FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Anadarko Petrolem Corp.
Dry Willow Phase II
ENVIRONMENTAL ASSESSMENT –WY-070-07-148

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Anadarko Petrolem Corp.'s Dry Willow Phase II Coal Bed Natural Gas (CBNG) POD comprised of the following 43 Applications for Permit to Drill (APDs), as follows:

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
1	DRY WILLOW 2	3-12	SWNW	3	43N	76W	WYW144531
2	DRY WILLOW 2	3-14	SWSW	3	43N	76W	WYW144531
3	DRY WILLOW 2	3-22	SENW	3	43N	76W	WYW144531
4	DRY WILLOW 2	3-23	NESW	3	43N	76W	WYW144531
5	DRY WILLOW 2	3-32	SWNE	3	43N	76W	WYW144531
6	DRY WILLOW 2	3-41	NENE	3	43N	76W	WYW144531
7	DRY WILLOW 2	3-43	NESE	3	43N	76W	WYW144531
8	DRY WILLOW 2	4-12	SWNW	4	43N	76W	WYW144531
9	DRY WILLOW 2	4-14	SWSW	4	43N	76W	WYW153076
10	DRY WILLOW 2	4-21	NENW	4	43N	76W	WYW144531
11	DRY WILLOW 2	4-23	NESW	4	43N	76W	WYW153076
12	DRY WILLOW 2	4-32	SWNE	4	43N	76W	WYW144531
13	DRY WILLOW 2	4-34	SWSE	4	43N	76W	WYW153076
14	DRY WILLOW 2	4-41	NENE	4	43N	76W	WYW144531
15	DRY WILLOW 2	4-43	NESE	4	43N	76W	WYW153076
16	DRY WILLOW 2	10-32	SWNE	10	43N	76W	WYW153076
17	DRY WILLOW 2	10-34	SWSE	10	43N	76W	WYW144531
18	DRY WILLOW 2	10-41	NENE	10	43N	76W	WYW153076
19	DRY WILLOW 2	10-43	NESE	10	43N	76W	WYW144531
20	DRY WILLOW 2	11-12	SWNW	11	43N	76W	WYW153076
21	DRY WILLOW 2	11-14	SWSW	11	43N	76W	WYW144531
22	DRY WILLOW 2	11-21	NENW	11	43N	76W	WYW153076
23	DRY WILLOW 2	11-23	NESW	11	43N	76W	WYW144531
24	DRY WILLOW 2	11-32	SWNE	11	43N	76W	WYW144531
25	DRY WILLOW 2	11-34	SWSE	11	43N	76W	WYW144531
26	DRY WILLOW 2	11-41	NENE	11	43N	76W	WYW144531
27	DRY WILLOW 2	11-43	NESE	11	43N	76W	WYW144531
28	DRY WILLOW 2	14-14	SWSW	14	43N	76W	WYW144532
29	DRY WILLOW 2	14-21	NENW	14	43N	76W	WYW144532
30	DRY WILLOW 2	14-23	NESW	14	43N	76W	WYW144532
31	DRY WILLOW 2	14-32	SWNE	14	43N	76W	WYW144532
32	DRY WILLOW 2	14-41	NENE	14	43N	76W	WYW144532
33	DRY WILLOW 2	14-12	SWNW	14	43N	76W	WYW144532
34	DRY WILLOW 2	15-14	SWSW	15	43N	76W	WYW146285
35	DRY WILLOW 2	15-43	NESE	15	43N	76W	WYW144532
36	DRY WILLOW 2	23-12	SWNW	23	43N	76W	WYW144532
37	DRY WILLOW 2	23-21	NENW	23	43N	76W	WYW144532
38	DRY WILLOW 2	23-23	NESW	23	43N	76W	WYW144532
39	DRY WILLOW 2	23-32	SWNE	23	43N	76W	WYW144532

	Well Name	Well #	Qtr/Qtr	Sec	TWP	RNG	Lease #
40	DRY WILLOW 2	23-34	SWSE	23	43N	76W	WYW144532
41	DRY WILLOW 2	23-41	NENE	23	43N	76W	WYW144532
42	DRY WILLOW 2	23-43	NESE	23	43N	76W	WYW144532
43	DRY WILLOW 2	26-41	NENE	26	43N	76W	WYW144532

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.
8. Due to the injection of the produced water, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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
Anadarko Petrolem Corp.
Dry Willow Phase II
PLAN OF DEVELOPMENT
WY-070-07-148

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/or impacts that are not covered within the PRB FEIS.

1. PURPOSE AND NEED

The purpose for the proposal is to define and produce coal bed natural gas (CBNG) on 4 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: Anadarko Petrolem Corp.'s Dry Willow Phase II Plan of Development (POD) for 45 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 45 wells proposed within this POD, the wells are vertical bores proposed on an 80 acre spacing pattern with 1 well per location. Wells are located as follows:

	Well Name	Well #	Qtr/Qtr	Section	TWP	RNG	Lease #
1	DRY WILLOW 2	3-12	SWNW	3	43N	76W	WYW144531
2	DRY WILLOW 2	3-14	SWSW	3	43N	76W	WYW144531
3	DRY WILLOW 2	3-22	SENW	3	43N	76W	WYW144531
4	DRY WILLOW 2	3-23	NESW	3	43N	76W	WYW144531
5	DRY WILLOW 2	3-32	SWNE	3	43N	76W	WYW144531
6	DRY WILLOW 2	3-34	SWSE	3	43N	76W	WYW144531
7	DRY WILLOW 2	3-41	NENE	3	43N	76W	WYW144531
8	DRY WILLOW 2	3-43	NESE	3	43N	76W	WYW144531
9	DRY WILLOW 2	4-12	SWNW	4	43N	76W	WYW144531
10	DRY WILLOW 2	4-14	SWSW	4	43N	76W	WYW153076
11	DRY WILLOW 2	4-21	NENW	4	43N	76W	WYW144531
12	DRY WILLOW 2	4-23	NESW	4	43N	76W	WYW153076
13	DRY WILLOW 2	4-32	SWNE	4	43N	76W	WYW144531
14	DRY WILLOW 2	4-34	SWSE	4	43N	76W	WYW153076
15	DRY WILLOW 2	4-41	NENE	4	43N	76W	WYW144531
16	DRY WILLOW 2	4-43	NESE	4	43N	76W	WYW153076
17	DRY WILLOW 2	10-32	SWNE	10	43N	76W	WYW153076
18	DRY WILLOW 2	10-34	SWSE	10	43N	76W	WYW144531
19	DRY WILLOW 2	10-41	NENE	10	43N	76W	WYW153076
20	DRY WILLOW 2	10-43	NESE	10	43N	76W	WYW144531
21	DRY WILLOW 2	11-12	SWNW	11	43N	76W	WYW153076
22	DRY WILLOW 2	11-14	SWSW	11	43N	76W	WYW144531
23	DRY WILLOW 2	11-21	NENW	11	43N	76W	WYW153076
24	DRY WILLOW 2	11-23	NESW	11	43N	76W	WYW144531
25	DRY WILLOW 2	11-32	SWNE	11	43N	76W	WYW144531
26	DRY WILLOW 2	11-34	SWSE	11	43N	76W	WYW144531
27	DRY WILLOW 2	11-41	NENE	11	43N	76W	WYW144531
28	DRY WILLOW 2	11-43	NESE	11	43N	76W	WYW144531
29	DRY WILLOW 2	14-14	SWSW	14	43N	76W	WYW144532
30	DRY WILLOW 2	14-21	NENW	14	43N	76W	WYW144532
31	DRY WILLOW 2	14-23	NESW	14	43N	76W	WYW144532
32	DRY WILLOW 2	14-32	SWNE	14	43N	76W	WYW144532
33	DRY WILLOW 2	14-41	NENE	14	43N	76W	WYW144532
34	DRY WILLOW 2	14-12	SWNW	14	43N	76W	WYW144532
35	DRY WILLOW 2	15-14	SWSW	15	43N	76W	WYW146285
36	DRY WILLOW 2	15-34	SWSE	15	43N	76W	WYW144532
37	DRY WILLOW 2	15-43	NESE	15	43N	76W	WYW144532
38	DRY WILLOW 2	23-12	SWNW	23	43N	76W	WYW144532
39	DRY WILLOW 2	23-21	NENW	23	43N	76W	WYW144532
40	DRY WILLOW 2	23-23	NESW	23	43N	76W	WYW144532
41	DRY WILLOW 2	23-32	SWNE	23	43N	76W	WYW144532
42	DRY WILLOW 2	23-34	SWSE	23	43N	76W	WYW144532
43	DRY WILLOW 2	23-41	NENE	23	43N	76W	WYW144532
44	DRY WILLOW 2	23-43	NESE	23	43N	76W	WYW144532
45	DRY WILLOW 2	26-41	NENE	26	43N	76W	WYW144532

County: Campbell

Applicant: Anadarko Petrolem Corp.

Surface Owners: T-Chair Land Company and State of Wyoming

Project Description:
The proposed action involves the following:

- Drilling of 45 total federal CBM wells in the Big George coal zone to depths of approximately 1419 – 1890 feet.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves pumping water to the water transfer station, which will pump the water to an existing high pressure line. The water will be injected into 5 injections wells in Midwest, Natrona County, WY from the high pressure line. The water will be injected into the Madison and Tensleep formations.

- 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(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 MSRP, 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 reduce potential impacts to natural resources. 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 or minimize 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 Dry Willow Phase II POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. To minimize erosion, the access to the Fed 3-12 needs a low water crossing in the drainage.
2. The Fed 3-34 location was dropped because it was proposed within a ¼ of a raptor nest. An alternative location, that met the operator, surface owner, and BLM requirements, was not identified during the onsite.
3. Moved Fed 4-21 to top of ridge to avoid cut/fill pad, therefore, minimizing disturbance.
4. To minimize disturbance, pads were dropped for the following well; Fed 4-41, Fed 10-34, Fed 11-14, & Fed 11-23.
5. Due to grades exceeding 8%, access to the Fed 10-41 must be engineered, therefore lessoning environmental damage.
6. To allow for level drilling, Fed 10-43 will need slotted pad.
7. The Fed 15-34 is proposed within a sage grouse lek CSU. During the on-site we were able to locate the well location outside of the CSU, but not the associated access or pipeline corridor. The well will be dropped.
8. To lesson fill, Corner B on the constructed pad for the Fed 10-32 was rounded and redesigned.

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. Surface Water

1. 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.
2. 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.

2.3.2.2. 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. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or

sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.

2.3.2.3. Threatened, Endangered, or Sensitive Species

2.3.2.3.1. Bald Eagle

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

2. Surveys for active bald eagle nests and winter roost sites will be conducted within suitable habitat by a biologist. Surface disturbing activities will not be permitted within one mile of suitable habitat prior to survey completion.

3. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle nest sites. A seasonal minimal disturbance buffer zone of one mile will be established for all bald eagle nest sites (February 15 – August 15).

4. A disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) will be established year-round for all bald eagle winter roost sites. A seasonal minimal disturbance buffer zone of 1 mile will be established for all bald eagle winter roost sites (November 1 – April 1). These buffer zones and timing may be adjusted based on site-specific information through coordination with, and written approval from, the USFWS.

5. Within ½ mile of bald eagle winter roost sites additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 and 3:00 may be necessary to prevent disturbance (November 1 – April 1).

6. 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.

2.3.2.4. 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.

2.3.2.5. Noise

1. Noise mufflers will be installed on the exhaust of compressor engines to reduce the exhaust 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.

2.3.2.6. 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 form the BLM authorized officer.

2.3.3. Site specific mitigation measures

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

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 Dry Willow Phase II POD is Covert Green (18-0617 TPX).

3. Pad construction is authorized for the following federal wells; 3-12, 3-14, 10-32, 10-41 and the 10-43 has a slot design.

4. To lesson fill, Corner B on the constructed pad for the Fed 3-14 will be rounded.

5. The existing bladed main access road located in the NW Sec. 4, T43N R75W and Sec. 3 & Sec 4 T43N R76W must be crowned and ditched and have adequate cross drainage.

6. Due to sandy and/or shallow soils the following locations and associated infrastructure need additional soil amendments; Fed 3-34, Fed 4-14, Fed 4-21, Fed 10-32, Fed 11-12, Fed 11-23, Fed 11-34, Fed 14-12, Fed 14-14, Fed 23-34, Fed 23-41, Fed 23-43, & Fed 26-41.

7. Due to impermeable soils the following drilling pits need to be lined; Fed 4-23, Fed 4-41, Fed 10-34, and Fed 11-12.

8. To protect sage grouse habitat, no brush hogging will be authorized on the Fed 23-32.

9. 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 a different specific mix desired by the surface owner, use the following:

Species		**% in Mix**	**Lbs PLS***
Thickspike Wheatgrass (Elymus lanceolatus ssp. lanceolatus)		20	2.4
Prairie sandreed (Calamovilfa longifolia)		15	1.8
Indian ricegrass (Achnatherum hymenoides)		20	2.4
Bluebunch Wheatgrass (Pseudoroegneria spicata ssp. Spicata)		30	3.6
Prairie coneflower (Ratibida columnifera)		5	0.6
White or purple prairie clover (Dalea candidum, purpureum)		5	0.6

Scarlet Globemallow (Sphaeralcea coccinea) / or ***Blue flax***(Linum lewisii)		5	0.6
Totals		**100%**	**12 lbs/acre**

10. 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 un-forested 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.

11. All earth moving activity in the following areas will be monitored by an archeologist who meets or exceed the qualification standards recommended by the Secretary of the Interior. The Bureau has identified these areas as containing the potential for buried cultural deposits. The Bureau will require the submission of two copies of a monitoring report within 30 days of the completion of all monitoring work. All monitored areas must be plotted on a map provided with the monitoring report.

    a. All earth moving activity associated with the construction of the utility corridor south of well 14-23 to the 23-41 well. It is noted that some portions of this monitoring area may be outside alluvial and aeolian deposits, the exact areas to be monitored are left to the discretion of the archeological monitor.

    b. All earth moving activity associated with the construction of the utility corridor from well 23-43 to approximately 800 feet north of the well. It is noted that some portions of this monitoring area may be outside alluvial and aeolian deposits, the exact areas to be monitored are left to the discretion of the archeological monitor.

12. Please contact Casey Freise, Natural Resource Specialist, @ (307) 684-1189, Bureau of Land Management, Buffalo, if there are any questions concerning these surface use COAs.

Wildlife

1. No surface disturbing activity shall occur within one mile of bald eagle habitat (Cottonwood Creek) annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1

through August 15 (CM8) prior to a nesting survey. This affects the following wells and infrastructure:

Township/Range	*Section*	*Wells and Infrastructure*
43/76	15	**Well: 15-14** **ALL** project related activities within the **SW ¼ and SWNW ¼ ¼** of this section.
43/76	23	**Wells: 23-12, 23-21, 23-23, 23-32, 23-34, and 23-43** **ALL** project related activities within this **ENTIRE** section, ***except*** the NENE ¼ ¼ of this section.
43/76	26	**Well: 26-41** **ALL** project related activities within this **ENTIRE** section.

2. The following conditions will minimize the impacts to raptors:
   a. No surface disturbing activity shall occur within ½ 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	*Sec.*	*Affected Wells and Infrastructure*
43/76	3	**Wells: 3-12, 3-14, 3-22, 3-23, 3-32, 3-41, and 3-43** **ALL** project related activities within this **ENTIRE** section.
43/76	4	**Wells: 4-12, 4-34, and 4-41** **ALL** project related activities within the **SWSE ¼ ¼** of this section.
43/76	10	**Wells: 10-32, 10-34, 10-41, and 10-43** **ALL** project related activities within this **ENTIRE** section.
43/76	11	**Wells: 11-12, 11-14, 11-21, 11-23, 11-32, 11-34, 11-41, and 11-43** **ALL** project related activities within this **ENTIRE** section.
43/76	14	**Wells: 14-12, 14-14, 14-21, 14-23, 14-32, and 14-41** **ALL** project related activities within this **ENTIRE** section, ***except*** the 14-41 well and its associated infrastructure within the NENE ¼ ¼ of this section.
43/76	15	**Wells: 15-14** **ALL** project related activities within this **ENTIRE** section, ***except*** the 15-43 well and its associated infrastructure within the NESE ¼ ¼ of this section.
43/76	23	**Wells: 23-21, 23-32, 23-34, and 23-43** **ALL** project related activities within this **ENTIRE** section, ***except*** the 23-12 and 23-23 wells and their associated infrastructure within the SENW and NESW ¼ ¼s of this section.
43/76	26	**Well: 26-41** **ALL** project related activities within this **ENTIRE** section.

   b. 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 ½ mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within ½ mile of occupied raptor nests from February 1 to July 31.
   c. 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 following nest(s):

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE
4218	Great-horned owl	420880E 4843920N	NESW Sec. 34 T44N, R76W	Cottonwood, live
4219	Red-tailed hawk	420995E 4836835N	SESW Sec. 22 T43N, R76W	Cottonwood, live
4099	Red-tailed hawk	421000E 4842857N	NWNW Sec. 3 T43N, R76W	Cottonwood, dead
4100	Great-horned owl	422840E 4840705N	SWNE Sec. 11 T43N, R76W	Cottonwood, live
4220	Red-tailed hawk	423390E 4838510N	SESE Sec. 13 T43N, R76W	Cottonwood, live
4221	Red-tailed hawk	418250E 4842947N	NWNE Sec. 5 T43N, R76W	Cottonwood, dead
4222	Great-horned owl	420333E 4838802N	NESE Sec. 16 T43N, R76W	Cottonwood, live
4223	Red-tailed hawk	419773E 4839591N	NWNE Sec. 16 T43N, R76W	Cottonwood, live
4224	Red-tailed hawk	420630E 4841310N	NWNW Sec. 10 T43N, R76W	Cottonwood, live
4225	Great-horned owl	420330E 4836410N	NENE Sec. 28 T43N, R76W	Cottonwood, live
4226	Red-tailed hawk	422362E 4836365N	NWNW Sec. 26 T43N, R76W	Cottonwood, live
4227	Great-horned owl	424518E 4836617N	NENW Sec. 25 T43N, R76W	Cottonwood, live
4105	Red-tailed hawk	422960E 4841850N	SWSE Sec. 2 T43N, R76W	Cottonwood, dead
4228	Red-tailed hawk	424310E 4840135N	SESW Sec. 12 T43N, R76W	Cottonwood, live
4229	Unknown	423500E 4837700N	NESE Sec. 23 T44N, R76W	Cottonwood, live
4230	Unknown	421022E 4838258N	SESW Sec. 15 T43N, R76W	Cottonwood, live
4114	Red-tailed hawk	421300E 4841470N	NW Sec. 10 T43N, R76W	Cottonwood, dead
4231	Golden eagle	422600E 4838555N	SWSW Sec. 14 T43N, R76W	Cottonwood, live
4232	Long-eared owl	423636E 4838780N	NWSW Sec. 13 T43N, R76W	Cottonwood, live
4233	Unknown	417641E 4841935N	SESW Sec. 5 T43N, R76W	Cottonwood, live
4234	Unknown	417750E 4841370N	NENW Sec. 8 T43N, R76W	Cottonwood, live
4235	Unknown	419530E	SENW Sec. 16	Cottonwood, live

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE
		4839180N	T43N, R76W	
4236	Unknown	419575E 4839390N	SWNE Sec. 16 T43N, R76W	Cottonwood, live
4237	Unknown	419799E 4839627N	NWNE Sec. 16 T43N, R76W	Cottonwood, live
4238	Unknown	419865E 4841205N	NWNE Sec. 9 T43N, R76W	Cottonwood, live
4239	Great-horned owl	420635E 4841350N	NWNW Sec. 10 T43N, R76W	Cottonwood, live
4240	Unknown	424185E 4837652N	SENW Sec. 24 T43N, R76W	Cottonwood, live
4241	Unknown	424233E 4837443N	NESW Sec. 24 T43N, R76W	Cottonwood, live
4242	Unknown	423995E 4837335N	NWSW Sec. 24 T43N, R76W	Cottonwood, live
4243	Unknown	423904E 4837289N	NWSW Sec. 24 T43N, R76W	Cottonwood, live
4244	Unknown	423820E 4837206N	NWSW Sec. 23 T43N, R76W	Cottonwood, live
4245	Unknown	424293E 4838001N	NENW Sec. 24 T43N, R76W	Cottonwood, live
4246	Unknown	423889E 4836281N	NWNW Sec. 25 T43N, R76W	Cottonwood, live
4247	Unknown	424509E 4836613N	NENW Sec. 25 T43N, R76W	Cottonwood, live
4248	Unknown	424510E 4836605N	NENW Sec. 25 T43N, R76W	Cottonwood, live
4249	Unknown	424360E 4840215N	SESW Sec. 12 T43N, R76W	Cottonwood, live
3656	Red-tailed hawk	420124E 4841310N	NENE Sec. 9 T43N, R76W	Cottonwood, live
None	Red-tailed hawk	423390E 4838510N	SESE Sec. 14 T43N, R76W	Cottonwood, live
None	Red-tailed hawk	418250E 4842947N	NWNE Sec. 5 T43N, R76W	Cottonwood, dead
None	Great-horned owl	423282E 4835284N	SESE Sec. 26 T43N, R76W	Cottonwood, live
None	Burrowing owl	421745E 4842437N	SENE Sec. 3 T43N, R76W	Prairie dog burrow
None	Ferruginous hawk	421109E 4842636N	NENW Sec. 3 T43N, R76W	Ground, hillside
None	Red-tailed hawk	422132E 4839808N	NWNW Sec. 14 T43N, R76W	Cottonwood, live
None	Great-horned owl	422099E 4838740N	SWSW Sec. 14 T43N, R76W	Cottonwood, live
None	Unknown	423820E 4837206	NWSW Sec. 23 T43N, R76W	Cottonwood, live

d. 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.
e. Well metering, maintenance and other site visits within 0.5 miles of raptor nests shall be minimized as much as possible during the breeding season (February 1 – July 31), and restricted to between 0900 and 1500 hours.

3. The following conditions will minimize the impacts to sage-grouse:
   a. No surface disturbing activities are permitted within 2 miles of a sage grouse lek 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:

Township/Range	*Section*	*Affected Wells and Infrastructure*
43/76	3	**Wells: 3-12, 3-14, 3-22, 3-23, 3-32, 3-34, 3-41, and 3-43** **ALL** project related activities within this **ENTIRE** section.
43/76	4	**Wells: 4-12, 4-21, 4-23, 4-32, 4-34, 4-41, and 4-43** ALL project related activities within this ENTIRE section, except the SWSW ¼ ¼ of this section.
43/76	10	**Wells: 10-32, 10-34, 10-41, and 10-43** **ALL** project related activities within this **ENTIRE** section.
43/76	11	**Wells: 11-12, 11-14, 11-21, 11-23, 11-32, 11-34, 11-41, and 11-43** **ALL** project related activities within this **ENTIRE** section.
43/76	14	**Wells: 14-12, 14-14, 14-21, 14-23, 14-32, and 14-41** **ALL** project related activities within this **ENTIRE** section.
43/76	23	**Wells: 23-12, 23-21, 23-23, 23-32, 23-34, 23-41, 23-43** **ALL** project related activities within this **ENTIRE** section.
43/76	26	**Well: 26-41** **ALL** project related activities within this **ENTIRE** section.

   b. 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.
   c. Creation of raptor hunting perches will be avoided within 0.5-mile of documented sage grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on sage grouse.
   d. Well metering, maintenance and other site visits within 0.5 miles of documented sage grouse lek sites shall be minimized as much as possible during the breeding season (March 1– June 15), and restricted to between 0900 and 1500 hours.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on 9/15/07. Field inspections of the proposed Dry Willow Phase II CBNG project were conducted on 2/9/2007, 2/27/07 and 4/17/07 by Jennifer Radle, Pat Walker, Jeff Ramsey, Don Lindley, and Brent Trinier - Anadarko Petroleum Corporation, Chuck Williams – Rocky Mountain Permitting, Eric Reis – Land Surveying Incorporated, Gene Mankin & Patricia Clark – T Chair, Buddy Green, Jennifer Morton, Buck Damone, Lee Harrelson, & Casey Freise – BLM, and Brad Rogers

– Fish & Wildlife Service.

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		Casey Freise
Wilderness Values			X	Casey Freise
ACECs			X	Casey Freise
Water Resources		X		Casey Freise
Air Quality		X		Casey Freise
Cultural or Historical Values		X		G.L. "Buck" Damone III
Prime or Unique Farmlands			X	Casey Freise
Wild & Scenic Rivers			X	Casey Freise
Wetland/Riparian		X		Casey Freise
Native American Religious Concerns		X		G.L. "Buck" Damone III
Hazardous Wastes or Solids		X		Casey Freise
Invasive, Nonnative Species	X			Casey Freise
Environmental Justice		X		Casey Freise

3.1. Topographic Characteristics of Project Area

The Dry Willow Phase II project area is located 50 miles south of Gillette, WY in the Pumpkin Buttes area. The project is south & west of north middle butte. The topography consists of gentle rolling prairie dissected by gentle ephemeral swales and occasional steep erosive ephemeral drainages. Some existing fee and state CBNG development and conventional oil and gas exist in the area.

The project area is located approximately 40 miles south and west of Gillette, WY in southwestern Campbell County, Township 43 North, Range 76 West, Sections 3, 4, 10, 11, 14, 15, and 23, Sixth Principal Meridian. The project area involves private and federal surface overlying federal minerals. The project area is bounded by Anadarko's Dry Willow Phase 3 to the north and the east and Dry Willow Phase 1 to the northeast. There is currently no federal CBNG development directly south or west of the project area.

Elevations within the project area range from 4800 to 5200 feet above sea level. The topography varies from semi flat ridges to deeply incised draws and occasional rock outcroppings. The Pumpkin Buttes are located directly north and east of the project area. Cottonwood Creek dissects the southern portion of the project area. Several more ephemeral draws are found throughout the area, draining from east to west into Cottonwood Creek. The climate is semi-arid, averaging 14-16 inches of precipitation, annually, with most of the precipitation falling during late winter and spring.

Land cover within the project area is dominated by sagebrush grasslands. The sagebrush cover type varies from sparse to dense throughout the project area. In general, herbaceous vegetation includes

several grass species, such as needleandthread grass, western wheatgrass, prairie junegrass, buffalo grass and thread leafed sedge. No coniferous trees were observed within the project area. Occasional juniper trees were observed along incised draws. Cottonwood trees are present in many deep-cut draws and along Cottonwood Creek. Current land uses within the project area include livestock grazing and conventional oil production.

3.2. Vegetation & Soils

3.2.1. Soils

Soils within the project area were identified from the *South Campbell County Survey Area, Wyoming (WY605).* The soil survey was 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.

Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 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. Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.2.2.

3.2.2. Vegetation

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.

Table 3.3 – Map Units and Ecological Sites

MUSYM	Ecological Site
113	Loamy 10-14" Northern Plains
120	LOWLAND (10-14 NP)
121	Loamy 10-14" Northern Plains
127	Loamy 10-14" Northern Plains
146	Loamy 10-14" Northern Plains
147	Loamy 10-14" Northern Plains
152	LOWLAND (10-14 NP)
156	SANDY (10-14 NP)
157	SANDY (10-14 NP)
158	SANDY (10-14 NP)
170	SANDY (10-14 NP)
210	SHALLOW SANDY (10-14 NP)
211	SHALLOW LOAMY (10-14 NP)
213	SANDY (10-14 NP)
215	Loamy 10-14" Northern Plains
216	Loamy 10-14" Northern Plains
217	Loamy 10-14" Northern Plains
233	Badlands

Dominant Ecological Sites and Plant Communities identified in this POD and its infrastructure, by dominant soil series are: Badlands, Loamy and Sandy sites.

"Miscellaneous Areas"*, Badlands*:
This site occurs on steep slopes and ridge tops, but may occur on all slopes which include landforms such as hillsides, ridges, and escarpments. Badlands have essentially no soil and support little or no vegetation. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badlands is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Loamy Sites:
This site occurs 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 Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Rhizomatous Wheatgrasses, Needleandthread, Blue Grama Plant Community. The potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants.

The present plant community is a *Mixed Sagebrush/Grass*. Compared to the HCPC, cheatgrass has invaded with western wheatgrass and thickspike wheatgrass maintaining at a similar or slightly higher level. Virtually all other cool-season mid-grasses are severely decreased. Blue grama is the same or slightly less than found in the HCPC. Plant diversity is low.

Dominant grasses identified include: prairie june grass, bluebunch wheatgrass, and downy brome grass. Other vegetative species identified the at onsite: Wyoming big sagebrush and prickly pear cactus.

Wyoming big sagebrush is a significant component of this Mixed Sagebrush/Grass 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.

Sandy Site:
This site occurs on nearly level to 50 percent slopes on landforms which include alluvial fans, hillsides, plateaus, ridges and stream terraces in the 10-14"precipitation zone.

The soils of this site are moderately deep to very deep (greater than 20" to bedrock), well drained soils that formed in eolian deposits or residuum derived from unspecified sandstone. These soils have moderate, moderately rapid or rapid permeability. The main soil limitations include low available water holding capacity, and high wind erosion potential.

The Historic Climax Plant Community (HCPC - defined as the plant community that was best adapted to the unique combination of factors associated with this ecological site) for this site would be a Needleandthread/Prairie sandreed Plant Community. Potential vegetation is about 75% grasses or grass-like plants, 15% forbs, and 10% woody plants. The state is a mix of warm and cool season midgrasses.

The present plant community is a *Needleandthread/threadleaf sedge/Fringed sagewort* plant community. Compared to the HCPC, prairie sandreed and Indian ricegrass have decreased. Threadleaf sedge, needleand thread and fringed sagewort have increased.

Dominant grasses identified include: needleandthread grass, prairie sandreed, bluebunch wheatgrass, and downy brome grass. Other vegetative species identified at onsite: prickly pear cactus, yucca, and Wyoming big sagebrush.

A summary of the ecological sites within the project area are listed in the table below along with the individual acreage and the percentage of the total area identified within the POD boundary.

Table 3.4 – Summary of Ecological Sites

Ecological Site	Acres	Percent
Badlands	1817	41%
Loamy 10-14" Northern Plains	1445	33%
SANDY (10-14 NP)	1048	24%
SHALLOW LOAMY (10-14 NP)	68	2%
SHALLOW SANDY (10-14 NP)	48	1%
LOWLAND (10-14 NP)	18	<1%

3.2.3. Wetlands/Riparian

Cottonwood Creek and Dry Willow Creek are two major ephemeral drainages located on the southern and northern POD boundaries. Both creek bottoms are relatively flat and lack continuous well-defined channels. No standing water, running water, or wetlands were observed in any of the inspected channel sections. A few decadent isolated and clustered cottonwood trees are located in the drainage bottoms.

3.2.4. Invasive Species

The following state-listed noxious weeds and/or weed species of concern infestations were discovered by a search of inventory maps or databases on the CBM Clearinghouse website (http://www.cbmclearinghouse.info/):

- Russian knapweed
- Canada thistle
- common burdock

The CBM Clearinghouse database was created cooperatively by the University of Wyoming, BLM and county Weed and Pest offices. Additionally, the operator or BLM confirmed the following CBM Clearinghouse identified infestations and/or documented additional weed species during subsequent field investigations:

- Common cocklebur
- wild licorice

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

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 Wildlife Resources LLC.

Wildlife Resources performed surveys for bald eagles, mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests and prairie dog colonies according to protocol in 2006 and 2007. No formal surveys were conducted for Ute ladies'-tresses orchid, though the project area was surveyed for potential habitat.

A BLM Biologist conducted a field visit on February 9, April 12, and 17, 2007. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project adjustment recommendations where wildlife issues arose.

Wildlife species common to the habitat types present are identified in the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS 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 Dry Willow Phase 2 project area include pronghorn antelope and mule deer. The project area is part of the Pumpkin Buttes Pronghorn antelope herd unit. The 2004 estimated Pumpkin Buttes pronghorn antelope herd unit population was 27,109 with a population objective of 18,000 (WGFD 2004). Mule deer belong to the Pumpkin Buttes herd unit. The 2004 estimated Pumpkin Buttes mule deer herd unit population was 14,800 with a population objective of 11,000 (WGFD 2004).

The WGFD has designated the entire project area project area as winter-yearlong range for pronghorn antelope and mule deer. Populations of pronghorn antelope and mule deer within their respective hunt areas are above WGFD objectives.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. Big game range maps 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 Cottonwood Creek, an intermittent tributary of the Powder River. One natural spring is present within the project area within NESE Section 14, T43N, R76W (Anadarko 2006). Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

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. 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

Thirty-seven raptor nest sites were identified by Wildlife Resources within 0.5 mile of the project area, fourteen of which were active in 2006. Eight new nests were discovered in 2007. Of the forty-five nests, thirteen were active in 2007 (Table 4.).

Table 4. Documented raptor nests within the Dry Willow Phase 2 project area in 2006.

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2006/2007

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2006/2007
4218	Great-horned owl	420880E 4843920N	NESW Sec. 34 T44N, R76W	Cottonwood, live	Good	Active/Active
4219	Red-tailed hawk	420995E 4836835N	SESW Sec. 22 T43N, R76W	Cottonwood, live	Good	Active/Unknown
4099	Red-tailed hawk	421000E 4842857N	NWNW Sec. 3 T43N, R76W	Cottonwood, dead	Good	Active/Active
4100	Great-horned owl	422840E 4840705N	SWNE Sec. 11 T43N, R76W	Cottonwood, live	Good	Active/Active
4220	Red-tailed hawk	423390E 4838510N	SESE Sec. 13 T43N, R76W	Cottonwood, live	Good	Active/Unknown
4221	Red-tailed hawk	418250E 4842947N	NWNE Sec. 5 T43N, R76W	Cottonwood, dead	Good	Active/Unknown
4222	Great-horned owl	420333E 4838802N	NESE Sec. 16 T43N, R76W	Cottonwood, live	Fair	Active/Inactive
4223	Red-tailed hawk	419773E 4839591N	NWNE Sec. 16 T43N, R76W	Cottonwood, live	Good	Active/Inactive
4224	Red-tailed hawk	420630E 4841310N	NWNW Sec. 10 T43N, R76W	Cottonwood, live	Good	Active/Inactive
4225	Great-horned owl	420330E 4836410N	NENE Sec. 28 T43N, R76W	Cottonwood, live	Good	Active/Unknown
4226	Red-tailed hawk	422362E 4836365N	NWNW Sec. 26 T43N, R76W	Cottonwood, live	Good	Active/Active
4227	Great-horned owl	424518E 4836617N	NENW Sec. 25 T43N, R76W	Cottonwood, live	Fair	Active/Unknown
4105	Red-tailed hawk	422960E 4841850N	SWSE Sec. 2 T43N, R76W	Cottonwood, dead	Good	Active/Active
4228	Red-tailed hawk	424310E 4840135N	SESW Sec. 12 T43N, R76W	Cottonwood, live	Good	Active/Inactive
4229	Unknown	423500E 4837700N	NESE Sec. 23 T44N, R76W	Cottonwood, live	Fair	Inactive/Unknown
4230	Unknown	421022E 4838258N	SESW Sec. 15 T43N, R76W	Cottonwood, live	Poor	Inactive/Inactive
4114	Red-tailed hawk	421300E 4841470N	NW Sec. 10 T43N, R76W	Cottonwood, dead	Good	Inactive/Active
4231	Golden eagle	422600E 4838555N	SWSW Sec. 14 T43N, R76W	Cottonwood, live	Good	Inactive/Unknown
4232	Long-eared owl	423636E 4838780N	NWSW Sec. 13 T43N, R76W	Cottonwood, live	Good	Inactive/Inactive
4233	Unknown	417641E 4841935N	SESW Sec. 5 T43N, R76W	Cottonwood, live	Poor	Inactive/Unknown
4234	Unknown	417750E 4841370N	NENW Sec. 8 T43N, R76W	Cottonwood, live	Poor	Inactive/Unknown
4235	Unknown	419530E 4839180N	SENW Sec. 16 T43N, R76W	Cottonwood, live	Fair	Inactive/Unknown
4236	Unknown	419575E 4839390N	SWNE Sec. 16 T43N, R76W	Cottonwood, live	Poor	Inactive/Unknown

BLM ID#	SPECIES	UTM	LEGAL LOCATION	SUBSTRATE	CONDITION	STATUS IN 2006/2007
4237	Unknown	419799E 4839627N	NWNE Sec. 16 T43N, R76W	Cottonwood, live	Fair	Inactive/Inactive
4238	Unknown	419865E 4841205N	NWNE Sec. 9 T43N, R76W	Cottonwood, live	Remnants	Inactive/Inactive
4239	Great-horned owl	420635E 4841350N	NWNW Sec. 10 T43N, R76W	Cottonwood, live	Fair	Inactive/Active
4240	Unknown	424185E 4837652N	SENW Sec. 24 T43N, R76W	Cottonwood, live	Fair	Inactive/Inactive
4241	Unknown	424233E 4837443N	NESW Sec. 24 T43N, R76W	Cottonwood, live	Fair	Inactive/Inactive
4242	Unknown	423995E 4837335N	NWSW Sec. 24 T43N, R76W	Cottonwood, live	Poor	Inactive/Unknown
4243	Unknown	423904E 4837289N	NWSW Sec. 24 T43N, R76W	Cottonwood, live	Poor	Inactive/Inactive
4244	Unknown	423820E 4837206N	NWSW Sec. 23 T43N, R76W	Cottonwood, live	Fair	Inactive/Unknown
4245	Unknown	424293E 4838001N	NENW Sec. 24 T43N, R76W	Cottonwood, live	Fair	Inactive/Unknown
4246	Unknown	423889E 4836281N	NWNW Sec. 25 T43N, R76W	Cottonwood, live	Fair	Inactive/Inactive
4247	Unknown	424509E 4836613N	NENW Sec. 25 T43N, R76W	Cottonwood, live	Fair	Inactive/Unknown
4248	Unknown	424510E 4836605N	NENW Sec. 25 T43N, R76W	Cottonwood, live	Fair	Inactive/Unknown
4249	Unknown	424360E 4840215N	SESW Sec. 12 T43N, R76W	Cottonwood, live	Poor	Inactive/Unknown
3656	Red-tailed hawk	420124E 4841310N	NENE Sec. 9 T43N, R76W	Cottonwood, live	Unknown	Unknown/Inactive
None	Red-tailed hawk	423390E 4838510N	SESE Sec. 14 T43N, R76W	Cottonwood, live	Good	Active – '07
None	Red-tailed hawk	418250E 4842947N	NWNE Sec. 5 T43N, R76W	Cottonwood, dead	Good	Active – '07
None	Great-horned owl	423282E 4835284N	SESE Sec. 26 T43N, R76W	Cottonwood, live	Fair	Inactive – '07
None	Burrowing owl	421745E 4842437N	SENE Sec. 3 T43N, R76W	Prairie dog burrow	N/A	Active – '07
None	Ferruginous hawk	421109E 4842636N	NENW Sec. 3 T43N, R76W	Ground, hillside	Good	Active – '07
None	Red-tailed hawk	422132E 4839808N	NWNW Sec. 14 T43N, R76W	Cottonwood, live	Good	Active – '07
None	Great-horned owl	422099E 4838740N	SWSW Sec. 14 T43N, R76W	Cottonwood, live	Good	Active – '07
None	Unknown	423820E 4837206	NWSW Sec. 23 T43N, R76W	Cottonwood, live	Fair	Inactive – '07

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 three 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 1988, the WGFD identified four prairie dog complexes (Arvada, Recluse, Thunder Basin National Grasslands, and Midwest) partially or wholly within the BLM Buffalo Field Office administrative area as potential black-footed ferret reintroduction sites (Oakleaf 1988).

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).

One black-tailed prairie dog colony was identified during site visits by Wildlife Resources partially within the project area. This colony is located within sections 2 and 3, T43N, R76W and is approximately 215 acres in size. No other black-tailed prairie dog colonies are located within 1.5km of this town. The Dry Willow Phase 2 project area is located approximately seven miles east of the Midwest black-footed ferret reintroduction area. Black-footed ferret habitat is not present within the Dry Willow Phase 2 project area.

3.3.5.1.2. Bald eagle

On February 14, 1978, the bald eagle was federally listed as Endangered in all of the continental United States except for Minnesota, Wisconsin, Michigan, Oregon, and Washington. In these states the bald eagle was listed as Threatened. On July 12, 1995 the eagle's status was changed to Threatened throughout the United States. Species-wide populations are recovering from earlier declines, and the bald eagle was proposed for de-listing in 2000, but as yet no final decision has been made.

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 can be more varied. In addition to prairie dogs, ground squirrels, and lagomorphs, domestic sheep and big game carcasses 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.

The Dry Willow Phase 2 project area has several stands of mature cottonwood trees associated with it within Cottonwood Creek, located within approximately ½ mile of the southern portions of the project area. Wildlife Resources observed 2 adult bald eagles along Cottonwood Creek (NWSE Section 26, T43N, R76W) on December 29, 2005. Hayden-Wing Associates observed 1 adult bald eagle on two separate occasions (January 5 and 25, 2006) also along Cottonwood Creek in NWNE Section 21, T43N, R76W. No potential nests were identified during consultants (Brown 2006) or BLM biologist's site

visits, within the immediate project area or extending one mile from proposed activities.

3.3.5.1.3. Ute's Ladies Tresses Orchid

This orchid is listed as Threatened under the Endangered Species Act. It is extremely rare and occurs in moist, sub-irrigated or seasonally flooded soils at elevations between 1,780 and 6,800 feet above sea level. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. Prior to 2005, only four orchid populations had been documented within Wyoming. Five additional sites were located in 2005 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the same tributary and within a few miles of an original location. Drainages with documented orchid populations include Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

One natural spring is present within the project area within NESE Section 14, T43N, R76W. No other potential habitat is present.

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. 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. Black-tailed prairie dog

On August 12, 2004, the U.S. Fish and Wildlife Service removed the black-tailed prairie dog's Candidate status. The Buffalo Field Office however will consider prairie dogs as a sensitive species and continue to afford this species the protections described in the FEIS. The black-tailed prairie dog is a diurnal rodent inhabiting prairie and desert grasslands of the Great Plains. Their decline is related to multiple factors including, habitat destruction, poisoning, and Sylvatic plague.

One black-tailed prairie dog colony was identified during site visits by Wildlife Resources partially within the project area. This colony is located within sections 2 and 3, T43N, R76W and is approximately 215 acres in size.

3.3.5.2.2. Greater sage-grouse

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 through out the project area. Six documented sage-grouse leks are present within two miles of the project area (Table 6). Sage-grouse were observed by Wildlife Resources on all of these leks in 2006. Activity on all of these leks for 2007 is noted below.

Table 6. Documented sage-grouse leks within two miles of the Dry Willow Phase 2 project in 2006.

Lek ID	UTM NAD83	Legal Location	Status (Peak Males) in 2006 / 2007	Distance From Project Area (Miles)
Windmill	423350E 4841900N	SESE Sec. 2 T43N, R76W	Active – 3 / Active – 4	0.23

Windmill North	423500E 4843360N	SESE Sec. 35 T44N, R76W	Active – 25 / Active – 27	1.04
Windmill NW	422593E 4842050N	NESW Sec. 2 T43N, R76W	Active – 1 / Inactive – 0	0.46
Cottonwood Creek 1	419386E 4834409N	SENW Sec. 33 T43N, R76W	Active – 27 / Unknown	2.00
Cottonwood Creek 2	421621E 4838450N	SESE Sec. 15 T43N, R76W	Active – 25 / Active – 21	0.00
Dry Willow	421500E 4844450N	NWNE Sec. 34 T44N, R76W	Active – 70 / Active – 40	0.80

3.3.5.2.3. Mountain plover

Mountain plovers, which are a Buffalo Field Office sensitive species, are typically associated with high, dry, short grass prairies containing vegetation typically shorter than four inches tall, and slopes less than 5 degrees (BLM 2003). Mountain plovers are closely associated with heavily grazed areas such as prairie dog colonies and livestock pastures.

Mountain plover breeding and nesting habitat exists throughout the project area. Surveys for mountain plover occupancy according to Service protocol were conducted during 2006 and 2007 (Brown) nesting seasons. No mountain plovers were observed.

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

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 Dry Willow Creek and Cottonwood Creek drainage systems. Both Cottonwood Creek and Dry Willow Creek are ephemeral streams located in a portion of the Powder River Breaks comprised of rolling hills trending to steep hills and deep draws feeding towards the Powder River. The total drainage area of the Cottonwood Creek watershed is approximately 80 sq mi. Cottonwood Creek has a slope ranging from .3 to 1.9 percent. It possesses a channel with low sinuosity, ranging from 1.0 to 1.58. The total drainage area of the Dry Willow Creek watershed is approximately 12 square miles. Dry Willow Creek has a slope of .9 to 2.4. It possesses a channel with low sinuosity ranging from 1 to 1.18.

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.

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 24 registered stock and domestic water wells within the POD boundary with depths ranging from 160 to 960 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 Dry Willow Creek and Cottonwood Creek drainages which are tributaries to the Upper Powder River primary 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).

No registered natural springs were identified within ½ mile of the Dry Willow POD boundary. However, according to the surface owners, there is a spring located in the NESE Sec. 14, T43N R76W. 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 Dry Willow Phase II project prior to on-the-ground project work (BFO project no. 070070017). Arcadis Consultants conducted a Class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) for the project. G.L. "Buck" Damone III, BLM Archaeologist, reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following cultural resources are located in or near the area of potential effect.

Table 3.5 Cultural Resources Inventory Results

Site Number	Site Type	Eligibility
48CA268	Pumpkin Buttes TCP	Eligible
48CA1568	Historic Trail	Eligible
48CA1570	Historic Trail	Eligible
48CA3143	Historic Trash	Not Eligible
48CA3145	Historic Trash	Not Eligible
48CA3443	Lithic Scatter	Not Eligible
48CA5388	Historic Trash	Not Eligible
48CA5389	Historic Trash/Lithic Scatter	Not Eligible
48CA5402	Lithic Scatter	Not Eligible
48CA5403	Lithic Scatter	Not Eligible
48CA5404	Historic Homestead	Eligible
48CA5405	Lithic Scatter	Not Eligible
48CA6298	Lithic Scatter	Not Eligible
48CA6299	Lithic Scatter	Unevaluated
48CA6300	Lithic Scatter	Eligible
48CA6301	Lithic Scatter	Not Eligible
48CA6302	Lithic Scatter	Not Eligible
48CA6303	Lithic Scatter	Eligible

4. ENVIRONMENTAL CONSEQUENCES

The changes to the proposed action POD, which resulted in development of Alternative C as the preferred alternative, have reduced the potential impact 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 approved well locations, 38 can be drilled without a well pad being constructed, 4 will require a constructed (cut & fill) well pad, and 1 well will be slotted. Surface disturbance associated with the drilling of the (38) 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 20 x 50 feet), and compaction (from vehicles driving/parking at the drill site). Estimated disturbance associated with these 38 wells would involve approximately 0.1 acre/well for 3.8 total acres. The 4 wells requiring cut & fill pad construction would disturb approximately .5 acres/well pad for a total of 2.0 acres. The slotted pad will disturb .1 acre/well. The total estimated disturbance for all 43 wells would be 5.9 acres.

No access roads will be constructed without being corridors with associated infrastructure. All 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 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.

The effects to soils resulting from well pad, access roads and pipeline construction may include:

- Mixing of horizons – occurs where construction on roads, pipelines or other activities take place. Mixing may result in removal or relocation of organic matter and nutrients to depths where it would be unavailable for vegetative use. Soils which are more susceptible to wind and water erosion may be moved to the surface. Soil structure may be destroyed, which may impact infiltration rates. Less desirable inorganic compounds such as carbonates, salts or weathered materials may be relocated and have a negative impact on revegetation. This drastically disturbed site may change the ecological integrity of the site and the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil Erosion would also affect soil health and productivity. Erosion rates are site specific and are dependant on soil, climate, topography and cover.
- Soil Compaction – the collapse of soil pores results in decreased infiltration and increased erosion potential. Factors affecting compaction include soil texture, moisture, organic matter, clay content and type, pressure exerted, and the number of passes by vehicle traffic or machinery. Compaction may be remediated by plowing or ripping.
- Modification of hill slope hydrology.

Soil disturbances other than permanent facilities would be short term, and have minor impacts with expedient, successful interim reclamation and site stabilization. Construction activities would be designed following Best Management Practices (BMPs) Seed mixes were determined based on soil map unit types, the dominant ecological sites found within the project area, and the mixing of soil horizons in disturbed areas.

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 Constructed Pad Slotted Pad	38 4 1	0.1/acre .5/acre .1/acre	3.8 2.0 .1	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells	0	0.1/acre	0.0	Long Term
Improved Roads With Corridor Existing with Corridor Proposed with Corridor	 5.4 2.7	 40' – 50' Width or Site Specific	 27.6 16.6	Long Term
2-Track Roads With Corridor	 17.3	40' Width or Site Specific	48.1	Long Term
Pipelines No Corridor With Corridor	 .9	 40' Width or Site Specific	 4.5	Short Term
Buried Power Cable No Corridor	 0	12' Width or Site Specific	 0	Short Term
Overhead Powerlines	0.0	15' Width	0	Long Term

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

No effects to wetland/riparian habitat are expected due to all water being transferred off site via water pipeline to injection wells. No wells or other infrastructure are located within wetlands or riparian areas.

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 following measures in an Integrated Pest Management Plan (IPMP) included in the proposal:

1. Control Methods include spraying in the summer and again in the fall if necessary.
2. Preventive practice includes washing vehicles and other equipment that have been transported from another state.
3. Field crews will be able to spot noxious weeds per Weed Management Plan.

The species downy brome, *Bromus tectorum* and to a lesser extent, Japanese brome, *Bromus 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 at this

time. Pricklypear cactus, *Opuntia polyacantha*,is a native species and found throughout native rangelands. A control program for this species is not recommended.

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. Impacts are within the parameters identified in the PRB FEIS.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Under the environmentally preferred alternative, winter-yearlong range for pronghorn antelope and 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 feels 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 accepted 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. In order to survive 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.

4.2.1.1. 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

Produced water will be conveyed from each well through an underground pipeline network to a main water transfer station and transferred by pipeline down to Anadarko's operating area near Midwest for injection into the Madison aquifer. Aquatic species will not be affected.

4.2.2.1. 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).

Density of breeding Brewer's sparrows declined by 36% within 100 m of dirt roads within a natural gas field. Effects occurred along roads with light traffic volume (<12 vehicles per day). Findings suggest that indirect habitat losses from energy development may be substantially larger than direct habitat losses (Ingelfinger 2004).

Density of breeding sage sparrows was reduced by 57% within a 100-m buffer of dirt roads regardless of traffic volume. The density of roads constructed in natural gas fields exacerbated the problem and the area of impact was substantial (Ingelfinger 2004).

Overhead power lines may affect migratory birds in several ways. Power poles provide raptors with perch sites and may increase predation on migratory birds. Power lines placed in flight corridors may result in collision mortalities. Some species may avoid suitable habitat near power lines in an effort to avoid predation. Additional direct and indirect effects to migratory birds are discussed in the PRB FEIS (4-231-235).

4.2.3.1. 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.

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 over heating or chilling of eggs or chicks. The 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. Additional direct and indirect impacts to raptors, from oil and gas development, are analyzed in the PRB FEIS (4-216-221).

Table 5. Infrastructure within close proximity to documented raptor nests within the Dry Willow Phase 2 project area (Timing limitations will apply to this infrastructure).

BLM ID#	UTM (NAD 83)	SPECIES	WELL / PIT NUMBER	DISTANCE (MILES)
4105	422960E 4841850N	Red-tailed hawk	11-31 11-41	0.36 0.46
4099	421000E 4842857N	Red-tailed hawk	3-12 3-22 3-23 3-32 4-41	0.35 0.25 0.45 0.31 0.48
4238	419865E 4841205N	Unknown	4-34	0.37
3656	420124E 4841310N	Red-tailed hawk	3-14 4-34	0.44 0.36
4239	420635E 4841350N	Great-horned owl	3-14	0.29
4224	420630E 4841310N	Red-tailed hawk	3-14 10-32	0.32 0.49
4114	421300E 4841470N	Unknown	3-14 3-23 10-32 10-41	0.48 0.45 0.31 0.31
4100	422840E 4840705N	Great-horned owl	11-12 11-21 11-23 11-32 11-34 11-43	0.38 0.41 0.20 (out of line-of-sight) 0.25 0.42 0.37
4232	423636E 4838780N	Long-eared owl	14-32 23-41	0.49 0.45
4220	423390E 4838510N	Red-tailed hawk	23-41	0.45
4231	422600E 4838555N	Golden eagle	14-14 14-23 23-21	0.26 0.21 (out of line-of-sight) 0.41
4222	420333E 4838802N	Great-horned owl	15-14	0.29
4230	421022E 4838258N	Unknown	15-14	0.28

BLM ID#	UTM (NAD 83)	SPECIES	WELL / PIT NUMBER	DISTANCE (MILES)
4229	423500E 4837700N	Unknown	23-32 23-41 23-43	0.36 0.24 0.40
4242	423995E 4837335N	Unknown	23-43	0.41
4243	423904E 4837289N	Unknown	23-43	0.35
4244	423820E 4837206N	Unknown	23-43	0.28
4226	422362E 4836365N	Red-tailed hawk	23-34	0.46
4246	423889E 4836281N	Unknown	26-41	0.33
New	421109E 4842636N	Ferruginous hawk	3-12 3-22 3-23 3-32 3-41	0.36 0.12 (out of line-of-sight) 0.31 0.21 0.49
New	422132E 4839808N	Red-tailed hawk	10-34 10-43 11-14 14-12 14-21	0.46 0.47 0.18 (out of line-of-sight) 0.35 0.26
New	423390E 4838510N	Red-tailed hawk	23-41	0.27
New	423820E 4837206N	Unknown	23-43	0.28

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 3-34 well location was removed from the project plan due to an inability to find a new location greater than 0.25 mile from a red-tailed hawk nest.

4.2.4.1. 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. No additional mitigation measures are required.

4.2.5. Threatened and Endangered and Sensitive Species

Within the BLM Buffalo Field Office there are three species that are Threatened or Endangered under the Endangered Species Act. Potential project effects on Threatened and Endangered Species were analyzed in a Biological Assessment and a summary is provided in Table 4.3. 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 Direct and Indirect Effects

Table 4.3 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				
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body.	K	LAA	Increased human activity within occupied habitat.
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.
Effect Determinations

Listed Species
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

Because the black-tailed prairie dog colony within the Dry Willow Phase 2 project area is of insufficient size for supporting ferrets and is 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. Bald eagle

Based on the raptor nesting and bald eagle winter roost surveys, it is likely bald eagles may nest or roost within the Dry Willow Phase 2 project area. Steps have been taken to minimize loss if eagles do use the area such as timing limitations, buried power lines and road design for minimal speeds. The proposed project should not affect bald eagle nesting or winter roosting.

There are 2.6 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. Anadarko is proposing to bury any additional power lines associated with this project.

The presence of overhead existing power lines ***may adversely affect*** foraging bald eagles. Bald eagles forage opportunistically throughout the Powder River Basin particularly during the winter when migrant eagles join the small number of resident eagles. Power poles provide attractive perch sites in areas where mature trees and other natural perches are lacking. From May 2003, through December 28, 2006, Service Law Enforcement salvage records for northeast Wyoming identified that 156 raptors, including 1 bald eagle, 93 golden eagles, 1 unidentified eagle, 27 hawks, 30 owls and 4 unidentified raptors were electrocuted on power poles within the Powder River Basin Oil and Gas Project area (USFWS 2006a). Of the 156 raptors electrocuted 31 were at power poles that are considered new construction (post 1996 construction standards). Additionally, two golden eagles and a Cooper's hawk were killed in apparent mid span collisions with powerlines (USFWS 2006a). Power lines not constructed to APLIC suggestions pose an electrocution hazard for eagles and other raptors perching on them; the Service has developed additional specifications improving upon the APLIC suggestions. Constructing power lines to the APLIC suggestions and Service standards minimizes but does not eliminate electrocution risk.

Roads present a collision hazard, primarily from bald eagles scavenging on carcasses resulting from other road related wildlife mortalities. Collision risk increases with automobile travel speed. 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%).

4.2.5.1.3. Ute's Ladies Tresses Orchid

No impoundments are proposed as part of the Dry Willow Phase 2 project. The spring should not be affected by any project activities. Suitable habitat is not present within the project area. Implementation of the proposed coal bed natural gas project should have ***no effect*** on the Ute ladies'- tresses orchid.

4.2.5.2. Sensitive Species Direct and Indirect Effects

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. 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.

Prairie dogs colonies create a biological niche or habitat for many species of wildlife (King 1955, Reading 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 Reading1989) suggest that richness of associated species on black-tailed prairie dog colonies increases with colony size and regional colony density. Prairie dog colonies attract many insectivorous and carnivorous birds and mammals because of the concentration of numerous 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, Mac Cracken 1985, Agnew 1986, Uresk 1986, Deisch 1989). Of those species regularly associated with prairie dog colonies, six are on the Wyoming BLM sensitive species list. The species of concern are 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*).

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.

Table 4.4 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	MIIH	Additional water will affect existing waterways.
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.
Brewer's sparrow (*Spizella breweri*)	Basin-prairie shrub	S	MIIH	Sagebrush cover will be affected.
Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	MIIH	Prairie dog colonies present.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Grassland and shrubland habitats will be affected.
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	MIPV	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	S	MIIH	Grasslands will be affected.
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	S	MIIH	Prairie will be affected.
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	New reservoirs may increase usage during migration.
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	One prairie dog town exists in the project area.
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	S	MIIH	Grassland habitat will be affected.
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

4.2.5.2.1. Black-tailed prairie dog

Approximately one mile of proposed two-track and two wells are proposed within the prairie dog colony located in the northern most portion of the project area.

The presence of roads and pipelines may limit colony expansion. The well house and nearby power poles may provide habitats for mammal and avian predators increasing prairie dog predation. Mineral related traffic on the adjacent road may result in prairie dog road mortalities.

4.2.5.2.2. Greater sage-grouse

There are fourteen sage-grouse lek within three miles of the Dry Willow Phase 2 project area. This placement of leks would indicate a 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 between which male sage grouse may be expected to interchange from one day to the next. Development of this project will cause fragmentation to the landscape of the complex. This fragmentation may cause males to avoid previous routes to some leks within the complex and subsequently abandon lek sites. Crowding of this population may occur, which leads to diminished genetic variability within the population. This can weaken the health of the entire population. As the project area is situated within this complex, sage-grouse are likely to nest throughout the project area. Activity disturbing to habitat within the complexes during breeding season may alter movements of male grouse. Cover utilized by the male sage-grouse as they move between leks should not be removed during the season of peak use. This action may cause the grouse to change their behavior in such a way as to increase an individuals' vulnerability to predation. Direct loss of sage-grouse may also occur as a result of the methods used (brush-hogging) to groom the surface for pipeline placement and initial road preparation.

Greater sage-grouse habitat is being directly lost with the addition of well sites, roads, pipelines, power lines, reservoirs and other infrastructure (Theiele 2005, Oedekoven 2004). Sage grouse avoidance of CBNG infrastructure results in even greater indirect habitat loss. The Wyoming Game and Fish Department (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).

Noise can affect sage grouse by preventing vocalizations that influence reproduction and other behaviors (WGFD 2003). Sage grouse attendance on leks within one mile of compressors is lower than for sites farther from compressors 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 Buffalo Field Office (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.

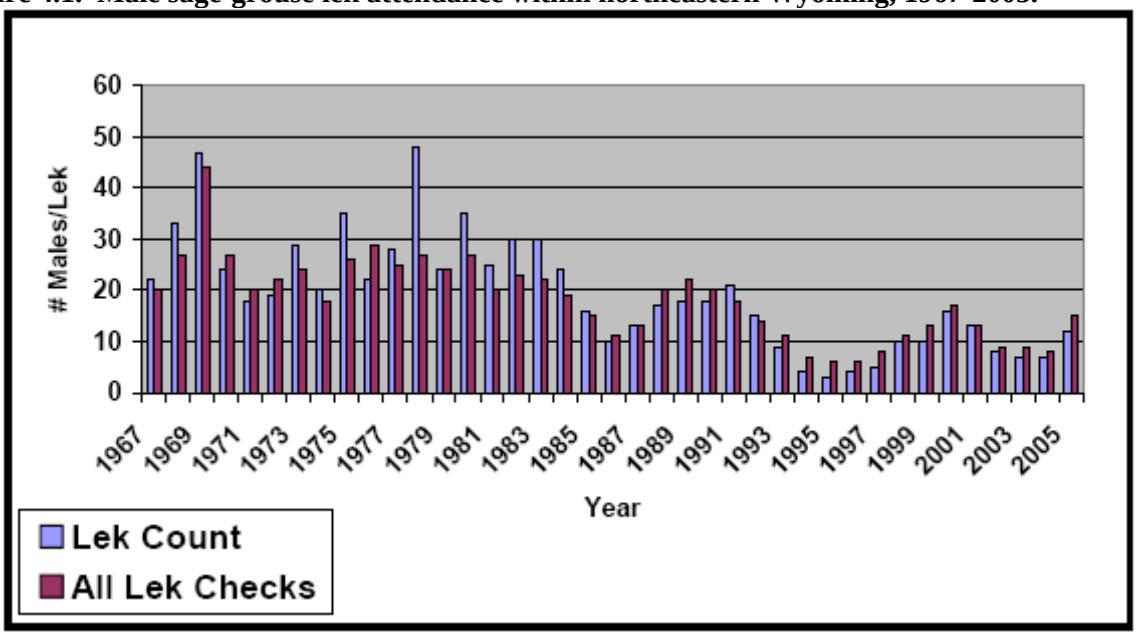
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km (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. In press).

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. Habitat conditions and sage grouse biology within the Buffalo Field Office is probably most similar to Moynahan's north-central Montana study area.

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 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 In press, Holloran and Anderson 2005). A recent 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; meanwhile 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.

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



Sage-grouse populations within the PRB are declining independent of coalbed natural gas 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 Powder River Basin Oil and Gas Project Final Environmental Impact Statement 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 likely 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 Wyoming Game and Fish Department (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).

4.2.5.2.3. Mountain plover

Mineral development may have mixed effects on mountain plovers. Disturbed ground such as buried pipe line corridors and roads may be attractive to plovers while human activities within one-quarter mile may be disruptive. Use of roads and pipe line corridors by mountain plovers may increase their vulnerability to vehicle collision. The existing overhead power lines adjacent to the project area provide perch sites for

raptors potentially resulting in increased mountain plover predation. CBNG infrastructure such as the well houses, roads, pipe line corridors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes. 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).

Mountain plover breeding and nesting habitat exists throughout the project area. Surveys for mountain plover occupancy according to Service protocol were conducted during 2005 and 2006 (Brown) nesting seasons. No mountain plovers were observed.

4.2.5.3. 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

Produced water is being piped offsite and reinjected into the Madison formation. No produced water is being surface discharged; therefore no mosquito breeding habitat will be created as a result of the Dry Willow POD. Without mosquitoes, there will be no increased risk of WNV spread resulting from the Dry Willow POD.

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), should reduce project area and downstream potential impacts from proposed water management strategies due to all of the produced water being injected.

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 Water Management Plan (WMP) proposes the transportation and injection of a maximum of 40,000 barrels per day (BPD) from the Dry Willow POD. The wells will inject into the Madison and Tensleep formations near the Anadarko's Salt Creek field. Underground Injection Permit (UIC) 05-231, Class V, is permitted for a maximum of 80,000 BPD per well (potentially 5 wells) for a total of 400,000 BPD. This reinjection contribution from this POD would account for 10% of the total reinjection capacity if all wells were online at maximum water production. Reinjection is discussed in the PRB FEIS in the CBM Produced Water Use and Treatment section on page 3-54.

4.4.1. Groundwater

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 in the water wells in the area. The permitted water wells in the area produce from alluvial or bedrock zones above the targeted coal bed natural gas producing zones (275- 1132 feet depth for the stock and domestic wells compared to 1,325-1,844 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 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 within the POD boundary. The well will be sampled for analysis within sixty days of initial production and a copy of the water analysis will be submitted to the BLM Authorizing Officer.

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 CBM 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 CBM 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 operator has obtained a Wyoming Class V Underground Injection permit (Permit UIC 05-231)for the injection of water produced from this project from the WDEQ, which is permitted for a maximum of 80,000 BPD per well for a total of 400,000 BPD. The proposed action involves the transportation and injection of a maximum of 40,000 barrels per day (BPD) into potentially 5 injection wells into the Madison and Tensleep formations near the Anadarko's Salt Creek field. The injected water cannot exceed 5,000 mg/L total dissolved solids.

The quality for the water produced from the Big George target coal zone is predicted to be similar to, or better than, the ground water within the Madison and Tensleep formations. The TDS in the Madison Well 10 MAD SW13 is 4,090 mg/L while the Big George TDS of the representative water quality sample is 2,140 mg/L.

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 WDEQ analytical parameters 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 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.

4.5. Cultural Resources

The eastern edge of the project is over 2 miles west of the central portion of the Pumpkin Buttes (48CA268), an NRHP eligible traditional cultural property. The setting of the buttes can contribute to the sites' integrity, when the setting is intact. A visual assessment was undertaken on 6/6/07 and 6/21/07 by G.L. "Buck" Damone III, Clint Crago and Casey Freise to determine if the construction of the Dry Willow II POD would impact the setting of the Pumpkin Buttes. For the following visual assessment, a key observation point was chosen on the westernmost point on the summit of North Middle Butte, as it is closest to the project area.

Recently constructed oil and gas related facilities are visible from the base of the Buttes to approximately 15 miles westward. Modern visual distractions include conventional gas and oil wells, well pads, pump jacks, access roads (both crowned and ditched and two track), pipeline scars, reservoirs, fence lines, power lines, a large water storage facility, uranium mine facilities, ranch buildings and dust from vehicle traffic. The setting of the Pumpkin Buttes as they face the project area is nearly dominated by modern visual distractions.

As excerpted from *Pumpkin Buttes Visual Assessment* by Gary D. Long, Outdoor Recreation Planner for the Wyoming BLM State Office:

> Roads and Trails: Roads were readily visible at distances up to five miles. Roads were most visible where located in darker, sagebrush-dominated landscapes. This was because of the contrast created by a light colored linear feature in a dark colored landscape that was devoid of similar natural linear features.
>
> Coal Bed Natural Gas Development (CBM): While this could be seen, the structures associated with CBM are not readily seen at distances over one mile. What is seen are the roads and well site locations, particularly when cleared in sagebrush-dominated landscapes.
>
> Reservoirs: Reservoirs were readily seen at distances equal to or exceeding two miles.
>
> Power Lines: Several single pole power lines were noted. They could be seen but at distances exceeding a mile would not attract the attention of the casual observer.

A few proposed wells and accesses are within 2 and ½ miles of North Middle and South Middle Buttes. The project area can be viewed from all the Buttes. At distances over two miles, the frost boxes associated with CBM wells will be painted to blend into the background and will not be visible. All major access roads (crowned and ditched roads) associated with the project are already constructed and are visible from the Buttes. Construction of pipelines and parallel two track roads accessing wells are over two miles away, will re-vegetate and will not be visible from the Buttes. There is very little sage in the project area (mostly grass) and the construction and reclamation of new accesses or pipelines will not create a vegetation contrast. There are not any reservoirs or other large production related facilities associated with the project. The majority of the power lines associated with the project will be buried.

Overhead lines associated with the project will be well over 2 miles from the buttes.

It does not appear that the construction of the Dry Willow II POD will add visual distractions to the setting of Pumpkin Buttes, especially considering the existing developments that attract the viewers' attention. Additionally, the setting of the buttes is nearly compromised by modern oil and gas related activities. Construction of the project will result in "no effect" to Pumpkin Buttes (48CA268).

There are no eligible sites within the APE of the proposed project. Following the Wyoming State Protocol Section VI (A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 6/24/07 that no historic properties exist within the APE.

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
Jennifer Radle	Regulatory	Anadarko Petroleum Corp. (APC)	Yes
Jeff Ramsey	Field Production	APC	Yes
Don Lindley	Engineer	APC	Yes
Brent Trinier	Engineer	APC	Yes
Chuck Williams	Permitting	Rocky Mountain Permitting	Yes
Eric Reis	Surveyor	Land Surveying Inc.	Yes
Gene Mankin	Surface Owner	T Chair Land	Yes
Patricia Clark	Surface Owner	T Chair Land	Yes
Mary Hopkins	Interim Wyoming SHPO	Wyoming SHPO	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.

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