CHAPTER 2 — PUBLIC PARTICIPATION, ISSUES AND CONCERNS, AND ALTERNATIVES

2.1 PUBLIC PARTICIPATION

NEPA regulations (40 C.F.R. 1500) require the BLM to use an early scoping process to identify significant issues in preparation for impact analysis. The principle 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 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, 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. On November 20, 2003, EnCana 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. Additional opportunities for agency and public participation are planned during EIS review periods.

Numerous issues and concerns were identified and comments were submitted between March 2003 and August 2004. Consultation and coordination with other government agencies included: WGFD, USFWS, U.S. Department of Agriculture Forest Service (USFS), Environmental Protection Agency (EPA) and the BLM Interdisciplinary Team (IDT). The issues and concerns identified to date are summarized in Appendix C.

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 the key issues. These alternatives provide a range of potential effects to key issues because of varying levels of surface disturbance and/or by inclusion or exclusion of various development guidelines/management protocol.

The extent and distribution of surface disturbance affects all the key resources but most notably those associated with wildlife, wildlife habitat, and livestock forage. 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 provides 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 B), including Operator-committed monitoring, reporting and off-site compensatory mitigation (CM), provides a range of potential impacts to most key resources/resource issues including air quality, greater sage-grouse, pronghorn antelope, and other wildlife, livestock forage, and BLM inspection and enforcement capability.

2.1.1 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 impacts on regional visibility, particularly at area residences and in Class I airsheds and other air quality impacts including those associated with emission volumes, 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 wilderness areas (Class I airsheds). 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 antelope herd. Continued development within the JIDPA and at other locations within the Sublette herd unit area were identified as potentially cumulatively affecting pronghorn antelope 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 in the area 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 C.

2.2 DEVELOPMENT OF ALTERNATIVES

The BLM IDT used the nine key issues (see Section 2.1) to build the project alternatives. The Proposed Action and other action alternatives meet the purpose and need for the project, are technically and economically reasonable and provide a reasonable range of management and mitigation opportunities. Operators committed to various mitigations depending on the alternative (see Appendix B, Exhibit B-1); the IDT developed additional mitigation measures that would avoid, minimize, rectify, reduce, eliminate, or compensate for adverse impacts (see Sections 2.14 and 5.2). Some of these mitigation measures are common to all action alternatives including the Proposed Action, whereas others are applied only to one or a few action alternatives. Some Operator-committed practices are outside the jurisdiction of the BLM (see Appendix B).

The variable well numbers and development paces analyzed result from unknowns in the natural gas market and in potential future development technologies. Experience in Wyoming reveals that well number and development pace predictions are often incorrect; therefore, ranges in these development parameters are appropriate. Furthermore, as new technologies become available and resource demand changes, development protocol also will likely change. For example, in the past well development operations for wells similar to those in the JIDPA could take months to drill, require pads of >5.0 acres, lacked adequate surface casing to protect freshwater aquifers, and did not consider such practices as flareless completions or directional drilling. All alternatives analyzed in this EIS consider these new technological advances, and allow for the inclusion of new technologies as they become available.

Alternatives considered to be technically or economically unfeasible, and/or unrealistic, were eliminated from detailed impact analysis. The rationale for eliminating these alternatives is provided in Section 2.15.

2.3 FEATURES COMMON TO ALL ALTERNATIVES

Development requirements and procedures common to all alternatives are provided in Appendix G, and in general these procedures would be applied under all alternatives.

All applicable federal, state, and local laws, rules, and regulations would be applied under any approved alternative, and all requirements listed in Appendix A would be implemented under all alternatives except Alternative A. For the purpose of analyses designed to minimize directional drilling under Alternative A, requirements for avoiding selected resources such as steep slopes, greater sage-grouse leks, and raptor nests, were not applied.

Appendix B provides a list of Operator-committed measures, and Exhibit B-1 lists which of these measures the operators committed to by alternative, except the BLM Preferred Alternative. All Operator-committed practices that can be required by the BLM would be applied under the Preferred Alternative.

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).

Operators would comply with all appropriate federal, state, and local laws and regulations, and all appropriate permits from the appropriate regulatory agency would be obtained before proceeding.

Operators would continue to encourage limiting the speed of all vehicles operated by the leaseholder, Operator, or Operator agents in the JIDPA.

Operators would install remote telemetry or equivalent technology at all wells to minimize well monitoring trips.

A ground water monitoring program for all water wells in or affected by activities in the JIDPA would be implemented, with annual reports to BLM, Jonah Infill Working Group (JIWG), WSEO, and WDEQ. Water wells would be tested annually for drawdown, general chemical constituents, and total petroleum hydrocarbons, using WDEQ-approved methods.

Operators would submit to BLM for approval a reclamation plan (interim and long-term) for the JIDPA within one year of the ROD for this project. 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 monitor raptor, including ferruginous hawk and burrowing owl, nesting activity, greater sage-grouse lek attendance, and occurrence of other sagebrush-obligate species in the JIDPA.

Traffic would be confined to the running surface of roads and well pads as approved in APDs and ROWs. Operators would continue to cooperate with the BLM to identify and prohibit use of two-tracks where ROWs have not been obtained.

2.4 ALTERNATIVES ANALYZED IN DETAIL

The No Action, the Proposed Action, and eight alternative development actions are evaluated in this EIS. A brief comparison of alternatives is provided in Table 2.1.

The types and locations of existing surface disturbance in the JIDPA are presented in Map 2.1. The LOP for all alternatives is shown in Table 2.2.

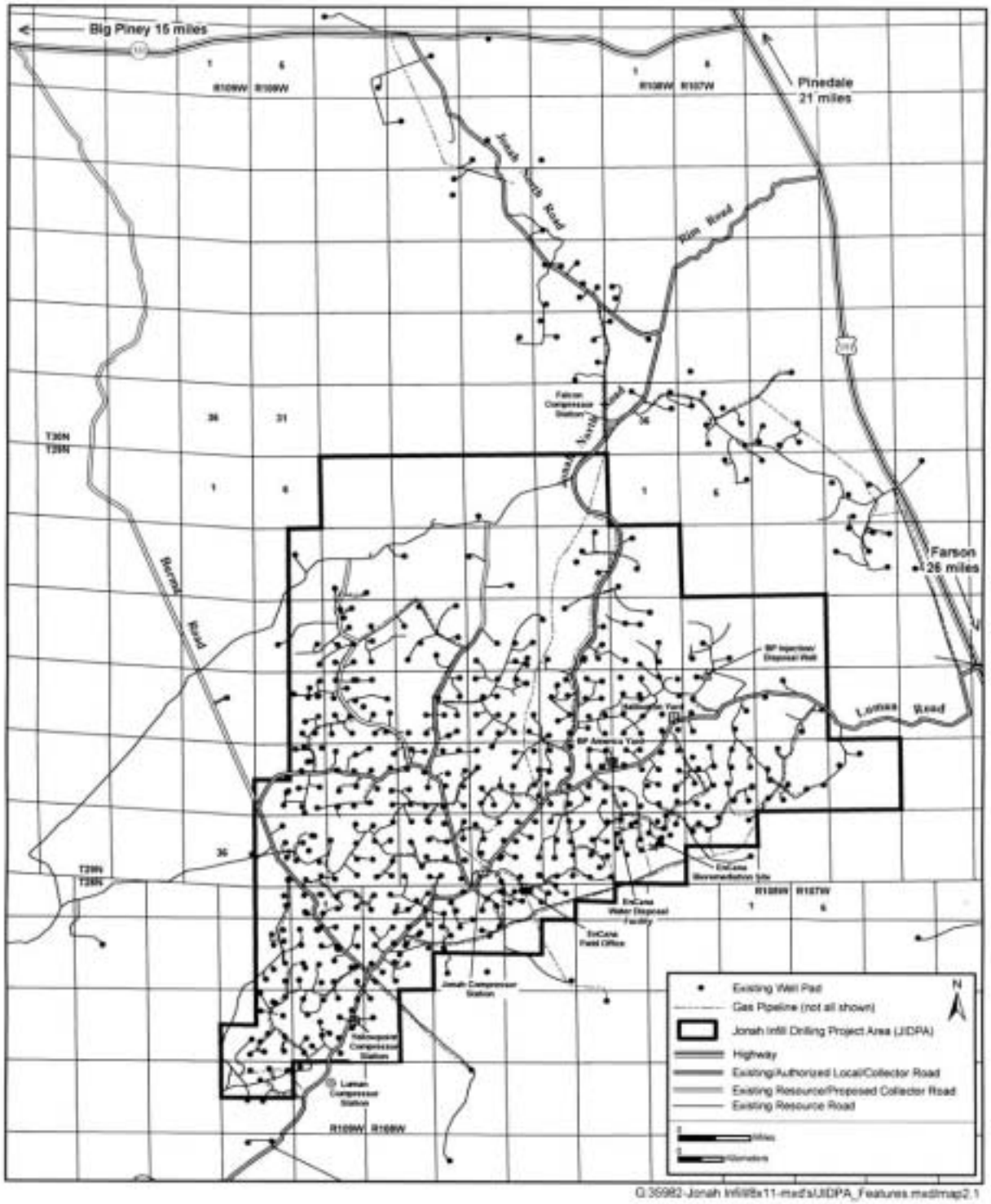
2.5 NO ACTION ALTERNATIVE – REJECT OPERATORS' PROPOSAL

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 committed to development (533 wells) and surface

Table 2.1 Comparison of Alternatives, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Alternative									
	No Action[1]	Proposed Action[2]	A[2]	B[3]	C[4]	D[5]	E[6]	F[7]	G[8]	BLM Preferred Alternative[9]
Development Features										
Total Acres Surface Disturbance	4,209	20,409	20,409	7,506	10,914	15,790	10,595	14,655	18,198	12,525
LOP Acres Surface Disturbance	1,409	6,040	6,040	2,622	3,399	4,755	3,597	3,997	5,408	3,847
Total Miles of Resource Roads/Gathering Pipelines	199	664	664	199	387	529	239	353	582	473
Total Miles of Collector/Local Roads	38	46	46	46	46	46	46	46	46	46
Total Number of Natural Gas Well Pads[10]	497	3,597	3,597	497	1,747	2,697	763	1,705	3,050	3,597
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.										
Pace of Development										
Wells Developed per year	0	250	75-250	75-250	75-250	75-250	75-250	75-250	75-250	250
Life-of-Project (years)	63	76	76-105	76-105	68-80	72-73	76-105	76-105	76-105	76
Pace of development directly or indirectly affects duration of habitat and forage loss, visibility, socioeconomics, gas recovery, and BLM enforcement and monitoring capability.										

1 See Table 2.3 for further detail.
2 See Table 2.4 for further detail.
3 See Table 2.5 for further detail.
4 See Table 2.6 for further detail.
5 See Table 2.7 for further detail.
6 See Table 2.8 for further detail.
7 See Table 2.9 for further detail.
8 See Table 2.10 for further detail.
9 See Table 2.11 for further detail.
10 Although pad numbers may not vary under some alternatives, the types and spatial distribution of pads would vary across all alternatives.



Map 2.1 Jonah Infill Drilling Project Area, Sublette County, Wyoming, 2005.

Table 2.2 Estimated Life-of-Project (LOP) (in Years), Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Phase	No New Wells	1,250 Wells	2,200 Wells	3,100 Wells
Development				
75 wells drilled/year	0	17	30	42
150 wells drilled/year	0	9	15	21
250 wells drilled/year	0	5	9	13
Total Development	0	5-17	9-30	13-42
Production	40	40	40	40
Reclamation	23	23	23	23
Life-of-Project (LOP)	63 [1]	68-80	72-93	76 [2]-105

[1] No Action LOP.
[2] Proposed Action and Preferred Alternative LOP.

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 initial and 1,409 acres LOP (see Table 2.3).

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). Site-specific NEPA analyses would be conducted for each additional natural gas development activity authorized in the project area. Because the location and/or extent of individual well development under this scenario cannot be predicted, the impact analysis for the No Action Alternative assumes no new development.

2.6 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. Operators have committed to various mitigation measures depending upon alternative (see Appendix B), and propose to establish a Cumulative Impacts Mitigation Fund to mitigate potential adverse impacts in the JIDPA. While details are emerging, one form of financing the fund could be to deposit a particular dollar amount for every acre of new initial surface disturbance in the JIDPA above a certain acreage threshold. For example, Operators have suggested a hypothetical amount of $850.00 for every acre of new initial surface disturbance authorized in the JIDPA, above a threshold of 11,000 acres. The Fund could be managed by an independent Advisory Board.

On January 13, 2005, BLM received a letter from EnCana modifying their Proposed Action relative to compensatory mitigation. In part, the letter states "…EnCana is committed to

Table 2.3 Surface Disturbance Required for the No Action Alternative, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.[1]

	Disturbance (acres)	
Project Parameter[2]	Short-term	LOP
Well Pads[3]	1,889	447
Resource Roads/Gathering Pipelines[4]	1,766	699
Collector/Local Roads[5]	239	119
Burma Road[6]	35	35
Ancillary Facilities[7]	87	80
Water Wells[8]	0	11
Sales Pipeline[9]	133	0
Exploration Activities[10]	60	18
Total[11]	4,209	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 of initial and 0.9 acre of LOP disturbance per pad.

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

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

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

7 Includes disturbances from four compressor stations, water disposal facilities, field offices, ware yards, a sand pit, and other facilities required for the existing projects 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-ft disturbance width for sales pipelines outside the JIDPA; no new sales pipelines are proposed to carry gas from the JIDPA under this alternative.

10 All exploration activities are included in the disturbance area estimates listed above. Disturbance estimate includes areas occupied by existing natural gas developments (pads [five], roads, pipelines) in the $N^1/_2$ Section 23, T28N, R109W.

11 Includes disturbance on 4,001 acres (short-term) and 1,348 acres (LOP) in the JIDPA; the additional 208 acres (short-term) and 61 acres (LOP) disturbance listed occur at location outside the JIDPA (e.g., Burma Road, compressor stations).

achieving a net positive impact on the environment and resources affected by development in the Jonah Field. EnCana is willing to consider other approaches to mitigation including the funding of any compensatory mitigation measures identified by the Bureau of Land Management in the Draft Environmental Impact Statement for the Jonah Infill Drilling Project ("Jonah Infill DEIS"). EnCana intends to discuss its willingness to fund specific compensatory mitigation proposals or projects, in relation to the various alternatives presented in the Jonah Infill DEIS, in its formal comments on the Jonah Infill DEIS."

Drilling would begin in 2005 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 2.2).

If selected, the Proposed Action would approve:

- up to 3,100 new wells on up to 11,780 acres new initial surface disturbance and 2,790 acres LOP surface disturbance (assumes all 3,100 wells would be drilled from single-well pads with an estimated surface disturbance of 3.8 acres initial and 0.9 acre LOP per single well pad);

- 465 miles of new resource roads with gathering pipelines--4,131 acres of new initial and 1,635 acres of LOP disturbance;

- 8 miles of new collector/local roads--73 acres of new initial and 37 acres of LOP disturbance;

- an upgrade of approximately 12 miles of the Burma Road--75 acres of new and 20 acres LOP disturbance;

- ancillary facilities--41 acres of new initial and LOP disturbance (water disposal, storage, and compressor station facilities); and

- exploration activities--100 acres of new initial and LOP disturbance 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 (post-drilling during production phase) reclamation, LOP surface disturbance under the Proposed Action would be 6,040 acres, which includes 1,409 acres of existing disturbance (Table 2.4). Interim reclamation success is estimated to require 5 to 10 years at any site because it generally takes that long to restore sagebrush. Restoration of habitat function could take twice that long.

Operators have identified a number of mitigation/development practices that they would apply during development of the Proposed Action (see Appendix B), including CM.

2.7 ALTERNATIVE A – MINIMIZE DIRECTIONAL DRILLING

Alternative A is similar to the Proposed Action in its estimated surface disturbance requirements (see Section 2.6 and Table 2.4), but differs from the Proposed Action in that known areas with sensitive resources in the JIDPA would not be avoided (e.g., Sand Draw, raptor nest and sage grouse lek buffers). Development of natural gas resources beneath these areas would therefore not require the use of directional drilling. Three rates of development (75, 150, and 250 wells per year) are considered under Alternative A. This alternative would not necessarily provide for required balance between gas recovery and other resource protection.

Under this alternative, well pads, access roads, and other above-ground facilities could be located within 825 ft of active raptor nests.

Under this alternative, surface disturbance and occupancy would not be prohibited within 0.25 mile of the perimeter of greater sage-grouse leks.

Under this alternative, prairie dog towns would not be avoided.

Under this alternative, the Sand Draw NSO and other drainage and steep slope avoidance areas would not be maintained.

Under this alternative, well pads, pipelines, and associated roads would not be located and designed to avoid disturbance to known raptor nest sites.

Operators have identified a number of mitigation/development practices that they would apply during development of Alternative A (see Appendix B), including CM.

2.8 ALTERNATIVE B – MINIMIZE SURFACE DISTURBANCE

Surface disturbance would be reduced by requiring that 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. If selected, Alternative B would approve:

- expansion of existing well pads--3,081 acres of initial and 1,044 acres of LOP disturbance (6.2 acres new initial and 3.0 acres of LOP disturbance per well pad expansion);
- an upgrade of approximately 12 miles of the Burma Road--75 acres of new initial and 20 acres of LOP disturbance;
- ancillary facilities--41 acres of new initial and of LOP disturbance (water disposal, storage, and compressor station facilities); and
- exploration activities--100 acres of new initial and of LOP disturbance to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.5).

Table 2.4 Surface Disturbance Required for the Proposed Action and Alternative A, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres)	
	New	LOP
Well Pads [1]	11,780	2,790
Resource Roads/ Gathering Pipelines [2]	4,131	1,635
Collector/Local Roads [3]	73	37
Burma Road [4]	75	20
Ancillary Facilities [5]	41	41
Water Wells [6]	0	8
Sales Pipeline [7]	0	0
Exploration Activities [8]	100	100
Subtotal	16,200	4,631
Existing Disturbance [9]	4,209	1,409
Total [10]	20,409	6,040

[1] Conservatively assumes all well pads are single-well pads and require 3.8 acres of initial disturbance and 0.9 acre of LOP disturbance per pad.

[2] Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad with average initial and LOP disturbance widths of 73.3 ft and 29.0 ft, 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 initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

[4] Assumes an approximate 12-mile road length outside the JIDPA with initial and LOP disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft 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 of LOP disturbance per water well.

[7] No new sales pipelines are proposed.

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

[9] See Table 2.3.

[10] Estimates include 20,126 acres and 5,959 acres of initial and LOP disturbance in the JIDPA, respectively; the additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

Table 2.5 Surface Disturbance Required for Alternative B, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres)	
	New	LOP
Well Pads [1]	3,081	1,044
Resource Roads/ Gathering Pipelines [2]	0	0
Collector/Local Roads [3]	0	0
Burma Road [4]	75	20
Ancillary Facilities [5]	41	41
Water Wells [6]	0	8
Sales Pipeline [7]	0	0
Exploration Activities [8]	100	100
Subtotal	3,297	1,213
Existing Disturbance [9]	4,209	1,409
Total [10]	7,506	2,622

[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] Assumes an approximate 12-mile road length outside the JIDPA, with initial and LOP surface disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft 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 of LOP disturbance per water well.

[7] No new sales pipelines would be constructed.

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

[9] See Table 2.3.

[10] Includes approximately 7,223 acres and 2,541 acres new and LOP disturbance in the JIDPA, respectively; the additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

Following successful interim reclamation, LOP surface disturbance under Alternative B would total 2,622 acres, which includes 1,409 acres of existing disturbance (Table 2.5).

Appendix B, Exhibit B-1 lists the Operator-committed practices that would be applied under Alternative B, and additional BLM protection requirements are provided in Appendix A. Three rates of development (75, 150, and 250 wells/year) are considered under Alternative B.

2.9 ALTERNATIVE C – 1,250 NEW WELLS

Alternative C limits drilling and development to an assumed 1,250 new wells on up to 1,250 new single-well pads with associated roads, pipelines, and ancillary facilities. If selected, Alternative C would approve:

- 1,250 new well pads--4,750 acres of new initial surface disturbance and 1,125 acres of LOP surface disturbance;
- 188 miles of new road construction with gathering pipelines--1,666 acres of new initial and 659 acres of LOP surface disturbance;
- 8 miles of new collector/local roads--73 acres of new initial and 37 acres of LOP surface disturbance;
- an upgrade of approximately 12 miles of the Burma Road--75 acres of new initial and 20 acres of LOP surface disturbance;
- ancillary facilities--41 acres of new initial and of LOP surface (water disposal, storage, and compressor station facilities) disturbance; and
- exploration activities--100 acres of new initial and LOP surface disturbance to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.6).

Following successful interim reclamation, LOP surface disturbance under Alternative C would total 3,399 acres, which includes 1,409 acres of existing disturbance (Table 2.6).

Appendix B, Exhibit B-1 lists the Operator-committed practices that would be applied under Alternative C, and additional BLM protection requirements are provided in Appendix A. Three rates of development (75, 150, and 250 wells/year) are considered under Alternative C.

2.10 ALTERNATIVE D – 2,200 NEW WELLS

Alternative D limits drilling and development up to an assumed 2,200 new wells on up to 2,200 new single-well pads with associated roads, pipelines, and ancillary facilities. If selected, Alternative D would approve:

- 2,200 new well pads--8,360 acres of new initial surface disturbance and 1,980 acres of LOP surface disturbance;
- 330 miles of new road construction with gathering pipelines--2,932 acres of new initial and 1,160 acres of LOP surface disturbance;

Table 2.6 Surface Disturbance Required for Alternative C, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres)	
	New	LOP
Well Pads [1]	4,750	1,125
Resource Roads/ Gathering Pipelines [2]	1,666	659
Collector/Local Roads [3]	73	37
Burma Road [4]	75	20
Ancillary Facilities [5]	41	41
Water Wells [6]	0	8
Sales Pipeline [7]	0	0
Exploration Activities [8]	100	100
Subtotal	6,705	1,990
Existing Disturbance [9]	4,209	1,409
Total [10]	10,914	3,399

[1] Assumes all wells are developed from single-well pads with 3.8 acres of initial disturbance and 0.9 acre of LOP disturbance per pad.

[2] Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad, with average initial and LOP disturbance widths of 73.3 ft and 29.0 ft, respectively (approximately 188 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 initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

[4] Assumes an approximate 12-mile road length outside the JIDPA boundary with initial and LOP disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft 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 of LOP disturbance per water well.

[7] No new sales pipelines would be constructed.

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

[9] See Table 2.3.

[10] Includes approximately 10,631 acres and 3,318 acres new initial and LOP disturbance in the JIDPA, respectively. The additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

- 8 miles of new collector/local roads--73 acres of new initial and 37 acres of LOP surface disturbance;
- an upgrade of approximately 12 miles of the Burma Road--75 acres of new initial and 20 acres of LOP surface disturbance;
- ancillary facilities--41 acres of new initial and of LOP surface disturbance (water disposal, storage and compressor station facilities); and
- exploration activities--100 acres of new initial and of LOP surface disturbance to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.7).

Following successful interim reclamation, LOP surface disturbance under Alternative D would total 4,755 acres, which includes 1,409 acres of existing disturbance (Table 2.7).

Appendix B, Exhibit B-1 lists the Operator-committed practices that would be applied under Alternative D, and additional BLM protection requirements are provided in Appendix A. Three rates of development (75, 150, and 250 wells/year) are considered under Alternative D.

2.11 ALTERNATIVE E – 16 WELL PADS/SECTION

Under Alternative E no more than 16 well pads per 640-acre section (1 well pad/40 acres) would be developed, but there would be no restriction on the number of new wells (assumes 3,100 new wells). All new wells would be drilled from the 497 existing and 266 new well pads. Necessary roads, pipelines, and ancillary facilities would also be developed. If selected, Alternative E would approve:

- 266 new well pads--5,742 acres of new initial surface disturbance and 1,842 acres of LOP surface disturbance;
- 40 miles of new road construction with gathering pipelines--355 acres of new initial and 140 acres of LOP disturbance;
- 8 miles of new collector/local roads--73 acres of new initial and 37 acres of LOP surface disturbance;
- an upgrade of approximately 12 miles of the Burma Road--75 acres of new initial and 20 acres of LOP surface disturbance;
- ancillary facilities--41 acres of new initial and of LOP surface disturbance (water disposal, storage and compressor station facilities); and
- exploration activities--100 acres of new initial and of LOP surface disturbance to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.8).

Following successful interim reclamation, LOP surface disturbance under Alternative E would total 3,597 acres, which includes 1,409 acres of existing disturbance (Table 2.8).

Table 2.7 Surface Disturbance Required for Alternative D, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres)	
	New	LOP
Well Pads [1]	8,360	1,980
Resource Roads/ Gathering Pipelines [2]	2,932	1,160
Collector/Local Roads [3]	73	37
Burma Road [4]	75	20
Ancillary Facilities [5]	41	41
Water Wells [6]	0	8
Sales Pipeline [7]	0	0
Exploration Activities [8]	100	100
Subtotal	11,581	3,346
Existing Disturbance [9]	4,209	1,409
Total [10]	15,790	4,755

[1] Assumes all wells are developed from single-well pads with 3.8 acres of initial disturbance and 0.9 acre of LOP disturbance per pad.

[2] Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad with average initial and LOP disturbance widths of 73.3 ft and 29.0 ft, respectively (approximately 330 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 initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

[4] Assumes an approximate 12-mile road length outside the JIDPA boundary with initial and LOP disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft 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 of LOP disturbance per water well.

[7] No new sales pipelines would be constructed.

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

[9] See Table 2.3.

[10] Includes approximately 15,507 acres and 4,674 acres new initial and LOP disturbance in the JIDPA, respectively. The additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

Table 2.8 Surface Disturbance Required for Alternative E, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres) [1]	
	New	LOP
Well Pads [2]	5,742	1,842
Resource Roads/Gathering Pipelines [3]	355	140
Collector/Local Roads [4]	73	37
Burma Road [5]	75	20
Ancillary Facilities [6]	41	41
Water Wells [7]	0	8
Sales Pipeline [8]	0	0
Exploration Activities [9]	100	100
Subtotal	6,386	2,188
Existing Disturbance [10]	4,209	1,409
Total [11]	10,595	3,597

[1] Assumes 16 well pads per 640-acre section throughout the entire 30,500-acre JIDPA. Disturbance from the currently approved 497 well pads is included in the "Existing Disturbance" of this table.

[2] Assumes all new pads would have multiple wells requiring an average of 10 acres of new disturbance and 3.0 acres of LOP disturbance per pad and that all existing pads (497) would require expansion from 3.8 acres to an average of 10.0 acres of initial disturbance (6.2 acres new disturbance per pad) and from 0.9 acre to 3.0 acres of LOP disturbance (2.1 acres new disturbance per pad).

[3] Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad, with average initial and LOP disturbance widths of 73.3 ft and 29.0 ft, respectively (approximately 40 linear miles of road). While new gathering pipelines may be constructed from existing pads, they would be built within existing pipeline corridor disturbance areas.

[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). Collector/local road average initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

[5] Assumes an approximate 12-miles road length outside the JIDPA boundary, with initial and LOP disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft existing).

[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 of LOP disturbance per water well.

[8] No new sales pipelines would be constructed.

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

[10] See Table 2.3.

[11] Estimates include 10,312 acres and 3,516 acres of new initial and LOP disturbance in the JIDPA, respectively. The additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

Appendix B, Exhibit B-1 lists the Operator-committed practices that would be applied under Alternative E, and additional BLM protection requirements are provided in Appendix A. Three rates of development (75, 150, and 250 wells/year) are considered under Alternative E.

2.12 ALTERNATIVE F – 32 WELL PADS/SECTION

Under Alternative F no more than 32 pads per 640-acre section (1 well pad/20 acres) would be developed but there would be no restriction on the number of new wells (assumes 3,100 new wells). All wells would be drilled from the 497 existing and 1,028 new pads. Necessary roads, pipelines, and ancillary facilities would also be developed. If selected, Alternative F would approve:

- 1,028 new well pads--8,787 acres of new initial surface disturbance and 1,840 acres of LOP surface disturbance;
- 154 miles of new road construction with gathering pipelines--1,370 acres of new initial and 1,370 acres of LOP disturbance;
- 8 miles of new collector/local roads--73 acres of new initial and 37 acres of LOP surface disturbance;
- an upgrade of approximately 12 miles of the Burma Road--75 acres of new initial and 20 acres of LOP surface disturbance;
- ancillary facilities--41 acres of new initial and of LOP surface disturbance (water disposal, storage, and compressor station facilities); and
- exploration activities--100 acres of new initial and of LOP surface disturbance to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.9).

Following successful interim reclamation, LOP surface disturbance under Alternative F would total 3,997 acres, which includes 1,409 acres of existing disturbance (Table 2.9).

Appendix B, Exhibit B-1 lists the Operator-committed practices that would be applied under Alternative F, and additional BLM protection requirements are provided in Appendix A. Three rates of development (75, 150, and 250 wells/year) are considered under Alternative F.

2.13 ALTERNATIVE G – 64 WELL PADS/SECTION

Under Alternative G no more than 64 pads per 640-acre section (1 well pad/10 acres) would be developed, but there would be no restriction on the number of new wells (assumes 3,100 new wells). All wells would be drilled from the 497 existing and 2,553 new pads. Necessary roads, pipelines, and ancillary facilities would also be developed. If selected, Alternative G would approve:

- 2,553 new well pads--10,298 acres of new initial disturbance and 2,247 acres of LOP surface disturbance;

Table 2.9 Surface Disturbance Required for Alternative F, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres) [1]	
	New	LOP
Well Pads [2]	8,787	1,840
Resource Roads/Gathering Pipelines [3]	1,370	542
Collector/Local Roads [4]	73	37
Burma Road [5]	75	20
Ancillary Facilities [6]	41	41
Water Wells [7]	0	8
Sales Pipeline [8]	0	0
Exploration Activities [9]	100	100
Subtotal	10,446	2,588
Existing Disturbance [10]	4,209	1,409
Total [11]	14,655	3,997

[1] Assumes 32 well pads per 640-acre section throughout the entire 30,500-acre JIDPA. Disturbance from the currently approved 497 well pads is included in the "Existing Disturbance" row of this table.

[2] Assumes all new pads would have multiple wells requiring an average of 7.0 acres new initial disturbance and 1.5 acres of LOP disturbance per pad and that all existing pads would require expansion from 3.8 acres to an average of 7.0 acres of initial disturbance (3.2 acres new disturbance per pad) and from 0.9 acre to 1.5 acres LOP disturbance (0.6 acre new disturbance per pad).

[3] Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad with average initial and LOP disturbance widths of 73.3 ft and 29.0 ft, respectively (154 linear miles of road). While new gathering pipelines may be constructed from existing pads, they would be built within existing pipeline corridor disturbance areas.

[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). Collector/local roads average initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

[5] Assumes an approximate 12-miles road length outside the JIDPA boundary with initial and LOP disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft existing).

[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 of LOP disturbance per water well.

[8] No new sales pipelines would be constructed.

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

[10] See Table 2.3.

[11] Estimates include 14,372 acres and 3,916 acres of new initial and LOP disturbance in the JIDPA, respectively. The additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

Table 2.10 Surface Disturbance Required for Alternative G, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

	Disturbance (acres) [1]	
Project Parameter	New	LOP
Well Pads [2]	10,298	2,447
Resource Roads/Gathering Pipelines [3]	3,402	1,346
Collector/Local Roads [4]	73	37
Burma Road [5]	75	20
Ancillary Facilities [6]	41	41
Water Wells [7]	0	8
Sales Pipeline [8]	0	0
Exploration Activities [9]	100	100
Subtotal	13,989	3,999
Existing Disturbance [10]	4,209	1,409
Total [11]	18,198	5,408

[1] Assumes 64 well pads per 640-acre section throughout the entire 30,500-acre JIDPA. Disturbance from the currently approved 497 well pads is included in the "Existing Disturbance" row of this table.

[2] Assumes all new pads would have a single well requiring an average of 3.8 acres of new disturbance and 0.9 acre of LOP disturbance per pad and that all existing pads (497) would require expansion from 3.8 acres to an average of 5.0 acres initial disturbance (1.2 acres new disturbance per pad) and from 0.9 acre to 1.2 acres LOP disturbance (0.3 acre new disturbance per pad).

[3] Assumes an average well pad access road/gathering pipeline length of 0.15 mile for each pad with average initial and LOP disturbance widths of 73.3 ft and 29.0 ft, respectively (383 linear miles of road). While new gathering pipelines may be constructed from existing pads, they would be built within existing pipeline corridor disturbance areas.

[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). Collector/local road average initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

[5] Assumes an approximate 12-miles road length outside the JIDPA boundary with initial and LOP disturbance widths of 51.7 ft (75.7 ft required less 24.0 ft existing) and 13.8 ft (37.8 ft required less 24.0 ft existing).

[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 of LOP disturbance per water well.

[8] No new sales pipelines would be constructed.

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

[10] See Table 2.3.

[11] Estimates include 17,915 acres and 5,327 acres of new initial and LOP disturbance in the JIDPA, respectively. The additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

- 383 miles of new road construction with gathering pipelines--3,402 acres of new initial and 1,346 acres of LOP disturbance;

- 8 miles of new collector/local roads--73 acres of new initial and 37 acres of LOP surface disturbance;

- an upgrade of approximately 12 miles of the Burma Road--75 acres of new initial and 20 acres of LOP surface disturbance;

- ancillary facilities--41 acres of new initial and of LOP surface disturbance (water disposal, storage and compressor station facilities); and

- exploration activities--100 acres of new initial and of LOP surface disturbance to develop well pads and other infrastructures necessary to explore for natural gas resources in formations other than the Lance Pool (Table 2.10).

Following successful interim reclamation, LOP surface disturbance under Alternative G would total 5,408 acres, which includes 1,409 acres of existing disturbance (Table 2.10).

Appendix B, Exhibit B-1 lists the Operator-committed practices that would be applied under Alternative G, and additional BLM protection requirements are provided in Appendix A. Three rates of development (75, 150, and 250 wells/year) are considered under Alternative G.

2.14 BLM PREFERRED ALTERNATIVE

The BLM Preferred Alternative optimizes natural gas recovery while minimizing impacts related to the key issues (see Section 2.1) with outcome-based performance objectives, mitigation and Best Management Practices (BMPs). If selected, the Preferred Alternative would approve:

- Up to approximately 34% (214 acres) new surface disturbance per 640-acre section within a 14,390-acre area (Map 2.2), based on 16 parent well pads and 48 satellite well pads per section (as many as 128 well bores per section)

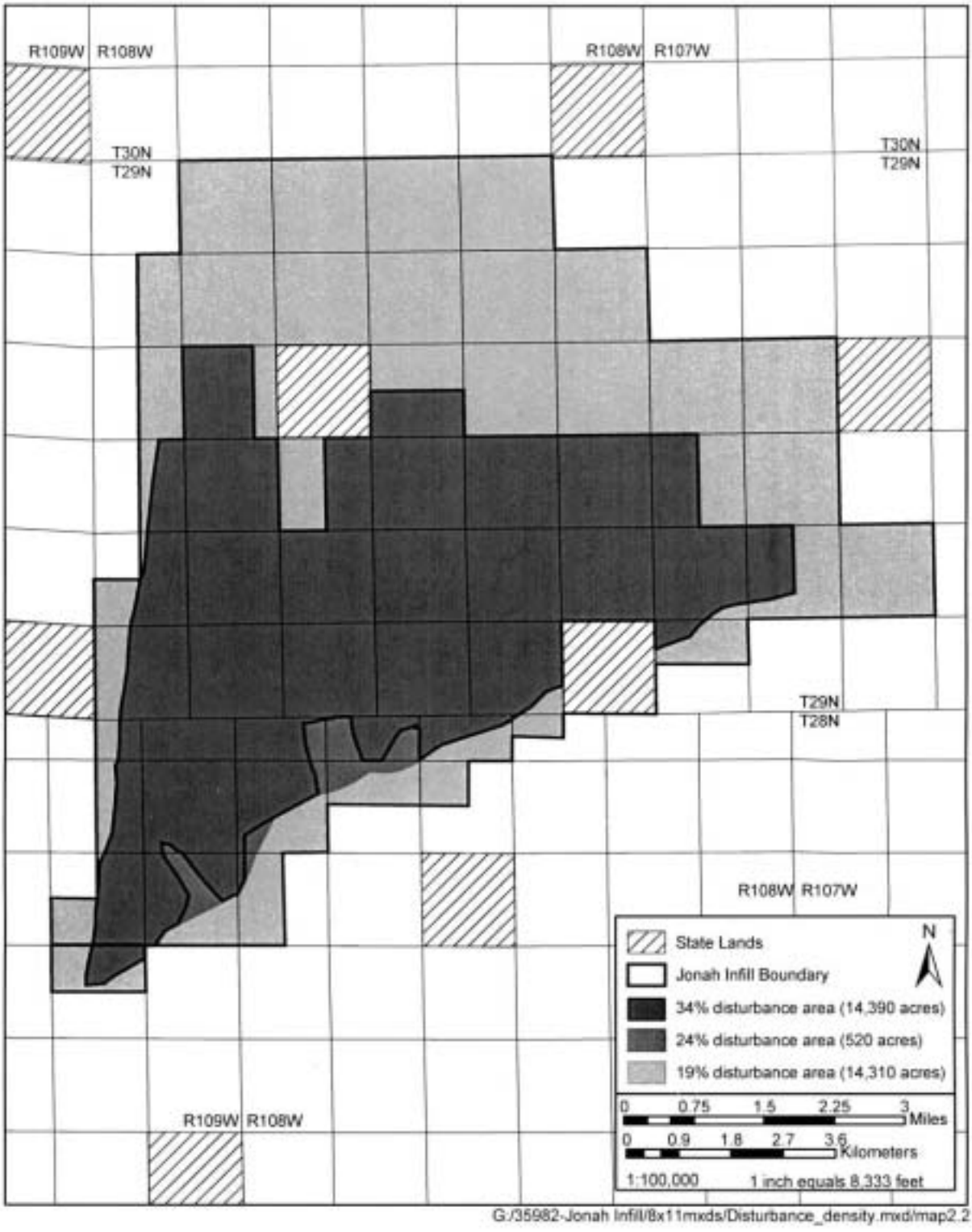
  - 4,667 acres of new initial surface disturbance and 1,300 acres LOP surface disturbance within the 14,390-acre area

  - a parent well pad is a multi-well pad and/or a pad with centralized facilities (assumes 7.0 acres of surface disturbance, including resource road and gathering pipeline)

  - a satellite well pad is a well head with no on-site storage or processing facilities (assumes 2.0 acres of surface disturbance, including resource road and gathering pipeline);

- up to approximately 24% (150 acres) new surface disturbance per 640-acre section within a 520-acre area (Map 2.2), based on 16 parent well pads and 16 satellite well pads per section (as many as 128 well bores per section)

  - 117 acres of new initial disturbance and 33 acres LOP surface disturbance.



Map 2.2 Preferred Action Surface Disturbance Limitation Areas, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

  - well pad density limitation would be applicable until monitoring data, with up to 10-year trends, conclusively show that denser than 40-acre surface spacing can meet performance-based field development and production objectives;

- up to approximately 19% (118 acres) new surface disturbance per 640-acre section within a 14,310-acre area (Map 2.2), based on 16 parent well pads per section (as many as 128 well bores per section)

  - 2,576 acres of new initial disturbance and 716 acres of LOP surface disturbance

  - well pad density limitation would be applicable until monitoring data, with up to 10-yr trends, conclusively show that denser than 40-acre surface spacing can meet performance-based field development and production objectives;

- 8 miles of new collector/local roads -- 73 acres of new initial and 37 acres of LOP surface disturbance;

- an upgrade of approximately 12 miles of the Burma Road -- 75 acres of new initial and 20 acres of LOP surface disturbance;

- ancillary facilities -- 41 acres of new initial and LOP surface disturbance (water disposal, storage, compressor station facilities);

- exploration activities -- 100 acres of new initial and LOP surface disturbance to develop well pads and other infrastructure necessary to explore for natural gas resources in formations other then the Lance Pool (Table 2.11);

- 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 include activities within the JIDPA and would include a habitat mitigation plan;

- establish/implement the JIWG, an interagency adaptive management working group, at the ROD for this project (see Appendix D);

  - BLM would consider annual JIWG recommendations to adjust conditions of approval (COAs), monitoring, mitigation, and best management practices (BMPs) to meet field development and production objectives throughout the LOP

  - If the Pinedale Anticline Working Group (PAWG) is functioning effectively in 2006, the PAWG charter would be revised to include the Jonah Field in the PAWG's responsibilities during charter renewal in 2006; otherwise the JIWG would continue to function and

- recommend implementation of Operator-committed CM at the ROD as appropriate and consistent with BLM policy.

Following successful interim reclamation, LOP surface disturbance under the BLM Preferred Alternative would total 3,847 acres, which includes 1,409 acres of existing disturbance (Table 2.11).

Table 2.11 Surface Disturbance Required for the BLM Preferred Alternative, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.

Project Parameter	Disturbance (acres)	
	New	LOP
Well Pads/ Resource Roads/ Gathering Pipelines (34% Disturbance Area)[1]	4,677	1,300
Well Pads/ Resource Roads/ Gathering Pipelines (24% Disturbance Area)[2]	117	33
Well Pads/ Resource Roads/ Gathering Pipelines (19% Disturbance Area)[3]	2,576	716
Well Pads/ Resource Roads/ Gathering Pipelines (State of Wyoming Lands)[4]	657	183
Collector/ Local Roads[5]	73	37
Burma Road[6]	75	20
Ancillary Facilities[7]	41	41
Water Wells[8]	0	8
Sales Pipeline[9]	0	0
Exploration Activities[10]	100	100
Subtotal	8,316	2,438
Existing Disturbance[11]	4,209	1,409
Total[12]	12,525	3,847

1 Assumes no more than 34% (approximately 214 acres) of new initial project-specific disturbance per 640-acre section, 33% of which would be associated with well pads, resource roads, and gathering pipelines (i.e., 16 7.0-acre pads and associated roads and pipeline disturbance areas and 48 2.0-acre satellite pads and associated roads and pipeline disturbance areas). The remaining 1% of the disturbance acreage would encompass other project facilities (i.e., collector/ local roads, Burma Road upgrade, ancillary facilities, and exploration activities). Approximately 27.8% of new initial disturbance would be retained for the LOP. See Map 2.2.

2 Assumes no more than 24% (150 acres) of new initial project-specific disturbance per 640-acre section, 23% of which would be associated with well pads, resource roads, and gathering pipelines (i.e., 16 7.0-acre pads and associated roads and pipeline disturbance areas and 16 2.0-acre satellite pads and associated roads and pipeline disturbance areas). The remaining 1% of the disturbance acreage would encompass other project facilities (i.e., collector/ local roads, Burma Road upgrade, ancillary facilities, and exploration activities). Approximately 27.8% of the new initial disturbance would be retained for the LOP. See Map 2.2.

3 Assumes no more than 19% (118 acres) of new initial project-specific disturbance per 640-acre section, 18% of which would be associated with well pads, resource roads, and gathering pipelines (i.e., 16 7.0-acre pads and associated roads and pipeline disturbance areas). The remaining 1% of the disturbance acreage would encompass other project facilities (i.e., collector/ local roads, Burma Road upgrade, ancillary facilities, and exploration activities). Approximately 27.8% of new initial disturbance would be retained for the LOP. See Map 2.2.

4 Assumes approximately 52% (333 acres) of new initial project-specific disturbance per 640-acre section, approximately 51% of which would be associated with well pads, resource roads, and gathering pipelines. The remaining 1% of the disturbance acreage would encompass other project facilities (i.e., collector/ local roads, Burma Road upgrade, ancillary facilities, and exploration activities). Approximately 27.8% of new initial disturbance would be retained for the LOP. See Map 2.2.

5 Conservatively 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 initial and LOP disturbance widths of 75.7 ft and 37.8 ft, respectively.

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

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

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

9 No new sales pipelines are proposed.

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

11 See Table 2.3.

12 Estimates include 12,242 acres and 3,766 acres of initial and LOP disturbance in the JIDPA, respectively; the additional 283 acres (new initial) and 81 acres (LOP) of disturbance would occur outside the JIDPA.

Analysis of this alternative assumes that up to an estimated 52% (333 acres) of new surface disturbance/640-acre section would occur on State of Wyoming lands (1,280 acres) (see Map 2.2). Assumes 657 acres of new initial disturbance and 183 acres of LOP surface disturbance for well pads, resource roads, and pipelines on State of Wyoming lands.

BLM would not regulate the number of wells or the pace of development under this alternative. For the purpose of this analysis, up to 3,100 wells at a pace of 250 wells drilled per year is considered.

2.14.1 Outcome-Based Performance Objectives

The BLM Preferred Alternative field development and production would be based on meeting performance objectives to allow maximum flexibility for Operators to utilize innovation to maximize gas recovery while providing long-term protection for other resources in the JIDPA. Objectives of the BLM Preferred Alternative are as follows:

- Maintain airborne emissions at or below levels sufficient to avoid:
  - near-field or far-field concentrations exceeding Wyoming Ambient Air Quality Standards (WAAQS) or National Ambient Air Quality Standards (NAAQS);
  - cumulative near-field concentrations greater than applicable Prevention of Significant Deterioration (PSD) Class II increments;
  - cumulative far-field concentrations in regional Class I wilderness areas and parks and sensitive Class II areas greater than applicable PSD increments;
  - decreases in visibility in regional Class I and sensitive Class II areas greater than Federal Land Managers' Air Quality Related Values Workgroup (FLAG), USFS, and/or National Park Service (NPS) thresholds;
  - decreases in Acid Neutralizing Capacity (ANC) in sensitive regional lakes greater than USFS levels of acceptable change (LAC);
  - increases in total acid deposition in sensitive areas greater than deposition analysis thresholds (DAT); and
  - cumulative deposition total loadings greater than USFS levels of concern (LOC).
- Maximize centralization of development and production facilities.
- Maintain sediment erosion (salt and silt discharge rates) at WDEQ- and BLM-acceptable levels.
- Reclaim sites to establish indigenous vegetation cover and species composition to maintain soil stability and provide nutritional value, palatability, and vegetative structure (i.e., habitat function).

- Plan development activities and interim and final reclamation to maximize and increase habitat patch sizes and reduce habitat fragmentation for sagebrush-obligate species.

- Limit any increase in production activity noise levels to 10-decibel or less increase above background noise levels, as measured at noise-sensitive resource locations (e.g., greater sage-grouse leks, occupied raptor nests).

- Minimize or reduce impacts to sagebrush and other habitats to maintain or minimize losses in the number of male greater sage-grouse on leks, numbers of sagebrush-obligate listed and sensitive species, and other wildlife.

- Maintain or improve currently active big game migration routes.

- Reduce human activity per well pad in the JIDPA below current levels during both the development and production phases.

- Prevent contamination of all surface and ground water.

- Utilize state-of-the-art technologies to avoid, minimize, or mitigate impacts.

- Encourage Operators to participate in and support peer-reviewed research that evaluates impacts from development and effectiveness of applied mitigation.

2.14.2 General Conditions of Approval, Mitigation, Monitoring, Surveying, and Best Management Practices

The BLM would impose the following general COAs, mitigation and BMPs on all project authorizations and would consider annual JIWG recommendations to adjust these requirements to meet field development and production objectives throughout the LOP.

- Tracking surface disturbance area would be implemented by Operators, and Operators would provide BLM 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 reclamation activities. BLM would randomly verify these data.

- Well pad surface disturbance would be limited to a maximum of 7.0 acres for parent and multi- well pads, 4.0 acres for single-well well pads, and 2.0 acres for satellite well pads. These acreages include well pad, access road, pipeline, and topsoil and spoil piles.

- Hard-line 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.

- Operators would utilize flareless completions for all wells within the JIDPA unless proven on a case-by-case basis that flareless completions would be unsafe.

- Operators would begin piping produced water and condensate from all wells in the JIDPA to appropriate treatment or disposal facilities beginning no later than January 1, 2008; this would supersede previous decisions related to method of condensate disposal.

- To eliminate or minimize surface sediment discharge, all well pad and road construction shall comport WDEQ storm water discharge specifications, standards, and permitting requirements. Existing well pads and roads shall be retro-fitted to meet this requirement as directed by the Authorized Officer. Based on site-specific analysis, BLM may require more stringent sediment control measures be implemented.

- Operators would utilize remote telemetry or equivalent technology at all wells to minimize well monitoring trips.

- Centralization of development and production facilities would be maximized in the JIDPA.

- All hydraulic structures would be engineered and designed by a certified civil engineer, utilizing hydraulic runoff modeling software, to ensure the structures are stable and erosion is minimized throughout the LOP.

- All engineering for construction would be designed to minimize or mitigate cumulative impacts and minimize sedimentation at the JIDPA boundary.

- Operators would utilize closed drilling systems (no reserve pits) for all wells unless proven on a case-by-case basis that to do so would be technologically or economically infeasible. If reserve pits are approved, Operators would remove/vacuum fluids from reserve pits within 60 days of all wells on a pad being placed into production, to accelerate pit closure and reclamation.

- New compressor sites would be located away from noise-sensitive resources or muffled appropriately to minimum noise standards.

- Topsoil stockpiles would be designed to maintain soil microbial and nutrient vitality and to minimize the surface area occupied. Should stockpiles exceed 3 feet in height and/or be stored for two years or longer, Operators would consult with BLM for acceptable site-specific mitigation to maintain microbial and nutrient viability.

- Well pads, access roads, and other above-ground facilities would not be located within 825 feet of any raptor nest, within 1,000 feet of ferruginous hawk nests, and within 2,640 feet of bald eagle nests.

- 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 15 through April 1, within 2.5 miles of all bald eagle winter foraging areas.

- Surface-disturbing and disruptive activities in greater sage-grouse winter concentration areas 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 would be avoided between 8 p.m. and 8 a.m. from March 1 through May 15.

- Operators would inventory greater sage-grouse seasonal habitats within the JIDPA not already inventoried by BLM or WGFD within one year of the ROD for this project; GIS data would be provided to BLM, WGFD, and the JIWG with FGDC-compliant metadata.

- Operators would map prairie dog towns and provide all map data to BLM, WGFD, and the JIWG with FGDC-compliant metadata.

- Three active and productive ferruginous hawk nesting territories, two burrowing owl nesting territories, and other raptor nesting territories would be maintained on and adjacent to the JIDPA; to the extent any of these may not be feasible, compensatory mitigation may be appropriate.

- Operator-related vehicle and OHV traffic in the JIDPA would be limited to BLM-approved roads/trails and travel on non-all-weather roads would be avoided during saturated soil conditions to avoid impacts from rutting.

- Operators would inventory all roads/trails in the JIDPA not already inventoried by BLM within one year of the date of the ROD for this project; GIS data would be provided to BLM, WGFD, and the JIWG with FGDC-compliant metadata.

- The Sand Draw No Surface Occupancy (NSO) restriction would be maintained.

- Operators would be responsible for establishing viable site-stabilizing plant growth, as determined by the Authorized Officer, within 2 years of initiation of reclamation. Site-stabilizing plant growth would consist of indigenous species and/or ecologically-comparable species as approved by the Authorized Officer. Within 5 years of initiation of reclamation, Operators must establish at least 50%, and within 8 years of initiation of reclamation establish at least 80%, of indigenous vegetative cover and species composition to maintain soil stability and provide nutritional value, palatability, and vegetative structure (i.e., habitat function). The initiation of reclamation would commence within 1 year of drilling and completion of the last well scheduled on a pad.

In the event that more than one year would lapse between the drilling of wells on a pad, the Authorized Officer may require temporary site stabilization measures.

- Operators would maximize interim (production phase) well pad reclamation (reclaim up to the wellhead, or up to the wellhead and dehydrators and separators on those pads with central production facilities).

- Field-wide interim and long-term reclamation plans would be submitted to BLM for approval no later than one year from the date of this ROD. Site-specific reclamation plans would be incorporated into all Surface Use Plans for APDs and Plans of Development for ROWs. A reclamation quality assurance/quality control monitoring program would be implemented by the Operators until development and interim (production phase) reclamation is completed to BLM standards.

Some of the aforementioned seasonal and surface use restrictions may not match those listed in Appendix A. Those provided for this BLM Preferred Alternative incorporate recent changes in agency guidance regarding wildlife restrictions.

2.14.2.1 Resource Monitoring and Surveying

The following monitoring and surveying activities would be required to monitor the effectiveness of COAs, BMPs, and mitigation, and BLM would consider JIWG recommendations to adjust monitoring and surveying requirements which determine if field development and production objectives are being met.

- Operators would continue supporting existing wildlife studies and monitoring efforts.

- Operators would implement a ground water monitoring program for all water wells in or affected by activities in the JIDPA, with annual reports to BLM, JIWG, WSEO and WDEQ. Wells would be tested annually for general chemical constituents and total petroleum hydrocarbons, using WDEQ-approved methodology.

- Operators would be required to conduct surveys of soils and vegetation types throughout the JIDPA in coordination with the BLM, and provide survey results to BLM within one year of the ROD for this project.

- Operators would be required to conduct sixth-level watershed modeling throughout the JIDPA (including identification of current sediment discharge rates), and provide the results to BLM and WDEQ, contingent on availability of data.

- Operators would prepare and implement a Sensitive Species Survey and Monitoring Plan for BLM and WGFD approval that would determine the presence, distribution, and population trends of all federally-listed, proposed, candidate, BWS, and other species including amphibians, reptiles, passerine birds, and small mammals, throughout the JIDPA. Monitoring would be conducted annually for the LOP or until BLM determines that additional monitoring is not required. Operators would prepare an annual report for BLM, WGFD, and the JIWG. Survey results would be provided annually to the WyNDD with FGDC-compliant metadata.

- Operators would monitor first flush total suspended solids in coordination with WDEQ, BLM, and other agencies.

- Operators would be required to assist BLM and WGFD in monitoring greater sage-grouse movements to determine if populations are migratory.

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

- Operators would monitor traffic volume on collector roads and provide an annual report to BLM.

- Operators would monitor the number of visits to well pads and provide an annual report to BLM.

- Operators would monitor noise near noise-sensitive resources and provide an annual report to BLM.

- In coordination with BLM and WGFD, Operators would monitor pronghorn antelope numbers on crucial winter ranges north and south of the JIDPA.

- 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.

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

On a site-specific basis, the BLM would impose the following COAs, mitigations and BMPs and would consider annual JIWG recommendations to adjust these requirements to meet field development and production objectives throughout the LOP.

- Convert resource roads to 2-tracks during interim reclamation.

- Provide nighttime lighting/glare restrictions (e.g., light shades/hoods, directional lighting, colored lights, wattage limits, motion detectors, elimination during non-working hours) to minimize light within and from the field.

- Monitor night lighting mitigation effectiveness in coordination with BLM.

- Spoil piles would be contoured to blend with surrounding topography and be contemporaneously reclaimed.

- Avoid prairie dog towns where practical to provide burrowing owl habitat.

2.14.4 Compensatory Mitigation

In lieu of the proposed Cumulative Impacts Mitigation Fund, the BLM Preferred Alternative recommends that, where appropriate and consistent with BLM policy, Operators voluntarily seek BLM-approved CM projects aimed at alleviating on-site mitigation concerns.

2.15 ALTERNATIVES CONSIDERED AND ELIMINATED FROM DETAILED STUDY

Many suggestions for alternatives were proposed by the public. 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 suggested well number, development rate, or surface disturbance suggestions were analyzed, the BLM used these suggestions when developing the alternatives analyzed in this EIS to provide a range in well numbers, development paces, and surface disturbance.

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 2.5).

Action alternatives with fewer than 1,250 wells were rejected from consideration based upon known natural gas reservoir properties indicating that at least this many wells would be necessary for adequate resource recovery. Operators believe up to 3,100 wells would be necessary for maximum recovery.

Action alternatives with a development pace slower than 75 wells per year were rejected from consideration because the reduced development pace would result in 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 75, 150, and 250 wells developed per year provides an adequate range of development paces to assess potential effects associated with the rate of development (e.g., socioeconomics, duration of habitat loss).

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. Additional measures (see Chapter 5) 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 Appendix A and B for BLM standard mitigations, Operator-committed measures and CM ideas).

2.16 SUMMARY OF ENVIRONMENTAL IMPACTS

Table 2.12 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 E, and in the detailed impact assessments provided in Chapter 4.

Table 2.12 Brief Comparison of Impacts to Key Issues Across Alternatives, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.[1]

Key Issue	No Action	Proposed Action	Other Alternatives							Preferred[2]
			A	B	C	D	E	F	G	
Disturbance Volume										
Total Acres Surface Disturbance	4,209	20,409	20,409	7,506	10,914	15,790	10,595	14,655	18,198	12,525
LOP Acres Surface Disturbance	1,409	6,040	6,040	2,622	3,399	4,755	3,597	3,997	5,408	3,847
Project Duration/Pace/Economics										
LOP (years)	63	76	76-105	76-105	68-80	72-93	76-105	76-105	76-105	76
Wells Developed Per Year	0	250	75-250	75-250	75-250	75-250	75-250	75-250	75-250	250
New Worker Years (development and production)	0	16,863	16,863	16,863	7,011	12,106	16,863	16,863	16,863	16,863
Total Taxes and Royalties (millions)	2,335	6,072	6,235	4,876	4,846	5,646	4,993	5,588	6,030	6,030
Sublette County Share (millions)	742	1,839	1,892	1,446	1,503	1,728	1,484	1,677	1,824	1,824
Air Quality/Visibility per year										
Additional Days of Impairment per year at Bridger Wilderness	0	10	10	11	8	8-10	11	11	10-11	10-11
Additional Days of Impairment per year at Pinedale	0	3	3	5	2	2-3	3-5	3	3	3
Habitat Loss All Species										
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.										
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.										
Total Well Pads	497	3,597	3,597	497	1,747	2,697	763	1,705	3,050	3,597
New Roads (miles)	237	710	710	245	433	575	285	399	628	519
Average Daily Traffic Volume[3] (round trips to and from the JIDPA per day)	45-88	312-610	312-610	312-610	145-284	231-452	312-610	312-610	312-610	312-610
Mineral Resource Recovery										
Natural Gas (billion cubic feet)	3,366	7,947	8,191	6,124	6,657	7,554	6,302	7,186	7,876	7,876
Condensate (million barrels)	32	76	78	58	63	72	60	68	75	75
Livestock										
Livestock forage loss and hazard conditions would be related to the total volume of surface disturbance, the types of surface disturbance, and traffic as listed above.										
LOP Forage Loss (AUMs)	116	509	509	218	284	400	300	335	455	310
Short-term Forage Loss (AUMs)	342	1,720	1,720	618	909	1,325	881	1,277	1,531	1,002
BLM Inspection and Enforcement										
BLM inspection and enforcement capability would be dependent upon management requirements and annual budgets and priorities.										
Compensatory Mitigation										
Hypothetical Value (thousand $)	0	4,420	4,420	0	0	494	0	0	2,541	0

[1] Further summary detail is provided in Appendix E, Summary of Impacts; complete detail for all resources is provided in Chapter 4.0.
[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.

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