FINDING OF NO SIGNIFICANT IMPACT & DECISION RECORD
FOR
Devon Energy
Mallard
ENVIRONMENTAL ASSESSMENT –WY-070-EA07-078

DECISION: Is to approve Alternative C as described in the attached Environmental Assessment (EA) and authorize Devon Energy's Mallard Coal Bed Natural Gas (CBNG) POD comprised of the following 50 Applications for Permit to Drill (APDs), as follows:

#	WELL NAME	WELL #	QTR/QTR	SEC	TWP	RGE	LEASE #
1	MALLARD RECORD	14A-595	SWSW	5	49N	75W	WYW147303
2	MALLARD RECORD	14W-595	SWSW	5	49N	75W	WYW147303
3	MALLARD MAYCOCK M&D	34A-595	SWSE	5	49N	75W	WYW147303
4	MALLARD MAYCOCK M&D	34W-595	SWSE	5	49N	75W	WYW147303
5	MALLARD MAYCOCK M&D	12A-695	SWNW	6	49N	75W	WYW147305
6	MALLARD MAYCOCK M&D	12W-695	SWNW	6	49N	75W	WYW147305
7	MALLARD RECORD	14A-695	SWSW	6	49N	75W	WYW147303
8	MALLARD RECORD	14W-695	SWSW	6	49N	75W	WYW147303
9	MALLARD MAYCOCK M&D	23A-695	NESW	6	49N	75W	WYW147305
10	MALLARD MAYCOCK M&D	23W-695	NESW	6	49N	75W	WYW147305
11	MALLARD RECORD	12A-795	SWNW	7	49N	75W	WYW147303
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	RESERVOIR NAME	QTR/QTR	SEC	TWP	RNG	O&G LEASE NUMBER
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2	14-6A-4975	SWSW	6	49	75	WYW147305
3	14-6B-4975	SWSW	6	49	75	WYW147305
4	42-7-4975	SENE	7	49	75	WYW147303
5	13-8-4975	NWSW	8	49	75	WYW135913
6	13-17-4975	NWSW	17	49	75	FEE
7	32-9-4975	SWNE	9	49	75	WYW147304
8	33-9-4975	NWSE	9	49	75	WYW147303

In addition to the listed APDs, it is my decision to approve the following right-of-way grant:

ROW Grant	Type	Sections	TWP/RNG
WYW-169706	**Overhead power line**	**SESE Sec. 9**	**T49N, R75W**

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.
    - Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
    - 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 Landowners.
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. Based on current information, 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
Devon Energy
Mallard
PLAN OF DEVELOPMENT
WY-070-EA07-078

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 one or more 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

Description of the Proposed Action

Proposed Action Title/Type: Devon Energy's Mallard Plan of Development (POD) for 50 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 50 wells proposed within this POD, as follows:

#	Well Name	Well #	Qtr/Qtr	Sec	Twp	Rng	Lease #
1	MALLARD FEDERAL	41A-995	NENE	9	49N	75W	WYW147304
2	MALLARD FEDERAL	41W-995	NENE	9	49N	75W	WYW147304
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3	14-6B-4975	SWSW	6	49	75	WYW147305
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5	13-8-4975	NWSW	8	49	75	WYW135913
6	13-17-4975	NWSW	17	49	75	FEE
7	32-9-4975	SWNE	9	49	75	WYW147304
8	33-9-4975	NWSE	9	49	75	WYW147303

The 32-9-4975 and 33-9-4975 dams were added and evaluated after the onsite visits. These two locations were visited on December 6, 2006.

The 31-17-4975 dam was dropped due to wildlife issues.

The 23-6-4975 dam was dropped due to its proximity to a **huge (15-30 footer)** headcut about 160 feet downstream.

County: Campbell

Applicant: Devon Energy

Surface Owners: Jerry Record, Mitch Maycock
The proposed action involves the development of the project, which includes the following:

- Drilling of 50 total federal CBM wells in the Anderson and Wall coal zones to depths of approximately 1600 and 2250 feet, respectively.

- An unimproved and improved road network.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 8 discharge points and 8 stock water reservoirs within the Upper Powder River watershed.

- A buried gas, water and power line network.

- A Right-of-Way (R/W), WYW169706 granted under the Federal Lands Policy and Management Act (FLPMA), on Federal surface for an overhead powerline. The right-of-way area granted herein contains:
  Overhead – 30 feet wide, 811 feet long, and contains 0.559 acres, more or less;
  Located: 6th PM Campbell County, WYoming
  T. 49 N., R. 75 W.,
  Section 9: SESE

  See Devon POD for location of overhead powerline.

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. Provide water well agreements to the owners of record for permitted water wells within the area of influence of the action.
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

At the on-sites, all areas of proposed surface disturbance were inspected to ensure that potential impacts to natural resources would be minimized. 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 or minimize environmental effects of the operator's proposal. The specific changes identified for the Mallard POD are listed below under 2.3.1:

2.3.1. Changes as a result of the on-sites

1. 12-695 wells: The downhill corner of the pad was pulled in approximately 30 feet to avoid potential erosion problems.

2. 23-695 wells: Access road moved approximately 0.25 miles west to take advantage of gentler topography and to avoid having to build a major engineered road through a drainage.

3. 12-795 wells: Southwest corner of pad pulled in to stay out of shallow drainage.

4. 34-795 wells: Well pad moved approximately 400 feet northeast at the request of the landowner.

5. 32-895 wells: To reduce surface disturbance, this will be a slot instead of a full-sized pad.

6. 12-995 wells: Southwest corner of pad moved in 35 feet, and all corners on drainage side rounded to avoid the drainage.

7. 14-995 wells: Edge of pad near drainage was pulled in approximately 30 feet to avoid the drainage.

8. 23-995 wells: Pad site moved approximately 125 feet northwest to avoid building pad in a slumped area of hillside.

9. 32-995 wells: Southeast corner of pad pulled in approximately 50 feet, and east side of pad pulled in approximately 20 feet to reduce surface disturbance.

10. 34-995 wells: Pipeline access to well site will be corridored in proposed access road to avoid excessive disturbance to sagebrush associated with a separate pipeline access.

11. Starting at the power drop in the SESE corner of Section 9, power to the 43-995, 32-995, and 41-995 wells will be buried to reduce impacts to sage grouse habitat,.

12. 31-17-4975 Dam: Dropped. This dam was located in a sage grouse lek.

13. 23-6-4975 Dam: Dropped due to its proximity to a sizable headcut about 160 feet downstream.

14. 32-9-4975 and 33-9-4975 dams: Water balance insufficient without these additional reservoirs. Sites visited on December 6, 2006, and made a part of this POD's Water Management Plan.

Implementation of committed mitigation measures contained in the Master Surface Use Plan, Drilling Program and Water Management Plan, in addition to the Standard COA contained in the PRB FEIS Record of Decision Appendix A, are incorporated and analyzed in this alternative.

2.3.2. Programmatic mitigation measures identified in the PRB FEIS ROD

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

2.3.2.1. Groundwater

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004. For WYPDES permits received by DEQ after the August 1st effective date, the BLM will require that operators comply with the latest DEQ standards and monitoring guidance. WDEQ has also established a task force to evaluate the need for investigation of shallow groundwater aquifers under existing impoundments used for storage and disposal of CBNG produced water.

2.3.2.2. Surface Water

1. Channel Crossings:
   a) Minimize channel disturbance as much as possible by limiting pipeline and road crossings.
   b) Avoid running pipelines and access roads within floodplains or parallel to a stream channel.
   c) 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.
   d) 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.

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

4. The operator will be required to provide a reclamation bond for impoundments to be used for the management of CBNG water which lie over federal minerals in the amount specified by a qualified Professional Engineer for impoundments with embankments over 10,000 cubic yards, or $2.50 multiplied by the yardage involved for embankments with less than 10,000 cubic yards. The bonding instrument will be submitted to the BLM, with a "cc" to the Buffalo Field Office, prior to commencing construction.

5. The operator will supply a copy of the complete approved SW-4, SW-3, SOD or SW-CBNG permits to BLM as they are issued by WSEO for impoundments.

2.3.2.3. Soils

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

2.3.2.4. 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.

3. The Companies will construct power lines to minimize the potential for raptor collisions with the lines. Potential modifications include burying the lines, avoiding areas of high avian use (for example, wetlands, prairie dog towns, and grouse leks), and increasing the visibility of the individual conductors.

4. The Companies will locate aboveground power lines, where practical, at least 0.5 mile from any sage grouse breeding or nesting grounds to prevent raptor predation and sage grouse collision with the conductors. Power poles within 0.5 mile of any sage grouse breeding ground will be raptor-proofed to prevent raptors from perching on the poles.

5. The Companies will locate impoundments to avoid sagebrush shrublands, where practical.

6. Containment impoundments will be fenced to exclude wildlife and livestock. If they are not fenced, they will be designed and constructed to prevent entrapment and drowning.

7. The Companies will limit the construction of aboveground power lines near streams, water bodies, and wetlands to minimize the potential for waterfowl colliding with power lines.

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

2.3.2.5. Threatened, Endangered, or Sensitive Species

2.3.2.5.1. Bald Eagle

1. Site-specific project areas will be evaluated for suitable bald eagle nesting and roosting habitat prior to permit approval. Suitable nesting habitat is any mature stand of conifer or cottonwood trees in association with rivers, streams, reservoirs, lakes or any significant body of water. Suitable roosting habitat is defined as any mature stands of conifer or cottonwood trees.

2. Special habitats for raptors, including wintering bald eagles, will be identified and considered during the review of the APD/POD or Sundry Notices.

2.3.2.5.2. Mountain Plover

1. Project-related features that encourage or enhance the hunting efficiency of predators of mountain plover will not be constructed within ¼ mile of known mountain plover nest sites.

2. When above ground markers are used on capped and abandoned wells they will identified with markers no taller than four feet with perch inhibiting devices on the top to avoid creation of raptor hunting perches within 0.5 mile of nesting areas.

3. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

2.3.2.6. Visual Resources

1. The Companies will mount lights at compressor stations 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.

2.3.2.7. 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.

2.3.2.8. 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. 34-595: Stabilization measure required for the edge of well site near the drainage.

2. 12-695, 12-795: Stabilization measures necessary for downhill side of pads.

3. 23-695: Bladed portion of access road to monitor well should be reclaimed and stabilized.

4. 12-895: Minimize mowing to preserve sagebrush. Follow the submitted site-specific mitigation plan to minimize habitat loss for sage grouse.

5. 21-895: 20' max corridor width to minimize sagebrush disturbance

6. 32-895: Minimize mowing to reduce sagebrush disturbance.

7. 41-895: Minimize mowing to reduce sagebrush disturbance.

8. 12-995: Site stabilization necessary to prevent erosion.

9. 32-995: 20' max corridor width to minimize sagebrush disturbance

10. Due to the terrain and the presence of numerous sandstone outcrops, the 32-9 dam will require construction oversight.

Wildlife:

1. If any dead or injured sensitive species is located during construction or operation, the BLM Buffalo Field Office (307-684-1100) shall be notified within 24 hours.
2. The Record of Decision for the Powder River Basin EIS includes a programmatic mitigation measure that states, "The companies will conduct clearance surveys for threatened and endangered or other special-concern species at the optimum time". The measure requires companies to coordinate with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters. Should this project not be completed by November 1, Devon Energy will coordinate with the BLM to determine if additional surveys will be required.
3. The following conditions will minimize impacts to roosting and nesting bald eagles;
   a. No disturbing activities shall occur within one mile of bald eagle roost habitat from November 1 through April 1, annually, prior to a bald eagle roost survey. Surveys will be required annually in Sections 4-6 of T49N:R75W and Sections 31-33 of T50N:R75W.
   b. Within 0.5 miles 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).
   c. If a roost is identified and construction has not been completed, a year round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
   d. No disturbing activities shall occur within one mile of bald eagle nesting habitat from February 1 through July 31, annually, prior to a bald eagle nest survey. Surveys are required annually in Sections 4-6 of T49N:R75W and Sections 31-33 of T50N:R75W.
   e. If a nest is identified and construction has not been completed, a minimum disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald

eagle nests. A seasonal minimum disturbance-free buffer zone of 1-mile will be established for all bald eagle nest sites (February 1 - August 15).

f. Additional mitigation measures may be necessary if the site-specific project is determined by a Bureau biologist to have an adverse affect to bald eagles or their habitat.

4. The following conditions will minimize 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 affects the following;

BLM Nest ID#	Township/Range	Section	Wells and Infrastructure
3546/3547/4149	49/75	5	The 14W and 14A-595, 34W and 34A-595 wells, their associated infrastructure.
3548/3549	49/75	7	The 34W and 34A-795 and their associated infrastructure southeast.
3546/3547/4149	49/75	8	The 13-8 Reservoir and its associated discharge points, pipelines, monitoring wells, and temporary access roads. All wells within Section 8 **EXCEPT** the 14W and 14A-895, 34W and 14A-895.
3545	49/75	9	The 41W and 41A-995 wells and associated infrastructure.
3431/3436/3437	49/75	15	All overhead powerlines.

   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. 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 occupancy checks shall be completed for all raptor nests within the Mallard POD listed in the table below. The occupancy checks shall be completed for the first five years following project completion. The occupancy checks shall be conducted no earlier than June 1 or later than June 30 and any evidence of nesting success/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.

BLM ID	UTM E	UTM N	Species	2006 Activity
3545	429640	4899732	Unk	Inactive
3546	427407	4899584	RTHA	Active
3547	427702	4898574	LEOW	Active
3549	426157	4897658	RTHA	Active
3548	425922	4897450	GHOW/RTHA	Inactive
4149	427398	4898771	UNK	Inactive

   d. Routine maintenance should be scheduled outside the nesting season (Feb 1-July 31) for all active nests. Emergency activities should be reduced as much as possible and restricted between the hours of 9:00 am and 3:00 pm.

5. A mountain plover nesting survey is desired in suitable habitat prior to commencement of surface disturbing activities in the prairie dog towns located in Sections 3, 6, 8, 9, 10, and 17 of Township 49 North, Range 75 West. If the survey is not conducted prior to commencement of surface disturbing activities, it shall be conducted during the first breeding season following POD approval. No surface disturbing activities are permitted in suitable habitat areas listed above, from March 15-July 31, until a mountain plover nesting survey has been conducted for the current breeding season. This affects all wells and their associated infrastructure and reservoirs located within 0.25 miles of a prairie dog colony.

a. If a mountain plover is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plovers are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
b. Work schedules and shift changes will be set to avoid the periods from 30 minutes before to 30 minutes after sunrise and sunset during June and July, when mountain plovers and other wildlife are most active.
c. Reclamation of areas of previously suitable mountain plover habitat will include the seeding of vegetation to produce suitable habitat for mountain plover.

6. No surface disturbing activity shall occur the within the five black-tailed prairie dog colonies located in Sections 3, 6, 8, 9, 10, and 17 of Township 49 North, Range 75 West from April 15 through August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. This will affect all wells their associated infrastructure and reservoirs within 0.25 miles of a prairie dog colony.

7. Any migratory bird killed by sodium toxicity or salt crystallization in the impoundments will be considered as birds taken in violation of the Migratory Bird Treaty Act. Each violation will be referred to the Office of Law Enforcement for investigation.

8. Devon and Thunderbird should report any elk observations within the Mallard project area to the BLM biologist.

9. The following conditions will minimize impacts to sage-grouse:
   a. No surface disturbing activities are permitted throughout the entire project area from March 1st to June 15th, prior to conducting sage-grouse surveys (activity status on previously identified leks and searches for new lek sites) for the current breeding season and results reviewed by a BLM biologist. This condition will be implemented on an annual basis for the duration of surface disturbing activities.
   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 the Watsabaugh lek (T49N:R75W:S17) is active, the following will be affected;

Township/Range	***Section***	***Affected Wells and infrastructure***
49/75	5	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	7	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	8	All wells, roads, pipelines, buried and overhead power, power drops, generators, compressors, and reservoirs (construction and/or improvements).
49/75	9	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	15	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	17	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	18	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).

If the Barber Creek lek (T49N:R76W:S1) is active, the following will be affected;

Township/Range	***Section***	***Affected Wells and infrastructure***
49/75	5	All wells, roads, pipelines, buried and overhead power, power drops,

Township/Range	*Section*	*Affected Wells and infrastructure*
		generators, and reservoirs (construction and/or improvements).
49/75	6	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	7	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).
49/75	8	The 14W and 14A-895, 12W and 12A-895, and 21W and 21A-895 wells and their associated infrastructure. Overhead power, power drops, generators, compressors, and reservoirs (construction and/or improvements).
49/75	18	All wells, roads, pipelines, buried and overhead power, power drops, generators, and reservoirs (construction and/or improvements).

Additional Sage-grouse Mitigation Measures:

a. Raptor perch deterrents will be installed on all proposed power poles within the Mallard POD and the main line 2 miles south of the project area. Devon has committed to work directly with PRECORP to ensure the perch deterrents are installed and fixed to the poles prior to installation. Construction of the overhead powerlines will be prohibited from March 1 through June 15th.
b. The main pipeline and overhead power line will be relocated to follow the existing improved road.
c. The maximum width for the main pipeline will not exceed 40 feet.
d. Devon has committed to propose the installation of a gate to the landowner that will prevent unauthorized vehicles from accessing the JR Streeter reservoir.
e. Pipeline corridors will be mowed, not flat bladed.
f. Devon has committed to require the third party gas gathering company to move the proposed compressor site approximately 500-700 feet northwest. Moving it further from the Watsabaugh lek site. The installation of mufflers will also be required, reducing sound levels from 105 to 40 decibels.
g. Devon has committed to require all third party companies to adhere to sage-grouse timing limit stipulations.
h. Re-seeding efforts will focus on the entire utility corridor. The seed mix recommended by the Northeast Wyoming Sage-grouse Local Working Group will be used. Devon has committed to utilize specialty equipment to ensure the establishment of sagebrush.
i. The 3-phase overhead power line associated with the 41W/A-995 and 43W/A-995 wells in Section 9 will be removed from the project design. A buried power line will be used instead.
j. Minimal mowing of sage-brush at well head locations and a maximum width not to exceed 20 feet (maximum width of disturbance) for utility corridors and roads combined are required at the following locations; 41W/A-995, 32W/A-995, 34W/A-995, 23W/A-995, 14W/A-995, 12W/A-895, 21W/A-895.
k. All utilities associated with the 34W/A-995 will be placed in a common corridor as discussed.
l. The proposed 3-phase overhead powerline in Section 9 associated with the 34W/A-995, 41W/A-995, and 43W/A-995 will be removed from the project design and replaced with a lower voltage buried line. The buried line will be corridored along the existing 2-track road.
m. No potentially disruptive activities are permitted throughout the entire project area from March 1 through June 15th.
n. No CBM traffic is permitted in Section 17 from March 1 through June 15th. Signs must be posted north and south of the lek site. Outside of March 1-June 15th, only traffic directly related to the reservoir will be permitted in Section 17. Signs will only be required if a gate is not installed.

10. The following conditions will minimize impacts to sharp-tailed grouse:
    a. If an active lek is identified during the survey, the 0.64 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting

season. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 0.5 mile buffer until the following breeding season (April 1). The required sharp-tailed grouse survey will be conducted by a biologist following WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.

b. Creation of raptor hunting perches will be avoided within 0.64 miles of documented sharp-tailed grouse lek sites. Perch inhibitors will be installed to deter avian predators from preying on grouse.

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

2.4. Alternatives considered but not analyzed in detail

Water management alternatives evaluated by the operator included direct discharge, containment, re-injection, land application disposal, and treatment. For a full discussion of why these alternatives were rejected or accepted, please see pages 9-11 of the submitted water management plan.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

Applications to drill were received on May 19, 2006. Field inspections of the proposed Mallard CBM project were conducted on 11/15, 11/16, and 12/6/2006 by: Rick Taylor, Ed Glass, Dennis Randleman, Richard Zander-Devon; Philip and Jerry Record-Landowners; Lindy Johnson-WWC Engineering; Dave Vlien-Land Survey, Inc.; Ben Adams, Arlene Kosic, Melanie Hunter-BLM .

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

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

Mandatory Item	Potentially Impacted	No Impact	Not Present On Site	BLM Evaluator
Threatened and Endangered Species	X			Arlene Kosic
Floodplains			X	Melanie Hunter, Ben Adams
Wilderness Values			X	Melanie Hunter
ACECs		X		Melanie Hunter
Water Resources	X			Melanie Hunter, Ben Adams
Air Quality	X			Melanie Hunter
Cultural or Historical Values		X		G.L. "Buck" Damone III
Prime or Unique Farmlands			X	Melanie Hunter
Wild & Scenic Rivers		X		Melanie Hunter
Wetland/Riparian			X	Melanie Hunter, Ben Adams
Native American Religious Concerns			X	G.L. "Buck" Damone III
Hazardous Wastes or Solids		X		Melanie Hunter
Invasive, Nonnative Species	X			Melanie Hunter
Environmental Justice		X		Melanie Hunter

3.1. Topographic Characteristics of Project Area

The project area is located approximately 18 miles west of Gillette, in Campbell County, Wyoming. The project elevations range from 4500 to 4800 feet. The topography is characterized by broad, grassy ridges with numerous drainages. The drainages on the north side of the main road running east-west through the POD are steep-sided, and are typical of the Powder River "breaks" country. These drainages have narrow ridges with occasional sandstone outcrops, and some areas of highly erosive soils. The ridges and drainages to the south of the main road are broader and more rounded, with less relief between ridge tops and drainage bottoms. These gradual slopes tend to be much more stable than those found in the northern portion of the POD.

3.2. Vegetation & Soils

Species typical of short grass prairie comprise the project area flora. Specific species observed throughout the project area include sagebrush, rabbitbrush, yucca, prickly pear, prairie junegrass, little bluestem, needle and thread grass, and cheatgrass, Most of the POD is located on land belonging to the Records and the Maycocks, and has been managed to maintain the healthy grass community. Differences in dominant species within the project area vary with soil type, aspect and topography.

The soils vary from sandy to loamy and clay loam throughout the project area, and occurs on nearly level to 30% slopes. Soils range from moderately deep (greater than 20" to bedrock) to very deep, well-drained soils that formed in alluvium or alluvium over residuum. These soils have slow permeability. The layers of soil having the most influence on plants vary from 4 to 8 inches thick. The surface soil will vary from 2 to 5 inches deep and have one of the following textures: silty clay, sandy clay, clay, and the finer portions of silty clay loam, clay loam, and sandy clay loam. These soils may develop severe cracks. The main soil limitations include: low organic matter content and soil droughtiness. The low annual precipitation should be considered when planning a seeding. Topsoil depths range from less than 4 inches on ridges to 6-8 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, ranging from fair to poor, with most of the project area having fair reclamation potential. Special care must be taken to avoid operations during wet period, due to the potential for severe soil rutting that exists throughout the project area.

3.2.1. Wetlands/Riparian

There were no wetland or riparian areas observed within the project area during the onsite visits, except for areas that are seasonally wet due to seepage from existing dams. No cottonwood forests exist in the area until one reaches the mainstem of the Powder River, approximately 7 miles downstream of the POD boundary.

3.2.2. Invasive Species

A search of the inventory maps and databases compiled by the University of Wyoming through cooperation between the BLM and Johnson County Weed and Pest shows the possible presence of leafy spurge in the eastern edge of the POD. Field investigation by the proposed project proponents also found salt cedar, skeletonleaf bursage, diffuse knapweed, spotted knapweed, Russian knapweed, Canada thistle, field bindweed, black henbane, Scotch thistle, and areas of cheatgrass.

3.3. Wildlife

A habitat assessment and wildlife inventory surveys were performed by Thunderbird-Jones & Stokes (TJS). TJS performed surveys for mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and prairie dog colonies according to protocol in 2006. No formal surveys were conducted for bald eagles or Ute ladies'-tresses orchid.

A BLM Biologist conducted a field visits on September 6, and November 13 and 14, 2006.

During this time, she 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 project area include elk, pronghorn antelope and mule deer. The WGFD has determined the entire project area to be Winter Yearlong range for antelope and Yearlong for mule deer.

Yearlong use is when a substantial portion of a population makes general use of the habitat on a year-round basis. **Winter/Yearlong** use is when a population of animals makes general use of suitable habitat sites within a 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.

The project area is part of the Gillette pronghorn antelope herd unit #351. There was a population of 13,339 in 2003, and the 2004 population was estimated at 13,985. The population objective for the Gillette herd unit is 11,000 (WGFD 2004). Mule deer belong to the Powder River herd unit #319. The 2003 population was 51,401 and the 2004 population is estimated at 55,561. The population objective for the Powder River herd unit is 52,000 (WGFD 2004).

Elk

Elk formerly ranged over much of central and western North America from the southern Canadian Provinces and Alaska south to the southern United States, and eastward into the deciduous forests. In Wyoming, this species occurs throughout the sate in a variety of habitats, including coniferous forests, mountain meadows, short and mixed grass prairies, and sagebrush and other shrublands. A study in the 1990's indicated high use of ponderosa pine and juniper stands. Elk rely on a combination of browse, grasses, and forbs, depending on their availability throughout the seasons. Elk tend to be migratory, moving between summer and winter ranges. Typically, mortality is a result of predation on claves, hunting, and winter starvation. Predators include coyotes, mountain lions, bobcats, bears, and golden eagles.

Elk occurred in the Fortification Creek area historically. However, due to the lack of roads and difficult access, little information on numbers and distribution are known. The Fortification elk herd was re-established in 1952 and 1953 by the release of transplanted elk from Montana. Another transplant of 19 yearling bulls from the Jackson area were released into the area in June 1974.

In 1992 a 2.5 year study of the Fortification elk herd was initiated by the Game and Fish Department in cooperation with the Bureau of Land Management and area landowners, with the collaring of 17 cow elk. Data from this study allowed the Wyoming Game and Fish Department to better delineate elk ranges. In 2005, a second study was initiated and 26 elk were collared.

The Mallard project area contains suitable habitat for elk and documented use. One cow elk was observed in Section 6 during onsites and the data collected from one study documents 2 elk observations within 4 miles of the project area in 2005 and 2006. The Mallard project area is located 2.4 miles southeast of WGFD designated elk yearlong range within Fortification Creek.

3.3.2. Aquatics

The project area is drained by ephemeral tributaries of South Prong Barber Creek. Fish that have been identified in the watershed are listed in the PRB FEIS (3-156-159). Amphibian and reptile species occur throughout the Basin, but there is little recorded baseline information available for them.

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

Raptors species expected to occur in suitable habitats within the project area include northern harrier, golden eagle, red-tailed hawk, Swainson's hawk, ferruginous hawk, American kestrel, prairie falcon, short-eared owl, great horned owl, osprey, bald eagle, rough-legged hawk, merlin, and burrowing owl. Most raptor species nest in a variety of habitats including but not limited to; native and non-native grasslands, agricultural lands, live and dead trees, cliff faces, rock outcrops, and tree cavities (PRB FEIS 3-145-148).

The BLM database and TJS identified 6 raptor nests within 0.5 miles of the Mallard project area. Table 4 lists the species and activity status of these nests in 2006.

Table 3.3.4.1. Documented raptor nests within the Mallard project area in 2006 (UTM Zone 13, NAD83).

BLM ID#	EASTING	NORTHING	SPECIES	ACTIVITY 2006	DISTANCE TO WELLS
3545	429640	4899732	Unk	Inactive	< 0.5 miles
3546	427407	4899584	RTHA	Active	< 0.5 miles
3547	427702	4898574	LEOW	Active	< 0.5 miles
3549	426157	4897658	RTHA	Active	< 0.5 miles
3548	425922	4897450	GHOW/RTHA	Inactive	< 0.5 miles
4149	427398	4898771	UNK	Inactive	< 0.5 miles

Unk=Unknown, RTHA=Red-tailed hawk, LEOW=Long eared owl, GHOW=Great horned owl

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).

Five occupied prairie dog colonies totaling 150 acres were identified within the project area. The access roads to the 14-8 and 43-9 wells are proposed on the edge of two colonies.

Section	Acres	Activity
17	79.1	Occupied
8	37.3	Occupied
3 and 10	26.8	Occupied
9	8.1	Occupied
6	1.1	Occupied

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. A decision is expected in June 2007.

Bald eagle nesting habitat is generally found along lakes, rivers, and other 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 congregate in communal 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 Mallard project area is suitable for bald eagle roosting and nesting. Bald eagle habitat exists in small stands and lone cottonwood trees within South Prong Barber Creek and several unnamed drainages. Two bald eagles were observed less than one mile north of the project area in January 2007 during the midwinter bald eagle survey.

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. Habitat includes wet meadows, abandoned stream channels, valley bottoms, gravel bars, and near lakes or perennial streams that become inundated during large precipitation events. The orchid is documented in four Wyoming locations, Converse County along a tributary of Antelope Creek, an irrigated field in Niobrara County, along Bear Creek in Goshen County, and Horse Creek in Laramie County. Produced water will be piped to 5 reservoir locations. No springs or other potential orchid habitat is present within the project area.

3.3.5.2. Sensitive Species

The USDI Bureau of Land Management (BLM) Wyoming has prepared a list of sensitive species to focus species management efforts towards maintaining habitats under a multiple use mandate. 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.

Five occupied prairie dog colonies totaling 150 acres were identified within the project area. The access roads to the 14-8 and 43-9 wells are proposed on the edge of two colonies.

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).

The Mallard project area is suited for sage-grouse breeding, nesting, and wintering grounds. Habitats within the Mallard project area have potential to support sage-grouse throughout the year. Ten lek sites are located between 0.2 and 4.0 miles of the project area. Sage-grouse were observed displaying during all surveys conducted by TJS in 2005 and 2006. In 2006, 51 displaying males and 5 females were documented at the Watsabaugh IV lek. Many sage-grouse observations were documented throughout the project area. Individual birds and roosting birds (up to 24 birds) were documented in Sections 1, 4, 5, 6, 7, 8, 9, and 15. TJS biologists also documented abundant fresh sage-grouse droppings throughout prairie dog colonies in Sections 1, 8, and 15. Droppings were also documented within dense sagebrush. (Gregory 2006) Additionally, during onsites conducted in September and November, 16 sage-grouse were flushed at two locations in Section 9, one flushed in Section 7, and one sage-grouse was found dead in spill way of an existing reservoir.

Sharp-tailed grouse

Surveys were conducted for sharp-tailed grouse in conjunction with sage-grouse surveys. No sharp-tailed grouse were identified.

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.

Suitable mountain plover habitat is present within the prairie dog colonies located throughout the project area. No surface disturbance is proposed within the prairie dog colonies.

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 been firmly established in the United States and has continued to spread west. Birds are the natural vector host and serve not only to amplify the virus, but spread it rapidly throughout the country since they are the only known animal to infect mosquitoes. Though less than 1% of mosquitoes are infected with WNV, they still are very effective in transmitting the virus to humans, horses, and wildlife. The *Culex* genus appears to be the most important mosquito group that vector, WNV.

The human health issues related to WNV are well documented and may continue to escalate as the virus moves west. 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

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 4 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 some *Culex* species, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in

which mosquitoes might breed (APHIS 2002).

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

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

3.5. Water Resources

The project area is within the Upper Powder River drainage system. It lies in ephemeral headwater tributaries to the South Prong of Barber Creek and Barber Creek. The upper reaches consist of steep, dissected terrain with slopes at times exceeding 40%. The channels themselves range in steepness from 5% to 15%. For a more detailed description of the affected watersheds, see pages 4-5 of the water management plan.

3.5.1. Groundwater

Wyoming Department of Environmental Quality (WDEQ) water quality parameters for groundwater classifications (Chapter 8 – Quality Standards for Wyoming Groundwater) define the following limits for Total Dissolved Solids (TDS) and the classes of groundwater; 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 PRB EIS Record of Decision 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 related to groundwater, the plan identified the following (PRB EIS ROD page E-4):

- The effects of infiltrating 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 CBNG impoundments
- Shallow groundwater wells would be installed and monitored where necessary

As stated in the MMRP, an Interagency Working Group has been established to implement an adaptive management approach. BLM is working with the WDEQ and the Interagency Working Group regarding the monitoring information being collected and assessed to determine if changes in mitigation are warranted.

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

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

The WDEQ implemented requirements for monitoring shallow groundwater of Class III or better quality under unlined CBNG water impoundments effective August 1, 2004. The intent is to identify locations where the impoundment of water could potentially degrade any existing shallow groundwater aquifers. These investigations are conducted where discharged water will be detained in existing or proposed impoundments. If shallow groundwater is detected and the water quality is determined to fall within the Class III or better class of use (WDEQ Chapter 8 classifications for livestock use), operators are required to install batteries of 1 to 3 wells, develop a monitoring plan and monitor water levels and quality. The results of these investigations have yet to be analyzed and interpreted.

A search of the Wyoming State Engineer's Office (WSEO) Ground Water Rights Database for this area showed ___5___ registered stock and domestic water wells within the POD boundary with depths ranging from 400 to 913 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 South Prong Barber Creek and Barber Creek drainages. The South Prong Barber Creek is a tributary to Barber Creek, which is a tributary to the Upper Powder River . All drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt), except that certain reaches of Barber Creek have permanent water in them. Some of this water may be natural groundwater and some may be due to upstream discharges of CBNG production water. Some of the channels are vegetated grassy swales, without defined beds and banks. Others are fairly deeply incised gullies with a mixture of sagebrush and grass in their bottoms and along their sides.

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 1797 µmhos/cm at Maximum monthly flow to 3400 µmhos/cm 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 on the Powder River at Arvada, WY(PRB

FEIS page 3-49).

According to the Mallard Water Management Plan, no natural springs were identified by the operator within a mile of the proposed POD's boundary.

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

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the project prior to on-the-ground project work (BFO project no. 070060095 and 070070090). Greer Services and Antquus Cultural Resource Consulting conducted Class III cultural resource inventories 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
48CA3910	Lithic Scatter	Not Eligible
48CA5191	Historic Trash	Not Eligible
48CA5192	Historic Trash	Not Eligible
48CA5193	Historic Homestead	Not Eligible
48CA5194	Historic Homestead	Not Eligible
48CA5195	Historic Trash	Not Eligible
48CA5196	Historic Trash	Not Eligible
48CA5197	Historic Trash	Not Eligible
48CA5198	Historic Trash/Lithic Scatter	Not Eligible
48CA5199	Lithic Scatter	Not Eligible
48CA5200	Lithic Scatter	Not Eligible
48CA5201	Lithic Scatter	Unevaluated
48CA5202	Lithic Scatter	Not Eligible
48CA5203	Historic Trash	Not Eligible
48CA5204	Lithic Scatter	Not Eligible
48CA5205	Lithic Scatter	Not 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

Overall impacts to vegetation and soils from surface disturbance will be reduced, based on the operator's plans and BLM applied mitigation. Of the 25 proposed well locations (2 wells to a location), 1 is on a reclaimed conventional well pad, 14 can be drilled without a well pad being constructed, 1 will be slotted, and 9 will require a constructed (cut & fill) well pad. Surface disturbance would occur with the drilling of the (16) of the locations. This disturbance would involve digging-out of rig wheel wells (for leveling drill rig on minor slopes), reserve pit construction (estimated approximate size of 15 x 80feet), and compaction

(from vehicles driving/parking at the drill site). Estimated disturbance associated with these 16 well locations would involve approximately 0.35 acre/well for 5.6 total acres. The other 9 wells requiring cut & fill pad construction would disturb approximately 0.7 acres/well pad for a total of 6.3 acres. The total estimated disturbance for all 50 wells would be 11.9 acres. This would be a short-term, impact with expedient, successful reclamation and site-stabilization, as committed to by the operator in their POD MSUP and as required by BLM in COAs.

Approximately 1.5 miles of improved roads would be constructed to provide access to various well locations. Approximately 3.8 miles of new and existing two-track trails would be utilized to access well sites. The majority of proposed pipelines (gas and water) have been located in "disturbance corridors." Disturbance corridors involve the combining of 2 or more utility lines (water, gas, power) in a common trench, usually along access routes. This practice results in less surface disturbance and overall environmental impacts. Approximately 0.8 miles of pipeline would be constructed outside of corridors. Expedient reclamation of disturbed land with stockpiled topsoil, proper seedbed preparation techniques, and appropriate seed mixes, along with utilization of erosion control measures (e.g., waterbars, water wings, culverts, rip-rap, etc.) would ensure land productivity/stability is regained and maximized.

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

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

Table 4.1 summarizes the proposed surface disturbance.

Table 4.1 - SUMMARY OF DISTURBANCE

Facility	Number or Miles	Factor	Acreage of Disturbance	Duration of Disturbance
Nonconstructed Pad Constructed Pad	16 9	0.35/acre 0.7/acre	5.6 6.3	Long Term
Gather/Metering Facilities	0	Site Specific	0.0	Long Term
Screw Compressors	0	Site Specific	0.0	Long Term
Monitor Wells		0.1/acre		Long Term
Impoundments On-channel Off-channel Water Discharge Points	8 0 8 0 8	 Site Specific Site Specific Site Specific or 0.01 ac/WDP	0.0 30 0.0 0.1	Long Term
Channel Disturbance Headcut Mitigation* Channel Modification	 0 0	 Site Specific Site Specific	 0.0 0.0	
Improved Roads No Corridor With Corridor	1.5	40' Width or Site Specific	7.3	Long Term
2-Track Roads No Corridor With Corridor	 0.4 3.4	30' Width or Site Specific 30' Width or Site Specific	 0.05 0.41	Long Term
Pipelines No Corridor With Corridor	 0.8	20' Width or Site Specific	 0.1	Short Term
Buried Power Cable No Corridor	Miles Buried 0.3	15' Width or Site Specific	 0.04	Short Term
Overhead Powerlines	6.0	15' Width	11	Long Term
Additional Disturbance	9580'	35'	7.7	

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 natural wetland or riparian areas exist within the project area and mature cottonwood forests do not exist along Barber Creek until the very lowest reaches as the draw approaches the Powder River floodplain approximately 7 miles downstream of the POD boundary. There is a distinct possibility that seepage from the proposed reservoirs will, create wetland areas immediately below the dams. These areas will expand downstream over time as the reservoirs remain filled with CBNG product water. The water will cause a change in vegetation in the draw and gully bottoms, contributing to bank sloughing and sedimentation within these systems. See the PRB FEIS page 4-175 for further discussion on impacts to

wetland and riparian areas caused by CBNG development within the Powder River Basin.

4.1.2. Invasive Species

Utilization of existing facilities and 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 is likely 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. An Integrated Pest Management Plan (IPMP) was provided by Devon Energy. Devon has also committed to using preventive practices such as;

- Prompt reseeding and revegetation of areas of disturbed soils with certified weed-free seed
- Cleaning of equipment and vehicles prior to entering and leaving each worksite
- Herbicide application
- Mowing newly revegetated areas during the first season of establishment, prior to seed formation on the weeds of concern to avoid the transport and spread of noxious weeds into the area .

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 will occur to soils and vegetation as a result of discharged produced CBNG water. The cumulative effects on vegetation and soils are anticipated to be minimal for the following reasons:

- They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 15% of that total (see section 4.4.2.1).
- The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
- The commitment by the operator to monitor the volume of water flowing into Barber Creek and South Prong of Barber Creek and to construct additional downstream reservoirs, if necessary, to prevent significant volumes of water from flowing into the Upper Powder River.
- The WMP for the Mallard POD proposes that produced water will not contribute significantly to flows downstream.

No additional mitigation measures are required.

4.2. Wildlife

4.2.1. Big Game Direct and Indirect Effects

Over the years the elk herd has gradually increased to a 1990 post season population estimate of about 400 elk. Currently there are an estimated 230 elk in the Fortification herd, down from an average of 272 in 2002. The current WYGF objective for the herd is 150. The Mallard project area may provide occasional use for elk. CBNG development will likely reduce and may prevent future elk movements throughout the project area.

Under the environmentally preferred alternative, Winter Yearlong range for pronghorn antelope and Yearlong range for mule deer will 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 may provide some habitat value as these areas are reclaimed and native vegetation becomes established. Although, when these reclaimed areas are located along road sides, vehicular collisions may increase.

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 contained in 5 reservoirs. If a reservoir were to discharge, the likelihood of produced water reaching a fish-bearing stream and affecting downstream species is unlikely.

4.2.2.1. Cumulative effects

Water produced as a result of this project is highly unlikely to reach the Powder River except as a result of a relatively major precipitation event in the Barber Creek drainage upstream or in the project area. Cumulatively, however, as more and more reservoirs are constructed in this watershed, subsurface flows will increase until they begin to come to the surface. However, 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.

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).

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

Eight wells (4 locations) are proposed less than 0.25 miles from raptor nests. All of the wells except for the 34W and 34A-795 wells were initially proposed out of direct line of site from a nest. The 34W and 34A-795 wells were relocated approximately 350 feet east during the onsite. Drilling rigs and larger equipment may be visible from the nest site. However, the well heads, pick-up trucks, and personnel will not be visible. Applying the 0.5 mile timing limit stipulation should minimize adverse affects from drilling activities during the raptor breeding season.

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).

Despite commitments such as telemetry metering to limit well visits, well visits during the nesting season will occur 2 to 3 times per week which may lead to nest failure through nest abandonment, displacement, and increased predation.

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a one-half mile radius timing limitation during the breeding season around active raptor nests and recommends all infrastructure requiring human visitation to be located greater than one-quarter mile from occupied raptor nests.

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 and Sensitive Species

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	Overhead power and improved roads present.
Ute ladies'-tresses orchid (*Spiranthes diluvialis*)	Riparian areas with permanent water	NP	NE	Historically perennial water 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.
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

Prairie dog colonies are present within the Mallard project area; however, they are of insufficient size for supporting ferrets. Implementation of the proposed development should have no effect on the black-footed ferret.

4.2.5.1.2. Bald eagle

The proposed project is likely to affect bald eagles due to the presence of proposed and existing roads and overhead powerlines.

Devon proposes 5.2 miles of three phase overhead powerlines throughout the project area. Currently there are no overhead powerlines within the project boundaries. Existing overhead powerlines are located approximately 0.5 miles west and south of 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).

Devon is proposing 1.5 miles of improved CBNG constructed roads which will be used to access the Mallard project area. Additionally, 2.0 miles of existing roads will also be utilized as corridors and access.

The presence of overhead power lines and roads 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, such as the Mallard project area. 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%).

Produced water will be stored in 5 proposed reservoirs which may attract eagles if a reliable prey base is present, most likely in the form of waterfowl. The effect of the reservoirs on eagles is unknown. The reservoirs could prove to be a benefit (e.g. increased food supply) or an adverse effect (e.g. contaminants, proximity of power lines and/or roads to water). Eagle use of reservoirs should be reported to determine the need for any future management.

4.2.5.1.3. Ute's Ladies Tresses Orchid

The discharge of all produced CBNG produced water will be to 3 proposed and 2 existing reservoirs. Improvements will be made to all existing reservoirs. All of the reservoirs are located within South Prong Barber Creek and its tributaries. All wells will be connected such that any or all wells can discharge to

any discharge point.

Suitable orchid habitat is not present within the Mallard project area. Reservoir seepage may create suitable habitat if historically ephemeral drainages become perennial, however no historic seed source is present within or upstream of the project area. Implementation of the proposed project should not affect the Ute ladies'- tresses orchid as neither suitable habitat nor a seed source is present.

4.2.5.2. Sensitive Species Direct and Indirect Effects

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	NI	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	MIIH	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	Five prairie dog colonies identified within 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

Five occupied prairie dog colonies totaling 150 acres were identified within the project area. The access roads to the 14W/A-895 and 43W/A-995 wells are proposed on the edge of two colonies. Prairie dog mounds will not be disturbed from the construction of the access roads. However, project related traffic on these roads may result in prairie dog road mortalities.

4.2.5.2.2. Greater sage-grouse

The Mallard project area is suited for sage-grouse breeding, nesting, and wintering grounds. Habitats within the Mallard project area have potential to support sage-grouse throughout the year. The JR Streeter, an existing reservoir and the proposed 31-17 reservoir were originally proposed within 0.25 miles of the Watsabaugh IV lek site. The 31-17 reservoir was dropped from the project design and only minimal improvements, which will remain within the original footprint of the JR Streeter reservoir, are permitted. The JR Streeter reservoir was constructed over 20 years ago and has not deterred sage-grouse from the Watsabaugh IV lek site.

Wells and other infrastructure located within sagebrush communities will result in direct habitat loss. Sage-grouse avoidance of these facilities produces even greater indirect habitat loss. The WGFD feels a well density of eight wells per section creates a high level of impact for sage-grouse and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004). Well houses and power poles may provide habitats for mammal and avian predators increasing sage-grouse predation. Mineral traffic may result in occasional collisions with sage-grouse, particularly during the construction phase when traffic is heaviest. Overhead power lines may also present a collision risk for sage-grouse. Sage-grouse may avoid suitable habitat containing overhead power lines to reduce their exposure to predation.

It is BLM Wyoming policy to limit disruptive activities within a two mile radius of occupied lek sites during the nesting season; this radius may be expanded based on site-specific criteria (Bennet 2004). The Western Association of Fish and Wildlife Agencies (WAFWA) sage-grouse management guidelines (Connely et. al. 2004) recommend the protection of suitable habitats within 5 km of leks where habitats are not distributed uniformly such as the Mallard project area. The entire project area is within 5 km of several leks. The Partners in Flight's Western Working Group recommend no net loss of sagebrush habitats (Paige and Ritter 1999). BLM Wyoming policy also states that rehabilitation activities will include sagebrush and appropriate forb species (Bennet 2004).

The presence of overhead power lines and roads within the project area may adversely affect sage grouse. Overhead power lines create hunting perches for raptors, thus increasing the potential for predation on sage grouse. Increased predation from overhead power near leks may cause a decrease in lek attendance and possibly lek abandonment. Overhead power lines are also a collision hazard for sage grouse flying through the area. Increased roads and mineral related traffic can affect grouse activity and reduce survival (Braun et al. 2002). Activity along roads may cause nearby leks to become inactive over time (WGFD 2003).

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.

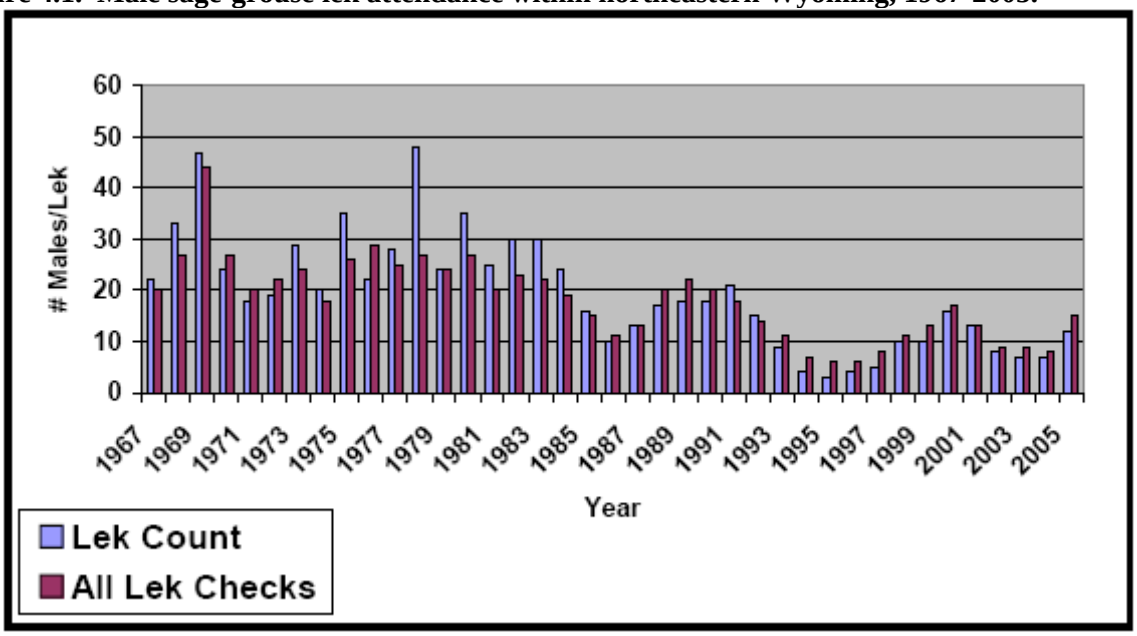
Additional studies, across more of the sage-grouse's range, indicate that many populations nest much farther than two miles from the lek of breeding (Bennett 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported only 45% of their sage grouse hens nested within 3 km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

<u>Mitigation Measures Implemented as a Result of Onsites:</u>

1. Minimal mowing of sage-brush at well head locations and a maximum width not to exceed 20 feet (maximum width of disturbance) for utility corridors and roads combined are required at the following locations; 41W/A-995, 32W/A-995, 34W/A-995, 23W/A-995, 14W/A-995, 12W/A-

895, 21W/A-895.

2. All utilities associated with the 34W/A-995 will be placed in a common corridor as discussed.
3. The proposed 3-phase overhead powerline in Section 9 associated with the 34W/A-995, 41W/A-995, and 43W/A-995 will be removed from the project design and replaced with a lower voltage buried line. The buried line will be corridored along the existing 2-track road.
4. No potentially disruptive activities are permitted throughout the entire project area from March 1 through June 15th.
5. No CBM traffic is permitted in Section 17 from March 1 through June 15th. Signs must be posted north and south of the lek site. Outside of March 1-June 15th, only traffic directly related to the reservoir will be permitted in Section 17.

The following has been proposed and will be implemented by Devon Energy in order to mitigate impacts to sage-grouse;

1. Raptor perch deterrents will be installed on all proposed power poles within the Mallard POD and the main line 2 miles south of the project area. Devon will work directly with PRECORP to ensure the perch deterrents installed are fixed to the poles prior to installation. Construction of the overhead powerlines will be prohibited from March 1 through June 15th.
2. The main pipeline and overhead powerline will be relocated to follow the existing improved road.
3. The maximum width for the main pipeline will not exceed 40 feet.
4. A gate will be proposed to the landowner that will prevent unauthorized vehicles from accessing the JR Streeter reservoir. If the gate is installed, signs will not be required.
5. Pipeline corridors will be mowed, not flat bladed.
6. Devon will require the third party gas gathering company to move the proposed compressor site approximately 500-700 feet northwest. Moving it further from the Watsabaugh IV lek site. The installation of mufflers will also be required, reducing sound levels from 105 to 40 decibels.
7. All third party companies will be required to adhere to sage-grouse timing limit stipulations.
8. Re-seeding efforts will focus on the entire utility corridor. The seed mix recommended by the Northeast Wyoming Sage-grouse Local Working Group will be used. Devon will utilize specialty equipment to ensure the establishment of sagebrush. Sagebrush should be established within one year of project completion.

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 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).

No surface disturbance is proposed within the suitable mountain plover habitat present within the project area. Implementation of the project should not affect mountain plovers.

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

The PRB FEIS and ROD included a programmatic mitigation measure that states, "The BLM will consult with appropriate state agencies regarding WNV. If determined to be necessary, a COA will be applied at the time of APD approval to treat mosquitoes for any CBM discharge waters that become stagnant." This project is likely to result in standing surface water which may potentially increase mosquito breeding habitat. BLM has consulted with applicable state agencies, County Weed and Pest and the State Health Department, per above mitigation in the PRB ROD page 18, regarding the disease and the need to treat. BLM has also consulted with the researchers that are studying the dynamics of WNV species and its effects in Wyoming.

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

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

BLM will keep monitoring this issue by continuing to consult with the State agencies and the researchers working in the area in order to stay abreast of the most current developments and any need to apply mitigation. Based on current information, we determined that no significant impacts in the spread of WNV would occur from the implementation of this project.

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 a commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), should minimize project area and downstream potential impacts from proposed water management strategies.

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

The maximum water production is predicted to be 20.0 gpm per well or 1000.0 gpm (2.2 cfs or 1613 acre-feet per year) for this POD. The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 171,423 acre-feet in 2006 (maximum production was also estimated to occur in 2006. As such, the volume of water resulting from the production of these wells is less than 1% of the total volume projected for 2006, which will result in an insignificant increase to the present volume of water produced from coal bed natural gas in the Powder River Basin. This volume of produced water is also within the predicted parameters of the PRB FEIS.

4.4.1. Groundwater

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 400 gpm will infiltrate at or near the discharge points and impoundments (645 acre feet per year). This

water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "…the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). However, there is potential for infiltration of produced water to influence the quality of the antecedent groundwater. The WDEQ requires that operators determine initial groundwater quality below impoundments to be used for CBNG produced water storage. If high quality water is detected (Class 3 or better) the operator is required to establish a groundwater monitoring program at those impoundments.

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

In order to address the potential impacts from infiltration on shallow ground water, the Wyoming DEQ has developed a guidance document, "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004) which can be accessed on their website. This guidance document became effective August 1, 2004. The Wyoming DEQ has also established an Impoundment Task Force which is in the process of drafting an "Impoundment Monitoring Plan" to investigate the potential for existing impoundments to have impacted shallow ground water. WYPDES permits received by DEQ prior to August 1, 2004, for discharging to impoundments will be assessed through the "Impoundment Monitoring Plan". For WYPDES permits received by DEQ after August 1, 2004, the BLM will require that operators comply with the requirements outlined in the DEQ compliance monitoring guidance document (June 14, 2004) prior to discharge of federally-produced water into newly constructed or upgraded impoundments.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of water wells in the area. The permitted water wells in the area produce from water bearing zones ranging in depth from 400 to 913 feet below the ground surface. The targeted coal zones range from 800 to 2800 feet below ground surface. 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 analyses submitted for the pre-approval evaluation, the operator has committed to designate a reference well within the POD boundary. The well will be capable of being sampled at the wellhead. A sample will be collected at the wellhead for analysis within sixty days of initial production. 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 following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gaging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

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

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** µmhos/cm
Most Restrictive Proposed Limit –		2	1000
Least Restrictive Proposed Limit		10	3200
Powder River at Arvada, WY Historic Data Average at Maximum Flow Historic Data Average at Minimum Flow		 4.76 7.83	 1797 3400
WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) Drinking Water (Class I) Agricultural Use (Class II) Livestock Use (Class III)	 500 2,000 5,000	 8	
WYPDES permit not available at time of APD processing			
Predicted Produced Water Quality Wall Anderson	 1490 1970	 16.2 22.1	 2410 3110

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is1970 mg/l TDS which is marginally within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal

The quality for the water produced from the Wall coal zone is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 20.0 gallons per minute (gpm) is

projected is to be produced from these 25 wells, for a total of 500.0 gallons per minute. See Table 4.4 .

The quality for the water produced from the Anderson coal zone is predicted to be similar to the sample water quality collected from a location near the POD. A maximum of 20.0 gpm is projected is to be produced from these 25 wells, for a total of 500.0 gpm for the POD. See Table 4.4.

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

There are 8 discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

To manage the produced water, 8 impoundments (242 acre feet) would potentially be used within the project area. These impoundments would disturb approximately 30 acres including the dam structures. All of these dams would be on-channel. Monitoring may be required based upon WYDEQ findings relative to "Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments" (June 14, 2004). Existing impoundments will be upgraded and proposed impoundments will be constructed to meet the requirements of the WSEO, WDEQ and the needs of the operator and the landowner. All water management facilities were evaluated for compliance with best management practices during the onsite.

The PRB FEIS assumes that 15% of the impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Consequently, the volume of water produced from these wells may result in the addition of 0.33 cfs below the lowest reservoir (after infiltration and evapotranspiration losses). The operator has committed to monitor the condition of channels and address any problems resulting from this discharge. Discharge from the impoundments will potentially allow for streambed enhancement through wetland-riparian species establishment. Sedimentation will occur in the impoundments, but would be controlled through a concerted monitoring and maintenance program. Phased reclamation plans for the impoundments will be submitted and approved on a site-specific, case-by-case basis as they are no longer needed for disposal of CBNG water, as required by BLM applied COAs.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-86). The predicted maximum discharge rate from these 50 wells is anticipated to be a total of 1000.0 gpm or 2.2 cfs to impoundments. Using an assumed conveyance loss of 20% (PRB FEIS pg 4-74) and full containment, the produced water re-surfacing in South Prong Barber Creek and in Barber Creek from this action (0.33 cfs) may add a maximum 0.3 cfs to the Upper Powder River flows, or less than 0.5% of the predicted total CBNG produced water contribution. This incremental volume is statistically below the measurement capabilities for the volume of flow of the Upper Powder River except during periods of extremely low flow such as late summer (refer to Statistical Methods in Water Resources U.S. Geological Survey, Techniques of Water-Resources Investigations Book 4, Chapter A3 2002, D.R. Helsel and R.M. Hirsch authors). For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the potential development in the watershed above the project area (WMP pages 1-3). Based on the area of the South Prong of Barber Creek watershed above the POD (11.8 sq mi) and an assumed density of 1 wells per location every 80 acres, the potential exists for the development of 94 wells which could produce a maximum flow rate of 1880 gpm (4.2 cfs) of water. At an assumed density of 2 wells per location, the total flow rate of produced water could be as high as 3760 gpm (8.4 cfs). The BLM agrees with the operator that this is not

expected to occur because:

1. Some of these wells have already been drilled and are producing.
2. New wells will be phased in over several years, and
3. A decline in well discharge generally occurs after several months of operation.

The potential maximum flow rate of produced water within the watershed upstream of the project area, 8.4 cfs, is much less than the volume of runoff estimated from the 2-year storm event for the South Prong of Barber Creek.

The proposed method for surface discharge provides passive treatment through the aeration supplied by the energy dissipation configuration at each discharge point outfall. Aeration adds dissolved oxygen to the produced water which can oxidize susceptible ions, which may then precipitate. This is particularly true for dissolved iron. Because iron is one of the key parameters for monitoring water quality, the precipitation of iron oxide near the discharge point will improve water quality at downstream locations.

The operator has applied for a Wyoming Pollutant Discharge Elimination System (WYPDES) permit for the discharge of water produced from this project from the WDEQ.

The WYPDES permit will also address existing downstream concerns, such as irrigation use, in the COA for the permit.

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

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

In-channel downstream impacts are addressed in the WMP for the Mallard POD prepared by WWC Engineering for Devon Energy Production Company, L.P..

4.4.2.1. Surface Water Cumulative Effects

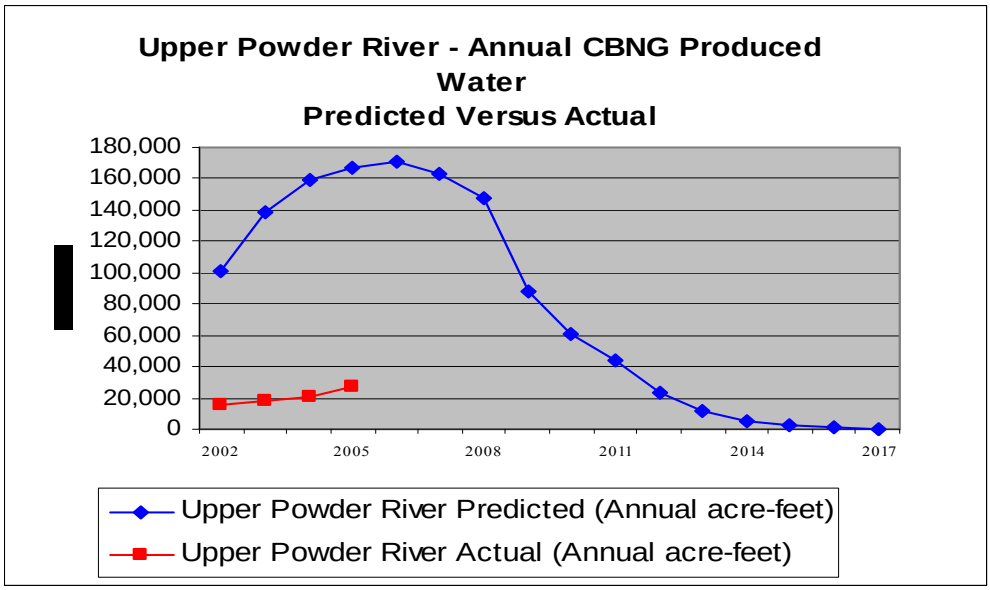
The analysis in this section includes cumulative data from Fee, State and Federal CBNG development in the Upper Powder River watershed. These data were obtained from the Wyoming Oil and Gas Conservation Commission (WOGCC).

As of December 2005, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 83,072 acre-ft of water compared to the predicted 565,096 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.1 and Table 4.6 following. This actual total volume of produced water is 14.7 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.6 Actual vs predicted water production in the Upper Powder River watershed ***2005 Data Updated 4-5-06***

Year	Upper Powder River Predicted (Annual acre-feet)	Upper Powder River Predicted (Cumulative acre-feet from 2002)	Upper Powder River Actual (Annual acre-feet)		Upper Powder River Actual (Cumulative acre-feet from 2002)	
			A-ft	% of Predicted	A-Ft	% of Predicted
2002	100,512	100,512	15,846	15.8	15,846	15.8
2003	137,942	238,454	18,578	13.5	34,424	14.4
2004	159,034	397,488	20,991	13.2	55,414	13.9
2005	167,608	565,096	27,658	16.5	83,072	14.7
2006	171,423	736,519				
2007	163,521	900,040				
2008	147,481	1,047,521				
2009	88,046	1,135,567				
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	**1,285,233**					

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



The PRB FEIS identified downstream irrigation water quality as the primary issue for CBNG produced water. Electrical Conductivity (EC) and SAR are the parameters of concern for suitability of irrigation

water. The water quality analysis in the PRB FEIS was conducted using produced water quality data, where available, from–existing wells within each of the ten primary watersheds in the Powder River Basin. These predictions of EC and SAR can only be reevaluated when additional water quality sampling is available.

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states continued. As the two states develop a better understanding of the effects of CBM discharges through the enhanced monitoring required by the MOC, they can adjust the permitting approaches to allow more or less discharges to the Powder River drainage. Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage and the total amount that was predicted in the PRB FEIS, which is only approximately 15% of that total (see section 4.4.2.1).
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

No additional mitigation measures are required.

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

4.5. Cultural Resources

The Bureau has determined that non-eligible sites 48CA5193, 48CA5198 and 48CA5199 will be impacted by the proposed project. 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 2/8/07 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
Rick Taylor	Field Rep	Devon	yes
Lindy Johnson	CE	WWC Engineering	yes
Jerry & Phillip Record	Landowners		yes
Ed Glass	Project Engineer	Devon	yes
Sara Needles	Wyoming SHPO	Wyoming SHPO	No
Brian T. Kelly	Field Supervisor	USFWS	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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