**DECISION RECORD**
**For Storm Cat Energy (USA) Operating Corporation, Robinson Draw Plan of Development (POD)**
**Environmental Assessment, (EA), WY-070-EA11-340**
**Buffalo Field Office, Bureau of Land Management**

**DECISION:**
The BLM approves Storm Cat Energy (SCE) (USA) Operating Corporation's Robinson Draw POD's applications for permit to drill (APDs) as described in Alternative B of the EA, WY-070-EA11-340. This approval includes the well's associated infrastructure.

Compliance. This decision complies with:

- Federal Land Policy and Management Act of 1976 (FLPMA) (43 USC 1701).
- Mineral Leasing Act of 1920 (MLA) (30 USC 181); to include On Shore Order No. 1.
- National Environmental Policy Act of 1969 (NEPA) (42 USC 4321).
- National Historic Preservation Act of 1966 (NHPA) (16 USC 470).
- Endangered Species Act of 1973 (ESA) (16 USC 1531); Migratory Bird Treaty Act (16 USC 703).
- Powder River Basin Final Environmental Impact Statement (PRB FEIS), April 2003.
- Buffalo Resource Management Plan (RMP) 1985, Amendments 2001, 2003, 2011.
- Greater Sage-Grouse Habitat Management Policy on WY Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate, (WY-IM-2010-012), Jan 2010.
- DOI Order 3310.

**The Selected Alternative.**
**Features.** BFO approves SCE's Robinson Draw coalbed natural gas (CBNG) POD as Alternative B from EA, WY-070-11-340 as conditioned below. Alternative B is the modified proposed action, resultant of collaboration between the BLM and SCE and includes mitigation requirements the operator must meet. BML analyzed Alternative B and found it to have no significant impacts on the human environment, beyond those described in the PRB EIS thus an EIS is not required. A summary of the approval is below. See the EA for the project description, changes made at the onsites, and mitigation measures.

**Well Site:** BLM approves the following 36 APDs and associated infrastructure:

| | Well Name | Well # | QTR | Sec | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 1 | ROBINSON DRAW BUTLER FED | 07-19 | SWNE | 19 | 55N | 76W | WYW161434 |
| 2 | ROBINSON DRAW FEDERAL | 11-14 | NESW | 14 | 55N | 77W | WYW146332 |
| 3 | ROBINSON DRAW FEDERAL | 13-25 | SWSW | 25 | 55N | 77W | WYW146334 |
| 4 | ROBINSON DRAW FEDERAL | 15-25 | SWSE | 25 | 55N | 77W | WYW146334 |
| 5 | ROBINSON DRAW TIETJEN | 15-19 | SWSE | 19 | 55N | 76W | WYW161434 |
| 6 | ROBINSON DRAW TIETJEN | 09-19 | NESE | 19 | 55N | 76W | WYW161434 |
| 7 | ROBINSON DRAW TIETJEN | 13-19 | SWSW | 19 | 55N | 76W | WYW161434 |
| 8 | ROBINSON DRAW TIETJEN | 11-19 | NESW | 19 | 55N | 76W | WYW161434 |
| 9 | ROBINSON DRAW TIETJEN | 01-19* | NENE | 19 | 55N | 76W | WYW161434 |
| 10 | ROBINSON DRAW TIETJEN | 13-23 | SWSW | 23 | 55N | 77W | WYW146333 |
| 11 | ROBINSON DRAW TIETJEN | 05-23 | SWNW | 23 | 55N | 77W | WYW146853 |
| 12 | ROBINSON DRAW TIETJEN | 15-23 | SWSE | 23 | 55N | 77W | WYW146853 |
| 13 | ROBINSON DRAW TIETJEN | 09-24 | NESE | 24 | 55N | 77W | WYW146333 |
| 14 | ROBINSON DRAW TIETJEN | 01-25 | NENE | 25 | 55N | 77W | WYW146334 |
| 15 | ROBINSON DRAW TIETJEN | 03-25 | NENW | 25 | 55N | 77W | WYW146334 |
| 16 | ROBINSON DRAW TIETJEN | 07-25 | SWNE | 25 | 55N | 77W | WYW146334 |
| 17 | ROBINSON DRAW TIETJEN | 11-25 | NESW | 25 | 55N | 77W | WYW146334 |
| 18 | ROBINSON DRAW TIETJEN | 09-25 | NESE | 25 | 55N | 77W | WYW146334 |

| | Well Name | Well # | QTR | Sec | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 19 | ROBINSON DRAW TIETJEN | 05-25 | SWNW | 25 | 55N | 77W | WYW146334 |
| 20 | ROBINSON DRAW TIETJEN | 01-26 | NENE | 26 | 55N | 77W | WYW146334 |
| 21 | ROBINSON DRAW TIETJEN | 03-26 | NENW | 26 | 55N | 77W | WYW146334 |
| 22 | ROBINSON DRAW TIETJEN | 05-26 | SWNW | 26 | 55N | 77W | WYW146334 |
| 23 | ROBINSON DRAW TIETJEN | 07-26 | SWNE | 26 | 55N | 77W | WYW146334 |
| 24 | ROBINSON DRAW TIETJEN | 09-26 | NESE | 26 | 55N | 77W | WYW146334 |
| 25 | ROBINSON DRAW TIETJEN | 13-26 | SWSW | 26 | 55N | 77W | WYW146334 |
| 26 | ROBINSON DRAW TIETJEN | 15-26 | SWSE | 26 | 55N | 77W | WYW146334 |
| 27 | ROBINSON DRAW TIETJEN | 11-26 | NESW | 26 | 55N | 77W | WYW146334 |
| 28 | ROBINSON DRAW TIETJEN | 09-27 | NESE | 27 | 55N | 77W | WYW155142 |
| 29 | ROBINSON DRAW TIETJEN | 01-34 | NENE | 34 | 55N | 77W | WYW155142 |
| 30 | ROBINSON DRAW TIETJEN | 01-35 | NENE | 35 | 55N | 77W | WYW146334 |
| 31 | ROBINSON DRAW TIETJEN | 03-35 | NENW | 35 | 55N | 77W | WYW146334 |
| 32 | ROBINSON DRAW TIETJEN | 07-35 | SWNE | 35 | 55N | 77W | WYW146334 |
| 33 | ROBINSON DRAW TIETJEN | 09-35 | NESE | 35 | 55N | 77W | WYW146334 |
| 34 | ROBINSON DRAW TIETJEN | 13-35 | SWSW | 35 | 55N | 77W | WYW146334 |
| 35 | ROBINSON DRAW TIETJEN | 11-35 | NESW | 35 | 55N | 77W | WYW146334 |
| 36 | ROBINSON DRAW TIETJEN | 15-35 | SWSE | 35 | 55N | 77W | WYW146334 |

**Water Management:**
BLM approves the use or disposal of federal water via the Subsurface Drip Irrigation (SDI) system. SCE identified the SDI system and the associated booster pumps as their primary water discharge and management system. The remaining water management facilities are considered secondary systems and incorporate the use of impoundments or reservoirs to discharge the CBNG produced water. SCI has chosen not to provide reclamation bonds for the reservoirs and impoundments and will not use them until BLM receives a sundry and proof of bonding.

| | FACILITY TYPE | Qtr/Qtr | Sec | TWP N | RNG W | Capacity | Surface Disturbance (acres) |
|---|---|---|---|---|---|---|---|
| 9 | SDI Field #1** | N 1/2 | 26 | 55 | 77 | 600 gpm | 89.8 |
| 10 | SDI Field #2** | SENE | 26 | 55 | 77 | 26.8 ac-ft | 19.9 |
| 11 | SDI Field #3** | SE | 26 | 55 | 77 | 15.2 ac-ft | 40.6 |
| 12 | SDI Field #4** | E 1/2 NE | 35 | 55 | 77 | 2 ac-ft | 36.9 |
| 13 | 15 hp Booster/Filter | NWNE | 26 | 55 | 77 | NA | 0.1 |
| 14 | 20 hp Booster/Filter | NWSE | 26 | 55 | 77 | NA | 0.1 |
| 15 | 15 hp Booster/Filter | NENE | 35 | 55 | 77 | NA | 0.1 |

** From Water Management Plan (WMP), Appendix H-1

**Rights-of-Way:** SCE requested 2 right-of-way (ROW) grants for the Robinson Draw POD. BLM issues ROW WYW-168314 under the MLA for a gas pipeline and ROW WYW-168315 under FLPMA for a road, water pipeline, and buried power line as a road/utility corridor. These ROWs will adhere to the POD's Surface Use Program Conditions of Approval (COAs) and stipulations. BLM will grant the following rights-of-way for use in this POD:

| Right-of-Way | Action | Legal Description | Length (ft) | Width (ft) |
|---|---|---|---|---|
| WYW-168314 | Gas pipeline | T55N, R76W, sec 19, NWSW | 2,040 | 30 |
| WYW-168315 | Road;<br>Water pipeline; buried power; | T55N, R76W, sec 19, NWSW;<br>T55N, R76W, sec 29, W2NW | 4,080;<br>2,040 | 25;<br>30; 20 |

**Limitations:** The following impoundments, and surface irrigation (center pivot) systems can not be utilized for water discharged from Federal mineral leases until a sundry for use is provided and approved. The impoundments located over Federal mineral must be properly bonded prior to use. These facilities and water management systems were evaluated in the EA
There are no other denials or deferrals. Also see the COAs.

| | FACILITY TYPE | Qtr/Qtr | Sec | TWP N | RNG W | Capacity | Surface Disturbance (acres) |
|---|---|---|---|---|---|---|---|
| 1 | Hull #9 Reservoir* | SESW | 19 | 55 | 76 | 21.7 ac-ft | 8.8 |
| 2 | PIT 1-30 55-76 | NENE | 30 | 55 | 76 | 26.8 ac-ft | 7.2 |
| 3 | Cross H West Reservoir | NENW | 30 | 55 | 76 | 15.2 ac-ft | 4.4 |
| 4 | Robinson East Reservoir* | NENE | 35 | 55 | 77 | 2 ac-ft | 2.1 |
| 5 | PIT 9-26 55-77 | NESE | 26 | 55 | 77 | 11.2 ac-ft | 4.4 |
| 6 | Robinson West Reservoir | NWNE | 27 | 55 | 77 | 27 ac-ft | 9.3 |
| 7 | Robinson Reservoir* | NESE | 35 | 55 | 77 | 62 ac-ft | 10.8 |
| 8 | Exterran Treatment Plant | NWNW | 26 | 55 | 77 | NA | Appx. 3.5 |
| 16 | Pivot #1 | SWSW | 14 | 55 | 77 | Not Available | 19.2 |
| 17 | Pivot #2 | SENE | 22 | 55 | 77 | | 30.0 |
| 18 | Pivot #3 | SENW | 26 | 55 | 77 | | 43.6 |
| 19 | Pivot #4 | NESE | 26 | 55 | 77 | | 56.7 |
| 20 | Pivot #5 | NENE | 35 | 55 | 77 | | 18.9 |

* Existing Reservoir or Stock Water Impoundment
NA – Not Available

**THE FINDING OF NO SIGNIFICANT IMPACT (FONSI).** Analysis of Alternative B of the EA, WY-070-EA11-340, and the FONSI found SCE's Robinson Draw POD will have no significant impacts on the human environment, beyond those described in the PRB FEIS, thus an EIS is not required.

**COMMENT OR NEW INFORMATION SUMMARY.**
Since development of SCE's Robinson Draw POD BFO received a new policy on management of sage-grouse populations and habitats and then maintained that policy into its RMP, and received a new Interior Department policy on wilderness.

**DECISION RATIONALE:**
BLM's approval of the selected Alternative B, is based on:

1. BLM included mitigation measures to reduce environmental impacts while meeting the project's need. For a description of all site-specific COAs associated with this approval, see the COAs.
2. The selected alternative will not result in any undue or unnecessary environmental degradation.
3. The selected alternative will help meet the nation's energy needs, and help stimulate local economies by maintaining workforce stability.
4. The Operator committed to:
   - Comply with all applicable federal, state, and local laws and regulations.
   - The operator incorporated several measures to alleviate resource impacts into their surface use plan and drilling plan submitted.
5. The Operator certified it has a surface use agreement with the landowner or bonded.

6. Alternative B incorporates components of the Wyoming Governor's Sage Grouse Implementation Team's "core population area" strategy, the Governor's executive order, Wyoming BLM Instruction Memorandum 2010-012, Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate, and local research to provide mitigation for sage-grouse, while meeting the need for the project.
7. The project is clearly lacking in wilderness characteristics as there is no federal surface.

**ADMINISTRATIVE REVIEW AND APPEAL:** This decision is subject to administrative review according to 43 CFR 3165. 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: 9/30/11

**FINDING OF NO SIGNIFICANT IMPACT**
**Storm Cat Energy (USA) Operating Corporation, Robinson Draw Plan of Development (POD)**
**Environmental Assessment, (EA), WY-070-EA11-340**
**Buffalo Field Office, Bureau of Land Management**

**FINDING OF NO SIGNIFICANT IMPACT (FONSI):** Based on the information in the EA, WY-070-EA11-340, which is incorporated here by reference; I find that: (1) the implementation of Alternative B will not have significant environmental impacts beyond those already addressed in the Buffalo Final Environmental Impact Statement (FEIS) 1985, and the Powder River Basin (PRB) FEIS, 2003, to which the EA tiers; (2) Alternative B conforms to the Buffalo Field Office (BFO) Resource Management Plan (RMP) (1985, 2001, 2003, 2011); and (3) Alternative B does not constitute a major federal action having a significant effect on the human environment. Thus an EIS is not required. I base this finding on my consideration of the Council on Environmental Quality's (CEQ) criteria for significance (40 CFR 1508.27), both with regard to the context and to the intensity of the impacts described in the EA, and in consideration of Interior Department Order 3310.

**CONTEXT:** Mineral development is a long-standing land use in the PRB. About 42% of the nation's coal comes from the PRB. The PRB FEIS reasonably foreseeable development predicted and analyzed the development of 51,000 CBNG wells and 3,200 oil wells. The additional CBNG development described in Alternative B is insignificant in the national, regional, and local context.

**INTENSITY:** The implementation of Alternative B will result in beneficial effects in the forms of energy and revenue production however; there will also be adverse effects to the environment. Design features and mitigation measures included in Alternative B will minimize adverse environmental effects. The preferred alternative does not pose a significant risk to public health and safety. The geographic area of project does not contain unique characteristics identified within the 1985 RMP, 2003 PRB FEIS, or other legislative or regulatory processes.

BLM used relevant scientific literature and professional expertise in preparing the EA. The scientific community is reasonably consistent with their conclusions on environmental effects relative to oil and gas development. Research findings on the nature of the environmental effects are not highly controversial, highly uncertain, or involve unique or unknown risks. The PRB FEIS predicted and analyzed oil development of the nature proposed with this project and similar projects. The selected alternative does not establish a precedent for future actions with significant effects. There are no significant cultural resources that will be adversely affected by the selected alternative. The project area is clearly lacking in wilderness characteristics as there is no federal surface. No species listed under the Endangered Species Act or their designated critical habitat will be adversely affected. The selected alternative will not have any anticipated effects that would threaten a violation of federal, state, or local law or requirements imposed for the protection of the environment.

**ADMINISTRATIVE REVIEW AND APPEAL:** This finding is subject to administrative review according to 43 CFR 3165. Request for administrative review of this finding 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 FONSI is received or considered to have been received. Any party who is adversely affected by the State Director's finding may appeal that finding to the Interior Board of Land Appeals, as provided in 43 CFR 3165.4.

Field Manager: _____ Date: 9/30/11

**ENVIRONMENTAL ASSESSMENT (EA), WY-070-EA11-340**
**Storm Cat Energy (USA) Operating Corporation, Robinson Draw Plan of Development (POD)**
**Buffalo Field Office, Bureau of Land Management**

# 1. INTRODUCTION

This site-specific analysis tiers to and incorporates by reference the information and analysis in the Final Environmental Impact Statement and Proposed Plan Amendment for the Powder River Basin Oil and Gas Project (PRB FEIS), WY-070-02-065, 2003, Buffalo Resource Management Plan (RMP), and the PRB FEIS Record of Decision (ROD) pursuant to 40 CFR 1508.28 and 1502.21. One may review these documents at the BLM Buffalo Field Office (BFO) and on our website. These applications are pursuant to the Mineral Leasing Act (MLA) for exploring or developing oil or gas. This EA addresses site-specific resources and impacts that were unavailable for analysis when BFO completed the PRB FEIS.

## 1.1. Background

SCE submitted the Robinson Draw POD on October 2, 2009 with 33 federal APD's to develop and produce coalbed natural gas (CBNG) PRB. SCE and BLM conducted onsite visits on June 6-8, and 14, 2011 to evaluate the proposal and modified it as necessary to alleviate environmental impacts. At the June 6 onsite, SCE representatives added an additional 6 Notice of Stakings (NOS) for evaluation. Due to resource concerns (soils, topography) SCE, with BLM, input withheld submitting APDs for 3 of the NOSs. BLM sent a post-onsite deficiency on June 22, 2011. SCE submitted documentation addressing deficiencies and an additional 3 APDs on August 8, 2011. BLM sent a second deficiency letter on August 30, 2011. SCE submitted an updated POD September 26, 2011 completing the complete project proposal with 36 APDs. BFO shared proposed conditions of approval (COAs) with SCE in September 29, 2011.

## 1.2. Need for the Proposed Project

The need for this project is to determine how and under what conditions to balance natural resource conservation while allowing the operator to exercise lease rights to develop fluid minerals on federal leaseholds as described in their proposed project. Information contained in the APD is an integral part of this EA and is incorporated by reference (CFR 1502.21). The extraction of fluid minerals is important to meeting the nation's energy needs. The fluid mineral leasing programs fall under the authority of the MLA, the Federal Land Policy Management Act (FLPMA), and other laws and regulations.

## 1.3. Decision to be Made

The BLM will decide whether or not to approve the proposed development, and if so, under what terms and conditions to comport with the Bureau's multiple use mandate, environmental protection, and RMP.

## 1.4. Scoping and Issues

The BFO limited external scoping on this EA to its timely publication on the BFO website. Previously BFO conducted extensive external scoping for the PRB FEIS - discussed on p. 2-1 of the PRB FEIS and on p. 15 of the PRB ROD. This project is similar in scope to other fluid mineral development analyzed by the BFO. External scoping would be unlikely to identify new issues, as verified by the few fluid mineral EAs that were recently externally scoped such as the Clabaugh (WY-070-EA08-134) and Hollcroft/Stotts Draw (WY-070-EA07-021). Recent external scoping in 2010 and 2011 for a geographically-focused proposed RMP amendment revealed no new issues outside of the geographically-specific issues.

The BFO interdisciplinary team (ID team) conducted internal scoping by reviewing the proposed development and project location to identify potentially affected resource and land uses. The ID team identified resources and land uses present and affected by the proposed project. This EA will not discuss resources and land uses that are either not present, not affected, or that the PRB FEIS adequately

addressed. The ID team identified important issues for the affected resources to focus the analysis. This EA addresses the project and its site-specific impacts that were unavailable for review at the time of the PRB FEIS analysis to help the decision maker come to a reasoned decision. Project issues include:

- Soils and vegetation: site stability, reclamation potential, riparian and wetland communities, invasive species
- Water: ground water depletion, quality and quantity of produced water.
- Wildlife: raptor and owl productivity, greater sage-grouse lek occupancy and persistency
- Cultural: Impacts to cultural resources resulting from installation of SDI

These issues are not present, or minimally so, and were analyzed in the EIS and not analyzed in this EA

| | | |
|---|---|---|
| Geological resources | Forest, lands, realty | Fire, fuels management, and rehabilitation |
| Cave and karst resources | Renewable energy | Minerals: locatable, leasable-coal, salable |
| Paleontology | Rights-of-way | Wilderness characteristics |
| Wilderness study areas | Transportation | Areas of critical environmental concern (ACEC) |
| Tribal Treaty rights | Livestock grazing | Social and economic resources |
| Visual resources | Wild and scenic rivers | Environmental justice |

## 2. PROPOSED PROJECT AND ALTERNATIVES

### 2.1. Alternative A - No Action

The PRB FEIS considered a No Action Alternative, Volume 1, pp. 2-54 to 2-62. This alternative must also consider and combine the PRB FEIS analysis with the subsequent analysis and development from the adjacent PODs (by approval date) (see also, Table 2.3 for current disturbance):

**Table 2.1. Operators and NEPA Documents Contiguous or Adjacent**

| Operator / POD Name | NEPA Document | Approval Date |
|---|---|---|
| Penaco / Hank Williams | WY-070-EA01-212 | 9/5/01 |
| Devon / North Wild Horse 1 | WY-070-EA04-200 | 9/30/04 |

This comports to the PRB FEIS which analyzed the reasonably foreseeable development rolling across the PRB of over 51,000 CBNG and 3,200 oil wells. The no action alternative would consist of no new federal wells. This alternative would deny these APDs and /or POD requiring the operator to resubmit APDs or a POD that complies with statutes and the reasonable measures in the PRB RMP Record of Decision (ROD) in order to lawfully exercise conditional lease rights. This alternative could, through secretarial discretion suspend the senior leasehold, or could administratively cancel or withdraw the lease if improperly awarded, or seek to cancel the lease. It is not possible in the abstract to identify every interest and that is beyond the scope here.

### 2.2. Alternative B Proposed Action

Alternative B contains complete APDs and is based on SCE and BLM working to reduce environmental impacts. This alternative summarizes the POD as it was, after site visits, submitted to the BLM by SCE on August 11, 2011, and identified as being complete on September 26, 2011.

**Project Name: Robinson Draw**

**Table 2.2. Robinson Draw APD Name / # / Lease/Location:**

| | Well Name | Well # | QTR | Sec | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 1 | ROBINSON DRAW BUTLER FED | 07-19 | SWNE | 19 | 55N | 76W | WYW161434 |
| 2 | ROBINSON DRAW FEDERAL | 11-14 | NESW | 14 | 55N | 77W | WYW146332 |
| 3 | ROBINSON DRAW FEDERAL | 13-25 | SWSW | 25 | 55N | 77W | WYW146334 |

| | Well Name | Well # | QTR | Sec | TWP | RNG | Lease # |
|---|---|---|---|---|---|---|---|
| 4 | ROBINSON DRAW FEDERAL | 15-25 | SWSE | 25 | 55N | 77W | WYW146334 |
| 5 | ROBINSON DRAW TIETJEN | 15-19 | SWSE | 19 | 55N | 76W | WYW161434 |
| 6 | ROBINSON DRAW TIETJEN | 09-19 | NESE | 19 | 55N | 76W | WYW161434 |
| 7 | ROBINSON DRAW TIETJEN | 13-19 | SWSW | 19 | 55N | 76W | WYW161434 |
| 8 | ROBINSON DRAW TIETJEN | 11-19 | NESW | 19 | 55N | 76W | WYW161434 |
| 9 | ROBINSON DRAW TIETJEN | 01-19* | NENE | 19 | 55N | 76W | WYW161434 |
| 10 | ROBINSON DRAW TIETJEN | 13-23 | SWSW | 23 | 55N | 77W | WYW146333 |
| 11 | ROBINSON DRAW TIETJEN | 05-23 | SWNW | 23 | 55N | 77W | WYW146853 |
| 12 | ROBINSON DRAW TIETJEN | 15-23 | SWSE | 23 | 55N | 77W | WYW146853 |
| 13 | ROBINSON DRAW TIETJEN | 09-24 | NESE | 24 | 55N | 77W | WYW146333 |
| 14 | ROBINSON DRAW TIETJEN | 01-25 | NENE | 25 | 55N | 77W | WYW146334 |
| 15 | ROBINSON DRAW TIETJEN | 03-25 | NENW | 25 | 55N | 77W | WYW146334 |
| 16 | ROBINSON DRAW TIETJEN | 07-25 | SWNE | 25 | 55N | 77W | WYW146334 |
| 17 | ROBINSON DRAW TIETJEN | 11-25 | NESW | 25 | 55N | 77W | WYW146334 |
| 18 | ROBINSON DRAW TIETJEN | 09-25 | NESE | 25 | 55N | 77W | WYW146334 |
| 19 | ROBINSON DRAW TIETJEN | 05-25 | SWNW | 25 | 55N | 77W | WYW146334 |
| 20 | ROBINSON DRAW TIETJEN | 01-26 | NENE | 26 | 55N | 77W | WYW146334 |
| 21 | ROBINSON DRAW TIETJEN | 03-26 | NENW | 26 | 55N | 77W | WYW146334 |
| 22 | ROBINSON DRAW TIETJEN | 05-26 | SWNW | 26 | 55N | 77W | WYW146334 |
| 23 | ROBINSON DRAW TIETJEN | 07-26 | SWNE | 26 | 55N | 77W | WYW146334 |
| 24 | ROBINSON DRAW TIETJEN | 09-26 | NESE | 26 | 55N | 77W | WYW146334 |
| 25 | ROBINSON DRAW TIETJEN | 13-26 | SWSW | 26 | 55N | 77W | WYW146334 |
| 26 | ROBINSON DRAW TIETJEN | 15-26 | SWSE | 26 | 55N | 77W | WYW146334 |
| 27 | ROBINSON DRAW TIETJEN | 11-26 | NESW | 26 | 55N | 77W | WYW146334 |
| 28 | ROBINSON DRAW TIETJEN | 09-27 | NESE | 27 | 55N | 77W | WYW155142 |
| 29 | ROBINSON DRAW TIETJEN | 01-34 | NENE | 34 | 55N | 77W | WYW155142 |
| 30 | ROBINSON DRAW TIETJEN | 01-35 | NENE | 35 | 55N | 77W | WYW146334 |
| 31 | ROBINSON DRAW TIETJEN | 03-35 | NENW | 35 | 55N | 77W | WYW146334 |
| 32 | ROBINSON DRAW TIETJEN | 07-35 | SWNE | 35 | 55N | 77W | WYW146334 |
| 33 | ROBINSON DRAW TIETJEN | 09-35 | NESE | 35 | 55N | 77W | WYW146334 |
| 34 | ROBINSON DRAW TIETJEN | 13-35 | SWSW | 35 | 55N | 77W | WYW146334 |
| 35 | ROBINSON DRAW TIETJEN | 11-35 | NESW | 35 | 55N | 77W | WYW146334 |
| 36 | ROBINSON DRAW TIETJEN | 15-35 | SWSE | 35 | 55N | 77W | WYW146334 |

**Rights-of-Way:**

SCE requested two right-of-way (ROW) grants for the Robinson Draw POD, Table 2.3. BLM issues ROW WYW-168314 under the MLA for a gas pipeline and ROW WYW-168315 under the FLPMA for a road, water pipeline, and buried power line as a road/utility corridor. These ROWs will adhere to the POD's Surface Use Program Conditions of Approval (COAs) and stipulations.

**Table 2.3. Right of Way Grants for Robinson Draw POD**

| Right-of-Way | Action | Legal Description | Length (ft) | Width (ft) |
|---|---|---|---|---|
| WYW-168314 | Gas pipeline | T55N, R76W, sec 19, NWSW | 2,040 | 30 |
| WYW-168315 | Road;<br>Water pipeline; buried power; | T55N, R76W, sec 19, NWSW;<br>T55N, R76W, sec 29, W2NW | 4,080;<br>2,040 | 25;<br>30; 20 |

**Table 2.4. Proposed Water Management:**
The following water management infrastructure was proposed for use in this POD:

| | FACILITY TYPE | Qtr/Qtr | Sec | TWP N | RNG W | Capacity | Surface Disturbance (acres) |
|---|---|---|---|---|---|---|---|
| 1 | Hull #9 Reservoir* | SESW | 19 | 55 | 76 | 21.7 ac-ft | 8.8 |
| 2 | PIT 1-30 55-76 | NENE | 30 | 55 | 76 | 26.8 ac-ft | 7.2 |
| 3 | Cross H West Reservoir | NENW | 30 | 55 | 76 | 15.2 ac-ft | 4.4 |
| 4 | Robinson East Reservoir* | NENE | 35 | 55 | 77 | 2 ac-ft | 2.1 |
| 5 | PIT 9-26 55-77 | NESE | 26 | 55 | 77 | 11.2 ac-ft | 4.4 |
| 6 | Robinson West Reservoir | NWNE | 27 | 55 | 77 | 27 ac-ft | 9.3 |
| 7 | Robinson Reservoir* | NESE | 35 | 55 | 77 | 62 ac-ft | 10.8 |
| 8 | Exterran Treatment Plant | NWNW | 26 | 55 | 77 | NA | Appx. 3.5 |
| 9 | SDI Field #1** | N 1/2 | 26 | 55 | 77 | | 89.8 |
| 10 | SDI Field #2** | SENE | 26 | 55 | 77 | | 19.9 |
| 11 | SDI Field #3** | SE | 26 | 55 | 77 | | 40.6 |
| 12 | SDI Field #4** | E 1/2 NE | 35 | 55 | 77 | 600 gpm | 36.9 |
| 13 | 15 hp Booster/Filter | NWNE | 26 | 55 | 77 | NA | 0.1 |
| 14 | 20 hp Booster/Filter | NWSE | 26 | 55 | 77 | NA | 0.1 |
| 15 | 15 hp Booster/Filter | NENE | 35 | 55 | 77 | NA | 0.1 |
| 16 | Pivot #1 | SWSW | 14 | 55 | 77 | | 19.2 |
| 17 | Pivot #2 | SENE | 22 | 55 | 77 | | 30.0 |
| 18 | Pivot #3 | SENW | 26 | 55 | 77 | | 43.6 |
| 19 | Pivot #4 | NESE | 26 | 55 | 77 | Not | 56.7 |
| 20 | Pivot #5 | NENE | 35 | 55 | 77 | Available | 18.9 |

* Existing Reservoir or Stock Impoundment
** From Water Management Plan (WMP), Appendix H-1 (located in App G)

**County:** **Sheridan**

**Operator/Applicant:** SCE

**Surface Owners:** PK Ranch, LLC

**Drilling and Construction:**

- Drilling and construction activities are anticipated to be completed within 2 years, the term of an APD. Drilling and construction occurs year-round in the PRB. Weather may cause delays lasting several days but rarely do delays last multiple weeks. Timing limitations in the form of COAs and/or agreements with surface owners impose longer temporal restrictions on portions of this POD, but rarely do these restrictions affect an entire POD.

- Well metering shall be accomplished by telemetry and well visitation. Metering would entail approximately 4 visits per month to each well for maintenance, calibration, sampling, etc. More frequent visits will likely occur during the first several months of operation.

- **Water Management Plan (WMP)**: The operator has submitted a water management plan that will use five, or a combination of five water management strategies. Costs of implementation, landowner agreements, and permitting from the State of Wyoming regulatory agencies will determine the

operators' final choice in water management for CBNG water produced within this POD boundary. The five water management strategies submitted for evaluation in this POD are: 1) Full containment of CBNG produced water, 2) Containment of the CBNG produced water in reservoirs with permitted seasonal discharges to the Powder River by utilizing Assimilative Capacity credits from the Wyoming Department of Environmental Quality (WDEQ), 3) Treating the water through the Exterran Higgins Loop™ Continuous Counter Current Ion Exchange (IX) treatment plant and discharging the treated water to the Powder River (Exterran), 4) Sub-surface drip irrigation (SDI), and 5) Surface irrigation from a center pivot irrigation system (Pivot). Locations of the proposed water management reservoirs, treatment plant, SDI fields, and center pivot plots are described in Table 2.4 above and in further detail in the POD's WMP and MSUP

- A road network consisting of existing and proposed improved including use of appropriately sized culverts. The project will have 17.1 miles of improved road.

- There is an above ground power line network to be built by a third party. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. Power line construction is unscheduled and will not complete before the CBNG wells are producing. If the power line network is not completed before the wells are producing, then temporary diesel generators shall be placed at the 7 power drops. A storage tank of 1000 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 12 months. Fuel deliveries are anticipated to be 1-2 times per week. Generator noise level at the unit is approximately 100 dB and drops to 50 dB ¼ mile away.

- A buried gas, water and power line network and 1 compression facility.

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, WMP in the POD, and individual APDs. Also see the POD for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production and standard practices also is available in the PRB FEIS, Volume 1, pp. 2-9 to 2-40 (2003). Implementation of committed mitigation measures contained in the MSUP, Drilling Plan, and WMP, in addition to the Standard COAs contained in Appendix A of the PRB FEIS ROD, are incorporated and analyzed in this alternative.

### 2.3. Alternatives Considered but Not Analyzed in Detail

SCE submitted the original POD for the Robinson Draw on October 2, 2009 with 33 federal APDs. A series of discussions and onsite visits occurred between BLM and SCE based on the initial project POD (see Sec 1.1). SCE did not file APDs for 3 NOS proposals as a result of the onsites and discussions (due to soils and topography issues). SEC documented the above changes in a revised project description provided to BFO on August 11, 201. This response to BLM's deficiency letters resulted in a refined proposed project, which BLM analyzes in this document as Alternative B. BLM identified the POD was complete on September 26, 2011 with SCE's response to the deficiency letters, (found in the project's administrative record at BFO).

### 2.4. Summary of Alternatives

A summary of the infrastructure existing in the POD area (Alternative A), the additional infrastructure proposed by the operator (Alternative B), are in Table 2.5.

**Table 2.5. Summary of Alternatives**

Acres or mileage in the Robinson Draw POD Boundary, Alternative B, represent additional facilities and do not include the existing facilities (for specifics see MSUP, Master Surface Use Data Summary Form).

| Facility | Alternative A (No Action) Includes existing conditions within the POD boundary Number/Acres/Miles | Alternative B (Operator Proposal) Proposed Number/ Acres/Miles |
|---|---|---|
| Total CBNG Wells | 1 | 36 |
| Well Locations<br>Non-constructed<br>Constructed<br>Slotted<br>NOTE: no constructed or slotted pads are required, ~1 ac. disturbance will consist of pit construction, mow and/or crushed vegetation and slight soil compaction | 1 | 32/32 ac<br>2/1ac<br>2 |
| Gather/Metering Facilities<br>Number of Facilities | 0 | 0 |
| Compressors<br>Number of Compressors<br>Acreage of Facilities | 0 | 1<br>2 ac. |
| Number of Ancillary Facilities<br>Staging Areas<br>Pump Stations | 0<br>0 | 2/4ac<br>1/1ac |
| Acres (Miles) of Template/ Spot Upgrade Roads<br>*No Corridor*<br>*With Corridor* | .25 miles | .93/2.8ac<br>16.2/98.0ac |
| Acres (Miles) of Engineered Roads | 0 | 0 |
| Acres (Miles) of Primitive Roads | 0 | 0 |
| Miles of Buried Utilities Gas/Water/Electric<br>No Corridor<br>With Corridor | .25 miles | 1.8/6.7ac<br>16.2/98.0ac |
| Miles of Buried Power<br>No Corridor | 0 | .89/2.2ac |
| Miles of Pipeline<br>No Corridor | 0 | .74/1.8ac |
| Miles of Overhead Powerlines | .25 miles | 4.2/7.67ac |
| Number of Communication Sites | 0 | 0 |
| Number of Monitor Wells | 4 | 12 |

| Facility | Alternative A (No Action) Includes existing conditions within the POD boundary Number/Acres/Miles | Alternative B (Operator Proposal) Proposed Number/ Acres/Miles |
|---|---|---|
| Number of Impoundments<br>On-channel<br>Off-channel<br>Lined<br>Unlined | 3 (21.7 acres)<br>3 (21.7 acres)<br>0<br>0<br>3 (21.7 acres) | 4 (25.3 acres)<br>2 (13.7 acres)<br>2 (11.6 acres)<br>0<br>4 (25.3 acres) |
| Water Discharge Points | 0 (0 acre) | 7 (0.70 acre) |
| Exterran Water Treat Plant | 0 (0 acre) | 1 (Appx. 3.5 acre) |
| SDI Fields | 0 (0 acre) | 4 (187 acres) |
| Center Pivot Irrigation | 0 (0 acre) | 5 (168.4 acres) |
| **TOTAL ACRES DISTURBANCE** | 67.3 ac | **564.0 ac** |

Note: for further detail concerning existing conditions see Surface Use Data Summary (SUDS) Form in the MSUP.

### 2.5. Conformance with the Land Use Plan and Other Environmental Assessments and Laws

This proposal does not diverge from the goals and objectives in the Buffalo RMP, 1985, 2001, 2003, 2011 and generally conforms to the terms and conditions of that land use plan, its amendments, and supporting FEISs, 1985, 2003, 2011. BLM did not use the rebuttable presumption in the 2005 Energy Policy Act to process these APDs via a categorical exclusion to save time; since this EA initiation pre-dated the August 12, 2011 decision by the Federal District Court of Wyoming.

## 3. AFFECTED ENVIRONMENT

This section briefly describes the physical and regulatory environment affected by implementation of the alternatives in Section 2. Aspects of the affected environment here focus on the major issues. Resources unaffected, or not affected beyond the level analyzed in the PRB FEIS, are outside the scope of this EA.

### 3.1. Project Area Description

The Robinson Draw POD is in Eastern Sheridan County, about 1.0 miles east of Arvada, Wyoming. Elevations in the project area range from 3,600 to 4,100 feet above sea level. The general topography has moderately sloped ridges and draws descending to flat floodplains of the Powder River. Robinson Draw and Cross H Creek drain the project area. These ephemeral draws are tributary to the Powder River, which is west of the POD boundary. The climate in the area is semi-arid, averaging 12 inches of precipitation annually, more than 60% of which occurs between April and September. Current land uses in the project area include livestock grazing and CBNG development. The area is experiencing active development of federal and fee minerals. It is reasonable foreseeable that oil, natural gas, and coalbed natural gas (CBNG) development will fill in the overlapping, contiguous, or adjacent leases in manners appropriate with technology to drain the fluid mineral resources.

### 3.2. Air Quality

Existing air quality in most of the PRB is in attainment with all ambient air quality standards. However specific air quality presents a knowledge gap as monitoring does not occur throughout most of the PRB. PRB air quality is a rising concern due to ozone in the oil and gas producing Upper Green River Basin that exceeded EPA limits for 13 days in 2011. Existing air emission sources in the region include:

- Exhaust emissions (primarily CO and nitrogen oxides [NOx]) from existing natural gas fired compressor engines used in production of natural gas and CBNG; and, gasoline and diesel vehicle tailpipe emissions of combustion pollutants;

- Dust (particulate matter) generated by vehicle travel on unpaved roads, windblown dust from neighboring areas and road sanding during the winter months;
- Transport of air pollutants from emission sources located outside the region;
- Dust (particulate matter) from coal mines;
- NOx, particulate matter, and other emissions from diesel trains and,
- SO2 and NOx from power plants.

Refer to the PRB Final EIS Vol. 1, Chap. 3, pp. 3-291 to 3-299, for the PRB air quality in 2003.

### 3.3. Soils & Vegetation

The general vegetation community, observed at the onsites, within the project area consists of a mixed sagebrush/grasses mosaic. Various native bunch grasses dominate the vegetative composition of the project area intermixed with Wyoming big sagebrush. The greatest concentrations of sagebrush occurred among the gentler upland slopes and several minor tributaries of major drainages. Expansive cottonwood stands are prevalent throughout the bottomlands of the Powder River.

BLM identified soils in the project area from the *Sheridan County Survey Area, Wyoming (WY605).* The Natural Resource Conservation Service (NRCS) performed the survey according to National Cooperative Soil Survey standards. BLM obtained pertinent information for analysis from the published soil survey and the National Soils Information System (NASIS) database for the area.

The map unit symbols for the soils identified below and the associated ecological sites for the identified soil map unit symbols found within the POD boundary are in the table below. Ecological Site Descriptions are soil and vegetation community descriptions compiled by the NRCS for the purpose of resource identification, and providing management and reclamation recommendations. To determine the appropriate ecological sites for the area in this proposed action, BLM specialists analyzed data from onsite field reconnaissance and NRCS published soil survey soils information.

**Table 3.1. Ecological Sites and Map Units**

| Ecological Sites | Map Units | Acres |
|---|---|---|
| Clayey (CY) 10-14 NP | Wyarno clay loam, dry, 3 to 9% slopes | 150.00 |
| Loamy (Ly) 10-14 NP | Bidman-Ulm, dry, complex 0 to 6% slopes | 116.20 |
| Loamy (Ly) 10-14 NP | Cushman-Forkwood association, 3 to 15% slopes | 191.59 |
| Loamy (Ly) 10-14 NP | Kishona-Cambria complex, 0 to 6%slopes | 32.00 |
| Loamy (Ly) 10-14 NP | Parmleed-Bidman fine sandy loams, 3 to 15% slopes | 164.86 |
| Loamy (Ly) 10-14 NP | Platmak loam, dry, 0 to 9% slopes | 15.56 |
| Loamy (Ly) 10-14 NP | Shingle-Theedle-Kishona association, 6 to 25% slopes | 1149.25 |
| Loamy (Ly) 10-14 NP | Zigweid-Cambria loams, 0 to 15% slopes | 35.00 |
| Lowland (LL) 10-14 NP | Haverdad very fine sandy loam, 0 to 3% slopes | 93.00 |
| Sandy (Sy) 10-14 NP | Hargreave-Moskee association, dry, 3 to 15% slopes | 25.38 |
| Sandy (Sy) 10-14 NP | Hiland-Decolney complex, 3 to 15% slopes | 113.84 |
| Sandy (Sy) 10-14 NP | Taluce-Tullock-Vonalee association, 6 to 15% slopes | 270.00 |
| Shallow Loamy (SwLy) 10-14 NP | Shingle-Haverdad complex, 0 to 80% slopes | 264.21 |
| Shallow Loamy (SwLy) 10-14 NP | Shingle-Rock outcrop complex, 30 to 50% slopes | 360.68 |
| Shallow Loamy (SwLy) 10-14 NP | Shingle-Samday clay loams, 6 to 60% slopes | 273.81 |
| Shallow Loamy (SwLy) 10-14 NP | Shingle-Theedle complex, 45 to 75% slopes | 194.01 |
| Shallow Loamy (SwLy) 10-14 NP | Worfka-Shingle-Samday complex, 6 to 30% slopes | 151.86 |

**Dominant Ecological Sites in Robinson Draw POD**

| Dominant Ecological Sites | Acres | % |
|---|---|---|
| Loamy | 1704.46 | 47.00 |
| Shallow Loamy | 1244.56 | 35.00 |

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

*Vegetation Makeup*: The major grasses include western wheatgrass, needleandthread, and green needlegrass. Other grasses occurring in this state include Cusick's and Sandberg's bluegrass, bluebunch wheatgrass, and blue grama. A variety of forbs and half-shrubs also occur. Big sagebrush is a conspicuous element of this state, occurs in a mosaic pattern, and makes up 5 to 10% of the annual production. Plant diversity is high.

This plant community is extremely stable and well adapted to the Northern Great Plains climatic conditions. The diversity in plant species allows for high drought tolerance. This is a sustainable plant community (site/soil stability, watershed function, and biologic integrity).

*Shallow Loamy Sites:* The soils of this site are shallow (less than 20 inches to bedrock) well-drained soils formed in alluvium over residuum or residuum. These soils have moderate permeability and may occur on all slopes. The bedrock may be any kind which is virtually impenetrable to plant roots, except igneous. The surface soil will have one or more of the following textures: very fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, and clay loam. Thin ineffectual layers of other textures are disregarded. Layers of the soil most influential to the plant community vary from 3 to 6 inches thick.

*Vegetation Makeup*: Dominant grasses include bluebunch wheatgrass, rhizomatous wheatgrasses, and blue grama. Grasses of secondary importance include little bluestem, prairie junegrass, and Sandberg bluegrass. Forbs, commonly found in this plant community, include Louisiana sagewort (cudweed), plains wallflower, hairy goldaster, slimflower scurfpea, and scarlet globemallow. Big sagebrush canopy ranges from 20% to 30%. Fringed sagewort is commonly found. Plains pricklypear and winterfat can also occur.

### 3.3.1. Reclamation Potential

Currently, soil conditions in the project area are impacted by CBNG development as well as traditional activities, including livestock grazing and wildlife use. The majority of the area is categorized as having a fair reclamation potential, Table 3.2. This is consistent with field observations and analysis as about 60% of the project area consists of loamy soil types. Field observations of disturbed areas show soil stabilization and revegetation are limiting factors affecting reclamation of disturbed areas. Impacts from grazing will also hinder vegetation establishment. Soil impacts (e.g., roads, linear pipeline scars, and artificial wet areas) can be readily observed in areas of Shallow Sandy and Sandy soil types.

**Table 3.2. Reclamation Potential within the Robinson Draw Project Area**

| Reclamation Potential | Acres |
|---|---|
| Fair | 1923.4 |
| Poor | 1682.5 |

## 3.4. Wetlands/Riparian

The National Wetland Inventory (NWI) identifies approximately 10 acres of wetlands within the POD

boundary. The wetlands are adjacent to streams and existing stock/CBNG reservoirs. Riverine type wetland/riparian habitat is found mainly along the Powder River with the Freshwater Pond types in the areas of the existing impoundments. Rushes, grasses, cattails, and cottonwood trees are the predominant vegetative type in the POD's NWI habitats.

**Table 3.3. NWI Wetlands and Acres in the Robinson Draw POD Boundary**

| NWI Attribute | Type | Acres |
|---|---|---|
| R2USC | Riverine | 0.6 |
| PEMCh | Freshwater Emergent Wetland | 0.1 |
| PABfH | Freshwater Pond | 2.3 |
| PUSCh | Freshwater Pond | 2.5 |
| PUSAh | Freshwater Pond | 3.3 |
| R2UBH | Riverine | 1.2 |
| | **Total Acres of NWI Wetlands** | 10.0 |

### 3.5. Invasive Species

The operator consulted with the Sheridan County Weed and Pest office obtaining information concerning weeds in the project area (see MSUP, Integrated Pest Management Plan). The following is a list of State and County Designated Noxious Weeds that are weeds of concern in Robinson Draw POD:

- Canada thistle (*Cirsium arvense L.*)
- Russian knapweed (*Centaurea repens Lam.*)
- Leafy spurge (*Euphorbia esula L.*)
- Hoary Cress (White Top) (*Cardari draba L.*)

The Sheridan County Weed and Pest declared these species as weeds of concern in the POD Area.

- Black henbane (*Hyoscyarnus niger L.*)
- Buffalobur (*Solanum rostratum Dun.*)
- Common cocklebur (*Xanthium strumarium L.*)
- Salt cedar (*Tamarix ramosissima Ledeb.*)

At the onsites Canada thistle and Salt cedar were observed.
Cheatgrass is prevalent throughout the project area. The state-listed noxious weeds are listed in PRB FEIS, Table 3-21, p. 3-104; and the Weed Species of Concern are in Table 3-22, p. 3-105.

### 3.6. Water Resources

The project area is in the Upper Powder River drainage system. The Wyoming Department of Environmental Quality (WDEQ) assumed primacy from the U.S. Environmental Protection Agency (EPA) for maintaining the water quality in the state of Wyoming. The Wyoming State Engineer's Office (WSEO) has authority for regulating water rights and permitting reservoirs for impounding surface water in the state. The Wyoming Oil and Gas Conservation Commission (WYOGCC) has authority for permitting and bonding off-channel impoundments that are over state and fee minerals.

#### 3.6.1. Groundwater

The groundwater in the project area is historically used for stock water or domestic purposes. A search of the WSEO groundwater rights database for this area showed 30 registered stock and domestic ground water appropriations within 1 mile of the POD boundary with depths ranging from 110 to 1,000 feet. For additional information on groundwater, please refer to the PRB FEIS (2003), Chapter 3, Affected Environment pp. 3-1 to 3-36. WDEQ Water Quality Rules and Regulations: Chapter 8. Quality Standards for Wyoming Groundwaters, define the general limits for total dissolved solids (TDS): 500 mg/l TDS for drinking water (Class I), 2000 mg/l for agricultural use (Class II) and 5000 mg/l for livestock use (Class III). For additional water quality limits for groundwater, refer to the WDEQ internet site.

The PRB ROD includes a monitoring, mitigation and reporting plan (MMRP). The objective of the MMRP is to monitor those elements of the analysis addressed in the ROD where there was limited

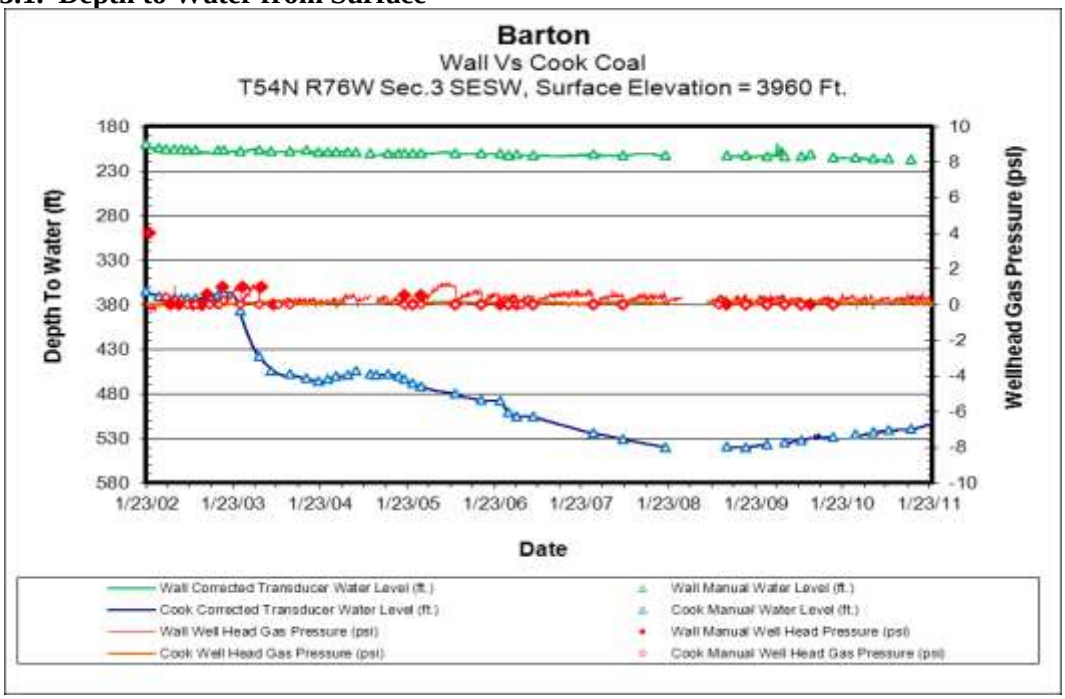
information available during the preparation of the PRB FEIS. The MMRP called for the use of adaptive management to make management changes based on the results of monitoring data.

Specifically relative to groundwater, the MMRP identified the following (PRB ROD, p. E-4):

- Effects of infiltrated waters on the water quality of shallow groundwater aquifers are not well documented [2003];
- Potential impacts will be highly variable depending upon local geologic and hydrologic conditions;
- It may be necessary to conduct investigations at representative sites in the basin to quantify impacts;
- Provide site specific guidance on the placement and design of CBM impoundments, and
- Shallow groundwater wells would be installed and monitored where necessary.

The production of CBNG requires the temporary reduction of the hydraulic head in the saturated coal zones targeted for CBNG production. The BFO has been monitoring coal zone water levels and gas pressures in the PRB since the early 1990s. The Robinson Draw POD is surrounded by numerous approved federal, fee, and state CBNG projects. As a result, the target coal zone pressure may have been reduced through off set water production associated with those projects. Pennaco Energy, Inc., installed the Barton groundwater monitoring wells, and BFO includes these in the groundwater monitoring program. The wells are in the SESW of Section 3, Township 54 N, Range 76 W, and are 3 miles to the southeast from the Robinson Draw Pod boundary. The initial water level of the Cook coal at this site was recorded at 364 feet below ground level on January 23, 2002. On April 12, 2011, the water level was 508 feet below the ground surface, representing a decline of 144 feet since the well was completed (Figure 3.1). This level of drawdown is in the range predicted through the regional groundwater modeling conducted for the PRB FEIS. For additional information refer to the PRB FEIS. Chapter 4, Groundwater; and the Wyoming State Geological Survey's Open File Report 2009-10 titled "1993-2006 Coalbed Natural Gas (CBNG) Regional Groundwater Monitoring Report: Powder River Basin, Wyoming" which is available at: http://www.wsgs.uwyo.edu.

**Figure 3.1. Depth to Water from Surface**



### 3.6.2. Surface Water

The project area is in the Robinson Draw and Cross H Creek drainages which are tributaries to the Upper Powder River watershed. Most of the contributing drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary). The channels are primarily well vegetated and stable with mild incision and meandering. Several headcuts were identified by the operator within the POD boundary and downgradient of proposed impoundments.

The PRB FEIS presents the historic mean electrical conductivity (EC, in µmhos/cm) and sodium adsorption ratio (SAR) by watershed at selected U.S. Geological Survey (USGS) Gauging Stations in Table 3-11 (PRB FEIS, p. 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, p. 3-48). For the Upper Powder River watershed, the EC ranges from 1,797 at maximum monthly flow to 3,400 at low monthly flow; and the SAR ranges from 4.76 at maximum monthly flow to 7.83 at low monthly flow. These values were determined at the USGS gaging station (Station ID 06317000) at Arvada, WY (PRB FEIS, p. 3-49).

The operator identified 2 springs within the POD boundary. The springs are in the NWSW of Section 24, T55N, R77W and in the NESW Section 23, T55N R77W. The operator has sampled the spring waters and will provide the sample analysis data in the WMP, Appendix F when the data is available. SCE identified 6 seeps. Five of the seeps are associated with a leaking stock reservoir in the Cross H Creek drainage in the SESE Section 24, T55N, R77W and the remaining seep is in the SWNW Section 35, T55N, R77W. None of the seeps had sufficient flow to sample according to the operator. For more information regarding surface water refer to the PRB FEIS, Chapter 3 Affected Environment, pp. 3-36 to 3-56.

## 3.7. Wildlife (Fish and Wildlife)

BLM consulted several resources identifying wildlife species that may occur in the proposed project area, these included: the wildlife database compiled and managed by the BFO wildlife biologists, the PRB FEIS, the Wyoming Game and Fish Department (WGFD) big game and sage-grouse maps, and the Wyoming Natural Diversity Database (WYNDD). ICF International performed habitat assessments and wildlife inventory surveys according to the PRB Interagency Working Group's protocols in 2009, 2010 and 2011. ICF surveyed for mountain plover, sharp-tailed grouse, greater sage-grouse, bald eagles, raptor nests, prairie dog colonies, bald eagle winter roosts, and Ute ladies'-tresses orchid. There is no habitat for blowout penstemon so there were no surveys. BLM wildlife biologists conducted field visits in 2009 and 2011. The biologists reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided modification recommendations where wildlife issues arose.

### 3.7.1. Habitat Types

Habitats occurring in the Robinson Draw project area are riparian, sagebrush grassland and grassland types. Riparian habitat dominated by cottonwood trees is located along the Powder River, while small patches of conifer woodlands and rock outcrops are present throughout the project area. Ponderosa pine dominates in some areas, particularly on north-facing slopes in the steep draws leading to the Powder River, while scattered patches of juniper are present throughout.

The Powder River riparian corridor represents one of the most important ecosystems for wildlife in Wyoming, due to its importance for storing water, contributing woody debris, resisting flood damage and invasive species, and providing shade and habitat for aquatic species. The Sagebrush/Mixed Grass Habitats are important because they support a number of sagebrush obligate species, and sagebrush

habitats are a critical food source for species such as greater sage-grouse, pronghorn, and mule deer, particularly during the fall, winter, and spring. Sagebrush also provides cover (nesting, resting, and escape) for a wide variety of species. For more detail regarding these habitat types see: WGFD Strategic Habitat Plan (WGFD 2009)

### 3.7.2. Threatened, Endangered, Proposed, and Candidate Species

#### 3.7.2.1. Threatened and Endangered Species

The project area supports suitable habitat for Ute-ladies' tresses orchid (ULT). ICF surveyed suitable habitat in the project area for flowering plants in 2008, 2009, and 2010. None were found.

#### 3.7.2.2. Candidate Species

##### 3.7.2.2.1. Greater Sage-grouse

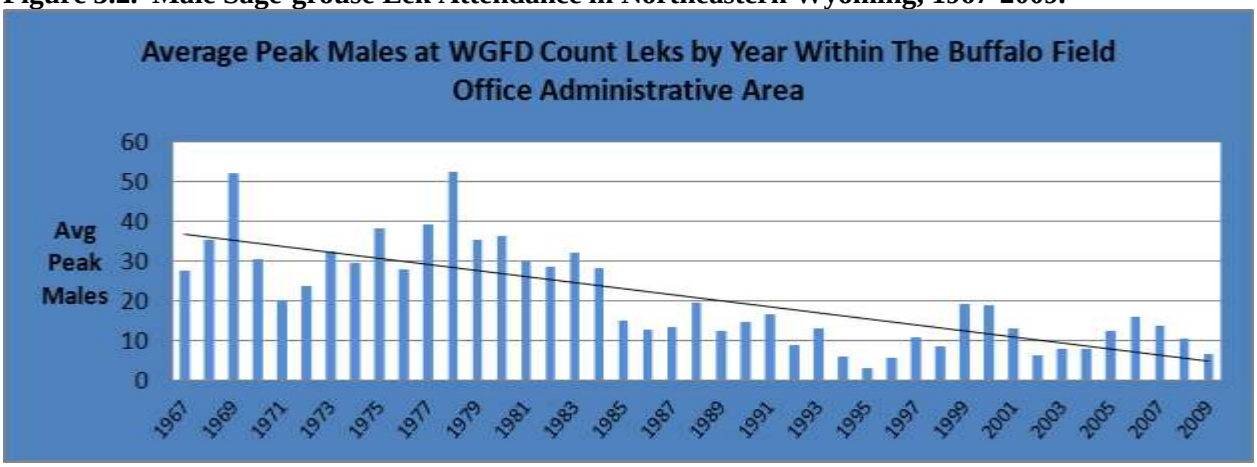
The U.S. Fish and Wildlife Service (FWS) warranted the sage-grouse for listing across its range (FWS 2010). The FWS did not list the species due to higher priorities. In addition, the sage-grouse is a Wyoming BLM sensitive species, and a WGFD species of greatest conservation need because populations are declining and they are experiencing ongoing habitat loss. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action.

**Powder River Basin**

The PRB serves as a link between the Wyoming Basin and central Montana grouse populations. The PRB is in sage-grouse Management Zone 1, which is predominantly grasslands and approaches the periphery of sage-grouse distribution that extends into the Dakotas and southern Saskatchewan. In the PRB sagebrush is naturally fragmented by grasslands, and where found, is at lower densities (less canopy cover), than it is in other management zones.

The sage-grouse population in northeast Wyoming is exhibiting a steady long term downward trend, as measured by lek attendance (FWS 2010). The following figure illustrates a 10-year cycle of periodic highs and lows. Each subsequent population peak is lower than the previous peak. Research suggests that these declines may be a result, in part, of CBNG development in this region of Wyoming and that the leks in the project area are experiencing similar declines (FWS 2010).

**Figure 3.2. Male Sage-grouse Lek Attendance in Northeastern Wyoming, 1967-2009.**




Several studies show that well density is useful as a metric for evaluating impacts to sage-grouse, as measured by declines in lek attendance (Braun et al. 2002, Holloran et al. 2005, and Walker et al. 2007). These studies showed oil or gas development exceeding approximately 1 well pad per square mile, resulted in calculable impacts on breeding sage-grouse populations, as measured by the number of male

sage-grouse attending leks (State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development 2008). In the PRB, sage-grouse populations have declined 79% since Coal Bed Natural Gas development began (FWS 2010 p. 13944).

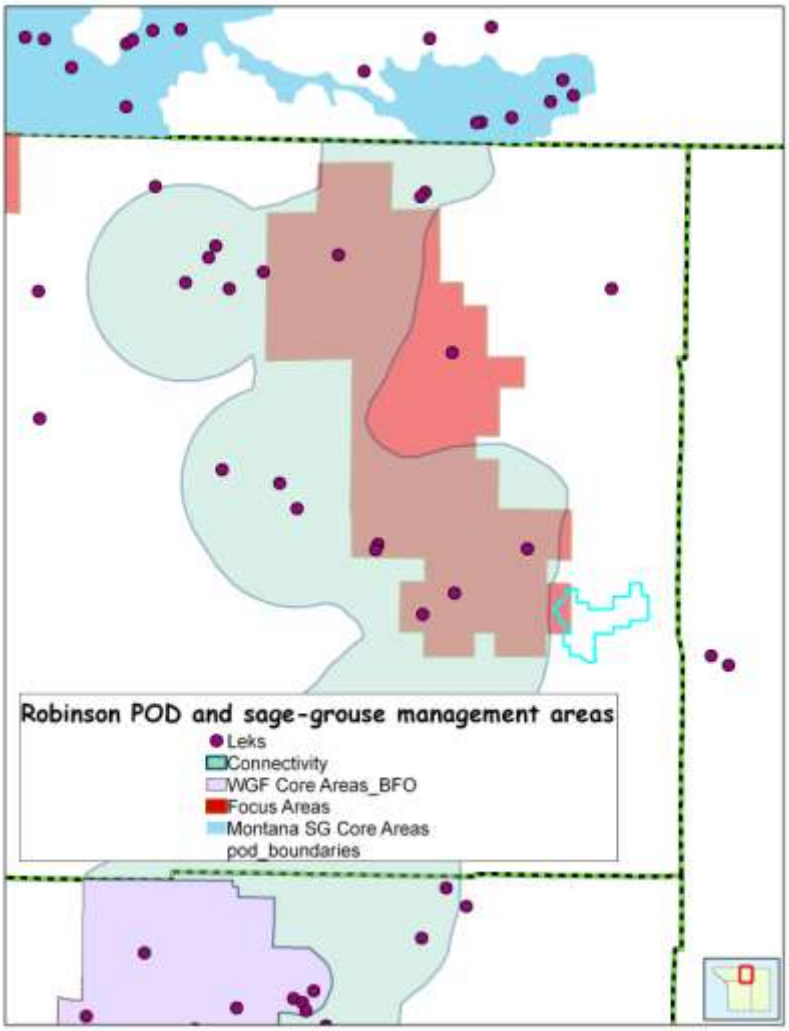
Declines in lek attendance associated with oil and gas development may be a result of a suite of factors; however, fragmentation of habitat is the predominant issue (FWS 2010). Wyoming adopted a "core area" habitat concept that protects the largest populations of sage-grouse (Mead 2011). The BLM adopted this concept and added "focus area" habitat in the PRB area to supplement the core concept. Sage-grouse core/focus areas assume those sufficient amounts of good quality sage-grouse habitat remain un-fragmented by energy or other man-made infrastructure. These basic concepts for management are based on the assumptions that sufficient "islands" of undisturbed (by human infrastructure) sage-grouse habitat would remain to sustain a large enough sage-grouse population for the long-term. Statewide core population areas are probably sufficient since they encompass approximately 70% of the sage-grouse population; however, in the PRB area the core population / focus areas capture approximately 25% of the PRB area's sage-grouse population. To address this inadequacy of core/focus areas in the PRB, the BLM, in coordination with the State of Wyoming, identified areas (between core areas in Wyoming and Montana) as "connectivity" habitat in an effort to maintain a viable greater sage-grouse population in the PRB area.

**Project Area**

The project area contains sage-grouse nesting, brooding and wintering habitat. Much of what was probably the best habitat in Sections 19, 25, 26, and 35 is now hayed grassland. East and south of the project area agricultural activities converted sagebrush to hayland and winter wheat. To the west of the project intact sage-grouse habitat exists in the focus and connectivity habitat areas west of the Powder River. Portions of the project area (Sections 22 and 27) met the criteria for inclusion as a focus habitat area for interim sage-grouse management while the BFO revised its RMP. BLM management goals for focus habitat areas are to work with the project proponent to develop projects that demonstrated no adverse impact to grouse populations in the focus habitat area. Focus habitat areas came before the State of Wyoming's Core Area Designations and will remain in place until completion of the BFO RMP Revision. Focus habitat area guidance is found at the BFO web page: (http://www.blm.gov/wy/st/en/field_offices/Buffalo/wildlife/sagegrouse.html).

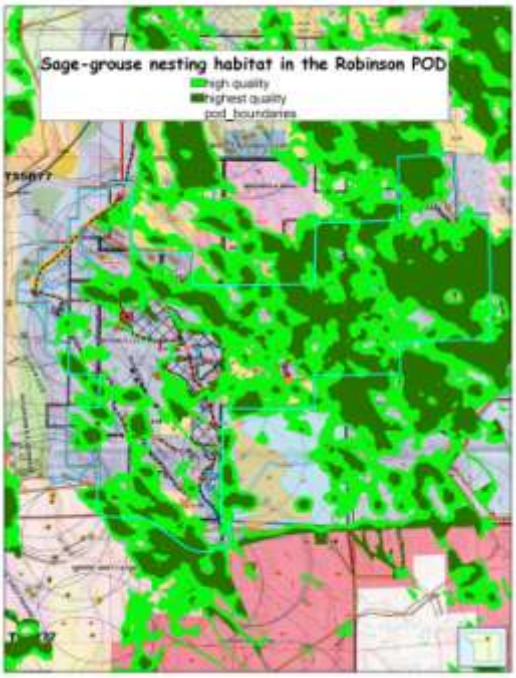
The portion of the project area identified as a focus habitat area (east of the Powder River) was not included as core or connectivity habitat area in 2010 when core areas were revised and connectivity designated.See Figure 3.3). Connectivity habitat was delineated in 2010, in response to the FWS listing decision as an attempt to provide gene flow between the core habitat areas in Wyoming and Montana. Figure 3.3 depicts the project area in relation to these various sage-grouse areas.

**Figure 3.3. Robinson Draw POD and Sage-grouse Focus, Core, and Connectivity Habitat Areas.**




BLM saw sage-grouse sign in Section 19 during the onsite. BLM observed sage-grouse habitat at these proposed well locations: 11-14, 1-19, 11-19, 15-19, 9-24, 7-25, 9-25, 1-26, 11-35, 13-35, 15-35. ICF reported (2009, 2010) seeing no sage-grouse in the POD. The ICF 2009 habitat report confirmed suitable sage-grouse modeled habitat in the center of Section 25, south half of Section 30, east half of Section 27. Modeled high quality nesting habitat is shown in Figure 3.4.

**Figure 3.4. Sage-grouse Nesting Habitat in the Robinson Draw POD area.**




Existing disturbances in the project area include numerous 2-track roads, fences, agricultural fields and a transmission line over the middle of Sections 25, and 26, and south half of Section 27. To the east of the project, extending approximately 6 miles, agricultural tillage dominates the landscape. To the west of the project area, across the Powder River, important sage-grouse connectivity habitat exists. The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008) recommends that BLM consider impacts for leks within 4 miles of oil and gas developments. WGFD records indicate that 3 sage-grouse leks occur within 4 miles of the project area. BLM identified these 3 lek sites in Table 3.4.

**Table 3.4. Sage-grouse Leks within 4 Miles of the Robinson Draw Project Area**

| # | Lek ID | Legal Location | Distance from project | Occupied | WGFD Impact Category* | Within WGFD Core Area |
|---|---|---|---|---|---|---|
| 1 | Barton North | SWSE Sec 34 T55N R76W | 3 miles | Yes | Low | No |
| 2 | Larey Draw | NENE Sec 2 T54N R76W | 3.8 miles | Yes | Extreme | No |
| 3 | Weller | NSW Sec 9 T55N R77W | 2.5 miles | Yes | Extreme | No, In Connectivity |

*In their Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats (2009), WGFD categorized impacts to sage-grouse by number of well pad locations per square mile within 2 miles of a lek and within identified nesting/brood-rearing habitats greater than 2 miles from a lek. Moderate impacts occur when well density is between 1 and 2 well pad locations per square mile or where there is less than 20 acres of disturbance per square mile. High impacts occur when well density is between 2 and 3 well pad locations per square mile or when there are between 20 and 60 acres of disturbance per square mile. Extreme impacts occur when well density exceeds 3 well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile.

### 3.7.3. BLM Sensitive Species

Wyoming BLM sensitive species are those which focus management efforts towards maintaining habitats under a multiple use mandate. The goals of the policy are:

- Maintaining vulnerable species and habitat components in functional BLM ecosystems
- Ensuring sensitive species are considered in land management decisions
- Preventing a need for species listing under the ESA
- Prioritizing needed conservation work with an emphasis on habitat

The authority for the sensitive species policy and guidance comes from the Endangered Species Act of 1973; Title II of the Sikes Act, FLPMA; the Department Manual 235.1.1A, and BLM policy. BLM Wyoming sensitive species impacted beyond the level analyzed in the PRB FEIS are below.

#### 3.7.3.1. Western yellow-billed cuckoo

The PRB FEIS addressed the Western yellow-billed cuckoo on p. 3-185. The Powder River cottonwood forest provides habitat. BLM and FWS biologists saw a pair on June 5, 2009 in the NENW of Section 27.

#### 3.7.3.2. Bald Eagle

The PRB FEIS discusses the affected environment for bald eagles on p. 3-175. The bald eagle was a threatened species under the ESA when the PRB FEIS was written. Recovery efforts allowed removal of the eagle from threatened status in 2007. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In order to avoid violation of these laws and uphold the BLM's commitment to avoid any future listing of this species, the BLM continues complying with all conservation measures and terms and conditions identified in the PRB ROD.

Bald eagle roosting and nesting habitat exists along the Powder River. BLM data shows a historic bald eagle nest approximately 6 miles to the west of the project. A communal roost was identified in Section 15 to the north west of the project with 9 bald eagles in 2004. The mapped location of the roost is probably inaccurate since the location is on the Lower Powder River Road. Most likely, this roost was in the large cottonwoods to the east of the road, approximately 0.5 miles from the 5-23 location. Single and paired bald eagles have been recorded roosting in the cottonwoods along the Powder River in the project area in 2005, 2006, 2009, 2010, and 2011. The prairie dog colonies in the eastern half of the project area most likely provide a food source for bald eagles. In addition coal bed produced water discharges upstream may be keeping the river ice-free for longer periods in the winter, increasing the availability of fish and waterfowl.

#### 3.7.3.3. Brewer's Sparrow

The PRB FEIS discusses the affected environment for Brewer's sparrow in the PRB FEIS on p. 3-200. Brewer's sparrow habitat exists and the species occurs in the project area.

#### 3.7.3.4. Loggerhead Shrike

The PRB FEIS discusses the affected environment for loggerhead shrike on p. 3-187. Loggerhead shrike habitat exists and they occur in the project area.

#### 3.7.3.5. Mountain Plover

The PRB FEIS discussed the affected environment for mountain plover on pp. 3-177 to 3-178. The FWS proposed the mountain plover as a threatened species under the ESA when the PRB FEIS was written. In 2003, USFWS withdrew the listing proposal. The species was again proposed in 2010 and found not warranted in 2011. ICF conducted protocol surveys for mountain plover in 2010 and 2011. None were found. Suitable habitat for mountain plover breeding exists in the project area in Section 36 on an active black-tailed prairie dog colony.

#### 3.7.3.6. Sage Thrasher

The PRB FEIS discusses the affected environment for sage thrasher on pp. 3-199 to 3-200. Sage thrasher habitat exists and the species occurs in the project area.

#### 3.7.3.7. Black-tailed Prairie Dogs

The FWS had the black-tailed prairie dog on the list of candidate species for federal listing in 2000 (FWS 2000). FWS removed it from the list in 2004. BLM Wyoming considers black-tailed prairie dogs a sensitive species and continue affording this species the protections described in the PRB ROD. Two prairie dog colonies occur in the Robinson Draw POD (ICF 2009).

**Table 3.5. Black-tailed Prairie Dog Colony Locations Robinson Draw.**

| Reference # | QQ | Section(s) | Twp N | Rng W | Size (in acres) | Status 2011 |
|---|---|---|---|---|---|---|
| 1 | SENE | 30 | 55 | 77 | 2 | Active |
| 2 | W1/2 | 36 | 55 | 77 | 180 | Active |

#### 3.7.3.8. Western Burrowing Owl

The PRB FEIS discusses the affected environment for western burrowing owl (burrowing owl) on p. 3-186. Burrowing owl habitat exists in the Robinson Draw project area (see Table 3.5 for locations of prairie dog colonies). One known burrowing owl BLM nest #8489 was active in 2009, 2010, and 2011 and is located 0.2 miles from an existing access road. A second nest (#11200, active 2010) is 0.4 miles from this road.

### 3.7.4. Big Game

WGFD data indicate that the entire Robinson Draw POD contains yearlong habitat for pronghorn antelope and winter-yearlong for mule deer. White-tailed deer yearlong range exists as a strip along the Powder River riparian forest. Winter-Yearlong use is when there is a significant winter influx of additional animals into the area from other seasonal ranges. Big game range maps are available in the PRB FEIS (pp. 3-119 to 3-143).

### 3.7.5. Upland Game Birds

#### 3.7.5.1. Plains Sharp-tailed Grouse

The PRB FEIS discusses the affected environment for plains sharp-tailed grouse on pp. 3-148 to 3-150. Sharp-tailed grouse inhabit short and mixed-grass prairie, sagebrush shrublands, woodland edges, and river canyons. Habitats in the Robinson Draw project have potential to support sharp-tailed grouse during most of the year. The mosaic pattern of grasslands and sagebrush-grassland could provide habitat from April through October, while some of the woody vegetation located tributaries to the Powder River have the potential to support sharp-tailed grouse throughout winter months. The recent WGFD records indicate the closest known sharp-tailed lek is 11 miles to the south-east.

### 3.7.6. Aquatic Species

The PRB FEIS discusses the Powder River ecosystem and fishery from p. 3-153 to 3-166. The U.S. Geological Survey (USGS) sampled northeast Wyoming perennial streams between 1980 and 1981 that generally supported invertebrate communities which included taxa adapted to flowing water. Ephemeral stream communities generally hosted taxa adapted to standing water (Peterson 1990).

Table 3.6 lists the fish found in the Upper Powder River sub-basin and their WGFD NSS designation, if applicable. WGFD identified SGCN in the state, all of which are given NSS designations. Seven of the species that may occur in the Upper Powder River sub-basin have designations as either NSS 1, 2, or 3 species. Species in these designations are species of concern, in need of more immediate management

attention, and more likely subject to future petitioning under the ESA. For these species WGFD recommends that no loss of habitat function occur. WGFD has no special concern for NSS 4-7 species.

**Table 3.6. Fish Occurring in the Upper Powder River Sub-basin**

| Wyoming Native Species Status | Species | Wyoming BLM Sensitive? |
|---|---|---|
| NSS1 | Sturgeon chub | No |
| NSS2 | Goldeye | No |
| | Sauger | No |
| NSS3 | Black bullhead | No |
| | Flathead chub | No |
| | Mountain sucker | No |
| | Plains minnow | No |
| NSS4 | Channel catfish | No |
| | Northern redhorse | No |
| | Quillback | No |
| | River carpsucker | No |
| | Stonecat | No |
| NSS6 | Fathead minnow | No |
| | Plains killifish | No |
| NSS7 | Longnose dace | No |
| | Sand shiner | No |
| | White sucker | No |
| None | Common carp | No |
| | Rock bass | No |
| | Shovelnose sturgeon | No |

Source: BLM 2010c.

Amphibian and reptile species (herpetiles) occur throughout the Basin. WGFD conducted a baseline inventory of herpetiles along the Powder River and its major tributaries from 2004-2006 (Turner 2007). WYNDD completed the first 2 years of a 3-year herpetile study in the PRB in order to detect impacts from CBNG development (Griscom et al. 2009, Estes-Zumph 2010). Herpetiles documented in the PRB, according to these studies are: northern leopard frog (BLM sensitive species), Columbia spotted frog (BLM sensitive species), boreal chorus frog, great plains toad, Woodhouse's toad, plains spadefoot toad, tiger salamander, northern prairie lizard, short-horned lizard, sagebrush lizard, eastern yellowbelly racer, prairie rattlesnake, western hog-nosed snake, bullsnake, terrestrial garter snake, plains garter snake, common garter snake, snapping turtle, painted turtle, and spiny softshell turtle.

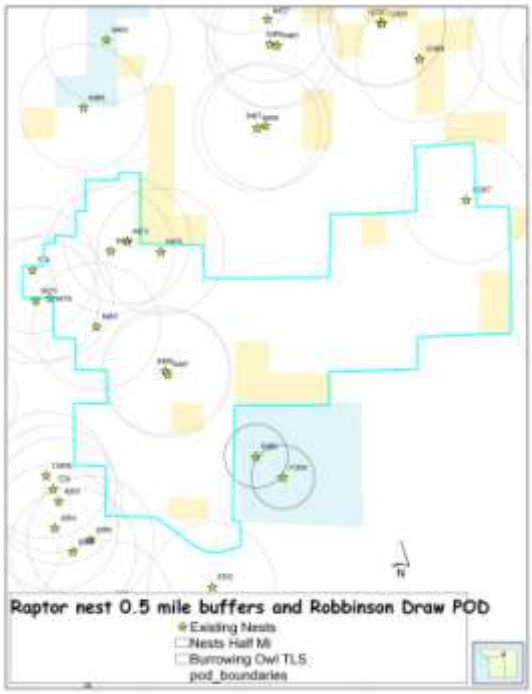
### 3.7.7. Migratory Birds

The PRB FEIS discusses the affected environment for migratory birds on pp. 3-150 to 3-153. The BLM-FWS MOU (2010) promotes the conservation of migratory birds, as directed in Executive Order 13186 (Federal Register V. 66, No. 11). BLM must include migratory birds in every NEPA analysis of actions that have potential to affect migratory bird species of concern to fulfill obligations under the MBTA. A wide variety of migratory birds may be found in the proposed project area at some time throughout the year. Many high management concern species use shrub-steppe and shortgrass prairie areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds declined more consistently than any other ecological association of birds over the last 30 years (WGFD 2009).

### 3.7.8. Raptors

The PRB FEIS discusses the affected environment for raptors on pp. 3-141 to 3-148. ICF biologists conducted ground surveys to monitor known raptor nests and to search for new nests on several dates throughout the peak raptor-breeding season in 2009, 2010 and 2011. Twenty one nests are within the one-half mile buffer of the Robinson Draw project of which 5 were active in 2011, Figure 3.5.

**Figure 3.5. Known Raptor Nests within the 0.5 mile Buffer of Robinson Draw POD**




### 3.7.9. 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 is now firmly established and spread across the United States. Birds are the natural vector host and serve not only to amplify the virus, but to spread it. Though less than 1% of mosquitoes are infected with WNv, they still are very effective in transmitting the virus to humans, horses, and wildlife. Culex tarsalis appears to be the most common mosquito to vector, WNv.

The human health issues related to WNv are well documented and appear to have leveled off. Historic data collected by the CDC and published by the USGS at www.westnilemaps.usgs.gov are summarized in Table 3.7. Reported data from the PRB includes Campbell, Sheridan and Johnson counties.

**Table 3.7. Historical West Nile Virus Information**

| Year | Total WY Human Cases | Human Cases PRB | Equine Cases PRB | Bird Cases PRB |
|---|---|---|---|---|
| 2001 | 0 | 0 | 0 | 0 |
| 2002 | 2 | 0 | 15 | 3 |
| 2003 | 392 | 85 | 46 | 25 |

| Year | Total WY Human Cases | Human Cases PRB | Equine Cases PRB | Bird Cases PRB |
|---|---|---|---|---|
| 2004 | 10 | 3 | 3 | 5 |
| 2005 | 12 | 4 | 6 | 3 |
| 2006 | 65 | 0 | 2 | 2 |
| 2007 | 155 | 22 | Unk | 1 |
| 2008 | 10 | 0 | 0 | 0 |
| 2009 | 10 | 1 | 1 | No record |
| 2010 | 6 | 0 | 0 | 0 |

Source: Wyoming Department of Health, http://diseasemaps.usgs.gov/wnv_wy_human.html

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 focused on human health issues, WNv had an impact on vertebrate wildlife populations. At a recent conference at the Smithsonian Environmental Research Center, scientists disclosed WNv was detected in 157 bird species, horses, 16 other mammals, and alligators (Marra et al 2003). In the eastern US, avian populations incurred very high mortality, particularly crows, jays and related species. Raptor species also appear to be highly susceptible to WNv.

Researchers documented that 36 raptors died from WNv in Wyoming in 2003. These included 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 PRB 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 PRB indicates WNv mosquito vectors were notably more abundant on a developed CBNG site than 2 similar undeveloped sites (Walker et al. 2003). Reducing the population of mosquitoes, especially species that are apparently involved with bird-to-bird transmission of WNv, such as Culex tarsalis, can help to reduce or eliminate the presence of virus in a given geographical area (APHIS 2002). The most important step any property owner can take to control such mosquito populations is to remove all potential man-made sources of standing water in which mosquitoes might breed (APHIS 2002).

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

### 3.8. Cultural Resources

Class III cultural resource inventory was performed for portions of the Robinson Draw POD prior to on-the-ground project work (BFO project no. 70100002). A class III cultural resource inventory following the Archeology and Historic Preservation, Secretary of the Interior's Standards and Guidelines (48CFR190) and the *Wyoming State Historic Preservation Office Format, Guidelines, and Standards for Class II and III Reports* was provided to BFO by SCE. Previously reviewed and accepted reports 70000057 and 70020091 covered the remainder of the project area. Seth Lambert, BLM Archaeologist, reviewed the reports for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The resources in Table 3.8 are in or near the project area.

**Table 3.8. Cultural Resources In or Near the Robinson Draw POD Area**

| Site Number | Site Type | National Register Eligibility |
|---|---|---|
| 48SH1016 | Historic | Not Eligible |
| 48SH1017 | Prehistoric | Not Eligible |
| 48SH1084 | Prehistoric | Not Eligible |
| 48SH1085 | Prehistoric | Not Eligible |
| 48SH1160 | Historic | Not Eligible |
| 48SH1161 | Prehistoric | Unevaluated |
| 48SH1162 | Prehistoric | Unevaluated |
| 48SH1172 | Historic | Not Eligible |
| 48SH1173 | Prehistoric | Not Eligible |
| 48SH1174 | Prehistoric | Unevaluated |
| 48SH1175 | Prehistoric | Unevaluated |
| 48SH1176 | Prehistoric | Unevaluated |
| 48SH1200 | Historic and Prehistoric | Eligible |
| 48SH1207 | Prehistoric | Not Eligible |
| 48SH1707 | Prehistoric | Not Eligible |
| 48SH1732 | Historic | Not Eligible |

Some of the project area analyzed in this EA occurs on alluvial and aeolian deposits. Such deposits typically have a high potential for buried cultural resources, which are nearly impossible to locate during a Class III inventory (Ebert & Kohler 1988:123; Eckerle 2005:43). Subsurface testing by a geoarchaeologist occurred in areas of proposed SDI (McFaul and Green 2011). The resulting analysis showed that much of the area contained potential for preserving intact buried cultural deposits.

## 4. ENVIRONMENTAL EFFECTS

This section describes the environmental effects of the proposed action, alternative B. The effects analysis addresses the direct and indirect effects of implementing the proposed action, the cumulative effects of the proposed action combined with reasonably foreseeable Federal and non-federal actions, identifies and analyzes mitigation measures (COAs), and discloses any residual effects remaining following mitigation.

### 4.1. Alternative A

The No Action Alternative was analyzed as Alternative 3 in the PRB FEIS, and is incorporated by reference into this EA in addition to the EAs in Table 2.1. Information specific to resources for this alternative is included in the PRB Final EIS on pages listed in Table 4.1.

**Table 4.1. Location of Discussion of the No Action Alternative in the PRB FEIS**

| Resource | | Type of Effect | Page(s) of PRB FEIS |
|---|---|---|---|
| Project Area Description | Geologic Features and Mineral Resources | Direct and Indirect Effects | 4-164 and 4-134 |
| | | Cumulative Effects | 4-164 and 4-134 |
| Soils, Vegetation, and Ecological Sites | Soils | Direct and Indirect Effects | 4-150 |
| | | Cumulative Effects | 4-152 |
| | Vegetation | Direct and Indirect Effects | 4-163 |
| | | Cumulative Effects | 4-164 |
| | Wetlands/Riparian | Direct and Indirect Effects | 4-178 |
| | | Cumulative Effects | 4-178 |
| Wildlife | Sensitive Species - Greater Sage-Grouse | Direct and Indirect Effects | 4-271 |
| | | Cumulative Effects | 4-271 |
| | Aquatic Species | Direct and Indirect Effects | 4-246 |
| | | Cumulative Effects | 4-249 |
| | Migratory Birds | Direct and Indirect Effects | 4-234 |
| | | Cumulative Effects | 4-235 |
| | Waterfowl | Direct and Indirect Effects | 4-230 |
| | | Cumulative Effects | 4-230 |
| | Big Game | Direct and Indirect Effects | 4-186 |
| | | Cumulative Effects | 4-211 |
| | Raptors | Direct and Indirect Effects | 4-224 |
| | | Cumulative Effects | 4-225 |
| Water | Ground Water | Direct and Indirect Effects | 4-63 |
| | | Cumulative Effects | 4-69 |
| | Surface Water | Direct and Indirect Effects | 4-77 |
| | | Cumulative Effects | 4-69 |
| Economics and Recovery of CBNG Resources | | Direct and Indirect Effects | 4-362 |
| | | Cumulative Effects | 4-370 |
| Cultural Resources | | Direct and Indirect Effects | 4-286 |
| Air Quality | | Direct and Indirect Effects | 4-386 |
| | | Cumulative Effects | 4-386 |
| Visual Resources | | Direct and Indirect Effects | 4-313 |
| | | Cumulative Effects | 4-314 |

### 4.2. Alternative B

#### 4.2.1. Air Quality

In the project area, air quality impacts would occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, as well as drilling rig and vehicle engine exhaust) and production (including non-CBNG well production equipment, booster and pipeline compression engine exhaust). The amount of air pollutant emissions during construction would be controlled by watering disturbed soils, and by air pollutant emission limitations imposed by applicable air quality regulatory agencies. Air quality impacts modeled in the PRB FEIS concluded that projected oil & gas development would not violate any local, state, tribal or federal air quality standards.

### 4.2.2. Soils & Vegetation

#### 4.2.2.1. Soils

##### 4.2.2.1.1. Direct and Indirect Effects

The impacts listed below, singly or in combination, would increase the potential for valuable soil loss, invasive plant establishment, and increased sedimentation and salt loads to the watershed system. The effects to soils resulting from well pad, access roads and pipeline construction include:

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

Direct effects (removal and/or compaction) to vegetation would occur from ground disturbance caused by drilling rig equipment and construction of a compressor station, associated pipelines, and roads. Short term effects would occur where vegetated areas are disturbed but later reclaimed within 1 to 3 years of the initial disturbance. Long-term effects would occur where well pads, compressor stations, roads, water-handling facilities or other semi-permanent facilities may result in loss of vegetation and affect reclamation success for the life of the project.

##### 4.2.2.2. Reclamation Potential

Table 4.2. lists wells that have been identified to have poor reclamation potential. Infrastructure associated with each specific well also has been categorized as having poor reclamation potential.

**Table 4.2.**

| Well Number | Township | Range | Section | QTR/QTR |
|---|---|---|---|---|
| 07-19 | 0550N | 0760W | 19 | SWNE |
| 09-19 | 0550N | 0760W | 19 | NESE |
| 01-19 | 0550N | 0760W | 19 | NENE |
| 11-19 | 0550N | 0760W | 19 | NESW |
| 13-19 | 0550N | 0760W | 19 | SWSW |
| 13-23 | 0550N | 0770W | 23 | SWSW |
| 07-25 | 0550N | 0770W | 25 | SWNE |
| 13-25 | 0550N | 0770W | 25 | SWSW |
| 15-25 | 0550N | 0770W | 25 | SWSE |
| 03-26 | 0550N | 0770W | 26 | NENW |
| 13-26 | 0550N | 0770W | 26 | SWSW |
| 15-26 | 0550N | 0770W | 26 | SWSE |
| 01-34 | 0550N | 0770W | 34 | NENE |

| Well Number | Township | Range | Section | QTR/QTR |
|---|---|---|---|---|
| 09-35 | 0550N | 0770W | 35 | NESE |
| 07-35 | 0550N | 0770W | 35 | SWNE |
| 03-35 | 0550N | 0770W | 35 | NENW |

#### 4.2.2.2.1. Cumulative Effects

The designation of the duration of disturbance is defined in the PRB FEIS, p 4-1 and 4-151. Most soil disturbances would be short term impacts with expedient interim reclamation and site stabilization, as committed to by the operator in their POD Surface Use Plan and as required by the BLM in COAs.

Geomorphic effects of roads and other surface disturbance range from chronic and long-term contributions of sediment into waters of the state to catastrophic effects associated with mass failures of road fill material during large storms. Roads can affect geomorphic processes primarily by: accelerating erosion from the road surface and prism itself through mass failures and surface erosion processes; directly affecting stream channel structure and geometry; altering surface flow paths, leading to diversion or extension of channels onto previously unchannelized portions of the landscape; and causing interactions among water, sediment, and debris at road-stream crossings.

#### 4.2.2.2.2. Mitigation Measures

The proponent planned their project to maximize the fluid mineral drainage while avoiding areas with soil limitation where possible. The proponent also designed the infrastructure such that 2 out of 36 wells will require a constructed pad and no engineered roads will be required. BLM made further recommendations during the onsite to avoid areas with low reclamation potential and poor site suitability. Disturbances approved in these areas require complimenting the programmatic/standard COAs with site specific performance based reclamation related COAs. The following mitigation will be applied through a COA:

- Impacts to soils and vegetation from surface disturbance will be reduced by following the BLM applied mitigation. The planned wells are located in manners negating a need for constructed pads. Access roads are planned such that no engineered roads are required. The operator committed to minimizing disturbance widths for roads and pipeline corridors; and maintaining 20 foot vegetative buffers near drainages.
- The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-90-231), Appendix B of this EA. The Wyoming Reclamation Policy applies to all surface disturbing activities. Authorizations for surface disturbing actions are based upon the assumptions that an area can and ultimately will be successfully reclaimed. BLM reclamation goals emphasize eventual ecosystem reconstruction, which means returning the land to a condition approximate to an approved "Reference Site" or NRCS Ecological Site Transition State. Final reclamation measures are used to achieve this goal. BLM reclamation goals also include the short-term goal of quickly stabilizing disturbed areas to protect both disturbed and adjacent undisturbed areas from unnecessary degradation. Interim reclamation measures are used to achieve this short-term goal. Stabilization efforts shall be finished within 30 days of the initiation of construction activities for wells (and associated infrastructure) identified in Table 4.2
- Compaction would be remediated by plowing or ripping.
- All engineered road segments will be completed, including any culverts, low water crossings and required surfacing, before the drilling rig or other drilling equipment moves onto the pad.

#### 4.2.2.2.3. Residual Effects

Erosion will occur in the POD area due to the presence of highly erosive soils and the topography. Rilling and gullying of cut and fill slopes on, access/utility corridors, will take place. Impacts from livestock to stabilized cut and fill slopes will limit soils becoming stable and getting vegetation establish. Residual

effects were also identified in the PRB FEIS, p. 4-408, such as the loss of vegetative cover, despite expedient reclamation, for several years until reclamation is successfully established.

### 4.2.3. Wetland/Riparian

#### 4.2.3.1. Direct and Indirect Effects

Potential re-surfacing water from the impoundments will possibly allow for wetland-riparian species establishment in previously dry, ephemeral drainages that exist below the proposed reservoir locations. Continuous increased stream flows into the Powder River wetlands and riparian areas from directly discharged CBNG waters would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges.

Vegetation in riparian areas, such as cottonwood trees, that cannot tolerate year-round inundated root zones would die and would not be replaced. Other plant species in riparian areas and wetland edges that favor inundated root zones would flourish, thus changing the plant community composition and the associated animal species. A rise in the shallow ground groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas." (PRB FEIS, p. 4-175). The NWI identifies one small (0.8 acre) wetland in NWSE of Section 26 which is downgradient of the SDI fields and crop pivots. To monitor groundwater impacted by the SDI, the WDEQ required the Operator to install a groundwater monitoring wells below the SDI fields.

#### 4.2.3.2. 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 POD 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, p. 4-151).

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

#### 4.2.3.3. Mitigation Measures

Mitigation measures are listed in the Standard Conditions of Approval (Appendix A).

#### 4.2.3.4. Residual Effects

Long term residual effects would be the establishment of wetland/riparian habitat in drainages that once were only ephemeral but are now perennial due to construction of impoundments and increased soil moisture in low lying areas within the POD boundary.

### 4.2.4. Invasive Species

#### 4.2.4.1. Direct and Indirect Effects

The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread.

#### 4.2.4.2. Cumulative Effects

Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar and Canada thistle.

#### 4.2.4.3. Mitigation Measures

The operator committed to the control of noxious weeds and species of concern using the following measures identified in their integrated pest management plan (IPMP):

1. Control Methods include physical, biological, and chemical methods:
   Physical methods include mowing during the first season of establishment, prior to seed formation, and hand pulling of weeds (for small or new infestations). Biological methods include the use of domestic animals, or approved biological agents. Chemical methods include the use of herbicides, done in accordance with the existing surface use agreement with the private surface owner.
2. Preventive practices:
   Certified weed-free seed mixtures will be used for re-seeding, and vehicles and equipment will be washed before leaving areas of known noxious weed infestations.
3. Education:
   The company will provide periodic weed education and awareness programs for its employees and contractors through the county weed districts and federal agencies. Field employees and contractors will be notified of known noxious weeds or weeds of concern in the project area.

#### 4.2.4.4. Residual Effects

Control efforts by the operator are limited to the surface disturbance associated the implementation of the project. Cheat grass and other invasive species that are present within non-physically disturbed areas of the project area are anticipated to continue to spread unless control efforts are expanded. Cheatgrass and to a lesser extent, Japanese brome (*B. japonicus*) are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time; these annual bromes would continue to be found within the project area.

### 4.2.5. Water Resources

The operator submitted a WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates water management practices, monitoring of downstream impacts in the Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Hydrologists, contracted by the operator, developed the water management plan that proposes to manage produced water through the use of 5 strategies. What strategy is used is dependent upon permitting from the WDEQ, landowner agreements yet to be finalized, and costs to the operator to implement the selected strategy. Depending upon the outcome of those factors, the operator stated they may elect to use one or a combination of all 5 water management and disposal strategies. Adherence to the WMP, the WDEQ permitted discharge methods and limits, and the BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies.

BLM analyzes the 5 proposed water management strategies, below.

1. SCE proposes full containment of the produced water through the use of 5 on-channel reservoirs, and 2 off-channel pits. Table 2.4, above, shows the location and size of the impoundments.

2. Full containment of the produced water with permitted seasonal discharges to the Powder River by using Assimilative Capacity credits from the WDEQ. SCE proposes discharging water from the Robinson Reservoir through a buried pipe, along a utility corridor on the west ridgeline of the

Robinson Draw drainage, down to an outfall and weir in the NWNE Section 27, T55N R77W. The stock and weir collection point will then re-pipe the discharge water westerly to the Powder River.

3. Treating the water through the Exterran Higgins Loop™ Continuous Counter Current Ion Exchange (IX) (Exterran), treatment plant and discharging the treated water to the Powder River via a buried pipeline down to an outfall and weir in the NWNE Section 27, T55N R77W. The outfall and weir collection point will then re-pipe the discharge water westerly to the Powder River.

4. Discharge of the produced water through Sub-surface drip irrigation (SDI). WDO Systems of Powell, WY will design the SDI system that will be permitted with the Wyoming DEQ as a Class 5 underground injection facility. The SDI system is being designed to discharge approximately 600 GPM in 14 fields (grouped into 4 areas) in an upland area of the Powder River. The produced water will be injected into the Powder River shallow alluvium and colluviums at the locations shown on Map C of the WMP, Map H-1 in Appendix H of the WMP, and as described in Table 2.4 above.

5. Discharge of CBNG produced water via surface irrigation from a center pivot irrigation system. SCE proposed 5 center pivot locations on the PK Ranch property to assist the rancher in producing hay/alfalfa for his cattle. Three of the pivot fields are in the right bank upland of the Robinson Draw drainage and the remaining 2 pivot fields are on the right bank flood plain of the Powder River. The 3 upland pivots in Robinson Draw are in the same approximate location as the proposed SDI fields in Sections 26 and 35, T55N R77W. The 2 remaining pivot fields along the right bank flood plain of the Powder River are in Sections 14 and 22, T55N R77W.

As stated earlier, the type of water discharge and management systems that will be used in this POD are dependent upon pending WDEQ permitting, soil analysis, and landowner agreements. Locations for the water management systems proposed are described in Table 2.4, above.

The maximum water production for the Robinson Draw POD is predicted to be 30 gpm per well, or 1080 gpm for the POD as approved under this alternative (2.4 cubic feet per second (cfs) or 1,742 acre-feet per year). 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, p. 2-26), for the Upper Powder River drainage, the volume projected to be produced in the watershed in 2011 was 44,169 acre-feet (maximum production was estimated to be 171,423 acre-feet in 2006). As such, the volume of water from these wells is 3.9% of the total volume projected for 2011. This volume of produced water is within the predicted parameters of the PRB FEIS.

#### 4.2.5.1. Groundwater

##### 4.2.5.1.1. Direct and Indirect Effects

If SCE uses only the SDI or pivot irrigation water management methodology for the Robinson Draw POD, 100% of the produced water applied to the fields will infiltrate at or near the irrigation sites as WDEQ permits require the applied water stay on the fields with no runoff allowed. SCE estimated in their WMP that the maximum volume of water produced from the 36 wells will be 1080 gpm (1,742 acre-feet/yr).

According to Wyoming State Water Law (W.S. 41-3-101) the water extracted in the production of CBNG is the waters of the state; BLM policy 1982 directs the BLM's cooperation and full compliance with State water laws. Subsurface Drip Irrigation (SDI) is permitted and regulated by WDEQ through the Underground Injection control (UIC) program, requiring a WDEQ 5C5 UIC permit. The BLM is responsible for analyzing the proposed action with available data provided in the WMP for the POD and disclose potential impacts of the proposed action. Responsibility, liability, monitoring, mitigation measures and reclamation should be addressed in the surface use agreement (SUA).

SDI systems are designed to utilize cations present in the soils to mitigate the impact of the quality of CBNG water on soils. The irrigation quality of the CBNG "produced water" and the variability of soils and the range in characteristics (RIC) of their physical and chemical properties within the project area, have the potential to cause long term soil impacts.

Literature review of soils and soil primary soil characterization lab data collected by the NRCS indicates a wide variability of the soils and their properties within the Powder River Basin. The variability of soils identified within the project area are included in Table 3.1. Variability or RIC of soil features and properties of the identified soils include:

- soil depth
- available water holding capacity
- saturated hydraulic conductivity
- amount, depth to base and the mineralogy of clays present
- highly variable chemical properties found in alluvial and colluvial soils within the Powder River Basin.

CBNG "produced water" has a moderate to high salinity hazard and often has a very high sodium hazard based on standards used for irrigation suitability. The sodium hazard of CBNG "produced water" may affect the soil resource. Sodic irrigation water causes dispersion of clays and clogging of soil pores thereby impairing soil hydraulic conductivity, affecting water availability and reducing soil aeration, all of which are important to long term soil health and productivity. Elevated sodium concentrations can harm some plants due to direct toxicity as they are taken up by the root cells. Sodium can also indirectly affect crop growth by causing calcium, potassium, and magnesium deficiencies.

With time, salts from CBNG water can accumulate in the root zone in concentrations that will affect plant growth and water utilization. Semi arid and arid climates create the potential for upward movement of salts into the root zone. Proper plant selection for deep rooted salt tolerance is important. Germination of these plant species may require special management practices to prevent negative impacts to soils.

With yearlong water disposal at volumes above the desirable leaching fraction, there is a potential for impacted water to affect shallow aquifers. The characteristics of the water impacting shallow ground water maybe very difficult to predict and model, from our previous experience there is a potential for migration of low quality water to impact the subsurface environment.

Sites should be closely monitored to assure long term soil health and productivity is maintained. Specific soil chemical and physical property action levels should be established to ensure that the soil is not measurably impacted and that remedial actions can be implemented before soil damage occurs. These thresholds should be based on soil type, vegetation, water quality, soil and/or water amendments used, potential land use, beneficial use goals and landowner requests. Monitoring of the SDI site should include an evaluation of soil chemical and physical properties, runoff and erosion, water quantity and quality, and vegetative performance

The long term impacts and mitigation success are unknown at this time. Impacts are subjective and not well defined and long term effects will depend on the success of applied soil amendments and intense monitoring, management and immediate site mitigation. Reclamation and mitigation practices maybe difficult to achieve and are expensive and are the sole responsibility of the operator, contractor and landowner.

If water is discharged to the Powder River directly through the WDEQ Assimilative Capacity credit program and/or after treatment from the Exterran system, then the infiltration will occur after mixing with

the larger volume of water in the river channel. The amount of water discharged will be regulated by the WDEQ permits based on water quality parameters meeting the Assimilative Capacity limits.

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS, Table 4-1, p. 4-5). The produced 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, p. 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the possible environmental consequences of CBNG production is 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, p. 4-1). In the process of dewatering the coal zones to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The permitted water wells within 1 mile of the POD boundary as identified by the Operator in Table A2 of their WMP, shows the wells drilled to depths ranging from 110 to 1,000 feet. The Operator has estimated CBNG well depths of 2007-2284 feet to reach the producing zones of the Smith, Anderson, Canyon Cook, Wall and Pawnee coals. The operator committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (0.5 mile of a federal CBNG producing well) of the proposed wells.

Recovery of the coal bed aquifer was predicted in the PRB FEIS to ". . . resaturate and repressurize the areas that were partially depressurized during operations. The amount of groundwater stored within the Wasatch - Tongue River sand and coals, and sands units above and below the coals is almost 750 million acre-feet of recoverable groundwater are (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, p. 4-38).

#### 4.2.5.1.2. 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, p. 4-64).

Development of CBNG through 2018 (and coal mining through 2033) would remove 4 million acre-feet of groundwater from the coal zone aquifer (PRB FEIS, p. 4-65). This volume of water "…cumulatively represents 0.5 percent of the recoverable groundwater stored in the Wasatch – Tongue River sands and coals (nearly 750 million acre-feet, from Table 3-5). All of the groundwater projected to be removed during reasonably foreseeable CBNG development and coal mining would represent less than 0.3 percent of the total recoverable groundwater in the Wasatch and Fort Union Formations within the PRB (nearly 1.4 billion acre-feet, from Table 3-5)." (PRB FEIS, p. 4-65).

#### 4.2.5.1.3. Mitigation Measures

Adherence to the drilling COAs, the setting of casing at appropriate depths, following safe remedial procedures in the event of casing failure, and utilizing proper cementing procedures should protect any 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.

The WDEQ has authority over groundwater impacts in Wyoming, and therefore has a detailed monitoring program in their WYPDES and UIC permits for the water management systems. Monitoring well and discharge pipe sampling criteria and schedules outlined in the permits will allow Wyoming DEQ to identify adverse impacts to waters of the state and to take appropriate mitigation actions.

#### 4.2.5.1.4. Residual Effects

As described in Chapter 3.4.1, the production of CBNG in this project area already reduced the saturation level in some of the coal zones targeted for CBNG production. As predicted in the PRB-FEIS, these saturation levels are predicted to recover over time.

### 4.2.5.2. Surface Water

#### 4.2.5.2.1. Direct and Indirect Effects

Produced Water Quality and Quantity

Table 4.3 shows the average values of EC and SAR as measured at selected USGS gauging stations at high and low monthly flows, as well as the Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water (there is no current standard for EC). Many of the limits established by the project WYPDES permits are variable according to time of year, and are dependent on other parameters. It also shows concentrations found in the POD's representative water sample.

**Table 4.3. Comparison of Regulated Water Quality Parameters to Predicted Water Quality**

| Sample location or Standard | TDS mg/l | SAR | EC µmhos/cm |
|---|---|---|---|
| Upper Powder River at Arvada, WY gaging station (06317000) | | | |
| Historic Data Average at Maximum Flow | | 4.76 | 1,797 |
| Historic Data Average at Minimum Flow | | 7.83 | 3,400 |
| WDEQ Quality Standards for Wyoming Groundwater (Chapter 8) | | | |
| Drinking Water (Class I) | 500 | | |
| Agricultural Use (Class II) | 2,000 | 8 | |
| Livestock Use (Class III) | 5,000 | | |
| Predicted Produced Water Quality from the Smith, Anderson, Canyon, Cook, Wall, and/or Pawnee Coal Zones (Co-mingled) | 1,850 | 43.4 | 2,900 |

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the PRB is the irrigation of crops (PRB FEIS, p. 4-69). The quality for the water produced from the target coal zone wells is predicted to be similar to the sample water quality collected from a location near the POD. The water quality projected for this POD is 1850 mg/l TDS which is within the WDEQ criteria for agricultural use (2000 mg/l TDS).

Alternative (2A), the approved alternative in the PRB ROD, states that the peak production of water discharged to the surface will occur in 2006 with a total contribution to the Upper Powder River of 68 cfs (PRB FEIS, p. 4-90). The Robinson Draw POD estimated maximum water production is approximately only 3.5% of that 2006 peak production estimate. A maximum of 30 gallons per minute (gpm) is projected is to be produced from these 35 wells, for a total of 1080 gpm, (1.6 MGD, 2.4 cfs), for the POD. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-8 (PRB-FEIS, p. 4-89).

The operator applied to the WDEQ for a WYPDES permit to use 3 reservoirs (Robinson, Robinson East, and Robinson West) to contain 0.33 MGD of discharged CBNG produced water. The WDEQ will regulate the quality of the water discharged into the reservoirs.

The operator applied to the WDEQ for a WYPDES permit to use 2 off channel pits (Pit 1-30 55-76 & Pit 9-26 55-77) to contain 0.186 MGD of discharged CBNG produced water. The WDEQ will regulate the quality of the water discharged into the reservoirs.

The operator is applying to the WDEQ for a WYPDES permit to use 2 on-channel reservoirs (Cross H West and Hull #9) to contain discharged CBNG produced water. The WDEQ will regulate the quality of the water discharged into the reservoirs.

SCE applied to the WDEQ for a WYPDES permit to use Assimilative Capacity credits to directly discharge 0.042 MGD of CBNG produced water to the Powder River. The permit application provided in the WMP also lists the Exterran water treatment system as a potential pre-treatment of the water prior to discharge into the Powder River. The WDEQ will regulate the quality of the water discharged.

SCE is applying for a Class 5 Underground Injection Control Permit from the WDEQ for the injection of produced water in the SDI system. The WDEQ will regulate the quality of the water discharged. SCE stated it will install 5 shallow groundwater monitoring wells around the SDI fields to monitor water quality if or when water is encountered at these locations. SCE estimated that they will discharge 1.5 feet (253 acre –feet) water of over the center pivot ground area through the months of April – September.

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 committed to designate a reference well to each coal zone in the POD boundary. The reference well will be sampled at the wellhead for analysis within 60 days of initial production. A copy of the water analysis will be submitted to the BLM Authorized Officer. For more information, please refer to the WMP included in this POD.

The WDEQ WYPDES and UIC permits require the operator monitor the water quality released through the discharge points and SDI fields. WDEQ enforces compliance with the permit and administers fines for non-compliance up to and including shut in of wells until compliance with the WYPDES permits can be demonstrated by the operator.

The interactions between the Pivot and or SDI irrigation systems with the Powder River are addressed in the WDEQ permits and will be regulated by WDEQ. Monitoring wells installed as part of the permits will provide information that will allow the WDEQ to determine the effects of the water management systems on the Powder River.

Springs
The development of CBNG and the production and discharge of water in the area surrounding any natural springs may affect the flow rate or water quality of the spring.

#### 4.2.5.2.2. Cumulative Effects

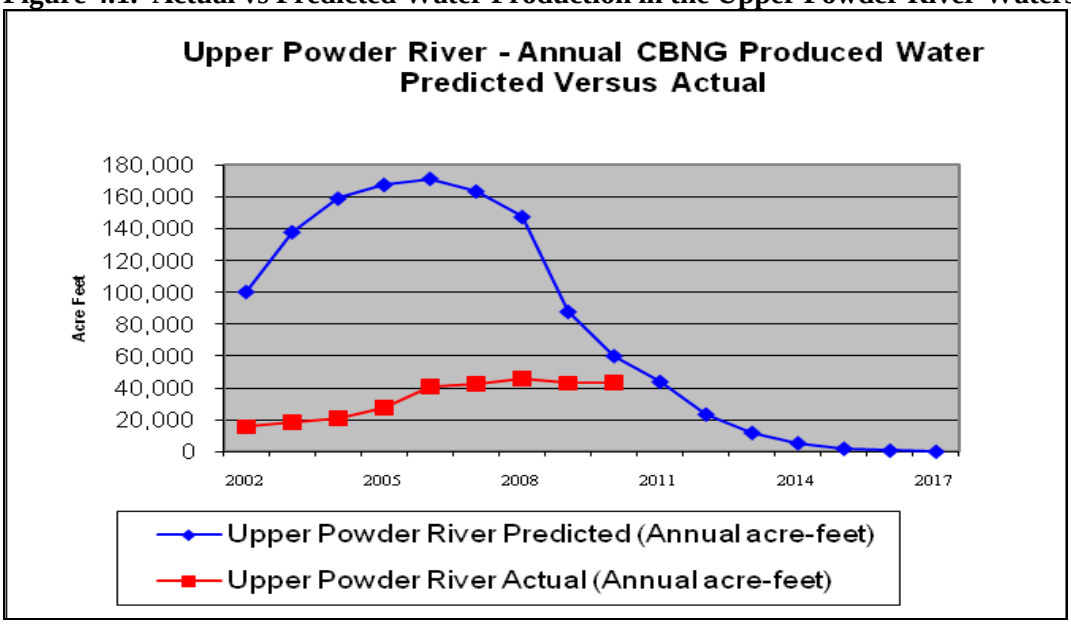
The analysis in this section includes cumulative data from fee, state and federal CBNG development in the Upper Powder River watershed. BLM obtained these data from the WOGCC.

As of December 2010, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 298,864 acre-ft of water compared to the predicted 1,195,886 acre-ft disclosed in the PRB FEIS (Table 2-8, p. 2-26). These figures are presented graphically in Figure 4.1 and Table 4.4 following. This volume is 25% of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

**Table 4.4. Actual vs predicted water production in the Upper Powder River watershed**
2010 Data Update 04-06-11

| Year | Upper Powder River Predicted (Annual acre-feet) | Upper Powder River Predicted (Cumulative acre-feet from 2002) | Upper Powder River Actual (Annual acre-feet) | | Upper Powder River Actual (Cumulative acre-feet from 2002) | |
|---|---|---|---|---|---|---|
| | | | A-ft | % of Predicted | A-Ft | % of Predicted |
| **2002** | 100,512 | 100,512 | 15,846 | 15.8 | 15,846 | 15.8 |
| **2003** | 137,942 | 238,454 | 18,578 | 13.5 | 34,424 | 14.4 |
| **2004** | 159,034 | 397,488 | 20,991 | 13.2 | 55,414 | 13.9 |
| **2005** | 167,608 | 565,096 | 27,640 | 16.5 | 83,054 | 14.7 |
| **2006** | 171,423 | 736,519 | 40,930 | 23.9 | 123,984 | 16.8 |
| **2007** | 163,521 | 900,040 | 42,112 | 25.8 | 166,096 | 18.5 |
| **2008** | 147,481 | 1,047,521 | 45,936 | 31.1 | 212,522 | 20.3 |
| **2009** | 88,046 | 1,135,567 | 43,079 | 48.9 | 255,601 | 22.5 |
| **2010** | 60,319 | 1,195,886 | 43,263 | 71.7 | 298,864 | 25.0 |
| **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** | | **298,864** | | | |

**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. 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 in each of the 10 primary watersheds in the PRB. These predictions of EC and SAR can only be re-evaluated when additional water quality sampling is available.

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 25% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to manage the produced water within the applicable federal, state, and local laws.

Refer to the PRB FEIS, Volume 2, pp. 4-115 – 117 and Table 4-13 for cumulative effects relative to the watershed and p. 4- 117 for cumulative effects common to all sub-watersheds.

##### 4.2.5.2.3. Mitigation Measures

Channel crossings by roads 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. Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom. The operator will monitor the discharge water's quality and quantity to meet WYPDES permit(s) criteria.

##### 4.2.5.2.4. Residual Effects

"Streams enhanced by large volumes of CBM produced water may begin to establish meander patterns on longer wavelengths in response to increased flows. Stream drainages would readjust to their existing natural flows at the end of the project's life. Downcutting (stream erosion) and sediment deposition (aggradation) are natural processes that occur as stream drainages age through time. Downcutting occurs within the upper reaches of a drainage system as the stream channel becomes incised through erosion, until the slope of the stream and its velocity are reduced and further erosion is limited. Sediment is deposited within the lower, slower reaches of a stream.

Surface drainages could be degraded from erosion caused by increased surface flow, unless rates of CBM discharge and outfall locations are carefully controlled. Increased flows could cause downcutting in fluvial environments, resulting in increased channel capacity over time within the upper and middle reaches of surface drainages." (PRB FEIS, p. 4-118).

## 4.3. Wildlife (Fish and Wildlife) (Alternative B – Environmentally Preferred)

### 4.3.1. Wildlife Threatened, Endangered, Proposed and Candidate Species

| Common Name (scientific name) | Habitat | Presence | Project Effects | Rationale |
|---|---|---|---|---|
| *Threatened* | | | | |
| Ute ladies'-tresses orchid (*Spiranthes diluvialis*) | Riparian areas with permanent water | NP | NE | Limited poor habitat present. Negative surveys. |

| Common Name (scientific name) | Habitat | Presence | Project Effects | Rationale |
|---|---|---|---|---|
| *Candidate* | | | | |
| Greater sage-grouse (*Centrocercus urophasianus*) | Basin-prairie shrub, mountain-foothill shrub | K | MIIH | Sagebrush cover will be affected. Human presence and traffic will increase. Overhead power will be present. |

**Presence : K -** Known, documented observation within project area. **NP -** Habitat not present and species unlikely to occur within the project area.
**Project Effects: NE** - No Effect.
**Effects Determination for Candidate, Petitioned and Sensitive Species: MIIH** -The project may impact individuals or habitat, but will not likely contribute to a trend toward federal listing or loss of viability to the population or species.

#### 4.3.1.1. Ute Ladies'-Tresses Orchid

##### 4.3.1.1.1. Direct and Indirect Effects

The PRB FEIS addressed impacts to Ute ladies'-tresses (ULT) on pp. 4-253 to 4-254. The proposed project is more than 40 miles from known populations. The survey observed no flowers during the flowering period. Implementation of the proposed CBNG project will have "***no effect***" on ULT individuals or habitat.

##### 4.3.1.1.2. Cumulative Effects

Cummulatve Impacts to Ute ladies'-tresses are addressed in the PRBFEIS on p. 4-273.

##### 4.3.1.1.3. Mitigation Measures

None.

##### 4.3.1.1.4. Residual Effects

None.

### 4.3.2. Candidate Species

#### 4.3.2.1. Greater Sage-grouse

##### 4.3.2.1.1. Direct and Indirect Effects

The PRB FEIS addressed impacts to greater sage-grouse on pp. 4-257 to 4-271.
The proposed action will impact sage-grouse habitat, and may affect individuals. Suitable habitat in the project area, described in Section 3, will be directly and effectively lost to grouse for the duration of construction, and most likely operations, of the project. Based on the wildlife surveys from ICF and the onsite investigation, there is a small probability that many sage-grouse currently use the project area.

The operator proposes to discharge water onto the surface in the form of ponds, as well as subsurface drip irrigation, that will create habitat for (*Culex tarsalis*), the mosquito vector for West Nile Virus. West Nile Virus kills greater sage-grouse and was documented as the cause of population declines in the Spotted Horse area of Campbell County in 2007 (Walker 2003, Walker et al 2007 Knick et al 2011 chapter 9) .

##### 4.3.2.1.2. Cumulative Effects

The PRB FEIS (BLM 2003) states that "the synergistic effect of several impacts would likely result in a downward trend for the sage-grouse population, and may contribute to the array of cumulative effects that may lead to its federal listing. Local populations may be extirpated in areas of concentrated development, but viability across the Project Area [PRB] or the entire range of the species is not likely to be

compromised (p. 4-270)." Based on the impacts described in the PRB FEIS and the findings of more recent research, the proposed action may contribute to a decline in male attendance at the three leks that occur within four miles of the project area.

Declines in lek attendance associated with oil and gas development may be a result of a suite of factors including avoidance (Holloran et al. 2005, Holloran et al. 2007, Aldridge and Boyce 2007, Walker et al. 2007, Doherty et al. 2008, WGFD 2009), loss and fragmentation of habitat (Connelly et al. 2000, Braun et al. 2002, Connelly et al. 2004, WGFD 2004a, Rowland et al. 2005, WGFD 2005, Naugle et al. in press), reductions in habitat quality (Braun et al. 2002, WGFD 2003, Connelly et al. 2004, Holloran et al. 2005) and changes in disease mechanisms (Naugle et al. 2004, WGFD 2004b, Walker et al. 2007, Cornish pers. comm.). The current well density within 4 miles of the three known sage-grouse leks potentially affected by the project is 4.3 wells/square mile. When proposed wells () are added to the existing wells within 4 miles of the leks, the well density increases to 4.7 wells per square mile.

#### 4.3.2.1.3. Mitigation Measures

Project Area:
A condition of approval restricting surface disturbance during the breeding and nesting season will be applied to high quality nesting habitat within the POD. This will affect the majority of the POD as seen in Figure 3-6 (Section 3 of this EA).

Several guidance documents are available that recommend practices that would reduce impacts of development on greater sage-grouse. These include Northeast Wyoming Sage-Grouse Conservation Plan (Northeast Wyoming Sage-grouse Working Group 2006), Sage-Grouse Habitat Management Guidelines for Wyoming (Bohne et al. 2007), Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats (WGFD 2009), Bureau of Land Management National Sage-Grouse Habitat Conservation Strategy (USDI 2004), and Greater Sage-Grouse Comprehensive Conservation Strategy (Stiver et al. 2006).

Focus Area:
Sections 22 and 27 are in a BLM sage-grouse focus habitat area. To meet focus habitat area guidance, the project proponent modified the project to remove the EMIT facility and well 1-27 from the focus area and move well 9-27 within the focus habitat area to avoid impacts to habitat. These project adjustments, in addition to BLM COAs, will effectively conserve sage-grouse populations in the focus area.

A COA will be included to treat all project discharge water that has the potential to breed *Culex tarsalis* with an appropriate larvicide.

Appropriate and timely reclamation will minimize the length of time that the project area is unsuitable sage-grouse habitat.

#### 4.3.2.1.4. Residual Effects

As discussed in Section 3 sage-grouse are suffering a downward trend, in part due to energy development, to which this project is expected to contribute despite SCE's and BLM's efforts to minimize impacts.

A timing limitation does nothing to mitigate loss and fragmentation of habitat and changes in disease mechanisms. Rather than limiting mitigation to only timing restrictions, more effective mitigation strategies may include, at a minimum, burying power lines (Connelly et al. 2000b; PRB ROD, A.5.9.3.); minimizing road and well pad construction, vehicle traffic, and industrial noise (Lyon and Anderson 2003, Holloran 2005); and managing produced water to prevent the spread of mosquitoes with the potential to vector West Nile Virus in sage grouse habitat (Walker et al 2007). Walker et al. (2007)

recommend maintaining extensive stands of sagebrush habitat over large areas (at least 1 mile in size) around leks to ensure sage-grouse persistence.

### 4.3.3. BLM-Sensitive Species

#### 4.3.3.1. Bald Eagle

##### 4.3.3.1.1. Direct and Indirect Effects

The PRB FEIS addressed impacts to bald eagle on p. 4-250 to 4-253. Suitable bald eagle habitat is present along the Powder River with documented winter use, but no nesting. Construction and maintenance activities may disrupt nesting and roosting behaviors.

##### 4.3.3.1.2. Cumulative Effects

The PRB FEIS discusses cumulative effects to bald eagle are on p. 4-273.

##### 4.3.3.1.3. Mitigation Measures.

Nesting surveys will identify nests. If a nest is found, surface disturbance will be prohibited for the breeding season (Feb. 1- Aug. 15). Roost surveys will identify roosts. If a roost is found, surface disturbance will be prohibited for the roositng season (Nov. 1 – April 1).

##### 4.3.3.1.4. Residual Effects

None.

#### 4.3.3.2. Mountain Plover

##### 4.3.3.2.1. Direct and Indirect Effects

The PRB FEIS addressed impacts to mountain plover on p. 4-254 - 255. Suitable mountain plover habitat is present near the project area, particularly in the prairie dog colony in Section 36. No plover have been found with 2 survey years, and the suitable habitat is approximately 0.25 miles east of the project. The project is “not likely to jeopardize the continued existence of the mountain plover”.

##### 4.3.3.2.2. Cumulative Effects

The PRB FEIS discusses impacts to mountain plover are on p. 4-254.

##### 4.3.3.2.3. Mitigation Measures

Timing restrictions in place for raptors and sage-grouse will also protect nesting mountain plover where they overlap.

##### 4.3.3.2.4. Residual Effects

None.

#### 4.3.3.3. Western Yellow-Billed Cuckoo

##### 4.3.3.3.1. Direct and Indirect Effects

The PRB FEIS addressed impacts to western yellow-billed cuckoo on p. 4-263 (Table 4-57). Nesting and foraging habitat along the Powder River may be rendered less effective by project construction.

##### 4.3.3.3.2. Cumulative Effects

Non-federal CBNG development has much higher potential to impact cuckoos than federal development due to the prevalence of fee mineral ownership along waterways. Non-federal development does not require timing restrictions for raptors, which incidentally protect cuckoo, thereby exposing cuckoo to construction impacts.

#### 4.3.3.3.3. Mitigation Measures

Raptor timing limitations will effectively prevent construction activities during the cuckoo breeding and nesting season.

#### 4.3.3.3.4. Residual Effects

Where no raptor timing limitations occur along the Powder River, cuckoos could be disturbed and reproductive success compromised.

### 4.3.3.4. Brewer's Sparrow, Loggerhead Shrike, Sage Thrasher

Direct and Indirect Effects

The PRB FEIS addressed impacts to these species on pp. 4-263 and 4-264 (Table 4-57). Nesting and foraging habitat within the project area may be removed or rendered less effective by project construction.

#### 4.3.3.4.1. Cumulative Effects

No cumulative impacts exceeding those addressed in the PRB FEIS are anticipated (PRB FEIS pp. 4-257 to 4-273).

#### 4.3.3.4.2. Mitigation Measures

Raptor and sage-grouse timing restrictions will effectively prevent construction activities during the breeding and nesting season.

#### 4.3.3.4.3. Residual Effects

Operation and maintenance of the project wells, and associated increased human activity, may impact reproductive success.

### 4.3.3.5. Western Burrowing Owl

#### 4.3.3.5.1. Direct and Indirect Effects

Impacts to burrowing owls are discussed in the PRB FEIS, p. 4-263. Nesting habitat, in Section 36 adjacent to the project area, may be indirectly impacted by the operations and maintenance of project elements.

#### 4.3.3.5.2. Cumulative Effects

Practices such as poisoning or shooting of prairie dogs or other intentional methods of extermination can affect burrowing owl productivity through a reduction in nest site availability.

#### 4.3.3.5.3. Mitigation Measures

Timing restrictions will effectively prevent construction activities during the burrowing owl breeding and nesting season.

#### 4.3.3.5.4. Residual Effects

None identified.

### 4.3.3.6. Sharp-tailed grouse

#### 4.3.3.6.1. Direct and Indirect Effects

The PRB FEIS discussed impacts to sharp-tailed grouse pp. to 4-221-223. . No additional impacts are anticipated with approval of the project.

#### 4.3.3.6.2. Cumulative Effects

The PRB FEIS discussed impacts to sharp-tailed grouse on p. 4-225. No additional cumulative impacts are anticipated with approval of the project.

#### 4.3.3.6.3. Mitigation Measures

Raptor and sage-grouse timing restrictions will provide some relief to sharp-tailed grouse.

#### 4.3.3.6.4. Residual Impacts

None identified.

### 4.3.4. Big Game

#### 4.3.4.1. Direct and Indirect Effects

The PRB FEIS discussed impacts to big game on pp. 4-181 to 4-215. Impacts to mule deer may occur through alterations in hunting and/or poaching, increased vehicle collisions, harassment and displacement, increased noise, increased dust, alterations in nutritional status and reproductive success, increased fragmentation, loss or degradation of habitats, reduction in habitat effectiveness, and declines in populations.

#### 4.3.4.2. Cumulative Effects

The PRB FEIS discussed impacts to big game on p. 4-211. No additional cumulative impacts are anticipated with approval of the project.

#### 4.3.4.3. Mitigation Measures

Raptor and sage-grouse timing restrictions will provide some relief to big game during birthing season. Winter bald eagle restrictions, if eagles are present during the roost surveys and restrictions are implemented will provide some relief to big game during winter months.

#### 4.3.4.4. Residual Impacts

Due to the increased human activity associated with the project, big game numbers in the project area are expected to decline.

### 4.3.5. Migratory Birds

#### 4.3.5.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect effects to migratory birds (pp. 4-231 to 4-235). More recent research suggests that impacts will occur. Ingelfinger (2004) identified that the density of some breeding bird species declined within 100 m of dirt roads in a natural gas field. In the study, the density of Brewer's sparrows declined by 36%, and the density of breeding sage sparrows declined by 57%. Effects occurred along roads with light traffic volume (greater than12 vehicles per day). The increasing density of roads constructed in developing natural gas fields exacerbated the problem creating substantial areas of impact where indirect habitat losses through displacement were much greater than the direct physical habitat losses. Migratory bird species in the PRB nest in the spring and early summer and are vulnerable to the same effects as sage-grouse and raptor species.

#### 4.3.5.2. Cumulative Effects

The cumulative effects to migratory birds are described in the PRB FEIS, p. 4-235.

#### 4.3.5.3. Mitigation Measures

No timing restrictions are typically applied specifically to protect migratory bird breeding or nesting. Sage-grouse and raptor nesting timing limitations will protect some nesting migratory birds.

#### 4.3.5.4. Residual Effects

Nests with eggs or dependent young may be lost after July 1, when sage-grouse protections lift, and where no protections for raptors are in place.

### 4.3.6. Raptors

#### 4.3.6.1. Direct and Indirect Effects

The PRB FEIS discussed direct and indirect effects to raptors (pp. 4-216 to 4-221). Human activities in close proximity to active raptor nests may interfere with nest productivity. Romin and Muck (1999) indicate that activities within 0.5 miles of a nest are prone to cause adverse impacts to nesting raptors. If mineral activities occur during nesting, they could be sufficient to cause adult birds to remain away from the nest and their chicks for the duration of the activities. This absence can lead to overheating or chilling of eggs or chicks. Prolonged disturbance can also lead to the abandonment of the nest by the adults. Both actions can result in egg or chick mortality. In addition, routine human activities near these nests can draw increased predator activity to the area and increase nest predation.

The golden eagle nest BLM #8475 has not been active for the last 3 years and is not considered active. The nest is 0.22 miles and in line of sight of the 15-23 well. The FWS recommended the well be moved at least 0.5 miles from the nest (see project file for FWS communication). The topographic, and lease, limitations made moving this well impractical. The Buffalo RMP does not provide protections to inactive nests, with inactivity defined as three years without nesting activity. If eagles choose to nest here again, then operations and maintenance of the 15-23 well location has a very high probability of causing abandonment.

#### 4.3.6.2. Cumulative Effects

The cumulative effects on raptors are described in the PRB FEIS, p. 4-221.

#### 4.3.6.3. Mitigation Measures

To reduce the risk of decreased productivity or nest failure, the BLM BFO requires a 0.5 mile radius timing limitation during the breeding season around active raptor nests. The operator moved the 11-26 well and access to protect the nesting pair of red-tail hawks using nest #8487. In addition, the operator removed the access road to well 13-23 that went past nest #8474.

#### 4.3.6.4. Residual Effects

Even with the operator proposed mitigation and a timing limitation on surface disturbance, raptors may abandon nests due to human activity associated with operations and maintenance, alteration in foraging habitats associated with development, or because of sensitivity to well or infrastructure placement. Declines in breeding populations of some species that are more sensitive to human activities, such as golden eagle, may occur.

The BFO RMP decision considering a nest inactive after 3 years of inactivity may not be sufficient protection for certain species that use a number of nests within a territory, such as ferruginous hawks or golden eagles.

### 4.3.7. Aquatics

Direct and Indirect Impacts

This project will result in produced water entering the Powder River and potentially impacting aquatic resources. The USGS, as part of the Powder River Basin Interagency Working Group's Aquatic Task Group has collected, analyzed and published water quality, algae and macro-invertebrate data from the Powder River 2005-2008 (Peterson et al 2008). Their findings indicate that CBNG discharged water is not having an acute or dramatic impact on aquatic resources

#### 4.3.7.1. Cumulative Effects

The Peterson et al 2010 report and more recent, unpublished data indicate changes to the algal and macroinvertebrate communities in the middle section of the Powder River between Willow and Crazy

Woman Creeks. Continued monitoring above and below CBNG discharges will assist in identifying the cause of these changes, which may or may not be due to CBNG development.

#### 4.3.7.2. Mitigation Measures

The operator removed their proposal to directly discharge into Robinson and Cross H Draws, which will reduce the potential for high SAR water entering the Powder River.

#### 4.3.7.3. Residual Effects

None identified.

### 4.3.8. West Nile Virus

#### 4.3.8.1. Direct and Indirect Impacts

This project will result in standing surface water which may potentially increase mosquito breeding habitat. Reservoir construction techniques, such as using steep banks, will minimize mosquito habitat.

#### 4.3.8.2. Cumulative Effects

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 precipitation, livestock watering facilities, coal mining operations, and outdoor water use and features in and around communities.

#### 4.3.8.3. Mitigation Measures

The operator removed their proposal to directly discharge into Robinson and Cross H Draws, which will reduce the potential for creation of mosquito habitat.

A COA will be included to treat all project discharge water that has the potential to breed *Culex tarsalis* with an appropriate larvicide.

#### 4.3.8.4. Residual Effects

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

### 4.3.9. Cultural Resources

#### 4.3.9.1. Direct and Indirect Effects

Non eligible site(s) 48SH1172 and 48SH1732 will be impacted by the proposed project. Non-contributing portions of Eligible site 48SH1200 will be physically impacted. The proposed project will not diminish any aspects of integrity of the historic property. Following the Wyoming State Protocol Sections VI(A)(1) and VI(B)(1) the BLM determined that the project will result in “No Adverse Effect” and electronically notified the Wyoming State Historic Preservation Officer (SHPO) in September of 2011. If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS And ROD)] 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).

#### 4.3.9.2. Cumulative Effects

Construction and development of oil and gas resources impacts cultural resources through ground disturbance, unauthorized collection, and visual intrusion of the setting of historic properties. This results in fewer archaeological resources available for study of past human life-ways, changes in human behavior through time, and interpreting the past to the public. Additionally, these impacts may compromise the

aspects of integrity that make a historic property eligible for the National Register of Historic Places. Recording and archiving basic information about archaeological sites and the potential for subsurface cultural materials in the proposed project area serve to partially mitigate potential cumulative effects to cultural resources.

Fee actions constructed in support of federal actions can result in impacts to historic properties. Construction of large plans of coalbed natural gas development on split estate often include associated infrastructure that is not permitted through BLM. Project applicants may connect wells draining fee minerals, or previously constructed pipelines on fee surface with a federal plan of development. BLM has no authority over such development which can impact historic properties. BLM has the authority to modify or deny approval of federal undertakings on private surface, but that authority is limited to the extent of the federal approval. Historic properties on private surface belong to the surface owner and they are not obligated to preserve or protect them. The BLM may go to great lengths to protect a site on private surface from a federal undertaking, but the same site can be legally impacted by the landowner at any time. The cumulative effect of numerous federal approvals can result in impacts to historic properties. Archeological inventories reveal the location of sites and although the BLM goes to great lengths to protect site location data, information can potentially get into the wrong hands. BLM authorizations that result in new access can inadvertently lead to impacts to sites from increased visitation by the public.

#### 4.3.9.3. Mitigation Measures

If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS and ROD)] 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).

When a project is constructed in an area with a high potential for buried cultural material, archaeological monitoring is often included as a condition of approval. Due to the presence of alluvial and/or aeolian deposits identified by the geoarchaeological analysis (McFaul and Green 2011), the operator will be required to have an archeologist monitor all earth moving activities associated with construction of the SDI fields. Such monitoring is performed by a qualified archeologist working in unison with construction crews. If buried cultural resources are located by the archeologist, construction is halted while BLM consults with the SHPO to determine if the resource is significant, and over any potential mitigation or avoidance. All surface disturbing activity associated with SDI installation (with the exception of tape installation) will be monitored by an archeologist.

#### 4.3.9.4. Residual Effects

During the construction phase, there will be numerous crews working across the project area using heavy construction equipment without the presence of archaeological monitors. Due to the extent of work and the surface disturbance caused by large vehicles, it is possible that unidentified cultural resources can be damaged by construction activities. The increased human presence associated with the construction phase can also lead to unauthorized collection of artifacts or vandalism of historic properties.

## 5. CONSULTATION/COORDINATION:

| Contact | Title | Organization | Phone Number | Present at Onsite? |
|---|---|---|---|---|
| Mary Hopkins | SHPO | WY SHPO | (307) 777-6311 | No |
| | | | | |
| | | | | |
| | | | | |

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## Appendix A: RECLAMATION REQUIREMENTS, WY BLM

*The following Reclamation Requirements apply to all surface disturbing activities, including BLM initiated activities, and must be addressed in each reclamation plan. These requirements also must be met prior to release of the bond and/or the reclamation liability. Where these Reclamation Requirements differ from other applicable federal, laws, rules, and regulations, those requirements supersede this policy. State and/or local statutes or regulations may also apply.*

1. **Manage all waste materials:**
   a. Segregate, treat, and/or bio-remediate contaminated soil material.
   b. Bury only authorized waste materials on site. Buried material must be covered with a minimum of three feet of suitable material or meet other program standards.
   c. Ensure all waste materials moved off-site are transported to an authorized disposal facility.

2. **Ensure subsurface integrity, and eliminate sources of ground and surface water contamination.**
   a. Properly plug all drill holes and other subsurface openings (mine shafts, adits etc.).
   b. Stabilize, properly back fill, cap, and/or restrict from entry all open shafts, underground workings, and other openings.
   c. Control sources of contamination and implement best management practices to protect surface and ground water quality.

3. **Re-establish slope stability, surface stability, and desired topographic diversity.**
   a. Reconstruct the landscape to the approximate original contour or consistent with the land use plan.
   b. Maximize geomorphic stability and topographic diversity of the reclaimed topography.
   c. Eliminate highwalls, cut slopes, and/or topographic depressions on site, unless otherwise approved.
   d. Minimize sheet and rill erosion on/or adjacent to the reclaimed area. There shall be no evidence of mass wasting, head cutting, large rills or gullies, down cutting in drainages, or overall slope instability on/or adjacent to the reclaimed area.

4. **Reconstruct and stabilize water courses and drainage features.**
   a. Reconstruct drainage basins and reclaim impoundments to maintain the drainage pattern, profile, and dimension to approximate the natural features found in nearby naturally functioning basins.
   b. Reconstruct and stabilize stream channels, drainages, and impoundments to exhibit similar hydrologic characteristics found in stable naturally functioning systems.

5. **Maintain the biological, chemical, and physical integrity of** the **topsoil and subsoil** (where appropriate).
   a. Identify, delineate, and segregate all salvaged topsoil and subsoil based on a site specific soil evaluation, including depth, chemical, and physical characteristics.
   b. Protect all stored soil material from erosion, degradation, and contamination.
   c. Incorporate stored soil material into the disturbed landscape.
   d. Seed soils to be stored beyond one growing season, with desired vegetation.
   e. Identify stockpiles with appropriate signage.

6. **Prepare site for revegetation.**
   a. Redistribute soil materials in a manner similar to the original vertical profile.
   b. Reduce compaction to an appropriate depth (generally below the root zone) prior to redistribution of topsoil, to accommodate desired plant species.

c. Provide suitable surface and subsurface physical, chemical, and biological properties to support the long term establishment and viability of the desired plant community.
d. Protect seed and seedling establishment (e.g. erosion control matting, mulching, hydro-seeding, surface roughening, fencing, etc.)

7. **Establish a desired self-perpetuating native plant community.**
   a. Establish species composition, diversity, structure, and total ground cover appropriate for the desired plant community.
   b. Enhance critical resource values (e.g. wildlife, range, recreation, etc.), where appropriate, by augmenting plant community composition, diversity, and/or structure.
   c. Select genetically appropriate and locally adapted native plant materials based on the site characteristics and ecological setting.
   d. Select non-native plants only as an approved short term and non-persistent alternative to native plant materials. Ensure the non-natives will not hybridize, displace, or offer long-term competition to the endemic plants, and are designed to aid in the re-establishment of native plant communities.

8. **Reestablish complementary visual composition**
   a. Ensure the reclaimed landscape features blend into the adjacent area and conform to the land use plan decisions.
   b. Ensure the reclaimed landscape does not result in a long term change to the scenic quality of the area.

9. **Manage Invasive Plants**
   a. Assess for invasive plants before initiating surface disturbing activities.
   b. Develop an invasive plant management plan.
   c. Control invasive plants utilizing an integrated pest management approach.
   d. Monitor invasive plant treatments.

10. **Develop and implement a reclamation monitoring and reporting strategy.**
   a. Conduct compliance and effectiveness monitoring in accordance with a BLM (or other surface management agency) approved monitoring protocol.
   b. Evaluate monitoring data for compliance with the reclamation plan.
   c. Document and report monitoring data and recommend revised reclamation strategies.
   d. Implement revised reclamation strategies as needed.
   e. Repeat the process of monitoring, evaluating, documenting/reporting, and implementing, until reclamation goals are achieved.