FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Lance Oil & Gas INC
Teardrop POD
ENVIRONMENTAL ASSESSMENT –WY-070-EA08-72

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Lance Oil &Gas INC's Teardrop POD Coal Bed Natural Gas (CBNG) POD comprised of the following 43 Applications for Permit to Drill (APDs):

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	TEAR DROP FEDERAL	12-4*	SWNW	4	49N	78W	WYW127423
2	TEAR DROP FEDERAL	13-4	NWSW	4	49N	78W	WYW127423
3	TEAR DROP FEDERAL	21-4	NENW	4	49N	78W	WYW127423
4	TEAR DROP FEDERAL	22-4	SENW	4	49N	78W	WYW127423
5	TEAR DROP FEDERAL	23-4	NESW	4	49N	78W	WYW127423
6	TEAR DROP FEDERAL	34-4	SWSE	4	49N	78W	WYW127423
7	TEAR DROP FEDERAL	41-4	NENE	4	49N	78W	WYW127423
8	TEAR DROP FEDERAL	43-4	NESE	4	49N	78W	WYW127423
9	TEAR DROP	12-5	SWNW	5	49N	78W	WYW127423
10	TEAR DROP	14-5	SWSW	5	49N	78W	WYW127423
11	TEAR DROP	21-5	NENW	5	49N	78W	WYW127423
12	TEAR DROP	23-5	NESW	5	49N	78W	WYW127423
13	TEAR DROP	31-5	NWNE	5	49N	78W	WYW127423
14	TEAR DROP	34-5	SWSE	5	49N	78W	WYW127423
15	TEAR DROP	41-5	NENE	5	49N	78W	WYW127423
16	TEAR DROP	43-5	NESE	5	49N	78W	WYW127423
17	TEAR DROP	32-6	SWNE	6	49N	78W	WYW144230
18	TEAR DROP	34-6	SWSE	6	49N	78W	WYW144230
19	TEAR DROP	41-6	NENE	6	49N	78W	WYW144230
20	TEAR DROP	43-6	NESE	6	49N	78W	WYW144230
21	TEAR DROP	14-7	SWSW	7	49N	78W	WYW144231
22	TEAR DROP FEDERAL	21-7	NENW	7	49N	78W	WYW144231
23	TEAR DROP	23-7	NESW	7	49N	78W	WYW144231
24	TEAR DROP	34-7	SWSE	7	49N	78W	WYW144231
25	TEAR DROP FEDERAL	41-7	NENE	7	49N	78W	WYW144231
26	TEAR DROP	43-7	NESE	7	49N	78W	WYW144231
27	TEAR DROP BOOTJACK	12-20	SWNW	20	50N	78W	WYW157763
28	TEAR DROP FEDERAL	14-20	SWSW	20	50N	78W	WYW162090
29	TEAR DROP BOOTJACK	22-20	SWNW	20	50N	78W	WYW157763
30	TEAR DROP FEDERAL	24-20	SESW	20	50N	78W	WYW157763
31	TEAR DROP BOOTJACK	32-20	SWNE	20	50N	78W	WYW157763
32	TEAR DROP BOOTJACK	42-20	SENE	20	50N	78W	WYW157763
33	TEAR DROP BOOTJACK	12-21	SWNW	21	50N	78W	WYW152616

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
34	TEAR DROP FEDERAL	13-21	NWSW	21	50N	78W	WYW152616
35	TEAR DROP FEDERAL	21-21	NENW	21	50N	78W	WYW162090
36	TEAR DROP FEDERAL	23-21	NESW	21	50N	78W	WYW152616
37	TEAR DROP BOOTJACK	32-21	SWNE	21	50N	78W	WYW162090
38	TEAR DROP FEDERAL	34-21	SWSE	21	50N	78W	WYW152616
39	TEAR DROP FEDERAL	41-21	NENE	21	50N	78W	WYW162090
40	TEAR DROP FEDERAL	44-21	SESE	21	50N	78W	WYW162090
41	TEAR DROP	34-31	SWSE	31	50N	78W	WYW144232
42	TEAR DROP	43-31	NESE	31	50N	78W	WYW144232
43	TEAR DROP FEDERAL	22-33	SENW	33	50N	78W	WYW162090

The primary water management strategy for the Tear Drop POD includes treatment at the existing Bear Draw Beta RO facility with subsequent discharge to an unammed tributary of Flying E Creek and transporting produced water via the Salt Creek Pipeline for reinjection near Midwest, Wyoming.

This approval is subject to adherence with all of the operating plans and mitigation measures contained in the Master Surface Use Plan of Operations, Drilling Plan, Water Management Plan, and information in individual APDs. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

RATIONALE: The decision to authorize Alternative C, as described in the attached Environmental Assessment (EA), is based on the following:

1. The Operator, in their POD, has committed to:
    - Comply with all applicable Federal, State and Local laws and regulations.
    - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
    - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
    - Provide water analysis from a designated reference well in each coal zone.
2. The Operator has certified that a Surface Use Agreement has been reached with the Landowner(s).
3. Alternative C will not result in any undue or unnecessary environmental degradation.
4. It is in the public interest to approve these wells, as the leases are being drained of federal gas, resulting in a loss of revenue for the government.
5. Mitigation measures applied by the BLM will alleviate or minimize environmental impacts.
6. Alternative C is the environmentally-preferred Alternative.
7. The proposed action is in conformance with the PRB FEIS and the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management (BLM), Buffalo Field Office, April 2001.

FINDING OF NO SIGNIFICANT IMPACT: Based on the analysis of the potential environmental impacts, I have determined that NO significant impacts are expected from the implementation of Alternative C and, therefore, an environmental impact statement is not required.

ADMINISTRATIVE REVIEW AND APPEAL: Under BLM regulations, this decision is subject to administrative review in accordance with 43 CFR 3165. Any request for administrative review of this decision must include information required under 43 CFR 3165.3(b) (State Director Review), including all supporting documentation. Such a request must be filed in writing with the State Director, Bureau of Land Management, P.O. Box 1828, Cheyenne, Wyoming 82003, no later than 20 business days after this Decision Record is received or considered to have been received.

Any party who is adversely affected by the State Director's decision may appeal that decision to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager:_____ Date: _____

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Lance Oil &Gas INC
Teardrop POD
PLAN OF DEVELOPMENT
WY-070-EA08-72

INTRODUCTION

This site-specific analysis tiers into and incorporates by reference the information and analysis contained in the Powder River Basin Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS), #WY-070-02-065 (approved April 30, 2003), pursuant to 40 CFR 1508.28 and 1502.21. This document is available for review at the Buffalo Field Office. This project EA addresses site-specific resources and impacts that were not covered within the PRB FEIS.

1. PURPOSE AND NEED

The purpose for the proposal is to produce coal bed natural gas (CBNG) on 15 valid federal oil and gas mineral leases issued to the applicant by the BLM. Analysis has determined that federal CBNG is being drained from the federal leases by surrounding fee or state mineral well development. The need exists because without approval of the Applications for Permit to Drill (APDs), federal lease royalties will be lost and the lessee will be deprived of the federal gas they have the rights to develop.

1.1. Conformance with Applicable Land Use Plan and Other Environmental Assessments:

The proposed action is in conformance with the terms and the conditions of the Approved Resource Management Plan for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), April 2001 and the PRB FEIS, as required by 43 CFR 1610.5

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1. Alternative A - No Action

A No Action Alternative was considered in the PRB FEIS, Volume 1, pages 2-54 through 2-62. This alternative would consist of no new federal wells. An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove, and dispose of all oil and gas deposits" in the lease lands, "subject to the terms and conditions incorporated in the lease." Thus, under this alternative, the operator's proposal would be denied.

2.2. Alternative B Proposed Action

Proposed Action Title/Type: Lance Oil & Gas INC's Teardrop POD Plan of Development (POD) for 43 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 43 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Each well will produce from 2 coal seams (Big George and Wall). Well head production facilities will be housed in a 42 inch cubical well head enclosure.

Wells are located as follows:

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
1	TEAR DROP FEDERAL	12-4*	SWNW	4	49N	78W	WYW127423
2	TEAR DROP FEDERAL	13-4	NWSW	4	49N	78W	WYW127423
3	TEAR DROP FEDERAL	21-4	NENW	4	49N	78W	WYW127423
4	TEAR DROP FEDERAL	22-4	SENW	4	49N	78W	WYW127423
5	TEAR DROP FEDERAL	23-4	NESW	4	49N	78W	WYW127423
6	TEAR DROP FEDERAL	34-4	SWSE	4	49N	78W	WYW127423
7	TEAR DROP FEDERAL	41-4	NENE	4	49N	78W	WYW127423
8	TEAR DROP FEDERAL	43-4	NESE	4	49N	78W	WYW127423
9	TEAR DROP	12-5	SWNW	5	49N	78W	WYW127423
10	TEAR DROP	14-5	SWSW	5	49N	78W	WYW127423
11	TEAR DROP	21-5	NENW	5	49N	78W	WYW127423
12	TEAR DROP	23-5	NESW	5	49N	78W	WYW127423
13	TEAR DROP	31-5	NWNE	5	49N	78W	WYW127423
14	TEAR DROP	34-5	SWSE	5	49N	78W	WYW127423
15	TEAR DROP	41-5	NENE	5	49N	78W	WYW127423
16	TEAR DROP	43-5	NESE	5	49N	78W	WYW127423
17	TEAR DROP	32-6	SWNE	6	49N	78W	WYW144230
18	TEAR DROP	34-6	SWSE	6	49N	78W	WYW144230
19	TEAR DROP	41-6	NENE	6	49N	78W	WYW144230
20	TEAR DROP	43-6	NESE	6	49N	78W	WYW144230
21	TEAR DROP	14-7	SWSW	7	49N	78W	WYW144231
22	TEAR DROP FEDERAL	21-7	NENW	7	49N	78W	WYW144231
23	TEAR DROP	23-7	NESW	7	49N	78W	WYW144231
24	TEAR DROP	34-7	SWSE	7	49N	78W	WYW144231
25	TEAR DROP FEDERAL	41-7	NENE	7	49N	78W	WYW144231
26	TEAR DROP	43-7	NESE	7	49N	78W	WYW144231
27	TEAR DROP BOOTJACK	12-20	SWNW	20	50N	78W	WYW157763
28	TEAR DROP FEDERAL	14-20	SWSW	20	50N	78W	WYW162090
29	TEAR DROP BOOTJACK	22-20	SWNW	20	50N	78W	WYW157763
30	TEAR DROP FEDERAL	24-20	SESW	20	50N	78W	WYW157763
31	TEAR DROP BOOTJACK	32-20	SWNE	20	50N	78W	WYW157763
32	TEAR DROP BOOTJACK	42-20	SENE	20	50N	78W	WYW157763
33	TEAR DROP BOOTJACK	12-21	SWNW	21	50N	78W	WYW152616
34	TEAR DROP FEDERAL	13-21	NWSW	21	50N	78W	WYW152616
35	TEAR DROP FEDERAL	21-21	NENW	21	50N	78W	WYW162090
36	TEAR DROP FEDERAL	23-21	NESW	21	50N	78W	WYW152616
37	TEAR DROP BOOTJACK	32-21	SWNE	21	50N	78W	WYW162090
38	TEAR DROP FEDERAL	34-21	SWSE	21	50N	78W	WYW152616
39	TEAR DROP FEDERAL	41-21	NENE	21	50N	78W	WYW162090
40	TEAR DROP FEDERAL	44-21	SESE	21	50N	78W	WYW162090

	Well Name	Well #	QTR	Sec	TWP	RNG	Lease
41	TEAR DROP	34-31	SWSE	31	50N	78W	WYW144232
42	TEAR DROP	43-31	NESE	31	50N	78W	WYW144232
43	TEAR DROP FEDERAL	22-33	SENW	33	50N	78W	WYW162090

Water Management Proposal: A Water Management Plan (WMP) that involves the following infrastructure and strategy: The primary water management strategy includes treatment at the existing Bear Draw Beta RO facility and direct discharge into an unnamed tributary of Flying E Creek and transporting produced water via the Salt Creek Pipeline for reinjection near Midwest, Wyoming. If water production exceeds the capacity of these strategies, then there is a secondary water management strategy which includes 18 proposed discharge points and 16 proposed and existing 'secondary' stock water reservoirs and 2 proposed 'secondary'off-channel pits. Although this EA will analyze the environmental consequences related to the reservoirs, the decision record did not authorize reservoir discharge. A sundry application must be submitted and approved in order to authorize reservoir use.

	IMPOUNDMENT Name / Number	**Qtr/Qtr**	**Section**	**TWP**	**RNG**	**Lease #**
1	11-4-4978	NWNW	4	49	78	WYW127423
2	41-4-4978	NENE	4	49	78	WYW127423
3	21-5-4978E	NENW	5	49	78	WYW127423
4	21-5-4978W	NENW	5	49	78	WYW127423
5	22-5-4978S	SENW	5	49	78	WYW127423
6	Pit 41-5-4978	NENE	5	49	78	WYW127423
7	22-5-4978N	SENW	5	49	78	WYW127423
8	Marton Reservoir	SWNE	6	49	78	NA
10	23-7-4978	NESW	7	49	78	WYW144231
11	14-7-4978	SWSW	7	49	78	WYW144231
12	41-7-4978	NENE	7	49	78	WYW144231
13	21-20-5078	NENW	20	50	78	WYW161181
14	23-20-5078	NESW	20	50	78	WYW157763
15	11-21-5078	NWNW	21	50	78	WYW162090
16	Taylor Stock Reservoir	SWNW	31	50	78	WYW143880
17	Pit 42-31-5078	SENE	31	50	78	NA
18	34-31-5078	SWSE	31	50	78	WYW144232
19	12-33-5078	SWNW	33	50	78	WYW152617

County: Johnson

Applicant: Lance Oil & Gas INC

Surface Owners: Bureau of Land Management, Robert J. Ruby, Tear Drop Cattle Co., State of Wyoming

Project Description:
The proposed action involves the following:

- Drilling of 43 total federal CBM wells in the Big George and Wall coal zones to depths of approximately 2280 feet. A single well per location will be drilled which is capable of producing from multiple coal seams.

- Drilling and construction activities are anticipated to be completed within two years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners may impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry. Metering would entail 2-3 visits per month during the summer and 4 visits per month during the winter months.

- An unimproved and improved road network.

- Overhead Power line construction has been permitted (Right-of-Way: WYW-69622) and depending on construction schedule, may be completed before the CBNG wells are producing. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 9 power drops.

- A storage tank of 500 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for up yo 24 months. Fuel deliveries are anticipated to be 3 times per week. Noise level is expected to be 100.5 decibels at 3 feet distance.

- A buried gas, water and power line network.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP in the POD and individual APDs. Also see the subject POD and/or APDs for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

Implementation of committed mitigation measures contained in the MSUP, Drilling Program and WMP, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

Additionally, the Operator, in their POD, has committed to:

1. Comply with all applicable Federal, State and Local laws and regulations.
2. Obtain the necessary permits for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
3. Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD
4. Provide water analysis from a designated reference well in each coal zone.

The Operator has certified that a Surface Use Agreement has been reached with the Landowners.

2.3. Alternative C – Environmentally Preferred

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B with the addition of the project modifications identified by BLM and the operator following the initial project proposal (Alternative B). At the on-sites, all areas of proposed surface disturbance were inspected to insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified, mitigated or dropped from further consideration to alleviate environmental impacts. Alternatives to the different aspects of the proposed action are always considered and applied as pre-approval changes, site specific mitigation and/or Conditions of Approval (COAs), if they will alleviate environmental effects of the operator's proposal. The specific changes identified for the Teardrop POD POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

Well #	Aliquot	Sec	T	R	Onsite Notes
23-5	NESW	5	49N	78W	well moved: operator request: minimize disturbance, less issues w/ existing oil/gas infrastructure
32-5	SWNE	5	49N	78W	well moved: operator request: shorter access/utility (A/U) corridor, minimize disturbance, new location slope ~7%,proposed ~12%
34-5	SWSE	5	49N	78W	well moved: wildlife issue: proximity to raptor nest
43-7	NESE	7	49N	78W	well moved: operator request, slot instead of engineered pad, this location was identified to be dropped, upon looking at 23-31 &14-31 locations this location has less value as sage grouse habitat(SGH), those locations will be dropped (14-31 will be incorporated into the Bear Draw Unit POD)
23-31	NESW	31	50N	78W	dropped**:** SGH issues, in conjunction w/ permitting the 43-7 and 34-7 locations
14-31	SWSW	31	50N	78W	dropped: SGH issues, will be incorporated into Bear Draw Unit POD, (new location) this well dropped in conjunction w/ permitting the 43-7 and 34-7 locations
12-20	SWNW	20	50N	78W	well moved: steep side slopes, engineered pad required 18'of cut, new location: eyebrow off existing oil/gas (O/G) lease road (rd)
33-20	NWSE	20	50N	78W	well moved: wildlife issue (proximity to Golden Eagle nest), new location eyebrow off existing O/G lease rd
42-20	SENE	20	50N	78W	well moved: operator request: A/U maintenance issues, due to narrow channel bottom w/ steep side slopes, no alternative route, this move in conjunction w/ dropping the 43-20
43-20	NESE	20	50N	78W	dropped: wildlife issue, 11/7 moved (golden eagle issues, proximity to nest) to S of Flying E creek w/ agreement that no pad and or construction. 11/9 ground checked could not be done due to location being in drainage and pad/A/U require dirt work
12-21	SWNW	21	50N	78W	well moved: proposed location in drainage bottom, new location eyebrow off existing rd

Well #	Aliquot	Sec	T	R	Onsite Notes
12-4	SWNW	4	49N	78W	well moved: so location could be designed as drive through using Devon's proposed access rd (Golden Eagle POD)
14-4	SWSW	4	49N	78W	well moved: location w/in 460' lease buffer, A/U on > 25% slopes, no room for pad
32-4	SWNE	4	49N	78W	well moved: operator and BLM request: topography required excessive engineering for pad/A/U in highly erosive soils, wildlife issue: Sage Grouse habitat
43-4	NESE	4	49N	78W	well moved: topography issue, proposed location on narrow ridge w/ steep side slopes not enough room for rig
21-7	NENW	7	49N	78W	well moved: wildlife issue, Sage Grouse habitat issues
24-20	SESW	20	50N	78W	well moved: wildlife Golden Eagle issues, proximity to nest, moved to far end of P/A (plugged and abandoned) conventional pad to get out of line of sight
13-21	NWSW	21	50N	78W	well moved: moved in conjunction w/ the operator dropping the 43-20 well, this location was moved and longer A/U corridor allowed, to provide an opportunity for the operator improved drainage of the lease
41-21	NENE	21	50N	78W	well moved: to get distance from newly built range fence
43-5	NESE	5	49N	78W	A/U rerouted SBH obligate species
43-31	NESE	31	50N	78W	staging area to N to be dropped, A/U template from main rd rerouted to get off ridge (narrow, highly erosive soils(HES)-existing flat blade 2TK will be ripped, reseeded, engineered pad, from 43-31 2TK to be rerouted to get off of ridge, existing to be ripped, recontoured, reseeded
32-20	SWNE	20	50N	78W	pad no issues, A/U rerouted, proposed route is existing Yates rd w/ pipeline on narrow ridge, no room for new A/U and increased traffic needs requires template rd, new A/U engineered
21-4	NENW	4	49N	78W	A/U rerouted to avoid HE soils/steep slopes, , engineered pad
14-20	SWSW	20	50N	78W	access to N has been dropped, narrow ridge, HES, no need for road this access as main access comes from the E
21-21	NENW	21	50N	78W	A/U rerouted due to increase in average daily traffic(ADT) existing primitive road on ridge w/ steep side slopes, excessive dirt work required to improve to meet needs for CBM development
44-21	SESE	21	50N	78W	A/U rerouted, SGH issue
12-33	SWNW	33	50N	78W	well moved: wildlife issue: Sage Grouse habitat

Water Management

1. The operator removed reservoir 41-21-5078, from the proposed action, the proposed location was in an area of steep slopes and highly erosive soils, poor reclamation potential and excessive dirt work were identified at the on-site as the limiting factors.
2. The 31-21-5078 reservoir was removed due the location having National Register eligibility.
3. Pit 31-7-4978 was removed due to potential Sage Grouse habitat impacts.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

Programmatic mitigation measures are those, determined through analysis, which may be appropriate to apply at the time of APD approval if site specific conditions warrant. These mitigation measures can be applied by BLM, as determined necessary at the site-specific NEPA APD stage, as COAs and will be in addition to stipulations applied at the time of lease issuance and any standard COA.

2.3.2.1. Groundwater

1. In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed and revised a guidance document, "Compliance Monitoring and siting Requirements for Unlined Impoundments Containing Coalbed Methane Produced Water" (September, 2006) which can be accessed on their website. For all WYPDES permits the BLM will require that operators comply with the latest DEQ standards and monitoring guidance.

2.3.2.2. Surface Water

2. Channel Crossings:
   a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.
3. Low water crossings will be constructed at original streambed elevation in a manner that will prevent any blockage or restriction of the existing channel. Material removed will be stockpiled for use in reclamation of the crossings.

4. Concerns regarding the quality of the discharged CBNG water on downstream irrigation use may require operators to increase the amount of storage of CBNG water during the irrigation months and allow more surface discharge during the non-irrigation months.

2.3.2.3. Soils

1. The Companies, on a case by case basis depending upon water and soil characteristics, will test sediments deposited in impoundments before reclaiming the impoundments. Tests will include the standard suite of cations, ions, and nutrients that will be monitored in surface water testing and any trace metals found in the CBNG discharges at concentrations exceeding detectable limits.

2.3.2.4. Wetland/Riparian

1. No waste material will be deposited below high water lines in riparian areas, flood plains, or in natural drainage ways.

2. The lower edge of soil or other material stockpiles will be located outside the active floodplain.

3. Disturbed channels will be re-shaped to their approximate original configuration or stable geomorphological configuration and properly stabilized.

2.3.2.5. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.

2. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.

2.3.2.6. Threatened, Endangered, or Sensitive Species

2.3.2.6.1. Bald Eagle

1. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the Sundry Notices.

2. Additional mitigation measures may be necessary if the site-specific project is determined by a BLM biologist to have adverse effects to bald eagles or their habitat.

2.3.2.7. Visual Resources

1. The Companies will mount lights at compressor stations and other facilities on a pole or building and direct them downward to illuminate key areas within the facility while minimizing the amount of light projected outside the facility.

2.3.2.8. Noise

2. Where noise impacts to existing sensitive receptors are an issue, noise levels will be required to be no greater than 55 decibels measured at a distance of one-quarter mile from the appropriate booster (field) compressor. When background noise exceeds 55dBA, noise levels will be no greater than 5dBA above background. This may require the installation of electrical compressor motors at these locations.

2.3.2.9. Air Quality

1. During construction, emissions of particulate matter from well pad and resource road construction will be minimized by application of water, or other dust suppressants, with at least 50 percent control efficiency. Roads and well locations constructed on soils susceptible to wind erosion could be appropriately surfaced or otherwise stabilized to reduce the amount of fugitive dust generated by traffic or other activities, and dust inhibitors (surfacing materials, non-saline dust suppressants, and water) could be used as necessary on unpaved collector, local and resource roads that present a fugitive dust problem. The use of chemical dust suppressants on BLM surface will require prior approval from the BLM authorized officer.

2.3.3. Site specific mitigation measures

All changes made at the onsite will be followed. They have all been incorporated into the operator's POD.

General

1. Please contact Eric Holborn – Natural Resource Specialist, @ (307) 684-1044, Bureau of Land Management, Buffalo, if there are any questions concerning surface use COAs.

Surface Use

Lease	Well #	Aliquot	Sec	T	R	Site specific COAs
WYW127423	43-5	NESE	5	49N	78W	Mowing for the well location will not exceed 35 feet radius from the well stake.

Lease	Well #	Aliquot	Sec	T	R	Site specific COAs
WYW144230	32-6	SWNE	6	49N	78W	A sign will be placed at the intersection of the access road to the 32-6 and the FEE well 21-6-4978 that states “no oil and gas traffic beyond this point".
WYW144231	43-7	NESE	7	49N	78W	Mowing for the well location will not exceed 35 feet radius from the well stake.
WYW144232	43-31	NESE	31	50N	78W	The existing 2-track road from the main road (sec.5 T49R78) to the FEE well 23-31-5078 will be ripped, recontoured and reseeded.
WYW157763	32-20	SWNE	20	50N	78W	The 2-track to the east of the 32-20 access will be ripped and seeded not recontoured due to it being existing p/line corridor.
WYW157763	24-20	SESW	20	50N	78W	A sign will be placed on location, upon well completion, stating “park here" for pumper traffic, to keep out of line sight of Golden Eagle Nest. A BLM authorized officer will be contacted to determine sign location.
WYW162090	21-21	NENW	21	50N	78W	The 2-track on the ridge to the west will be ripped, reseeded.

2. All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” The color selected for the Tear Drop POD is Carlsbad Canyon, (Munsell Soil Color 2.5Y 6/2).
3. Constructed pad and slot locations will be built to design specifications, component of the Teardrop Plan of Development, submitted by Kadrmas Lee & Jackson.
4. The following well locations in the project area have been identified to have limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities.

Lease	Well #	Aliquot	Sec	T	R
WYW157763	32-20	SWNE	20	50N	78W
WYW157763	33-20	NWSE	20	50N	78W
WYW127423	14-4	SWSW	4	49N	78W
WYW127423	23-4	NESW	4	49N	78W

Lease	Well #	Aliquot	Sec	T	R
WYW127423	34-4	SWSE	4	49N	78W
WYW157763	24-20	SESW	20	50N	78W

The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231) specifically the following:

Reclamation Standards:

C. 3 The reclaimed area shall be stable and exhibit none of the following characteristics:

a. Large rills or gullies.

b. Perceptible soil movement or head cutting in drainages.

c. Slope instability on, or adjacent to, the reclaimed area in question.

C.4. The soil surface must be stable and have adequate surface roughness to reduce runoff and capture rainfall and snow melt. Additional short-term measures, such as the application of mulch, shall be used to reduce surface soil movement.

C.5. Vegetation canopy cover (on unforested sites), production and species diversity (including shrubs) shall approximate the surrounding undisturbed area. The vegetation shall stabilize the site and support the planned post disturbance land use, provide for natural plant community succession and development, and be capable of renewing itself. This shall be demonstrated by:

a. Successful onsite establishment of species included in the planting mixture or other desirable species.

b. Evidence of vegetation reproduction, either spreading by rhizomatous species or seed production.

C.6. The reclaimed landscape shall have characteristics that approximate the visual quality of the adjacent area with regard to location, scale, shape, color and orientation of major landscape features and meet the needs of the planned post disturbance land use.

5. The operator will drill seed on the contour to a depth of 0.5 inch, followed by cultipaction to compact the seedbed, preventing soil and seed losses. To maintain quality and purity, the current years tested, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. ON BLM surface or in lieu of different specific mix desired by the surface owner, use the following:

Shallow Loamy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)	50	6.0
Bluebunch wheatgrass (Pseudoroegneria spicata ssp. Spicata)	35	4.2
Prairie coneflower (Ratibida columnifera)	5	0.6
White or purple prairie clover (Dalea candidum, purpureum)	5	0.6
Rocky Mountain beeplant (Cleome serrulata)	5	0.6

Shallow Loamy Ecological Site Seed Mix		
Species	**% in Mix**	**Lbs PLS***
Totals	**100%**	**12 lbs/acre**

6. Provide 4" of aggregate where grades exceed 8% for stability and erosion prevention.
7. The culvert locations will be staked prior to construction. The culvert invert grade and finished road grade will be clearly indicated on the stakes. Culverts will be installed on natural ground, or on a designed flow line of a ditch. The minimum cover over culverts will be 12" or one-half the diameter whichever is greater. Drainage laterals in the form of culverts or water bars shall be placed according to the following spacing:

Grade	Drainage Spacing
2-4%	310 ft
5-8%	260 ft
9-12%	200 ft

8. The operator is responsible for having the licensed professional engineer certify that the actual construction of the road meets the design criteria and is constructed to Bureau standards.

Wildlife

Burrowing Owls

1. The following conditions will alleviate impacts to burrowing owls:
   No surface disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities within the prairie dog town(s). This timing limitation will be in effect unless surveys determine the nest(s) to be inactive. This timing limitation will affect the following

Township/Range	Section	Wells and Infrastructure
50/78	**21**	**Wells: 32-21-5078, 41-21-5078, and 44-21-5078** All access and/or pipeline corridors in the **NE and SESE** of this section.
50/78	**22**	All access and/or pipeline corridors in the **SWSW** of this section.
50/78	**27**	All access and/or pipeline corridors in the **NWNW** of this section.
50/78	**28**	All access and/or pipeline corridors in the **NENE** of this section.

Raptors

1. The following conditions will alleviate impacts to raptors:
   a. No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. This timing limitation will affect the following

Township/Range	Section	Wells and Infrastructure
50/78	**20**	**Wells: 14-20-5078,22-20-5078, 24-20-5078, 32-20-5078, and 42-20-5078** Impoundment: 23-20-5078

Township/Range	Section	Wells and Infrastructure
		All access and/or pipeline corridors in the **S1/2, SENW, SWNE, and SENE** of this section.
50/78	**21**	**Wells: 32-21-5078, 41-21-5078, and 44-21-5078** All access and/or pipeline corridors in the **E1/2** of this section
50/78	**22**	All access and/or pipeline corridors in this **ENTIRE** section.
50/78	**33**	Impoundment: 12-33-5078 All access and/or pipeline corridors in **S1/2** of this section.
49/78	**4**	**Wells: 21-4-4978, 22-4-4978, and 41-4-4978** Impoundment: 41-4-4978 All access and/or pipeline corridors in the **NE** and **NENW** of this section.
49/78	**5**	**Wells: 14-5-4978, 23-5-4978, 34-5-4978, and 43-5-4978** Impoundment: 22-5-4978N All access and/or pipeline corridors in the **SE, NESW, SESW, SENW, and SENE** of this section.
49/78	**18**	The proposed template road in the **W1/2** of this section **south of the existing stock tanks**.
49/78	**19**	The proposed template road in the **N1/2** of this section.

1) Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.
2) Nest productivity checks shall be completed for the first five years following project completion. The productivity checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. This applies to the nests listed in Table 3.1 of the Tear Drop POD EA.

b. If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
c. Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

Sage Grouse

1. The following conditions will alleviate impacts to sage-grouse:
   a. No surface disturbing activities are permitted within 2 miles of all sage grouse lek(s) between March 1 and June 15, prior to completion of a greater sage grouse lek survey**. This condition will be implemented on an annual basis for the duration of surface disturbing activities.** This timing limitation will affect the following: **The ENTIRE project area, except the proposed template road in Sections 19 and 20, T49N, R78W.**
      1) If an active lek is identified during the survey, the 2 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 2 mile buffer until the following breeding season (March 1). The required sage grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

b. Well metering, maintenance and other site visits within 2.0 miles of documented sage grouse lek sites should be minimized as much as possible during the breeding season (March 1– June 15).

Sharp-tailed Grouse

1. The following conditions will alleviate impacts to sharp-tailed grouse:
   a. A survey is required for sharp-tailed grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist.
      (1) If an active lek is identified during the survey, the 0.64 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. The required sharp-tailed grouse survey will be conducted by a biologist following WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
      (2) If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 0.5 mile buffer until the following breeding season (April 1).
   b. Creation of raptor hunting perches will be avoided within 0.64 miles of documented sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on grouse.

Migratory Birds

1. All pits associated with water treatment facilities containing more than 17,000 mg/L of sodium concentration will designed to prevent access by migratory birds.

Water Management

1. Secondary reservoir locations have been analyzed for hydrologic and wildlife issues. In order to change the status of a reservoir from 'secondary' to 'primary' a sundry must be submitted, which includes current wildlife survey data and proof of submission of bonding. Reservoir construction will not commence until the sundry has been approved.

2.4 Alternatives Considered but not Analyzed in Detail

Pre-planning:

Lance Oil & Gas has conducted considerable pre-planning for project water management in conjunction with the landowners to arrive at the strategy for water management proposed in this plan of development.

The landowners have participated in choosing impoundment sites and have approved the locations proposed for water discharge and the impoundment structures that will contain water on the surface they own. Further, the landowners have approved the appropriate State Engineer permit applications for the design of the impoundments.

Alternatives considered:

A variety of water management alternatives were considered for the project including the following. Factors that contributed to these alternatives not being chosen are noted.

Direct Discharge:

a. Direct discharge to Flying E Creek, Dry Creek, and their tributaries.
b. Landowners expressed concerns regarding impacts to ranching operations.
c. May cause adverse impacts to channels.

Land Application:

d. Good irrigation sites were not readily available.
e. Substantial soil remediation would have been required.
f. Costs would be substantially increased over the proposed alternative due to ongoing operational and monitoring costs.
g. Land application is not a year-round strategy, and as such storage would still be required for the non – irrigation season.

Re-injection into disposal wells and/or Aquifer Storage and Retrieval:

a. No geologic formation could be found that appeared that it would economically receive the quantities of water anticipated.
b. Surface disturbance associated with drilling of injection wells, tank batteries and additional ditching for high pressure water lines was not desirable.
c. Re-injection reduces the beneficial use of the water for livestock, which was a desired result for the project.

Water Treatment:

a. Water Treatment strategies have been researched, and with current technology available costs were prohibitive for this project and/or sufficient water treatment capacity could not be economically established with that current technology.
b. Treatment technologies considered were Counter Current Ion Exchange, Reverse Osmosis, Capacitive Ion Removal, Freeze-Thaw Technology.
c. Treatment philosophies which produce a waste stream require either that waste stream to be disposed of in a commercial injection well or further treatment by evaporation on site. These additional costs and/or disturbance detracted from their viability for this project.

Artificial Wetlands

a. This alternative was not chosen as the preferred alternative as it does not effectively address dissolved solids or the water volume needs of the project.
b. Landowners did not desire production of large wetland areas.

2.5. Summary of Alternatives

A summary of the infrastructure currently existing within the POD area (Alternative A), the infrastructure originally proposed by the operator (Alternative B), and the infrastructure within the BLM/operator modified proposal (Alternative C) are presented in Table 2.5.

Table 2.5 Summary of the Alternatives

Facility	Alternative A (No Action) Existing Number or Miles	Alternative B (Original Proposal) Proposed Number or Miles	Alternative C (Environmental Alt.) Revised Number or Miles
Total CBNG Wells	40 (w/in the Teardrop POD area)	46	43
Total Locations		46	43
Nonconstructed Pads		0	6
Slotted Pads		28	20
Constructed Pads		18	17
Conventional Wells	2	N/A	N/A
Gather/Metering Facilities	0	0	0
Compressors	1	0	0
Monitor Wells	5	0	0
Impoundments		23	18
On-channel	5	17	16
Off-channel	0	6	2
Water Discharge Points	1	23	18
Treatment Facilities	0	0	0
Improved Roads	10.7		
No Corridor		0	9.0
With Corridor		11.6	13.6
2-Track Roads	12.1	0	
No Corridor			.04
With Corridor		1.5	2.5
Buried Utilities	0		
No Corridor		2.6	5.0
With Corridor		13.1	16.1
Overhead Powerlines	6.2	3.0	7.3
Communication Sites	0	0	0
Staging/Storage Areas	1	0	1
Other Disturbance			
Acres of Disturbance		209.12	314.0
Existing Roads identified for reclamation, not to be used due to highly erosive soils, slope and inadequate room for new infrastructure		0	2.5

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on May 25, 2007. Field inspections of the proposed Teardrop POD CBNG project were conducted on November 4-9, 2007 by;

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NAME	TITLE	AGENCY
Joy Kennedy	Regulatory Agent	Lance Oil & Gas Company
Colt Rodeman	Senior Foremen	Lance Oil & Gas Company
Tammy Hitt	Regulatory Analyst	Lance Oil & Gas Company
Ethan Jahnke	Federal Permit Coordinator	Lance Oil & Gas Company
Liz Hunter	Civil Engineer	KLJ Engineering
Eric Holborn	Natural Resource Specialist	BLM
Jennifer Morton	Wildlife Biologist	BLM
Guymen Easdale	Wildlife Biologist	BLM
Mike McKinley	Hydrologist	BLM
Wendy Sutton	Archeologist	BLM
Hilaire Peck	Civil Engineer	BLM

This section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major issues. Certain critical environmental components require analysis under BLM policy. These items are presented below in Table 3.1.

Table 3.1 - Critical elements requiring mandatory evaluation are presented below.

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species		X		Jennifer Morton
Floodplains			X	Eric Holborn
Wilderness Values			X	Eric Holborn
ACECs			X	Eric Holborn
Water Resources	X			Mike Mckinley
Air Quality	X			Eric Holborn
Cultural or Historical Values		X		Wendy Sutton
Prime or Unique Farmlands			X	Eric Holborn
Wild & Scenic Rivers			X	Eric Holborn
Wetland/Riparian			X	Mike Mckinley
Native American Religious Concerns			X	Wendy Sutton
Hazardous Wastes or Solids		X		Eric Holborn
Invasive, Nonnative Species	X			Eric Holborn
Environmental Justice		X		Eric Holborn

3.1. Topographic Characteristics of Project Area

The Teardrop Plan of Development area is located in eastern Johnson County, Wyoming, immediately north of Interstate- 90's Indian Creek exit. The development area is located within the Dry Creek watershed and Flying E Creek which are both tributaries to the Upper Powder River. The area is semi-badland country with many erosional features (buttes, badlands, break valleys, and canyons) and sparse

vegetation. The elevation changes and presence of woody species provide a windbreak effect while also capturing additional moisture; vegetation from semi-desert to woodland, are supported.

This is an area of extensive existing CBNG development, as well as some existing conventional oil and gas production. Most of the roads which will be used for access to the proposed wells were constructed or improved to accommodate the current Federal, Fee or State of Wyoming minerals production and/or existing cattle operations.

3.2. Vegetation & Soils

General vegetation communities within the project area consist of sagebrush/grassland. Wyoming big sagebrush intermixed with various native bunch grasses dominates the vegetative composition of the project area. Grass species consist of needle and thread, western wheatgrass, cheatgrass, threadleaf sedge, little bluestem, and buffalo grass. Broom snakeweed, rubber rabbitbrush, and prickly pear are found interspersed throughout the area. Juniper trees were observed along incised draws, cottonwood trees and willows were observed in draw bottoms and along the Powder River flood plain. Differences in dominant species within the project area vary with soil type, aspect, and topography.

Soils within the project area were identified from the *North Johnson County Survey Area, Wyoming (WY719).* At this time soil survey data does not exist for the whole project area. The soil surveywas performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area and on-site field work conducted by BLM. The soils and landforms of this area present distinct challenges for reclamation. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 2 to 4 inches on ridges to 8 inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope. Reclamation potential of soils also varies throughout the project area. Areas with limited reclamation capability and/or highly erosive soils were identified by BLM specialists and the operator during the pre-approval onsite inspection.

The main soil limitations in the project area include: depth to bedrock, low organic matter content, soil droughtiness, low water holding capacity, and high erosion potential especially in areas of steep slopes.

Ecological Site Descriptions are used to provide soils and vegetation information needed for resource identification, management and reclamation recommendations. To determine the appropriate Ecological Sites for the area contained within this proposed action, BLM specialists analyzed data from onsite field reconnaissance and Natural Resources Conservation Service published soil survey soils information. The map unit symbols identified for the soils and the associated ecological sites found within the POD boundary are listed in the table below.

Map Unit Symbol	Ecological Site
639	LOAMY (10-14NP)
684	SHALLOW CLAYEY (10-14NP)
707	LOAMY (10-14NP)
708	LOAMY (10-14NP)
709	LOAMY (10-14NP)
718	SANDY (10-14NP)

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are: ***Shallow Clayey and Loamy 10-14" precipitation zone Northern Plains.***

The *shallow clayey sites* occur on slopes and ridge tops on landforms which include hill sides, ridges and escarpments in the 10-14”precipitation zone. The soils of this site are shallow (less than 20" to bedrock) well drained soils that formed in alluvium or residuum derived from unspecified shale. These soils have moderate to slow permeability and may occur on all slopes. The bedrock is clay shale which is virtually impenetrable to plant roots. The main soil limitations include depth to bedrock and clay content.

The *loamy sites* occur on gently undulating to rolling land on landforms which include hill sides, alluvial fans, ridges and stream terraces, in the 10-14 inch precipitation zone. The soils of this site are moderately deep to deep (greater than 20" to bedrock), well drained soils that formed in alluvium and residuum derived from sandstone and shale. These soils have moderate permeability.

The present plant community for the project area, for both identified ecological sites, is defined as; Mixed Sagebrush/Grass. Big sagebrush is a significant component of this plant community. Cool-season grasses make up the majority of the understory with the balance made up of short warm-season grasses, annual cool-season grass, and miscellaneous forbs. Dominant grasses include rhizomatous wheatgrasses, and green needlegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Plains pricklypear and winterfat can also occur. Cheatgrass (downy brome) has invaded the project area.

3.2.1. Wetlands/Riparian

Riparian areas within the Tear Drop project area were not found along unnamed tributaries and portions of Flying E and Dry Creek. Along the banks of the Powder River riparian environment exists primarily due to natural flow.

3.2.2. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory databases on the Wyoming Energy Resource Information Clearinghouse (WERIC) web site (www.weric.info):

- salt cedar
- Russian knapweed
- leafy spurge

The WERIC database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105).

3.3. Wildlife

Land cover within the project area consists of sagebrush interspersed with short native grasses including blue grama, and Western wheatgrass. Scattered juniper and plains cottonwood trees are found in upland draws throughout the project area with more mature individual cottonwoods occurring in the larger drainages. Current land uses within the project area include CBNG development and livestock grazing.

Several resources were consulted to identify wildlife species that may occur in the proposed project area. Resources that were consulted include the wildlife database compiled and managed by the BLM Buffalo Field Office (BFO) wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD).

A habitat assessment and wildlife inventory surveys were performed by Big Horn Environmental Consultants (BHEC) (Maechtle 2007). BHEC performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to Powder River

Basin Interagency Working Group (PRBIWG) accepted protocol. No formal surveys were conducted for Ute ladies'-tresses orchid as well locations and other infrastructure within the project area are located in dry upland vegetation and the drainages within the project area are ephemeral. PRB IWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM biologist conducted field visits on November 6-9, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the PRB FEIS (pg. 3-114). Species that have been identified in the project area or that have been noted as being of special importance are described below.

3.3.1. Big Game

Big game species expected to be within the Tear Drop project area include pronghorn antelope and mule deer. The project area provides winter-yearlong range for mule deer and yearlong range for pronghorn. Big game seasonal range maps and definitions are available in the PRB FEIS (3-119-143), the project file, and from the WGFD.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of the Powder River. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available about them. Confluence Consulting, Inc. identified the following species present within the Clear Creek and Powder River watersheds: Woodhouse's toad, Northern leopard frog, gopher snake, and garter snake (2004). Because sampling at the upper two sites on Clear Creek occurred late in the season, seasonality may have influenced the lack of reptiles and amphibians observed at these sites.

3.3.3. Migratory Birds

A wide variety of migratory birds may be found in the proposed project area at some point throughout the year. Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the calendar year. Many species that are of high management concern use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Migratory bird species of management concern that may occur in the project area are listed in the PRB FEIS (3-151).

3.3.4. Raptors

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, bald eagle, rough-legged hawk, merlin, Cooper's hawk, northern goshawk, long-eared owl, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rocky outcrops, and tree cavities.

Ten raptor nest sites were identified by BHEC (Maechtle 2007) and BLM within 0.5 mile of the project area in 2006, of these, seven nests were active. In 2007, BHEC identified eight additional nests within the project area. Of the eighteen nests, twelve were active in 2007.

Table 3.1. Documented raptor nests within the Tear Drop project area in 2006 and 2007.

BLM ID#	SPECIES	UTM (NAD 83)	LEGAL LOCATION	SUBSTRATE	CONDITION /STATUS IN 2006	CONDITION / STATUS IN 2007
2234	Golden eagle	398986E 4904659N	NWSE Sec. 20 T50N, R78W	Cottonwood, live	Good / Active	Excellent / Active
2647	Great-horned owl	399346E 4903150N	NESE Sec. 29 T50N, R78W	Cottonwood, live	Good / Active	Good / Active - failed
2825	Great-horned owl	398853E 4899870N	NWSE Sec. 5 T49N, R78W	Cottonwood, live	Good / Inactive	Fair / Active
2826	Unknown	397891E 4898423N	NWSW Sec. 8 T49N, R78W	Juniper, live	Fair / Inactive	Good / Inactive
3563	Red-tailed hawk	399480E 4902884N	SESE Sec. 29 T50N, R78W	Cottonwood, live	Good/ Active	Fair / Active
4438	Red-tailed hawk	401236E 4905241N	SWNW Sec. 22 T50N, R78W	Creek bank	Good / Active	
4439	Long-eared owl	397371E 4903825N	SWNE Sec. 30 T50N, R78W	Juniper, live	Good / Active	Good / Active
4440	Red-tailed hawk	397701E 4898732N	SENE Sec. 7 T49N, R78W	Cottonwood, dead	Good / Active	Gone / Inactive
1274	Great-horned owl	400469E 4898632N	SENW Sec. 4 T49N, R78W	Cottonwood, live	Fair / Active	Fair / Inactive
492	Unknown	398408E 48998632N	SENW Sec. 8 T49N, R78W	Cottonwood, live	Unknown / Unknown	Good / Active
4819	Red-tailed hawk	401601E 4899555N	SESW Sec. 3 T49N, R78W	Cottonwood, live	New in 2007	Good / Active
4820	Long-eared owl	401698E 4899450N	SESW Sec. 3 T49N, R78W	Juniper, live	New in 2007	Fair / Active
4821	Unknown	401770E 4899437N	SESW Sec. 3 T49N, R78W	Juniper, live	New in 2007	Fair / Inactive
4871	Red-tailed hawk	398650E 4898437N	NWSE Sec. 8 T49N, R78W	Cottonwood, live	New in 2007	Good / Active
None	American kestrel	397427E 4904102N	NWNE Sec. 30 T50N, R78W	Creek bank	New in 2007	Good / Active
None	Red-tailed hawk	401522E 4905084N	NESW Sec. 30 T50N, R78W	Man-made structure	New in 2007	Good / Active
None	Unknown	401518E 4905067N	NWSW Sec. 22 T50N, R78W	Man-made structure	New in 2007	Good / Inactive
None	Red-tailed hawk	401236E 4905241N	SWNW Sec. 22 T50N, R78W	Creek bank	New in 2007	Fair / Active - failed

3.3.5. Threatened and Endangered and Sensitive Species

3.3.5.1. Threatened and Endangered Species

Within the BLM Buffalo Field Office there are two species that are Threatened or Endangered under the Endangered Species Act.

3.3.5.1.1. Black-footed ferret

The USFWS listed the black-footed ferret as Endangered on March 11, 1967. Active reintroduction efforts have reestablished populations in Mexico, Arizona, Colorado, Montana, South Dakota, Utah, and Wyoming. In 2004, the WGFD identified six prairie dog complexes (Arvada, Sheridan, Pleasantdale, Four Corners, Linch, Kaycee, and, Thunder Basin National Grasslands) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Grenier et al. 2004).

This nocturnal predator is closely associated with prairie dogs, depending almost entirely upon them for its food. The ferret also uses old prairie dog burrows for dens. Current science indicates that a black-footed ferret population requires at least 1000 acres of black-tailed prairie dog colonies for survival (USFWS 1989).

The WGFD believes the combined effects of poisoning and Sylvatic plague on black-tailed prairie dogs have greatly reduced the likelihood of a black-footed ferret population persisting east of the Big Horn Mountains (Grenier 2003). The U.S. Fish and Wildlife Service has also concluded that black-tailed prairie dog colonies within Wyoming are unlikely to be inhabited by black-footed ferrets (Kelly 2004).

Two black-tailed prairie dog colonies were identified during site visits by the BLM biologist within the project area. Six additional colonies are located within 0.9 mile (Table 3.2). The project area is located approximately nine miles from the Arvada complex, the nearest potential reintroduction area. Black-footed ferret habitat is not present within the Tear Drop project area as the area of suitable habitat present is insufficient to support ferrets.

Table 3.2. Black-tailed prairie dog colonies within and surrounding the Tear Drop project area.

Legal Location	Approximate Size (acres)	Status
Within the project area		
SESE Sec. 21,T50N, R78W	**12.8**	**Active**
SENE Sec. 21,T50N, R78W	**4.2**	**Active**
Outside the project area, but within 0.9 mile of colonies		
SESE Sec. 16, T50N, R78W	**5.9**	**Active**
SWSW Sec. 23, T50N, R78W	**10.8**	**Active**
SESW Sec. 23, T50N, R78W	**5.8**	**Active**
SESW Sec. 23, T50N, R78W	**4.6**	**Active**
WNW Sec. 25, T50N, R78W	**12.1**	**Active**
NWNE Sec. 25, T50N, R78W	**10.5**	**Active**
Total	**66.7**	

3.3.5.1.2. Ute Ladies'-Tresses Orchid

Flying E Creek, Dry Creek, and their tributaries are ephemeral. No springs were documented within the project area. BHEC found that the ephemeral drainages within the project area have heavy clay soils and immediately rise up to upland vegetation (Maechtle 2007). Suitable orchid habitat is not present within the Tear Drop project area.

3.3.5.2. Sensitive Species

The USDI Bureau of Land Management (BLM) Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. Two habitat types, prairie dog colonies and sagebrush ecosystems, specifically, are the most common among habitat types within the Powder River Basin and contain habitat components required in the life cycle of several sensitive species. These are described below in general terms. Those species within the Powder River Basin that were once listed or candidates for listing under the Endangered Species Act of 1973 and remain BLM Wyoming sensitive species are described in more detail. The authority for this policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.5.2.1. Prairie dog colony obligates

Prairie dog colonies create habitat for many species of wildlife (King 1955, Reading et al. 1989). Agnew

(1986) found that bird species diversity and rodent abundance were higher on prairie dog towns than on mixed grass prairie sites. Several studies (Agnew 1986, Clark 1982, Campbell and Clark 1981 and Reading et al. 1989) suggest that species richness increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of prey species (Clark 1982, Agnew 1986, Agnew 1988).

In South Dakota, forty percent of the wildlife taxa (134 vertebrate species) are associated with prairie dog colonies (Agnew 1983, Apa 1985, McCracken et al. 1985, Agnew 1986, Uresk and Sharps 1986, Deisch et al. 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list: swift fox (*Vulpes velox*), mountain plover (*Charadrius montanus*), ferruginous hawk (*Buteo regalis*), burrowing owl (*Athene cunicularia*), loggerhead shrike (*Lanius ludovicianus*), and long-billed curlew (*Numenius americanus*). Species observed by BHEC include burrowing owls.

3.3.5.2.2. Sagebrush obligates

Sagebrush ecosystems support a variety of species. Sagebrush obligates are animals that cannot survive without sagebrush and its associated perennial grasses and forbs; in other words, species requiring sagebrush for some part of their life cycle. Sagebrush obligates within the Powder River Basin, listed as sensitive species by BLM Wyoming include greater sage-grouse, Brewer's sparrow, sage thrasher, and sage sparrow. Sage sparrows, Brewer's sparrows, and sage thrashers all require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Sage thrashers usually nest in tall dense clumps of sagebrush within areas having some bare ground for foraging. Sage sparrows prefer large continuous stands of sagebrush, and Brewer's sparrows are associated closely with sagebrush habitats having abundant scattered shrubs and short grass (Paige and Ritter 1999). Other sagebrush obligate species include pygmy rabbit, sagebrush vole, pronghorn antelope, and sagebrush lizard.

3.3.5.2.3. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered. On August 8, 2007, the bald eagle was removed from the Endangered Species list. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (WY07F0075) (USFWS 2007) shall continue to be complied with.

Bald eagle nesting habitat is generally found in areas that support large mature trees. Eagles typically will build their nests in the crown of mature trees that are close to a reliable prey source. This species feeds primarily on fish, waterfowl, and carrion. In more arid environments, such as the Powder River Basin, prairie dogs, ground squirrels, and lagomorphs (hares and rabbits) can make up the primary prey base. The diets of wintering bald eagles are often more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, carcasses of domestic sheep and big game may provide a significant food source in some areas. Historically, sheep carcasses from large domestic sheep ranches provided a reliable winter food source within the Powder River Basin (Patterson and Anderson 1985). Today, few large sheep operations remain in the Powder River Basin. Wintering bald eagles may congregate in roosting areas generally made up of several large trees clumped together in stands of large ponderosa pine, along wooded riparian corridors, or in isolated groups. Bald eagles often share these roost sites with golden eagles as well.

Flying E Creek and Dry Creek contain few mature trees able to support roosting or nesting bald eagles. Habitat exists approximately six miles to the east (Powder River) and five miles to the west and northwest (Crazy Woman Creek). Terrestrial-based prey sources are limited to the few small prairie dog colonies located within and surrounding the project area. No bald eagle observations have been recorded within the immediate project area or extending one mile from proposed activities.

3.3.5.2.4. Black-tailed prairie dog

The black-tailed prairie dog was added to the list of Candidate species for federal listing on February 4, 2000 (USFWS 2000). On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. BLM Wyoming, considers prairie dogs as a sensitive species and continues to afford this species the protections described in the PRB FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains.

Due to human-caused factors, black-tailed prairie dog populations are now highly fragmented, and isolated (Miller 1994). Most colonies are small and subject to potential extirpation due to inbreeding, population fluctuations, and other problems, such as landowner poisoning and disease that affect long term population viability (Primack 1993, Meffe and Carroll 1994, Noss and Cooperrider 1994).

The black-tailed prairie dog is considered common in Wyoming, although its abundance fluctuates with activity levels of Sylvatic plague and the extent of control efforts by landowners. Comparisons with 1994 Digital Ortho Quads indicated that black-tailed prairie dog acreage remained stable from 1994 through 2001. However, aerial surveys conducted in 2003 to determine the status of known colonies indicated that a significant portion (approximately 47%) of the prairie dog acreage was impacted by Sylvatic plague and/or control efforts (Grenier 2004).

Two black-tailed prairie dog colonies were identified during site visits by the BLM biologist within the project area (see Table 3.2 for colonies within the project area).

3.3.5.2.5. Burrowing owl

The burrowing owl is a small, long-legged owl found throughout open landscapes of North and South America. Burrowing owls can be found in grasslands, rangelands, agricultural areas, deserts, or any dry open area with low vegetation where abandoned burrows dug by mammals such as ground squirrels (*Spermophilus spp*.), prairie dogs (*Cynomys spp.),* and badgers (*Taxidea taxus*) are available. Black-tailed prairie dog colonies provide the primary habitat for burrowing owls (Klute et al. 2003).

The western burrowing owl has declined significantly throughout its North American range. Current population estimates for the United States are not well known but trend data suggest significant declines (McDonald et al. 2004). The last official population estimate placed them at less than 10,000 breeding pairs. The majority of the states within the owl's range have recognized that western burrowing owl populations are declining. It is listed as a sensitive species by the BLM throughout the west and by the USDAFS. Primary threats across the North American range of the burrowing owl are habitat loss and fragmentation primarily due to intensive agricultural and urban development, and habitat degradation due to declines in populations of colonial burrowing mammals (Klute et al. 2003).

Burrowing owl nesting habitat consists of open areas with mammal burrows. Individual burrowing owls have moderate to high site fidelity to breeding areas and even to particular nest burrows (Klute et al. 2003). Burrow and nest sites are reused at a higher rate if the bird has reproduced successfully during the previous year. Favored nest burrows are those in relatively sandy sites (possibly for ease of modification and drainage), areas with low vegetation around the burrows (to facilitate the owl's view and hunting success), holes at the bottom of vertical cuts with a slight downward slope from the entrance, and slightly elevated locations. In Wyoming, egglaying begins in mid-April. Incubation is assumed to begin at the mid-point of the laying period and lasts for 26 days (Olenick 1990). Young permanently leave the primary nest burrow around 44 days from hatch (Landry 1979). Juveniles will continue to hunt with and associate with parents until migration (early September through early November) (Haug 1985).

The BLM BFO database indicates one active burrowing owl nest at the following locations within the

project area or within 0.25 mile of the Tear Drop project area in 2007: SWSW Section 22, T50N, R78W (UTMs 401119E, 4904462N).

3.3.5.2.6. Grouse

3.3.5.2.6.1. Greater sage-grouse

The Greater sage-grouse is listed as a sensitive species by BLM (Wyoming). In recent years, several petitions have been submitted to the USFWS to list greater sage-grouse as Threatened or Endangered. On January 12th, 2005, the USFWS issued a decision that the listing of the greater sage-grouse was "not warranted" following a Status Review. The decision document supporting this outcome noted the need to continue or expand all conservation efforts to conserve sage-grouse. A judge in Idaho ordered the USFWS to conduct a new Status Review as a result of a lawsuit and questions surrounding the 2005 review (Winmill Decision Case No. CV-06-277-E-BLW, December 2007).

Greater sage-grouse are found in prairie, sagebrush shrublands, other shrublands, wet meadows, and agricultural areas; they depend upon substantial sagebrush stands for nesting and winter survival (BLM 2003). Suitable sage-grouse habitat is present throughout the project area. Large patches of high quality sage-grouse nesting and brood-rearing habitat exist in the northwest one-third and southeast quarter of the northern portion of the project area. A very large, landscape-scale patch of high quality sage-grouse nesting and brood-rearing habitat exists within and surrounding the western two-thirds of the southern portion of the project area. Sage-grouse sign was observed by BLM biologists within Sections 4 and 7, T49N, R78W and Sections 20, 21, 22, and 31, T50N, R78W. The entire project area has been identified as suitable wintering habitat (Naugle 2006). BLM records identified eight sage grouse leks within 3 miles of the Tear Drop POD. These lek sites are identified below (Table 3.3).

Table 3.3. Sage-grouse leks surrounding the Tear Drop project area.

LEK NAME	LEGAL LOCATION	STATUS YEAR / PEAK MALES	DISTANCE FROM PROJECT AREA (MILES)
Bear Draw	SWSE Sec. 16 T50N, R78W	'04/0, '05/24, '06/1, '07/0	0.29
BLM	SE Sec. 36 T50N, R79W	'85/38, '86/37, '95/0, '00/0, '02/0, '03/0, '04/0, '05/9, '06/20, '07/0	0.71
BLM Alt. Location	NWSE Sec. 36 T50N, R79W	'07/15	0.75
Flying E Creek	SENE Sec. 11 T49N, R79W	'01/8(unk), '02/0, '03/0, '04/37, '05/33, '06/56, '07/56	1.15
Tear Drop	NESE Sec. 33 T50N, R78W	'06/13, '07/8	0.0
Tear Drop II	SENW Sec. 32 T50N, R78W	'06/14, '07/15	0.58
Upper Dry Creek I	NENW Sec. 27 T50N, R79W	'01/4(unk), '04/2, '05/2, '06/30(unk), '07/7	2.93
Upper Dry Creek II	NWSW Sec. 14 T50N, R79W	'04/24, '05/69, '06/55, '07/51	3.00
Coal Gulch	SENE Sec. 5 T50N, R79W	'04/32, '05/34, '06/124, '07/95	2.46

These leks represent eight of the ten leks that make up the BLM lek complex. A complex is represented by a group of leks that are relatively close and represents part or all of a single breeding population and between which male sage grouse may be expected to interchange from one day to the next.

3.3.5.2.6.2. Sharp-tailed grouse

Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. In Wyoming, this species is found where grasslands are intermixed with shrublands, especially wooded draws, shrubby riparian area, and wet meadows.

The Tear Drop project area has the potential to support sharp-tailed grouse during most of the year. The mosaic of grasslands and sagebrush-grasslands could provide habitat from April through October. Cottonwoods and junipers could provide buds and berries, respectively, to sustain grouse through the winter. Three sharp-tailed grouse leks are located within 3.5 miles of the project area.

3.3.5.2.7. Mountain plover

The mountain plover was proposed for listing in 1999 (USFWS). In 2003, the USFWS withdrew a proposal to list the Mountain Plover as a Threatened species, stating that the population was larger than had been thought and was no longer declining. Mountain plovers, which are a BLM sensitive species, are typically associated with high, dry, short grass prairies (BLM 2003). Mountain plover nesting habitat is often associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Suitable mountain plover habitat is very limited within the project area. Due to rough topography and large amounts of sagebrush, habitat for mountain plovers only exists along ridge tops and in draw bottoms, but is not of sufficient size to likely be utilized by nesting mountain plovers. No plovers were observed by BHEC during surveys conducted in 2006 and 2007.

3.4. West Nile Virus

West Nile virus (WNv) is a mosquito-borne disease that can cause encephalitis or brain infection. Mosquitoes spread this virus after they feed on infected birds and then bite people, other birds, and animals. WNv is not spread by person-to-person contact, and there is no evidence that people can get the virus by handling infected animals.

Since its discovery in 1999 in New York, WNv has become firmly established and spread across the United States. Birds are the natural vector host and serve not only to amplify the virus, but to spread it. Though less than 1% of mosquitoes are infected with WNv, they still are very effective in transmitting the virus to humans, horses, and wildlife. *Culex tarsalis* appears to be the most common mosquito to vector, WNv.

The human health issues related to WNv are well documented and continue to escalate. Historic data collected by the CDC and published by the USGS at www.westnilemaps.usgs.gov are summarized below. Reported data from the Powder River Basin (PRB) includes Campbell, Sheridan and Johnson counties.

Table 3.4 Historical West Nile Virus Information

Year	Total WY Human Cases	Human Cases PRB	Veterinary Cases PRB	Bird Cases PRB
2001	0	0	0	0
2002	2	0	15	3
2003	392	85	46	25
2004	10	3	3	5

2005	12	4	6	3
2006	65	0	2	2
2007*	155	22	Unk	1

*Wyoming Department of Health Records September 12, 2007.

Human cases of WNv in Wyoming occur primarily in the late summer or early fall. There is some evidence that the incidence of WNv tapers off over several years after a peak following initial outbreak (Litzel and Mooney, personal conversations). If this is the case, occurrences in Wyoming are likely to increase over the next few years, followed by a gradual decline in the number of reported cases.

Although most of the attention has been focused on human health issues, WNv has had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNv had been detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations have incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNv. During 2003, 36 raptors were documented to have died from WNv in Wyoming including golden eagle, red-tailed hawk, ferruginous hawk, American kestrel, Cooper's hawk, northern goshawk, great-horned owl, prairie falcon, and Swainson's hawk (Cornish et al. 2003). Actual mortality is likely to be greater. Population impacts of WNv on raptors are unknown at present. The Wyoming State Vet Lab determined 22 sage-grouse in one study project (90% of the study birds), succumbed to WNv in the PRB in 2003. While birds infected with WNv have many of the same symptoms as infected humans, they appear to be more sensitive to the virus (Rinkes 2003).

Mosquitoes can potentially breed in any standing water that lasts more than four days. In the Powder River Basin, there is generally increased surface water availability associated with CBNG development. This increase in potential mosquito breeding habitat provides opportunities for mosquito populations to increase. Preliminary research conducted in the Powder River Basin indicates WNv mosquito vectors were notably more abundant on a developed CBNG site than two similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNv, such as *Culex tarsalis*, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

The most common pesticide treatment is to place larvicidal briquettes in small standing water pools along drainages or every 100 feet along the shoreline of reservoirs and ponds. It is generally accepted that it is not necessary to place the briquettes in the main water body because wave action prevents this environment from being optimum mosquito breeding habitat. Follow-up treatment of adult mosquitoes with malathion may be needed every 3 to 4 days to control adults following application of larvicide (Mooney, personal conversation). These treatment methods seem to be effective when focused on specific target areas, especially near communities, however they have not been applied over large areas nor have they been used to treat a wide range of potential mosquito breeding habitat such as that associated with CBNG development.

The WDEQ and the Wyoming Department of Health sent a letter to CBNG operators on June 30, 2004. The letter encouraged people employed in occupations that require extended periods of outdoor labor, be provided educational material by their employers about WNv to reduce the risk of WNv transmission. The letter encouraged companies to contact either local Weed and Pest Districts or the Wyoming Department of Health for surface water treatment options.

3.5. Water Resources

The project area is within the Upper Powder River drainage system. The upper reaches and the main portion of the Flying E Creek watershed and three unnamed tributaries to Dry Creek consist of steep, dissected terrain with slopes at times exceeding 40%. The watersheds have slope gradients in the range of 5 to 15 % throughout their catchments. The main stems and most tributaries possess a sinuous, well-vegetated channel bottom with a well-defined low flow channel.

3.5.1. Groundwater

WDEQ water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for TDS: 500 mg/l TDS for Drinking Water (Class I), 2000 mg/l for Agricultural Use (Class II) and 5000 mg/l for Livestock Use (Class III).

The ROD includes a Monitoring, Mitigation and Reporting Plan (MMRP). The objective of the plan is to monitor those elements of the analysis where there was limited information available during the preparation of the EIS. The MMRP called for the use of adaptive management where changes could be made based on monitoring data collected during implementation.

Specifically relative to groundwater, the plan identified the following (PRB FEIS ROD page E-4):

- The effects of infiltrated waters on the water quality of existing shallow groundwater aquifers are not well documented at this time;
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites around the basin to quantify these impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and;
- Shallow groundwater wells would be installed and monitored where necessary.

The BLM has installed shallow groundwater monitoring wells at five impoundment locations throughout the PRB to assess ground-water quality changes due to infiltration of CBNG produced water. The most intensively monitored site has a battery of nineteen wells which have been installed and monitored jointly by the BLM and USGS since August, 2003. Water quality data has been sampled from these wells on a regular basis. That impoundment lies atop approximately 30 feet of unconsolidated deposits (silts and sands) which overlie non-uniform bedrock on a side ephemeral tributary to Beaver Creek and is approximately one and one-half miles from the Powder River. Baseline investigations showed water in two sand zones, the first was at a depth of 55 feet and the second was at a depth of 110 feet. The two water bearing zones were separated by a fifty-foot thick shale layer. The water quality of the two water bearing zones fell in the WDEQ Class III and Class I classifications respectively. Preliminary results from this sampling indicate increasing levels of TDS and other inorganic constituents over a six month period resulting in changes from the initial WDEQ classifications.

The on-going shallow groundwater impoundment monitoring at four other impoundment locations are less intensive and consist of batteries of between 4 and 6 wells. Preliminary data from two of these other sites also are showing an increasing TDS level as water infiltrates while two other sites are not.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 3 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 20 to 120 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

3.5.2. Surface Water

The project area is within the Flying E Creek and Dry Creek drainages, which are tributaries to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated grassy swales, without defined bed and bank.

The PRB FEIS presents the historic mean Electrical Conductivity (EC, in µmhos/cm) and Sodium Adsorption Ratio (SAR) by watershed at selected United States Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS page 3-49). These water quality parameters "illustrate the variability in ambient EC and SAR in streams within the project area. The representative stream water quality is used in the impact analysis presented in Chapter 4 as the baseline for evaluating potential impacts to water quality and existing uses from future discharges of CBM produced water of varying chemical composition to surface drainages within the Project Area" (PRB FEIS page 3-48). For the Upper Powder River, the EC ranges from 1,797 at Maximum monthly flow to 3,400 at Low monthly flow and the SAR ranges from 4.76 at Maximum monthly flow to 7.83 at Low monthly flow. These values were determined at the USGS station located at Arvada, WY (PRB FEIS page 3-49).

The operator has not identified any natural springs within ½ mile of this POD boundary.

For more information regarding surface water, please refer to the PRB FEIS Chapter 3 Affected Environment pages 3-36 through 3-56.

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the Teardrop POD project, following the Secretary of the Interior's Guidelines and Standards. A Class III inventory specifically for the project was conducted by NPAS (BLM project no. 70070137). The inventory covered approximately 3,939 acres; this inventory recorded, rerecorded, or revisited 8 sites and 20 isolates. Sites and isolates are defined as specified by the *2006 State Protocol Between the Wyoming Bureau of Land Management State Director and the Wyoming State Historic Preservation Officer*. Additional Class III inventories within the project area were also consulted during the review of the proposed action (BLM project nos. 70050085 and 70050060). The following cultural resources are located in or near the APE (area of potential effect).

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48JO2571	Prehistoric	NE
48JO2578	Historic	NE
48JO2870	Prehistoric	NE
48JO2871	Prehistoric	E
48JO2874	Prehistoric & Historic	NE
48JO3854	Prehistoric	E
48JO3855	Historic	NE
48JO3856	Prehistoric	NE

Site Number	Site Type	National Register Eligibility
IR1	Prehistoric	NE
IR2	Prehistoric	NE
IR3	Historic	NE
IR4	Prehistoric	NE
IR5	Prehistoric	NE
IR7	Prehistoric & Historic	NE
IR8	Historic	NE
IR9	Prehistoric	NE
IR10	Prehistoric	NE
IR11	Prehistoric	NE
IR12	Prehistoric	NE
IR13	Prehistoric	NE
IR14	Prehistoric	NE
IR15	Historic	NE
IR16	Historic	NE
IR17	Historic	NE
IR18	Prehistoric	NE
IR19	Prehistoric	NE
IR20	Prehistoric	NE
IR21	Historic	NE

A reservoir (31-21) was initially proposed near an eligible site, 48JO3854. Staking for the reservoir was noted running through the site during the onsite on 11/7/2007. The proposed reservoir was dropped as a result of the onsite, to avoid adverse effects to 48JO3854.

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action (Alternative B) resulted in development of Alternative C as the preferred alternative. The changes have reduced impacts to the environment which will result from this action. The environmental consequences of Alternative C are described below.

4.1. Vegetation & Soils Direct and Indirect Effects

Impacts to vegetation and soils from surface disturbance will be reduced, by following the operator's plans and BLM applied mitigation. Of the 43 well locations, 1 is on a reclaimed conventional well pad,

25 can be drilled without a well pad being constructed and 17 will require a constructed (cut & fill) well pad. Surface disturbance associated with the drilling of the 25 wells without constructed pads would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 2- 32 feet x 20 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 25 wells would involve approximately 0.9 acre/well for 22.5 total acres. The other 17 wells requiring cut & fill pad construction would disturb approximately .9 acres/well pad for a total of 15.3 acres. The total estimated disturbance for all 43 wells would be 37.8 acres.

Approximately 22.63 miles of improved roads would be constructed to provide access to various well locations. Approximately 2.5 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 1.8 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, gabions etc.) would ensure land productivity/stability is regained and maximized.

Proposed stream crossings, including culverts and fords (low water crossings) are shown on the MSUP and the WMP maps (see the POD). These structures would be constructed in accordance with sound, engineering practices and BLM standards.

The PRB FEIS made predictions regarding the potential impact of produced water to the various soil types found throughout the Basin, in addition to physical disturbance effects. "Government soil experts state that SAR values of 13 or more cause potentially irreversible changes to soil structure, especially in clayey soil types, that reduce permeability for infiltration of rainfall and surface water flows, restrict root growth, limit permeability of gases and moisture, and make tillage difficult." (PRB FEIS page 4-144).

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad	6	.9	5.4	Long Term
Constructed Pad	17	.9	15.3	
Slotted Pad	20	.9	18.0	
Gather/Metering Facilities	0	Site Specific		Long Term
Screw Compressors	0	Site Specific		Long Term
Monitor Wells		0.1/acre		Long Term
Impoundments				Long Term
On-channel	16	Site Specific	63.0	
Off-channel	2	Site Specific	14.4	
Water Discharge Points	18	Site Specific or 0.01 ac/WDP	0.18	
Channel Disturbance				
Headcut Mitigation*		Site Specific	0.0	

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Channel Modification		Site Specific	0.0	
Improved Roads				Long Term
No Corridor	9.0	45’ width	48.3	
With Corridor	13.6	50’ width	71.2	
2-Track Roads				Long Term
No Corridor	.04	35’ width	.2	
With Corridor	2.5		10.6	
Pipelines				Short Term
No Corridor	1.84	30’ width	6.7	
Utilities plus buried high voltage power not w/in an access	5.3	45’ width	28.7	Short Term
Overhead Powerlines	0.0	15’ Width		Long Term
Additional Disturbance	1 staging area	300’x650’	4.5	

The designation of the duration of disturbance is defined in the PRB FEIS (pg 4-1 and 4-151). “For this EIS, short-term effects are defined as occurring during the construction and drilling/completion phases. Long-term effects are caused by construction and operations that would remain longer”.

4.1.1. Wetland/Riparian

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges. Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas.” (PRB FEIS Page 4-175). These changes would take place downstream of the discharge into an unnamed Flying E Creek tributary and downstream of any secondary reservoir that is later authorized to receive discharge.

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4.1.2. Invasive Species

Based on the investigations performed during the POD planning process, the operator has committed to the control of noxious weeds and species of concern using the following measures in an Integrated Pest Management Plan (IPMP) included in the proposal:

1. Administer herbicides.

2. Incorporate weed prevention and control measures into environmental restoration and infrastructure maintenance activities (for specifics see Integrated Pest Management Plan (IPMP) in the POD.
3. Initiate a weed education policy to assist contractors and field employees in the identification of noxious weeds and to create an awareness of the impacts of noxious weeds and invasive plants.

Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) are known to exist in the affected environment. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible.

The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed. However, mitigation as required by BLM applied COAs will reduce potential impacts from noxious weeds and invasive plants.

4.1.3. Cumulative Effects

The PRB FEIS stated that cumulative impacts to soils could occur due to sedimentation from water erosion that could change water quality and fluvial characteristics of streams and rivers in the sub-watersheds of the Project Area. SAR in water in the sub-watersheds could be altered by saline soils because disturbed soils with a conductivity of 16 mmhos/cm could release as much as 0.8 tons/acre/year of sodium (BLM 1999c). Soils in floodplains and streambeds may also be affected by produced water high in SAR and TDS. (PRB FEIS page 4-151).

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 18.5% of the total predicted in the PRB FEIS.
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Flying E and Dry Creeks and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River Watershed.
- The WMP for the Teardrop POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, Yearlong range for pronghorn antelope and Winter-Yearlong range for mule deer would be directly disturbed with the construction of wells, reservoirs, pipelines and roads. Table 4.1 summarized the proposed activities; items identified as long term disturbance would be direct habitat loss. Short-term disturbances also result in direct habitat loss; however, they should provide some habitat value as these areas are reclaimed and native vegetation becomes established.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD indicates a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). A multi-year study on the Pinedale Anticline suggests not only do mule deer avoid mineral activities, but after three years of drilling activity the deer have not become accustomed to the disturbance (Madson 2005).

Big game animals are expected to return to the project area following construction; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Mule deer are more sensitive to operation and maintenance activities than pronghorn, and, as the Pinedale Anticline study suggests, mule deer do not readily habituate. A study in North Dakota stated "Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic" (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

Winter big game diets are sub-maintenance, meaning they lose weight and body condition as the winter progresses. Survival below the maintenance level requires behavior that emphasizes energy conservation. Canfield et al. (1999) pointed out that forced activity caused by human disturbance exacts an energetic disadvantage, while inactivity provides an energetic advantage for animals. Geist (1978) further defined effects of human disturbance in terms of increased metabolism, which could result in illness, decreased reproduction, and even death.

Reclamation activities that occur within big game habitats during the spring will likely displace does and fawns due to the human presence in the area. This may cause reduced survival rate of does and fawns that must expend increased energies to avoid such activities.

4.2.1.1. Big Game Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-211.

4.2.2. Aquatics Direct and Indirect Effects

Lance's primary water management strategy includes discharge of the water produced by the Tear Drop project directly into a tributary of Flying E Creek, following treatment at the Bear Draw Unit Beta Reverse Osmosis facility.

If the primary water management strategy is insufficient, produced water may be discharged to 18 proposed on-channel impoundments and three proposed off-channel impoundments. If a reservoir were to discharge, it is unlikely that the produced water will reach a fish-bearing stream.

The Wyoming Department of Environmental Quality (DEQ) regulates effluent discharge through the National Pollution Discharge Elimination System in compliance with the Federal Water Pollution Control Act and the Wyoming Environmental Quality Act. The Wyoming DEQ has established effluent limits for the protection of game and non-game, aquatic life other than fish, wildlife, and other water uses. Aquatic species will not be affected by this project.

4.2.2.1. Aquatics Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-247. No additional mitigation measures are required.

4.2.3. Migratory Birds Direct and Indirect Effects

Disturbance of the habitat types within the project area is likely to impact migratory birds. Native habitats are being lost directly with the construction of wells, roads, and pipelines. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Human activities likely displace migratory birds farther than simply the physical habitat disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

Habitat fragmentation results in more than just a quantitative loss in the total area of habitat available; the remaining habitat area is also qualitatively altered (Temple and Wilcox 1986). Ingelfinger (2004) identified that the density of breeding Brewer's sparrows declined by 36% and breeding sage sparrows declined by 57% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses (displacement) were much greater than the direct physical habitat losses.

Reclamation activities that occur in the spring may be detrimental to migratory bird survival.
Those species that are edge-sensitive will be displaced further away from vegetative edges due to increased human activity, causing otherwise suitable habitat to be abandoned. If the interior habitat is at carrying capacity, then birds displaced from the edges will have no place to relocate. One consequence of habitat fragmentation is a geometric increase in the proportion of the remaining habitat that is near edges (Temple 1986). In severely fragmented habitats, all of the remaining habitat may be so close to edges that no interior habitat remains (Temple and Cary 1988). Over time, this will lead to a loss of interior habitat species in favor of edge habitat species. Other migratory bird species that utilize the disturbed areas for nesting may be disrupted by the human activity and nests may be destroyed by equipment.

The use of the proposed water treatment facility can increase the potential for migratory bird mortality in the evaporation ponds that receive a backwash stream from the conditioning ponds. This evaporation pond will contain a concentrated brine solution. Birds entering this pond can ingest the brine and die from sodium toxicity. Salt toxicosis has been reported in ponds with sodium concentrations over 17,000 mg/L. Ingestion of water containing high sodium levels can chronically affect aquatic birds, especially if a source of fresh water is not available nearby. Aquatic birds ingesting hypersaline water can be more susceptible to avian botulism. During cooler temperatures, sodium in the hypersaline water can crystallize on the feathers', affecting thermoregulatory and buoyancy functions, and causing the bird to die of hypothermia or drowning (Windingstad et al.2004). Effective wildlife exclusionary devices, such as netting, will be required to prevent access by migratory birds, or other options should be utilized to contain and dispose of the brine solution should sodium concentrations rise over 17,000 mg/L.

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same affects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. Migratory Birds Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, Page 4-235. No additional mitigation measures are required.

4.2.4. Raptors Direct and Indirect Effects

Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to overheating or chilling of eggs or chicks. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests.
The 34-5 well was relocated approximately 170 feet southeast to remove it from line-of-sight of a great-horned owl nest. The 33-20 well was relocated approximately 121 feet west, the 24-20 well was relocated approximately 153 west, the 42-20 well was relocated to an existing corral area and the 33-20 and 43-20 wells were removed from the project plan to lessen the impacts to a golden eagle nest.

Table 5. Infrastructure within close proximity (0.5 mile) to documented raptor nests within the Tear Drop project area (Timing limitations will apply to this infrastructure).

BLM ID#	INFRASTRUCTURE	DISTANCE
2234	Impoundment: 23-20-5078	0.17
	Well: 24-20-5078	0.31
	Well: 42-20-5078	0.36
	Well: 32-20-5078	0.39
	Well: 22-20-5078	0.48
4438	Impoundment: Taylor	0.13
	Well: 41-21-5078	0.35
	Well: 44-21-5078	0.43
1274	Impoundment: 41-4-4978	0.09
	Well: 41-4-4978	0.27
	Well: 21-4-4978	0.32
	Well: 22-4-4978	0.45
2825	Well: 34-5-4978	0.15
	Impoundment: 22-5-4978	0.26
	Well: 43-5-4978	0.33
	Well: 23-5-4978	0.38
	Well: 14-5-4978	0.45

Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

4.2.4.1. Raptors Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-221.

4.2.5. Threatened and Endangered and Sensitive Species

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 4.2.5.1. Threatened and Endangered Species potentially affected by the proposed project area are further discussed following the table.

4.2.5.1. Threatened and Endangered Species

Table 4.2 Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (*Mustela nigripes*)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat of insufficient size.
Threatened				
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.

Project Effects
LAA Likely to adversely affect
NE No Effect.
NLAA May Affect, not likely to adversely effect individuals or habitat.

4.2.5.1.1. Black-Footed Ferret Direct and Indirect Effects

Because the black-tailed prairie dog colonies within and adjacent to the Tear Drop project area are of insufficient size for supporting ferrets and are isolated from any prairie dog complexes, implementation of the proposed development should have "*no effect*" on the black-footed ferret.

4.2.5.1.2. Ute Ladies'-Tresses Orchid Direct and Indirect Effects

The Ute ladies'-tresses orchid is threatened by energy developments, noxious weeds, and water developments. Prolonged idle conditions in the absence of disturbance (flooding, grazing, mowing) may be a threat just as repeated mowing and grazing during flowering may lead to decline (Hazlett 1996, 1997, Heidel 2007). Heavy equipment used in energy development construction could dig up plants. Invasive weeds transplanted by vehicle and foot traffic in habitat could out compete this fragile species. Restricting work from areas of Ute ladies'-tresses orchid habitat reduces these impacts.

Many of the reservoirs are located within ephemeral drainages of Flying E Creek. The remaining proposed reservoirs are located in upland habitats. No springs have been identified within the project area. Suitable habitat is not present within the Tear Drop project area.

Impoundments and/or Treatment Facility discharge point may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within the project area. Implementation of the proposed coal bed natural gas project will have "***no effect***" on the Ute ladies'-

tresses orchid as suitable habitat is not present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

BLM will take necessary actions to meet the policies set forth in sensitive species policy (BLM Manual 6840). BLM Manual 6840.22Astates: "The BLM should obtain and use the best available information deemed necessary to evaluate the status of special status species in areas affected by land use plans or other proposed actions and to develop sound conservation practices. Implementation-level planning should consider all site-specific methods and procedures which are needed to bring the species and their habitats to the condition under which the provisions of the ESA are not necessary, current listings under special status species categories are no longer necessary, and future listings under special status species categories would not be necessary."

4.2.5.2.1. Prairie dog colony obligates

Wells, roads, pipelines and other infrastructure associated with energy development constructed within prairie dog colonies will directly remove habitat for prairie dog colony obligate species. Activities that disturb these species could lead to temporary or even long-term or permanent abandonment. Direct loss of species may also occur from vehicle traffic. Continued loss of prairie dog habitat and active prairie dog towns will result in the decline of numerous sensitive species in the short grass prairie ecosystem.

4.2.5.2.2. Sagebrush obligates

Shrubland and grassland birds are declining faster than any other group of species in North America (Knick et al. 2003). In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100 m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001). Increased numbers of corvids and raptors associated with powerlines (Steenhof et al. 1993, Knight and Kawashima 1993, Vander Haegen et al. 2002) increases the potential predation impact on sage-grouse and other sagebrush-breeding birds (Knick et al. 2003)

Fragmentation of shrubsteppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as a remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Populations of sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats (Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of shrub-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return even after habitat reestablishment.

Table 4.3 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*Rana pipiens*)	Beaver ponds, permanent water in plains and foothills	S	BI	Additional habitat will be provided.
Spotted frog (*Ranus pretiosa*)	Ponds, sloughs, small streams	NP	NI	Prairie not mountain habitat.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Grasslands, weedy fields	S	MIIH	Sagebrush cover will be affected.
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	S	MIIH	Sagebrush cover will be affected.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	K	MIIH	Burrowing owl nest present.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Sagebrush cover will be affected.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIPV	Sagebrush cover will be affected.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	NP	NI	Habitat not present.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	NP	NI	Habitat not present.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NP	NI	No forest habitat present.
Peregrine falcon (*Falco peregrinus*)	cliffs	NP	NI	No nesting habitat present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Trumpeter swan (*Cygnus buccinator*)	Lakes, ponds, rivers	S	MIIH	Reservoirs may provide migratory habitat.
White-faced ibis (*Plegadis chihi*)	Marshes, wet meadows	NP	NI	Permanently wet meadows not present.
Yellow-billed cuckoo (*Coccyzus americanus*)	Open woodlands, streamside willow and alder groves	NP	NI	Streamside habitats not present.
Fish				
Yellowstone cutthroat trout (*Oncoryhynchus clarki bouvieri*)	Mountain streams and rivers in Tongue River drainage	NP	NI	Outside species range.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Prairie dog towns will be affected.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines	NP	NI	Habitat not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines	NP	NI	Habitat not present.
Spotted bat (*Euderma maculatum*)	Cliffs over perennial water.	NP	NI	Cliffs & perennial water not present.
Swift fox (*Vulpes velox*)	Grasslands	NP	NI	Habitat not present.
Townsend's big-eared bat (*Corynorhinus townsendii*)	Caves and mines.	NP	NI	Habitat not present.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Plants				
Porter's sagebrush (*Artemisia porteri*)	Sparsely vegetated badlands of ashy or tufaceous mudstone and clay slopes 5300-6500 ft.	NP	NI	Habitat not present.
William's wafer parsnip (*Cymopterus williamsii*)	Open ridgetops and upper slopes with exposed limestone outcrops or rockslides, 6000-8300 ft.	NP	NI	Habitat not present.

Presence
K Known, documented observation within project area.
S Habitat suitable and species suspected, to occur within the project area.
NS Habitat suitable but species is not suspected to occur within the project area.
NP Habitat not present and species unlikely to occur within the project area.

Project Effects
NI No Impact.
MIIH May Impact Individuals or Habitat, but will not likely contribute to a trend towards Federal listing or a loss of viability to the population or species.
WIPV Will Impact Individuals or Habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI Beneficial Impact

4.2.5.2.3. Bald eagle Direct and Indirect Effects

Based on the raptor nesting and bald eagle winter roost surveys and lack of suitable habitat, it is unlikely bald eagles nest or roost within the Tear Drop project area. The proposed project should not affect bald eagle nesting or winter roosting.

There are 13.6 miles of existing overhead three-phase distribution lines within the project area. The wire spacing is likely in compliance with the Avian Power Line Interaction Committee's (1996) suggested practices and with the Service's standards (USFWS 2002); however other features may not be in compliance. Lance is proposing no additional overhead three-phase distribution lines. There are currently 10.7 miles of improved roads within the project area, with 8.9 miles proposed.

Typically two-tracks and improved project roads pose minimal collision risk. In one year of monitoring road-side carcasses the BLM Buffalo Field Office reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; eagles (bald and golden) were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

Produced water may be stored in fourteen proposed and five existing reservoirs which may attract eagles if reliable prey is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.2.4. Black-tailed Prairie Dog Direct and Indirect Effects

The access route to the 44-21 well was proposed within the prairie dog colony located within SESE Section 21, T50N, R78W. The access was relocated to the west to avoid the burrowing owl nest located within this prairie dog colony. No other facilities are proposed within prairie dog colonies.

Well houses and power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent roads may result in prairie dog road mortalities. During construction of these facilities, there is the possibility that prairie dogs within these colonies may be killed as a direct result of the earth moving equipment. Constant noise and movement of equipment and the destruction of burrows puts considerable stress on the animals and will cause an increase in prairie dog mortalities. During the construction of these facilities individuals are exposed more frequently to predators and have less protective cover.

4.2.5.2.5. Burrowing owl Direct and Indirect Effects

The access route to the 44-21 well was proposed within the prairie dog colony located within SESE Section 21, T50N, R78W. The access was relocated to the west to avoid the burrowing owl nest located within this prairie dog colony.

Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. Overhead power lines provide perch sites for larger raptors that could potentially result in increased burrowing owl predation. CBNG infrastructure such as roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

The USDAFS Thunder Basin National Grasslands in Campbell County, WY, whom cooperated with the BLM in the creation of the 2003 PRB EIS, recommends a 0.25 mile timing restriction buffer zone for

burrowing nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to "use the least restrictive stipulations that effectively accomplish the resource objectives or uses." Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls while shortening the timing restriction period to four and one half months (See Chapter 3 for breeding, nesting, and migration chronology) from six and one half months and from 0.5 mile to 0.25 mile.

4.2.5.2.6. Grouse

4.2.5.2.6.1. Greater sage-grouse Direct and Indirect Effects

BLM records identified eight sage grouse leks within 3 miles of the Tear Drop POD. 36.3 acres of sage-grouse habitat will be directly disturbed by the construction of six road/pipeline segments and if four secondary impoundments are constructed. The 14-31-5078 and 23-31-5078 wells were removed from the project plan to reduce impacts to sage-grouse. Pit 31-7-4978, was proposed within sage-grouse nesting habitat and was removed from the project. Additionally, Pit 41-5-4978, Pit 42-31-5078, and impoundment 21-5-4978 are also located within sage-grouse nesting habitat. Lance has proposed all impoundments as secondary to be used only if the primary water management strategy is incapable of handling the produced water volume. The BLM BFO will require additional field visits and analysis if these impoundments are to be made into primary options.

Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, powerlines, reservoirs and other infrastructure (Theiele 2005, Oedekoven 2004). Sage-grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that sage-grouse avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004).

Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al. 2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003). Limiting travel speed to 25mph provides sage-grouse sufficient time to escape from approaching vehicles. The BLM BFO documented motor vehicles kills of several sage-grouse males displaying on a road in Campbell County in 2007. Sage-grouse displaying near roads may be too pre-occupied to notice approaching vehicles, therefore travel speed within 0.5 miles of lek sites will be limited to 10 mph. CBNG disturbance and infrastructure may also attract small predators that prey on eggs in the nest.

Noise can affect sage-grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). Gibson and Bradbury (1986) reported that male sage-grouse mating success was more closely related to individual differences in strut display effort and sound characteristics (i.e., lek attendance, strut display rate, and the temporal and frequency characteristics of the whistle emitted towards the end of the strut display) than to territorial or morphological characteristics. Gibson (1989) further indicated that the acoustic component of the strut display alone (produced by hidden audio speakers situated on a lek) was attractive to females. Although it is unknown if unnatural noises associated with anthropogenic activity (i.e., gas and oil development operations, traffic) disrupt females' ability to evaluate males' displays, it seems reasonable that noises within the range of those emitted by sage-grouse males (within the frequency bands 300-1200 Hz; Dantzker et al. 1999) could mask courtship acoustics and influence breeding behavior and lek attendance (Holloran et al. 2005). Sage-grouse attendance on leks within one mile of compressors is lower than for sites farther from compressor locations (Braun et al. 2002).

Another concern with CBNG is that reservoirs created for water disposal provide habitat for mosquitoes associated with West Nile virus (Oedekoven 2004). West Nile virus represents a significant new stressor, which in 2003 reduced late summer survival of sage-grouse an average of 25% within four populations

including the Powder River Basin (Naugle et al. 2004). Powder River Basin grouse losses during 2004 and 2005 were not as severe. Summer 2003 was warm and dry, more conducive to West Nile virus replication and transmission than the cooler summers of 2004 and 2005 (Cornish pers. comm.).

The BFO Resources Management Plan (BLM 2001) and the Powder River Basin Oil and Gas Project Record of Decision (BLM 2003) include a two-mile timing limitation within sage-grouse nesting habitat. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA), which includes the WGFD 1977 sage-grouse guidelines (Bennett 2004). Under pressure for standardization, BLM Wyoming adopted the two-mile recommendation in 1990, and instructed the field offices to incorporate the measure into their land use plans (Bennett 2004, Murkin 1990).

The two-mile recommendation was based on research which indicated between 59 and 87 percent of sage-grouse nests were located within two miles of a lek (Bennett 2004). These studies were conducted within prime, contiguous sage-grouse habitat such as Idaho's Snake River plain.

Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the breeding lek (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage-grouse hens nested within 3 km (1.86 mi) of the capture lek. Moynahan and Lindberg (2004) found 36% of their grouse nesting within 3 km of the capture leks. Moynahan's study area was north-central Montana in an area of mixed-grass prairie and sagebrush steppe, with Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) being the dominant shrub species (Moynahan et al. 2006). Habitat conditions and sage-grouse biology within the Buffalo Field Office is probably most similar to Moynahan's north-central Montana study area.

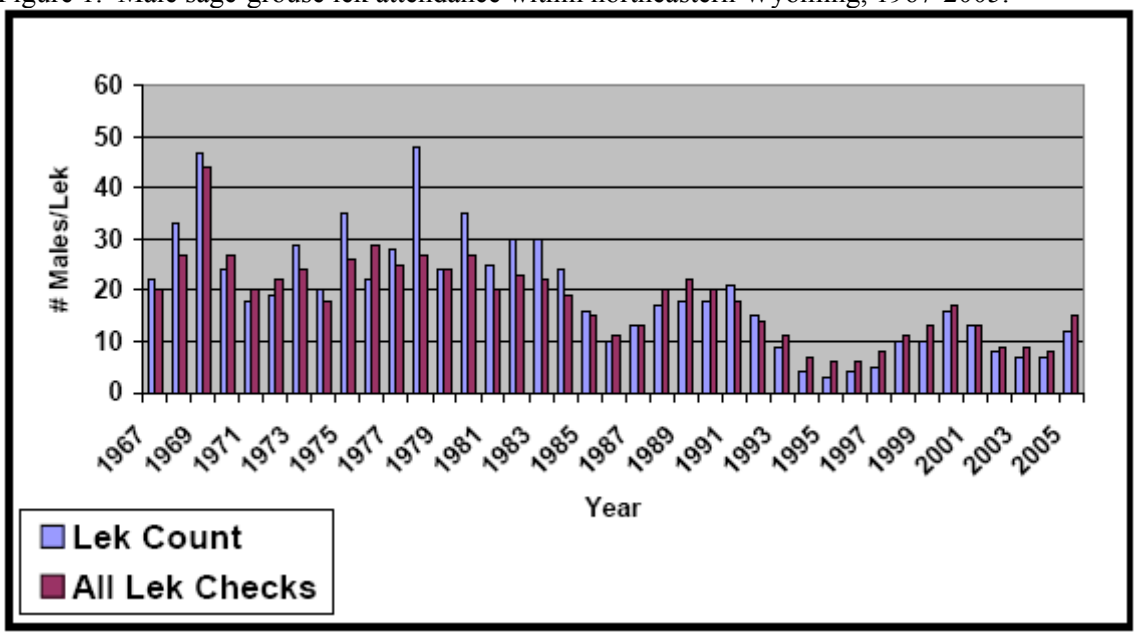
Percentage of sage-grouse nesting within a certain distance from their breeding lek is unavailable for the Powder River Basin. The Buffalo and Miles City field offices through the University of Montana with assistance from other partners including the U.S. Department of Energy and industry are currently researching nest location and other sage-grouse questions and relationships between grouse and coalbed natural gas development.

Vegetation communities within the Powder River Basin are naturally fragmented, as they represent a transition between the intermountain basin sagebrush communities to the west and the prairie communities to the east. The Powder River Basin is also near the eastern edge of greater sage-grouse range. Without contiguous habitat available to nesting grouse, it is likely that a smaller percentage of grouse nest within two-miles of a lek within the PRB than grouse within those areas studied in the development of the 1977 WAFWA recommendations, and even the Holloran and Moynahan study areas. Holloran and Moynahan both studied grouse in areas of contiguous sagebrush habitats without large scale fragmentation and habitat conversion (Moynahan et al. 2006, Holloran and Anderson 2005). A sagebrush cover assessment within Wyoming basins estimated sagebrush coverage within Hollaran and Anderson's Upper Green River Basin study area to be 58% with an average patch size greater than 1200 acres. Powder River Basin sagebrush coverage was estimated to be 35% with an average patch size less than 300 acres (Rowland et al. 2005). The Powder River Basin patch size decreased by more than 63% in forty years, from 820 acre patches and an overall coverage of 41% in 1964 (Rowland et al. 2005). Recognizing that many populations live within fragmented habitats and nest much farther than two miles from the lek of breeding, WAFWA revised their sage grouse management guidelines (Connelly et. al. 2000) and now recommends the protection of suitable habitats within 5 km (3.1 mi) of leks where habitats are not distributed uniformly, such as the Powder River Basin. Due to the impacts of previously constructed projects in this project area, no additional fragmentation of large, landscape-size patches of sage-grouse habitat should occur.

The sage-grouse population within northeast Wyoming is exhibiting a steady long term downward trend

(Figure 1) (Thiele 2005). The figure illustrates a ten-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak and each periodic low is lower than the previous population low. Long-term harvest trends are similar to that of lek attendance (Thiele 2005).

Figure 1. Male sage-grouse lek attendance within northeastern Wyoming, 1967-2005.



Sage-grouse populations within the PRB are declining independent of CBNG development. CBNG is a recent development, with the first well drilled in 1987 (Braun et al. 2002). In February 1998 there were 420 producing wells primarily restricted to eastern Campbell County (BFO 1999). By May 2003 there were 26,718 CBNG wells permitted within the BFO area (Oedekoven 2004). The PRB FEIS estimated 51,000 additional CBNG wells to be drilled over a ten year period beginning in 2003 (BFO 2003). Impacts from CBNG development are likely to be significant and additive to the long-term impacts afflicting the sage-grouse population (Oedekoven 2004). In other terms, CBNG development is expected to accelerate the downward sage-grouse population trend.

A two-mile timing limitation, given the long-term population decline and that less than 50% of grouse are expected to nest within the limitation area, is insufficient to reverse the population decline. Moynahan and Lindberg (2004), like WAFWA (Connely et al. 2000), recommend increasing the protective distance around sage-grouse leks. Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. As stated earlier, a well density of eight wells per section creates sage-grouse avoidance zones which overlap, creating contiguous avoidance areas (WGFD 2004).

An integrated approach including habitat restoration, grazing management, temporal and spatial mineral limitations etc. is necessary to reverse the population decline. The WGFD has initiated such a program within the Buffalo Field Office area (Jellison 2005). The WGFD program is modeled after a successful program on the Deseret Ranch in southwestern Wyoming and northeastern Utah. The Deseret Ranch has demonstrated a six-fold increase in their sage-grouse population while surrounding areas exhibited decreasing populations (Danvir 2002).

4.2.5.2.7. Sharp-tailed grouse Direct and Indirect Effects

Effects similar to sage-grouse.

4.2.5.2.8. Mountain plover Direct and Indirect Effects

Suitable mountain plover habitat is not present within the project area. The project should not affect mountain plovers. An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (4-254-255).

4.2.5.2.9. Sensitive Species Cumulative effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, please refer to the referenced PRB FEIS, Volume 2, Chapter 4, page 4-271.

4.3. West Nile Virus Direct and Indirect Effects

This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNv species and its effects in Wyoming.

There is no evidence that treatment, either through the use of larvicides or malithion, on a site specific or basin-wide scale will have any effect on the overall spread of the disease. The State agencies have not instituted state-wide treatment for mosquitoes due to WNv, nor are they requiring any mitigation specific to permitting for CBM operations.

Cumulatively, there are many sources of standing water, beyond CBM discharge, throughout the PRB that would add to the potential for mosquito habitat. Sources include; natural flows, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities.

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation.

4.4. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies. The primary water management strategy includes piping and treatment at the existing Bear Draw Beta RO facility and transporting produced water via the Salt Creek Pipeline for reinjection near Midwest, Wyoming.

The WDEQ has assumed primacy from United States Environmental Protection Agency for maintaining the water quality in the waters of the state. The WSEO has authority for regulating water rights issues and permitting impoundments for the containment of surface waters of the state.

The maximum water production is predicted to be 17.0 gpm per well or 731.0 gpm (1.63 cfs or 1,179 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the

projected volume produced within the watershed area was 171,423 acre-feet in 2006, maximum production. As such, the volume of water resulting from the production of these wells is 0.69% of the total volume projected for 2006. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 292.4 gpm will infiltrate at or near the discharge points and impoundments (471.6 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality. However, the primary treatment strategies are RO treatment and discharge to the Upper Powder River and transportation via the Salt Creek Pipeline for reinjection near Midwest, Wyoming. Therefore, the volume of water available for infiltration will be much less than what is identified above.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells produce from depths which range from 20 to 120 feet compared to 2,000 to 2,500 feet to the Big George. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to "…resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater storage within the coals and sands units above and below the coals is enormous. Almost 750 million acre-feet of recoverable groundwater are stored within the Wasatch - Tongue River sand and coals (PRB FEIS Table 3-5). Redistribution is projected to result in a rapid initial recovery of water levels in the coal. The model projects that this initial recovery period would occur over 25 years." (PRB FEIS page 4-38).

Adherence to the drilling plan, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures will protect any potential fresh water aquifers above the target coal zone. This will ensure that ground water will not be adversely impacted by well drilling and completion operations.

In order to determine the actual water quality of the producing formations in this POD, and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD. The reference well will be sampled at the well head for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

Shallow ground water monitoring is ongoing at impoundment sites across the basin. Due to the limited data available from these sites, the still uncertain overall fate or extent of change that is occurring due to infiltration at those sites, and the extensive variable site characteristics both surface and subsurface, it is not reliable at this time to infer that findings from these monitoring wells should be directly applied to other impoundment locations across the basin.

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004, and is currently being revised as the "Compliance Monitoring and Siting Requirements for Unlined Coalbed Methane Produced Water Impoundments" which should be approved by June, 2006. Approximately 800 new impoundments have been investigated to date with 102 impoundments in 52 permits that have gone into compliance monitoring. The Wyoming DEQ has established an Impoundment Task Force which is in the process of drafting an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow groundwater. Drilling at selected existing impoundments should begin in the spring of 2006. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the requirements outlined in the current approved DEQ compliance monitoring guidance document prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

4.4.1.1. Groundwater Cumulative Effects:

As stated in the PRB FEIS, "The aerial extent and magnitude of drawdown effects on coal zone aquifers and overlying and underlying sand units in the Wasatch Formation also would be limited by the discontinuous nature of the different coal zones within the Fort Union Formation and sandstone layers within the Wasatch Formation." (PRB FEIS page 4-64).

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS page 4-65). This volume of water "…cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS page 4-65). No additional mitigation is necessary.

4.4.2. Surface Water

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

Table 4.5 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit –		2	1,000
Least Restrictive Proposed Limit		10	3,200
Primary Watershed at Arvada, WY Gauging station Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 4.76 7.83	 1,797 3,400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
WDEQ Water Quality Requirement for WYPDES			

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Permit # WY0052639 At discharge point	5,000	NA	7,500
Predicted Produced Water Quality Big George Coal Zone	2,620	40.0	4,100

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 2620.0 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal. If at any future time the operator entertains the possibility of irrigation or land application with the water produced from these wells, the proposal must be submitted as a sundry notice for separate environmental analysis and approval by the BLM.

The quality for the water produced from the Big George target coal zone from these wells is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 17.0 gallons per minute (gpm) is projected is to be produced from these 43 wells, for a total of 731.0 gpm for the POD. See Table 4.5 .

For more information, please refer to the WMP included in this POD.

To manage the produced water, 18 proposed impoundments (286.7 acre-feet) would potentially be constructed within the project area. It should be noted that all impoundments are secondary and their use will not be authorized unless the primary water management strategy of treatment and reinjection is not adequate. These impoundments could disturb approximately 77.4 acres including the dam structures. Of these water impoundments, 16 would be on-channel reservoirs disturbing 63.0 acres, and 2 would be off-channel ponds disturbing 14.4 acres. The off-channel impoundments would result in evaporation and infiltration of CBNG water. Criteria identified in "Off-Channel, Unlined CBNG Produced Water Pit Siting Guidelines for the Powder River Basin, Wyoming" (WDEQ, 2002) was used to locate these impoundments. Monitoring may be required based upon WYDEQ findings relative to "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 1.63 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the

mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 43 wells is anticipated to be a total of 731.0 gpm or 1.63 cfs which will be split between treatment with direct discharge into a Flying E Creek tributary and reinjection at Midwest, Wyoming. Lance did identify how much water would be disposed of by each management option. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

The operator has obtained and modified a Wyoming Pollutant Discharge Elimination System (WYPDES) permit # WY0052639 Major Modification (Bear Draw Beta Unit POD) for the discharge of water produced from this project from the WDEQ.

Permit effluent limits were set at (WYPDES, WMP Attachment A):

pH	6.5 to 9.0
TDS	5000 mg/l max
Specific Conductance	7500 mg/l max
Dissolved iron	1,000 µg/l max
Dissolved manganese	629 µg/l max
Total Recoverable Barium	1800 µg/l max
Total Recoverable Arsenic	7 µg/l max
Chlorides	150 mg/l
Total Flow MGD	2.13

The WYPDES permit also addresses existing downstream concerns, such as irrigation use, in the COA for the permit. The designated points of compliance identified for this permit are TRIB1 (NWSW, Sec. 28, T50N, R77W), DPR (SWNW, Sec. 28, T50N, R77W), and UPR (NESE, Sec. 32, T50N, R77W).

In order to determine the actual water quality of the producing formations in this POD and to verify the water analysis submitted for the pre-approval evaluation, the operator has committed to designate a reference well to each coal zone within the POD boundary. The reference well will be sampled at the wellhead for analysis within sixty days of initial production. A copy of the water analysis will be submitted to the BLM Authorized Officer.

As stated previously, the operator has committed to offer water well agreements to properly permitted domestic and stock water wells within the circle of influence of the proposed CBNG wells.

The development of coal bed natural gas and the production and discharge of water in the area surrounding the existing natural spring may affect the flow rate or water quality of the spring.

In-channel downstream impacts are addressed in the WMP, pages 26-28 for the Tear Drop POD prepared by Western Water Consultants for Lance Oil & Gas Company.

4.4.2.1. Surface Water Cumulative Effects

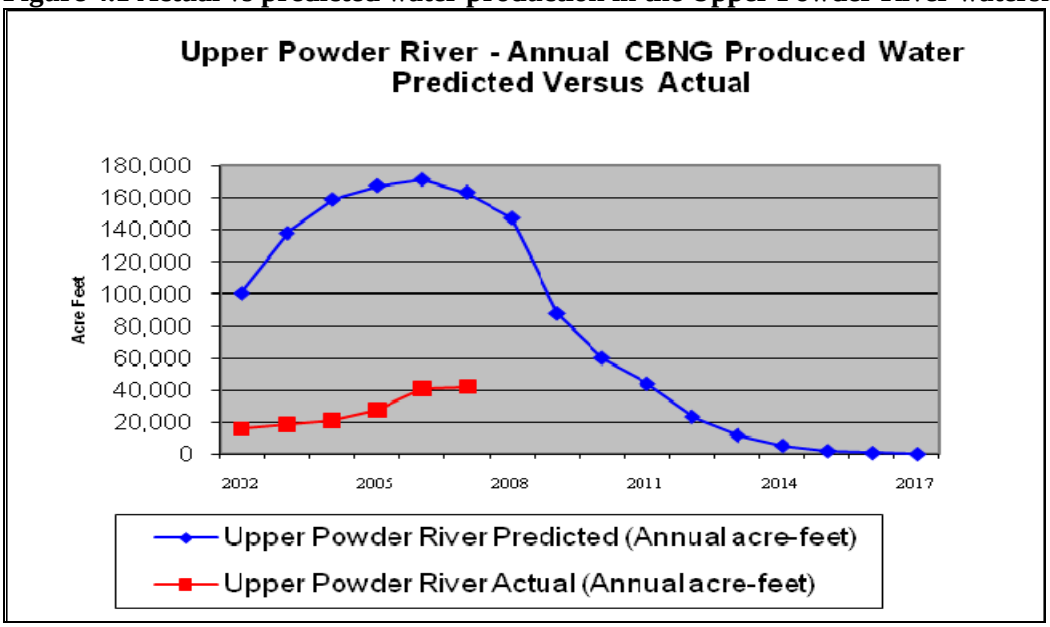
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of March 2008, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 166,096 acre-ft of water compared to the predicted 900,040 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This volume is 18.5% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6 Actual vs predicted water production in the Upper Powder River watershed *2007 Data Update 3-08-08*

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,640	16.5	83,054	14.7
2006	171,423	736,519	40,930	23.9	123,984	16.8
2007	163,521	900,040	42,112	25.8	166,096	18.5
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	**1,285,233**		**166,096**			

Figure 4.1 Actual vs predicted water production in the Upper Powder River watershed



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Electrical Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where available, from existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

As referenced above, the PRB FEIS did disclose that cumulative impacts may occur as a result of discharged produced CBNG water. The cumulative effects relative to this project are within the analysis parameters and impacts described in the PRB FEIS for the following reasons:

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 18.5% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

Refer to the PRB FEIS, Volume 2, page 4-115 – 117 and table 4-13 for cumulative effects relative to the Upper Powder River watershed and page 117 for cumulative effects common to all sub-watersheds.

4.5. Cultural Resources

BLM review, conducted by Wendy Sutton, has determined that 3 sites and 1 isolate will be impacted by the current project. The impacted sites (48JO2571, 48JO2874, and 48JO3856) and IR9 have all been recommended as not eligible to the National Register of Historic Places. As such, these resources are not considered historic properties; therefore, impacts to these resources result in *no historic properties affected*. Following the Wyoming State Protocol, Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 3/20/2008 that the proposed project would result in *no historic properties affected/no effect* (DBU_WY_2008_680).

A reservoir (31-21) was initially proposed near an eligible site, 48JO3854. Staking for the reservoir was noted running through the site during the onsite on 11/7/2007. The proposed reservoir was dropped as a result of the onsite, to avoid adverse effects to 48JO3854.

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the ***Standard COA*** (General)(A)(1).

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brad Rogers	Wildlife Biologist	US Fish and Wildlife Service	no

6. OTHER PERMITS REQUIRED

A number of other permits are required from Wyoming State and other Federal agencies. These permits are identified in Table A-1 in the PRB FEIS Record of Decision.

7. REFERENCES AND AUTHORITIES

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