting was held on November 13, 2003, to present to the public the draft project alternatives that had been developed to address public concerns and would be analyzed in the EIS. At the request of the BLM, on November 20, 2003, EnCana and BP jointly submitted to the BLM a revised development proposal. On December 12, 2003, the BLM issued a letter identifying Operator-proposed development plan revisions and soliciting further comment. This letter was issued to those who received the March 2003 scoping notice and other parties who had commented in response to the NOI.

Numerous issues and concerns were identified and comments were submitted between March 2003 and August 2004. Consultation and coordination with other government agencies included the Wyoming Game and Fish Department (WGFD), U.S. Fish and Wildlife Service (USFWS), U.S. Department of Agriculture Forest Service (USFS), Environmental Protection Agency (EPA), WDEQ, and the BLM Interdisciplinary Team (IDT). The issues and concerns identified during this period are summarized in Section 2.1.2 and presented in detail in Appendix D.

All comments received during the scoping process were reviewed and analyzed. The BLM identified nine key or driving issues based primarily upon the assumed quantity, intensity, or duration of a potential impact, and/or the volume of agency or public interest in the issue. The range of alternatives was developed in response to these key issues, and the potential effects to the issues expected to result from varying levels of surface disturbance and/or inclusion or exclusion of various development guidelines/management protocols. For the DEIS, ranges in the pace of development (75, 150, or 250 wells developed per year) were applied under Alternatives A through G, and a range of well numbers were analyzed (3,100 wells for most alternatives, 1,250 wells for Alternative C, and 2,200 wells for Alternative D). This range in pace of development and well numbers provided a range of effects to socioeconomics and air quality,

BLM inspection and enforcement capability, and project duration. The application or renewal of alternative-specific on-site surface disturbance protocols and mitigation (see Section 2.3, and Appendices A and C), including Operator-committed monitoring, reporting and off-site compensatory mitigation (CM), provided a range of potential impacts to key resources/resource issues including air quality, greater sage-grouse, pronghorn antelope, and other wildlife, livestock forage, and BLM inspection and enforcement capability.

2.1.2 Key Issues

Issue 1 The extent of proposed surface disturbance and its effects on all area resources.

Respondents identified the total volume and distribution of proposed surface disturbance associated with the Proposed Action as an issue for numerous area resources (e.g., wildlife and wildlife habitat, cultural resources, vegetation, soils). The extent and duration of surface disturbance was also identified as potentially adversely affecting appropriate management of these area resources.

Issue 2 Pace of proposed development, associated regional socioeconomic effects, and boom/bust avoidance.

Respondents expressed concern with the potential influx of transient workers who do not tend to maintain permanent residence as experienced with past energy development projects; the added burden to area infrastructures such as community support facilities, including hospitals and medical clinics, emergency services, housing, and roads; and inadequate capacity of governments to address infrastructure shortfalls.

Employees also identified as a concern the desire to maintain permanent residence in the area, but held the belief that if BLM does not approve continued development in the JIDPA, they would be forced to relocate. Furthermore, project proponents and local government agencies identified that the potential revenues from tax dollars, royalties, and jobs associated with the proposed project would benefit the State, county, and local communities.

Issue 3 Potential project and cumulative impacts on regional visibility, particularly at area residences and in Class I wilderness areas, and other air quality impacts, including those associated with emission rates, atmospheric deposition, and regulatory authority.

Many respondents indicated that regional haze and smoke plumes have increased locally in association with ongoing natural gas development projects in the region, and that maintenance and improvement of visibility is a requirement of the Clean Air Act within nearby Class I wilderness areas. Other respondents had concerns about project emission effects on worker and area resident health; others were concerned about excessive acid deposition. Nighttime star gazing was also identified as having been locally affected. Additionally, agencies and the public expressed concerns regarding the authority for air quality mitigation requirements.

Issue 4 Project effects to greater sage-grouse, greater sage-grouse habitats, and habitat function.

Respondents identified effects to this species and its habitats as an issue because of the historic population levels of greater sage-grouse in the JIDPA and the apparent decline in greater sage-grouse populations across their range. Potential project effects to breeding, nesting, brood-

rearing, and wintering habitat and habitat function were identified as potentially contributing to continued population declines. It was also noted that existing greater sage-grouse protection measures appear to be inadequate within the JIDPA and that with the proposed increase in development, existing protection measures would be even less effective.

Issue 5 Project effects on pronghorn antelope migration corridors leading to and from crucial winter ranges north of the JIDPA.

Current developments in the region were identified as already having adversely affected the historic migrations of the Sublette pronghorn herd. Continued development within the JIDPA and at other locations within the Sublette herd unit area were identified as potentially cumulatively affecting pronghorn seasonal migrations. Hunters, wildlife enthusiasts, and wildlife management agencies all consider the maintenance of existing migratory corridors extremely important to pronghorn population maintenance.

Issue 6 Proposed surface disturbance, human presence, and noise effects to overall habitat loss (direct and indirect) for numerous wildlife species and associated fragmentation of wildlife habitats.

Respondents indicated that, with implementation of the proposed project, the JIDPA would no longer be suitable habitat for many wildlife species (e.g., threatened and endangered species, BLM-sensitive species, and raptors). Habitat loss was attributed to direct loss through surface disturbance, indirect loss through animal avoidance of areas proximal to developments, and habitat fragmentation (habitat is no longer suitable for species requiring intact habitat patches larger than what would be available if the project were constructed).

Issue 7 Maximize natural gas recovery from the field.

Respondents indicated that one of BLM's mandates under the Mineral Leasing Act is to maximize recovery of available resources. It was pointed out that many of the existing and proposed development restrictions (e.g., lease stipulations, RMP requirements, Operator-committed practices) limit the economic feasibility of maximizing recovery of the JIDPA's natural gas resources.

Issue 8 Loss of livestock forage and project-associated hazardous conditions to area livestock/livestock operations.

Respondents indicated concerns for livestock operations on the JIDPA. Concerns were generally associated with the direct loss of livestock forage and the associated potential for a reduction in permitted livestock numbers; livestock water quality impairment at existing water sources; livestock movement restrictions/alterations due to pipeline trenches, roads, and fences; livestock management problems associated with the inability to access required area two-track routes from project-developed crowned-and-ditched roads; and livestock hazards from vehicle collisions, drinking contaminated waters from project pits, entrapment in pipeline trenches, and the increase in fugitive dust emissions potentially causing dust-induced pneumonia.

Issue 9 BLM monitoring and enforcement capability.

Respondents indicated that processing permits for current and proposed levels of natural gas development is limiting BLM staff from adequately fulfilling their concurrent responsibilities for area management (e.g., site inspections, reclamation monitoring, wildlife monitoring, cultural

resource clearance actions). It was suggested that this may lead to unidentified violations of numerous laws, rules, and regulations (e.g., Endangered Species Act, Clean Water Act, lease stipulations, RMP requirements, Operator-committed practices required under past project authorizations).

For more detail on these key issues and the variability in scoping respondent concerns see Appendix D.

2.2 DEVELOPMENT OF ALTERNATIVES

2.2.1 Summary of Alternatives Analyzed in the DEIS

The No Action Alternative, the Proposed Action, and eight additional alternatives that the BLM determined were capable of meeting the purpose and need for the project, and that were in compliance with CEQ NEPA requirements under 40 CFR 1502.14 for reasonableness and feasibility based on technical, economic, environmental, and other factors, were analyzed in detail in the February 2005 DEIS. This range of alternatives was also considered highly responsive to the key issues and concerns identified from public scoping (Section 2.1). The alternatives analyzed in the DEIS are summarized below.

The reader should note that throughout these descriptions and the remainder of the EIS, the terms “new surface disturbance” or “new disturbance” are used to denote the total surface disturbance that would be approved in the ROD for this project (i.e., any disturbance beyond the 4,209 acres already authorized by previous NEPA documents). The phrase “short-term disturbance” is used to indicate surface disturbance associated with the well drilling and completion phases of the project (i.e., that portion of new development disturbance from well pads, gathering pipelines, roads, and other necessary project-related infrastructure that is not subsequently reclaimed prior to the project production phase). The term “life-of-project (LOP) disturbance” denotes surface disturbance that will remain after interim reclamation (e.g., regrading and revegetation of portions of developed well pads and entire pipeline ROWs) has concluded, but prior to complete cessation of the production phase and full reclamation and abandonment of the JIDPA.

No Action Alternative: Reject Operators’ Proposal

The No Action Alternative would reject the Proposed Action and all new field-level development alternatives. Though this alternative rejects the field-level development as proposed, existing BLM management decisions could allow new drilling activity (BLM 1997a, 1998a, 1998b, 2000a, 2000b). However, the BLM cannot predict what level of development would be required to support existing management protocols, so for alternative analysis purposes assumes no new development. The No Action alternative serves as a benchmark enabling decision-makers and the public to compare the magnitude of environmental consequences across action alternatives. This alternative is carried forward for analysis in this FEIS.

Proposed Action

The Operators propose to increase recovery of natural gas and condensate reserves from the Lance and other formations at depths of approximately 11,000 feet by drilling as many as 3,100 additional wells on up to 16,200 acres of new surface disturbance. Specific features of the proposal include: a minimum of 64 well pads per 640-acre section; downhole well spacing from 1 well/5 acres to 1 well/40 acres; up to 465 miles of new resource roads with associated pipelines; 8 miles of new collector/local roads; 41 acres of new surface disturbance for ancillary facilities;

and 100 acres of new surface disturbance for exploration of other formations. A single well development rate of 250 wells drilled per year (20 simultaneously operating rigs) is assumed. The Operators have committed to various mitigation measures—these vary by alternative—and propose to fund a Cumulative Impacts Mitigation Fund (CIMF) for offsite compensatory mitigation (CM) under some alternatives. The CIMF could mitigate adverse impacts within the JIDPA by financing substitution mitigation projects outside the JIDPA. As proposed, the amount of the fund may be based on the level of authorized surface disturbance. This alternative is carried forward for analysis in this FEIS.

Alternative A: Maximize Mineral Resource Recovery

New short-term (drilling phase) surface disturbance would be comparable to the Proposed Action (16,200 acres), but development activity would be exempt from some existing BLM Conditions of Approval (COAs), stipulations, and mitigation. Most notably, environmentally sensitive areas such as the Sand Draw and greater sage-grouse lek Controlled Surface Use areas would not be avoided in order to increase gas recovery. Three well development rates (75, 150, and 250 wells drilled per year) were analyzed in the DEIS. This alternative, under a single well development rate of 250 wells drilled per year, is carried forward for analysis in this FEIS.

Alternative B: Minimize Surface Disturbance

All new wells would be drilled from the 497 currently approved well pads. This alternative requires expansion of existing well pads but results in the least amount of new surface disturbance (3,222 acres) while still providing for a high level of resource recovery within the JIDPA. Three well development rates (75, 150, and 250 wells drilled per year) were analyzed in the DEIS. This alternative, under a single well development rate of 75 wells drilled per year, is carried forward for analysis in this FEIS.

Alternatives C and D: Restrict Number of New Wells

Alternative C limits development to 1,250 new wells and well pads with an estimated total new surface disturbance of 6,705 acres. Alternative D increases the number of new wells and well pads to 2,200, resulting in new surface disturbance of 11,581 acres. Neither alternative includes well pad surface density restrictions. Three well development rates (75, 150, and 250 wells drilled per year) for each alternative were analyzed in the DEIS. These alternatives are not carried forward for analysis in this FEIS (see Section 2.2.3).

Alternatives E, F, and G: Restrict Well Pad Density

Alternative E stipulates a maximum of 16 well pads per section (1 well pad/40 acres) with a total new surface disturbance of approximately 6,386 acres. Alternative F increases well pad density to 32 wells per section (1 well pad/20 acres) and results in new surface disturbance of 10,446 acres. Alternative G increases the density to 64 wells per section (1 well pad/10 acres) with 13,989 acres of new surface disturbance. Each alternative assumes up to 3,100 new wells would be drilled. Three well development rates (75, 150, and 250 wells drilled per year) for each alternative were analyzed in the DEIS. These alternatives are not carried forward for analysis in this FEIS (see Section 2.2.3).

BLM Preferred Alternative

As presented in the DEIS, under the Preferred Alternative three different surface disturbance allowances per section would be established within different areas of the JIDPA, resulting in a total of approximately 8,316 acres of new surface disturbance. A single well development rate of 250 wells drilled per year is assumed. Performance-based field management objectives would address key issues and significant impacts. Monitoring and surveying would be required to determine if objectives are being met. An interagency adaptive management working group would be established to monitor the effectiveness of development guidelines, mitigation, and monitoring, and to recommend to BLM any modifications to these procedures based on monitoring results. This alternative has been significantly revised for the FEIS (see Section 2.4.5) as a result of public and agency comments on the DEIS.

2.2.2 Publication of the DEIS, Public Meetings, and Public Comments

On February 11, 2005, a Notice of Availability (NOA) of the DEIS for public review and comment was published in the *Federal Register* (70 FR 7296–7298). The DEIS was distributed in both paper and electronic formats (on CD-ROM), and was available for downloading from the BLM’s website. Additional copies of these volumes were made available for public inspection at the PFO and at the BLM Wyoming State Office. The BLM invited public and agency comment on the DEIS and the draft air quality and socioeconomic analysis technical support documents (TSDs) for a period of 60 calendar days, until April 12, 2005. BLM-sponsored public meetings to provide an opportunity to discuss the DEIS and the supporting documents were held on March 21, 2005, at BLM’s Rock Springs office and March 23, 2005, at Rendezvous Pointe in Pinedale.

Subsequent to publication of the DEIS, BLM determined that the air quality modeling and analysis done for the DEIS provided insufficient information for meaningful impact evaluation, largely because new analysis in another document showed emission levels of certain pollutants within the regional airshed had increased significantly since the original DEIS data had been compiled. Following consultation with the EPA and Wyoming Department of Environmental Quality-Air Quality Division (WDEQ/AQD), the BLM determined that supplemental air quality modeling and analysis would be conducted, DEIS and TSD supplements would be published, and the results of these studies would be incorporated into the FEIS. Therefore, on April 12, 2005, BLM published an Notice of Intent (NOI) in the *Federal Register* (70 FR 19094) to inform the public that supplemental DEIS documents would be prepared and that additional time would be made available to submit comments on the air quality information presented in the DEIS. When the new supplemental air quality information became available for public review and comment in August 2005, BLM published a new NOA in the *Federal Register* (70 FR 46187) and provided the public with an additional 60-day comment period.

BLM received a total of 877 separate written comment submissions (letters, e-mails, forms, etc.) on the DEIS, TSDs, and the August 2005 supplements. Within these submissions, 1,147 individual comments were identified as “substantive,” or meaningful to revision of the DEIS and/or its supporting volumes. Some submissions had several substantive comments; some had none. BLM crafted responses to each of these substantive comments, which were used to guide revision of the DEIS analyses. The substantive comments received and the responses that were generated as a result became central to the IDT’s decision to significantly revise the Preferred Alternative and to eliminate five of the alternatives presented in the DEIS from further consideration in the FEIS. All substantive comments, along with BLM’s responses, are included in Volume 3, *Jonah Infill Drilling Project Comment Analysis Report*.

Subsequent to publication of the DEIS, BLM also determined that additional erosion modeling was needed to assess the relative impacts of the alternatives on soil loss and sedimentation of surface waters. The results of this modeling have been incorporated into the impact analysis in Chapter 4 of this document. The full modeling report, *Erosion, Sediment Transport, and Salinity Modeling Technical Report: Jonah Infill Drilling Project, Sublette County, Wyoming* (HydroGeo 2005) is included as Appendix E.

2.2.3 Alternatives Considered and Eliminated from Detailed Study

2.2.3.1 DEIS Alternatives Not Carried Forward for Final Analysis

Of the 10 alternatives that were analyzed in detail in the DEIS, the IDT determined that five of these alternatives—Alternatives C, D, E, F, and G—would not be carried forward for final analysis in the FEIS. The BLM also determined that multiple well development rates within any single alternative would not be further analyzed.

Alternatives C and D provided different limits to restrict well numbers and were initially considered in the DEIS to provide a range of impacts to air quality. Alternative C proposed limiting development to 1,250 new wells and well pads and an estimated surface disturbance of 6,705 acres. Alternative D would have limited the number of new wells and well pads to 2,200 and an estimated surface disturbance of 11,581 acres. Neither Alternative C nor Alternative D limited well or well pad surface density. These two alternatives were eliminated from additional analysis because neither alternative is considered reasonable: at least 3,100 additional wells would be required to fully develop the field and anything less would result in stranded resources that would most likely never be recovered. Allowing mineral resources to remain unrecovered, as would occur under these and similar alternatives, would result in waste and prevent BLM from achieving its statutory and policy goals. In addition to not fully recovering the resource, Alternatives C and D would result in impacts similar to those resulting from components of the alternatives that are carried forward in this FEIS. Specifically, these components are individual wells from closely spaced well pads under Alternative A, multiple wells from a single well pad as analyzed in Alternative B, and a combination of single and multiple well pads as analyzed under the Preferred Alternative.

Alternatives E, F, and G provided variable surface well pad spacing allowances, and were initially considered to provide a range in the amount and distribution of surface disturbance across the JIDPA. Alternative E examined drilling and developing 16 wells from 16 well pads in a section, resulting in approximately 6,386 acres of additional disturbance. Alternative F analyzed the effects of increasing the well pad density to 32 well pads per section for a total of 10,446 acres of additional disturbance. Finally, Alternative G examined the effects of 64 well pads per section (one well pad for every 10 acres) at an estimated total additional disturbance of 13,898 acres. As with Alternatives C and D, these alternatives were eliminated from further consideration in the FEIS because the anticipated impacts from the alternative actions would be similar to those resulting from components of the alternatives that are carried forward for additional analysis in this FEIS.

Alternate paces of development within each alternative were eliminated from further analyses in this FEIS because it was determined that providing this information within each alternative introduced a level of complexity which made it difficult for the public and decision-makers to assess potential impacts across the full range of alternatives. Two development rates (250 and 75 wells drilled per year) are carried forward as parts of specific alternatives analyzed in this

FEIS, and with these analyses a sufficient range of resource effects (e.g., LOP, air quality, socioeconomics) is provided.

2.2.3.2 Other Alternatives Considered and Eliminated from Detailed Study

Many suggestions for alternatives were proposed by the public during scoping. Most of the suggested alternatives involved addressing varying well numbers, varying the rate at which the field is developed, and varying surface disturbance. While not all the suggested well number, development rate, or surface disturbance suggestions were analyzed, the BLM used these suggestions when developing the range of alternatives.

An alternative rejecting any new development was also suggested. While additional development in the area would likely occur under any no development alternative (e.g., State of Wyoming land development), for analytic purposes, the No Action Alternative sufficiently considers no new development-type impacts (see Section 2.4.1).

Action alternatives limiting the total number of wells were rejected from consideration based upon known natural gas reservoir properties indicating that an estimated 3,100 additional wells would be necessary for adequate resource recovery. Additional justification for eliminating these alternatives from detailed analyses is provided in Section 2.2.3.1.

Phased development alternatives suggesting a development pace slower than 75 wells per year were rejected from detailed analyses because the reduced development pace would result in recovery and operational and safety issues associated with drilling through depressurized zones (i.e., stuck pipe, mud weight variability problems, blow-out potential). It was determined that the analyzed development paces of 75 and 250 wells drilled per year provide an adequate range of development paces to assess the potential effects associated with development rate (e.g., socioeconomics, duration of habitat loss). Phased development alternatives involving systematic extraction of resources from portions of the JIDPA followed by appropriate reclamation prior to developing other areas of the JIDPA were not provided detailed analyses due to the potential for disproportionate adverse effects on resource recovery within some leaseholds (see also Section 2.2.3.1). Allowing mineral resources to remain unrecovered would result in waste and prevent BLM from achieving its statutory and policy goals.

Two alternatives requiring all new wells to be directionally drilled and requiring no new roads were not specifically analyzed in detail because Alternative B has a similar potential effect (i.e., no new well pads, few new roads needed).

An alternative rejecting all further development in the JIDPA until all existing disturbance in the area is adequately reclaimed was not considered since this action would likely lead to considerable unrecovered resource and would unnecessarily prolong the LOP.

Numerous alternatives requiring the inclusion/exclusion of multiple resource protection, mitigation, and monitoring measures were suggested for analysis, including the application of best management practices (BMPs), the use of adaptive management procedures, and consideration of off-site CM (see Chapter 5). Some of these additional measures have been included as components of the Proposed Action and Preferred Action alternatives and/or may be included as project requirements in the ROD. Many if not all of these suggested requirements are considered under one or more of the alternatives analyzed in detail (see also Appendices A and C for BLM standard mitigations, Operator-committed measures, and CM ideas).

2.3 ALTERNATIVES CARRIED FORWARD FOR FINAL ANALYSIS

2.3.1 Features Common to All Alternatives Carried Forward for Final Analysis

2.3.1.1 General Features

All applicable federal, state, and local laws, rules, and regulations would be applied under any approved alternative, and all requirements listed in Appendix A, *BLM Standard Stipulation/Mitigation Requirements*, would be implemented under all alternatives except Alternative A. To minimize directional drilling for the purpose of maximizing gas recovery under Alternative A, requirements for avoiding selected resources such as steep slopes, Sand Draw, greater sage-grouse leks, and raptor nests were not applied.

Development requirements and procedures common to all alternatives are provided in Appendix B, *Development Procedures Technical Support Document* (BLM 2004a) and in general these procedures would be applied under all alternatives.

Appendix C provides a list of Operator-committed measures; these will be finalized in the ROD for this project.

Absent specific revisions in the ROD for this project, Operators would comply with the management objectives, COAs, standard stipulations, and mitigation measures identified in the BLM PFO RMP ROD (BLM 1988b), and BLM RSFO RMP ROD (BLM 1997b). Under any alternative, Operators must comply with all appropriate federal, state, and local laws and regulations, and all appropriate permits from the appropriate regulatory agency must be obtained before proceeding.

General features of management applicable to all alternatives carried forward for analysis in this FEIS are listed below.

Water

- Operators would maintain or restore groundwater and surface water quality in the Jonah Field to Clean Water Act and WDEQ standards.
- A groundwater monitoring program for all water wells in or affected by activities in the JIDPA would be implemented, with annual reports to BLM, Wyoming State Engineer's Office (WSEO), and WDEQ. Water wells would be tested annually for drawdown, general chemical constituents, and total petroleum hydrocarbons, using WDEQ-approved methods.

Transportation

- Operators would continue to encourage limiting the speed of all vehicles operated by the leaseholder, Operator, or Operator agents in the JIDPA, and would implement voluntary fugitive dust control measures on primary access roads and heavily used resource roads

- Project-required traffic in the JIDPA would be limited to BLM-approved roads. Operators would continue to cooperate with the BLM to identify and prohibit use of two-tracks where ROWs have not been obtained.
- Operators would utilize remote telemetry or equivalent technology at all wells to minimize well monitoring trips, unless proven to the satisfaction of the authorized officer on a case-by-case basis that installation of remote telemetry or equivalent technology would not be technically or economically feasible, or that another method would create less environmental impact.

Reclamation

- Operators would submit to BLM for approval a reclamation plan, to include both interim and long-term reclamation of the JIDPA, within 1 year of the ROD for this project (see Appendix B). A reclamation quality assurance/quality control monitoring program would be implemented until development and interim (production phase) reclamation is completed to BLM standards.
- Operators would employ appropriate topsoil storage and replacement technology and procedures to ensure soil viability and plant rooting potential are maintained.

Wildlife

- Operators would monitor nesting of raptors, including ferruginous hawk, bald eagle, and burrowing owl; greater sage-grouse lek attendance; and occurrence of other sagebrush-obligate species within the JIDPA in coordination with BLM and WGFD.

2.3.1.2 Conditions of Approval

The COAs applicable to all alternatives carried forward for final analysis in this FEIS are listed below.

- Operators would monitor water withdrawal volumes from water wells and provide annual depletion reports to the BLM, WSEO, and USFWS.
- New well pads would be designed and constructed to meet WDEQ stormwater discharge requirements.
- Hydraulic structures (culverts, bridges, low water crossings, silt traps, catchments, retention dams, etc.) placed in existing, natural drainage courses would be engineered and designed by a certified civil engineer to ensure the structures are stable and erosion is minimized. Cross-drain structures installed outside existing, natural drainage courses would not require certified civil engineer design.
- All well pads, roads, pipelines, and other facilities would be engineered and constructed to minimize sedimentation down-channel from the JIDPA.
- All water wells would be cemented or grouted as required by the WSEO to protect groundwater aquifers.

- Operators would restore those portions of pads not needed for production operations to as close to original contours as practical during interim reclamation to minimize or eliminate the need to re-disturb those reclaimed areas when wells are plugged and abandoned.

2.3.2 Features Common to the Proposed Action, Alternative B, and the Preferred Alternative

Because Alternative A was specifically designed to maximize mineral resource recovery within the JIDPA by exempting the Operators from certain standard management practices, the following conditions would only be applicable to the Proposed Action, Alternative B, and the Preferred Alternative:

- The Sand Draw Conditional Surface Use restriction (formerly referred to as a No Surface Occupancy restriction) would be maintained.
- Well pads, access roads, and other aboveground facilities would not be located within 825 feet of an active raptor nest, within 1,000 feet of an active ferruginous hawk nest, or within 2,640 feet of any bald eagle nest.
- The following seasonal restrictions for activities near active raptor nests/roosting sites/foraging areas would be imposed:
 - February 1 through July 31, within 0.5 mile of all active raptor nests;
 - February 1 through July 31, within 1.0 mile of all active ferruginous hawk nests;
 - February 1 through August 15, within 1.0 mile of all active bald eagle nests;
 - November 1 through April 1, within 1.0 mile of active bald eagle communal winter roosts; and
 - November 1 through April 1, within 2.5 miles of a bald eagle nest and within 1.0 mile of winter forage areas.
- Operators would monitor nesting of raptors, including ferruginous hawk, bald eagle, and burrowing owl; greater sage-grouse lek attendance; and occurrence of other sagebrush-obligate species in coordination with BLM and WGFD.
- Surface-disturbing and disruptive activities in greater sage-grouse winter habitat would be avoided from November 15 through March 14.
- Surface-disturbing and disruptive activities in greater sage-grouse nesting and early brood-rearing habitat within 2.0 miles of an occupied lek, or in identified greater sage-grouse nesting and early brood-rearing habitat outside the 2.0-mile buffer would be prohibited from March 15 through July 15.
- Surface disturbance and occupancy would be prohibited within 0.25 mile of the perimeter of greater sage-grouse leks, and human activity in these areas would be avoided between 8 p.m. and 8 a.m. from March 1 through May 15.

2.4 ALTERNATIVES ANALYZED IN DETAIL

The No Action, the Proposed Action, and three alternative development actions (Alternative A, Alternative B, and the BLM Preferred Alternative) are evaluated in this FEIS. A brief comparison of alternatives is provided in Table 2.1.

Table 2.1. Comparison of Alternatives, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006

Project Parameter	Alternative				
	No Action ¹	Proposed Action ²	A ²	B ³	BLM Preferred Alternative ⁴
Development Features					
Total Acres Surface Disturbance ⁵	4,209	20,409	20,409	7,431	14,030–20,334
Total Acres New Disturbance	0	16,200	16,200	3,222	9,821–16,125
LOP Acres Surface Disturbance	1,409	6,040	6,040	2,600	4,267–6,020
Total Miles of Resource Roads/Gathering Pipelines	199	664	664	199	488–710
Total Miles of Collector/Local Roads	38	46	46	46	46
Total Number of Natural Gas Well Pads	497	3,597	3,597	497	3,597
<i>These development features directly or indirectly affect habitat loss and fragmentation for all species, pronghorn migration, visibility, livestock hazards and available forage, socioeconomics, and gas recovery.</i>					
Pace of Development					
Wells Developed per year	0	250	250	75	250
Development Phase (years)	0	13	13	42	13
Production Phase (years)	40	40	40	40	40
	23	23	23	23	23
Total Life-of-Project (years)	63	76	76	105	76
<i>Pace of development directly or indirectly affects duration of habitat and forage loss, visibility, socioeconomics, gas recovery, and BLM enforcement and monitoring capability.</i>					

¹ See Table 2.2 for further detail.

² See Table 2.3 for further detail.

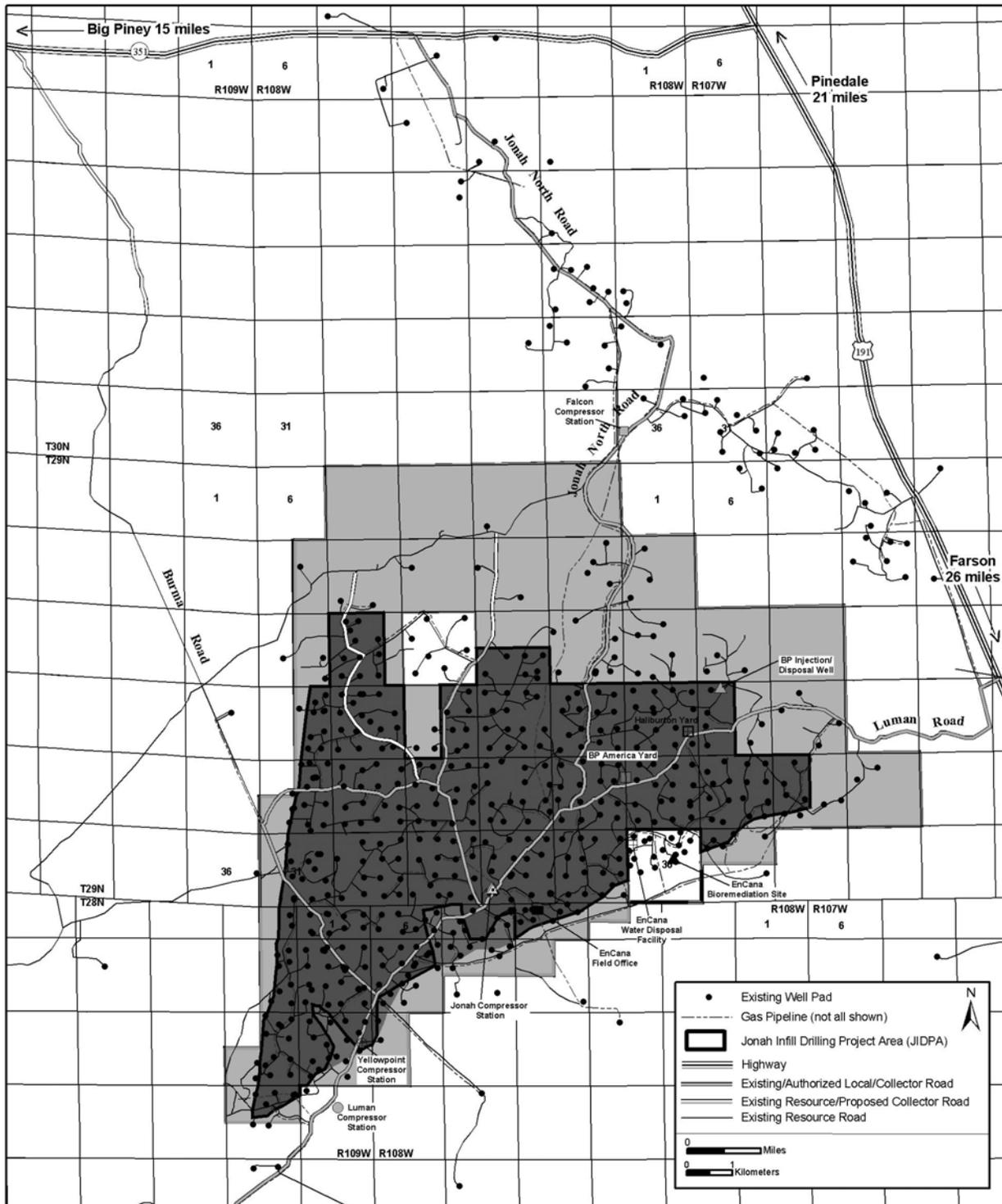
³ See Table 2.4 for further detail.

⁴ See Table 2.5 for further detail. New disturbance in excess of 9,821 acres is contingent on successful on-site reclamation to BLM standards.

⁵ Total disturbance includes 4,209 acres already allocated for disturbance through the existing Jonah NEPA documents (BLM 2000b) plus new disturbance proposed under each alternative.

2.4.1 No Action Alternative – Reject Operators’ Proposal

Under the No Action Alternative, the BLM would reject the Operators’ proposal for additional field-level natural gas development on federal lands within the JIDPA. Authorizations for and impacts from previously approved or analyzed development (533 wells) and surface disturbance (497 well pads with associated roads, pipelines, and ancillary facilities) would continue (BLM 1998b, 2000b). The approved surface disturbance under the No Action Alternative is 4,209 acres, including 1,409 acres of LOP disturbance (Table 2.2). LOP is estimated to be approximately 63 years (see Table 2.1). The types and locations of existing surface disturbance in the JIDPA are presented in Map 2.1.



Map 2.1. Jonah Infill Drilling Project Area, Sublette County, Wyoming, 2006.

However, rejection of the Operators' proposal would not preclude all additional natural gas development in the JIDPA. The No Action Alternative assumes the JIDPA would be managed as approved by existing management plans (BLM 1988b, 1997b) and as previously authorized by APDs and ROWs issued under existing decisions (BLM 1998b, 2000b). Though the extent of potential future development under this scenario is limited, it cannot be precisely predicted. Therefore, the impact analysis for the No Action Alternative assumes no new development.

Table 2.2. Surface Disturbance Allowed by the No Action Alternative, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006¹

Project Parameter ²	Disturbance (acres)		
	Total	Short-term	LOP
Well Pads ³	1,889	1,442	447
Resource Roads/Gathering Pipelines ⁴	1,766	1,067	699
Collector/Local Roads ⁵	239	120	119
Burma Road ⁶	35	0	35
Ancillary Facilities ⁷	87	7	80
Water Wells ⁸	0	0	11
Sales Pipeline ⁹	133	133	0
Exploration Activities ¹⁰	60	42	18
Total¹¹	4,209	2,811	1,409

¹ Generally as described in the EA for the Modified Jonah Field II Natural Gas Project (BLM 2000a).

² Includes all project parameters identified in BLM (2000a) as well as those proposed for the current project.

³ Assumes approximately 533 wells from 497 pads at 3.8 acres total and 0.9 acre LOP disturbance per pad.

⁴ Assumes a 0.4-mile road with adjacent gathering pipeline for each well pad with average total and LOP disturbance widths of 73.3 feet and 29.0 feet, respectively (approximately 199 linear miles of road at 8.9 acres/mile total disturbance and 3.5 acres/mile LOP).

⁵ Assumes 26 miles of collector roads with average total and LOP disturbance widths of 75.7 feet and 37.8 feet, respectively (approximately 9.2 acres/mile total disturbance and 4.6 acres/mile LOP disturbance).

⁶ Includes the approximately 12-mile road length outside the JIDPA and assumes an existing width of 24 feet.

⁷ Includes disturbances from four compressor stations, water disposal facilities, field offices, ware yards, a sand pit, and other facilities required for the existing project and occurring both within and outside the JIDPA. Approximately 7 acres of this disturbance would be reclaimed after completion of currently approved or committed to drilling activities.

⁸ Includes disturbance from approximately 25 existing water wells that have been developed on existing natural gas well pads; water wells require no new disturbance and less than 0.5 acre of disturbance each for the LOP.

⁹ Includes an approximately 22-mile pipeline corridor with 50-foot disturbance width for sales pipelines outside the JIDPA.

¹⁰ All exploration activities are included in the disturbance area estimates listed above. Disturbance estimates include areas occupied by existing natural gas developments (pads [five], roads, pipelines) in the N¹/₂ Section 23, T28N, R109W.

¹¹ Includes 4,001 acres total and 1,348 acres LOP disturbance within the JIDPA, respectively; the additional 208 acres total and 61 acres LOP disturbance occur at locations outside the JIDPA (e.g., Burma Road, compressor stations).

2.4.2 Proposed Action

If selected, the Operators would infill drill and develop up to 3,100 new wells on a minimum of 64 well pads/section (at least 1 pad every 10 acres) with related roads, pipelines, and ancillary facilities on up to 16,200 acres of new disturbance.

Drilling would begin in 2006 and continue until the total number of proposed wells have been drilled, the natural gas resources in the field have been fully developed, or economic conditions are such that it is no longer profitable to drill additional wells.

Operator reservoir modeling shows that 3,100 new wells would be necessary to adequately recover the natural gas resource present in the area. Their experience indicates that the use of directional drilling is in some cases not economically feasible and in other cases results in inadequate resource recovery.

The Proposed Action assumes that 250 wells would be developed annually (20 rigs operating year-round). LOP would be approximately 76 years (see Table 2.1).

If selected, the Proposed Action would approve:

- up to 3,100 new wells on up to 11,780 acres new disturbance (2,790 acres LOP)—assumes all 3,100 wells would be drilled from single-well pads with an estimated total disturbance of 3.8 acres and 0.9 acre LOP per single well pad;
- 465 miles of new resource roads with gathering pipelines—4,131 acres new disturbance (1,635 acres LOP);
- 8 miles of new collector/local roads—73 acres new disturbance (37 acres LOP);
- an upgrade of approximately 12 miles of the Burma Road—75 acres new disturbance (20 acres LOP);
- ancillary facilities—41 acres new disturbance (all LOP) for water disposal, storage, and compressor station facilities; and
- exploration activities—100 acres new disturbance (all LOP) to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.3).

Following successful interim reclamation (post-drilling during production phase), LOP surface disturbance under the Proposed Action would be 6,040 acres, which includes 1,409 acres of existing disturbance (see Table 2.3).

Operators have identified a number of mitigation/development practices they would apply during development of the Proposed Action (see Appendix C).

2.4.3 Alternative A – Maximize Mineral Resource Recovery

Alternative A is similar to the Proposed Action in its estimated surface disturbance requirements (see Section 2.4.2 and Table 2.3), but differs from the Proposed Action in that known areas with sensitive resources in the JIDPA would not be avoided (e.g., Sand Draw, steep slopes, raptor nest and sage grouse lek buffers). Development of natural gas resources beneath these areas would therefore not require the use of directional drilling. A rate of development of 250 wells per year and an LOP of 76 years are assumed under Alternative A. This alternative would not necessarily provide for the RMP-required balance between gas recovery and other resource protection; therefore, project authorization under this alternative would require an RMP amendment. Other features of Alternative A include:

- Well pads, access roads, and other aboveground facilities could be located within 825 feet of active raptor nests.
- Surface disturbance and occupancy would not be prohibited within 0.25 mile of the perimeter of greater sage-grouse leks.
- Prairie dog towns would not be avoided.

- The Sand Draw Conditional Surface Use restriction (formerly referred to as a No Surface Occupancy restriction) and other drainage and steep slope avoidance areas would not be maintained.

Operators have identified a number of mitigation/development practices they would apply during development of Alternative A (see Appendix C).

Table 2.3. Surface Disturbance Allowed by the Proposed Action and Alternative A, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006

Project Parameter	Disturbance (acres)		
	New	Short-term	LOP
Well Pads ¹	11,780	8,990	2,790
Resource Roads/Gathering Pipelines ²	4,131	2,496	1,635
Collector/Local Roads ³	73	36	37
Burma Road ⁴	75	55	20
Ancillary Facilities ⁵	41	0	41
Water Wells ⁶	0	0	8
Sales Pipeline ⁷	0	0	0
Exploration Activities ⁸	100	0	100
Total New Disturbance	16,200	11,577	4,631
Existing Disturbance ⁹	4,209	2,811	1,409
Total New and Existing Disturbance¹⁰	20,409	14,388	6,040

¹ Conservatively assumes all well pads are single-well pads and require 3.8 acres new total and 0.9 acre new LOP disturbance per pad.

² Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad with average new total and new LOP disturbance widths of 73.3 feet and 29.0 feet, respectively (approximately 465 linear miles of road).

³ Assumes approximately 8 miles of new collector/local roads would be required (existing resource roads may be expanded in some areas to serve as collector/local roads), and roads would have average new total and new LOP disturbance widths of 75.7 feet and 37.8 feet, respectively.

⁴ Assumes an approximate 12-mile road length outside the JIDPA with new total and new LOP disturbance widths of 51.7 feet (75.7 feet required less 24.0 feet existing) and 13.8 feet (37.8 feet required less 24.0 feet existing), respectively.

⁵ Accommodates areas potentially required for new water disposal facilities, storage yards, and increased pipeline compression capacity.

⁶ Approximately 16 new water wells would be developed on natural gas well pads. Water wells would require no new surface disturbance; assumes 0.5 acre LOP disturbance per water well.

⁷ No new sales pipelines are proposed.

⁸ An estimated 100 acres of new disturbance (all LOP) is included to allow for exploration of geologic formations other than the Lance Pool and Mesa Verde.

⁹ See Table 2.2.

¹⁰ Estimates include 20,126 acres new total and 5,959 acres new LOP disturbance in the JIDPA, respectively; the additional 283 acres new total and 81 acres new LOP disturbance would occur outside the JIDPA.

2.4.4 Alternative B – Minimize Surface Disturbance

Surface disturbance would be reduced under Alternative B by requiring all new wells be drilled from existing well pads. Existing well pads would need to be enlarged and new pipelines built within existing pipeline corridors. A rate of development of 75 wells per year and an LOP of 105 years are assumed under Alternative B. If selected, Alternative B would approve:

- expansion of existing well pads—3,081 acres new disturbance (1,044 acres LOP)—6.2 acres new disturbance (3.0 acres LOP) per well pad expansion;
- ancillary facilities—41 acres new disturbance (all LOP) for water disposal, storage, and compressor station facilities; and

- exploration activities—100 acres new disturbance (all LOP) to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.4).

Following successful interim reclamation, LOP surface disturbance under Alternative B would total 2,622 acres, which includes 1,409 acres of existing disturbance (see Table 2.4).

Although directional drilling under Alternative B would minimize surface disturbance and thereby benefit wildlife and other resources, it would also increase air emissions by approximately 20% over the Proposed Action and Alternative A. Thus, Alternative B could have a greater impact on air quality resources (see Chapter 4, Section 4.1.2).

Appendix C, Exhibit C-1 lists the Operator-committed practices that would be applied under Alternative B.

Table 2.4. Surface Disturbance Allowed by Alternative B, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006

Project Parameter	Disturbance (acres)		
	New	Short-term	LOP
Well Pads ¹	3,081	2,037	1,044
Resource Roads/Gathering Pipelines ²	0	0	0
Collector/Local Roads ³	0	0	0
Burma Road ⁴	0	0	0
Ancillary Facilities ⁵	41	0	41
Water Wells ⁶	0	0	8
Sales Pipeline ⁷	0	0	0
Exploration Activities ⁸	100	0	100
Total New Disturbance	3,222	2,037	1,193
Existing Disturbance ⁹	4,209	2,811	1,409
Total New and Existing Disturbance¹⁰	7,431	4,848	2,602

¹ Assumes expansion of existing well pads to accommodate 3,100 new wells (no new pads). Assumes all 497 existing pads would be expanded by an average of 6.2 acres initially (10.0 acres per multi-well pad less 3.8 acres existing disturbance) and 2.1 acres for the LOP (3.0 acres per multi-well pad less 0.9 acre of existing disturbance).

² No new resource roads would be constructed, and while new gathering pipelines may be built, they would be constructed in existing pipeline corridor disturbance areas.

³ No new collector/local roads would be constructed.

⁴ Burma Road improvements would not be performed under Alternative B.⁵ Accommodates areas potentially required for new water disposal facilities, storage yards, and increased pipeline compression capacity.

⁶ Approximately 16 new water wells would be developed on natural gas well pads. Water wells would require no new surface disturbance; assumes 0.5 acre LOP disturbance per water well.

⁷ No new sales pipelines would be constructed.

⁸ An estimated 100 acres new disturbance (all LOP) is included to allow for exploration of geologic formations other than the Lance Pool and Mesa Verde.

⁹ See Table 2.2.

¹⁰ Includes approximately 7,223 acres new total and 2,541 acres new LOP disturbance in the JIDPA, respectively; the additional 208 acres new total and 61 acres new LOP disturbance would occur outside the JIDPA.

2.4.5 BLM Preferred Alternative

The extensive and detailed public comment and associated technical information received on the DEIS, and subsequent new analyses conducted by BLM and WDEQ directly related to this information, have led BLM to revise its Preferred Alternative. The revised Preferred Alternative, and its associated outcome-based performance objectives, mitigation, and Best Management Practices (BMPs), would achieve high levels of natural gas recovery (potentially that of the Proposed Action) while minimizing impacts related to the key issues (see Section 2.1). BLM has concluded that this management approach would achieve the fewest long-term impacts while allowing recovery of the mineral resource as provided by federal laws and regulations, including FLPMA, and extant leasing stipulations.

If selected, the revised Preferred Alternative would limit total surface disturbance at any given time to 46% of the JIDPA, or a maximum of 14,030 acres. To mitigate surface disturbance and associated environmental impacts as quickly as possible, Operators would be required to initiate reclamation of developed well pads and road and pipeline construction ROWs pursuant to Reclamation Plan specifications (Appendix B, subappendix DP-B). Credit would thereafter be given, on an acre-for-acre basis for areas the BLM determines have successfully been reclaimed (i.e., achieved 80% indigenous vegetative basal cover/density and species composition). Under no circumstances would cumulative total surface disturbance exceed 20,334 acres over the LOP (Table 2.5).

BLM would not specifically regulate the pace of development. For the purposes of analysis, a total of 3,100 new wells and a pace of 250 wells drilled per year are assumed, resulting in the field development phase being completed in approximately 13 years. However, the actual pace of development may be limited by air quality impact restrictions and associated mitigation, which creates the potential to increase the duration of the field development phase. For the purposes of analysis the LOP is assumed to be 76 years.

Additional specific provisions of the Preferred Alternative are as follows:

- An interagency mitigation and monitoring implementation group, tentatively called the Jonah Interagency Mitigation and Reclamation Office (JIO), would be established and begin working once the ROD is issued. Details of JIO composition, objectives, and operating procedures are provided in Appendix F. General provisions of the JIO are as follows:
 - The JIO would oversee implementation of mitigation and monitoring of JIDP activities, including compensatory mitigation.
 - The JIO would include BLM, WDEQ, WGFD, and the Wyoming Department of Agriculture.
 - Funding for the JIO would be provided by the Operators.
 - BLM would consider annual JIO adaptive management recommendations to adjust COAs, monitoring, mitigation, and/or BMPs to meet field development and production objectives throughout the LOP.

- BLM would require implementation of Operator-committed compensatory mitigation at issuance of the ROD as appropriate and consistent with BLM policy (see Chapter 5 and Appendix C for a detailed discussion of compensatory mitigation goals and objectives, performance standards, and program-specific strategies).
- The *Wildlife Monitoring/Protection Plan* (Appendix D, *Record of Decision for the Jonah Field II Natural Gas Development Project Environmental Impact Statement, Sublette County, Wyoming* [BLM 1998b] as most recently adapted) would be modified to address activities within the JIDPA and include a habitat mitigation plan.
- To reduce potential wildlife impacts, no further improvements to the Burma Road would be authorized. That portion of the Burma road that is currently upgraded would be maintained to BLM standards.

Following successful interim reclamation and assuming the application of the maximum reclamation credit (6,379 acres), LOP surface disturbance under the BLM Preferred Alternative would total 6,020 acres, which includes 1,409 acres of existing long-term disturbance (see Table 2.5).

Table 2.5. Surface Disturbance Allowed by the BLM Preferred Alternative, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006¹

Project Parameter	Disturbance (acres)		
	New	Short-term	LOP
Well Pads ²	7,113–11,780	5,428–8,990	1,685–2,790
Resource Roads/Gathering Pipelines ³	2,494–4,131	1,507–2,496	987–1,635
Collector/Local Roads ⁴	73	36	37
Burma Road ⁵	0	0	0
Ancillary Facilities ⁶	41	0	41
Water Wells ⁷	0	0	8
Sales Pipeline ⁸	0	0	0
Exploration Activities ⁹	100	0	100
Total New Disturbance	9,821–16,125	6,971–11,577	2,858–4,611
Existing Disturbance ¹⁰	4,209	2,811	1,409
Total New and Existing Disturbance	14,030–20,334	9,782–14,388	4,267–6,020

¹ Provides the full range of disturbance acreage estimates, with the low-end estimates being limited to 46% of the JIDPA and the high-end estimates assuming the application of the entire 6,379-acre reclamation credit. High-end estimates are consistent with the estimates provided for the Proposed Action.

² Conservatively assumes all well pads are single-well pads and require 3.8 acres new total and 0.9 acre new LOP disturbance per pad.

³ Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad with average new total and new LOP disturbance widths of 73.3 feet and 29.0 feet, respectively (approximately 465 linear miles of road).

⁴ Assumes approximately 8 miles of new collector/local roads would be required (existing resource roads may be expanded in some areas to serve as collector/local roads), and roads would have average new total and new LOP disturbance widths of 75.7 feet and 37.8 feet, respectively.

⁵ Burma Road improvements would not be performed under the Preferred Alternative.

⁶ Accommodates areas potentially required for new water disposal facilities, storage yards, and increased pipeline compression capacity.

⁷ Approximately 16 new water wells would be developed on natural gas well pads. Water wells would require no new surface disturbance; assumes 0.5 acre LOP disturbance per water well.

⁸ No new sales pipelines would be constructed.

⁹ An estimated 100 acres new total and new LOP disturbance is included to allow for exploration of geologic formations other than the Lance Pool and Mesa Verde.

¹⁰ See Table 2.2.

2.4.5.1 Outcome-Based Performance Objectives

Project development and production under the BLM Preferred Alternative would apply outcome-based performance objectives to allow Operators to utilize innovations to maximize gas recovery while providing long-term protection for other resources in the JIDPA. Furthermore, the Preferred Alternative encourages Operators to develop and use the most effective technologies and processes available to achieve these objectives. The outcome-based performance objectives for the BLM Preferred Alternative are listed below, categorized by resource.

Land Use/Surface Disturbance

- Continue developing and implementing innovations by utilizing state-of-the-art technologies and JIDPA-wide planning throughout the LOP to minimize well pad, road, pipeline, and ancillary facility surface disturbance.

Air Quality

- Air Quality Goal 1a: Minimize the impact of management actions in the planning area on air quality by complying with all applicable air quality laws, rules, and regulations.
 - Air Quality Objective 1a.1: Maintain concentrations of criteria pollutants associated with management actions in compliance with applicable Wyoming and National Ambient Air Quality Standards (WAAQS, NAAQS).
 - Air Quality Objective 1a.2: Maintain concentrations of Prevention of Significant Deterioration (PSD) pollutants associated with management actions in compliance with the applicable increment.
- Air Quality Goal 1b: Implement management actions in the planning area to improve air quality as practicable.
 - Air Quality Objective 1b.1: Reduce visibility-impairing pollutants, in accordance with the reasonable progress goals and time-frames established within the State of Wyoming's Regional Haze State Implementation Plan (SIP).
 - Air Quality Objective 1b.2: Reduce atmospheric deposition pollutants to levels below federally established levels of concern (LOC) and levels of acceptable change (LAC).

Water Resources/Soils

- Maintain sediment erosion (salt and silt discharge rates) from the JIDPA at background levels.

Noise

- Design, construct, and implement operations so that ambient noise levels do not exceed 75 A-weighted decibels (dBA) 30 feet from the noise source (e.g., border of drill pad, compressor, etc.), where technically and economically feasible.

Biological Resources

- Meet BLM Wyoming Standards for Healthy Rangelands (Appendix A, Section A.2).
- Plan field-wide development activities and interim and final reclamation to maximize undisturbed/reclaimed habitat patch size and reduce habitat fragmentation for sagebrush-obligate species.
- Maintain the integrity of big game migration routes and movement corridors.
- Reclaim sites to establish indigenous vegetative cover, structure, and species composition; maintain soil stability; provide forage nutritional value and palatability; and prevent invasive plant and noxious weed establishment.

Visual Resources

- Reduce visual intrusions through the use of new technology, removal of unnecessary equipment, and use of the most appropriate equipment and paint colors as these become available throughout the LOP.

2.4.5.2 Required Operating Procedures and Best Management Practices

The Operators would implement the following required operating procedures and BMPs for all project actions within the JIDPA. Broad-spectrum procedures or BMPs, such as mapping all prairie dog colonies within the JIDPA, inventorying roads and trails, maximizing centralized production facilities, inventorying greater sage-grouse seasonal habitats, etc., would be programmatically implemented. Others would be implemented on a case-by case basis through the Surface Use Plan of an APD or the Plan of Development for a ROW application. Based on environmental assessments (EAs) for individual APDs or ROW applications, BLM may apply site-specific COAs to the APD or ROW grant. BLM would consider annual JIO recommendations to adjust these requirements to meet field development and production objectives throughout the LOP.

Exceptions to the following procedures and BMPs may be granted if a thorough analysis by BLM determines that the resource(s) for which the measure was developed would not be unacceptably impacted by the approved project. Exceptions may also be granted if the Operator can demonstrate to the satisfaction of the authorized officer on a case-by-case basis that the required mitigation or practice would not be technically or economically feasible, or that another method would create less environmental impact.

Land Use/Surface Disturbance

- Operators would track surface disturbance acreage. Operators would provide BLM and the JIO with Federal Geographic Data Committee (FGDC)-compliant metadata and geographic information system (GIS)/global positioning system (GPS) location data for all newly developed facilities and reclaimed areas within 30 days of completion of disturbance and/or reclamation activities.
- Operators would track well numbers in the JIDPA and provide BLM and the JIO with data within 30 days of drilling or abandoning wells.

- Operators would inventory all roads/trails in the JIDPA not already inventoried by BLM within 1 year of the ROD for this project; GIS data would be provided to BLM and the JIO with FGDC-compliant metadata. Operators would initiate coordination with the JIO prior to implementing this action.
- Within 6 months of the ROD for this project, Operators would provide the JIO with estimates of the average number of vehicle trips per day to a representative individual well pad and centralized completion facility (see Appendix B, Subappendix DP-A, *Transportation Plan*).
- To the extent reasonable and practical, well pad surface disturbance would not exceed 7.0 acres for parent and multi-well pads, 4.0 acres for single-well pads, and 2.0 acres for satellite well pads, unless the Operator can demonstrate to the satisfaction of the authorized officer on a case-by-case basis that the size limitation for a given pad would create a significant safety concern for the workers, the public at large, or the environment. These acreages include cut-and-fill slopes, but do not include access roads and pipelines.
- All new development and production facilities in the JIDPA would be placed at centralized locations to accommodate multiple wells, unless proven to the satisfaction of the authorized officer on a case-by-case basis that centralization of development and production facilities would not be technically or economically feasible, or that another method would create less environmental impact. The Operators would centralize existing development and production facilities to the extent economically feasible.
- Centralized fracturing processes would be required for all well pads when surface density is ≥ 1 well pad/40 acres, and recommended when well pad surface density is < 1 pad/40 acres, unless the Operator can demonstrate to the satisfaction of the authorized officer that centralized fracturing is not reasonable or technically or economically feasible, or that another well completion procedure would create less surface impact.
- Where technically and economically feasible, and at the earliest possible date, Operators would begin piping produced water and condensate from all wells in the JIDPA to an appropriate condensate collection point or sales line and an appropriate produced water treatment, disposal, or centralized transportation facility.
- Operators would utilize closed drilling systems (no reserve pits) for all wells unless proven to the satisfaction of the authorized officer on a case-by-case basis that closed drilling systems would not be technologically or economically feasible. If reserve pits are approved, Operators would remove/vacuum fluids from reserve pits within 60 days of all wells on the pad being put into production. If this timeframe is infeasible on a particular site, the Operators would notify the JIO and fluids would be removed as soon as practical.
- No surface occupancy would be allowed within 300 feet of Sand Draw.

Air Quality

- Operators would utilize flareless completions for all wells within the JIDPA unless proven to the satisfaction of the authorized officer on a case-by-case basis that flareless

completion operations would not be technically or economically feasible or would be unsafe, and that flaring completion is permitted by WDEQ.

- Tier II or equivalent diesel engine emission technologies would be required for all drill rigs at the earliest possible date.
- Operators would periodically demonstrate that potential impacts to visibility in the Bridger Wilderness from this project are less than or equal to the potential visibility impact level of concern.

Water Resources/Soils

- Operators would provide copies of their Spill Prevention, Control, and Countermeasure (SPCC) plans and Storm Water Pollution Prevention Plans (SWPPPs) to the BLM upon request.
- Stormwater and snowmelt water would be held on the JIDPA for as long as possible to allow for infiltration and to reduce surface flow velocity and associated sediment loads using geofabrics, jute netting, spreader dikes, retention ponds, additional armoring of existing watercourses, or other appropriate techniques.

Noise

- Operators would monitor the representative noise levels of drilling, cementing, and completion operations 30 feet from the well pad boundary and provide monitoring data to the JIO for the establishment of noise impact charts.
- Operators would monitor noise at noise-sensitive resource locations, as determined by the JIO, and annually report results to the JIO.

Biological Resources

- Operators would inventory greater sage-grouse seasonal habitats within the JIDPA not already inventoried by BLM or WGFD within 1 year after signing of the ROD for this project; GIS data would be provided to the JIO with FGDC-compliant metadata. Operators would initiate coordination with the JIO prior to implementing this action.
- Compressor stations would be sited at least 2 miles away from greater sage-grouse leks and no closer than ½ mile to an active raptor nest.
- Operators would coordinate with the JIO to review and revise the Jonah Wildlife Monitoring and Protection Plan, and include a wildlife/habitat mitigation plan, within 1 year of the ROD for this project.
- Operators would complete surveys of soils and vegetation types throughout the JIDPA in coordination with the JIO, and provide survey results to BLM and the JIO in a digital, 1:24,000-scale format with FGDC-compliant metadata. Operators would initiate coordination with the JIO prior to implementing this action.

- Operators would maximize interim (production phase) well pad reclamation by recontouring to the drilling rig anchor pins and reclaiming/revegetating to within 20 feet of the wellhead, or to within 20 feet of the wellhead, facilities, tanks, and spill containment structures on those pads with production facilities. The initiation of interim reclamation would commence immediately after the last well scheduled on a pad is put into production. In the event that more than 1 year would lapse between the drilling of wells on a pad, the authorized officer may require temporary site stabilization measures.
- Operators would submit interim and long-term reclamation plans for their respective areas of operation to the JIO for approval no later than 1 year from the date of the ROD for this project. Site-specific reclamation plans would be incorporated into all Surface Use Plans for APDs and Plans of Development for ROWs.
- Operators would accelerate reclamation of disturbed areas using innovative seed mixtures and application techniques, supplementing natural precipitation with sprinkler irrigation at key times, and/or other practices as approved by the JIO.
- Operators would undertake aggressive invasive plant species and noxious weed control or removal in disturbed areas, be responsible for weed control on all disturbed areas in the JIDPA, and be responsible for consultation with the authorized officer and/or local authorities for acceptable weed control methods. Where applicable, a “Pesticide Use Proposal” (Form WY-04-9222-1), surfactant material safety data sheet(s), and maps and/or legal descriptions of the area to be treated would be submitted by the Operator to the JIO no later than December 1 for use the following spring/summer.
- Minimum reclamation requirements would be:
 - establishment of viable site-stabilizing plant growth, as determined by the authorized officer, within 1 year of initiation of reclamation; site-stabilizing plant growth would consist of indigenous species.
 - establishment within 5 years of initiation of reclamation of at least 50%, and within 8 years of initiation of reclamation at least 80%, of indigenous vegetative basal cover/density and species composition to maintain soil stability and provide nutritional value, palatability, and vegetative structure (i.e., vegetative habitat function).
- Wildlife habitat evaluations using Habitat Evaluation Procedures (HEP) and Habitat Suitability Indices (HSI) for appropriate species would be developed and used to evaluate impacts to habitat and the effectiveness of reclamation and mitigation.
- Operators would participate in and support published research that evaluates impacts from development and the effectiveness of applied mitigations.

Livestock/Grazing Management

- In coordination with the JIO, Operators would monitor forage utilization on reclaimed areas throughout project development and into the full production phase.

Visual Resources

- New production facilities would be painted a non-contrasting color which is harmonious with the surrounding landscape (i.e., shale green, unless otherwise specified by BLM on a case-by-case basis); existing production facilities would be painted that color at the earliest opportunity, and no later than when facilities are due for routine repainting. Operators would develop a visual resource monitoring plan to ensure long-term compliance with stated visual resource management (VRM) objectives.

2.4.5.3 Site-Specific Conditions of Approval, Mitigation Monitoring, Surveying, and Best Management Practices

Based on the appropriate environmental review or assessment for individual APDs and ROW applications, the BLM may require the following COAs, mitigations, and BMPs. BLM would consider annual JIO recommendations to adjust these requirements to meet field development and production objectives throughout the LOP.

- Implement additional air quality protection measures such as reduced development rates, reduced flaring, use of selective or non-selective catalytic reduction on internal combustion engines, increased diameter pipelines, and/or increased water or magnesium chloride applications or other treatments (gravel, paving) on all surface disturbances, including resource roads and well pads.
- Convert resource roads to two-track roads during interim reclamation where environmentally sound, practical, safe, and where capable of providing the level of access necessary to maintain and produce the well.
- Contour spoil piles to approximate the surrounding topography and apply soil stabilization practices to spoil piles.
- Avoid prairie dog towns where practical to maintain burrowing owl habitat.
- Institute nighttime lighting/glare restrictions (e.g., install light shades/hoods, directional lighting, colored lights, wattage limits, motion detectors; extinguish all unnecessary lighting during non-working hours).
- Monitor effectiveness of night lighting mitigation measures in coordination with the JIO.

2.5 SUMMARY OF ENVIRONMENTAL IMPACTS

Table 2.6 provides a brief comparison of potential impacts to key project issues (see Section 2.1) across alternatives. Additional detail is provided in the summary of impacts table in Appendix G, and in the detailed impact assessments provided in Chapter 4.

Table 2.6. Brief Comparison of Impacts to Key Issues Across Alternatives, Jonah Infill Drilling Project, Sublette County, Wyoming, 2006¹

Key Issue	No Action	Proposed Action	A	B	Preferred ²
Disturbance Volume					
Total Acres Surface Disturbance	4,209	20,409	20,409	7,431	14,030–20,334
Total Acres New Disturbance	0	16,200	16,200	3,297	9,821–16,125
LOP Acres Surface Disturbance	1,409	6,040	6,040	2,602	4,267–6,020
Project Duration/Pace/Economics					
LOP (years)	63	76	76	105	76
Wells Developed Per Year	0	250	250	75	250
New Worker Years (development and production)	0	16,863	16,863	16,863	16,863
Total Taxes and Royalties (millions)	2,335	6,077	6,239	4,881	6,077
Sublette County Share (millions)	742	1,839	1,892	1,446	1,824
Air Quality/Visibility per year					
Additional Days of Impairment per year at Bridger Wilderness	0	10	10	4	3
Additional Days of Impairment per year at Pinedale	0	3	3	1	1
Habitat Loss All Species					
<i>Direct habitat loss for greater sage-grouse, pronghorn antelope, and other wildlife would be related to surface disturbance and project duration as listed above. Most wildlife species would likely avoid development areas under all alternatives.</i>					
<i>Indirect habitat loss for greater sage-grouse, pronghorn antelope, and other wildlife would be related to total surface disturbance (and its location), volume of human presence (worker-years), and project duration as listed above.</i>					
Total Well Pads	497	3,597	3,597	497	3,597
New Roads (miles)	237	710	710	245	488–710
Average Daily Traffic Volume ³ (round trips to and from the JIDPA per day)	45–88	312–610	312–610	312–610	312–610
Mineral Resource Recovery					
Natural Gas (billion cubic feet)	3,366	7,947	8,191	6,124	4,824 ⁴ –7,947
Condensate (million barrels)	32	76	78	58	46–76
BLM Inspection and Enforcement					
BLM inspection and enforcement capability would be dependent upon management requirements and annual budgets and priorities.					
Compensatory Mitigation					
Hypothetical Value (million \$)	0	28.5	28.5	0	5.5–28.5

¹ Further summary detail is provided in Appendix G, Summary of Impacts; detailed discussion of impacts to all resources is provided in Chapter 4.

² Application of alternative-specific COAs, BMPs, and other mitigation and monitoring may reduce impact levels from those shown in this table.

³ Traffic volumes would be highest during development.

⁴ Assumes no successful reclamation to BLM standards is achieved, and therefore no additional surface disturbance credit is granted.