DECISION RECORD
FOR
Lance Oil & Gas Company Inc.
Williams Draw Unit Gamma & Willams Draw Unit Delta PODs
ENVIRONMENTAL ASSESSMENT –WY-070-08-042

DECISION: BLM's decision is to approve Lance Oil & Gas Company, Inc.'s Williams Draw Unit Gamma and Williams Draw Unit Delta POD's as described in Alternatives C. Alternative C is the Modified Proposed Action, and is the result of collaboration between the Bureau of Land Management and Lance Oil & Gas Company.

I find this action will not result in significant impacts on the human environment pursuant to Title 40 Code of Federal Regulations 1508.27 (a) and (b) (1) through (10) and that an Environmental Impact Statement is not required.

The details of this approval are summarized below. For a complete description of the project, including specific changes made at the onsites, and site-specific mitigation measures, see the attached EA, pp 5-28.

The following 98 Applications for Permit to Drill (APDs) **and associated infrastructure are authorized:**

	Well Name	Well #	QTR	SEC	TWP	RNG	Lease
1	WDU DELTA WILLIAMS DU	44-7	SESE	7	50N	76W	WYW042305
2	WDU DELTA WILLIAMS DU	14-8	SWSW	8	50N	76W	WYW042305
3	WDU DELTA WILLIAMS DU	44-8	SESE	8	50N	76W	WYW042305
4	WDU DELTA WILLIAMS DU	11-17	NWNW	17	50N	76W	WYW042305
5	WDU DELTA WILLIAMS DU	41-17	NENE	17	50N	76W	WYW042305
6	WDU DELTA WILLIAMS DU	43-17	NESE	17	50N	76W	WYW042305
7	WDU DELTA WILLIAMS DU	31-17	NWNE	17	50N	76W	WYW042305
8	WDU DELTA WILLIAMS DU	23-18	NESW	18	50N	76W	WYW042305
9	WDU DELTA WILLIAMS DU	24-18	SESW	18	50N	76W	WYW042305
10	WDU DELTA WILLIAMS DU	32-18	SWNE	18	50N	76W	WYW042305
11	WDU DELTA WILLIAMS DU	14-18	SWSW	18	50N	76W	WYW145600
12	WDU DELTA WILLIAMS DU	14-19	SWSW	19	50N	76W	WYW146291
13	WDU DELTA WILLIAMS DU	21-19	NENW	19	50N	76W	WYW145600
14	WDU DELTA WILLIAMS DU	22-19	SENW	19	50N	76W	WYW145600
15	WDU DELTA WILLIAMS DU	23-19	NESW	19	50N	76W	WYW145600
16	WDU DELTA WILLIAMS DU	43-19	NESE	19	50N	76W	WYW145600
17	WDU DELTA WILLIAMS DU	14-20	SWSW	20	50N	76W	WYW139683
18	WDU DELTA WILLIAMS DU	34-20	SWSE	20	50N	76W	WYW130624
19	WDU DELTA WILLIAMS DU	14-29	SWSW	29	50N	76W	WYW139683
20	WDU DELTA WILLIAMS DU	21-29	NENW	29	50N	76W	WYW139683
21	WDU DELTA WILLIAMS DU	23-29	NESW	29	50N	76W	WYW139683
22	WDU DELTA WILLIAMS DU	32-29	SWNE	29	50N	76W	WYW130624
23	WDU DELTA WILLIAMS DU	43-29	NESE	29	50N	76W	WYW154407
24	WDU DELTA WILLIAMS DU	44-29	SESE	29	50N	76W	WYW154407

	Well Name	Well #	QTR	SEC	TWP	RNG	Lease
25	WDU DELTA WILLIAMS DU	13-29	NWSW	29	50N	76W	WYW139683
26	WDU DELTA WILLIAMS DU	12-30	SWNW	30	50N	76W	WYW145601
27	WDU DELTA WILLIAMS DU	21-30	NENW	30	50N	76W	WYW145601
28	WDU DELTA WILLIAMS DU	33-30	NWSE	30	50N	76W	WYW145601
29	WDU DELTA WILLIAMS DU	43-30	NESE	30	50N	76W	WYW145601
30	WDU DELTA WILLIAMS DU	13-30	NWSW	30	50N	76W	WYW145602
31	WDU DELTA WILLIAMS DU	34-30	SWSE	30	50N	76W	WYW145601
32	WDU DELTA WILLIAMS DU	12-31	SWNW	31	50N	76W	WYW130625
33	WDU DELTA WILLIAMS DU	22-31	SENW	31	50N	76W	WYW130625
34	WDU DELTA WILLIAMS DU	23-31	NESW	31	50N	76W	WYW130625
35	WDU DELTA WILLIAMS DU	33-31	NWSE	31	50N	76W	WYW130625
36	WDU DELTA WILLIAMS DU	41-31	NENE	31	50N	76W	WYW130625
37	WDU DELTA WILLIAMS DU	43-31	NESE	31	50N	76W	WYW130625
38	WDU DELTA WILLIAMS DU	21-31	NENW	31	50N	76W	WYW130625
39	WDU DELTA WILLIAMS DU	12-32	SWNW	32	50N	76W	WYW146291
40	WDU DELTA WILLIAMS DU	14-32	SWSW	32	50N	76W	WYW138137
41	WDU DELTA WILLIAMS DU	23-32	NESW	32	50N	76W	WYW138137
42	WDU DELTA WILLIAMS DU	31-32	NWNE	32	50N	76W	WYW138137
43	WDU DELTA WILLIAMS DU	33-32	NWSE	32	50N	76W	WYW138137
44	WDU DELTA WILLIAMS DU	41-32	NENE	32	50N	76W	WYW138137
45	WDU DELTA WILLIAMS DU	43-32	NESE	32	50N	76W	WYW146291
46	WDU DELTA WILLIAMS DU	44-32	SESE	32	50N	76W	WYW146291
47	WDU DELTA WILLIAMS DU	32-12	SWNE	12	50N	77W	WYW133630
48	WDU DELTA WILLIAMS DU	43-12	NESE	12	50N	77W	WYW133630
49	WDU DELTA WILLIAMS DU	33-12	NWSE	12	50N	77W	WYW133630
50	WDU DELTA WILLIAMS DU	41-12	NENE	12	50N	77W	WYW138447
51	WDU DELTA WILLIAMS DU	11-13	NWNW	13	50N	77W	WYW135629
52	WDU DELTA WILLIAMS DU	13-13	NWSW	13	50N	77W	WYW147347
53	WDU DELTA WILLIAMS DU	14-13	SWSW	13	50N	77W	WYW147347
54	WDU DELTA WILLIAMS DU	43-13	NESE	13	50N	77W	WYW133630
55	WDU DELTA WILLIAMS DU	24-34	SESW	34	50N	77W	WYW130639
56	WDU DELTA WILLIAMS DU	32-34	SWNE	34	50N	77W	WYW136688
57	WDU DELTA WILLIAMS DU	34-34	SWSE	34	50N	77W	WYW130639
58	WDU DELTA WILLIAMS DU	43-34	NESE	34	50N	77W	WYW130639
59	WDU DELTA WILLIAMS DU	33-34	NWSE	34	50N	77W	WYW130639
60	WDU DELTA WILLIAMS DU	23-35	NESW	35	50N	77W	WYW130639
61	WDU DELTA WILLIAMS DU	33-35	NWSE	35	50N	77W	WYW130639
62	WDU DELTA WILLIAMS DU	44-35	SESE	35	50N	77W	WYW130639
63	WDU DELTA WILLIAMS DU	24-35	SESW	35	50N	77W	WYW130639
64	WDU GAMMA WILLIAMS DU	11-5	NWNW	5	49N	76W	WYW144539

	Well Name	Well #	QTR	SEC	TWP	RNG	Lease
65	WDU GAMMA WILLIAMS DU	32-5	SWNE	5	49N	76W	WYW144539
66	WDU GAMMA WILLIAMS DU	34-5	SWSE	5	49N	76W	WYW147332
67	WDU GAMMA WILLIAMS DU	41-5	NENE	5	49N	76W	WYW144539
68	WDU GAMMA WILLIAMS DU	11-6	NWNW	6	49N	76W	WYW147332
69	WDU GAMMA WILLIAMS DU	12-6	SWNW	6	49N	76W	WYW147332
70	WDU GAMMA WILLIAMS DU	32-6	SWNE	6	49N	76W	WYW144539
71	WDU GAMMA WILLIAMS DU	41-6	NENE	6	49N	76W	WYW144539
72	WDU GAMMA WILLIAMS DU	13-6	NWSW	6	49N	76W	WYW147332
73	WDU GAMMA WILLIAMS DU	22-6	SENW	6	49N	76W	WYW147332
74	WDU GAMMA WILLIAMS DU	33-6	NWSE	6	49N	76W	WYW147332
75	WDU GAMMA WILLIAMS DU	14-8	SWSW	8	49N	76W	WYW160792
76	WDU GAMMA WILLIAMS DU	23-8	NESW	8	49N	76W	WYW160792
77	WDU GAMMA WILLIAMS DU	34-8	SWSE	8	49N	76W	WYW160792
78	WDU GAMMA WILLIAMS DU	12-8	SWNW	8	49N	76W	WYW160792
79	WDU GAMMA WILLIAMS DU	12-17	SWNW	17	49N	76W	WYW134233
80	WDU GAMMA WILLIAMS DU	41-1	NENE	1	49N	77W	WYW136688
81	WDU GAMMA WILLIAMS DU	33-1	NWSE	1	49N	77W	WYW136688
82	WDU GAMMA WILLIAMS DU	43-1	NESE	1	49N	77W	WYW136688
83	WDU GAMMA WILLIAMS DU	32-1	SWNE	1	49N	77W	WYW136688
84	WDU GAMMA WILLIAMS DU	11-2	NWNW	2	49N	77W	WYW136688
85	WDU GAMMA WILLIAMS DU	14-2	SWSW	2	49N	77W	WYW136688
86	WDU GAMMA WILLIAMS DU	23-2	NESW	2	49N	77W	WYW136688
87	WDU GAMMA WILLIAMS DU	34-2	SWSE	2	49N	77W	WYW136688
88	WDU GAMMA WILLIAMS DU	12-3	SWNW	3	49N	77W	WYW136688
89	WDU GAMMA WILLIAMS DU	13-3	NWSW	3	49N	77W	WYW136688
90	WDU GAMMA WILLIAMS DU	22-3	SENW	3	49N	77W	WYW136688
91	WDU GAMMA WILLIAMS DU	31-3	NWNE	3	49N	77W	WYW136688
92	WDU GAMMA WILLIAMS DU	43-3	NESE	3	49N	77W	WYW136688
93	WDU GAMMA WILLIAMS DU	44-3	SESE	3	49N	77W	WYW136688
94	WDU GAMMA WILLIAMS DU	21-3	NENW	3	49N	77W	WYW136688
95	WDU GAMMA WILLIAMS DU	41-24	NENE	24	50N	77W	WYW133630
96	WDU GAMMA WILLIAMS DU	42-24	SENE	24	50N	77W	WYW130640
97	WDU GAMMA WILLIAMS DU	32-25	SWNE	25	50N	77W	WYW130625
98	WDU GAMMA WILLIAMS DU	41-25	NENE	25	50N	77W	WYW130625

Rights of Ways:

The following rights-of-way are authorized with the approval of the Williams Draw Unit Delta and Gamma Plans of Development:

- WYW-170026 for road, water pipeline and buried power;
- WYW-170027 for “up to 20 inch” gas pipeline; all in:
  - T.49N., R.76W., section 9;
  - T. 50N., R.76W., Sec. 6, 7, 21;

- T. 50N., R.77W., Sec. 10, 12.

All utility corridors will be installed adjacent to and parallel with access routes extending approximately 20,099 feet in length. All authorized access, improved water, cable and gas will not exceed a total width of 50 feet.

Water Management:
The following water treatment facilities and associated existing infrastructure were inspected and approved for use in association with the water management strategy for the POD.

Facility Name	NEPA Document	WYPDES	Qtr/ Qtr	Sec	T	R	Lease	Water Discharge Point	QtrQtr	Sec	T	R
PVU EMIT	PVU Add POD WY-070-05-060	WY0056081	NWSE	29	50	77	Fee	006	NESE	29	50	77
Dry Creek	Williams Draw Beta POD WY-070-05-392	WY0056081	NESW	32	50	77	WYW148151	008	SWNE	32	50	77
WDUB - Proposed	Williams Draw Beta POD WY-070-05-392	WY0056081	SESE	28	50	77	WYW148362	011	SESE	28	50	77
River Unit Beta	River Unit Beta POD WY-070-05-294	WY0056081	NENW	27	49	77	WYW129047	003	SESW	21	49	77
Barber Creek East	Williams Draw Unit Alpha POD WY-070-05-134	WY0052175	SENW	11	50	77	Fee	002 012	NESW NESW	11 11	50	77
Barber Creek	Powder Valley Unit POD WY-070-04-072	WY0056081	NENW	9	50	77	WYW149359	012 013 014	NESE SWSW SWSW	8 4 4	50	77
Merrill Meadow	Powder Valley Unit Delta POD WY-070-08-143	WY0052248	NWNW	9	49	77	Fee	005	NWNW	9	49	77

The following 44 wells and associated access road and infrastructure are denied:

	Well Name	Well #	Environmental Issue
1	WDU GAMMA	31-1-4977	Pad design shows impacts to slopes 25- 58% with highly erosive soils across cut slope on the east side of the pad. This abandoned well location has experienced mass soil movement and erosion. The access WDUG Road D is proposed over badlands with slopes 25-37%. The combination of steep slopes and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.
2	WDU GAMMA	12-5-4976	Pad design shows impacts to slopes 25-28% with highly erosive soils. The access WDUG Road 12-5 is proposed over slopes 25-28%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure.
3	WDU GAMMA	23-5-4976	Pad design shows impacts to slopes 25-27% with highly erosive soils. The access WDUG Road E is proposed over badlands with slopes 25-27%. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and pad and road failure and indicate that there is no reclamation potential.
4	WDU GAMMA	24-5-4976	The access WDUG Road E is proposed over badlands with slopes 25-27% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
5	WDU GAMMA	44-6-4976	The access WDUG Road 44-6 is proposed over slopes 25-34% with highly erosive soils. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
6	WDU GAMMA	21-8-4976	The access WDUG Road E is proposed over badlands with slopes 25-27% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
7	WDU GAMMA	43-8-4976	Pad design shows filling over slopes >25 with highly erosive soils. The combination of steep slopes and severe erosion potential promote pad failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
8	WDU GAMMA	23-17-4976	The proposed access WDUG 23-17 road is within 0.07 mile and in direct line of sight of golden eagle nest BLM ID 2675 The well location is within 0.07 miles and in direct line of sight of raptornest BLM ID 5198. The distance does not provide an adequate biological buffer for a timing limitation stipulation to be effective. The access road to the well locations poses a risk to the success of the golden eagle nest BLM ID 2675 as well as raptor nests1370 and 6237.
9	WDU GAMMA	34-17-4976	The proposed access road is within 0.07 mile and in direct line of sight of golden eagle nest BLM ID 2675 The well location is within 0.13 miles and in direct line of sight of raptor nest BLM ID 6164 and 6179. The distance does not provide an adequate biological buffer for a timing limitation stipulation to be effective. The access road to the well locations poses a risk to the success of the golden eagle nest BLM ID 2675 as well as raptor nests1370 and 6237.
10	WDU DELTA	12-7-5076	The access WDUD Road D is proposed over slopes 25-28% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
11	WDU DELTA	21-7-5076	The well pad design shows impacts to slopes >25% and highly erosive soils. The access WDUD Road G is proposed over badlands with slopes 25-40% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.
12	WDU DELTA	23-7-5076	The well pad design shows impacts to slopes >25% and highly erosive soils. The access WDUD Road D is proposed over badlands with slopes 25-28% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
13	WDU DELTA	33-7-5076	The well pad design shows impacts to slopes >25% and highly erosive soils. The access WDUD Road G is proposed over badlands with slopes 25-40% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.
14	WDU DELTA	41-7-5076	The well is within 0.18 mile of and in direct line of sight of raptor nest BLM ID 5857. **The distance does not provide an adequate biological buffer for a timing limitation stipulation to be effective.** The proposed pad would impact side slopes > 25% across the fill slopes. The design shows no vegetative buffer between fill slopes and slopes >25% below the pad. The access WDUD Road H-4 is proposed on a ridge with slopes > 25% and highly erosive soils. . Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
15	WDU DELTA	14-17-5076	The access WDUD Road F-2 is proposed on a ridge with slopes 25-28% and highly erosive soils. . Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
16	WDU DELTA	23-17-5076	The access WDUD Road J-1 is proposed on a ridge with slopes 25-46% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
17	WDU DELTA	34-17-5076	The access WDUD Road J-1 is proposed on a ridge with slopes 25-46% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
18	WDU DELTA	34-18-5076	The proposed well pad does not provide an adequate vegetative buffer to excessively steep side slopes below the fill slope. This abandoned well location has experienced mass soil movement and erosion. The access WDUD Road F-1 is proposed on a ridge with slopes 25-28% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
19	WDU DELTA	43-18-5076	The proposed well pad does not provide an adequate vegetative buffer to excessively steep side slopes below the fill slope. The access WDUD Road F-1 is proposed on a ridge with slopes 25-28% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
20	WDU DELTA	32-19-5076	The proposed well pad does not provide an adequate vegetative buffer to excessively steep side slopes below the fill slope. This abandoned well location has experienced mass soil movement and erosion. The access WDUD Road L is proposed on a ridge with slopes 25-28% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
21	WDU DELTA	42-19-5076	The proposed well pad will impact 25-32%. The access WDUD Road P is proposed on a ridge with slopes 25-40% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.
22	WDU DELTA	13-20-5076	The access WDUD Road A is proposed on a ridge with slopes 25-37% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
23	WDU DELTA	23-20-5076	The access WDUD Road A is proposed on a ridge with slopes 25-37% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
24	WDU DELTA	32-20-5076	Pad design shows impacts to slopes 25- 28% on three sides and filling through an active drainage. The pad design is not adequate to ensure a safe work environment as it shows the rig placed over fill material that is prone to settle under the weight of the drill rig during the drilling operations and overturn. The access WDUD Road A is proposed on a ridge with slopes 25-35% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
25	WDU DELTA	31-20-5076	The access WDUD Road J-2 is proposed on a ridge with slopes 25-32% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
26	WDU DELTA	41-20-5076	The access WDUD Road E-8 is proposed on a ridge with slopes 25-33% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
27	WDU DELTA	42-20-5076	The pad design shows fills over slopes >25% with no vegetative buffer. The access WDUD Road E-8 is proposed on a ridge with slopes 25-48% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.
28	WDU DELTA	14-31-5076	Pad design shows impacts to slopes 25- 32%. The access WDUD Road 14-31 is proposed on a ridge with slopes 25-29% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.
29	WDU DELTA	12-12-5077	Pad design shows impacts to slopes >25%. The access WDUD Road 12-12 impacts slopes >25% and highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
30	WDU GAMMA	33-245077	The access WDUG Road O-3 is proposed over badlands with slopes 25-27% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
31	WDU GAMMA	34-24-5077	The access WDUG Road O-3 is proposed over badlands with slopes 25-27% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. A portion of the alignment lies over a large active headcut while another portion lies within and parallel with a drainage. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
32	WDU GAMMA	14-245077	The access WDUG Road O-4 is proposed over badlands with slopes 25-36% with highly erosive soils and filling over slopes up to 58%. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
33	WDU GAMMA	21-25-5077	The access WDUG Road O-4 is proposed over badlands with slopes 25-36 with highly erosive soils and filling over slopes up to 58%. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
34	WDU GAMMA	44-25-5077	The pad design is not adequate to ensure a safe work environment as it shows the rig placed over fill material that is prone to settle under the weight of the drill rig during the drilling operations and overturn. This abandoned well location has experienced mass soil movement and erosion. The access WDUG Road 44-25 has poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
35	WDU GAMMA	11-26-5077	The well is located within 0.25 mile of a raptor nest BLM ID 5094 and in line of site. The access road will likely remove nest BLM ID 5095. The access WDUG Road M is proposed over slopes 25-44% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
36	WDU GAMMA	22-26-5077	The access road will likely remove raptor nest BLM ID 5095. The access WDUG Road M is proposed over slopes 25-44% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The well pad impacts slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
37	WDU GAMMA	23-26-5077	The access WDUG Road Q is proposed over slopes 25-40% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
38	WDU GAMMA	24-26-5077	Pad design shows impacts to slopes >25% with highly erosive soils. The access WDUG Road Q is proposed over slopes 25-40% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential
39	WDU GAMMA	32-27-5077	The pad design is not adequate to ensure a safe work environment as it shows the rig placed over 2-5 feet of fill material that is prone to settle under the weight of the drill rig during the drilling operations and overturn. The access WDUG Road N is proposed over badlands with slopes 25-36% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote pad and road failure and indicate that there is no reclamation potential.

	Well Name	Well #	Environmental Issue
40	WDU GAMMA	42-27-5077	The access WDUG Road N is proposed over badlands with slopes 25-36% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
41	WDU DELTA	12-35-5077	The access WDUG Road Q is proposed over badlands with slopes 25-40% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
42	WDU DELTA	21-35-5077	The access WDUG Road Q is proposed over badlands with slopes 25-40% with highly erosive soils. Portions of the proposed road have poor road suitability as the design shows load bearing portion of the road cut and fill falling over slopes > 25%. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability and promote road failure and indicate that there is no reclamation potential.
43	WDU DELTA	42-35-5077	The WDUG Road 43-26 and the start of WDUD Road B are proposed over a very shallow/sandy site with poor road suitability and no reclamation potential. The combination of severe erosion potential and shallow soil limit soil stability and promote and road failure and indicate that there is no reclamation potential.
44	WDU DELTA	43-35-5077	The WDUG Road 43-26 and the start of WDUD Road B are proposed over a very shallow/sandy site with poor road suitability and no reclamation potential. The combination of severe erosion potential and shallow soil limit soil stability and promote and road failure and indicate that there is no reclamation potential.

The following infrastructure is denied.

	Infrastructure	Environmental Issue
1	WDU Delta Corridor A	The utility corridor alignment is proposed over badlandswith slopes 25-50%. The combination of steep slopes and shallow soil limit soil stability and with no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.
2	WDU Delta Corridor C	The utility corridor alignment is proposed over badlandswith slopes 25-40%. The combination of steep slopes and shallow soil limit soil stability and with no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.

	Infrastructure	Environmental Issue
3	WDU Gamma Corridor 33-8	The utility corridor alignment is proposed over badlands with 75% slopes. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability. These limitations indicate that there is no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.
4	WDU Gamma Corridor 43-8	The utility corridor alignment is proposed over side slopes 25-35%. The combination of steep slopes and shallow soil limit soil stability and with no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.
5	WDU Gamma Corridor L	The utility corridor alignment is proposed over side slopes 25-35%. The combination of steep slopes and shallow soil limit soil stability and with no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.
6	WDU Gamma Corridor Laskie-1	The utility corridor alignment is proposed over slopes 25-90%. The combination of steep slopes and shallow soil limit soil stability and with no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.
7	WDU Gamma Corridor Laskie-2	The utility corridor alignment is proposed over slopes >25%. The utilities are proposed to connect to the Laskie-1 utilities within the flow path of Laskie Draw which drains large water shed. The connection will require a large bell hole to be excavated. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability. These limitations indicate that there is no reclamation potential. There is high potential for the utilities to be unearthed by large run-off events that are frequent to this drainage. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.
8	WDU Gamma Corridor B-1	The utility corridor alignment is proposed over badlands with 65% slopes. The combination of steep slopes, severe erosion potential and shallow soil limit soil stability. These limitations indicate that there is no reclamation potential. The operator's site specific reclamation plan submitted February 1, 2010 does not adequately address the reclamation limitations.

Following the onsite inspection, BLM instructed Lance Oil & Gas to complete a geotechnical analysis along identified proposed road alignments listed below where road suitability is questionable due primarily to slopes exceeding 25%. Lance submitted a plan for geotechnical analysis received by BLM-BFO January 13, 2010 but the plan failed to address all the areas of concern identified.

The BLM ID team identified 10 engineered roads requiring a geotechnical analysis within the WDU Gamma POD including: C-1, C-2, F-1, F-2, G-1, L-3, O-1 and O-2.

The BLM ID team identified an additional 5 engineered roads requiring a geotechnical analysis within the WDU Delta POD including: C-1, C-2, J-1 and 34-19.

The sites identified have been judged to be of uncertain stability and require additional information before they are subjected to load bearing traffic. The Powder River Basin EIS states, "It may not be feasible or possible to build the road where slopes are steep and the rock or soil material is weak. In these cases, alternative road locations should be considered. Sites judged to be of uncertain stability should be

reviewed by a Geotechnical Specialist before they are used. Those sites where emerging ground water, thick organic layers, unstable geology, or other instability factors are present should not be used."

The extent and detail of the geotechnical investigation required should be determined by a licensed Professional Engineer competent in geotechnical engineering. The investigation should be submitted to the BLM and consider the following:

- The analysis should include distribution of bedrock and surficial deposits, outcrops, in-situ slope stability, discontinuities, structural features, ground-water occurrence and behavior, potential sliding, current failures, and observed and potential geologic hazards.
- The geotechnical analysis should also include a narrative description of surficial deposits, specifying engineering properties, especially those that can affect design or construction. These descriptions may include, but are not restricted to, soil structure, composition, cohesion, internal friction, the presence of swelling materials, low-density materials, gypsum and other sulfates, caliche, dispersive soils, loose deposits subject to liquefaction or consolidation, and erodible materials.

A minimum of three exploratory holes or test pits will be made along the proposed road alignment until bedrock is reached. All drill hole and test pit logs must show moisture condition, soil classification and depth. Location of all borings will be submitted to BLM prior to initiation of the geotechnical investigation on a map.

Following completion of the geotechnical investigation and analysis, Lance Oil & Gas Company, Inc. will submit proper mitigation measures, based on a professional geotechnical engineer's recommendation, to alleviate the stress that load bearing traffic would impose upon the native materials and prevent slope failure.

The following 27 wells are deferred pending BLM's review of a comprehensive geotechnical analysis of the project components listed below which is to be completed by the operator:

	Well Name	Well #	Environmental Issues
1	WDU GAMMA	23-1-4977	The access road WDU Gamma Roads C1 & C2 alignments are proposed over slopes 25-26%. Portions of the proposed roads have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
2	WDU GAMMA	44-5-4976	That portion of proposed access WDUG Road F within 0.25 miles of the Laskie Draw lek is not authorized to minimize impacts to sage-grouse and their habitats. This includes those segments of the proposed Road F located within SW section 4 T49N/R76W. The access WDUG Road F-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.

	Well Name	Well #	Environmental Issues
3	WDU GAMMA	33-8-4976	That portion of proposed access WDUG Road F within 0.25 miles of the Laskie Draw lek is not authorized to minimize impacts to sage-grouse and their habitats. This includes those segments of the proposed Road F located within SW section 4 T49N/R76W. The access WDUG Road F-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
4	WDU GAMMA	41-8-4976	That portion of proposed access WDUG Road F within 0.25 miles of the Laskie Draw lek is not authorized to minimize impacts to sage-grouse and their habitats. This includes those segments of the proposed Road F located within SW section 4 T49N/R76W. The access WDUG Road F-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
5	WDU GAMMA	21-17-4976	The access WDUG Road F-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
6	WDU GAMMA	32-17-4976	The access WDUG Road F-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
7	WDU GAMMA	41-17-4976	The access WDUG Road F-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
8	WDU GAMMA	43-17-4976	The access WDUG Road F-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
9	WDU GAMMA	12-1-4977	The access WDU Gamma Roads C1 & C2 alignments are proposed over slopes 25-26%. Portions of the proposed roads have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
10	WDU GAMMA	21-2-4977	The access WDUG Road G-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.

	Well Name	Well #	Environmental Issues
11	WDU GAMMA	32-2-4977	The access WDUG Road G-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
12	WDU GAMMA	41-2-4977	The access road WDU Gamma Roads C1 & C2 alignments are proposed over slopes 25-26%. Portions of the proposed roads have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
13	WDU GAMMA	43-2-4977	The access WDUG Road G-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
14	WDU DELTA	11-7-5076	The access WDUD Roads C-1 and C-2 are proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
15	WDU DELTA	34-19-5076	The access WDUD Road 34-19 is proposed over slopes >25%. This alignment follows an abandoned road and has experienced mass soil movement and erosion primarily below the proposed well location. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
16	WDU DELTA	42-29-5076	The access WDUD Road Q is proposed over slopes >25% at the ingress/egress of the well pad. This portion of the proposed road has poor road suitability as the design shows the load bearing portion of the road falling over slopes >25%. Road suitability is questionable for the segment(s) identified.
17	WDU DELTA	14-30-5076	The access WDUD Road 44-25A is proposed over slopes >25% at the ingress/egress of the well pad. This portion of the proposed road has poor road suitability as the design shows the load bearing portion of the road falling over slopes >25%. Road suitability is questionable for the segment(s) identified.
18	WDU DELTA	41-30-5076	The access WDUD Road 44-25A is proposed over slopes >25% at the ingress/egress of the well pad. This portion of the proposed road has poor road suitability as the design shows the load bearing portion of the road falling over slopes >25%. Road suitability is questionable for the segment(s) identified.
19	WDU DELTA	42-12-5077	The access WDUD Road C-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.

	Well Name	Well #	Environmental Issues
20	WDU DELTA	12-13-5077	The access WDUG Road O-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
21	WDU DELTA	23-13-5077	The access WDUD Road J-1 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
22	WDU DELTA	34-13-5077	The access WDUG Road O-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
23	WDU GAMMA	21-24-5077	The access WDUG Road O-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
24	WDU GAMMA	32-24-5077	The access WDUG Road O-2 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
25	WDU GAMMA	13-25-5077	The access WDUG Road L-3 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
26	WDU GAMMA	23-25-5077	The access WDUG RoadsL-3 and 23-25 are proposed over slopes >25%. Portions of the proposed roads have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.
27	WDU GAMMA	34-25-5077	The access WDUG Road L-3 is proposed over slopes >25%. Portions of the proposed road have poor road suitability as the design shows the load bearing portion of the road and back slope falling over slopes >25% . Road suitability is questionable for the segment(s) identified.

The operator agreed at the onsite to drop the following well, and incorporated this change into a new Master Surface Use Plan (MSUP), submitted August 3, 2009. The wells were dropped for the following reasons:

1. The 43-26-5077 was dropped due to the poor site suitability related to side slope exceeding 25% and highly erosive soils. These limitations indicate that the potential for road failure is high and there is no reclamation potential.

Operator Committed Measures:
As a result of the onsites, several mitigation measures proposed by the BLM were incorporated by the operator into the Williams Draw Unit Gamma and Delta plans. These changes were submitted as Operator Committed Measures on January 29, 2010. In addition, site specific reclamation plans for areas identified to have reclamation limitations were submitted to BLM on February 1, 2010.

Site-Specific Mitigation Measures:

- Conditions of Approval have been applied to this project to mitigate resources impacts. For a complete description of all COA's associated with this approval, see section **2.3.3** and Appendix I in the attached EA. COA's for the Williams Draw Unit Delta and Gamma POD's have been applied to reduce or mitigate impacts.

This approval is in compliance with all federal laws, regulations, and policies. This includes, but is not limited to, the National Environmental Policy Act, the Federal Land Policy and Management Act, the National Historic Preservation Act, the Endangered Species Act, the Migratory Bird Treaty Act, and the Resource Conservation and Recovery Act.

Approval of this alternative is in conformance with the *Powder River Basin Oil and Gas Project Environmental Impact Statement and Proposed Plan Amendment* (PRB FEIS), *Record of Decision and Resource Management Plan Amendments for the Powder River Basin Oil and Gas Project* (PRB FEIS ROD), ((refer to Appendix E of that document relative to adaptive management), and the Approved Resource Management Plan (RMP) for the Public Lands Administered by the Bureau of Land Management, Buffalo Field Office (BFO), April 2001.

This approval is subject to adherence with all of the operating plans and mitigation measures contained in the Master Surface Use Plan of Operations, Drilling Plan, Water Management Plan, and information in individual APDs submitted to BLM as of February 1, 2010. This approval is also subject to operator compliance with all mitigation and monitoring requirements contained within the Powder River Oil and Gas Project Final Environmental Impact Statement and Resource Management Plan Amendment (PRB FEIS) approved April 30, 2003.

RATIONALE: The decision to authorize the selected alternative, as summarized above, is based on the following:

1. The Operator, in their POD as of February 1, 2010, has committed to:
   - Comply with all applicable Federal, State and Local laws and regulations.
   - Obtain the necessary permits from other agencies for the drilling, completion and production of these wells including water rights appropriations, the installation of water management facilities, water discharge permits, and relevant air quality permits.
   - Offer water well agreements to the owners of record for permitted water wells within ½ mile of a federal CBNG producing well in the POD.
   - Provide water analysis from a designated reference well in each coal zone.

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

3. The selected alternative will not result in any undue or unnecessary environmental degradation.

4. It is in the public interest to approve these wells, as the leases have the potential of being drained of federal gas, resulting in a loss of revenue for the government. Furthermore, approval of this

development will help meet the nation's future needs for energy reserves, and will help to stimulate local economies by maintaining stability for the workforce.

5. The selected alternative incorporates appropriate local greater sage-grouse research and the best available science from across the species' range in development of the attached conditions of approval.

6. Mitigation measures were selected to best meet the purpose and need, and will be applied by the BLM to alleviate environmental impacts.

7. The selected alternative incorporates components of the Wyoming Governor's Sage Grouse Implementation Team's "core population area" strategy, the Governor's executive order, and local research to provide mitigation for sage-grouse, while meeting the purpose and need for the Williams Draw Unit Gamma and Williams Draw Unit Delta Projects.

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

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

Field Manager: _____ Date: 5/13/2016

FINDING OF NO SIGNIFICANT IMPACT
FOR
Lance Oil & Gas Company Inc.
Williams Draw Unit Gamma & Willims Draw Unit Delta PODs
ENVIRONMENTAL ASSESSMENT –WY-070-08-042

FINDING OF NO SIGNIFICANT IMPACT

On the basis of the information contained in the EA, and all other information available to me, it is my determination that: (1) the implementation of the selected alternative, Alternative C, will not have significant environmental impacts beyond those already addressed in PRB EIS to which the EA is tiered; (2) the selected alternative, Alternative C, is in conformance with the Buffalo Field Office Resource Management Plan; and (3) the selected alternative, Alternative C, does not constitute a major federal action having a significant effect on the human environment.

Therefore, an environmental impact statement or a supplement to the existing environmental impact statement is not necessary and will not be prepared.

This finding is based 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.

Field Manager: _____ Date: 5/13/2010

BUREAU OF LAND MANAGEMENT
BUFFALO FIELD OFFICE
ENVIRONMENTAL ASSESSMENT (EA)
FOR
Lance Oil & Gas Company Inc.
Williams Draw Unit Gamma & Willims Draw Unit Delta PODs
PLAN OF DEVELOPMENT
WY-070-08-042

1. INTRODUCTION

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

1.1. Background

Lance Oil and Gas Company, Inc. (LOG) submitted the Williams Draw Unit Gamma (WDU) POD December 10, 2007 and Williams Draw Unit (WDU) Delta POD November 11, 2008 with 74 and 96 federal APD's respectively. Due to the complexity of the issues presented by this project, there were several stages of onsites and negotiation between the BLM and LOG:

- Initial project onsites were conducted in 2009 on January 13, 16, 20, 21, 22, 28, 29 and 30. Onsites were then postponed due to inclement weather per operator request. Onsites were re-initiated May 4, 5, 6, 7, 8, 11, 12, 13, 19, 20, 22, 28 and 29 and June 1 and 2, 2009.
- BLM sent LOG post-onsite deficiency letters for the WDU Gamma POD June 17, 2009 and WDU Delta POD June 30, 2009.
- Additional on-sites were conducted:
  - July 14, 2009 to discuss moving a grazing allotment fence located SWNW section 21, T50N/R76W.
  - July 28, 2009 to re-visit various components of the projects.
  - February 19, 2010 to re-visit WDU Gamma Roads O-1, O-2, O-3 and O-4 not adequately staked during the initial onsites.
- LOG responded to BLM's post onsite deficiencies for WDU Gamma on August 3, 2009 and for WDU Delta on October 5, 2009.
- November 12, 2009 LOG and Williams Production RMT Company met with BLM at the Buffalo Field Office to present their plans for coordinated development of the remaining Williams Draw Unit and neighboring Carr Draw Unit CBNG developments. This included a voluntary phased development scenario on behalf of LOG for the WDU Gamma and Delta projects.
- December 21, 2009 LOG submitted plans for coordinated development of the remaining Williams Draw Unit and neighboring Carr Draw Unit CBNG developments to minimize impacts to the Fortification elk population. This included the voluntary phased development scenario on behalf of LOG for the WDU Gamma and Delta projects.
- BLM sent LOG a second post-onsite deficiency letter for the two projects January 20, 2010 to address shortcomings of the site specific reclamation plan and geotechnical analysis recommendations.
- February 1, 2010, LOG responded to BLM's second post onsite deficiency letters with re-submittals of the projects.

There is a direct relationship between the Williams Draw Unit Gamma and Delta PODs and the Williams Draw Unit Alpha and Beta PODs approved April 22, 2005 and July 19, 2005 respectively.

Both PODs will utilize the existing road and utility corridors as well as water management infrastructure from the previous developments.

1.2. Purpose and Need for the Proposed Action

The purpose of the proposed action is to explore, develop and produce oil and gas reserves conducted under the rights granted by a Federal oil and gas lease, as required in 43 CFR 3160, all Onshore Orders, and The Mineral Leasing Act, as amended and supplemented, (30 U.S.C. 181 *et seq.*).

The need for the action is the requirement to obtain approval for the development of an Oil and Gas Lease through an Application for Permit to Drill (APD) on public lands managed by the Bureau of Land Management under Onshore Order No. 1, pursuant to the authority of the Mineral Leasing Act, as amended and supplemented, (30 U.S.C. 181 *et seq.*) and prescribed in 43 CFR Part 3160.

Decision to be Made: The BLM will decide whether or not to approve the proposed development of oil and gas resources on the federal leasehold referred to as Williams Draw Units Gamma and Delta, and if so, under what terms and conditions.

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

The proposed action conforms to the terms and the conditions of the 1985 Buffalo RMP and the PRB FEIS, as required by 43 CFR 1610.5. The BFO RMP is currently under revision.

The proposed action is in conformance with Instruction Memorandum No. WY-2010-012, "Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management Administered Public Lands including the Federal Mineral Estate".

1.4. Issues

As stated above, this (EA) addresses site-specific resources and impacts that were not covered within the PRB FEIS. Resources potentially affected by this project include several wildlife species, cultural resources, soils and vegetation, and water management.

2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

Three alternatives, A, B, and C were evaluated. A brief description of each alternative follows.

Alternative A is the No Action Alternative. Alternative B is the project as proposed by the operator. Alternative C is the result of collaboration between the operator and BLM to mitigate project impacts.

2.1. Alternative A - No Action

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

2.2. Alternative B Proposed Action

Alternative B, the "proposed action" alternative, summarizes the WDU Gamma and WDU Delta projects as originally submitted to the BLM by Lance Oil & Gas Company Inc., prior to any BLM review or modifications. Williams Draw Unit Gamma POD was received by BLM December 10, 2007 including

74 APD's for federal wells and 3 APD's for non-federal wells returned to the operator. Williams Draw Unit Delta POD was received November 25, 2008 including 96 federal APD's.

Proposed Action Title/Type: Lance Oil & Gas Company Inc.'s WDU Gamma and WDU Delta Plans of Development (POD) for 170 coal bed natural gas well APD`s and associated infrastructure.

Proposed Well Information: There are 170 wells proposed within this 25,330 acre mapped, project area boundary. The wells are vertical bores proposed on an 80 acre spacing pattern with a single well per location. Each well will produce from Wall coal seam. The proposed well house dimensions are approximately 5 ft wide 5 ft long x 6 ft high. Well house color is Covert Green, selected to blend with the surrounding vegetation. Proposed wells are located as follows:

	Well Name	Well #	TWP	RNG	Sec	QTR	Lease
1	WDU DELTA WILLIAMS DU	11-7	50N	76W	7	NWNW	WYW042305
2	WDU DELTA WILLIAMS DU	12-7	50N	76W	7	SWNW	WYW042305
3	WDU DELTA WILLIAMS DU	21-7	50N	76W	7	NENW	WYW042305
4	WDU DELTA WILLIAMS DU	23-7	50N	76W	7	NESW	WYW042305
5	WDU DELTA WILLIAMS DU	33-7	50N	76W	7	NWSE	WYW042305
6	WDU DELTA WILLIAMS DU	41-7	50N	76W	7	NENE	WYW042305
7	WDU DELTA WILLIAMS DU	44-7	50N	76W	7	SESE	WYW042305
8	WDU DELTA WILLIAMS DU	14-8	50N	76W	8	SWSW	WYW042305
9	WDU DELTA WILLIAMS DU	44-8	50N	76W	8	SESE	WYW042305
10	WDU DELTA WILLIAMS DU	11-17	50N	76W	17	NWNW	WYW042305
11	WDU DELTA WILLIAMS DU	14-17	50N	76W	17	SWSW	WYW042305
12	WDU DELTA WILLIAMS DU	23-17	50N	76W	17	NESW	WYW042305
13	WDU DELTA WILLIAMS DU	31-17	50N	76W	17	NWNE	WYW042305
14	WDU DELTA WILLIAMS DU	34-17	50N	76W	17	SWSE	WYW042305
15	WDU DELTA WILLIAMS DU	41-17	50N	76W	17	NENE	WYW042305
16	WDU DELTA WILLIAMS DU	44-17	50N	76W	17	SESE	WYW042305
17	WDU DELTA WILLIAMS DU	14-18	50N	76W	18	SWSW	WYW145600
18	WDU DELTA WILLIAMS DU	23-18	50N	76W	18	NESW	WYW042305
19	WDU DELTA WILLIAMS DU	24-18	50N	76W	18	SESW	WYW042305
20	WDU DELTA WILLIAMS DU	32-18	50N	76W	18	SWNE	WYW042305
21	WDU DELTA WILLIAMS DU	34-18	50N	76W	18	SWSE	WYW042305
22	WDU DELTA WILLIAMS DU	43-18	50N	76W	18	NESE	WYW042305
23	WDU DELTA WILLIAMS DU	14-19	50N	76W	19	SWSW	WYW146291
24	WDU DELTA WILLIAMS DU	21-19	50N	76W	19	NENW	WYW145600
25	WDU DELTA WILLIAMS DU	22-19	50N	76W	19	SENW	WYW145600
26	WDU DELTA WILLIAMS DU	23-19	50N	76W	19	NESW	WYW145600
27	WDU DELTA WILLIAMS DU	34-19	50N	76W	19	SWSE	WYW145600
28	WDU DELTA WILLIAMS DU	42-19	50N	76W	19	SENE	WYW145600
29	WDU DELTA WILLIAMS DU	43-19	50N	76W	19	NESE	WYW145600
30	WDU DELTA WILLIAMS DU	32-19	50N	76W	19	SWNE	WYW145600
31	WDU DELTA WILLIAMS DU	13-20	50N	76W	20	NWSW	WYW139683

	Well Name	Well #	TWP	RNG	Sec	QTR	Lease
32	WDU DELTA WILLIAMS DU	14-20	50N	76W	20	SWSW	WYW139683
33	WDU DELTA WILLIAMS DU	23-20	50N	76W	20	NESW	WYW139683
34	WDU DELTA WILLIAMS DU	31-20	50N	76W	20	NWNE	WYW154407
35	WDU DELTA WILLIAMS DU	32-20	50N	76W	20	SWNE	WYW154407
36	WDU DELTA WILLIAMS DU	34-20	50N	76W	20	SWSE	WYW130624
37	WDU DELTA WILLIAMS DU	41-20	50N	76W	20	NENE	WYW154407
38	WDU DELTA WILLIAMS DU	42-20	50N	76W	20	SENE	WYW154407
39	WDU DELTA WILLIAMS DU	13-29	50N	76W	29	NWSW	WYW139683
40	WDU DELTA WILLIAMS DU	14-29	50N	76W	29	SWSW	WYW139683
41	WDU DELTA WILLIAMS DU	21-29	50N	76W	29	NENW	WYW139683
42	WDU DELTA WILLIAMS DU	23-29	50N	76W	29	NESW	WYW139683
43	WDU DELTA WILLIAMS DU	32-29	50N	76W	29	SWNE	WYW130624
44	WDU DELTA WILLIAMS DU	42-29	50N	76W	29	SENE	WYW154407
45	WDU DELTA WILLIAMS DU	43-29	50N	76W	29	NESE	WYW154407
46	WDU DELTA WILLIAMS DU	44-29	50N	76W	29	SESE	WYW154407
47	WDU DELTA WILLIAMS DU	12-30	50N	76W	30	SWNW	WYW145601
48	WDU DELTA WILLIAMS DU	13-30	50N	76W	30	NWSW	WYW145602
49	WDU DELTA WILLIAMS DU	14-30	50N	76W	30	SWSW	WYW145602
50	WDU DELTA WILLIAMS DU	21-30	50N	76W	30	NENW	WYW145601
51	WDU DELTA WILLIAMS DU	33-30	50N	76W	30	NWSE	WYW145601
52	WDU DELTA WILLIAMS DU	34-30	50N	76W	30	SWSE	WYW145601
53	WDU DELTA WILLIAMS DU	41-30	50N	76W	30	NENE	WYW145601
54	WDU DELTA WILLIAMS DU	43-30	50N	76W	30	NESE	WYW145601
55	WDU DELTA WILLIAMS DU	12-31	50N	76W	31	SWNW	WYW130625
56	WDU DELTA WILLIAMS DU	14-31	50N	76W	31	SWSW	WYW130625
57	WDU DELTA WILLIAMS DU	21-31	50N	76W	31	NENW	WYW130625
58	WDU DELTA WILLIAMS DU	22-31	50N	76W	31	SENW	WYW130625
59	WDU DELTA WILLIAMS DU	23-31	50N	76W	31	NESW	WYW130625
60	WDU DELTA WILLIAMS DU	33-31	50N	76W	31	NWSE	WYW130625
61	WDU DELTA WILLIAMS DU	41-31	50N	76W	31	NENE	WYW130625
62	WDU DELTA WILLIAMS DU	43-31	50N	76W	31	NESE	WYW130625
63	WDU DELTA WILLIAMS DU	12-32	50N	76W	32	SWNW	WYW146291
64	WDU DELTA WILLIAMS DU	14-32	50N	76W	32	SWSW	WYW138137
65	WDU DELTA WILLIAMS DU	23-32	50N	76W	32	NESW	WYW138137
66	WDU DELTA WILLIAMS DU	31-32	50N	76W	32	NWNE	WYW138137
67	WDU DELTA WILLIAMS DU	33-32	50N	76W	32	NWSE	WYW138137
68	WDU DELTA WILLIAMS DU	41-32	50N	76W	32	NENE	WYW138137
69	WDU DELTA WILLIAMS DU	43-32	50N	76W	32	NESE	WYW146291
70	WDU DELTA WILLIAMS DU	44-32	50N	76W	32	SESE	WYW146291
71	WDU DELTA WILLIAMS DU	12-12	50N	77W	12	SWNW	WYW135629

	Well Name	Well #	TWP	RNG	Sec	QTR	Lease
72	WDU DELTA WILLIAMS DU	32-12	50N	77W	12	SWNE	WYW133630
73	WDU DELTA WILLIAMS DU	33-12	50N	77W	12	NWSE	WYW133630
74	WDU DELTA WILLIAMS DU	41-12	50N	77W	12	NENE	WYW138447
75	WDU DELTA WILLIAMS DU	42-12	50N	77W	12	SENE	WYW133630
76	WDU DELTA WILLIAMS DU	43-12	50N	77W	12	NESE	WYW133630
77	WDU DELTA WILLIAMS DU	11-13	50N	77W	13	NWNW	WYW135629
78	WDU DELTA WILLIAMS DU	12-13	50N	77W	13	SWNW	WYW135629
79	WDU DELTA WILLIAMS DU	13-13	50N	77W	13	NWSW	WYW147347
80	WDU DELTA WILLIAMS DU	14-13	50N	77W	13	SWSW	WYW147347
81	WDU DELTA WILLIAMS DU	23-13	50N	77W	13	NESW	WYW135629
82	WDU DELTA WILLIAMS DU	34-13	50N	77W	13	SWSE	WYW147347
83	WDU DELTA WILLIAMS DU	43-13	50N	77W	13	NESE	WYW133630
84	WDU DELTA WILLIAMS DU	24-34	50N	77W	34	SESW	WYW130639
85	WDU DELTA WILLIAMS DU	32-34	50N	77W	34	SWNE	WYW136688
86	WDU DELTA WILLIAMS DU	33-34	50N	77W	34	NWSE	WYW130639
87	WDU DELTA WILLIAMS DU	34-34	50N	77W	34	SWSE	WYW130639
88	WDU DELTA WILLIAMS DU	43-34	50N	77W	34	NESE	WYW130639
89	WDU DELTA WILLIAMS DU	12-35	50N	77W	35	SWNW	WYW130639
90	WDU DELTA WILLIAMS DU	21-35	50N	77W	35	NENW	WYW130639
91	WDU DELTA WILLIAMS DU	23-35	50N	77W	35	NESW	WYW130639
92	WDU DELTA WILLIAMS DU	24-35	50N	77W	35	SESW	WYW130639
93	WDU DELTA WILLIAMS DU	35-35	50N	77W	35	NWSE	WYW130639
94	WDU DELTA WILLIAMS DU	42-35	50N	77W	35	SENE	WYW130625
95	WDU DELTA WILLIAMS DU	43-35	50N	77W	35	NESE	WYW130639
96	WDU DELTA WILLIAMS DU	44-35	50N	77W	35	SESE	WYW130639
97	WDU GAMMA WILLIAMS DU	11-5	49N	76W	5	NWNW	WYW144539
98	WDU GAMMA WILLIAMS DU	12-5	49N	76W	5	SWNW	WYW144539
99	WDU GAMMA WILLIAMS DU	23-5	49N	76W	5	NESW	WYW147332
100	WDU GAMMA WILLIAMS DU	24-5	49N	76W	5	SESW	WYW147332
101	WDU GAMMA WILLIAMS DU	32-5	49N	76W	5	SWNE	WYW144539
102	WDU GAMMA WILLIAMS DU	34-5	49N	76W	5	SWSE	WYW147332
103	WDU GAMMA WILLIAMS DU	44-5	49N	76W	5	SESE	WYW147332
104	WDU GAMMA WILLIAMS DU	41-5	49N	76W	5	NENE	WYW144539
105	WDU GAMMA WILLIAMS DU	11-6	49N	76W	6	NWNW	WYW147332
106	WDU GAMMA WILLIAMS DU	12-6	49N	76W	6	SWNW	WYW147332
107	WDU GAMMA WILLIAMS DU	13-6	49N	76W	6	NWSW	WYW147332
108	WDU GAMMA WILLIAMS DU	22-6	49N	76W	6	SENW	WYW147332
109	WDU GAMMA WILLIAMS DU	32-6	49N	76W	6	SWNE	WYW144539
110	WDU GAMMA WILLIAMS DU	33-6	49N	76W	6	NWSE	WYW147332
111	WDU GAMMA WILLIAMS DU	41-6	49N	76W	6	NENE	WYW144539

	Well Name	Well #	TWP	RNG	Sec	QTR	Lease
112	WDU GAMMA WILLIAMS DU	44-6	49N	76W	6	SESE	WYW147332
113	WDU GAMMA WILLIAMS DU	12-8	49N	76W	8	SWNW	WYW160792
114	WDU GAMMA WILLIAMS DU	14-8	49N	76W	8	SWSW	WYW160792
115	WDU GAMMA WILLIAMS DU	21-8	49N	76W	8	NENW	WYW160792
116	WDU GAMMA WILLIAMS DU	23-8	49N	76W	8	NESW	WYW160792
117	WDU GAMMA WILLIAMS DU	33-8	49N	76W	8	NWSE	WYW160792
118	WDU GAMMA WILLIAMS DU	34-8	49N	76W	8	SWSE	WYW160792
119	WDU GAMMA WILLIAMS DU	41-8	49N	76W	8	NENE	WYW160792
120	WDU GAMMA WILLIAMS DU	43-8	49N	76W	8	NESE	WYW160792
121	WDU GAMMA WILLIAMS DU	12-17	49N	76W	17	SWNW	WYW134233
122	WDU GAMMA WILLIAMS DU	21-17	49N	76W	17	NENW	WYW134233
123	WDU GAMMA WILLIAMS DU	23-17	49N	76W	17	NESW	WYW134233
124	WDU GAMMA WILLIAMS DU	32-17	49N	76W	17	SWNE	WYW134233
125	WDU GAMMA WILLIAMS DU	34-17	49N	76W	17	SWSE	WYW134233
126	WDU GAMMA WILLIAMS DU	41-17	49N	76W	17	NENE	WYW134233
127	WDU GAMMA WILLIAMS DU	43-17	49N	76W	17	NESE	WYW134233
128	WDU GAMMA WILLIAMS DU	41-1	49N	77W	1	NENE	WYW136688
129	WDU GAMMA WILLIAMS DU	43-1	49N	77W	1	NESE	WYW136688
130	WDU GAMMA WILLIAMS DU	12-1	49N	77W	1	SWNW	WYW136688
131	WDU GAMMA WILLIAMS DU	23-1	49N	77W	1	NESW	WYW136688
132	WDU GAMMA WILLIAMS DU	31-1	49N	77W	1	NWNE	WYW136688
133	WDU GAMMA WILLIAMS DU	32-1	49N	77W	1	SWNE	WYW136688
134	WDU GAMMA WILLIAMS DU	33-1	49N	77W	1	NWSE	WYW136688
135	WDU GAMMA WILLIAMS DU	11-2	49N	77W	2	NWNW	WYW136688
136	WDU GAMMA WILLIAMS DU	14-2	49N	77W	2	SWSW	WYW136688
137	WDU GAMMA WILLIAMS DU	21-2	49N	77W	2	NENW	WYW136688
138	WDU GAMMA WILLIAMS DU	23-2	49N	77W	2	NESW	WYW136688
139	WDU GAMMA WILLIAMS DU	32-2	49N	77W	2	SWNE	WYW136688
140	WDU GAMMA WILLIAMS DU	34-2	49N	77W	2	SWSE	WYW136688
141	WDU GAMMA WILLIAMS DU	41-2	49N	77W	2	NENE	WYW136688
142	WDU GAMMA WILLIAMS DU	43-2	49N	77W	2	NESE	WYW136688
143	WDU GAMMA WILLIAMS DU	12-3	49N	77W	3	SWNW	WYW136688
144	WDU GAMMA WILLIAMS DU	13-3	49N	77W	3	NWSW	WYW136688
145	WDU GAMMA WILLIAMS DU	21-3	49N	77W	3	NENW	WYW136688
146	WDU GAMMA WILLIAMS DU	22-3	49N	77W	3	SENW	WYW136688
147	WDU GAMMA WILLIAMS DU	31-3	49N	77W	3	NWNE	WYW136688
148	WDU GAMMA WILLIAMS DU	43-3	49N	77W	3	NESE	WYW136688
149	WDU GAMMA WILLIAMS DU	44-3	49N	77W	3	SESE	WYW136688
150	WDU GAMMA WILLIAMS DU	14-24	50N	77W	24	SWSW	WYW130640
151	WDU GAMMA WILLIAMS DU	21-24	50N	77W	24	NENW	WYW130640

	Well Name	Well #	TWP	RNG	Sec	QTR	Lease
152	WDU GAMMA WILLIAMS DU	32-24	50N	77W	24	SWNE	WYW130640
153	WDU GAMMA WILLIAMS DU	33-24	50N	77W	24	NWSE	WYW130640
154	WDU GAMMA WILLIAMS DU	34-24	50N	77W	24	SWSE	WYW130640
155	WDU GAMMA WILLIAMS DU	41-24	50N	77W	24	NENE	WYW133630
156	WDU GAMMA WILLIAMS DU	42-24	50N	77W	24	SENE	WYW130640
157	WDU GAMMA WILLIAMS DU	13-25	50N	77W	25	NWSW	WYW130625
158	WDU GAMMA WILLIAMS DU	21-25	50N	77W	25	NENW	WYW130625
159	WDU GAMMA WILLIAMS DU	23-25	50N	77W	25	NESW	WYW130625
160	WDU GAMMA WILLIAMS DU	32-25	50N	77W	25	SWNE	WYW130625
161	WDU GAMMA WILLIAMS DU	34-25	50N	77W	25	SWSE	WYW130625
162	WDU GAMMA WILLIAMS DU	41-25	50N	77W	25	NENE	WYW130625
163	WDU GAMMA WILLIAMS DU	44-25	50N	77W	25	SESE	WYW130625
164	WDU GAMMA WILLIAMS DU	11-26	50N	77W	26	NWNW	WYW130625
165	WDU GAMMA WILLIAMS DU	22-26	50N	77W	26	SENW	WYW130625
166	WDU GAMMA WILLIAMS DU	23-26	50N	77W	26	NESW	WYW130639
167	WDU GAMMA WILLIAMS DU	24-26	50N	77W	26	SESW	WYW130639
168	WDU GAMMA WILLIAMS DU	43-26	50N	77W	26	NESE	WYW130625
169	WDU GAMMA WILLIAMS DU	32-27	50N	77W	27	SWNE	WYW136688
170	WDU GAMMA WILLIAMS DU	42-27	50N	77W	27	SENE	WYW136688

Water Management Proposal: The following water treatment facilities were proposed for use in association with the water management strategy for the POD.

Facility Name	NEPA Document	WYPDES	QtrQtr	Sec	T	R	Lease	WDP #	QtrQtr	Sec	T	R
PVU EMIT	PVU Add POD WY-070-05-060	WY0056081	NWSE	29	50	77	Fee	006	NESE	29	50	77
Dry Creek	Williams Draw Beta POD WY-070-05-392	WY0056081	NESW	32	50	77	WYW148151	008	SWNE	32	50	77
WDUB - Proposed	Williams Draw Beta POD WY-070-05-392	WY0056081	SESE	28	50	77	WYW148362	011	SESE	28	50	77
River Unit Beta	River Unit Beta POD WY-070-05-294	WY0056081	NENW	27	49	77	WYW129047	003	SESW	21	49	77
Barber Creek East	Williams Draw Unit Alpha POD WY-070-05-134	WY0052175	SENW	11	50	77	Fee	002	NESW	11	50	77
Barber Creek East	Williams Draw Unit Alpha POD WY-070-05-134	WY0052176	SENW	11	50	77	Fee	012	NESW	11	50	77
Barber Creek	Powder Valley Unit Delta POD WY-070-08-143	WY0056081	NENW	9	50	77	WYW149359	012	NESE	8	50	77
Barber Creek	Powder Valley Unit POD WY-070-04-072	WY0056081	NENW	9	50	77	WYW149359	013	SWSW	4	50	77
Barber Creek	Powder Valley Unit POD WY-070-04-072	WY0056081	NENW	9	50	77	WYW149359	014	SWSW	4	50	77
Merrill Meadow	Powder Valley Unit Delta POD WY-070-08-143	WY0052248	NWNW	9	49	77	Fee	005	NWNW	9	49	77

County: Johnson

Applicant: Lance Oil & Gas Company Inc.

Surface Owners: BLM, Blue Butte Ranch, Powder River Ranch and State of Wyoming

Project Description:
The proposed action involves the following:

- Drilling of 170 total federal CBM wells in Wall coal zones to depths ranging from 2,225 to 2,500 feet.

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

- Well metering shall be accomplished by a combination of telemetry and well visitation. Metering would entail 2-3 visits per week during the summer and up to 4 visits per week during the winter to each well location.

- A Water Management Plan (WMP) that involves the following infrastructure and strategy: 10 previously permitted discharge points from 7 existing EMIT water treatment facilities within the Upper Powder River watershed discharging treated CBNG produced water directly into the Upper Powder River or its tributary, Barber Creek. Alternatively, untreated water will be added to the existing pipeline to be transported to the Salt Creek Field in Midwest for injection into the Madison formation.

- An existing and proposed improved road network.

- A buried power line network to be constructed by the operator. The proposed route has been reviewed by the contractor. If the proposed route is altered, then the new route will be proposed via sundry application and analyzed in a separate NEPA action. If the power line network is not completed before the wells are in production, then temporary diesel generators shall be placed at the 67 power drops.

- A storage tank of 500 gallon capacity shall be located with each diesel generator. Generators are projected to be in operation for 24 months. Fuel deliveries are anticipated to be 2-3 times per week during the summer months and 4 times per week during the winter. Duration of a delivery is expected to range between 30 and 60 minutes. Noise level is expected to be 100.5 decibels at 1 meter distance.

- A buried gas, water and power line network.

- There are no central gathering/metering facilities or compression facilities proposed with this federal action.

For a detailed description of design features, construction practices and water management strategies associated with the proposed action, refer to the Master Surface Use Plan (MSUP), Drilling Plan and WMP in the POD and individual APDs. Also see the subject POD for maps showing the proposed well locations and associated facilities described above. More information on CBNG well drilling, production

and standard practices is also available in the PRB FEIS, Volume 1, pages 2-9 through 2-40 (January 2003).

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

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

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

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

2.3. Alternative C – Modified Proposed Action

Alternative C represents a modification of Alternative B based on the operator and BLM working cooperatively to reduce environmental impacts. The description of Alternative C is the same as Alternative B, with the addition of the project modifications of the initial project proposal (Alternative B) identified by BLM and the operator. At the on-sites, all areas of proposed surface disturbance were inspected to insure that the project would meet BLM multiple use objectives to conserve natural resources while allowing for the extraction of Federal minerals. In some cases, access roads were re-routed, and well locations, pipelines, discharge points and other water management control structures were moved, modified or dropped from further consideration to alleviate environmental impacts.

This alternative represents BFO efforts to reduce project-specific impacts to steep slopes and highly erosive soils as well as wildlife habitat (sage-grouse, raptors and elk) while maintaining proposed spacing and infrastructure requirements consistent with the purpose and need of the proposed action.

2.3.1. Changes as a result of the on-sites

The following changes were made to the Williams Draw Unit Gamma project during the onsites:

1. 11-5 LOG requested to add utility corridor to the NW access route and withdraw the proposed corridor south to the 23-5 location. Maintain 45 overall width of disturbance. LOG agreed to reduce the pad on the east side by approximately 30'.
2. 32-5 LOG agreed to reduce the pad to 150' X 170' and upgraded the access road to Template A for surfacing and add culverts as needed.
3. 34-5 LOG agreed to minimize surface disturbance at that location to realigned the access road moving it off the ridge top to utilize the slope break on the east slope and add culverts as needed.
4. 44-5 LOG agreed to pursue and engineered access route to avoid the Laskie Draw lek and reduce the pad to 150’ X 170’.
5. 41-5 LOG agreed to upgrade the access to template A.
6. 11-6 LOG agreed to upgrade the access road template C.
7. 12-6 LOG agreed to upgrade Road B to template A to add surfacing.
8. 13-6 LOG agreed to move the well 231' north out of line of sight of raptor nest BLM ID 5165. A 150 X 170 pad will be designed. LOG agreed to upgrade the access road to a template A and add culvert about 300 feet before the well location.

9.	22-6	LOG must move the well about 115' SE due to the installation of the WPC water pipeline. The new location requires a 150 X 170 pad that will serve as a pullout along a narrow section of Barber Creek Road.
10.	32-6	This location is just off Barber Creek Road and disturbance associated with the installation of the WPC water pipeline. The disturbed area will be utilized for staging completion equipment and vehicles.
11.	33-6	LOG must move the well about 200' east due to the installation of the WPC water pipeline.
12.	12-8	LOG agreed to move the well 70' north to avoid a blowout area and to allow for increased work space area and minimize the Template D road/corridor to 45' overall width.
13.	14-8	LOG agreed to add a culvert to the segment of road uphill from the pad and before the intersection with the main access road.
14.	33-8	LOG withdrew the rig slot to minimize surface disturbance. The access/corridor to the 41-8 location will be minimized to 35' overall.
15.	34-8	LOG agreed to modify the access road.
16.	41-8	LOG withdrew the rig slot and agreed to minimize the access/corridor to the 44-5 location to primitive with a 35' overall width.
17.	12-17	BLM recommended the well to be moved 65' SW and withdraw the pad for a rig slot.
18.	32-17	LOG agreed to shift the well and pad west to avoid blocking off the drainage bottom with fill slopes including shifting the centerline of the access road west.
19.	41-17	LOG agreed to move the well approximately 100' SW and withdraw the pad for a rig slot. The road/corridor will be minimized to 35' overall width.
20.	43-17	This location is visible from I90. BLM recommended that LOG use covert green for the frost box and spray the surface disturbance of the access road, utility corridor and rig slot with hydro mulch similar to covert green. LOG agreed.
21.	41-1	LOG agreed to withdraw the pad design for a rig slot; there is an adjacent open, cheat grass area that can be utilized for completion equipment & vehicles. LOG upgraded the access to template C for surfacing. The disturbance for the access/corridor will be minimized to 35' overall.
22.	43-1	LOG moved the well be moved about 20' east to provide more work space with a rig slot.
23.	12-1	LOG realigned the access road/corridor to follow the disturbance from the installation of the WPC water pipeline.
24.	23-1	LOG moved the well 60' north and realigned Road C-1 due to the newly installed WPC water pipeline.
25.	32-1	LOG agreed to upgrade the access to template A to add surfacing but to with a 12' running surface.
26.	33-1	LOG moved the well 120' north due to the newly installed WPC water pipeline.
27.	11-2	LOG agreed to reduce the pad to 150 X 170 and add culverts as needed to the access. At least 4 additional culverts are needed including 1 type 2 culvert at a headcut.
28.	14-2	LOG agreed to add 5 culverts and upgrade the road to template A.
29.	21-2	Existing primitive road to the north to be signed closed to Oil and Gas traffic. LOG reduced the pad on the SE corner to buffer the headcut below the pad. Six type 2 culverts with armoring were added to the access road. The centerline of the access road was realigned to provide a 20' undisturbed, vegetative buffer above numerous headcuts.
30.	23-2	LOG added a 150 X 170 pad at this location that will also serve as a pullout along the access to the 11-2 location. LOG agreed to add culverts to the access road as needed.

31. 32-2 LOG moved the well 275' SW with a rig slot. The access road was modified a 2 headcuts to provide a 20' undisturbed vegetative buffer and type 2 culverts with armoring.
32. 34-2 LOG agreed to realign the access road to follow an existing stock water pipeline ROW offset to the north 15' to buffer the stock water pipeline; new disturbance width 35' overall. LOG agreed to reseed the entire disturbance and existing ROW with the approved seed mix.
33. 41-2 LOG withdrew the proposed stock tank at this location.
34. 43-2 The primitive road to the north will be signed closed to Oil and Gas Traffic. LOG agreed to move the well approximately 70' east with a rig slot; spoil from the slot be use to divert runoff around the well location. Diversion ditches may also be used to divert runoff. The open grass area below and west of the well location will be used for parking and staging. The road will incorporate the rig slot. The access Road G will be realigned to avoid the huge headcut. The alignment will be engineered beginning near the power drop is proposed and side hill down into the drainage well above the headcut to the well location. Provide a minimum 20' undisturbed vegetation buffer for the huge linear headcut below with an at-grade LWC.
35. 12-3 BLM recommended adding a culvert at the ingress to the pad and LOG agreed.
36. 21-3 LOG agreed to withdraw the proposed access for an alternate route from the north through Powder River Ranch avoiding 2 low water crossings across the same drainage and 0.83 miles of engineered road through high quality sage-grouse habitat.
37. 22-3 LOG agreed to withdraw the proposed access for an alternate route from the north through Powder River Ranch avoiding 2 low water crossings across the same drainage and 0.83 miles of engineered road through high quality sage-grouse habitat.
38. 31-3 LOG agreed to reduce the pad to 150 X 170 with a 20" vegetative buffer for the headcut below the SE corner and upgrade the Road I-1 to template minimizing overall width to 40". Blue Butte Ranch requested a stock tank here and BLM agreed.
39. 43-3 LOG agreed to reduce the pad to 150' X 170' rounding the SE corner to avoid a bare soil knob.
40. 14-24 LOG agreed to minimize the access to template D access road/corridor to 35' overall width. The primitive road continues NW of the well location will be closed by the construction of the pad and will be signed closed by LOG.
41. 21-24 LOG agreed to minimize the access/corridor to 35' overall width and avoid the rock outcropping at the upper end of the access road.
42. 32-24 The topsoil pile was moved to the top of ridge at NW corner of pad. LOG agreed to place the road and corridor alignment to follow the existing primitive road and fence line for Road O. The existing fence line will need to be removed and LOG has agreed to replace the fence with wildlife friendly fencing as per BLM manual Rel. 1-1572.
43. 33-24 LOG agreed to place the road and corridor alignment to follow the existing primitive road and fence line for Road O. The existing fence line will need to be removed and LOG has agreed to replace the fence with wildlife friendly fencing as per BLM manual Rel. 1-1572.
44. 34-24 LOG requested the well be moved 58' SW to provide for more work space, BLM agreed. BLM recommended that the intersection at the main road will be perpendicular rather that a "Y"; LOG agreed. LOG agreed to 35' overall width for this single well access road and corridor.
45. 41-24 LOG agreed to 35' overall width for the access road and corridor.
46. 42-24 LOG agreed to 35' overall width for the access road and corridor.
47. 13-25 LOG agreed to reduce the pad by rounding 3 pad corners excluding the SW corner with the access road.

48.	21-25	LOG agreed to continuing road engineering to the 21-25 location due to grade >8% and side slopes 10-20%.
49.	23-25	BLM agreed to allow a stock tank be added at this location.
50.	32-25	LOG agreed to shift the centerline between St 0+00 to St 20+00 SE and avoid rock outcroppings.
51.	41-25	BLM will allow the staging of support vehicles between the well location and the access road
52.	44-25	The centerline of the existing access road will be shifted upslope to reduce the curve and avoid a deep headcut that is next to the existing road. The trees cleared are to be scattered on the natural bench below this location.
53.	23-26	The well was moved to shifting the pad downhill to avoid 25% slope. The alignment of Road Q was realigned from the 24-26 location to the 23-26 to avoid 25% slopes and the majority of a sand blowout. An overall width for the access road/corridor is 40'. The large ponderosa tree below the alignment will act as the down slope disturbance boundary. Junipers and ponderosas removed will be scattered through the sand blowout area. A stock tank was added at this location.
54.	24-26	LOG agreed to reclaim that portion of the existing primitive road that the alignment of road Q does not follow. Sign the primitive road to the east "Closed to Oil & Gas"
55.	Road L	LOG agreed to add culverts as directed by BLM. LOG agreed to engineer the proposed template section of Road L between the start of 44-25 and the start of Road M (Delta POD) to increase curve radius and sight distance.
56.	Road K	Road K was realigned at its start at the 43-34-5077 Fee well location and cross the steep drainage and intersect with Road 43-26. The drainage crossing is requested by the land owner as a permanent road. The culvert for the crossing will be sized for a 100 year storm event. Juniper and ponderosa pine trees removed will be scattered throughout the sand blow outs for soil stabilization.
57.	Road 43-26	That portion of Road 43-26A (engineered sheets 45-46) within the Somerville Draw channel was withdrawn from the plan.
58.	Road G	The centerline will be adjusted to curve above existing headcuts providing a 20 foot undisturbed vegetative buffer. An alternate route to the 43-2 location will be used beginning approximately at the power drop location proposed along Road G and side hill down to the 43-2 location well above the 50 foot head cut. LOG agreed to fully reclaim the segment of existing primitive road avoided.
59.	Road I	LOG agreed barricade the existing primitive road along the ridge top that parallels this proposed access road. Add culverts as needed. BLM recommends that LOG pursue access to the 21-3 & 22-3 location from the north and at the 43-3 location. Road I north of the 43-3 location is within 0.25 mile CSU of the Maycock lek; BLM recommends that the segment of Road I and utility corridor north of the 43-3 location be withdrawn.
60.	Williams Draw Corridor	LOG withdrew the utility corridor.
61.	Section 17 Corridor	Approximately 0.8 miles corridor proposed along a common corridor route previously disturbed for existing infrastructure. Disturbance width will be minimized to 35 feet where bench cutting is not required. Where bench cutting is required, disturbance will be minimized to 45 feet overall.
62.	21-8 Corridor	The alignment was shifted to follow the existing primitive road from the 21-8 location into Laskie Draw along a bench on the west side of the channel. Disturbance width will be minimized to 35 feet overall where bench cutting is not required. Where bench cutting is required, disturbance will be limited to 45 feet overall.

The following changes were to the Williams Draw Unit Delta project during the onsites:

1. 11-7 LOG agreed to reduce the pad to a 150' X 170'. Engineered Road C was realigned to avoid the tight curve between ST 7+00 & 10+00.
2. 12-7 LOG agreed to reduce the pad to 150' X 170'. The pad was redesigned avoid slopes 25% and greater. LOG agreed to realigned Road D ST 26+00 to 33+00 to avoid the steep slopes of 25% and greater.
3. 21-7 LOG agreed to reduce the pad by rounding the corners on the cut slopes and redesign the pad to avoid the 25% slopes. LOG requested a slash pile be allowed at this location. LOG agreed to withdraw the access road & corridor to the north as per landowner request.
4. 23-7 LOG agreed to reduce the pad to 150' X 170' and design the pad to avoid the slopes 25% and greater. LOG agreed to withdraw Road D segment St. 0+00 to 26+00.
5. 33-7 LOG agreed to reduce the pad to avoid 25% slopes on the cut side of this drive through pad.
6. 41-7 BLM recommends LOG withdraw the APD and associated Road H as slopes in excess of 25% are unavoidable along the proposed access alignment and at the pad location.
7. 44-7 LOG moved the location 375' east and withdrew the pad.
8. 44-8 LOG agreed to reduce the pad to 150' X 170 and avoid storing topsoil over 25% slopes. A cross country utility corridor is proposed from the east via Augusta Unit that would provide access to this location with a template road. BLM recommends LOG withdraw Road 44-8 and pursue alternate access to the location.
9. 11-17 LOG withdrew the proposed rig slot.
10. 14-17 LOG agreed to reduce the pad to 150' X 170'.
11. 23-17 BLM requires the pad to be reduced to 150' X 170'. LOG agreed to shift the alignment of Road 23-17 to avoid the sage-grouse habitat and limit the width to 40' overall.
12. 31-17 LOG's well pad design has been compromised by the construction of their Fee access road through the cut slope. LOG will redesign the well pad and resubmit.
13. 34-17 LOG agreed to shift the alignment of template section of Road J to the east shortening the length and limit the width to 40' overall.
14. 41-17 LOG agreed to redesign the pad to avoid 25% slopes.
15. 44-17 LOG agreed to move the well NE 760' avoiding slopes 25% and greater.
16. 14-18 The well is located along an abandoned O&G road. LOG agreed to move the well about 200 feet north to a P&A well location. LOG agreed to withdraw the pad for a rig slot.
17. 24-18 The road is to be upgraded to template A.
18. 32-19 LOG agreed to have the road engineered and use the excess material identified in the well pad design in the access road design.
19. 34-19 LOG agreed to reduce the pad to 150' X 170’.
20. 43-19 LOG agreed to upgrade the access to template A. The existing primitive road to the north will be barricaded closed.
21. 13-20 LOG agreed to upgrade the road to template A but limit the road from the 23-20 to the 13-20 to 35' overall width.
22. 14-20 LOG can use the available open grassy area for auxiliary equipment and completion vehicles. LOG agreed to upgrade the proposed road to template A to surface over the shallow sandy soil.
23. 23-20 LOG withdrew the pad for a rig slot.
24. 31-20 LOG agreed to move the well north 420' north to avoid steep slopes and highly erosive soils and reduce the pad to 150' X 170'. Road J was realigned to pass through the 34-17 location, side hilling upslope to the ridge top and tying into the proposed template road to the 31-20 at the 40 line.
25. 32-20 LOG agreed to bury the utilities from the 34-20 location to the end of Road A within the road construction disturbance to minimize disturbance width.

26. 34-20 LOG requested to move the well to the road and withdraw the pad for an eye-brow rig slot. The grazing lessee requested a stock tank at this location.
27. 41-20 Road E was re-aligned and re-designed ST 0+00 to 15+00 following the toe of slope along the east side of the drainage.
28. 42-20 LOG agreed to shift the alignment of the road between ST 0+00 to 14+00 to follow the existing road. From ST 14+00 to 20+00 the alignment will no longer follow the existing road but will shift to the center of the ridge and the existing fence line will be removed and reconstructed east of Road E avoiding a fence crossing. LOG agreed to bury the utilities within the road disturbance.
29. 13-29 LOG agreed to reduce the pad size with the dimensions to be determined. The start of Road O was shifted about 950 feet north.
30. 14-29 LOG agreed to realign the access road to the follow the existing trail south and west of the location. LOG agreed to limit template section of Road N between the 43-30 and 14-29 to 45' overall width.
31. 21-29 LOG withdrew the constructed pad design for an eyebrow rig slot.
32. 23-29 LOG agreed to reduce the pad 150' X 170'.
33. 32-29 LOG withdrew the pad design for a rig slot.
34. 42-29 LOG agreed reduce the pad and avoid the bare soils at the ends of finger ridges along the north end of the pad. There is concern that the start of Engineered Road Q does not provide for an adequate landing at the intersection with template Road Q. LOG will widen at the intersection and extent the design 100' SW beyond the intersection (over the template A segment). LOG and Williams Production Company will coordinate the installation of utilities into a common corridor. The operators must coordinate construction and installation to minimize disturbance and expedite interim reclamation.
35. 44-29 LOG agreed to withdraw the pad for a rig slot to minimize surface disturbance. LOG may utilize the available open grass area NW of the location for turning trucks & staging equipment.
36. 13-30 LOG agreed to move the well 100' east to accommodate greater turning radius. The pad was reduced to 150' X 170'. Engineered road 13-30 is withdrawn. The new access route is begins at the Barber Creek oil field road SW of the new well location.
37. 14-30 LOG agreed to realign and engineer WDU Gamma Road 44-25 to NWNW section 31 T50NR76W avoid the shale blow out.
38. 21-30 The pad was reduced to 150' X 170'.
39. 33-30 LOG agreed to reduce the pad 150' X 170'. Road N engineered segment be minimized to a 14' running surface. Road N crosses an existing, unpermitted stock reservoir ST 6+00 to 9+00. This structure will be breeched and an adequately sized culvert will be installed.
40. 34-30 LOG agreed to move the well 100' west and minimize the access/corridor to 45' overall. Reduce pad to 150’ X 170’. The proposed Template A segment of the access road was realigned with the 21-31 well move to avoid a large blowout. A large juniper tree along this north slope will not be removed facilitating a biological buffer to avoid the blowout for the road alignment. The proposed template B segment of the access road was realigned upslope avoiding sagebrush.
41. 41-30 LOG agreed to reduce the pad 150' X 170' and minimize the road to 45' overall width.
42. 43-30 LOG agreed to minimize the template section of Road N between the 43-30 and 14-29 to 45' overall width.
43. 21-31 LOG agreed to move the well 210' SW to avoid a large blowout and steep slopes. The segment of Road L located NENW section 31, T50NR76W was engineered to improve site distance and increase the curve radius between PCULV 21-31 and the intersection of WDU Gamma-Road 44-25.

44. 22-31 LOG agreed to reduce the pad to 150' X 170' and minimize the template A road (WDU Gamma-Road L) by baring the utilities in the road way. BLM requires the utilities will be buried in the roadway from the WDU Delta 23-31 location to the end of Road L.
45. 23-31 LOG agreed to reduce the pad to 150' X 170' and minimize the template A road (WDU Gamma-Road L) by baring the utilities in the road way. BLM requires the utilities will be buried in the roadway from the WDU Delta 23-31 location to the end of Road L.
46. 33-31 LOG agreed to reduce the pad to 150' X 170' and add a cross drain culvert to the template road.
47. 41-31 LOG agreed to reduce the pad to 150' X 170'. LOG agreed to engineer this segment of Road 41-31 with 12' running surface and 1.5:1 back slope. A culvert was added above the head cut identified NWNW section 31 T50NR76W; water will be directed away from the headcut.
48. 43-31 LOG agreed to reduce the pad to 150' X 170' and redesign the pad to avoid the blowout located on the cut end of pad. LOG agreed to limit the access & corridor disturbance to 45' overall.
49. 12-32 LOG agreed to reduce the pad 150' X 170' and round the SW corner. Road 12-32 was upgraded to template A. The proposed stock tank was moved to the well pad.
50. 31-32 LOG agreed to reduce the pad 150' X 170' and upgrade Road 31-32 to a template A to add surfacing through the shallow sandy soil. Road 31-32 and corridor will be limited to 45' overall where side slopes exist and 35' overall on the ridge top.
51. 33-32 LOG agreed to reduce the pad by rounding the SW & NE corners. LOG will place a sign on WDU Gamma-Road B west of the intersection with Road 33-32; "SLOW - Trucks Turning on to Road".
52. 43-32 LOG agreed to reduce the pad to 150' X 170'.
53. 44-32 LOG agreed to move the well east 165'.
54. 12-12 LOG agreed to reduce the pad to 150' X 170' with topsoil storage at the east end of pad above the fill slope.
55. 32-12 LOG agreed to fully reclaim and barricade the existing primitive road between the 32-12 and 33-12 locations.
56. 33-12 LOG agreed to reduce the pad to 150' X 170'. The well was moved south about 45 feet to avoid 25% slopes in the cut. Add a culvert between the PCULV 23-12B and the pad. A drainage ditch was added on the east side of the pad to direct run-off way from the pad.
57. 41-12 LOG agreed to withdraw the pad for a rig slot and moved the well out of line of sight of the raptor nest BLM ID 5850. LOG may utilize the available open grass area adjacent to the location for turning & staging equipment. Template road to the SW will be limited to 45' overall.
58. 42-12 LOG agreed to move the well south out of line of sight of nest 5850 (RETA) and reduce the pad to 150' X 170'. The intersection of Road 41-12 and Road C was shifted to ST 10+00 of Road C. Road 41-12 was realigned to follow the existing primitive road alignment to the 11-7 location. The existing primitive road to the south will be barricaded and closed.
59. 43-12 LOG will upgrade the proposed Road C to a template A to add surfacing. The access road crosses the Kitty Hawk Reservoir. BLM has no interest in keeping the reservoir and requires LOG to place an adequately sized culvert through the structure to ensure the integrity of the proposed access road.
60. 11-13 LOG agreed to modify the pad design. A 20' vegetative buffer will be maintained for the headcut located below the fill slopes. Rock armoring will be implemented at interim reclamation to protect the headcut from surface runoff and soil transport. The landowner requires existing fence line to be moved to the top of the cut slope and eliminate the need for an access gate.

61.	12-13	LOG agreed to realign intersection of the Road 12-13 and WDU Gamma-Road O to be perpendicular. The pad design was modified to show silt fence at the down slope side to the topsoil pile.
62.	13-13	LOG agreed to reduce the pad 150' X 170'. Landowner requested the road to be realigned to follow the edge of the sagebrush.
63.	14-13	LOG agreed to upgrade the road to a template A but limit the disturbance width to 35' overall with a 12 running surface as per the landowners request.
64.	23-13	LOG agreed to move the wells about 165' east as per landowner request. The pad was reduced to 150' X 170'.
65.	34-13	LOG agreed to withdraw the pad design for a rig slot location and upgrade the access road to a template A to surface over the shallow sandy soil. The location is next to an existing fence line that will need to be removed temporarily.
66.	43-13	LOG agreed to reduce the pad size. There are some rock outcrops along the access road alignment will be avoided. The access & corridor was limited to 35' overall.
67.	24-34	LOG agreed reduce the pad to 150' X 170' with a ramp on to the pad allowing for clearance of the pipe trailer.
68.	32-34	LOG agreed to upgrade the template road segments to template A to accommodate the ADT. LOG agreed to withdraw the segment of Road K between the 12-34-5077 fee well and the 32-34-5077 for corridor only.
69.	33-34	LOG agreed to move the well 611' east and realign the Road S upslope to follow the slope break. The new location requires a 150' X 150' pad.
70.	12-35	LOG agreed to reduce the pad to 150' X 170'.
71.	21-35	LOG agreed to reduce the pad to 150' X 170'.
72.	23-35	LOG agreed to reduce the pad to 150' X 170'. 3 culverts will be added as needed south of the location.
73.	24-35	LOG agreed to upgrade the access to template A.
74.	33-35	LOG agreed to move the well and redesign the pad to avoid the newly installed WPC water pipeline.
75.	42-35	LOG will revise the pad design to include silt fencing below the topsoil pile. Road B was upgraded to a template A.
76.	43-35	LOG agreed to round the SE corner of the pad to avoid filling through a small drainage. A culvert was added to the proposed road about 300' SE of the pad. Road B was upgraded to a template A.
77.	44-35	Road 44-35 was upgraded to template A to establish drainage.
78.	Road 23-17	LOG agreed to shift the alignment of Road 23-17 to avoid the sage-grouse habitat and limit the width to 40' overall. The engineered segment is to be withdrawn.
79.	Road 42-12	The intersection of Road 42-12 and Road C was shifted to ST 10+00 of Road C. Road 42-12 was realigned to follow the existing primitive road alignment to the 11-7 location. The existing primitive road to the south will be barricaded and closed.
80.	Road 44-8	Engineered Road 44-8 was withdrawn to avoid steep slopes and an alternate route from the NE was selected.
81.	Road B	Road B was upgraded to a template A.
82.	Road C	This road was upgraded to a template A. The access road crosses the Kitty Hawk Reservoir. LOG will place an adequately sized culvert through the structure to ensure the integrity of the proposed access road. Engineered Road C was realigned to avoid the tight curve between ST 7+00 & 10+00.

83. Road M — The proposed Template A segment of the access road was realigned with the 21-31 well move to avoid a large blowout. A large juniper tree along this north slope will not be removed facilitating a biological buffer to avoid the blowout for the road alignment. The proposed template B segment of the access road was realigned upslope avoiding sage brush.
84. Road Q — LOG agreed to widen at the intersection and extend the engineered design 100' SW beyond the intersection. LOG agreed to coordinate the installation of utilities into a common corridor with Williams Production Company coinciding construction and installation.
85. Road S — The road was realigned to minimize surface disturbance and meet BLM standards.

2.3.2. Operator Committed Measures

- LOG plans to bury electrical power.
- The water management strategy for the project is to pipe produced water to treatment facilities and discharge directly to the Powder River.
- LOG submitted a site specific reclamation plan for WDU Gamma on August 3, 2009 and for WDU Delta on October 5, 2009 to recognize reclamation limitation within the project area.
- November 12, 2009 LOG and Williams Production RMT Company met with BLM at the Buffalo Field Office to present their plans to minimize impacts to Fortification Creek elk herd for through a coordinated development of the remaining Williams Draw Unit and neighboring Carr Draw Unit CBNG developments. This included a voluntary phased development scenario on behalf of LOG for the WDU Gamma and Delta projects.
- December 21, 2009 LOG submitted plans for coordinated development of the Williams Draw Unit Gamma and Delta PODs included the voluntary phased development scenario.
- LOG submitted a geotechnical report including a risk assessment of site specific project components proposed over slopes exceeding 25% on January 13, 2010.

2.3.3. Programmatic mitigation measures identified in the PRB FEIS ROD

Programmatic mitigation measures are those, determined through analysis, which may be appropriate to apply at the time of APD approval if site specific conditions warrant. These mitigation measures can be applied by BLM, as determined necessary at the site-specific NEPA APD stage, as COAs and will be in addition to stipulations applied at the time of lease issuance and any standard COA. Please see Record of Decision and Resource Management Plan Amendments for the Powder River Basin Oil and Gas Project (WY–070–02–065), Appendix A.

All programmatic mitigation measures, standard and site specific conditions of approval applied to the WDU Gamma and Delta PODs are included in Appendix I of this environmental assessment.

2.3.3.1. Surface Water

1. Channel Crossings:
   a) Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM.
   b) Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

2.3.3.2. Wildlife

1. For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
2. All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations.
3. The Companies will locate facilities so that noise from the facilities at any nearby sage grouse or sharp-tailed grouse display grounds does not exceed 49 decibels (10 dBA above background noise) at the display ground.

2.3.3.2.1. Threatened, Endangered, or Sensitive Species

The companies will conduct clearance surveys for threatened, endangered or other special-concern species at the optimum time. Inventory for special concern species, other than federally listed species below, is contingent upon landowner concurrence. This will require coordination with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters.

Mountain Plover

1. Creation of hunting perches or nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.

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

Ute Ladies'-tresses Orchid

1. Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid the establishment of noxious weeds.

2.3.3.3. Visual Resources

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

2.3.3.4. Air Quality

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

2.3.4. Alternative C Conditions of Approval

2.3.4.1. Standard Conditions of Approval

The Standard Conditions of Approval have been taken from the Record of Decision and Resource

Management Plan Amendments for the Powder River Basin Oil and Gas Project, (WY–070–02–065), Appendix A as needed.

2.3.4.2. Site-Specific

The following site specific Conditions of Approval are measures in addition to the programmatic and standard COAs developed by the BLM ID team to mitigate the WDU Gamma and Delta specific environmental consequences discussed and analyzed in Chapter 4 of this environmental assessment.

Travel Management

1. In order to maintain the travel management objectives in the RMP and to reduce conflicts between the public relative to new roads in the project area, the company will sign the junctions of private and public roads.
2. Travel within the William Draw Unit Gamma and Delta PODs, on all private roads that would access Federal land, is restricted to authorized company personnel serving in their official capacity. Signs reading "Private Road - No Public Access" will be installed at the intersection of private and public roads within the project area. Contact the Outdoor Recreation Planner at BLM BFO for specific direction regarding signage and related materials. Gates may be required to be installed if necessary to prevent unauthorized travel. The signs and gates will be provided and maintained by the operator.

2.3.4.2.1. Surface Use

1. To minimize surface disturbance and vegetation loss the following applies for rights-of-way WYW-170026 for road, water pipeline and buried power and WYW-170027 for "up to 20 inch" gas pipeline located T.49N., R.76W., section 9;T. 50N., R.76W., Sec. 6, 7, 21; and T. 50N., R.77W., Sec. 10, 12:
   a. All utilities will corridor with access routes and will extend approximately 20,099 feet in length.
   b. Proposed access to existing and/or proposed improved road/proposed water, buried electric cable, gas: not to exceed a total 50 foot width.
   c. If conditions warrant the use of primitive roads, then the proposed primitive/proposed water pipeline, and buried electric cable, gas: not to exceed a total 30 foot width.
2. BLM's preferred access to the 44-32 location is Williams Draw Unit Gamma Road B-2 Alternate. LOG will NOT CONSTRUCT the WDU Gamma Road B-2 to avoid steep slopes and highly erosive soils. LOG will remove all staking associated with this alignment prior to construction of Road B-2 Alternate.
3. LOG will apply a minimum of 4" of aggregate across the entire working surface (150' x 150') of the 34-5 location to protect fragile soils.
4. For all wells spudded after November 1, the reserve pit fluids must be removed immediately following completion activities to avoid potential conflicts with raptor nesting timing limitations (February 1) and the standard COA that reserve pits be closed within 90 days, unless an exception is granted by the BLM Authorized Officer.
5. All trees removed during construction will be salvaged. These trees will remain whole and used for stabilization and erosion control per BLM direction unless otherwise specified by the private surface owner. No trees will be buried to avoid subsidence.
6. The operator will follow the guidance provided in the Wyoming Policy on Reclamation (IM WY-2009-022); See http://web.wy.blm.gov/Wy.im/09/wy2009-022-atch1.pdf for details.
7. To minimize surface disturbance and vegetation removal:
   a. Improved roads with utility corridor working width will not exceed 50 feet with a clearing and blading not to exceed 40 feet in width unless a specific design is included in the plan and profile section of the master surface use plan.
   b. Pipeline installation and/or corridors without road access working width will not exceed 35 feet with clearing and blading not to exceed 20 feet.
   c. Mowing at the well site where a constructed pad is not approved as designed will be minimized to a diameter of 75 feet or less from the well stake.

8. To reduce erosion, thick walled plastic SDR9 pipe (or pipe with similar characteristics that will resist crushing with a minimum cover) may be used for ditch relief culverts. 9" or larger sizes must be used and a ditch block will be constructed as shown on a typical detail. 12" of cover will not be required for these pipes. They are not to be used for established drainages crossing the road.
9. To reduce subsidence, all pit spoil must be placed back in the pit once dry. If necessary, the pit area should be mounded slightly or restored to the original contour to allow for settling and positive surface drainage.
10. To reduce visual impacts and vertical intrusion, all permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates "Standard Environmental Colors." Temporary structures (i.e. generators, etc.) present for more than 90 days will be required to comply with visual resource mitigation. The color selected for the William Draw Unit Gamma and Delta PODs is Covert Green, 18-0617 TPX.
11. Final grading and surfacing shall occur immediately after utility installation is complete. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.
12. The Williams Draw Unit Gamma and Delta Project area is dominated by steep slopes and/or fragile soils. Improved roads used in conjunction with accessing federal wells must be fully built (including all water control structures such as wingditches, culverts, relief ditches, low water crossings, surfacing, etc.) and functional to BLM standards as outlined in the BLM Manual 9113 prior to drilling of the well. This applies to the ENTIRE Williams Draw Gamma and Delta project areas.
13. The Williams Draw Unit Gamma and Delta Project area is dominated by soils that have been identified to have limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities. This applies to the ENTIRE Williams Draw Unit Gamma and Delta Project areas.
14. BLM has developed seed mixes for each ecological site identified within the project area based on the NRCS ecological site description, the reference plant community and desired species richness with the intent of maximizing re-vegetation potential. The operator will seed on the contour to a depth of no more than 0.5 inch. To maintain quality and purity, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following: See Attachment 1 for the appropriate seed mix by Ecological Site.

2.3.4.2.2. Wildlife

1. BLM's preferred access road to the 41-8-4976, 33-8-4976 and 44-5-4976 locations is the WDU Gamma Road F-2 located within NW section 9 T49N/R76W. Lance Oil & Gas Company will NOT CONSTRUCT WDU Gamma Road F within 0.25 miles of the Laskie Draw lek to minimize impacts to sage-grouse and their habitats. This includes those segments of the proposed Road F located within SW section 4 T49N/R76W. All staking associated with this alignment will be removed prior to construction of Road F-2.

Burrowing Owls

The following conditions will alleviate impacts to burrowing owls:

1. No surface disturbing activity shall occur within 0.25 miles of all identified prairie dog colonies from April 15 to August 31, annually, prior to a burrowing owl nest occupancy survey for the current breeding season. A 0.25 mile buffer will be applied if a burrowing owl nest is identified. This condition will be implemented on an annual basis for the duration of surface disturbing activities

within the prairie dog town(s). This timing limitation will be in effect unless surveys determine the nest(s) to be inactive. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
T50N/R76W	7	Well location(s): 44-7-5076 All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SESE of this section.
T50N/R76W	8	Well location(s): 14-8-5076 All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SWSW of this section.
T50N/R76W	17	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NWNW of this section.
T50N/R76W	18	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NENE of this section.
T49N/R76W	4	All access road within 0.25 miles of the mapped prairie dog colony within the SWSW of this section.
T49N/R76W	9	All access road within 0.25 miles of the mapped prairie dog colony within the NWNW of this section.
T49N/R76W	17	Well location(s): 12-17-497 All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SW, NENW and SWNW of this section.
T49N/R76W	18	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NESE, SESE, SWSW and SESW of this section.
T49N/R77W	13	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SESE, SWSE and SESW of this section.

Mountain Plover

The following conditions will alleviate impacts to mountain plovers:

1. A mountain plover nesting survey is required in suitable habitat prior to commencement of surface disturbing activities in the following areas:

   Mountain plover nesting surveys shall be conducted by a biologist following the most current USFWS Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities.

   a. No surface disturbing activities are permitted in the suitable habitat area listed above, from March 15-July 31, unless a mountain plover nesting survey has been conducted during the current breeding season. This timing limitation will be in effect unless surveys determine no plovers are present. This timing limitation will affect the following:

Township/Range	Section	Wells and Infrastructure
T50N/R76W	7	Well location(s): 44-7-5076 All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SESE of this section.
T50N/R76W	8	Well location(s): 14-8-5076 All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SWSW of this section.
T50N/R76W	17	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NWNW of this section.

Township/Range	Section	Wells and Infrastructure
T50N/R76W	18	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NENE of this section.
T49N/R76W	4	All access road within 0.25 miles of the mapped prairie dog colony within the SWSW of this section.
T49N/R76W	9	All access road within 0.25 miles of the mapped prairie dog colony within the NWNW of this section.
T49N/R76W	17	Well location(s): 12-17-4976 All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SW, NENW and SWNW of this section.
T49N/R76W	18	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the NESE, SESE, SWSW and SESW of this section.
T49N/R77W	13	All access road and associated utility corridor within 0.25 miles of the mapped prairie dog colony within the SESE, SWSE and SESW of this section.

b. If occupied mountain plover habitat is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plover observations are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15).
c. No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.

Raptors

The following conditions will alleviate impacts to raptors:

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

Township/Range	Section	Wells and Infrastructure
T50N/R77W	11	All access road and associated utility corridor within the NESE, NWSE and NESW of this section.
T50N/R77W	12	Well location(s): 32-12-5077, 33-12-5077, 42-12-5077 and 43-12-5077 All access road and associated utility corridor within this ENTIRE section.
T50N/R77W	13	Well location(s): 11-13-5077, 12-13-5077, 13-13-5077, 14-13-5077, 23-13-5077, 34-13-5077 and 43-13-5077 All access road and associated utility corridor within this ENTIRE section.
T50N/R77W	22	All access road and associated utility corridor within this ENTIRE section.
T50N/R77W	23	All access road and associated utility corridor within this ENTIRE section.
T50N/R77W	24	Well location(s): 21-24-5077, 32-24-5077, 41-24-5077 and 42-24-5077 All access road and associated utility corridor within this ENTIRE section.
T50N/R77W	25	Well location(s): 13-25-5077, 23-25-5077, 34-25-5077, 32-25-5077 and 41-25-5077

Township/Range	Section	Wells and Infrastructure
		All access road and associated utility corridor within the SENE, SWNE, SESE and SW of this section.
T50N/R77W	26	All access road and associated utility corridor within the NW of this section.
T50N/R77W	34	Well location(s): 24-34-5077, 32-34-5077, 33-34-5077, 34-34-5077 and 43-34-5077 All access road and associated utility corridor within the SE, SESW, SENE and S2SWNE of this section.
T50N/R77W	35	Well location(s): 23-35-5077, 24-35-5077 and 33-35-5077 All access road and associated utility corridor within the NESE, NWSE, SW and SWNW of this section.
T50N/R77W	36	All access road and associated utility corridor within this ENTIRE section.
T50N/R76W	7	Well location(s): 11-7-5076 and 44-7-5076 All access road and associated utility corridor within this ENTIRE section.
T50N/R76W	8	Well location(s): 14-8-5076 All access road and associated utility corridor within this ENTIRE section.
T50N/R76W	17	Well location(s): 11-17-5076, 23-17-5077, 31-17-5076, 41-17-5076 and 43-17-5076 All access road and associated utility corridor within this ENTIRE section EXCEPT the W2SWSE and SWSW.
T50N/R76W	18	Well location(s): 14-18-5076, 23-18-5076, 24-18-5076, 32-18-5076 and 43-17-5076 All access road and associated utility corridor within this ENTIRE section EXCEPT the E2SESE.
T50N/R76W	19	Well location(s): 14-19-5076, 22-19-5076, 23-19-5076 and 34-19-5076 All access road and associated utility corridor within this ENTIRE section EXCEPT the NESE and SENE.
T50N/R76W	20	Well location(s): 14-20-5076 and 34-20-5076 All access road and associated utility corridor within the SE, SENE, SWNE, SESW and NESW of this section.
T50N/R76W	29	Well location(s): 13-29-5076, 14-29-5076, 21-29-5076, 23-29-5076, 32-29-5076, 42-29-5076, 43-2-5076 and 44-29-5076 All access road and associated utility corridor within this ENTIRE section.
T50N/R76W	30	Well location(s): 12-30-5076, 13-30-5076, 14-30-5076, 21-30-5076, 41-30-5076 and 43-30-5076 All access road and associated utility corridor within this ENTIRE section EXCEPT the SESW and SWSE.
T50N/R76W	31	Well location(s): 12-31-5076, 21-31-5076, 22-31-5076, 23-31-5076, 33-31-5076, 41-31-5076 and 43-31-5076 All access road and associated utility corridor within the W2SWSE, NESE, NENE, NENW, NWNW, SWNW, SWSW and NESW of this section.
T50N/R76W	32	Well location(s): 12-32-5076, 23-32-5076, 31-32-5076 and 41-32-5076 All access road and associated utility corridor within the NW, NENE, NWNE, NWSW and NESW of this section.

Township/Range	Section	Wells and Infrastructure
T49N/R77W	1	Well location(s): 12-1-4977, 23-1-4977, 32-1-4977, 33-1-4977, 41-1-4977 and 43-1-4977 All access road and associated utility corridor within this ENTIRE section EXCEPT the NWNE and N2SWNE.
T49N/R77W	2	Well location(s): 14-2-4977, 21-2-4977, 34-2-4977 and 43-2-4977 All access road and associated utility corridor within the NW, NENE, NWNE, NWSW and NESW of this section.
T49N/R77W	3	Well location(s): 31-3-4977 All access road and associated utility corridor within the N2NWNE and N2NENW of this section.
T49N/R77W	10	All access road and associated utility corridor within the NENE of this section.
T49N/R77W	11	All access road and associated utility corridor within the NENE, NWNE and NENW of this section.
T49N/R77W	12	All access road and associated utility corridor within the NENE of this section.
T49N/R77W	13	All access road and associated utility corridor within the N2SESW, SWSE and SESE of this section.
T49N/R76W	4	All access road within this ENTIRE section EXCEPT the S2SWSW.
T49N/R77W	5	All access road and associated utility corridor within the S2SESE of this section.
T49N/R77W	6	Well location(s): 11-6-4977, 12-6-4977, 13-6-4977, 22-6-4977 and 33-6-4977 All access road and associated utility corridor within the NW and NWSW of this section.
T49N/R77W	8	Well location(s): 33-8-4977, 41-8-4977 and 43-8-4977 All access road and associated utility corridor within the NENE, SWNE, NWSE and NESE of this section.
T49N/R77W	9	All access road and associated utility corridor within the N2SWSW and NWSW of this section.
T49N/R77W	17	Well location(s): 12-17-4977, 23-17-4977, 32-17-4977, 34-17-4977 and 43-17-4977 All access road within this ENTIRE section EXCEPT the NENE and NENW.
T49N/R77W	18	All access road and associated utility corridor within the NESE, SESE, SWSE and E2SESW of this section.

a. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.

b. Nest occupancy and productivity checks shall be completed for nests within a 0.5 mile of any surface disturbing activities across the entire POD for as long as the POD is under construction. Once construction of the POD has ceased, nest occupancy and productivity checks shall continue for the first five years on all nests that are within a 0.5 mile of locations where any surface-disturbing activities took place. Productivity checks shall be completed only on those nests that were verified to be occupied during the initial occupancy check of that year. The productivity checks shall be conducted no earlier than June 1 or later than June 30, and any evidence of

nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. The nests that are checked each year is subject to change, pending surveys.

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

Sage-Grouse

The following conditions will alleviate impacts to sage-grouse:

1. No surface disturbing activities are permitted from March 1 to June 15. This condition will be implemented on an annual basis for the life of the project. This condition affects the following locations:

Township/Range	Section	Wells and Infrastructure
T50N/R77W	11	All access road and associated utility corridor within the NESE and NWSE of this section.
T50N/R77W	12	Well location(s): 43-12-5077 All access road and associated utility corridor within the NESE, SENE and NENE of this section.
T50N/R77W	13	Well location(s): 12-13-5077 and 13-13-5077 All access road and associated utility corridor within the ENTIRE section EXCEPT the NWNW and SWNW.
T50N/R77W	22	All access road and associated utility corridor within the NESW, SESW and SWSE of this section.
T50N/R77W	23	Well location(s): 23-23-5077 All access road and associated utility corridor within the SW and SWNW of this section.
T50N/R77W	24	Well location(s): 21-24-5077, 32-24-5077, 41-24-5077, 42-24-5077 All access road and associated utility corridor within the ENTIRE section.
T50N/R77W	25	Well location(s): 13-25-5077, 23-25-5077, 32-25-5077, 34-25-5077 and 41-25-5077. All access road and associated utility corridor within the ENTIRE section EXCEPT the SESE.
T50N/R77W	26	All access road and associated utility corridor within the ENTIRE section.
T50N/R77W	27	All access road and associated utility corridor within the ENTIRE section.
T50N/R77W	34	Well location(s): 24-34-5077, 32-34-5077, 33-34-5077, 34-34-5077 and 43-34-5077. All access road and associated utility corridor within the ENTIRE section.
T50N/R77W	35	Well location(s): 23-35-5077, 24-35-5077, 33-35-5077 and 44-35-5077 All access road and associated utility corridor within the ENTIRE section.
T50N/R76W	7	Well location(s): 11-7-5076 All access road and associated utility corridor within the ENTIRE section EXCEPT the SESE and NESW.

Township/Range	Section	Wells and Infrastructure
T50N/R76W	8	Well location(s): 44-8-5076 All associated utility corridor within the SESE, NWSW, SWNW and NWNW of this section.
T50N/R76W	17	Well location(s): 43-17-5076 All access road and associated utility corridor within the ENTIRE section EXCEPT the NENE.
T50N/R76W	18	Well location(s): 14-18-5076, 23-18-5076, 24-18-5076 and 32-18-5076 All access road and associated utility corridor within the ENTIRE section EXCEPT the SWSE.
T50N/R76W	19	Well location(s): 14-19-5076, 21-19-5076, 22-19-5076, 23-19-5076, 34-19-5076 and 43-19-5076. All access road and associated utility corridor within the ENTIRE section.
T50N/R76W	20	Well location(s): 34-20-5076 All access road and associated utility corridor within the ENTIRE section EXCEPT the SWSW.
T50N/R76W	29	Well location(s): 13-29-5076, 14-29-5076, 21-29-5076, 23-29-5076, 32-29-5076, 42-29-5076, 43-29-5076, and 44-29-5076. All access road and associated utility corridor within the ENTIRE section.
T50N/R76W	30	Well location(s): 12-30-5076, 13-30-5076, 14-30-5076, 21-30-5076, 33-30-5076, 31-30-5076, 41-30-5076 and 43-30-5076. All access road and associated utility corridor within the ENTIRE section.
T50N/R76W	31	Well location(s): 12-31-5076, 21-31-5076, 22-31-5076, 23-31-5076, 33-31-5076, 41-31-5076 and 43-31-5076. All access road and associated utility corridor within the ENTIRE section.
T50N/R76W	32	Well location(s): 12-32-5076, 14-32-5076, 23-32-5076, 31-32-5076, 33-32-5076, 41-32-5076, 43-32-5076 and 44-32-5076. All access road and associated utility corridor within the ENTIRE section.
T49N/R77W	1	Well location(s): 12-1-4977, 23-1-4977, 32-1-4977, 33-1-4977, 41-1-4977, and 43-1-4977. All access road and associated utility corridor within the ENTIRE section.
T49N/R77W	2	Well location(s): 11-2-4977, 21-2-4977, 23-2-4977, 32-2-4977, 34-2-4977, 41-2-4977, and 43-2-4977. All access road and associated utility corridor within the ENTIRE section EXCEPT SWSW.
T49N/R77W	3	Well location(s): 21-3-4977, 22-3-4977, 31-3-4977, 43-3-4977 and 44-3-4977. All access road and associated utility corridor within the ENTIRE section EXCEPT SW and SWNW.
T49N/R77W	10	All access road and associated utility corridor within the NESE of this section.
T49N/R77W	11	All access road and associated utility corridor within the NE of this section.
T49N/R76W	4	All associated access road within the SWSW of this section.

Township/Range	Section	Wells and Infrastructure
T49N/R76W	5	Well location(s): 11-5-4976, 41-5-4976, 32-5-4976, 34-5-7-4976 and 44-5-4976. All access road and associated utility corridor within the ENTIRE section.
T49N/R76W	6	Well location(s): 11-6-4976, 12-6-4976, 13-6-4976, 22-6-4976, 32-6-4976, 33-6-4976, and 41-6-4976. All access road and associated utility corridor within the ENTIRE section.
T49N/R76W	8	Well location(s): 12-8-4976, 14-8-4976, 23-8-4976, 33-8-4976, 34-8-4976 and 41-8-4976. All access road and associated utility corridor within the ENTIRE section.
T49N/R76W	9	All access road and associated utility corridor within the ENTIRE section.
T49N/R76W	16	All access road and associated utility corridor within the NWNW of this section.
T49N/R76W	17	Well location(s): 12-17-4976, 21-17-4976, 32-17-4976, 41-17-4976 and 43-17-4976. All access road and associated utility corridor within the SWSE, NESE and North half of this section.

a. A sage-grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
b. Maximum design speed on all operator-constructed and maintained roads (except county roads) will not exceed 25 miles per hour except travel along roads within 1/2 mile of the Laskie Draw or Laskie Draw East sage grouse lek. These roads will be posted at 10 mph. This will affect the all roads located within Sections 3 and T50N/R76W.

Sharp-tailed Grouse

The following conditions will minimize impacts to sharp-tail-grouse:

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

Bald Eagles

The following conditions will alleviate impacts to bald eagles:

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

through August 15 (CM8) prior to a nesting survey. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive. This affects the following wells and infrastructure:

Township/Range	Section	Wells and Infrastructure
T50N/R77W	22	All access road and associated utility corridor within the ENTIRE section.
T50N/R77W	27	All access road and associated utility corridor within the ENTIRE section.
T50N/R77W	33	All access road and associated utility corridor within the NENE of this section.
T50N/R77W	34	All access road and associated utility corridor within the North half of this section.

a. Surveys to document winter roost activity shall be conducted by a biologist following BLM protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.
b. If a nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle nest sites (February 1 - August 15).

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

Big Game

1. No surface disturbing activity shall occur within identified elk calving range from May 1 to June 30. This timing limitation will affect the following

Township/Range	Section	Wells and Infrastructure
T50N/R76W	5	All access road and associated utility corridor within the SWSW of this section.
T50N/R76W	6	All access road and associated utility corridor within the SESE, SESW and NESW of this section.
T50N/R76W	7	Well location(s): 11-7-5076, 21-7-5076, 33-7-5076 and 41-7-5076. All access road and associated utility corridor within the NE, NENW, NWSE, NESE and N2SESE of this section.
T50N/R76W	8	Well location(s): 14-8-5076 and 44-8-5076. All access road and associated utility corridor within the ENTIRE section.
T50N/R76W	12	Well location(s): 41-12-5076 All access road and associated utility corridor within the NENE of this section.
T50N/R76W	17	Well location(s): 11-17-5076, 31-17-5076 and 41-17-5076. All access road and associated utility corridor within the NENE and NWNE of this section.

2.3.5. Water Management

1. The operator will sample Elephant Springs located in NWSW Sec 30 T50N R76W, twice each year (spring and fall) to be analyzed for the parameters required for an initial WDEQ WYPDES permit for

the duration of production to monitor for any changes in water quality or quantity. Copies of water quality and quantity results will be provided to the BLM BFO. If it is determined that either are changing as a result of CBNG production in the area, additional mitigation may be required.

2.4. Alternatives considered but not analyzed in detail

Several alternatives for managing produced CBNG water from the Augusta Unit Zeta POD were evaluated. The operator has chosen not to pursue the following water management alternatives: direct discharge of raw production water, land application and water containment impoundments.

Neither Lance Oil & Gas Company Inc. nor the BLM was able to develop an additional alternative that would meet the purpose and need while being technically and economically feasible. Alternatives considered, but eventually discarded included employing horizontal or directional drilling methods from locations outside the elk Yearlong range. These methods were eliminated from detailed analysis as non-vertical drilling has not been proven to be technically or economically feasible for Powder River Basin CBNG development.

2.5. Summary of Alternatives

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

Table 2.1 Summary of the Alternatives

Facility	Alternative A (No Action) Existing Number/ Acres/Miles	Alternative B (Original Proposal) Proposed Number/ Acres/Miles	Alternative C (Environmental Alt.) Revised Number/ Acres/Miles
Total CBNG Wells	116	170	125
Well Locations Nonconstructed or Slotted Constructed	 NA NA	 37.5 88.6	 35 56.7
Number of Existing Conventional Wells	5	5	5
Number of Compressors Stations Acres of Compressor Stations	2 28.0	0 0.0	0 0.0
Ancillary (Staging/Storage Areas)	3	0	0
Template No Corridor With Corridor	 0 32.3	 5.6 36.2	 5.6 36.2
Engineered Roads No Corridor With Corridor	 0 0	 1.3 24.9	 1.3 13.1

Facility	Alternative A (No Action) Existing Number/ Acres/Miles	Alternative B (Original Proposal) Proposed Number/ Acres/Miles	Alternative C (Environmental Alt.) Revised Number/ Acres/Miles
Primitive Roads No Corridor With Corridor	 71.4 43.6	 0 0	 0 0
Buried Power	0.5	9.4	9.4
Number of Power Meter Drops	0	67	67
Buried Pipeline No Corridor With Corridor	 5.0 12.3	 1.2 11.0	 1.2 9
Overhead Powerlines	9.6	0.0	0.0
Treatment Facilities	6 existing 1 approved but unconstructed 24 acres	No New	No New
Water Discharge Points	9 existing 1 approved but unconstructed 0.9 acres	No New	No New
Channel Disturbance Headcut Mitigation Channel Modification	 NA NA	 0.0 2.0	 0.0 0.0
TOTAL ACRES DISTURBANCE	**1039.1 Existing**	**570.1 Proposed**	**457.8**

Note: Figures within alternatives B and C represent the proposed facilities and do not include the existing facilities listed under alternative A.

3. DESCRIPTION OF AFFECTED ENVIRONMENT

This section describes the environment that would be affected by implementation of the Alternatives described in Section 2. Aspects of the affected environment described in this section focus on the relevant major issues.

The following are not present in the project area and will not be further analyzed:

Areas of Critical Environmental Concern (ACECs)
Environmental Justice
Prime or Unique Farmlands
Flood Plains
Hazardous or Solid Wastes
Native American Religious Concerns
Paleontology
Traditional Cultural Properties
Prime or Sole Source of Drinking Water

Wild and Scenic Rivers
Wilderness Values

Applications to drill for the WDU Gamma and WDU Delta PODs were received on December 10, 2007 and November 25, 2008 respectively. Field inspections of the proposed WDU Gamma and WDU Delta CBNG projects were conducted on January 13 to June 2, 2009 by the parties listed below.
Representing BLM:

- Jim Verplancke, Natural Resource Specialist/Wildlife Biologist
- Travis Kern, Natural Resource Specialist
- Kathy Brus, Hydrologist
- BJ Earle, Archeologist
- Stacy Gunderson, Civil Engineer
- Ted Hamersma, Civil Engineer Tech.
- Arnie Irwin, Soil Scientist
- Christine Sadler, Reality Specialist

Representing Lance Oil & Gas Company Inc.:

- Ethan Jahnke
- Joy Kennedy
- Colt Rodeman
- Naomi Knight, Knight Technologies
- Craig Knight, Knight Technologies

Representing the Landowners:

- Blue Butte Ranch:
    - Tom and Helen Jones
    - Denis Wells
- Powder River Ranch:
    - Delbert Jenkins & Lula Wagoner
- William Maycock
- State of Wyoming Office of State Lands & Investments
    - Jason Crowder, Principal Lands Management Representative

3.1. Topographic Characteristics of Project Area

Topography in the area is extremely rugged with steep ridgelines and deeply incised draws. Elevations range from 1,250 to 1,410 meters above sea level. Much of the project area consist of dissected uplands with steep down-cut channels, created predominately by summer thunderstorms and spring runoff in ephemeral drainages with steep gradients and fine sediment substrate, which lead to Powder River. The northern portion of the area is drained by Barber Creek and its tributaries. The southern portion is drained by Dead Horse Creek. The interior of the project area is drained by Somerville and Williams Draw. The riparian areas are dominated by mature deciduous trees and shrub species which consist mainly of cottonwood trees and willows with scattered salt cedar shrubs and areas of greasewood. The upland vegetation is dominated by sagebrush grassland with scattered ponderosa pine and juniper trees. This area is managed as rangeland with livestock grazing the main use and some historic oil and gas exploration.

3.2. Vegetation & Soils

The project area contains shrubby grasslands with scattered to fairly dense dwarf shrubs, mostly big sagebrush and scattered ridge-top juniper stands. Characteristic vegetation is downy brome, Japanese

brome, western wheatgrass, big sagebrush, Junegrass, Sandberg bluegrass, bluebuuch wheat grass and cottonwood. Other typical species are threadleaf sedge, winterfat, thickspike wheatgrass, broom snakeweed, rubber rabbit brush, prickly pear, and saltbushes. Species typical of short grass prairie comprise the project area flora. Differences in dominant species within the project area vary with soil type, aspect and topography.

Sage brush is the dominant shrub interspersed with short native grasses. Cheatgrass is well established and extensive in many areas. Juniper is prevalent in many draws throughout the project area with scattered ponderosa pine occurring in the higher elevation individually as well as in groves. Galleries of mature cottonwood trees occur along Barber Creek.

Soils have developed in alluvium and residuum derived from the Wasatch Formation. Lithology consists of light to dark yellow and tan siltstone and sandstones with minor coal seams. Soils have surface and subsurface textures of silt loam and fine sandy loam. Soil depths vary from deep on lesser slopes to shallow and very shallow on steeper slopes. Soils are generally productive, though varies with texture, slope and other characteristics. Soils differ with topographic location, slope and elevation. Topsoil depths to be salvaged for reclamation range from 0 to 4 inches on ridges to 8+ inches in bottomland. Erosion potential varies from moderate to severe depending on the soil type, vegetative cover and slope.

Reclamation potential of soils also varies throughout the project area. The main soil limitations in the project area include: depth to bedrock, low organic matter content, and high erosion potential especially in areas of steep slopes. Many of the soils and landforms of this area present distinct challenges for development. Approximately 94 percent of the area within the boundary of the proposed action contains soil mapping units with a named component identified as being a highly susceptible water erosion and 34 percent of the area has slopes greater than 25% making stabilization of disturbance and reclamation challenging and possibly unachievable. The proponent planned their project and the BLM made further recommendations during the onsite to avoid those areas where possible. Disturbances approved within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA. Soils within the project area were identified from the *North Johnson County Survey Area, Wyoming (WY719) and South Campbell County Survey Area, Wyoming (WY605).*

The soil survey was performed by the Natural Resource Conservation Service according to National Cooperative Soil Survey standards. Pertinent information for analysis was obtained from the published soil survey and the National Soils Information System (NASIS) database for the area.

The map unit symbols within this project area were filtered and map units representing 2.0% or greater in extent within the POD boundary are displayed. Dominant soil map units are listed in the table below with their individual acreage and percentage of the area within the POD boundary.

Table 3.1 - Soil Map Unit Types within the WDU Gamma & Delta Project Area

Map Unit Symbol	Map Unit Name	Acres	%
684	Samday-Shingle-Badland complex, 10 to 45 percent slopes	10,529	41.4%
709	Theedle-Shingle loams, 3 to 30 Percent slopes	5,832	22.9%
708	Theedle-Kishona-Shingle loams, 3 to 30 percent slopes	2,321	9.1%
707	Theedle-Kishona loams, 6 to 20 percent slopes	1,433	5.6%
716	Ustic Torriorthents, gullied	1,371	5.4%
718	Vonalee-Terro-Taluce fine sandy loams, 3 to 30 percent slopes	898	3.5%
683	Samday-Samday, cool-Shingle clay loams, 6 to 40 percent slopes	902	3.5%

Map Unit Symbol	Map Unit Name	Acres	%
727	Haverdad-Kishona association, 0 to 6 percent slopes	505	2.0%

Note: Additional site specific soil information is included in the Ecological Site interpretations which follow in Section 3.3.

Table 3.2 Water Erosion Potential within the WDU Gamma & Delta Project Area

Water Erosion Potential	Acres	% of Project Area
High	23,748	94%
Moderate	169	<1%
Low	1,509	6%

Figure 3.1 Water Erosion Hazard within the WDU Gamma & Delta Project Area

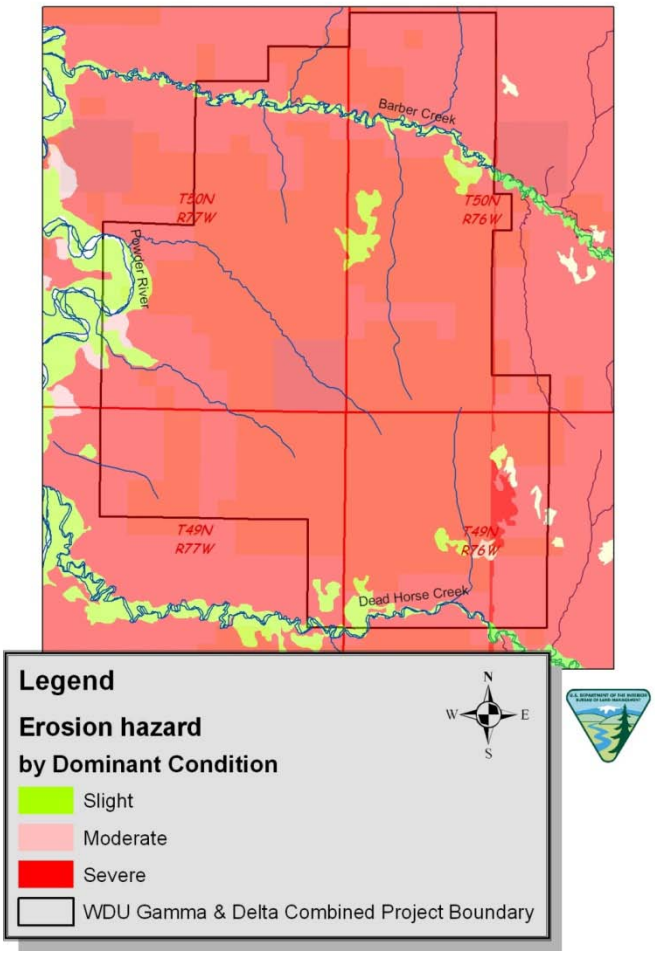
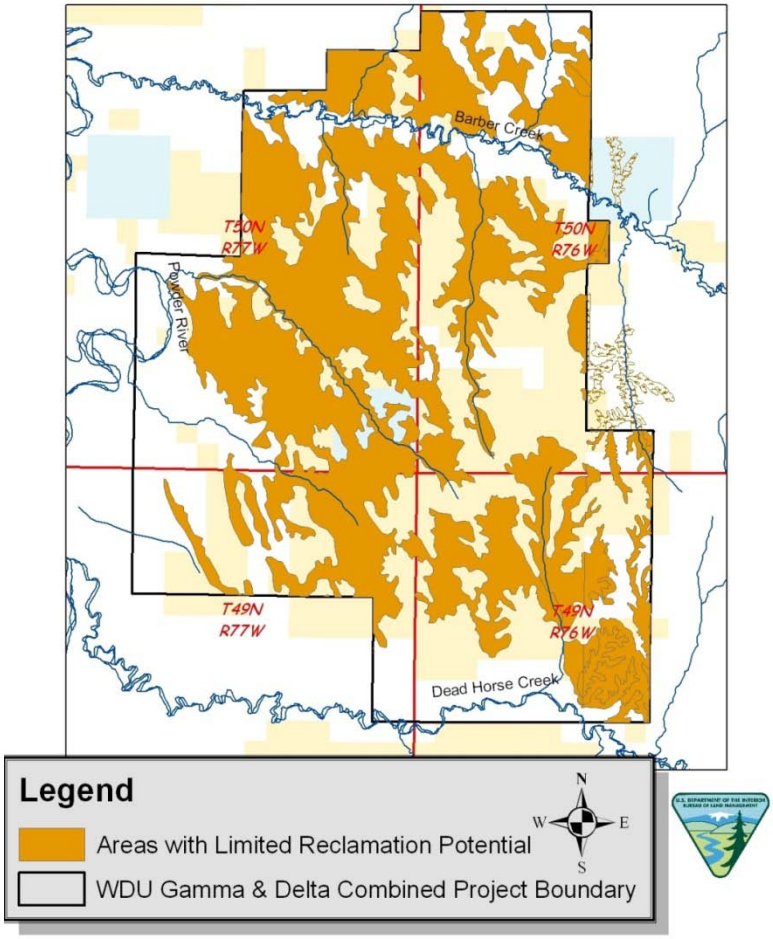


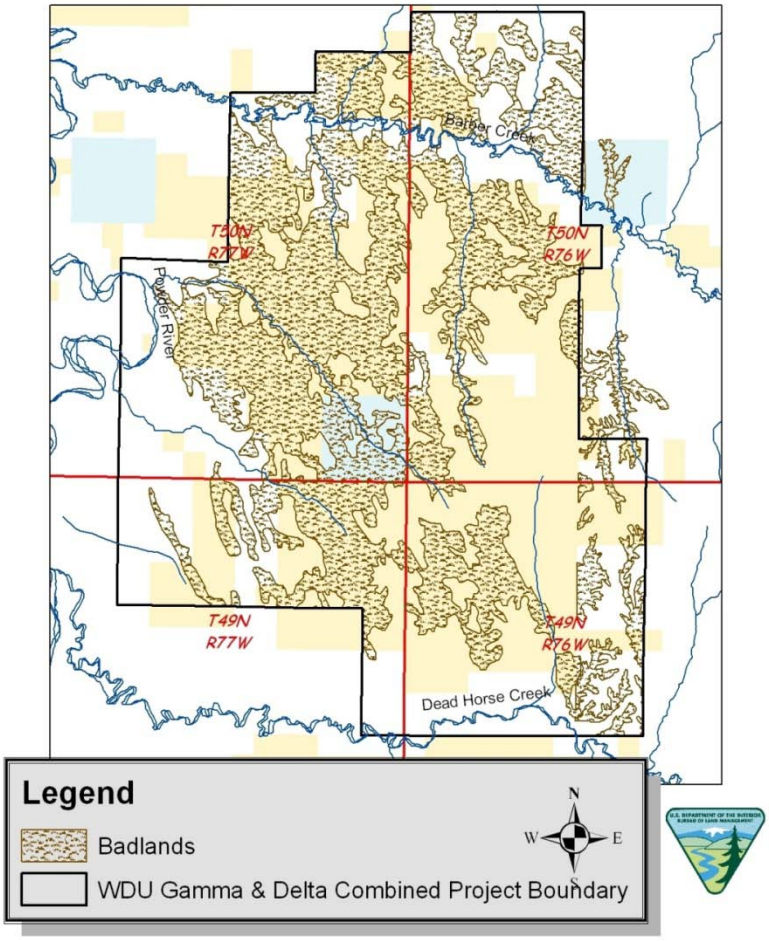
Figure 3.2 Areas with Limited Reclamation Potential within the WDU Gamma & Delta Project Area



Samday–Shingle-Badlands complex covers 10,914 acres or approximately 41% of the project area with a depth 6 inches or less. These three components occur at a proportion of 35%, 30% and 15% of the map unit respectively. Samday and Shingle are both clay/sand silt with Samday primarily clayey and Shingle primarily sandy. Badlands are moderately steep to very steep barren land dissected by many intermittent drainage channels. They occur on steep slopes and ridge tops, but may occur on all slopes which include landforms such as hillsides, ridges and escarpments. Potential runoff is very high, and erosion is active (Soil Survey Division Staff 1993). On the surface vegetation is sparse or barren on slopes, highly dissected and gullied with active erosion ranging from slight to severe.

The three components of the complex have the lowest rating as a source of topsoil or reclamation material. Paralithic bedrock 10 to 20 inches subsurface of the complex is an extremely weak cemented layer averaging 10 to 50 inches thick with the lowest rating as a construction material source.

Figure 3.3 Samday-Shingle-Badlands Complex within the WDU Gamma & Delta Project Area



3.2.1. Slope Hazard

A soil's stability is greatly affected by the slope on which it occurs. In general, the greater the slope, the greater the potential for slumping, landslides and water erosion. Approximately 8,684 acres (34.4%) in the project area have slopes of 25% or more. Slopes greater than 25% are shown on Figure 3.4 below.

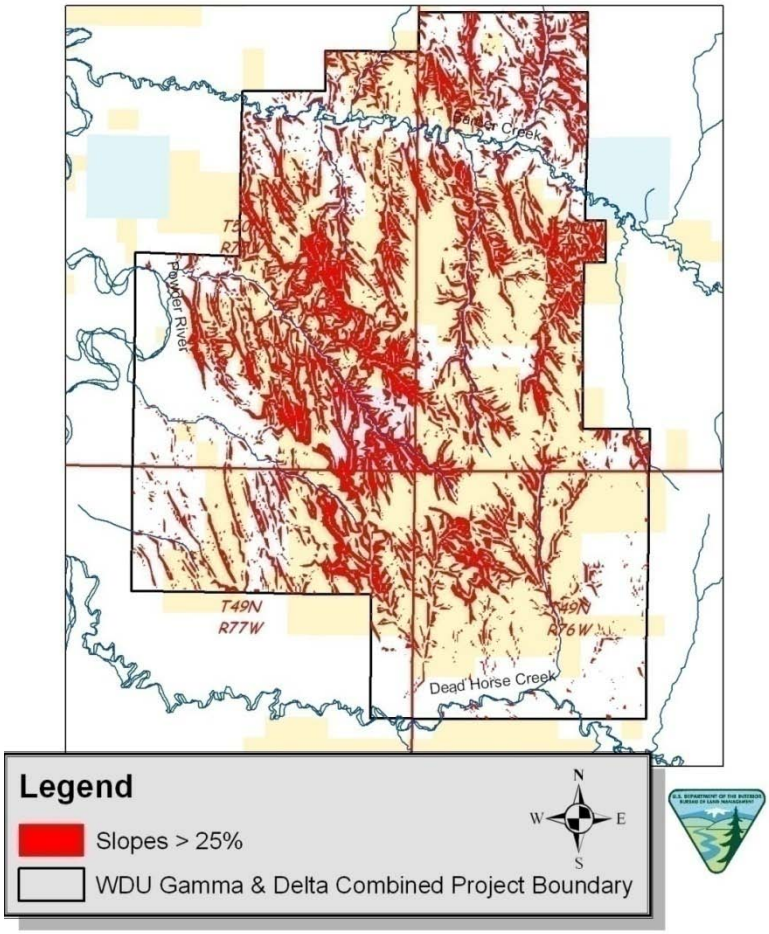
Soils with slopes of less than 25% may also be prone to high erosion because of the soil type, particle size, texture, or amount of organic matter. Soil types in the Williams Draw area with severe erosion potential, as defined by the Natural Resources Conservation Service (NRCS; USDA NRCS 2007), are listed in Tables 3.1 and 3.2 along with the number of acres and percentage of the project area.

Other contributing factors to slope stability include slope length, slope aspect and colluviums. Slope length has considerable control over runoff and potential accelerated water erosion. Slope aspect is the direction toward which the surface of the soil faces. Slope aspect may affect soil temperature, evapotranspiration, winds received and soil moisture. Colluvium is poorly sorted debris that has accumulated at the base of slopes, in depressions, or along small streams through gravity, soil creep, and local wash. It consists largely of material that has rolled, slid or fallen down the slope under the influence of gravity. The rock fragments in colluvium are usually angular, in contrast to the rounded, water-worn cobbles and stones in alluvium and glacial outwash. These factors in combination with slope determine soil stability and the potential for mass soil movement.

Table 3.3 – Percent Slope within the WDU Gamma & Delta Project Area

% Slope	Acres	% of Project Area
0-24%	16,561	65.6%
Greater than or Equal to 25%	8,684	34.4%

Figure 3.4 Areas of Slopes Exceeding 25% within the WDU Gamma & Delta Project Area



3.2.2. Ecological Sites

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

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

Table 3.4 Map Units and Ecological Sites:

Map Units	Ecological Site	Acres	Percent
683, 684	SHALLOW CLAYEY (10-14NP)	11,432	44.9%
716	SHALLOW SAND/CLAYEY (10-14NP)	10,562	41.5%
631, 681	CLAYEY (10-14NP)	1,372	5.4%
124, 147, 615, 622, 639, 641, 678, 679, 707, 708, 709	LOAMY (10-14NP)	1,023	4.0%
613, 616, 649, 727	LOWLAND (10-14NP)	844	3.3%
160, 188, 213, 656, 718	SANDS (10-14 NP)	12	<1%

3.2.2.1. Biological Crust

A living community of bacteria, microfungi, cyanobacteria, green algae, mosses, liverworts, and lichens that grow on or just below the soil surface. Biological crusts can heavily influence the morphology of the soil surface, stabilize soil, fix carbon and nitrogen, and can either increase or decrease infiltration. The percent cover and the components of the crust can vary across short distances.

Biological crusts are present in the project area, particularly in areas with shallow soils. These crusts have not been well studied in the area, so their current extent or survival trend is unknown.

3.2.2.2. Reclamation Potential

Soils with poor reclamation and re-vegetation potential occur throughout the project area as shown in the table below. Currently, soil conditions in the Williams Draw area are being impacted by CBNG development as well as traditional activities, including livestock grazing and wildlife use. Much of the area is covered with soils that are easily damaged by use or disturbance or are difficult to revegetate or otherwise reclaim. Soil impacts (e.g., roads, linear pipeline scars, and artificial wet areas) can be readily observed in the area. This high erosion potential could result in higher suspended sediment and turbidity levels in the Powder River.

In the absence of recoverable topsoil as is common throughout the project area, the surface organic matter in the form of vegetation, litter and biological crust are critical to maintaining the integrity and viability of the soil.

Table 3.5 Reclamation Potential within the WDU Gamma & Delta Project Area

Reclamation Potential		
	Fair	Poor
Total Acres	6,640	18,605
% of Project Area	26.3%	73.6%

3.2.3. Wetlands/Riparian

This project area includes portions of the Upper Powder River and several tributaries including Barber Creek, Williams Draw and Somerville Draw. The Powder River flood plain contains wetland and riparian areas, as well as continuous cottonwood galleries invaded by salt cedar.

Barber Creek, Williams Draw and Somerville Draw contain sporadic cottonwood stands and isolated riparian areas along their courses. Due to the discharge of CBNG produced water upstream and in the project area, the flow in Barber Creek has become perennial.

3.2.4. Invasive Species

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

- Leafy spurge
- Russian knapweed
- White top
- Scotch thistle
- Saltcedar (Tamarix Ramosissima)
- Russian olive
- Spotted knapweed

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

- Canada thistle
- Common cocklebur
- Buffalo bur
- Wild licorice
- cheat grass
- Japanese brome

The state-listed noxious weeds are listed in PRB FEIS Table 3-21 (p. 3-104) and the Weed Species of Concern are listed in Table 3-22 (p. 3-105.

3.3. Wildlife

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

A habitat assessment and wildlife inventory surveys were performed by Big Horn Environmental Consultants (BHEC). BHEC performed surveys for mountain plover, sharp-tailed grouse, greater sage-grouse, raptor nests, and black-tailed prairie dogs according to Powder River Basin Interagency Working Group (PRBIWG) accepted protocol in (year). Surveys were conducted for the presence/absence Ute ladies'-tresses orchid and blowout penstemon habitat. PRBIWG accepted protocol is available on the CBM Clearinghouse website (www.cbmclearinghouse.info).

A BLM biologist conducted field visits between January 13 and June 2, 2009. During this time, the biologist reviewed the wildlife survey information for accuracy, evaluated impacts to wildlife resources, and provided project modification recommendations where wildlife issues arose.

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

3.3.1. Threatened and Endangered and Sensitive Species

3.3.1.1. Threatened and Endangered Species

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

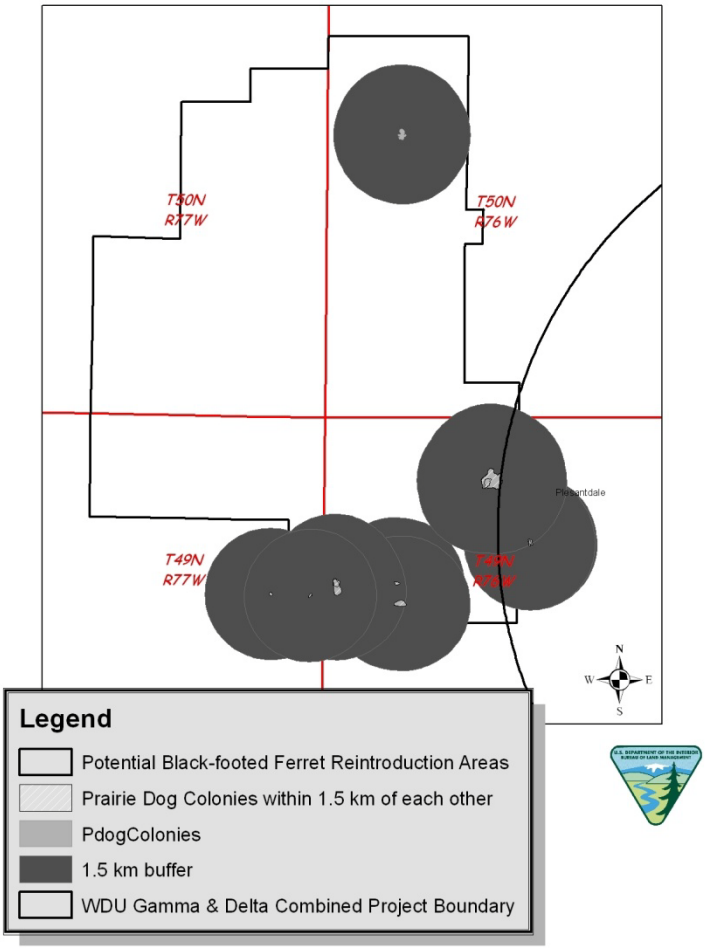
3.3.1.1.1. Black-footed ferret

The black-footed ferret is listed as Endangered under the ESA. The affected environment for black-footed ferrets is discussed in the PRB FEIS on pg. 3-175.

A black-footed ferret population requires at least 1,000 acres of prairie dog colonies, separated by no more than 1.5 km, for survival (USFWS 1989). There is not a group of black-tailed prairie dog colonies separated by less than 1.5 km and totaling greater than 1,000 acres that intersects the project area, therefore, black-footed ferret habitat is not present within the WDU Gamma and WDU Delta project area.

In 2004, WGFD identified seven prairie dog complexes, located partially or wholly within the BFO administrative area, as potential black-footed ferret reintroduction sites (Grenier et al. 2004). The WDU Gamma and WDU Delta project area is located partially within the Plesantdale complex, the nearest potential reintroduction area.

Figure 3.5. Prairie-dog colonies within 1.5 km of each other that intersect the WDU Gamma and WDU Delta project area



3.3.1.1.2. Blowout Penstemon

Blowout penstemon is listed as Endangered under the ESA. It is a regional endemic species with documented populations in the Sand Hills of west-central Nebraska and the northeastern Great Divide Basin of Carbon County, Wyoming. Suitable blowout penstemon habitat consists of sparsely vegetated, early successional, shifting sand dunes and blowout depressions created by wind (BLM 2005). In Wyoming, the habitat is typically found on sandy aprons or the lower half of steep sandy slopes deposited at the base of granitic or sedimentary mountains or ridges.

The WDU Gamma and WDU Delta project area does not contain areas with these characteristics, and blowout penstemon is not expected to occur.

3.3.1.1.3. Ute Ladies'-Tresses Orchid

The Ute ladies'-tresses orchid (ULT) is listed as Threatened under the ESA. The affected environment for ULT is discussed in the PRB FEIS on pg. 3-175.

The PRB FEIS reported that only four orchid populations had been documented within Wyoming, but since the writing of that document, five additional sites were located in 2005 and one in 2006 (Heidel pers. Comm.). The new locations were in the same drainages as the original populations, with two on the

same tributary and within a few miles of an original location. Drainages with documented orchid populations include Wind Creek and Antelope Creek in northern Converse County, Bear Creek in northern Laramie and southern Goshen Counties, Horse Creek in Laramie County, and Niobrara River in Niobrara County.

All of the proposed and/or existing water and gas pipeline crossings and proposed waterline crossings did not exhibit characteristics similar to that of ULT habitat. Flowing water observed at channel crossings was in response to seasonal runoff and not perennial flow. The locations are surrounded by rugged terrain and the vegetation consisted primarily of upland species dominated by Japanese brome, silver sagebrush, and western wheatgrass within and outside of the channels. Unsuitable habitat for this species and the absence of an historic population to provide a seed base make this area an unlikely candidate to support a future population of ULT orchids (BHEC 2009).

There are no proposed actions associated with the WDU Gamma or Delta project that have not been analyzed under NEPA that will impact perennial systems. Water discharge will occur at outfalls already analyzed and described in the water management strategy.

Table 3.6 Summary of Threatened and Endangered Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Endangered				
Black-footed ferret (Mustela nigripes)	Black-tailed prairie dog colonies or complexes > 1,000 acres.	NP	NE	Suitable habitat will not be directly impacted.
Threatened				
Blowout penstemon	Unstable, sandy blow-outs and active sand dunes	NP	NE	Depositional sands/dunes not present.
Ute ladies'-tresses orchid (Spiranthes diluvialis)	Riparian areas with permanent water	NP	NE	No suitable habitat present.

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

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

3.3.1.2. Sensitive Species

Wyoming BLM has prepared a list of sensitive species on which management efforts should be focused towards maintaining habitats under a multiple use mandate. The goals of the policy are to Maintain vulnerable species and habitat components in functional BLM ecosystems

- Ensure sensitive species are considered in land management decisions
- Prevent a need for species listing under the ESA
- Prioritize needed conservation work with an emphasis on habitat

This section lists those species on the Wyoming BLM sensitive species list that, according to the PRB FEIS, may occur in the Powder River Basin Oil and Gas Project Area, which includes the WDU Gamma and WDU Delta project area. The following discussion for each of those sensitive species includes an analysis of whether the species is likely to occur in or be affected by the proposed WDU Gamma and WDU Delta PODs. According to the PRB FEIS, spotted bats were not likely to be affected by the Powder River Basin Oil and Gas Project, and are therefore not discussed in this section. The authority for the sensitive species policy and guidance comes from the Endangered Species Act of 1973, as amended; Title II of the Sikes Act, as amended; the Federal Land Policy and Management Act (FLPMA) of 1976; and the Department Manual 235.1.1A.

3.3.1.2.1. Northern Leopard Frog

The affected environment for northern leopard frog is discussed in the PRB FEIS on pg. 3-181. This is a WGFD Species of Greatest Conservation Need (SGCN), with a rating of NSS4, indicating that the species is common (widely distributed throughout its native range and populations are stable) and habitat is stable along Dead Horse and Barber Creeks as well as along the Powder River.

3.3.1.2.2. Baird's Sparrow

The affected environment for Baird's sparrow is discussed in the PRB FEIS on pg. 3-188. In addition to being listed as a Wyoming BLM sensitive species, Baird's sparrows are listed by USFWS as a BCC for Region 17. Suitable habitat is present in the project area with the short grass prairie that occurs primarily in association with the prairie dog colonies identified in T49N/R76, sections 4, 17 and 18; T49N/R77W, section 13 T50N R76W and T50N/R76W section 8.

3.3.1.2.3. Bald Eagle

The affected environment for bald eagles is described in the PRB FEIS on pg. 3-175. At the time the PRB FEIS was written, the bald eagle was listed as a threatened species under the ESA. Due to successful recovery efforts, it was removed from the ESA on 8 August 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 shall continue to comply with all conservation measures and terms and conditions identified in the Powder River Basin Oil and Gas Project Biological Opinion (PRB Oil & Gas Project BO), #WY07F0075) (USFWS 2007) shall continue to be complied with.

In addition to being listed as a Wyoming BLM sensitive species, bald eagles are a WGFD SGCN with a NSS2 rating, due to populations being restricted in numbers and distribution, ongoing loss of habitat, and sensitivity to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region17.

In the PRB Oil & Gas Project BO, USFWS defined bald eagle winter roosting habitat as any mature conifer or deciduous trees where bald eagles consistently perch. A consistent use roost was defined as a location where bald eagles are observed on more than one occasion (at least one week apart) within a single winter or over multiple winters.

Bald eagle nesting and roosting habitat is present within one mile of the Williams Draw Unit Gamma PODs primarily along the Powder River. Roosting habitat is present along Dead Horse and Barber Creeks but seasonal surveys do not indicate bald eagle use for roosting likely due to the lack of prey and increased human acitivitiy associated with existng oil and gas wells. Although mature conifer trees exist scattered throughout the uplands provide suitable perches for bald eagles, observations are rare.

3.3.1.2.4. Brewer's Sparrow

The affected environment for Brewer's sparrow is discussed in the PRB FEIS on pg. 3-200. In addition to being listed as a BLM Wyoming sensitive species, Brewer's sparrows are a WGFD SGCN, with a rating of NSS4 because populations are declining, habitat is vulnerable with no ongoing loss, and the species is not sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17. Brewer's sparrow habitat is present throughout the project area and this species is suspected to occur.

3.3.1.2.5. Ferruginous Hawk

The affected environment for ferruginous hawk is discussed in the PRB FEIS on pg. 3-183. In addition to being listed as a Wyoming BLM sensitive species, ferruginous hawks are a WGFD SGCN, with a rating of NSS3 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, they are experiencing ongoing loss of habitat, and they are sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17.

The nearest known ferruginous hawk nest is approximately 2.8 miles from the project area. Foraging habitat and prey is available throughout the project area and ferruginous hawks may occur.

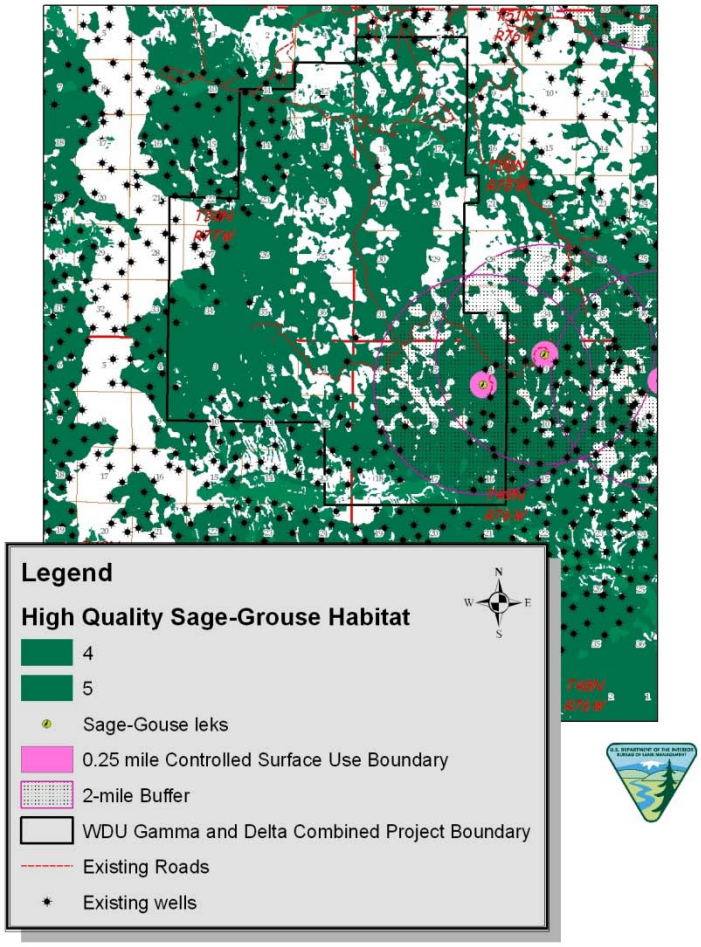
3.3.1.2.6. Greater Sage-Grouse

The affected environment for greater sage-grouse (herein referred to as sage-grouse) is discussed in the PRB FEIS (pg. 3-194 to 3-199). In addition to being listed as a Wyoming BLM sensitive species, sage-grouse are listed as a WGFD SGCN, with a rating of NSS2, because populations are declining, and they are experiencing ongoing substantial loss of habitat. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17.

On March 23, 2010, USFWS issued a decision that the listing greater sage-grouse was warranted but precluded by higher priority listing actions qualifying it as a candidate species.

Field visits of the project area by the BLM biologist confirm that sagebrush communities occur throughout and surrounding the WDU Gamma and Delta project area. Continuous stands of sparsely to dense sagebrush are present throughout the project area. Sections 17, 22, 29 and 33; T50N R76W; sections 5, 6, 7, 8, 17, and 18; T49N/R77W; and section 33,T50N/R77W inside the project area and section 33T50N R76W and sections 4, 9 and 16; T49N/76W west of the project area contain the largest and most contiguous stands of sagebrush on moderate topography. Old and fresh sign was observed in these areas during field visits in 2009 by the BLM biologist. Stands of sagebrush located near moist draws throughout the project area provide brood rearing and late summer habitat. Sage-grouse habitat models indicate that approximately 70% of the project area contains high quality sage-grouse nesting habitat (Doherty 2008).

Figure 3.6 High Quality Sage-Grouse Habitat within the WDU Gamma and Delta PODs



The State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to nesting habitat (2008) recommends that impacts be considered for leks within four miles of oil and gas developments. WGFD records indicate that six sage-grouse leks occur within four miles of the project area. These four lek sites are identified in Table 3.7 below.

Table 3.7 Sage-grouse leks within 4 miles of the WDU Gamma and Delta project area

Lek Name	Legal Location	Distance from Project Area (mi)	Occupied?
Laskie Draw East	NWNE S03 49/76	0.7	Yes
Laskie Draw	SWSE S04 49/76	Access roads proposed within the 0.13 miles of the lek	Yes
Barber Creek – South Prong	SENW S01 49/76	2.8	Yes
Fortification	SWNW S25 51/76	3.7	Yes

Table 3.8 displays the peak male sage-grouse counts observed during the sage-grouse survey season (April 1-May 7) from 2000 to 2009 for the 6 lek located within 4 miles of the WDU Gamma and Delta project area.

Table 3.8 Peak Males Sage-Grouse Counts of Leks within 4 miles of the POD

Lek Name	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000
Laskie Draw East	9	11	24	20	20	-	-	-	-	-
Laskie Draw	1	0	19	3	6	3	-	-	-	-
Barber Creek – South Prong	2	4	0	8	-	-	-	-	-	-
Fortification	0	0	0	0	-	-	-	-	-	-

3.3.1.2.7. Loggerhead Shrike

The affected environment for loggerhead shrike is discussed in the PRB FEIS on pg. 3-187. In addition to being listed as a Wyoming BLM sensitive species, loggerhead shrikes are listed by USFWS as a BCC for Region 17. The Wyoming Bird Conservation Plan rates them as a Level II species, indicating they are in need of monitoring.

The Loggerhead Shrike occurs exclusively in North America in habitat characterized by short grasses, interspersed with spiny shrubs and low trees. Pastures and hay meadows with hedges or shrubs are particularly suitable. Shrubs and trees are required for nesting and perching as well as for sites on which to impale their prey, which ranges from ants and spiders to small birds and mammals. Loggerhead shrike habitat is present throughout the project area, and the species is suspected to occur.

3.3.1.2.8. Long-billed Curlew

The affected environment for long-billed curlew is discussed in the PRB FEIS on pg. 3-184. In addition to being listed as a Wyoming BLM sensitive species, long-billed curlews are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, and habitat is vulnerable but not undergoing loss. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17.

Short-growth grasslands, mixed-grass prairies, meadows, grazed mixed-grass and scrub communities, cultivated fields, lawns, mud flats, grassy floodplains, sandy islands, shoals, salt marshes along coastal shorelines, and edges of ponds, lakes, and other non-flowing bodies of water comprise common habitats used by long-billed curlews. Long-billed curlews rely on the cover and openness of grasslands, prairies, and pastures to nest and rear young. Long-billed curlew habitat is present primarily along the Powder River within the project area, and the species is suspected to occur.

3.3.1.2.9. Mountain Plover

The affected environment for mountain plover is discussed in the PRB FEIS on pg. 3-177 to 3-178. At the time the PRB FEIS was written, the mountain plover was proposed for listing as a threatened species under the ESA. In 2003, USFWS withdrew the proposal, finding that the population was larger than had been thought and was no longer declining. In addition to being listed as a Wyoming BLM sensitive species, mountain plovers are a WGFD SGCN, with a rating of NSS4, because population status and trends are unknown but are suspected to be stable, habitat is vulnerable without ongoing loss, and the species is sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17. Mountain plover nesting habitat exists within the prairie dog colonies identified in T49N/R76, sections 4, 17 and 18; T49N/R77W, section 13 T50N R76W and T50N/R76W section 8.

3.3.1.2.10. Sage Sparrow

The affected environment for sage sparrow is discussed in the PRB FEIS on pg. 3-200 to 3-201. Sage sparrows are a WGFD SGCN, with a rating of NSS3, because populations are restricted in distribution, habitat is restricted but not undergoing significant loss, and they are sensitive to human disturbance. The

Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action. They are also listed by USFWS as a BCC for Region 17.

Restricted to open shrub lands and grasslands, sage sparrows are found in areas of with mature big sagebrush stands. These sparrows seem to prefer sites with sparse shrub cover, arranged in patches, with bare ground in between. Sage sparrow habitat is present throughout the project area, and the species is suspected to occur.

3.3.1.2.11. Sage Thrasher

The affected environment for sage thrasher is discussed in the PRB FEIS on pg. 3-199 to 3-200. In addition to being listed as a Wyoming BLM sensitive species, sage thrashers are a WGFD SGCN, with a rating of NSS4, because populations are declining, habitat is vulnerable but not undergoing loss, and the species is not sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level II species, indicating the action and focus should be on monitoring and because Wyoming has a high percentage of and responsibility for the breeding population. They are also listed by USFWS as a BCC for Region 17.

Considered sagebrush obligate, the Sage Thrasher inhabits prairie and foothills shrubland habitat where sagebrush is present. It prefers shrublands with tall shrubs and low grass cover, where sagebrush is clumped in a patchy landscape. Sage thrasher habitat is present throughout the project area, and the species is suspected to occur.

3.3.1.2.12. Western Burrowing Owl

The affected environment for western burrowing owl (burrowing owl) is discussed in the PRB FEIS on pg. 3-186. In addition to being listed as a Wyoming BLM sensitive species, burrowing owls are a WGFD SGCN, with a rating of NSS4 because the species is widely distributed, population status and trends are unknown but are suspected to be stable, habitat is restricted or vulnerable without recent or on-going significant loss, and it may be sensitive to human disturbance. The Wyoming Bird Conservation Plan rates them as a Level I species, indicating they are clearly in need of conservation action, and they are also a USFWS BCC in Region 17.

Current population estimates for the United States are not well known but trend data suggest declines throughout the burrowing owl's North American range (McDonald et al. 2004). Primary threats are habitat loss and fragmentation, mostly due to intensive agricultural and urban development and habitat degradation, due to declines in populations of colonial burrowing mammals (Klute et al. 2003).

The BFO database indicates no burrowing owl nests within 0.25 mile of the WDU Gamma and Delta project area. Prairie dog colonies are present within 0.25 miles of the prairie dog colonies identified in T49N/R76, sections 4, 17 and 18; T49N/R77W, section 13 T50N R76W and T50N/R76W section 8 and this species may occur in those areas (See Figure 3.5).

Table 3.9 Summary of Sensitive Species Habitat and Project Effects.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Amphibians				
Northern leopard frog (*Rana pipiens*)	Beaver ponds and cattail marshes from plains to montane zones.	NS	NI	Suitable habitat is present.
Birds				
Baird's sparrow (*Ammodramus bairdii*)	Shortgrass prairie and basin-prairie shrubland habitats; plowed and stubble fields; grazed pastures; dry lakebeds; and other sparse, bare, dry ground.	S	MIIH	Shortgrass prairie and sagebrush cover will be affected.
Bald eagle (*Haliaeetus leucocephalus*)	Mature forest cover often within one mile of large water body with reliable prey source nearby.	S	MIIH	Infrastructure within one mile of occupied habitat.
Brewer's sparrow (*Spizella breweri*)	Sagebrush shrubland	S	MIIH	Sagebrush cover will be affected.
Ferruginous hawk (*Buteo regalis*)	Basin-prairie shrub, grasslands, rock outcrops	S	MIIH	Nesting habitat will be impacted and human activities will increase
Greater sage-grouse (*Centrocercus urophasianus*)	Basin-prairie shrub, mountain-foothill shrub	K	WIP V	Sagebrush cover will be affected.
Loggerhead shrike (*Lanius ludovicianus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Long-billed curlew (*Numenius americanus*)	Grasslands, plains, foothills, wet meadows	S	MIIH	Grasslands, meadows will be impacted
Mountain plover (*Charadrius montanus*)	Short-grass prairie with slopes < 5%	NS	NI	Suitable habitat is present.
Northern goshawk (*Accipiter gentilis*)	Conifer and deciduous forests	NS	NI	No nesting habitat present.
Peregrine falcon (*Falco peregrinus*)	Cliffs	NS	NI	No nesting habitat present.
Sage sparrow (*Amphispiza billneata*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.
Sage thrasher (*Oreoscoptes montanus*)	Basin-prairie shrub, mountain-foothill shrub	S	MIIH	Sagebrush cover will be affected.

Common Name (scientific name)	Habitat	Presence	Project Effects	Rationale
Western Burrowing owl (*Athene cunicularia*)	Grasslands, basin-prairie shrub	S	MIIH	Infrastructure within 0.25 miles of prairie dog colonies, thus may impact nesting individuals or selection of nest sites.
Mammals				
Black-tailed prairie dog (*Cynomys ludovicianus*)	Prairie habitats with deep, firm soils and slopes less than 10 degrees.	K	MIIH	Prairie dog towns will be impacted.
Fringed myotis (*Myotis thysanodes*)	Conifer forests, woodland chaparral, caves and mines	NS	NI	Habitat is not present.
Long-eared myotis (*Myotis evotis*)	Conifer and deciduous forest, caves and mines	NS	NI	Habitat is not present.

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

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

3.3.2. Big Game

Big game species expected to be within the WDU Gamma and Delta project area include pronghorn antelope, mule deer, and elk. The WGFD has determined that the project area contains a small portion of winter yearlong range for pronghorn antelope, yearlong and winter yearlong range for mule deer, and yearlong and parturition range for elk.

Winter-Yearlong use is when a population or a portion of a population of animals makes general use of the documented suitable habitat sites within this range on a year-round basis. During the winter months there is a significant influx of additional animals into the area from other seasonal ranges. **Yearlong** use is when a population of animals makes general use of suitable documented habitat sites within the range on a year round basis. Animals may leave the area under severe conditions. **Parturition Areas** are documented birthing areas commonly used by females. It includes calving areas, fawning areas, and lambing grounds. These areas may be used as nurseries by some big game species.

Populations of pronghorn antelope, mule deer, and elk within their respective hunt areas are above WGFD objectives. Big game range maps are available in the PRB FEIS (3-119-143), the project file, and

from the WGFD. The affected environment for pronghorn is discussed in the PRB FEIS on pp. 3-117 to 3-122 and for mule deer on pp. 3-127 to 3-132.

3.3.2.1. Elk

The affected environment for the Fortification Creek elk herd is discussed in the PRB FEIS (pg. 3-132 to 3-140). The PRB FEIS considered cumulative impacts to elk within the Buffalo Field Office, but did not specifically address the isolated Fortification Creek elk herd with CBNG development forecasted throughout and completely surrounding the herd's seasonal ranges.

For the purposes of this analysis, the BLM selected three factors and corresponding metrics to evaluate cumulative effects upon elk. These factors (and metrics) are (1) habitat availability (2) pattern of elk use and (3) population (number of elk).

3.3.2.1.1. Elk Habitat and Availability

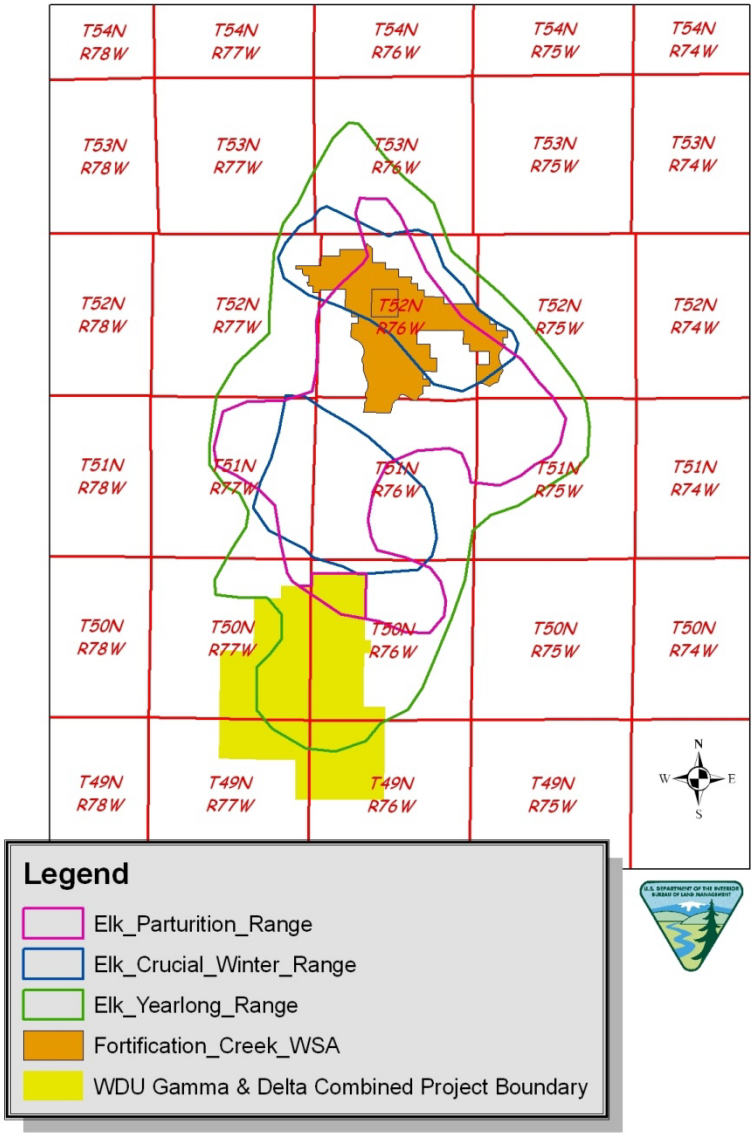
In 1992, a 2.5 year study of the Fortification elk herd was initiated by the WGFD in cooperation with the Bureau of Land Management and area landowners, with the collaring of 17 cow elk. Data from this study allowed the Wyoming Game and Fish Department to better delineate crucial elk winter range, elk summer/yearlong range and elk parturition range (BLM 2006).

The WGFD defined two types of important elk habitats that are located within the yearlong range and crucial range which includes the identified crucial winter range (CWR) and parturition range (PR) within the greater Fortification Creek area. Both provide important seasonal habitat functions during sensitive periods for elk (Table 3.10). It is important to note that these crucial ranges overlap each other on the landscape and these areas are commonly referred to as "dual crucial" range.

Table 3.10a Fortification Creek Elk Ranges

Range	Size (Acres)
Yearlong	122,930
Crucial Winter	38,233 (31% of Yearlong Range)
Parturition	59,291 (48% of Yearlong Range)
"Dual Crucial"	25,770 (21% of Yearlong Range)

Figure 3.7 Affected Environment - Fortification Creek Elk Ranges



3.3.2.1.1.1. Habitat Effectiveness

Habitat effectiveness is the degree to which habitat features fulfill specific functions; the degree to which a species or population is able use their habitat.

A security area is defined as "any area that will hold elk during periods of stress because of geography, topography, vegetation, or a combination of those features" (Lyon and Christensen 1992). Hillis et al. (1991) quantified security areas as nonlinear blocks of hiding cover ≥ 250 acres in size and ≥ one -half mile from any open road. Elk vulnerability increases when less than 30% of an analysis unit is comprised of security areas (Canfield 1991, Hillis et al 1991). WGFD uses this definition in the A Rocky Mountain Elk Habitat Conservation Plan for the WGFD Sheridan Region.

Table 3.10b 2009 Elk Security Habitat within the Fortification Creek Elk Ranges

Range	Security Habitat (Acres)
Yearlong	60,000
Crucial Winter	23,150 (39% of security habitat)
Parturition	33,770 (56% of security habitat)
"Dual Crucial"	17,957 (30% of security habitat)

In the 2007 Environmental Report, BLM used the elk relocation data (prior to 2008) and a viewshed model to further define security habitat within the Fortification Creek area based on elk avoidance of oil and gas wells and roads. Two types of habitat were considered in the model habitat effectiveness and security habitat. Habitat effectiveness is the total area greater than 0.5 miles from roads, or less than 0.5 miles from a road but not visible from a road. It generally refers to the available habitat during nonhunting conditions, particularly summer and fall (Lyon 1983). To simplify the model, all area is considered useable habitat, vegetation and other factors affecting habitat suitability are not included. Security habitat is a subset of effective habitat. Elk often retreat when disturbance in their usual range is intensified, such as during the hunting season, with elk appearing to be most comfortable or secure within effective habitat areas of a minimum size (Lyon 1983). A commonly used minimum patch size for security habitat is 250 contiguous acres more than 0.5 miles from an open road (Christensen et al. 1991, Leege 1984).

Wyoming Game & Fish Dept. submitted a letter to BLM-BFO dated December 29, 2009 as a public comment on a modification to the Augusta Unit Zeta Environmental Assessment (WY-070-08-154), Fortification Elk Cumulative Impact Assessment. Statements from the letter are as follows:
"*Relocation data retrieved from radio-collared elk from the ongoing Fortification Elk study confirm the importance of the crucial winter range and parturition ranges during those seasons. Furthermore, the relocation data shows that elk select the "security habitat" within those seasonal birthing time periods were within the delineated seasonal ranges. During the parturition season more than 70% and during the winter more that 80% of those relocations were found to be within the security habitat contained in the seasonal habitats. Although the 2010 winter season has just begun, relocations are again showing frequent use of both seasonal ranges and security habitat with the crucial winter range.*

CBNG development that has taken place in the southern portion of the Fortification Elk Herd Unit has reduced the amount of available security habitat has resulted in "high" or "extreme" impacts based on number of well sites, to parts of delineated crucial ranges. Taking into consideration the current level of impacts to the southern portion of the herd unit, we recommend that BLM make additional efforts to reduce negative impacts to elk habitats as development proceeds. We believe it is appropriate to employ an approach that gives the greatest consideration to areas that as within both crucial winter and parturition seasonal ranges and <u>also</u> overlap with identified security habitat. We recommend that within these "dual crucial" overlap areas the BLM strive to retain all identified remaining security habitat. For security habitats which overlap with only one delineated crucial range (winter or Parturition) we recommend the BLM strive to retain 75% of the remaining security habitat. Finally, within the yearlong range, we recommend the BLM strive to retain at least 50% of the remaining security habitat. When planning for development that could impact security habitat, we recommend using the elk relocation data to further identify portions of security habitat that receive heavy versus light use by elk and focus on retaining the functionality of heavy use areas.

We want to reiterate the importance of maintaining habitat function in crucial seasonal ranges. Under extreme impacts of more than 4 well sites per square mile habitat function is substantially impaired of lost. We recommend the BLM take a thorough look at managing the number of operating well sites to avoid an extreme impact scenario in crucial ranges and particularly dual crucial ranges. To reduce

disturbance of elk, visits to well sites should be restricted at night, dawn and duck (e.g. allow only daylight visits except in the case of emergency situations and repair. We also want to emphasize the need to not only require but monitor the success of reclamation to assume it occurs in a timely manner. Recognizing that efforts to stabilize and successfully reclaim slopes of greater that 25% are problematic. We reiterate our position that development on steep slopes should be avoided." (John Emmerich, WGFD Deputy Director, to Duane Spencer, BFO Field Manager, 2009).

Table 3.11 Elk Habitats within the WDU Gamma and Delta PODs

Range/Habitat	Size (Acres)	Percent Area of the WDU Gamma & Delta PODs
Yearlong	14,803	58.6%
Parturition	1,830	7.2%
Security Habitat	7,353	29.1%

3.3.2.1.2. Pattern of Habitat Use

In April 2005, 26 elk (5 yearling bulls and 21 adult cows) where captured and fitted with VHF radio collars and one cow elk was fitted with a GPS collar in February 2005. Radio-telemetry (VHS) and GPS collaring data collected by BLM and WGFD since 2005 have shown that the Fortification elk tend to avoid oil and gas development by moving to less developed areas. Disruptive activity is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000), albeit at 50% or less of the previous levels in forested environments (Hayden-Wing Associates 1990).

Sawyer (2005) observed similar response of elk within the more open terrain of the Jack Morrow Hills of Wyoming. The literature consistently shows a correlation between elk avoidance response and the level of human activity associated with roads including those servicing oil and gas development.

Studies of radio telemetered elk from the Fortification Creek herd in the early 1990's showed some elk ranging out of the Fortification Creek elk herd unit as far north as Montana. More recent studies of radio telemetered elk (26 of a herd roughly 230) from the Fortification Creek herd have shown that some animals (between 15-20% of the collared animals) have been at least seasonally observed east of Wild Horse Creek and the Fortification Creek area, on the west side of the Powder River, south along the Kinney Divide, and occasionally as far north as Sonnette, Montana, although the Fortification Creek Planning Area itself remains the core use area for the vast majority of this herd (Laird 2005). Some elk from this population have moved out of the Fortification Creek herd unit and pioneered new, small, local populations in surrounding areas in recent years, although these bands are currently not officially recognized as "herds" by the Wyoming Game and Fish Department. The long distance range use extensions to Montana in the north are probably reflective of relative habitat continuity along the Powder River Breaks. All of these observations support the fact that elk are a wide ranging species, and will naturally move around to some degree from their core habitat at least seasonally, and in some instances, on a permanent basis (BLM 2006).

Efforts to monitor the movement patterns of the Fortification Creek elk have continued with 38 VHS/GPS collars being deployed in March 2008 and 17 additional collars were deployed in December 2008 for a total of 55 VHS/GPS collared elk. The collars transmit a VHS signal that can be manually tracked with a VHS receiver or they can be tracked via satellite by the GPS receiver. The VHS/GPS collars are susceptible to moisture resulting in the loss of GPS function for 30 of the collars as of March 2010.

Each VHS/GPS collar represents at least 2 elk (cow with calf at side) as blood drawn from each collared elk tested positive for pregnancy.

Data collected in 2008-2010 have shown similar trends as observed in previous studies with 6 of 55 VHS/GPS collared elk from the Fortification Creek herd being relocated outside of the herd unit for periods of exceeding 5 months (See Table 3.12). Three of these elk left the herd unit by May 2008. Return has been confirmed; two of these elk have returned to the herd while the one of the three collars failed and the current location of this animal is unknown. Two other collared elk left the herd in April 2009. They have not returned to the herd as of March 1, 2010 and have been relocated north of Fortification Creek elk herd unit, the near the Montana border.

Table 3.12 Fortification Creek Elk with GPS Collars

	Elk GPS/VHS Collar #	Date Deployed	Status	Movement patterns Observed
1	216228	3/26/2008	Failed 9/12/09	Within the Fortification Cr. Herd
2	315311	3/26/2008	Active	Within the Fortification Cr. Herd
3	315495	3/26/2008	Failed 8/13/08	Within the Fortification Cr. Herd
4	317530	3/26/2008	Failed 12/6/2008	Within the Fortification Cr. Herd
5	319130	3/26/2008	Active	Within the Fortification Cr. Herd
6	319176	3/26/2008	Active	Within the Fortification Cr. Herd
7	323407	3/26/2008	Active	Within the Fortification Cr. Herd
8	323491	3/26/2008	Failed 6/11/2008	Within the Fortification Cr. Herd
9	324155	3/26/2008	Failed 6/4/2008	Within the Fortification Cr. Herd
10	324395	3/26/2008	Active	Within the Fortification Cr. Herd
11	326171	3/26/2008	Active	Within the Fortification Cr. Herd
12	335184	3/26/2008	Failed 9/14/2009	Within the Fortification Cr. Herd
13	335286	3/26/2008	Failed 5/24/2009	Within the Fortification Cr. Herd
14	335291	3/26/2008	Failed 6/6/2008	Within the Fortification Cr. Herd
15	335293	3/26/2008	Active	Within the Fortification Cr. Herd
16	335296	3/26/2008	Active	Within the Fortification Cr. Herd
17	335300	3/26/2008	Failed 4/19/2008	Within the Fortification Cr. Herd
18	335327	3/26/2008	Failed 5/23/2008	Within the Fortification Cr. Herd
19	335328	3/26/2008	Active	Within the Fortification Cr. Herd
20	335342	3/26/2008	Failed 6/14/2008	Within the Fortification Cr. Herd
21	335346	3/26/2008	Failed 5/23/2008	Within the Fortification Cr. Herd
22	335353	3/26/2008	Failed 5/23/2008	Within the Fortification Cr. Herd
23	335355	3/26/2008	Active	Within the Fortification Cr. Herd
24	335358	3/26/2008	Active	Within the Fortification Cr. Herd
25	335359	3/26/2008	Failed 4/22/2009	Within the Fortification Cr. Herd
26	335360	3/26/2008	Failed 1/4/2009	Left the Herd Unit 4/25/08-6/1/09
27	335367	3/26/2008	Failed 6/10/2008	Within the Fortification Cr. Herd
28	335398	3/26/2008	Failed 5/30/2008	Within the Fortification Cr. Herd
29	335401	3/26/2008	Failed 5/10/2009	Within the Fortification Cr. Herd
30	335663	3/26/2008	Failed 5/18/2008	Within the Fortification Cr. Herd
31	335664	3/26/2008	Failed 5/4/2008	Within the Fortification Cr. Herd
32	335666	3/26/2008	Failed 7/7/2009	Within the Fortification Cr. Herd

	Elk GPS/VHS Collar #	Date Deployed	Status	Movement patterns Observed
33	335672	3/26/2008	Failed 5/2/2009	Within the Fortification Cr. Herd
34	335673	3/26/2008	Failed 4/29/2009	Within the Fortification Cr. Herd
35	335698	3/26/2008	Failed 2/28/2010	Within the Fortification Cr. Herd
36	335714	3/26/2008	Active	Within the Fortification Cr. Herd
37	335399	3/27/2008	Failed 5/7/2009	Within the Fortification Cr. Herd
38	330469	12/6/2008	Active	Within the Fortification Cr. Herd
39	330485	12/6/2008	Active	Within the Fortification Cr. Herd
40	330510	12/6/2008	Active	Left the Herd Unit 12/12/2008-10/30/09
41	330523	12/6/2008	Active	Left the Herd Unit 7/22/09; Last located NE of the Herd Unit
42	330978	12/6/2008	Active	Within the Fortification Cr. Herd
43	330988	12/6/2008	Failed 9/8/2009	Left the Herd Unit 5/24/09; Last located south of the Herd Unit
44	331020	12/6/2008	Failed 3/5/2009	Within the Fortification Cr. Herd
45	332416	12/6/2008	Active	Within the Fortification Cr. Herd
46	332435	12/6/2008	Active	Within the Fortification Cr. Herd
47	350470	12/6/2008	Active	Within the Fortification Cr. Herd
48	350472	12/6/2008	Active	Within the Fortification Cr. Herd
49	356905	12/6/2008	Active	Within the Fortification Cr. Herd
50	330488	12/7/2008	Failed 7/4/2009	Within the Fortification Cr. Herd
51	330465	12/7/2008	Active	Within the Fortification Cr. Herd
52	330479	12/7/2008	Failed 1/7/2010	Left the Herd Unit 4/15/2009-7/22/09
53	330524	12/7/2008	Active	Within the Fortification Cr. Herd
54	332422	12/7/2008	Active	Left the Herd Unit 4/29/09; Last located NE of the Herd Unit near the MT border
55	330973	12/8/2008	Failed 2/13/2010	Within the Fortification Cr. Herd

Data from 16 GPS collars recorded 6,765 elk observations within the WDU Gamma and Delta project area over an 27 month window from March 2008 to May 2010. Of the 101,219 locations recorded, 6.6% are within the WDU Gamma and Delta POD.Seven of these collars were deployed during the collaring operation conducted March 2008 and the other nine collars were deployed December 2008.

Data points from 16 of the 55 collared elk cows are located within the project area. Though the data points indicate usage of the project area year-round, intensity increases within the northern portion of the (north half sections 5, 6, 7 and 8; T50N, R76W and section 12; T50N/R77W) of the project area, inside WGFD designated parturition range, throughout the spring months (April through June), indicating a likely reliance on this area for calving. Approximately 1,830 acres (7.2%) of the 25,245 acre project area falls within the Parturition range. The data points from the 15 collared elk located within the project area represents (1,052) 1.8% of all data points collected from all 55 of the collared elk within the elk parturition range (59,717) as of May 1, 2010.

The following lists the GPS/VHS collared elk located within the project area:

Elk GPS/VHS Collar #		
315311	330485	356905
317530	330510	335672
323491	330988	335399
324395	331020	335367
330448	332416	
330465	350470	

3.3.2.1.3. Population

The WGFD 2008 Job Completion Report indicates that the 2008 post-season population estimate for the Fortification Creek elk herd is 219, down from 272 in 2002. The current WYGF objective for the herd is 150 (BLM 2006).

The elk population occupying the Fortification Creek area is both locally and regionally important (Jahnke, 2006). As measured by hunting use, elk hunts in this area are destination hunts and this area is a highly sought after elk hunting area with relatively few licenses issued annually, although access is largely limited by the land ownership pattern. The effect of CBNG development on elk in the Fortification Creek area has a high public interest as gauged by the response to recent Resource Management Plan amendment scoping sessions (BLM, 2006).

Prairie elk herds, such as the Fortification Creek herd, while not uncommon, are somewhat unique in the sense that this type of non-mountainous range does not provide a great deal of security for the animals, and these populations are generally quite vulnerable to disturbance. There are other prairie elk herds in this region (e.g., Tisdale Mtn. portion of the Powder River herd, Pine Ridge herd, Rochelle Hills herd, Custer N.F. herd across the Montana border, etc.), but wherever these prairie elk herds are found they are usually locally prized and often protected by the local and regional residents (BLM, 2006).

3.3.3. Aquatics

The project area is drained by primarily by ephemeral tributaries Barber Creek and Dead Horse Creek which are intermittent streams of the Powder River. Fish that have been identified in the Powder River watershed are listed in the PRB FEIS (3-156-159).

Aquatic invertebrate communities, which can be indicators of the quality of aquatic environments (Peterson 1990), are discussed in the PRB FEIS (pp. 3-153 to 3-154). Perennial streams within northeastern Wyoming were sampled by USGS between 1980 and 1981, and generally supported invertebrate communities that included taxa adapted to flowing water. Ephemeral stream communities generally were composed of taxa adapted to standing water (Peterson 1990).

Table 3.13 lists the fish that occur in the Upper Powder River subbasin and their WGFD Native Species Status (NSS) designation, if applicable. WGFD has identified Species of Greatest Conservation Need (SGCN) within the state, all of which are given NSS designations. Seven of the species that may occur in the Upper Powder River subbasion are designated as either NSS 1, 2, or 3 species. Species in these designations are considered to be species of concern, in need of more immediate management attention, and more likely to be petitioned for listing under the Endangered Species Act (ESA). For these species, WGFD recommends that no loss of habitat function occur. WGFD allows for some modification of the habitat, provided that habitat function is maintained (i.e., the location, essential features, and species supported are unchanged). NSS 4-7 refers to populations that are widely distributed throughout their native range and are stable or expanding. Habitats are also stable. There is no special concern for these species.

The Powder River Basin ecosystem and fishery is discussed in further detail in the PRB FEIS (pp. 3-155 to 3-166).

Table 3.13 Fish that occur in the Upper Powder River Subbasin

Wyoming Native Species Status	Species	Wyoming BLM Sensitive
NSS1	Sturgeon chub	Yes
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

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 has completed the first year of a three-year herpetile study in the Power River Basin in order to detect impacts from CBNG development (Griscom et al. 2009). Herpetiles expected to occur in the Powder River Basin, according to these studies, are listed in Table 3.14 (Turner 2007, Griscom et al. 2009). Eight of the species listed are classified by WGFD as SGCNs, all with a rating of NSS4, indicating that they are widely distributed throughout their native ranges, and populations are stable. Of the species listed in Table 3.14, WYNDD reported that, for 2008 surveys, boreal chorus frogs were the most abundant amphibian in the PRB and were located in a variety of habitats. The second most abundant amphibian was Woodhouse's toad, which occurred along rivers, temporary ponds, and in CBNG reservoirs. Plains spadefoot and Great Basin toads were the least common species, occurring primarily in temporary ponds fed by rainstorms. Relatively few observations were made for reptile species. Bullsnakes and sagebrush lizards were most commonly seen. Turtles were rarely observed, due to their almost exclusive occurrence in deep backwaters. Two of the herpetiles listed in Table 3.14, northern leopard frog and Columbia spotted frog, are Wyoming BLM sensitive species and will be discussed in detail later in this document.

Table 3.14 Herpetile species expected to occur in the Powder River Basin (Turner 2007,Griscom et al. 2009)

Species	Verified by Survey*	WGFD Status	Wyoming BLM Sensitive
Tiger salamander	Yes	NSS4	No
Northern leopard frog	Yes	NSS4	Yes

Species	Verified by Survey*	WGFD Status	Wyoming BLM Sensitive
Milk Snake	No		No
Columbia spotted frog	Yes	NSS4	Yes
Bullfrog	Maybe	NSS4	No
Spiny softshell	Yes		No
Northern prairie lizard	No		No
Boreal chorus frog	Yes	NSS4	No
Great plains toad	Yes	NSS4	No
Woodhouse's toad	Yes	NSS4	No
Plains spadefoot toad	Yes	NSS4	No
Short-horned lizard	Yes		No
Sagebrush lizard	Yes		No
Eastern yellowbelly racer	Yes		No
Prairie rattlesnake	Yes		No
Western hog-nosed snake	Yes		No
Bullsnake	Yes		No
Terrestrial garter snake	Yes		No
Plains garter snake	Yes		No
Common garter snake	Yes		No
Snapping turtle	Yes		No
Painted turtle	Yes		No
Notes:* As reported in Turner (2007) and Griscom et al. (2009).			

No herpetile species were reported by BHEC or observed in the field by the BLM biologist.

3.3.4. Migratory Birds

Migratory birds are those that migrate for the purpose of breeding and foraging at some point in the year. The WGFD Wyoming Bird Conservation Plan (Nicholoff 2003) identified three groups of high-priority bird species in Wyoming: Level I – those that clearly need conservation action, Level II – species where the focus should be on monitoring, rather than active conservation, and Level III – species that are not otherwise of high priority but are of local interest. Vegetation types that occur in the project area include shortgrass prairie and shrub-steppe. Many species that are of high management concern use these areas for their primary breeding habitats (Saab and Rich 1997). Nationally, grassland and shrubland birds have declined more consistently in the last 30 years than any other ecological association of birds (WY 2009).

Species that may occur in these vegetation types, according to the Wyoming Bird Conservation Plan, are listed in Table 3.15 and are grouped by Level as identified in the Plan. None of the species listed below were reported by BHEC or observed in the field by the BLM biologist.

Table 3.15 High priority bird species that occur in the major vegetation type within the WDU Gamma and Delta project area

Level	Species	Wyoming BLM Sensitive
Level I	Brewer's sparrow	Yes
	Ferruginous hawk	Yes
	Greater sage-grouse	Yes
	Long-billed curlew	Yes
	McCown's longspur	No
	Mountain plover	Yes
	Sage sparrow	Yes

Level	Species	Wyoming BLM Sensitive
	Short-eared owl	No
	Upland sandpiper	No
	Western burrowing owl	Yes
Level II	Black-chinned hummingbird	No
	Bobolink	No
	Chestnut-collared longspur	No
	Dickcissel	No
	Grasshopper sparrow	No
	Lark bunting	No
	Lark sparrow	No
	Loggerhead shrike	Yes
	Sage thrasher	Yes
	Vesper sparrow	No
Level III	Common poorwill	No
	Say's phoebe	No

The affected environment for migratory birds is discussed in the PRB FEIS (pp. 3-150 to 3-153). This discussion includes a list of habitat requirements and foraging patterns for the species listed above, with the exception of upland sandpipers, common poorwills, and Say's phoebes, which are discussed here.

Upland sandpipers prefer Great Plains grasslands, dryland grass pastures, hayfields, and alfalfa fields. They nest in grass-lined depressions in the ground and feed on insects and seeds on the ground where grasses are low and open. Common poorwills inhabit sparse, rocky sagebrush; open prairies; mountain-foothills shrublands; juniper woodlands; brushy, rocky canyons; and ponderosa pine woodlands. They prefer clearings, such as grassy meadows, riparian zones, and forest edges for foraging. They lay eggs directly on gravelly ground, flat rock, or litter of woodland floor. Nests are often placed near logs, rocks, shrubs, or grass for some shade. They feed exclusively on insects, catching them by leaping from the ground or a perch, or picking them up from the ground. Say's phoebes inhabit arid, open country with sparse vegetation, including shrub-steppe, grasslands, shrublands, and juniper woodlands. They nest on a variety of substrates such as cliff ledges, banks, bridges, eaves, and road culverts and often reuse nests in successive years. They eat mostly insects and berries. None of these species were reported by BHEC or observed by the BLM biologist.

3.3.5. Raptors

The affected environment for raptors is discussed in the PRB FEIS on pp. 3-141 to 3-148. Raptor species known to have used nests within 0.5 miles of the project area: golden eagle, red-tailed hawk, great horned owl, American kestrel and barn owl.

The affected environment for golden eagles is discussed in the PRB FEIS on pp. 3-145 to 3-146. Golden eagles are listed as a Bird of Conservation Concern (BCC) by USFWS for Region 17, which encompasses the project area. BCCs are those species that represent USFWS's highest conservation priorities, outside of those that are already listed under ESA. The goal of identifying BCCs is to prevent or remove the need for additional ESA bird listings by implementing proactive management and conservation actions. Golden eagles were also identified as a Level III species in the Wyoming Bird Conservation Plan. Golden eagles are sensitive to extensive human activity around nest sites and are threatened by loss of nesting habitat to industrial development, powerline executions, and other factors (Nicholoff 2003). The WGFD Wyoming Bird Conservation Plan habitat objectives for golden eagles include maintaining open country to provide habitat for small mammals as a food source. Recommendations for management include restricting human activities near nests during peak breeding season; protecting, enhancing, and restoring prey

populations; and protecting known nesting territories.

The affected environment for red-tailed hawks and great-horned owls are discussed in the PRB FEIS (pp. 3-146 to 3-148).

Ninety raptor nest sites were identified by BHEC and BLM within 0.5 mile of the project related actions. These are listed in the table below. Of the nests listed, 11 were active in 2009.

Table 3.16 Documented raptor nests within the WDU Gamma and WDU Delta project area.

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
1	**1370**	**417101 4896390**	**S18 T49N R76W**	**Cottonwood**				
					2009	Unknown	Did not locate	n/a
					2008	Nest Gone	Inactive	n/a
					2007	Nest Gone	Inactive	n/a
					2003	Unknown	Active	Great horned owl
					2000	Unknown	Active	Great horned owl
2	**2141**	**414483 4896083**	**S13 T49N R77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
					2007	Good	Active	Red-tailed hawk
					2006	Good	Active	Red-tailed hawk
					2005	Unknown	Inactive	n/a
					2004	Good	Inactive	n/a
3	**2348**	**411058 4908312**	**S10 T50N 77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2006	Good	Inactive	n/a
					2005	Fair	Inactive	n/a
					2004	Good	Inactive	n/a
4	**2349**	**413708 4908015**	**S11 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
					2008	Good	Unknown	n/a
					2007	Good	Inactive	n/a
					2006	Good	Inactive	n/a
					2005	Good	Inactive	n/a
					2004	Good	Active	Golden eagle

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
5	**2350**	**413737 4907551**	**S11 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Nest Gone	Inactive	n/a
					2007	Nest Gone	Inactive	n/a
					2006	Unknown	Inactive	n/a
					2005	Unknown	Inactive	n/a
					2004	Good	Active	American kestrel
6	**2352**	**414763 4907619**	**S12 T50N R77W**	**Creek bank**				
					2009	Excellent	Active	Great horned owl
					2008	Good	Active	Great horned owl
					2008	Good	Unknown	n/a
					2007	Good	Active	Great horned owl
					2006	Good	Active	Great horned owl
					2005	Good	Active	Great horned owl
					2004	Good	Active	Great horned owl
7	**2353**	**416116 4907198**	**S18 T50N R76W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Inactive	n/a
					2006	Good	Active	Red-tailed hawk
					2005	Good	Active	Red-tailed hawk
					2004	Good	Inactive	n/a
8	**2675**	**416844 4896326**	**S18 T49N R76W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	ACTF	Golden eagle
					2006	Excellent	Active	Golden eagle
					2005	Good	Active	Golden eagle
					2004	Good	Active	Golden eagle
9	**3197**	**414495 4896282**	**S13 T49N R77W**	**Cottonwood**				
					2009	Poor	Inactive	n/a
					2008	Remnants	Inactive	n/a
					2007	Poor	Inactive	n/a
					2006	Poor	Inactive	n/a
					2005	Remnants	Inactive	n/a

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
10	**3202**	**411012 4904039**	**S27 T50N R77W**	**Cottonwood**				
					2009	Fair	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Fair	Inactive	n/a
					2006	Good	Active	Red-tailed hawk
					2005	Fair	Inactive	n/a
					2004	Fair	Unknown	n/a
11	**3203**	**410609 4904193**	**S27 T50NR77W**	**Cottonwood**				
					2009	Nest Gone	Did not locate	n/a
					2008	Nest Gone	Inactive	n/a
					2007	Unknown	Did not locate	n/a
					2006	Poor	Inactive	n/a
					2005	Poor	Inactive	n/a
					2004	Poor	Unknown	n/a
12	**3204**	**410625 4903900**	**S27 T50N R77W**	**Cottonwood**				
					2009	Excellent	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
					2007	Good	Inactive	n/a
					2006	Good	Inactive	n/a
					2005	Fair	Inactive	n/a
					2004	Fair	Unknown	n/a
13	**3205**	**410934 4904325**	**S22 T50N R77W**	**Cliff**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Inactive	n/a
					2006	Good	Inactive	n/a
					2005	Unknown	Active	American kestrel
					2004	Good	Unknown	n/a
14	**3732**	**419624 4904960**	**S21 T50N R76W**	**Ponderosa**				
					2009	Fair	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Unknown	Inactive	n/a
					2006	Nest Gone	Inactive	n/a
					2005	Fair	Inactive	n/a
					2004	Nest Gone	Inactive	n/a

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
15	**3744**	**412207 4901461**	**S35 T50N R77W**	**Cliff**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Great horned owl
					2007	Good	Active	Great horned owl
					2006	Good	Active	Great horned owl
16	**3960**	**414092 4909655**	**S1 T50N R77W**	**Ponderosa**				
					2009	Excellent	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Active	Golden eagle
					2005	Good	Active	Golden eagle
17	**4146**	**414275 4899885**	**S1 T49N R77W**	**Ponderosa**				
					2009	Nest Gone	Inactive	n/a
					2009	Nest Gone	Did not locate	n/a
					2008	Nest Gone	Inactive	n/a
					2007	Good	Active	Red-tailed hawk
					2006	Good	Inactive	n/a
18	**5093**	**410176 4908258**	**S9 T50N R77W**	**Creek bank**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Active	Red-tailed hawk
					2006	Good	Active	Red-tailed hawk
19	**5094/ 6177**	**412452 4904489**	**S23 T50N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Golden eagle
					2007	Good	Active	Golden eagle
					2006	Good	Active	Golden eagle
20	**5095**	**412699 4904168**	**S26 T50N R77W**	**Creek bank**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Inactive	n/a
					2006	Good	Active	American kestrel
21	**5103**	**419127 4895877**	**S21 T49N R76W**	**Cottonwood**				
					2006	Excellent	Inactive	n/a
22	**5160**	**411303 4904682**	**S22 T50N R77W**	**Creek bank**				
					2009	Excellent	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Active	Barn Owl

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
23	**5165**	**415846 4899892**	**S6 T49N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Unknown	n/a
					2007	Good	Active	Red-tailed hawk
24	**5166**	**415745 4899772**	**S6 T49N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Active	American kestrel
25	**5167**	**412828 4898891**	**S11 T49N R77W**	**Ponderosa**				
					2009	Poor	Inactive	n/a
					2008	Fair	Inactive	n/a
					2007	Poor	Inactive	n/a
26	**5168**	**417741 4896593**	**S17 T49N R76W**	**Cottonwood**				
					2009	Unknown	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Active	Great horned owl
27	**5195**	**415048 4906127**	**S13 T50N R77W**	**Ponderosa**				
					2007	Poor	Inactive	n/a
28	**5196**	**413671 4905530**	**S23 T50N R77W**	**Ponderosa**				
					2009	Good	Active	Great horned owl
					2008	Good	Active	Great horned owl
					2007	Good	Active	Great horned owl
29	**5197**	**416050 4907218**	**S18 T50N R76W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Unknown	n/a
					2007	Good	Inactive	n/a
30	**5198**	**411647 4908157**	**S10 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
					2007	Good	Active failed	Red-tailed hawk
31	**5199**	**415640 4906325**	**S13 T50N R77W**	**Ponderosa**				
					2007	Good	Inactive	n/a
32	**5200**	**415110 4905113**	**S24 T50N R77W**	**Ponderosa**				
					2007	Good	Active	Red-tailed hawk

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
33	**5201**	**415666 4908409**	**S7 T50N R76W**	**Ponderosa**				
					2009	Fair	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
					2007	Good	Inactive	n/a
34	**5202**	**416201 4908833**	**S7 T50N R76W**	**Ponderosa**				
					2009	Fair	Inactive	n/a
					2008	Good	Inactive	n/a
					2007	Good	Active	Red-tailed hawk
35	**5450**	**418799 4896097**	**S16 T49N R76W**	**Cottonwood**				
					2007	Good	Active	Golden eagle
36	**5451**	**419045 4895953**	**S21 T49N R76W**	**Cottonwood**				
					2007	Remnants	Inactive	n/a
					2006	Unknown	Inactive	n/a
37	**5591**	**418853 4898613**	**S9 T49N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
38	**5828**	**410824 4903344**	**S27 T50N R77W**	**Cottonwood**				
					2009	Fair	Active failed	Red-tailed hawk
					2008	Good	Inactive	n/a
39	**5833**	**410968 4901487**	**S34 T50N R77W**	**Ponderosa**				
					2009	Excellent	Active	Red-tailed hawk
					2008	Good	Active	Red-tailed hawk
40	**5846**	**417754 4908606**	**S8 T50N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
41	**5847**	**416659 4909244**	**S6 T50N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
42	**5848**	**418117 4907042**	**S17 T50N R76W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
43	**5850**	**415315 4908498**	**S12 T50N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
44	**5851**	**415123 4909666**	**S1 T50N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
45	**5852**	**418065 4908897**	**S8 T50N R76W**	**Juniper**				
					2009	Fair	Inactive	n/a
					2008	Good	Inactive	n/a
46	**5857**	**416836 4908924**	**S7 T50N R76W**	**Ponderosa**				
					2009	Good	Active	Red-tailed hawk
					2008	Excellent	Active	Red-tailed hawk
47	**6086**	**410896 4904358**	**S22 T50N R77W**	**Cottonwood**				
					2009	Nest Gone	Inactive	n/a
					2008	Unknown	Inactive	n/a
					2007	Unknown	Inactive	n/a
					2006	Unknown	Did not locate	n/a
					2005	Unknown	Active	Great horned owl
48	**6100/ 6163**	**417214 4901996**	**S31 T50N R76W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
					2007	Good	Active	Red-tailed hawk
49	**6101/ 6169**	**415791 4900967**	**S31 T50N R76W**	**Creek bank**				
					2008	Good	Active	Great horned owl
50	**6103**	**415449 4902346**	**S36 T50NR77W**	**Ponderosa**				
					2008	Fair	Inactive	n/a
51	**6106**	**415422 4904876**	**S24 T50N R77W**	**Ponderosa**				
					2008	Good	Active	Red-tailed hawk
52	**6107**	**415943 4907514**	**S7 T50N R76W**	**Creek bank**				
					2009	Good	Inactive	n/a
					2008	Good	Active	American kestrel
53	**6108**	**416048 4907530**	**S7 T50N R76W**	**Creek bank**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
54	**6157**	**411091 4903333**	**S27 T50N R77W**	**Cottonwood**				
					2009	Poor	Inactive	n/a
					2006	Fair	Inactive	n/a
					2005	Poor	Inactive	n/a

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
55	**6162**	**418031 4903022**	**S29 T50N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2007	Good	Inactive	n/a
56	**6164**	**418188 4896442**	**S17 T49N R76W**	**Cottonwood**				
					2007	Good	Active	Red-tailed hawk
57	**6165**	**413802 4902282**	**S36 T50N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
58	**6166**	**417959 4902504**	**S29 T50N R76W**	**Creek bank**				
					2009	Fair	Inactive	n/a
					2008	Good	Active	Great horned owl
					2007	Good	Active	Great horned owl
59	**6167**	**417910 4902569**	**S29 T50N R76W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2007	Good	Inactive	n/a
60	**6168**	**418031 4903152**	**S29 T50N R76W**	**Rock cavity**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Prairie falcon
					2007	Good	Active	Prairie falcon
61	**6102/ 6170**	**415654 4901307**	**S31 T50N R76W**	**Ponderosa**				
					2008	Good	Active	Golden eagle
					2007	Good	Active	Golden eagle
62	**6171**	**417175 4906988**	**S18 T50N R76W**	**Creek bank**				
					2009	Unknown	Inactive	n/a
					2007	Good	Active	American kestrel
63	**6104/ 6172**	**415468 4903414**	**S25 T50N R77W**	**Ponderosa**				
					2008	Good	Active	Red-tailed hawk
					2007	Good	Active	Red-tailed hawk
64	**6173**	**416684 4903702**	**S30 T50N R76W**	**Ponderosa**				
65	**6105/ 6174**	**416122 4904314**	**S19 T50N R76W**	**Ponderosa**				
					2008	Good	Active	Red-tailed hawk
					2007	Good	Inactive	n/a
66	**6175**	**418989 4895965**	**S21 T49N R76W**	**Creek bank**				
					2007	Good	Inactive	n/a

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
67	**6176**	**418781 4896116**	**S16 T49N R76W**	**Cottonwood**				
					2007	Good	Active	Golden eagle
68	**6178**	**414095 4902539**	**S36 T50N R77W**	**Creek bank**				
					2009	Substrate Gone	Inactive	n/a
					2008	Good	Inactive	n/a
69	**6179**	**418278 4896398**	**S17 T49N R76W**	**Cottonwood**				
					2007	Fair	Inactive	n/a
70	**6215**	**414297 4906389**	**S13 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
71	**6233**	**414639 4899608**	**S1 T49N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Poor	Inactive	n/a
72	**6234**	**414891 4899478**	**S1 T49N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
73	**6235**	**413979 4899838**	**S1 T49N R77W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Poor	Inactive	n/a
74	**6236**	**417606 4895580**	**S20 T49N R76W**	**Cottonwood**				
					2009	Nest Gone	Did not locate	n/a
					2008	Good	Inactive	n/a
75	**6237**	**417302 4896421**	**S17 T49N R76W**	**Creek bank**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Great horned owl
76	**6341**	**419531 4902826**	**S28 T50N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Golden eagle
77	**6342**	**419557 4902749**	**S28 T50N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Good	Inactive	n/a
78	**6345**	**419505 4904990**	**S21 T50N R76W**	**Juniper**				
					2009	Fair	Inactive	n/a
					2008	Fair	Inactive	n/a

	BLM ID	UTME	Legal	Substrate	Year	Condition	Status	Species
79	**6346**	**417950 4902596**	**S29 T50N R76W**	**Creek bank**				
					2009	Good	Inactive	n/a
					2008	Good	Active	Red-tailed hawk
80	**6347**	**418400 4904604**	**S20 T50N R76W**	**Ponderosa**				
					2009	Good	Inactive	n/a
					2008	Fair	Inactive	n/a
81	**6348**	**419335 4906024**	**S16 T50N R76W**	**Creek bank**				
					2009	Fair	Inactive	n/a
					2008	Unknown	Inactive	n/a
82	**6506**	**413113 4907931**	**S11 T50N R77W**	**Cottonwood**				
					2009	Good	Unknown	n/a
83	**6507**	**413055 4907932**	**S11 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	n/a
84	**6508**	**413056 4907933**	**S11 T50N R77W**	**Cottonwood**				
					2009	Good	Unknown	n/a
85	**6509**	**412926 4907921**	**S11 T50N R77W**	**Cottonwood**				
					2009	Fair	Inactive	n/a
86	**6510**	**412434 4901398**	**S35 T50N R77W**	**Juniper**				
					2009	Fair	Inactive	n/a
87	**6635**	**412438 4901398**	**S35 T50N R77W**	**Cliff**				
					2009	Fair	Inactive	n/a
88	**8370**	**418923 4906231**	**S16 T50N R76W**	**Cottonwood**				
					2009	Good	Inactive	Red-tailed hawk
89	**8371**	**413007 4907911**	**S111 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	Red-tailed hawk
90	**8372**	**412947 4907916**	**S11 T50N R77W**	**Cottonwood**				
					2009	Good	Inactive	Red-tailed hawk

3.3.6. Plains Sharp-tailed Grouse

Plains sharp-tailed grouse are discussed in this document because specific concerns for this species were identified during the scoping process for the PRB FEIS. The affected environment for plains sharp-tailed grouse is discussed in the PRB FEIS on pp. 3-148 to 3-150.

Habitats within the WDU Gamma and WDU Delta project area have potential to support sharp-tailed grouse. The mosaic of grasslands and sagebrush-grasslands, wooded draws, shrubby riparian areas, and wet meadows that occur in the area may provide nesting and brood-rearing habitat. The nearest known plains sharp-tailed grouse lek is approximately 6.5 miles to the south of the project area. Plains sharp-tailed grouse were noted in SENW Section 8, T49N, R76W in November 2009 during a field visit to the

project area by the BLM biologist. Surveys to search for sharp-tailed grouse leks revealed no displaying birds or undocumented leks (BHEC 2009).

3.3.7. Sagebrush Obligates

Sagebrush communities are the most common habitat type in the project area. Large-scale development of energy reserves underlying sagebrush ecosystems is placing sagebrush communities and wildlife increasingly at risk (WY 2009). Sagebrush ecosystems support a variety of species, including migratory birds, raptors, big game, reptiles, and small mammals. Several Wyoming BLM sensitive species are associated with sagebrush ecosystems. These include ferruginous hawk, loggerhead shrike, Townsend's big-eared bat, and western burrowing owl.

Sagebrush obligates are species that require sagebrush for some part of their life cycle and cannot survive without it. Sagebrush obligate species within the Powder River Basin that are listed as sensitive species by Wyoming BLM include Brewer's sparrow, sage thrasher, sage sparrow, and greater sage-grouse. All of these bird species require sagebrush for nesting, with nests typically located within or under the sagebrush canopy. Greater sage-grouse were observed within the project area by the BLM during field visits and BHEC reported sign observed also.

3.4. Water Resources

The project area is within the Upper Powder River drainage system. The Powder River is the primary hydrologic feature in the Powder River Basin, with a drainage area of 6,050 sq miles and flows ranging from 140 to 1400 cfs. In this project area there are three major tributaries, Barber Creek, Williams Draw and Somerville Draw.

3.4.1. Groundwater

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

A search of the Wyoming State Engineer Office (WSEO) Ground Water Rights Database for this area showed 47 registered stock and domestic water wells within ½ mile of a federal CBNG producing well in the POD with depths ranging from 8 to 1,500 feet. For additional information on water, please refer to the PRB FEIS (January 2003), Chapter 3, Affected Environment pages 3-1 through 3-36 (groundwater).

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

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

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

3.4.2. Surface Water

The project area is within the Barber Creek, Dead Horse Creek, Williams Draw and Somerville Flat drainages which are tributary to the Upper Powder River watershed. Most of the drainages in the area are ephemeral (flowing only in response to a precipitation event or snow melt) to intermittent (flowing only at certain times of the year when it receives water from alluvial groundwater, springs, or other surface source – PRB FEIS Chapter 9 Glossary).

Due to continuous discharge of CBNG produced water from existing production within and above the project area, the flow in Barber Creek has become perennial in the lower portions of the drainage. Barber Creek has a well defined, steeply incised channel in the lower reaches which broadens closer to the confluence with the Powder River. There are spreader dikes installed along the lower reaches for flood plain irrigation. For the Williams Draw and Somerville Flat drainages, the flow at present is ephemeral and the channels are primarily well vegetated grassy swales, without defined bed and bank. Most of the CBNG produced water from existing wells in this vicinity is treated and discharged directly to the Powder River under approved Wyoming Pollutant Discharge Elimination System (WYPDES) permits issued by the WDEQ.

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

The operator has identified a natural spring within this POD boundary at T50N, R76W, Sec 30. The estimated flow of the spring has been determined to be 3 gpm with a water quality of 3340 µmhos/ cm conductivity, 3620 mg/l TDS and 0.5 SAR.

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

3.5. Economics and Recovery of CBNG Resources

Development of this project would have effects on the local, state, and national economies. Based on the estimates in the PRBEIS, proposed wells will generate approximately 400 million cubic feet of gas (MCFG) per well, over the life of the well. This estimate was likely based on early CBNG wells with 20-40 ft coal seams but wells within the WDU Gamma and Delta project area have potential coal seams in excess of 100 feet and 4 to 5 times as much CBNG potential.

Actual revenue from this amount of gas is difficult to calculate, as there are several variables contributing to the price of gas at any given time. Regardless of the actual dollar amount, the royalties from the gas produced in the WDU Gamma and WDU Delta PODs would have wide-ranging benefit. The federal government collects 12.5% of the royalties from all federal wells, which helps offset the costs of maintaining the federal agencies that oversee permitting. In addition to generating federal income, approximately 49% of the royalties from the WDU Gamma and WDU Delta PODs wells would return to the State of Wyoming. This revenue from mineral development contributes to Wyoming's strong economy, and allows for improvements in state funded programs such as infrastructure and education.

The development of the WDU Gamma and WDU Delta projects would also provide local revenue by employing workers in the area to build the roads and project infrastructure, drill the wells, and maintain and monitor the project area. The large pool of individuals employed to work on the WDU Gamma and WDU Delta PODs would also result in an increase in demand for goods and services from nearby communities, primarily those of Buffalo and Gillette, Wyoming.

3.6. Cultural Resources

Class III cultural resource inventories were conducted for the WDU Gamma and WDU Delta PODs project prior to on-the-ground project work (BFO Inventory No.'s 70080067 and 70090033). North Platte Archaeological Services conducted a block 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*. BJ Earle, BLM Archaeologist, field-checked the project and reviewed the report for technical adequacy and compliance with Bureau of Land Management (BLM) standards, and determined it to be adequate. The following resources are located in or near the project area.

Table 3.17 Cultural Resources Inventory Results

Site Number	Site Type	National Register Eligibility
48 JO 2721	Historic site	Not eligible
48 JO 3245	Prehistoric site	Not eligible
48 JO 3766	Prehistoric site	Eligible
48 JO 3997	Prehistoric site	Not eligible
48 JO 3998	Historic site	Not eligible
48 JO 3999	Prehistoric site	Not eligible
48 JO 4000	Prehistoric site	Eligible
48 JO 4001	Prehistoric site	Not eligible
48 JO 4002	Prehistoric site	Not eligible
48 JO 4039	Prehistoric site	Eligible
48 JO 4040	Prehistoric site	Not eligible
48 JO 4041	Prehistoric site	Not eligible
48 JO 4042	Prehistoric site	Not eligible
48 JO 4043	Prehistoric site	Eligible
48 JO 4044	Prehistoric site	Eligible
48 JO 4045	Prehistoric site	Not eligible
48 JO 4046	Historic site	Not eligible

3.7. Air Quality

Existing air quality throughout most of the Powder River Basin is in attainment with all ambient air quality standards. Although specific air quality monitoring is not conducted throughout most of the

Powder River Basin, air quality conditions in rural areas are likely to be very good, as characterized by limited air pollution emission sources (few industrial facilities and residential emissions in the relatively small communities and isolated ranches) and good atmospheric dispersion conditions, resulting in relatively low air pollutant concentrations.

Existing air pollutant emission sources within the region include the following:

- 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.

For a complete description of the existing air quality conditions in the Powder River Basin, please refer to the PRB Final EIS Volume 1, Chapter 3, pages 3-291 through 3-299.

3.8. Recreation

The Williams Draw Unit contains approximately 14,425 acres of BLM administered surface. Historically, access was provided via a State of Wyoming section along the I-90 corridor, but the section was sold. Currently, Wyoming Game & Fish Department is pursuing the creation of a walk-in hunt area through a low-water crossing off of Powder River Road.

Public lands in the majority of the Buffalo Field Office consist of isolated tracts of land managed by the BLM that lack either the size or the public access needed to provide a quality recreation experience. Currently, no public access exists within the POD. Recreationists may acquire permission from the adjacent landowners to use the land. Traditionally, this practice involves the payment of a trespass fee to the private landowner for access to the BLM land, and is usually associated with hunting.

As stated in the 1985 Buffalo Resource Management Plan, “The Powder River Breaks are nationally known for big game hunting. Hunters come to the area from throughout the continental United States”. Hunting use has been increasing during the last seven years. Lands within the POD include portions of elk hunt area 129, antelope hunt areas 17 and 23 and deer hunt areas 17 and 19.

3.9. Travel Management

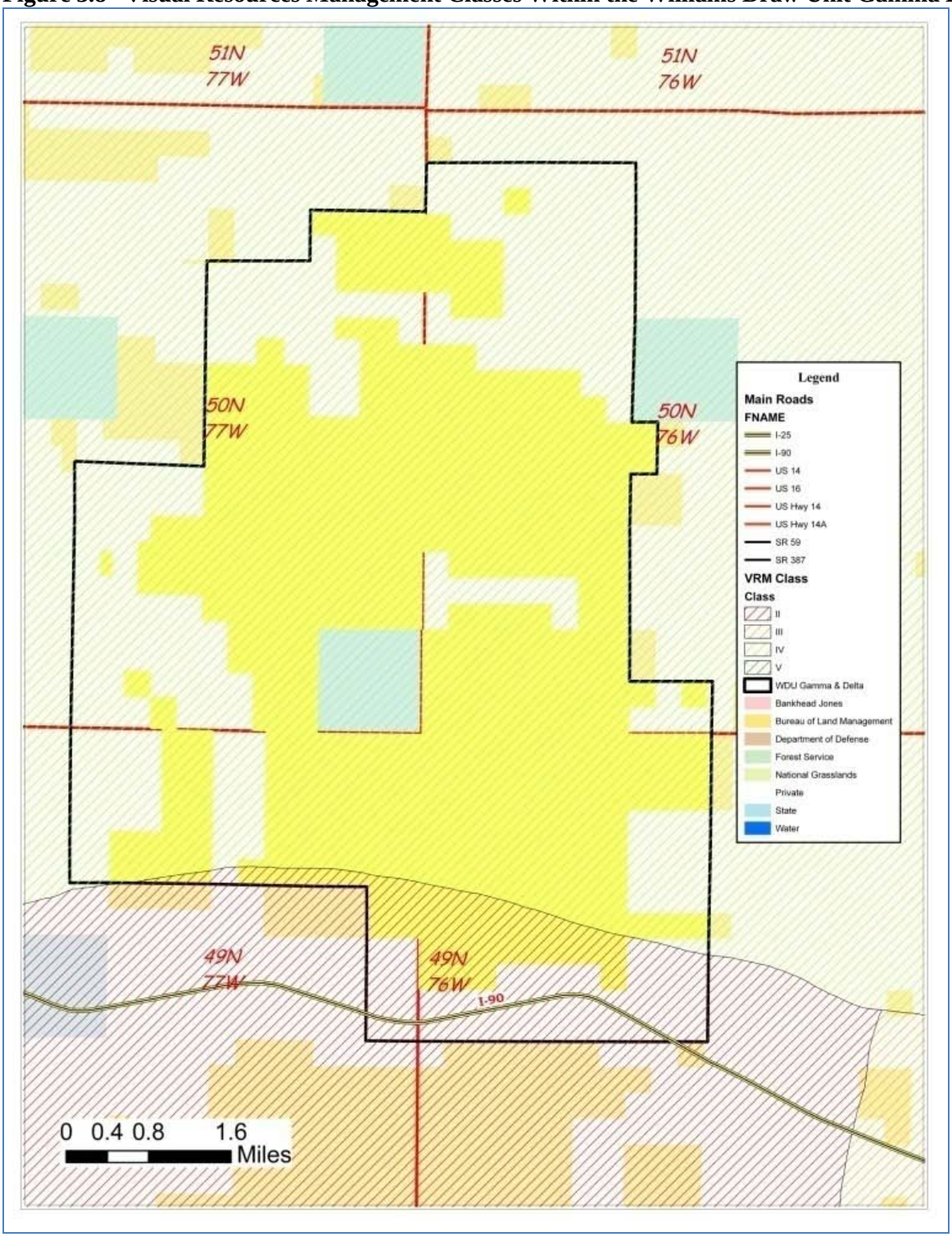
Interstate 90 bisects the southern portion of the POD, but does not provide access to any public land parcels. The PODs can be accessed via private roads that veer off of Upper Powder River Road to the west and Barber Creek Road to the east. There is no other legal vehicle access within the project area.

Several two-track roads are present within the project area; the roads are utilized for oil and gas operations and livestock management and are not currently accessible for public use.
The 2001 Buffalo Resource Management Plan designates travel in this area as a “Limited Area B: Use is limited to designated roads and vehicle routes within these areas. Until signs are posted, vehicle travel is limited to existing roads and vehicle routes” (BLM, 2001). The BLM recognizes a road as existing from the roads and trails inventoried from the 1985 RMP. RMP maintenance now recognizes roads found on the 1989-1991 Surface Ownership Maps as existing roads. The RMP further states that “Using motorized vehicles requires no fee and no permit, but their use is restricted depending on whether the area has been designated closed, limited or open” (BLM, 2001).

3.10. Visual Resources Management

The project area is located within a portion of the Powder River Breaks that has experienced moderate to major CBM development. The human influence is apparent on the landscape, as the site is within 5 miles of several other wells and compressor stations. Additionally, a stock water pond was previously present at the proposed location of well 43-17-4976 and fencelines are present within the viewshed. The majority of the project area is classified as VRM Class IV. The objective of this class provides for management activities which require major modification of the existing character of the landscape. The southern portion of the PODs that are within approximately 1 mile (distance ranges from 0.5- 1.4 miles) of Interstate 90 is classified as VRM Class II. Well 43-17-4976 is within VRM Class II and is directly within sight of Interstate 90. In a VRM Class II area, modification to the landscape should be low, with an objective to retain the existing character of the landscape. A map of the VRM Classes within the project area is provided below.

Figure 3.8 Visual Resources Management Classes Within the Williams Draw Unit Gamma POD



4. ENVIRONMENTAL CONSEQUENCES

For a discussion of Alternatives A and B environmental consequences see Powder River Basin Oil and

Gas Project Final Environmental Impact Statement (WY–070–02–065). The changes to the proposed action (Alternative B) resulted in development of Alternative C. These changes have reduced impacts to the environment which will result from this action, therefore only the environmental consequences of Alternative C are described below.

4.1. Alternative C

4.1.1. Vegetation & Soils

4.1.1.1. Direct and Indirect Effects

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.

- Modification of hill slope hydrology.

- An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (BLM 2003). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily disturbed or destroyed by surface disturbances associated with construction activities.

These impacts, singly or in combination, would increase the potential for valuable soil loss due to increased water and wind erosion, invasive plant establishment, and increased sedimentation and salt loads to the watershed system.

Of the 169 proposed well locations within the project area, the operator has staked 46 in areas identified with low reclamation potential, 44 within badlands areas and another 5 are located over slopes that exceed 25% slopes. These soil limitations are overlapping across the landscape where all or a single limiting factor may be present at any one site. Any one of these soil limitations by itself is cause to avoid surface disturbance as successful reclamation may be unachievable.

A well location placed on slopes that exceed 25% is prone to site failure due to mass soil movement and/or severe erosion as observed in the Williams Draw area from past and present oil and gas development. The operator has staked the following 5 wells at abandoned locations that have experienced site failure: 31-1-4977, 34-18-5076, 32-19-5076, 41-24-5077 and 44-25-5077. Under alternative C, 4

locations will be denied. The operator has committed minimal surface disturbance at the 41-24-5077 and it will be allowed. LOG proposes only to strip vegetation and smooth rills across an area 30' X 120' at the 41-24-5077 that should not destabilize the site.

There are a 66.8 miles of new proposed access roads proposed within the project area. The operator has indicated that the average width of disturbance related to road construction is 50 feet. This would equate to approximately 405 acres of surface disturbance. Approximately 30% of those roads propose to cross slopes that exceed 25%, 32% fall over areas with low reclamation potential and another 30% cross badlands areas. If all these roads were constructed, roughly 30% (121 acres) of the disturbed area would likely experience failed reclamation, site failure and/or severe erosion that may degrade adjacent, undisturbed areas. These specific roads are identified on page 82 and 83.

Other contributing factors to slope stability include slope length, slope aspect and colluviums. Slope length has considerable control over runoff and potential accelerated water erosion. Slope aspect is the direction toward which the surface of the soil faces. Slope aspect may affect soil temperature, evapotranspiration, winds received and soil moisture. Colluvium is poorly sorted debris that has accumulated at the base of slopes, in depressions, or along small streams through gravity, soil creep, and local wash. It consists largely of material that has rolled, slid or fallen down the slope under the influence of gravity. The rock fragments in colluvium are usually angular, in contrast to the rounded, water-worn cobbles and stones in alluvium and glacial outwash. These factors in combination with slope determine soil stability and the potential for mass soil movement.

Figure 4.1 Areas Highly Susceptible to Erosion within the WDU Gamma and Delta Project Area

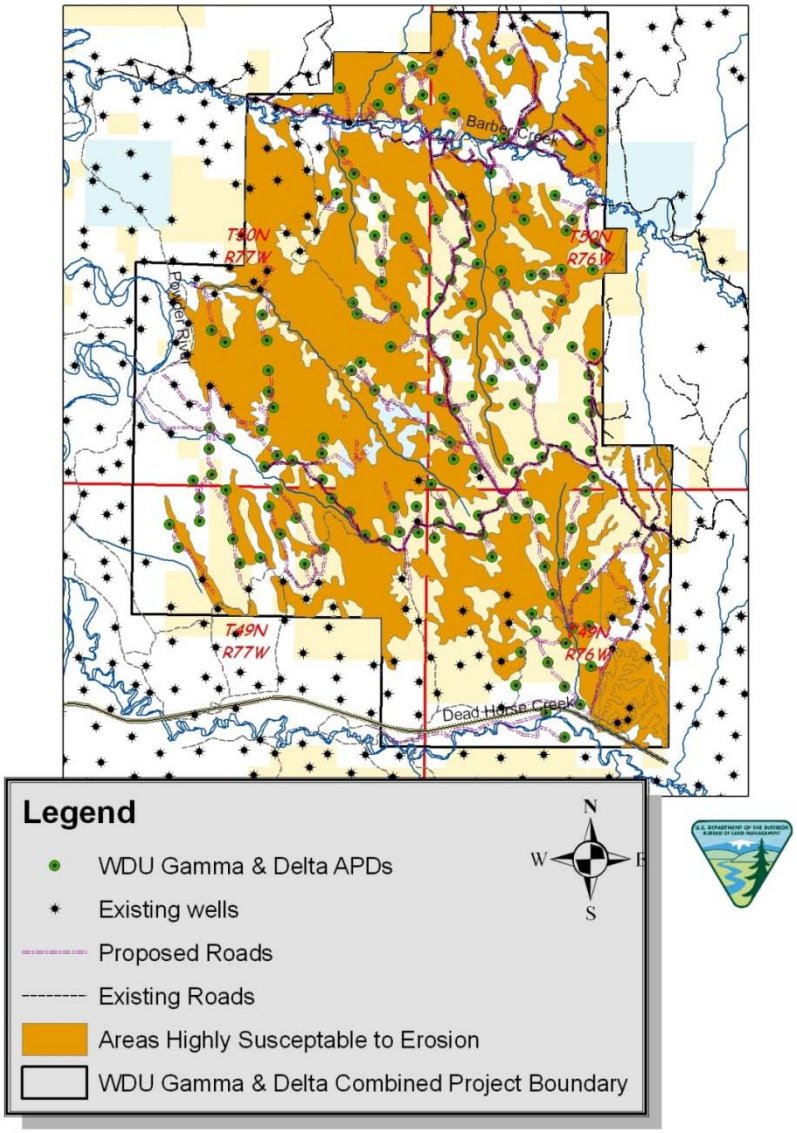
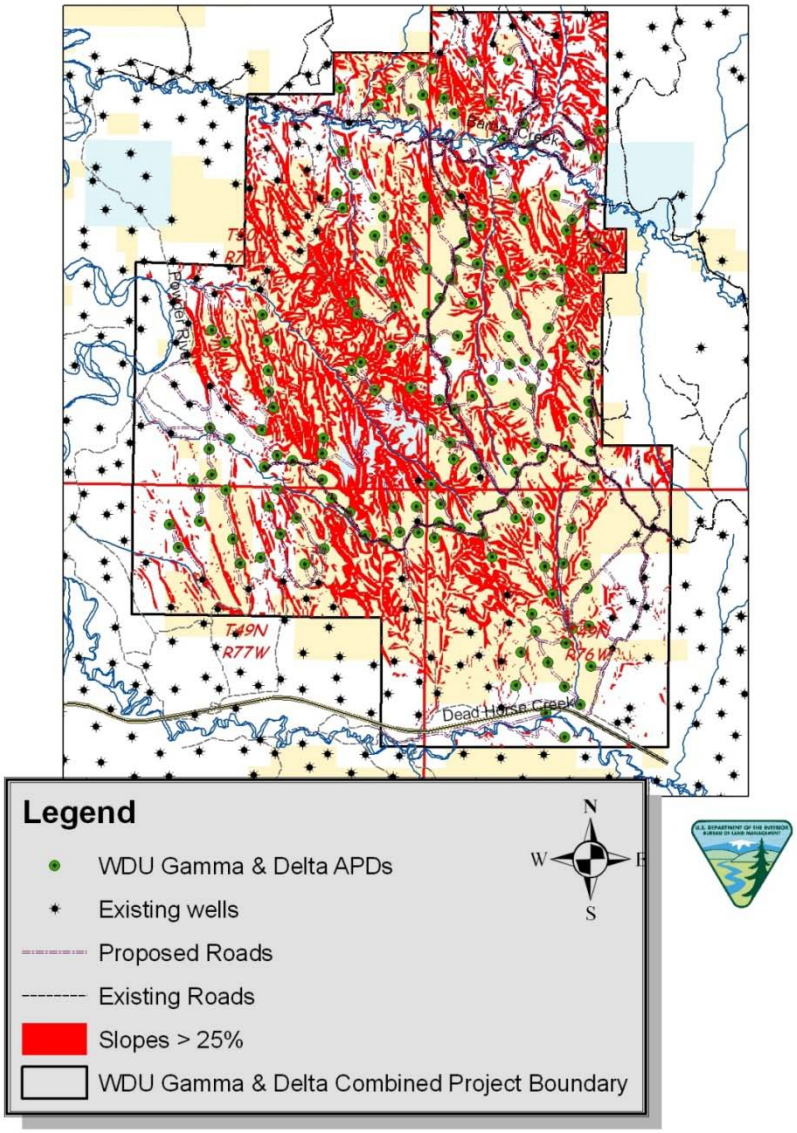


Figure 4.2 Areas of Slopes Exceeding 25% within the WDU Gamma & Delta Project Area



4.1.1.2. Cumulative Effects

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 success of the recommended seed mix.
- Loss of soil vegetation cover, biologic crusts, organic matter and productivity. With expedient reclamation, productivity and stability should be regained in the shortest time frame.
- Soil erosion would also affect soil health and productivity. Erosion rates are site specific and are 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. Compaction may be remediated by plowing or ripping.

- Modification of hill slope hydrology.
- An important component of soils in Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are biological soil crusts, or cryptogamic soils that occupy ground area not covered with vascular plants. Biological soil crusts are predominantly composed of cyanobacteria, green and brown algae, mosses and lichens. They are important in maintaining soil stability, controlling erosion, fixing nitrogen, providing nutrients to vascular plants, increasing precipitation infiltration rates, and providing suitable seed beds (BLM 2003). They are adapted to growing in severe climates; however, they take many years to develop (20 to 100) and can be easily disturbed or destroyed by surface disturbances associated with construction activities.

4.1.1.3. Mitigation Measures

The proponent planned their project to maximize the fluid mineral drainage while avoiding areas with soil limitation where possible. BLM made further recommendations during the onsite to avoid areas with low reclamation potential and poor site suitability. Disturbances approved within these areas require the programmatic/standard COA's be complimented with a site specific performance based reclamation related COA. Where appropriate BLM has required the operator to submit site specific reclamation plans to address soil limiting factors that would otherwise hinder successful reclamation. In other cases, site suitability is questionable due to the combination of steep slopes and high erosion potential; BLM has required the operator to develop a geotechnical analysis plan. Some sites are not suitable for oil and gas development and/or have no reclamation potential and cannot be mitigated.

The following conditions of approval have been applied to mitigate or minimize impacts:

1. To minimize surface disturbance and vegetation loss the following applies for rights-of-way WYW-170026 for road, water pipeline and buried power and WYW-170027 for "up to 20 inch" gas pipeline located T.49N., R.76W., section 9;T. 50N., R.76W., Sec. 6, 7, 21; and T. 50N., R.77W., Sec. 10, 12:
   a. All utilities will corridor with access routes and will extend approximately 20,099 feet in length.
   b. Proposed access to existing and/or proposed improved road/proposed water, buried electric cable, gas: not to exceed a total 50 foot width.
   c. If conditions warrant the use of primitive roads, then the proposed primitive/proposed water pipeline, and buried electric cable, gas: not to exceed a total 30 foot width.
2. BLM's preferred access to the 44-32 location is Williams Draw Unit Gamma Road B-2 Alternate. LOG will NOT CONSTRUCT the WDU Gamma Road B-2 to avoid steep slopes and highly erosive soils. LOG will remove all staking associated with the Road B-2 alignment prior to construction of Road B-2 Alternate.
3. LOG will apply a minimum of 4" of aggregate across the entire working surface (150' x 150') of the 34-5 location to protect fragile soils.
4. For all wells spudded after November 1, the reserve pit fluids must be removed immediately following completion activities to avoid potential conflicts with raptor timing limitations and the standard COA that reserve pits be closed within 90 days, unless an exception is granted by the BLM Authorized Officer.
5. All trees removed during construction will be salvaged. These trees will remain whole and used for stabilization and erosion control per BLM direction unless otherwise specified by the private surface owner. To avoid subsidence, no trees will be buried.
6. To minimize surface disturbance and vegetation removal:
   a. Improved roads with utility corridor working width will not exceed 50 feet with a clearing and blading not to exceed 40 feet in width unless a specific design is included in the plan and profile section of the master surface use plan.

b. Pipeline installation and/or corridors without road access working width will not exceed 35 feet with clearing and blading not to exceed 20 feet.
c. Mowing at the well site where a constructed pad is not approved as designed will be minimized to a diameter of 75 feet or less from the well stake.

7. To reduce erosion, thick walled plastic SDR9 pipe (or pipe with similar characteristics that will resist crushing with a minimum cover) may be used for ditch relief culverts. 9" or larger sizes must be used and a ditch block will be constructed as shown on a typical detail. 12" of cover will not be required for these pipes. They are not to be used for established drainages crossing the road.
8. To reduce subsidence, all pit spoil must be placed back in the pit once dry. If necessary, the pit area should be mounded slightly or restored to the original contour to allow for settling and positive surface drainage.
9. Final grading and surfacing shall occur immediately after utility installation is complete. All rills, gullies, and other surface defects shall be ripped to the full depth of erosion across the entire width of the roadway prior to final grading and surfacing.
10. The Williams Draw Unit Gamma and Delta Project area is dominated by steep slopes and/or fragile soils. Improved roads used in conjunction with accessing federal wells must be fully built (including all water control structures such as wingditches, culverts, relief ditches, low water crossings, surfacing, etc.) and functional to BLM standards as outlined in the BLM Manual 9113 prior to drilling of the well. This applies to the ENTIRE Williams Draw Gamma and Delta project areas.
11. The Williams Draw Unit Gamma and Delta Project area is dominated by soils that have been identified to have limited reclamation potential that will require disturbed areas to be stabilized (stabilization efforts may include mulching, matting, soil amendments, etc.) in a manner which eliminates accelerated erosion until a self-perpetuating native plant community has stabilized the site in accordance with the Wyoming Reclamation Policy. Stabilization efforts shall be finished within 30 days of the initiation of construction activities. This applies to the ENTIRE Williams Draw Unit Gamma and Delta Project areas.
12. BLM has developed seed mixes for each ecological site identified within the project area based on the NRCS ecological site description, the reference plant community and desired species richness with the intent of maximizing re-vegetation potential. The operator will seed on the contour to a depth of no more than 0.5 inch. To maintain quality and purity, certified seed with a minimum germination rate of 80% and a minimum purity of 90% will be used. On BLM surface or in lieu of a different specific mix desired by the surface owner, use the following: See Attachment 1 for the appropriate seed mix by Ecological Site.

    Impacts to vegetation and soils from surface disturbance will be further reduced by following the operator's plans and BLM applied mitigation.

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

- With expedient reclamation, productivity and stability should be regained in the shortest time frame.

- Compaction may be remediated by plowing or ripping.

4.1.1.4. Residual Effects

The operator agreed at the onsite to drop the well proposed at the 43-26-5077 location, and incorporated this change into a new Master Surface Use Plan (MSUP), submitted August 3, 2009. The 43-26-5077 was dropped due to the poor site suitability related to side slope exceeding 25% and highly erosive soils.

These limitations indicate that the potential for road failure is high and there is no reclamation potential.

The BLM ID team identified that surface disturbance should be avoided on 42 well locations and/or the related project components cannot be authorized due to high potential for well site or road failure (listed by well in the table below). In addition, the BLM ID team feels that reclamation at these sites in accordance with the BLM-WY reclamation policy is unachievable; i.e. to facilitate eventual ecosystem reconstruction to maintain a safe and stable landscape and meet the desired outcomes of the land use plan.

- Re-establish slope stability, surface stability, and desired topographic diversity.
    - Reconstruct the landscape to the approximate original contour or consistent with the land use plan.
    - Maximize geomorphic stability and topographic diversity of the reclaimed topography.
    - Eliminate highwalls, cut slopes, and/or topographic depressions on site, unless otherwise approved.
    - 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.

The BLM ID team has identified 10 engineered roads and 3 utility corridors with poor site suitability and/or no reclamation potential within the WDU Gamma POD which are denied under alternative C including:

- Roads: B-2, D, E, M, N, O-3, O-4, Q, 44-6 and 44-25.
- Utility Corridor: Laskie-1, B-1 and 33-8

The BLM ID team has identified an additional 14 engineered roads and 2 utility corridors with poor site suitability and/or no reclamation potential within the WDU Delta POD which are denied under alternative C including:

- Roads: A, D, E-9, E-8, F-2, G, H, J-1, J-2, L, 12-12, 34-18, 32-20 and 14-31
- Utility Corridors: A and C

The following 42 well locations would be denied under alternative C due to poor site suitability and/or no reclamation potential associated with the well site and/or access road.

	Well Name	Well #	TWP	RNG	Sec	Qrt	Lease #
1	WDU GAMMA	31-1	49N	77W	1	NWSE	WYW136688
2	WDU GAMMA	12-5	49N	76W	5	SWNW	WYW144539
3	WDU GAMMA	23-5	49N	76W	5	NESW	WYW147332
4	WDU GAMMA	24-5	49N	76W	5	SESW	WYW147332
5	WDU GAMMA	44-6	49N	76W	6	SESE	WYW147332
6	WDU GAMMA	21-8	49N	76W	8	NENW	WYW160792
7	WDU GAMMA	43-8	49N	76W	8	NESE	WYW160792
8	WDU DELTA	12-7	50N	76W	7	SWNW	WYW042305
9	WDU DELTA	21-7	50N	76W	7	NENW	WYW042305
10	WDU DELTA	23-7	50N	76W	7	NESW	WYW042305
11	WDU DELTA	33-7	50N	76W	7	NWSE	WYW042305
12	WDU DELTA	41-7	50N	76W	7	NENE	WYW042305
13	WDU DELTA	14-17	50N	76W	17	SWSW	WYW042305

	Well Name	Well #	TWP	RNG	Sec	Qrt	Lease #
14	WDU DELTA	23-17	50N	76W	17	NESW	WYW042305
15	WDU DELTA	34-17	50N	76W	17	SWSE	WYW042305
16	WDU DELTA	34-18	50N	76W	18	SWSE	WYW042305
17	WDU DELTA	43-18	50N	76W	18	NESE	WYW042305
18	WDU DELTA	32-19	50N	76W	19	SWNE	WYW145600
19	WDU DELTA	42-19	50N	76W	19	SENE	WYW145600
20	WDU DELTA	13-20	50N	76W	20	NWSW	WYW139683
21	WDU DELTA	23-20	50N	76W	20	NESW	WYW139683
22	WDU DELTA	32-20	50N	76W	20	SWNE	WYW154407
23	WDU DELTA	31-20	50N	76W	20	NWNE	WYW154407
24	WDU DELTA	41-20	50N	76W	20	NENE	WYW154407
25	WDU DELTA	42-20	50N	76W	20	SENE	WYW154407
26	WDU DELTA	14-31	50N	76W	31	SWSW	WYW130625
27	WDU DELTA	12-12	50N	77W	12	SWNW	WYW135629
28	WDU GAMMA	33-24	50N	77W	24	NWSE	WYW130640
29	WDU GAMMA	34-24	50N	77W	24	SWSE	WYW130640
30	WDU GAMMA	14-24	50N	77W	24	SWSW	WYW130640
31	WDU GAMMA	21-25	50N	77W	25	NENW	WYW130625
32	WDU GAMMA	44-25	50N	77W	25	SESE	WYW130625
33	WDU GAMMA	11-26	50N	77W	26	NWNW	WYW130625
34	WDU GAMMA	22-26	50N	77W	26	SENW	WYW130625
35	WDU GAMMA	23-26	50N	77W	26	NESW	WYW130639
36	WDU GAMMA	24-26	50N	77W	26	SESW	WYW130639
37	WDU GAMMA	32-27	50N	77W	27	SWNE	WYW136688
38	WDU GAMMA	42-27	50N	77W	27	SENE	WYW136688
39	WDU DELTA	12-35	50N	77W	35	SWNW	WYW130639
40	WDU DELTA	21-35	50N	77W	35	NENW	WYW130639
41	WDU DELTA	42-35	50N	77W	35	SENE	WYW130625
42	WDU DELTA	43-35	50N	77W	35	NESE	WYW130639

Following the onsite inspection, BLM instructed Lance Oil & Gas to complete a geotechnical analysis along identified proposed road alignments where road suitability is questionable due primarily to slopes exceeding 25%. Lance submitted a plan for geotechnical analysis received by BLM-BFO January 13, 2010 but the plan failed to address all the areas of concern identified.

The BLM ID team has identified 8 engineered roads requiring a geotechnical analysis within the WDU Gamma POD including: C-1, C-2, F-1, F-2, G-1, L-3, O-1 and O-2.

The BLM ID team has identified an additional 4 engineered roads requiring a geotechnical analysis within the WDU Delta POD including: C-1, C-2, J-1 and 34-19.

Minimal surface disturbance is required to complete the geotechnical analysis. The associated disturbance is analyzed within this NEPA document. BLM has the option to defer the 27 APD's associated with these access roads where a geotechnical analysis is being required. This would then allow Lance to complete

the required geotechnical analysis, compile and submit a report to BLM-BFO for review. An informed decision could then be issued on those APD's and associated road under a separate NEPA document that tiers to the detailed analysis completed for the POD. This affects the APD's listed in the table below.

The following 27 wells locations would be deferred under alternative C pending a geotechnical analysis to determine the slope stability of the associated access roads.

	Well name	Well #	TWP	RNG	Sec	QTR	Lease #
1	WDU GAMMA	12-1	49N	77W	1	SWNW	WYW136688
2	WDU GAMMA	23-1	49N	77W	1	NESW	WYW136688
3	WDU GAMMA	44-5	49N	76W	5	SESE	WYW147332
4	WDU GAMMA	33-8	49N	76W	8	NWSE	WYW160792
5	WDU GAMMA	41-8	49N	76W	8	NENE	WYW160792
6	WDU GAMMA	21-17	49N	76W	17	NENW	WYW134233
7	WDU GAMMA	32-17	49N	76W	17	SWNE	WYW134233
8	WDU GAMMA	41-17	49N	76W	17	NENE	WYW134233
9	WDU GAMMA	43-17	49N	76W	17	NESE	WYW134233
10	WDU GAMMA	21-2	49N	77W	2	NENW	WYW136688
11	WDU GAMMA	32-2	49N	77W	2	SWNE	WYW136688
12	WDU GAMMA	41-2	49N	77W	2	NENE	WYW136688
13	WDU GAMMA	43-2	49N	77W	2	NESE	WYW136688
14	WDU DELTA	11-7	50N	76W	7	NWNW	WYW042305
15	WDU DELTA	34-19	50N	76W	19	SWSE	WYW145600
16	WDU DELTA	42-29	50N	76W	29	SENE	WYW154407
17	WDU DELTA	14-30	50N	76W	30	SWSW	WYW145602
18	WDU DELTA	41-30	50N	76W	30	NENE	WYW145601
19	WDU DELTA	42-12	50N	77W	12	SENE	WYW133630
20	WDU DELTA	12-13	50N	77W	13	SWNW	WYW135629
21	WDU DELTA	23-13	50N	77W	13	NESW	WYW135629
22	WDU DELTA	34-13	50N	77W	13	SWSE	WYW147347
23	WDU GAMMA	21-24	50N	77W	24	NENW	WYW130640
24	WDU GAMMA	32-24	50N	77W	24	SWNE	WYW130640
25	WDU GAMMA	13-25	50N	77W	25	NWSW	WYW130625
26	WDU GAMMA	23-25	50N	77W	25	NESW	WYW130625
27	WDU GAMMA	34-25	50N	77W	25	SWSE	WYW130625

4.1.2. Wetland/Riparian

4.1.2.1. Direct and Indirect Effects

The PRB FEIS assumes that 15% of impounded water will re-surface as channel flow (PRB FEIS pg 4-74). Re-surfacing water from the impoundments will potentially allow for wetland-riparian species establishment. Continuous high stream flows into wetlands and riparian areas would change the composition of species and dynamics of the food web. The shallow groundwater table would rise closer to the surface with increased and continuous stream flows augmented by produced water discharges.

Three of the existing water discharge points that will potentially receive CBNG produced water are

located several miles upstream on tributaries to the Powder River. These discharge points, which have been in place for years, discharge directly to the channels of Barber Creek and Flying E Creek. From these discharge points, the stream channel character has been changed from intermittent or ephemeral to perennial flow. Based on periodic inspections, the channels are stable and adjusted to continuous discharge.
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 groundwater table would also influence the hydrology of wetlands by reducing or eliminating the seasonal drying periods that affect recruitment of plant species and species composition of benthic and water column invertebrates. These changes to the aquatic food web base would affect the higher trophic levels of fish and waterfowl abundance and species richness for wetlands and riparian areas." (PRB FEIS Page 4-175).

The PRB FEIS identified effects to gallery forests of mature cottonwood trees stating that "(they) may be lost by bank undercutting caused by the increased surface water flows in channels." Included in the ROD is programmatic mitigation "which may be appropriate to apply at the time of APD approval if site specific conditions warrant."(ROD page A-30). One of the conditions included in that section addresses the impact to trees in A.5.8-2: "To reduce adverse effects on existing wetlands and riparian areas, water discharge should not be allowed if increased discharge volumes or subsequent recharge of shallow aquifers will inundate and kill woody species, such as willows or cottonwoods."(ROD Page A-32).

4.1.2.2. Cumulative Effects

The increase in surface water flow resulting from continuous discharge from treatment facilities could affect existing wetlands and riparian areas. "The major effects to be expected may include (1) increased erosion of channels and floodplains; (2) loss of riparian streambank vegetation; (3) changes to the composition and physical structure of the vegetation community in the wetlands and riparian areas; and (4) raising of shallow groundwater in floodplains. Erosion of channels an floodplains would increase turbidity in the water column, thus adversely affecting plankton and macroinvertebrate production and growth rates that are the basis of aquatic food chains in the prairie streams of the Project Area." (PRB FEIS pg 4-174).

4.1.2.3. Mitigation Measures

The operator has committed to monitor the water discharge points and the channels downstream for stability. If erosion is noted, the operator will be required to repair and stabilize the area using standard mitigation techniques.

The operator has also committed to expediently stabilize and revegetate disturbance within channel and floodplain associated with this project.

4.1.2.4. Residual Effects

There will be changes to wetland and riparian areas through alterations in volume, velocity, timing and quality of the stream flow due to direct discharge. Turbidity and solids loading in the streams would probably increase due to erosion of project disturbed areas and sediment transport to the associated drainages. These impacts would be mitigated by expediently stabilizing the disturbance and reducing the amount of sediment reaching the streams.

4.1.3. Invasive Species

4.1.3.1. 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.

Cheatgrass or downy brome (*Bromus tectorum*) and to a lesser extent, Japanese brome (*B. japonicus*) are known to exist in the project area. These two species are found in such high densities and numerous locations throughout NE Wyoming that a control program is not considered feasible at this time.
The use of existing facilities along with the surface disturbance associated with construction of proposed access roads, pipelines, water management infrastructure, produced water discharge points and related facilities would present opportunities for weed invasion and spread. Produced CBNG water would likely continue to modify existing soil moisture and soil chemistry regimes in the areas of water release and storage. The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as cheatgrass, salt cedar and Canada thistle.

4.1.3.2. Cumulative Effects

The activities related to the performance of the proposed project would create a favorable environment for the establishment and spread of noxious weeds/invasive plants such as salt cedar, Canada thistle and perennial pepperweed.

4.1.3.3. Mitigation Measures

The operator will use an integrated approach to control known noxious weeds or weeds of concern throughout construction, production and reclamation of the WDU Gamma and Delta projects. Weed species, location, landscape and soils will all be taken into consideration when determining the best method of control as well as the surrounding vegetation and land use using to combination of the following methods identified in their Integrated Pest Management Plan (IPMP) submitted February 1, 2010:

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 as identified in the operator's integrated pest management plan.

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.

Table 4.1 Noxious Weed Infestation Locations

Drainage/Location	Township/Range	Section	Noxious Weed Species
Powder River	T50N/R77W	9, 22 & 27	Russian knapweed, Scotch thistle, Saltcedar, Russian olive, Canada thistle, common cocklebur, buffalo bur, wild licorice
Barber Creek	T50N/R77W	9, 10, 11, 14, 15 &	leafy spurge, Russian knapweed, Spotted knapweed, Scotch thistle, Saltcedar, Russian

Drainage/Location	Township/Range	Section	Noxious Weed Species
		23	olive, Canada thistle, common cocklebur, buffalo bur, wild licorice
Dead Horse Creek	T49N/R77W	10, 13, 14,15 & 16	leafy spurge, Russian knapweed, Spotted knapweed, Scotch thistle, Saltcedar, Russian olive, Canada thistle, common cocklebur, buffalo bur, wild licorice
Somerville Draw	T50N/R77W	28, 33, 34 & 35	Saltcedar, Canada thistle, common cocklebur, buffalo bur
Williams Draw	T50N/R77W	22, 23,	leafy spurge, Russian knapweed, Spotted knapweed, Scotch thistle, Saltcedar, Russian olive, Canada thistle, common cocklebur, buffalo bur, wild licorice
Elephant Foot Spring	T50N/R77W	25	Saltcedar, Canada thistle, common cocklebur, buffalo bur, wild licorice

4.1.3.4. 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 are anticipated to continue to spread where control efforts are not ongoing.

4.1.4. Wildlife

4.1.4.1. Threatened and Endangered Species

4.1.4.1.1. Direct and Indirect Effects

Potential project effects on Threatened and Endangered Species were analyzed and a summary is provided in Table 3.6.

An analysis of direct and indirect impacts to mountain plover due to oil and gas development is included in the PRB FEIS (pp. 4-254 to 4-255).

4.1.4.1.2. Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pp. 4-250 to 4-257.

4.1.4.1.2.1. Mountain Plovers

Mountain plovers have been forced to seek habitat with similar qualities that may be poor quality habitat when loss or alteration of their natural breeding habitat (predominantly prairie dog colonies) occurs, such as heavily grazed land, burned fields, fallow agriculture lands, roads, oil and gas well pads and pipelines.

These areas could become reproductive sinks. Adult mountain plovers may breed there, lay eggs and hatch chicks; however, the young may not reach fledging age due to the poor quality of the habitat.

One proposed access road with corridor is proposed within the prairie dog colony located in NWSW Section 17, T49N/R76W. It is likely that there will be increased traffic on existing roads through prairie dog colony located NWSW and SWNW section 16, T49N/R76W. Use of roads and pipeline corridors by mountain plovers may increase their vulnerability to vehicle collision. Designing roads for a travel speed up to 25mph provides drivers an opportunity to notice and avoid mountain plovers and allows mountain plovers sufficient time to escape from approaching vehicles.

Even if a nesting plover flushes in time, the nest likely would still be destroyed. To reduce impacts to nesting mountain plovers, the BLM BFO requires a 0.25 mile timing limitation for potential nesting habitat prior to nest survey completion and a 0.25 mile timing limitation for all occupied nesting habitat for the entire nesting season.

4.1.4.1.2.2. Ute Ladies'-tresses Orchid

Both direct and indirect disturbance of potential habitat of the species have the potential of increase the distribution and extent of noxious weeds that occur in similar habitats.

4.1.4.1.3. Mitigation Measures

LOG will conduct clearance surveys for threatened, endangered or other special-concern species at the optimum time. Inventory for special concern species, other than federally listed species below, is contingent upon landowner concurrence. This will require coordination with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters.

4.1.4.1.3.1. Mountain Plover

Creation of hunting perches over nest sites for avian predators within 0.5 mile of identified nesting areas will be avoided by burying power lines, using the lowest possible structures for fences and other structures and by incorporating perch-inhibiting devices into their design.

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

A mountain plover nesting survey is required in suitable habitat prior to commencement of surface disturbing activities in areas identified with suitable nesting habitat. Mountain plover nesting surveys shall be conducted by a biologist following the most current USFWS Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities. No surface disturbing activities are permitted in the suitable habitat area listed above, from March 15-July 31, unless a mountain plover nesting survey has been conducted during the current breeding season. This timing limitation will be in effect unless surveys determine no plovers are present. If occupied mountain plover habitat is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plover observations are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15). No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.

4.1.4.1.3.2. Ute Ladies'-tresses Orchid

Moist soils near wetlands, streams, lakes, or springs in the project area will be promptly revegetated if construction activities impact the vegetation in these areas. Revegetation will be designed to avoid the establishment of noxious weeds.

4.1.4.2. Sensitive Species

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

The PRB FEIS discusses impacts to sensitive species on pp. 4-257 to 4-273. Table 3.9 summarizes the habitat requirements and potential impacts of the WDU Gamma and WDU Delta PODs on all Wyoming BLM sensitive species that occur in the BFO administrative area. Some sensitive species are of particular concern in the project area, due to their demonstrated or suspected sensitivity to CBNG development or because they were recently considered for listing under the ESA.

These species include bald eagle, black-tailed prairie dog, greater sage-grouse, mountain plover, and western burrowing owl and are discussed in further detail in this section.

4.1.4.2.1. Direct and Indirect Effects

4.1.4.2.1.1. Bald Eagle

Impacts to bald eagles are discussed in the PRB FEIS on pg. 4-251 to 4-253. A more recent study completed in 2004 suggests that two-tracks and improved project roads pose minimal collision risk to bald eagles. In one year of monitoring road-side carcasses the BLM BFO reported 439 carcasses, 226 along Interstates (51%), 193 along paved highways (44%), 19 along gravel county roads (4%), and 1 along an improved CBNG road (<1%) (Bills 2004). No road-killed eagles were reported; bald and golden eagles were observed feeding on 16 of the reported road-side carcasses (<4%). The risk of big-game vehicle-related mortality along CBNG project roads is so insignificant or discountable that when combined with the lack of bald eagle mortalities associated with highway foraging leads to the conclusion that CBNG project roads do not affect bald eagles.

4.1.4.2.1.2. Baird's Sparrow

One proposed access road with corridor is proposed within the prairie dog colony located in NWSW Section 17, T49N/R76W. It is likely that there will be increased traffic on existing roads through prairie dog colony located NWSW and SWNW section 16, T49N/R76W. No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to Baird' sparrows are included in the PRB FEIS (page 4-264).

4.1.4.2.1.3. Brewer's Sparrow

No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to Baird' sparrows are included in the PRB FEIS (page 4-264).

4.1.4.2.1.4. Ferruginous Hawk

According to the BLM data base, ferruginous hawk populations within the Powder River Basin have declined in recent years. Ferruginous hawks are sensitive to human disturbance; pairs may abandon nests even when mildly disturbed during nest building or incubation (Smith and Murphy 1978, White and Thurow 1985, Olendorff 1993, Washington Department of Fish and Wildlife 1996). Furthermore, disturbed nests fledge fewer young, and they often are not reoccupied the year following disturbances (White and Thurow 1985). Rather than becoming acclimated to repeated disturbance, ferruginous hawks become sensitized and flush at greater distances (White and Thurow 1985), which may result in increased clutch or brood mortality due to exposure, predation, starvation, or nest desertion.

Potential effects to ferruginous hawks are included in the PRB FEIS (page 4-262).

4.1.4.2.1.5. Loggerhead Shrike

No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to loggerhead shrikes are included in the PRB FEIS (page 4-263).

4.1.4.2.1.6. Long-billed Curlew

No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to long-billed curlew are included in the PRB FEIS (page 4-262).

4.1.4.2.1.7. Sage Sparrow

No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to sage sparrow are included in the PRB FEIS (page 4-264).

4.1.4.2.1.8. Sage Thrasher

No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to sage thrasher are included in the PRB FEIS (page 4-263).

4.1.4.2.1.9. Western Burrowing Owl

One proposed access road with corridor is proposed within the prairie dog colony located in NWSW Section 17, T49N/R76W. It is likely that there will be increased traffic on existing roads through prairie dog colony located NWSW and SWNW section 16, T49N/R76W. No direct injury or mortality of adults is expected. Injury or mortality may occur to eggs or young as a result of construction. Nesting and foraging individuals may be harassed or displaced by the project. Disturbance, destruction, or fragmentation of nesting and foraging habitats would occur as a result of construction.

Potential effects to western burrowing owl are included in the PRB FEIS (page 4-263).

4.1.4.2.1.10. Fringed Myotis

No direct injury or mortality of adults is expected. Foraging individuals may be harassed or displaced by the project. Foraging habitats may be disturbed, destroyed or fragmented as a result of construction.
Potential effects to fringed myotis are included in the PRB FEIS (page 4-264).

4.1.4.2.1.11. Long-Eared Myotis

No direct injury or mortality of adults is expected. Foraging individuals may be harassed or displaced by the project. Foraging habitats may be disturbed, destroyed or fragmented as a result of construction.
Potential effects to fringed myotis are included in the PRB FEIS (page 4-264).

Potential effects to long-eared myotis are included in the PRB FEIS (page 4-264).

4.1.4.2.1.12. Black-tailed Prairie Dog

One proposed access road with corridor is proposed within the prairie dog colony located in NWSW Section 17, T49N/R76W. It is likely that there will be increased traffic on existing roads through prairie dog colony located NWSW and SWNW section 16, T49N/R76W. During construction of the wells, dispersal of prairie dogs may be affected. As prairie dog colonies grow in size, prairie dogs may disperse to new colonies, preferring to move into an existing colony or one that has been abandoned, rather than start a completely new colony (Hoogland 1995). Construction may cause increased stress on prairie dogs as they attempt to disperse and may result in avoidance of colonies in close proximity to such activities.

Additional impacts to black-tailed prairie dogs are discussed in the PRB FEIS on pg. 4-255 to 4-256.

4.1.4.2.1.13. Western Burrowing Owl

One proposed access road with corridor is proposed within the prairie dog colony located in NWSW Section 17, T49N/R76W. It is likely that there will be increased traffic on existing roads through prairie dog colony located NWSW and SWNW section 16, T49N/R76W. Use of roads and pipeline corridors may increase owl vulnerability to vehicle collision. CBNG infrastructure such as well houses, compressors, and nearby metering facilities may provide shelter and den sites for ground predators such as skunks and foxes.

The USFS Thunder Basin National Grasslands in Campbell County, WY, (who cooperated with the BLM in the creation of the PRB FEIS), recommends a 0.25 mile timing restriction buffer zone for burrowing owl nest locations during their nesting season (April 15 to August 31). Instruction Memorandum No. 2006-197, directs the field offices to “use the least restrictive stipulations that effectively accomplish the resource objectives or uses.” Alteration of the general raptor nest timing limitation (Feb 1 to July 31) to a more specific burrowing owl nesting season timing limitation will effectively reduce the vulnerability of owls to collision while shortening the timing restriction period to four and one half months from six and one half months and from 0.5 mile to 0.25 mile.

4.1.4.2.1.14. Greater Sage-grouse

For project specific impacts to sage-grouse see section 4.1.4.2.3 below. Direct and indirect impacts to sage-grouse are discussed in more detail in the PRB FEIS on pg. 4-257 to 4-273.

4.1.4.2.2. Cumulative Effects

4.1.4.2.2.1. Sensitive Species

Recent analysis of the USWFS Breeding Bird Survey (BBS) data suggests that mountain plover populations have declined at an annual rate of 3.7 % over the last 30 years which represents a cumulative decline of 63% during the last 25 years (Knopf and Rupert 1995).

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS (pp. 4-257 to 4-273).

4.1.4.2.2.2. Mitigation

The companies will conduct clearance surveys for threatened, endangered or other special-concern species at the optimum time. Inventory for special concern species, other than federally listed species below, is contingent upon landowner concurrence. This will require coordination with the BLM before November 1 annually to review the potential for disturbance and to agree on inventory parameters.

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

A mountain plover nesting survey is required in suitable habitat (within 0.25 miles of all identified prairie dog colonies) prior to commencement of surface disturbing activities. Mountain plover nesting surveys shall be conducted by a biologist following the most current USFWS Mountain Plover Survey Guidelines (the survey period is May 1-June 15). All survey results must be submitted in writing to the BFO and approved prior to initiation of surface disturbing activities. No surface disturbing activities are permitted in the suitable habitat area listed above, from March 15-July 31, unless a mountain plover nesting survey has been conducted during the current breeding season. This timing limitation will be in effect unless surveys determine no plovers are present. If occupied mountain plover habitat is identified, then a seasonal disturbance-free buffer of ¼ mile shall be maintained between March 15 and July 31. If no mountain plover observations are identified, then surface disturbing activities may be permitted within suitable habitat until the following breeding season (March 15). No dogs will be permitted at work sites to reduce the potential for harassment of mountain plovers.

No surface disturbing activity shall occur within one mile of bald eagle habitat (Powder River) annually from November 1 through April 1 (CM9), prior to a winter roost survey or from February 1 through August 15 (CM8) prior to a nesting survey. This timing limitation will be in effect unless surveys determine the nest/roost to be inactive. Surveys to document winter roost activity shall be conducted by a biologist following BLM protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. If a roost is identified and construction has not been completed, a year-round disturbance-free buffer zone of 0.5 mile will be established for all bald eagle winter roost sites. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle roost sites (November 1 - April 1). Additional measures such as remote monitoring and restricting maintenance visitation to between 9:00 AM and 3:00 PM may be necessary to prevent disturbance.

If a bald eagle nest is identified and construction has not been completed, a disturbance-free buffer zone of 0.5 mile (i.e., no surface occupancy) would be established year round for all bald eagle nests. A seasonal minimum disturbance buffer zone of 1 mile will be established for all bald eagle nest sites (February 1 - August 15).

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

4.1.4.2.3. Greater Sage-grouse Direct and Indirect Effects

The proposed action will adversely impact nesting, brood rearing, late summer, and winter habitat, both through loss of habitat and avoidance of habitat in proximity to the development. Proposed project elements that are anticipated to negatively impact grouse include 125 CBNG wells on 125 locations, 56 miles new oil and gas roads, 10 miles of cross country utility corridors and gas access roads with utility corridor and increased vehicle traffic on established roads. 104 well locations and approximately 48 miles of new proposed roads and 9 miles of cross country utility corridor are located within identified high quality sage-grouse habitat, however studies indicate that sage-grouse will avoid oil and gas wells and associated roads and infrastructure out to 0.6 mile radius. Therefore the footprint of impact from each well, each facility and associated road and infrastructure overlaps identified high quality habitat within and surrounding the WDU Gamma and Delta PODs. When considering a 0.6 mile radius of avoidance of existing oil and gas wells and roads, most all the high quality sage-grouse habitat with the

project area identified on pages 49-50 has been impacted.

The proposed action includes 2 segments of well access road approximately 0.3 of a mile in length that are within the 0.25 mile CSU are of the unoccupied Maycock lek located NENW, section 3, T49N/R77W. Male sage-grouse have not been observed at this location since 1992. Extensive ground searches for sign of breeding activity on the Maycock lek by BHEC beginning 2006 failed to yield any evidence that this area has been used as a lek. The terrain and vegetation in the area surrounding the location of this lek are not typical of areas that traditionally attract courting and displaying sage-grouse (BHEC). Nesting and brood rearing is present within and adjacent to the unoccupied lek as confirmed by the BLM biologist. The University Montana relocated nesting sage-grouse within this habitat 0.5 miles north of the lek in 2006.

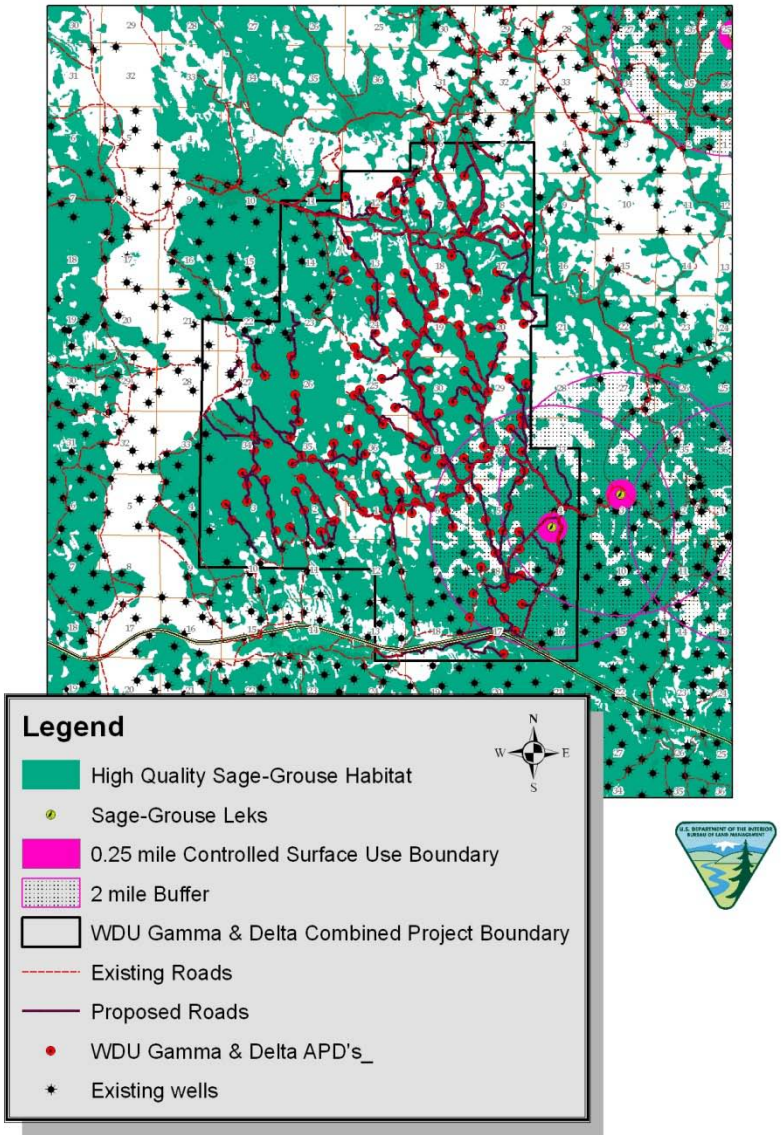
Direct impacts to high quality sage-grouse habitat resulting from 104 well locations and associated road and infrastructure proposed within identified habitat is listed in Table 4.2 below.

Table 4.2 Direct Impacts to High Quality Sage-Grouse Habitat

Proposed Project element	**Number or Miles**	**Direct Impact – Approximate Acres of High Quality Sage-Grouse Habitat Loss**
Well Locations	104	77
Access road	56	340
Cross Country Utility Corridors	9	38
	Total	**455**

Approximately 24,151 acres of seasonal sage-grouse habitat has been identified within the 25,245 acre Williams Draw Unit Gamma and Delta project area. This includes 17,640 acres of nesting and brood rearing habitat overlapping 6,577 acres of winter habitat. Although only 2.6% of the available will be directly impacted, indirect impacts under alternative C will compromise 48% of the seasonal habitat within the project area boundary. Proposed project elements within and adjacent to the project boundary (roads, overhead powerline and water pipeline) will indirectly impact approximately 12,000 acres of seasonal sage-grouse habitat.

Figure 4.3 Williams Draw Unit Gamma and Delta Project Elements within High Quality Sage-Grouse Habitat



Direct and indirect impacts to sage-grouse are discussed in more detail in the PRB FEIS on pg. 4-257 to 4-273.

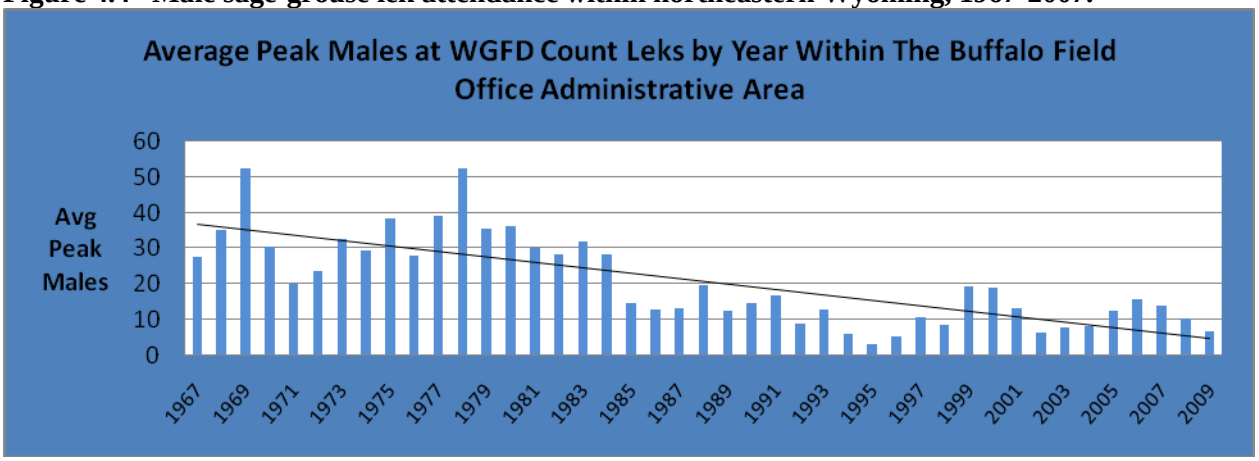
4.1.4.2.4. Greater Sage-grouse Cumulative Effects

Recent research suggests that the cumulative and synergistic effects of current and foreseeable CBNG development within the vicinity of the project area are likely to impact the local sage-grouse population, cause declines in lek attendance, and may result in local extirpation. The cumulative impact assessment area for this project encompasses a four mile radius from four sage-grouse leks that occur within four miles of the project boundary. Analysis of impacts up to four miles was recommended by the State Wildlife Agencies' Ad Hoc Committee for Consideration of Oil and Gas Development Effects to Nesting Habitat (2008).

The sage-grouse population within northeast Wyoming has been exhibiting a steady long term downward trend, as measured by lek attendance (Figure 4.4) (WGFD 2005). The figure illustrates a ten-year cycle of

periodic highs and lows. Each subsequent population peak is lower than the previous peak. Long-term harvest trends are similar to that of lek attendance (WGFD 2005). The research described below suggests that these declines may be a result, in part, of CBNG development in this region of Wyoming and that the leks within the cumulative impact assessment area may experience similar declines.

Figure 4.4 Male sage-grouse lek attendance within northeastern Wyoming, 1967-2007.



Research has shown that declines in lek attendance are correlated with oil and gas development. Several studies have shown that well density can be used 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).

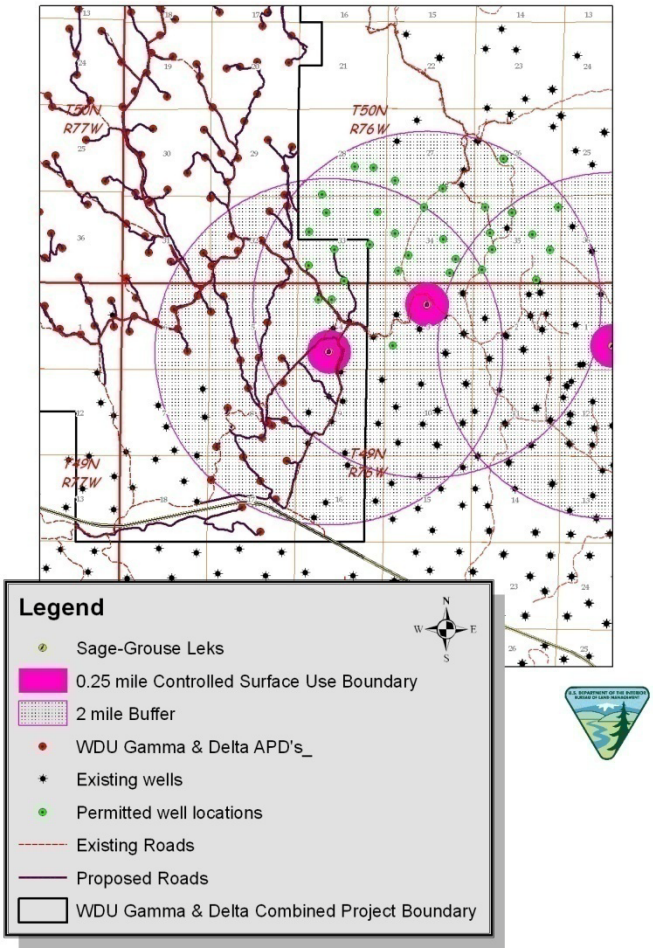
These studies indicated that oil or gas development exceeding approximately one well pad per square mile, resulted in calculable impacts on breeding populations, as measured by the number of male sage-grouse attending leks (State Wildlife Agencies' Ad Hoc Committee for Sage-Grouse and Oil and Gas Development 2008). For example, 12 years of coal-bed methane gas development in the Powder River Basin of Wyoming has coincided with 79 percent decline in the sage-grouse population (Emmerich 2009, pers. Comm.) [4]

The Laskie Draw East and Laskie Draw leks are the sage-grouse leks within two miles of the project boundary. There are currently 99 active well locations within two miles of these leks, an area of 17.5 square miles, for a total well density of 5.7 wells per square mile, indicating that impacts to this lek as a result of existing oil and gas development are considered by WGFD to be extreme.

According to WOGCC data (April 12, 2010), 96 of these wells are active. Another 33 wells have already been permitted for drilling. There are 35 additional wells proposed within two miles of the three leks. These thirty-five are from this project. If only the 35 WDU Gamma and Delta wells were to be drilled, well density would increase to 7.6 wells per square mile within two miles of the three leks. With the addition of the 35 permitted wells not associated with the WDU projects, well density within two miles of this lek would increase to 9.5 wells per square mile, well above the threshold of 3 wells per square mile for extreme impacts.

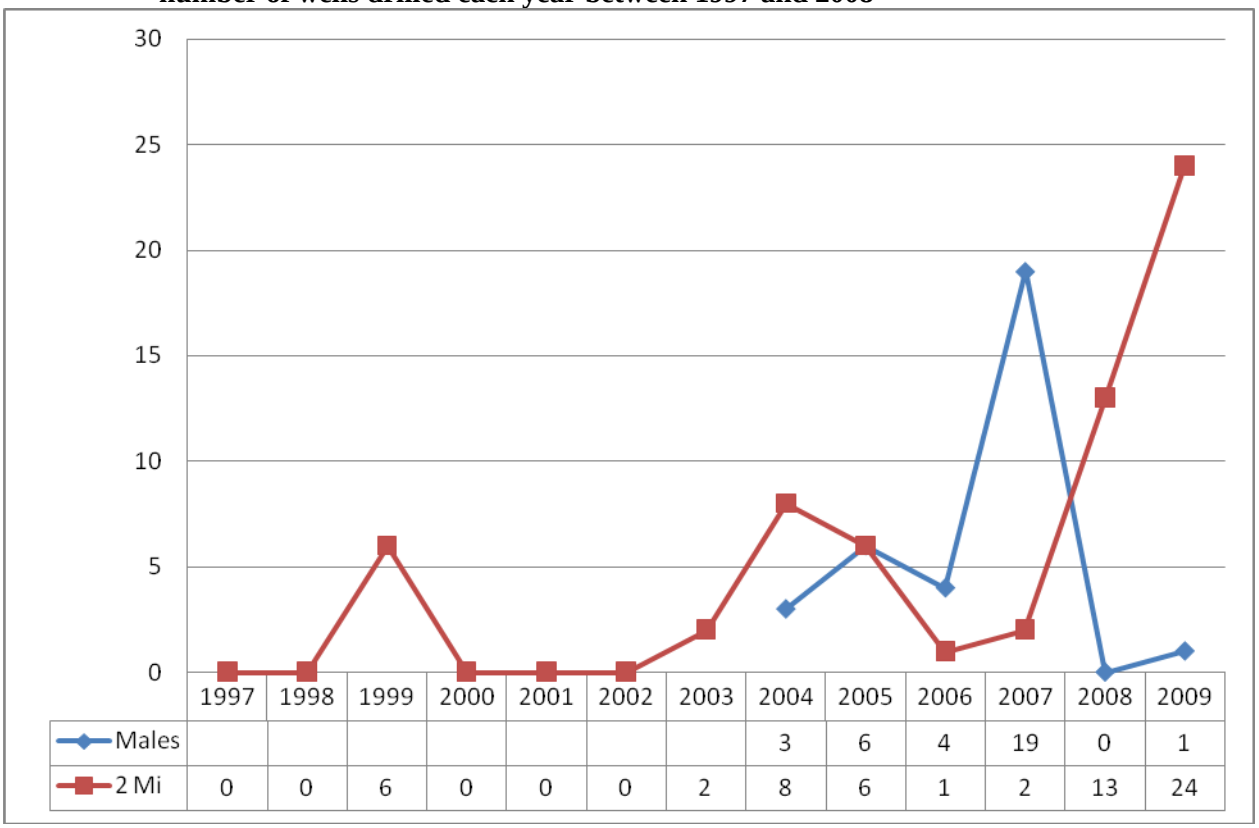
[4] U.S. Department of the Interior 2010, US Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants: 12-month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened and Endangered. March 4, 2010.

Figure 4.5 Existing and proposed wells within 2 miles of the Laskie Draw East and Laskie Draw leks



According to lek counts maintained by WGFD, the number of males attending the three leks increased between 2004 and 2007. The WOGCC data shows that the number of wells drilled within two miles of the lek increased between 2002 and 2004, decreased from 2004 to 2006, then drastically increased between 2007 and 2008. The peak number of males observed at the lek declined from 43 in 2007 to 15 in 2008. This is consistent with patterns described in Walker et al. (2007) where lek attendance initially increased as development encroached, to account for displaced birds, but then declined rapidly as development continued to move through an area.

Figure 4.6 Combined Peak Male attendance at the Laskie Draw East and Laskie Draw leks and number of wells drilled each year between 1997 and 2008



	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Males								3	6	4	19	0	1
2 Mi	0	0	6	0	0	0	2	8	6	1	2	13	24

Note: The blue line indicates male sage-grouse counted during the corresponding year's seasonal survey. The red line indicates O & G wells drilled during the corresponding year.

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.).

In its *Recommendations for Development of Oil and Gas Resources within Important Wildlife Habitats* (2009), WGFD categorized levels of oil and gas development into thresholds that correspond to moderate, high, and extreme impacts to habitat effectiveness for various species of wildlife, based on well pad densities and acreages of disturbance. All three levels of impact result in a loss of habitat function by directly eliminating habitat; disrupting wildlife access to, or use of habitat; or causing avoidance and stress to wildlife. Impacts to sage-grouse are categorized by number of well pad locations per square mile within two miles of a lek and within identified nesting/brood-rearing habitats greater than two miles from a lek. Moderate impacts occur when well density is between one and two 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 two and three 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 three well pad locations per square mile or when there are greater than 60 acres of disturbance per square mile. Extreme impacts mean those where the function of an important wildlife habitat is substantially impaired or lost.

The BFO Resource Management Plan (BLM 2001) and the PRB FEIS Record of Decision (BLM 2003) included a two-mile timing limitation on surface-disturbing activities around sage-grouse leks. The two-mile measure originated with the Western Association of Fish and Wildlife Agencies (WAFWA) (BLM 2004). Wyoming BLM adopted the two-mile recommendation in 1990 (BLM 1990).

The two-mile recommendation was based on early research which indicated between 59% and 87% of sage-grouse nests were located within two miles of a lek (BLM 2004). These studies were conducted within vast contiguous stands of sagebrush, such as those that occur in Idaho's Snake River plain.

Additional research across more of the sage-grouse's range have since indicated that nesting may occur much farther than two miles from the breeding lek (BLM 2004). Holloran and Anderson (2005), in their Upper Green River Basin study area, reported that only 45% of their sage-grouse hens nested within 1.9 miles of the capture lek. Moynahan and Lindberg (2004) found that only 36% of their sage-grouse hens nested within 1.9 miles of the capture lek. Habitat conditions, and, thus, sage-grouse biology, within the BFO are more similar to Moynahan's north-central Montana study area than the Upper Green River area.

Moynahan's study area occurred in mixed-grass prairie and sagebrush steppe, dominated by Wyoming big sagebrush (Moynahan et al. 2007). In a typical landscape in the Powder River Basin, energy development within two miles of leks is projected to reduce the average probability of lek persistence from 87% to 5% percent (Walker et al. 2007). Recent research in the Powder River Basin suggests that impacts to leks from energy development are discernable out to a minimum of four miles, and that some leks within this radius have been extirpated as a direct result of energy development (Walker et al. 2007, Walker 2008, Naugle et al. *In press*). Based on these studies, the BLM has determined that a two-mile timing limitation is insufficient to reverse the population decline.

Even with a timing limitation on construction activities, sage-grouse may avoid nesting within CBNG fields because of the activities associated with operation and production. 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); 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 one mile in size) around leks to ensure sage-grouse persistence. The size of such a no-development buffer would depend on the amount of suitable habitat around the lek and the population impact deemed acceptable. Connelly et al. (2000) recommended locating all energy-related facilities at least two miles from active leks. Other researchers have recommended avoiding areas within four miles of a lek and within areas of mapped nesting and brood-rearing habitat outside the four-mile perimeter (Walker et al. 2007, Walker 2008, Naugle et al. *In press*).

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). Most recently, Wyoming BLM issued Instruction Memorandum No. WY-2010- 012; Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate which establishes.

The Powder River Basin Oil and Gas Project 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 (Powder River Basin) or the entire range of the species is not likely to be compromised (pg. 4-270)." Based on the impacts described in the Powder River Basin Oil and Gas Project FEIS and the findings of more recent research, the selected alternative, alternative C, may contribute to a decline in male attendance at the 4 leks (list leks) that occur within four miles of the project area, and, potentially, extirpation of the local grouse population.

Impacts associated with the selection of alternative C will be less than those of alternative B. Although the decision not to authorize 44 wells is not based on impact to sage-grouse and their habitat, it will reduce direct habitat loss due to vegetation clearing by approximately 112 acres and indirect habitat loss due to fragmentation of habitat will be reduced.

4.1.4.2.5. Mitigation

In coordination with the WFGD as per BLM Instruction Memorandum WY-2010-012, the BLM-BFO's Field Office Manager, Duane Spencer received a letter dated April 9, 2010 from John Emmerich, Deputy Director – WGFD which include the following recommendations:

1. *A 0.25mile No Surface Occupancy (NSO) buffer be established around any occupied (documented use at least once in last ten years) sage-grouse leks within the project.*
2. *Surface disturbing and/or disruptive activities should be prohibited or restricted form 15 March – 30 June within suitable nesting and early brood rearing habitat within 2 miles of the perimeter of an occupied lek.*

BLM has taken into consideration the best available science as well as recommendation from the WGFD to develop the mitigation measures to address impacts related to the WDU Gamma and Delta PODs.

The following conditions will alleviate impacts to sage-grouse:

- No surface disturbing activities are being authorized within 0.25 miles of the occupied leks within the project boundary. This includes the Laskie Draw and Laskie Draw East leks.
- No surface disturbing activities are permitted from March 1 to June 15 in high quality sage-grouse habitat that has been mapped and/or identified within the project area by the BLM biologist. This condition will be implemented on an annual basis for the life of the project.
- A sage-grouse survey will be conducted by a biologist following the most current WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities.
- Maximum design speed on all operator-constructed and maintained roads (except county roads) will not exceed 25 miles per hour except travel along roads within 1/2 mile of the Laskie Draw sage grouse lek. These roads will be posted at 10 mph. This will affect the all roads located within SE Sections 4 and NE section 9;T49N/R76W.
- For any surface-disturbing activities proposed in sagebrush shrublands, the Companies will conduct clearance surveys for sage grouse breeding activity during the sage grouse's breeding season before initiating the activities. The surveys must encompass all sagebrush shrublands within 0.5 mile of the proposed activities.
- All stock tanks shall include a ramp to enable trapped small birds and mammals to escape. See Idaho BLM Technical Bulletin 89-4 entitled <u>Wildlife Watering and Escape Ramps on Livestock Water Developments: Suggestions and Recommendations</u>.
- BLM's preferred access road to the 41-8-4976, 33-8-4976 and 44-5-4976 locations is the WDU Gamma Road F-2 located within NW section 9 T49N/R76W. LOG will NOT CONSTRUCT WDU Gamma Road F within 0.25 miles of the Laskie Draw lek to minimize impacts to sage-

grouse and their habitats. This includes those segments of the proposed Road F located within SW section 4 T49N/R76W. All staking associated with this alignment will be removed prior to construction of Road F-2.

4.1.4.2.6. Residual Effects

The current trend in the Powder River Basin is a declining sage-grouse population irrespective of mitigation measures applied. This situation is anticipated to continue and it is uncertain at this time when or if this trend will change. Twelve years of coal-bed methane gas development in the PRB of Wyoming has coincided with 79% decline in the sage-grouse population. Garton et al. have projected the sage-grouse population to decline 90% by 2037 in the PRB based on habitat carrying capacity trends (FWS 2010).

4.1.4.3. Big Game Direct and Indirect Effects

Big game in the area including elk, mule deer, and pronghorn antelope, can be expected to respond in similar fashion. However, deer and pronghorn do not move as easily as elk through deep snow, so winter disturbance could impact these smaller individuals more severely. Under the environmentally preferred alternative, Yearlong range for elk and pronghorn antelope and Winter/Yearlong range for mule deer, will be directly disturbed by the construction of wells, pipelines, and roads resulting in habitat loss. The most important difference between the elk herd and deer or antelope herds is that the Fortification Creek elk are a relatively isolated herd.

Table 2.1 summarized the proposed activities associated with the development of the WDU Gamma and Delta PODs; items identified as long term disturbance would result in direct habitat loss. Short-term disturbances will also result in direct habitat loss as vegetative cover is removed. Short term disturbances may provide some habitat value as these areas are reclaimed and native vegetation becomes established.

However, they may also increase vehicular collision when adjacent to roads.

In addition to the direct habitat loss, big game would likely be displaced from the project area during drilling and construction. A study in central Wyoming reported that mineral drilling activities displaced mule deer by more than 0.5 miles (Hiatt and Baker 1981). The WGFD indicates a well density of eight wells per section creates a high level of impact for big game and that avoidance zones around mineral facilities overlap creating contiguous avoidance areas (WGFD 2004).

Big game animals are expected to return to the project area following drilling and construction activities; however, populations will likely be lower than prior to project implementation as the human activities associated with operation and maintenance continue to displace big game. Elk and mule deer are more sensitive to operation and maintenance activities than pronghorn.

The Pinedale Anticline study (Sawyer, H., R. Nielson, D. Strickland and L. McDonald. 2005) suggests mule deer do not readily habituate. A study in North Dakota stated “Although the population (mule deer) had over seven years to habituate to oil and gas activities, avoidance of roads and facilities was determined to be long term and chronic” (Lustig 2003). Deer have even been documented to avoid dirt roads that were used only by 4-wheel drive vehicles, trail bikes, and hikers (Jalkotzy et al. 1997).

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

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

Timing limitation stipulations for drilling, construction and other activities will be applied to protect elk during calving periods where proposed project elements of the project area fall within the identified ranges.

4.1.4.3.1. Elk Effects

To disclose the past and present actions within the Cumulative Impacts Analysis Area (CIAA) (1) Wyoming Oil and Gas Conservation Commission (WOGCC) well data were obtained, (2) Federal wells were verified with Automated Fluid Minerals Support System (AFMSS), and (3) an updated GIS layer displaying existing oil and gas access roads[1] were used. The CIAA provides a reasonably complete assessment of current oil and gas development on fee, state, and federal lands including the recently approved Augusta Unit Zeta (AUZ), the Carr Draw III West (CD3W) and Carr Draw V Add II (CD5a2) PODs.

Impacts to elk habitat and elk have already occurred during construction and drilling activities related to federal and non-federal wells. This analysis considers cumulative impacts to elk within the entire yearlong range, or other appropriate CIAA boundaries.

4.1.4.3.2. Habitat and Availability

CBNG development fragments habitats through placement of linear facilities such as roads and pipelines. The impacts from fragmentation can vary depending on the use of the feature. For example, a road used daily would displace elk by reducing habitat effectiveness as well as fragmenting habitat. The placement of linear elements can also act as vectors routes for the establishment of invasive plant species (e.g., Japanese brome and leafy spurge) that can reduce the forage value of the area by out competing native plants, and in the case of brome, increase the potential for wildfire (BLM 2006).

The foreseeable development within the Williams Draw Unit Gamma and Delta project area includes an additional 125 federal and 5 non-federal wells, for a total of 130 new well locations. There are 116 existing well locations within the project area (WOGCC as of May 5, 2010). The addition of the new wells will result in an average well density throughout the entire project area of 6.2 wells per section. Proposed project elements associated with the 125 federal CNBG wells that are anticipated to impact the Fortification elk herd are: 125 locations, 56.2 miles of new roads, 10.2 miles utility corridors and pipelines and increased vehicle traffic on established roads and increased noise from compressor stations.

There are 7 federal well locations proposed within Parturition range. These 7 wells are surrounded by existing oil and gas activity being located within 0.5 miles and/or within line-of-sight of existing improved roads. Two of the proposed federal wells are within effective elk habitat and are likely to increase impacts to elk habitat beyond the impacts already associated with the existing road oil and gas activities.

[1] During the 2009 field season, BLM BFO staff conducted field verification of “existing oil and gas roads” within the CIAA. View shed analysis, utilizing GIS models and the best available data, continue to be utilized by the BFO to determine security habitat effectiveness within the CIAA. The results of the most current analysis reflect statistics that differ from those documented in the original environmental analyses.

Approximately 1,830 acres of parturition range occurs in the northern half of the project area. Existing and proposed well locations throughout the entire parturition range is shown in Figure 4.9. There are currently 65 well locations within the entire parturition range, an area of 92.6 square miles. Sixty-one of these well locations are within the eastern portions of the parturition range in area approximately 34.3 square miles. The existing well density within this parturition range is 2 wells per square mile. There are 14 existing well locations within the parturition range within the project area. With the addition of the 7 well locations associated with the Williams Draw Unit Gamma and Delta, well density would instantly become 7.3 well locations per square mile, well above the threshold of 4 wells per square mile for extreme impacts (WGFD 2009).

Indirect disturbance from human activity is probably the largest potential impact from the proposed action. The PRB FEIS used "habitat effectiveness" - the degree to which habitat features fulfill specific habitat functions; the degree to which a species or population is able to continue using a habitat for a specific function, to assess the effect of human disturbance on elk populations. For elk, the habitat effectiveness of areas within 0.5 miles of an active area such as a road or well would be reduced. In Powell's study on elk response to oil and gas development in the Jack Morrow Hills area of southwestern Wyoming, elk avoided areas within 2 kilometers (1.25 miles) of active roads (Powell, 2003).

In an attempt to quantify the loss, both actual and functional, of crucial elk habitat (i.e., crucial winter range and parturition areas) in the Fortification Creek area resulting from CBNG development, a geographic information system (GIS) model was prepared to portray the physiographic and elk habitat data. Key assumptions were used in the development of the model:

- The ability of elk to see CBNG development activities within a 0.5 mile resulted in the non-use/lost functionality (i.e., lack of security) of the intervening habitat;
- Secure elk habitat was defined as those blocks of contiguous habitat >250 acres in size that would be unaffected by CBNG activities (Christensen et al. 1991, Leege 1984); and
- The presence of gas field roads and well pads (excluding the WSA) would be the parameter of measurement for development.

Security habitat occurs throughout the yearlong range and, subsequently, throughout the crucial winter and parturition ranges (Figure 4.8). Elk security habitat areas are important to minimize stress to elk related to human disturbance as well as providing fair chase during recreation big game hunting recreation. The most common impact to security cover is open roads.

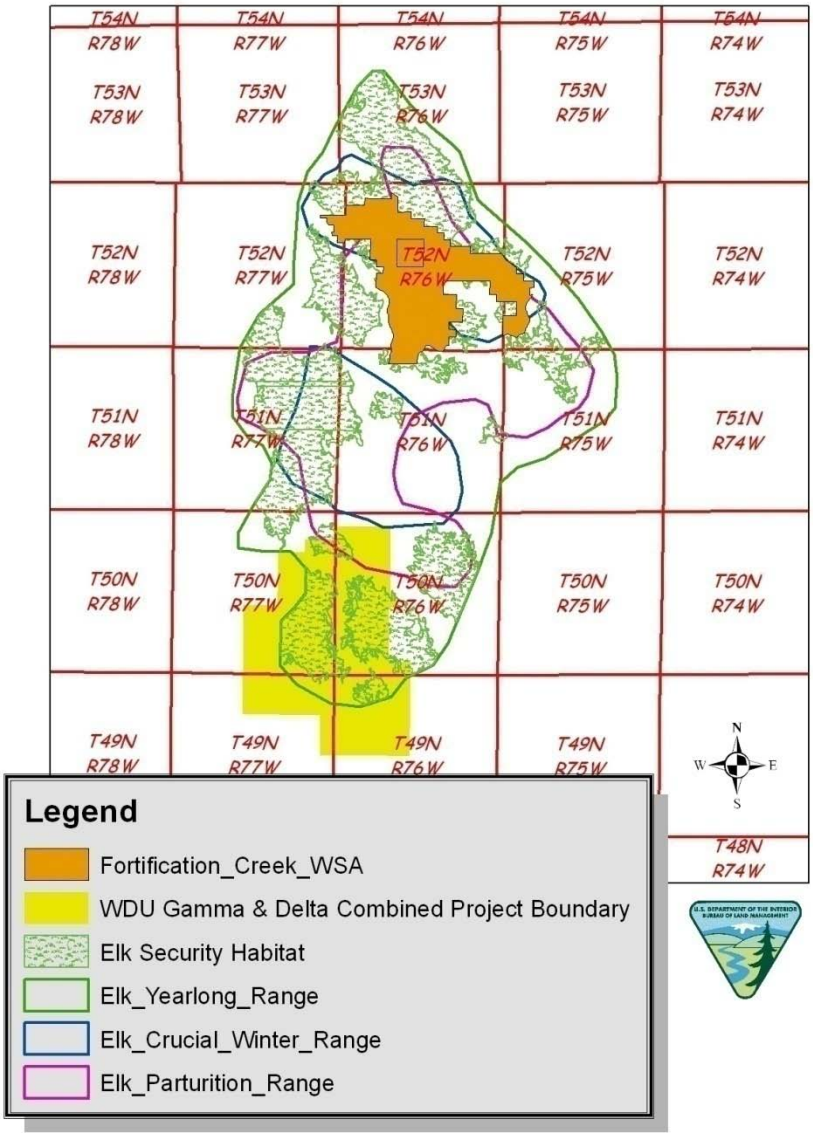
The Williams Draw Unit Gamma and Delta lies between Barber Creek and a large expanse of elk security habitat that also encompasses portions of the western half of the project area. Based on data from the Wyoming Oil and Gas Commission, as of March 1, 2010, there are 116 existing wells at 116 locations and associated infrastructure within the Williams Draw Unit Gamma and Delta project area of 39.4 square miles.

An analysis of elk habitat indicates that prior to federal CBNG development in 2009, approximately 60,000 acres of security habitat existed within the elk Yearlong range; 9,424 contiguous acres within the vicinity of the Williams Draw Unit Gamma and Delta and 7,600 acres within the project area boundary. Population monitoring conducted by WGFD as disclosed in the annual Job Completion Reports suggests connectivity between remaining security patches was relatively unimpeded prior to 2009 (WGFD 2008) .

A view shed analysis utilizing the geographic information system (GIS) model was conducted to determine habitat effectiveness within the WDU Gamma and Delta project boundary following the field visits confirming the existing oil and gas roads. The following statistics summarize the outcome of the habitat effectiveness analysis:

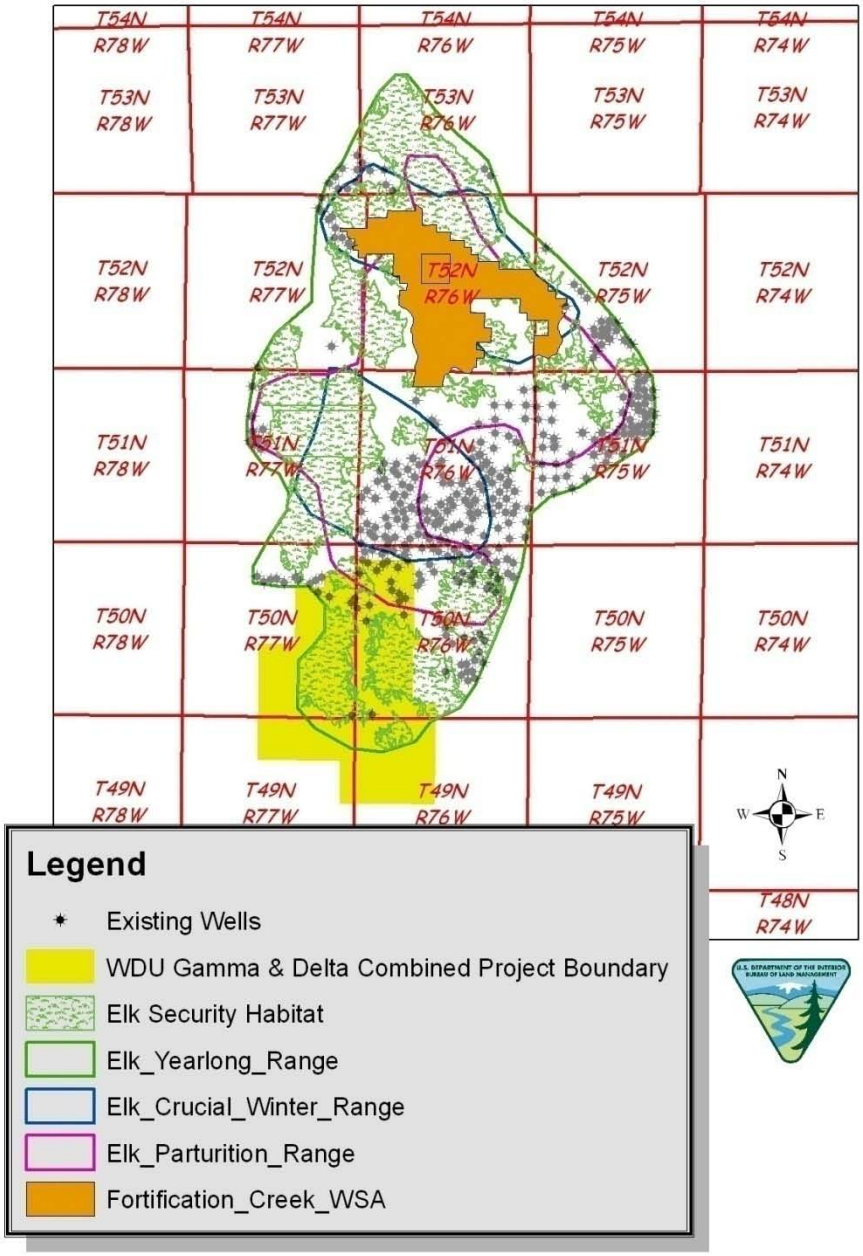
1. 33% of the WDU Gamma and Delta project area is effective habitat.
2. 30% of the project area is security habitat.
3. With the adoption of Alternative C, 87% of the effective habitat and 85% of the security habitat would be compromised.

Figure 4.7 Elk Security Habitat Remaining within the CIAA (as of December 2009)



As of December 15, 2009, WOGCC reports 493 existing federal and nonfederal oil and gas wells (including 10 oil, 55 conventional gas, and 428 CBNG wells) at 346 locations within the entire yearlong range, distributed in a non-uniform manner (Figure 4.8). The majority of these existing wells are concentrated in developed CBNG and conventional oil and gas fields across roughly 48,000 acres within the elk Yearlong range. This includes 122 existing well locations within the CWR (90% are federal wells) and 139 existing well locations within the PR (62% are federal wells).

Figure 4.8 Existing Wells (As of December 15, 2009) within the CIAA



4.1.4.3.3. Pattern of Elk Use

Radio-telemetry (VHS) and GPS collaring data collected by BLM and WGFD since 2005 have shown that the Fortification elk tend to avoid oil and gas development by moving to less developed areas. Disruptive activity is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000), albeit at 50% or less of the previous levels in forested environments (Hayden-Wing Associates 1990).

Sawyer (2005) observed similar response of elk within the more open terrain of the Jack Morrow Hills of Wyoming. The literature consistently shows a correlation between elk avoidance response and the level of human activity associated with oil and gas development. In the absence of forest cover, elk seem to

rely on a combination of shrubs, topography, and low human disturbance to meet their thermal and hiding cover requirements (Sawyer et al. 2007).

Table 4.3 details the percentage of documented elk collar locations in each of the defined ranges within the CIAA as of March 2010. Elk use of the identified range focused on the time period when the elk are most apt to be utilizing the given range. BLM and WGFD assume a period of two weeks for elk to acclimate to reduced oil and gas activity during the timing limitation stipulations periods. Therefore Table 4.3 observations within the Parturition range occurred May 15-June 30[2]. Observations within the Crucial Winter range were recorded December 1-April 30[3] of the corresponding year.

Table 4.3 Percent of documented elk collar locations in each of the defined ranges within the CIAA

Year / Range	Total observation points	Total observation points within respective range	% use of respective range
2008 Yearlong	32,709	28,257	86%
2009 Yearlong	49,604	43,839	88%
2008 Crucial Winter Season	6,203	4,615	74%
2009 Crucial Winter Season	27,125	19,119	71%
2008 Parturition Season	7,626	5,594	73%
2009 Parturition Season	8,955	5,948	66%

[2]Timing Limitation Stipulation (TLS) for elk Parturition range is May 1 – June 30
[3]Timing Limitation Stipulation (TLS) for elk Crucial Winter range is November 15 to April 30.

Currently there are an estimated 219 elk in the Fortification herd, down from an average of 272 in 2002. The current WYGF objective for the herd is 150 (BLM 2006).

Approximately 14,803 acres and 1,830 acres of the WDU Gamma and Delta project area lie within the elk Yearlong and Parturition ranges respectively (See Table 3.11). None of the project area lies within the elk Crucial Winter range.

Figure 4.9 Existing and proposed well locations within and surrounding elk security habitat (as of March 2010) within the Williams Draw Unit Gamma and Delta.

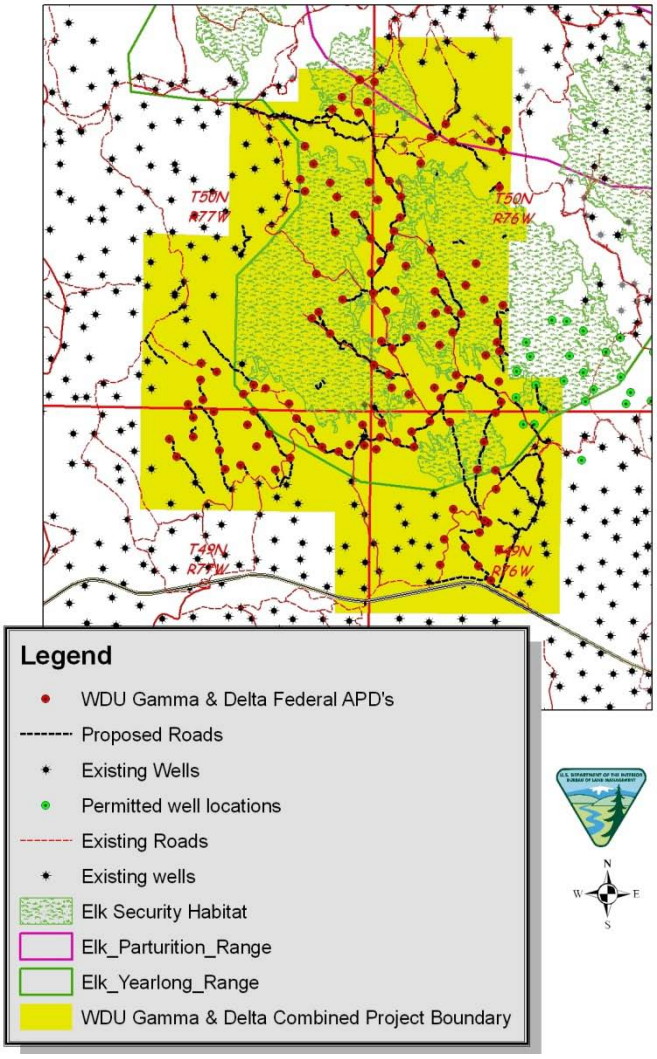
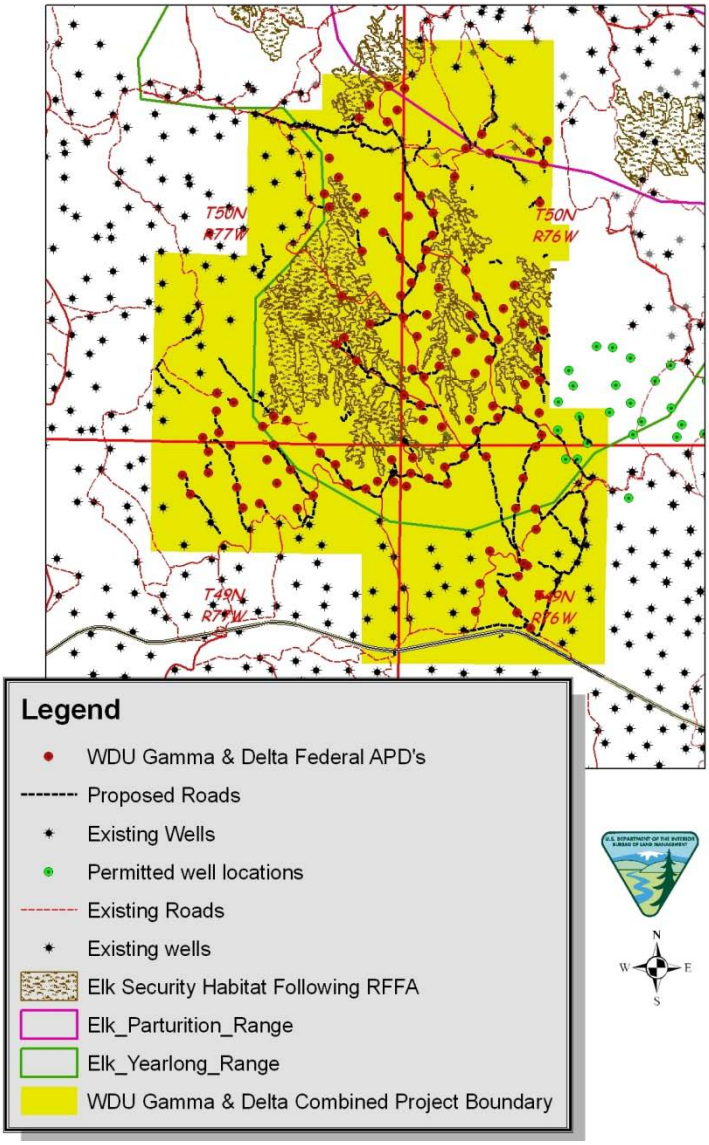


Figure 4.10 Williams Draw Unit Gamma and Delta Elk Security Remaining Post Reasonably Foreseeable Future Actions (RFFA).



The WDU Gamma and Delta projects are expected to affect elk occupying the Fortification Creek area and the immediate surrounding habitat. There is likely to be a larger amount of habitat effectiveness loss due to avoidance and displacement of animals and their altered behavior reacting to the CBNG activities with most of this occurring during the actual development stages.

Movement patterns of the elk differ for those elk captured north of Fortification Creek versus those elk captured south of Fortification Creek. Typically, those elk captured in the northern portion of the elk Yearlong range stay north of Fortification Creek where as the elk captured in the southern portion of the Yearlong range tend to roam more between the north and south halves of the Yearlong range. Nine (50%) of the 18 elk collared south of Fortification Creek spent considerable time north of Fortification Creek (April 1, 2008 - July 17, 2009), with 37% of the locations from these 'southern' elk being north of Fortification Creek. While of 37 elk collared north of Fortification Creek only three (8%) spent much time south of Fortification Creek; only 4% of the locations from the 'northern' elk were south of Fortification Creek. Effective elk habitat along the southern boundary of the Fortification Creek Planning

Area (FCPA) provides connectivity for these elk between the north and south halves of the elk Yearlong range. The WDU Gamma and Delta project area lies south of the FCPA near the southern boundary of the elk Yearlong range. Following nonfederal CBNG development initiated within the Augusta Unit in May of 2008, more than half the collared elk that had been located within the AUZ project areas left the area. As is consistent with the literature, less than 50% of the collared elk have returned to the project area to date. Only 6 of the 25 GPS collared elk have been relocated utilizing the remnants of security habitat within the AUZ's western boundary in the past 4 months (November 2009 to March 2010).

February had the highest number of elk relocations observed; 79 of a total 695 or 11%. It is likely that connectivity of the effective habitat within the AUZ POD has been compromised. In contrast, no elk relocations have been recorded within the CD3W or CD5a2 project areas even thought a 720 acres security patch has been maintained within those PODs. Security habitat provides refuge for elk when stressed by human disturbance. It is likely that elk will also be displaced from the WDU Gamma and Delta project area by human disturbance for prolonged periods of time or avoided altogether with loss of security areas as occurred in the AUZ project area.

4.1.4.3.4. Population

The effects of the proposed project on elk populations are difficult to predict because of the many unknown factors associated with each of the potential effects and the potential for a synergistic or countervailing relationship among the individual effects. Because determining the reaction of elk in the Fortification Creek area is difficult, it may be more appropriate to frame the potential cumulative effects of CBNG development to this species in terms of a likelihood, or probability. In September 2007, the BLM-BFO issued the Environmental Report: Coalbed Natural Gas Effects on the Fortification Creek Area Elk Herd to identify potential impacts to the elk and their habitats. This report identified 3 scenarios; 1) mass abandonment of the entire Fortification Creek area (least probable), 2) complete habituation of CBNG activities (possible, but unlikely) and 3) reduced herd residing in Fortification Creek (most probable).

Because of their affinity for the Fortification Creek area and their wary nature, the most probable scenario for elk response to the proposed CBNG development is for the herd to seek out security patches within the Fortification Creek herd unit and attempt to avoid the CBNG activities, at least during the development stage. During the peak of development as proposed, road and facility construction and human activity is apt to be taking place on most of the ridges and in most of the drainages in the WDU Gamma and Delta project area. The elk population is expected to be stressed and impacted almost continuously during the development phase.

While some habituation may occur over time, regardless, a reduction in the elk population through displacement should be expected. This disturbance is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000), albeit at 50% or less of the previous levels in forested environments (Hayden-Wing Associates 1990). It is also very likely the elk will shift their centers of distribution to the least impacted sites, such as the Wilderness Study Area (WSA). This trend is supported by data collected from 55 GPS collared elk within the Fortification Creek herd unit and the response to ongoing non-federal CBNG development. When monitoring the impacts of development on the elk population, it would be a concern if:

1. The current population trend, about 3% population decrease per year, were to precipitously decline (i.e., rapid rate increase).
2. The overall total herd population were to drop below an estimated 120 animals (about 52% of the current population).

3. The rate of elk ventures outside the Fortification Creek area were to drastically increase above 15% of the herd.
4. The nature (i.e., longevity) of elk ventures outside the Fortification Creek area were to shift from mostly seasonal to mostly permanent, and/or …
5. Degradation of security/effective habitat occurs due to elk concentrating within the remaining available habitat.

Another factor must be considered - when populations are reduced to near viability threshold levels, their small size can be an impact in itself. Small populations are subject to genetic inbreeding, and stochastic events such as fires, severe winter, disease, drought, etc. that make them intrinsically more vulnerable to extirpation (Soule 1986). Populations that are isolated, like the Fortification elk herd, are more sensitive to these internal (genetic) and external (stochastic) elements. In isolated populations, due to a closed gene pool with no gene immigration, deleterious genes can become more prevalent through time. While gene pool isolation may be a possibility in the Fortification Creek herd, it is currently thought that there is enough interbreeding and genetic interchange with surrounding elk herds that this occurrence is a low likelihood (Jahnke, 2006). Stochastic events such as fires or severe winter storms can remove individuals from populations. In populations that are small in number and isolated, such events are magnified because there are proportionally fewer animals left with no potential for immigration into the population (BLM 2006).

There will be some additional mortality due to vehicular collisions and poaching (Jahnke, 2006), as has already been seen in other parts of the Powder River Basin (BLM 2006).

4.1.4.4. Elk Cumulative effects

Virtually 100% of the federal mineral estate within the CIAA, excluding the Wilderness Study Area (WSA), has been leased, therefore additional APD filings are expected in the future. WOGCC and BLM data were used to predict the RFFA within the CIAA. Oil and gas wells were considered reasonably foreseeable if the WOGCC data showed the locations as AP status (Approved Permit) for state & fee locations, or if the BLM had received an APD. Access roads to Federal locations have been submitted with the APDs, and these alignments were used to predict future disturbance (assuming an average short-term disturbance width of 50 feet) and arrangement of disruptive activities within the CIAA. BLM has utilized the best available data collected in the field as well as data received from various operators that includes road alignments to both federal and non-federal locations. However access road alignments to all non-federal locations are not known, and so not all are included in this analysis. The reasonably foreseeable future development within the CIAA as proposed within these parameters consists of 520 CBNG additional well locations, 436.2 miles of new roads resulting in approximately 2,644 acres of surface disturbance (Figure 4.9).

4.1.4.4.1. Elk Habitat

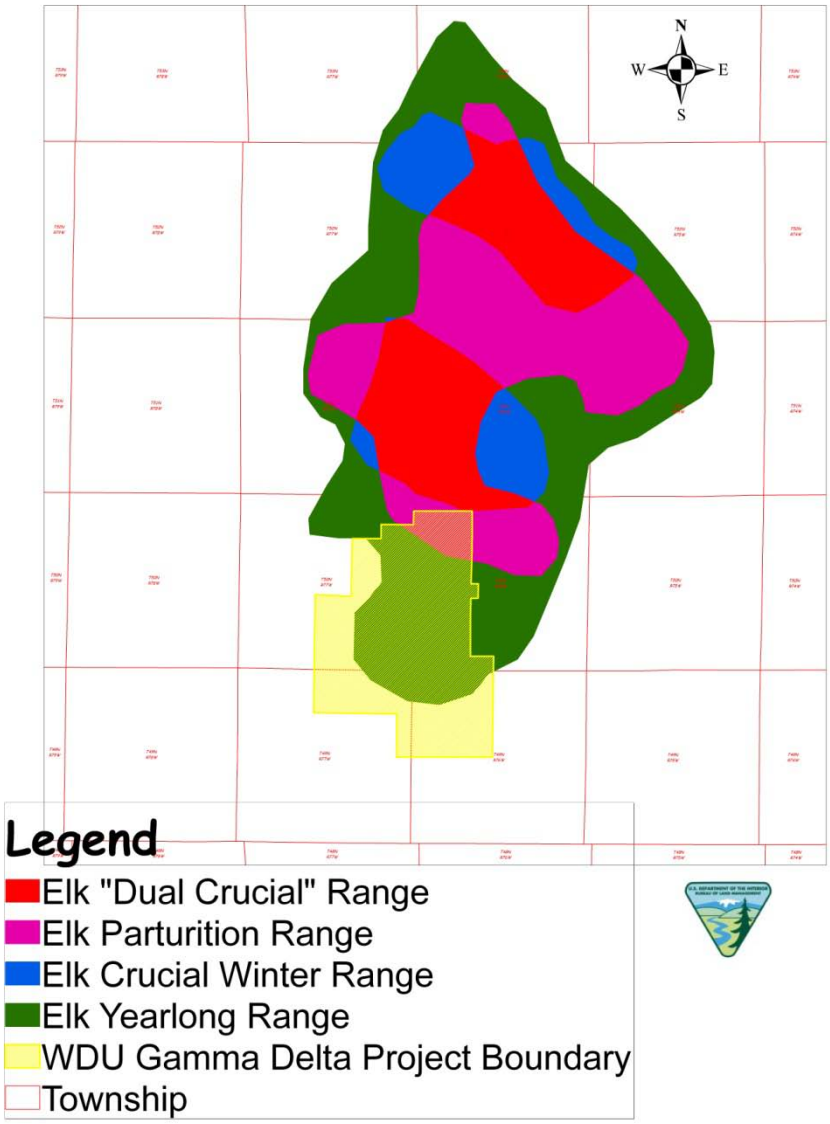
4.1.4.4.1.1. Habitat Effectiveness

As stated, the reasonably foreseeable future actions within the CIAA as proposed within the parameters above consists of 520 CBNG additional well locations, 436.2 miles of new roads resulting in approximately 2,644 acres of surface disturbance. Of those 520 proposed well locations 70 are within elk CWR resulting in approximately 199.8 miles of new roads and 1,211 acres of surface disturbance and 145 are within PR, resulting in approximately 146.1 miles of new roads and 885 acres of surface disturbance (Figure 4.9). The WDU Gamma and Delta projects propose 24% of the wells, 29% of the new roads and 17% of the total surface disturbance within the CIAA for the RFFA. One 505 acre security patch will be lost and the fragments the 3 other security patches within the vicinity of the WDU Gamma and Delta PODs into 4. The distance between security patches doubles and their total security habitat is

reduced 70%. The WDU Gamma and Delta projects add four additional main oil and gas roads between the remaining security patches.

The total loss of elk security habitat as a result of the implementation of preceding CBNG development is approximately 12,017acres. Elk security habitat remaining within the "dual crucial" overlap areas was reduced to 84% of that prior to the CIAA analysis. Likewise, elk security habitat remaining within the delineated crucial ranges (Parturition & Crucial Winter ranges) and the Yearlong range has been reduce to 86% and 90% respectively.

Figure 4.11 Fortification Elk Ranges



Ranching, hunting and various other recreational activities are also expected to occur within the CIAA, but are not anticipated to differ from historic levels previously identified in 2003 PRB EIS and 1985 RMP. Large expanses of yearlong range containing security habitat without any oil and gas development will still remain following the foreseeable development (Figure 4.13) but development plans are ongoing for all leased parcels.

Table 4.4 summarized the security habitat projected to remain following the development of previously analyzed CBNG development as well as reasonably foreseeable future actions within the elk yearlong range.

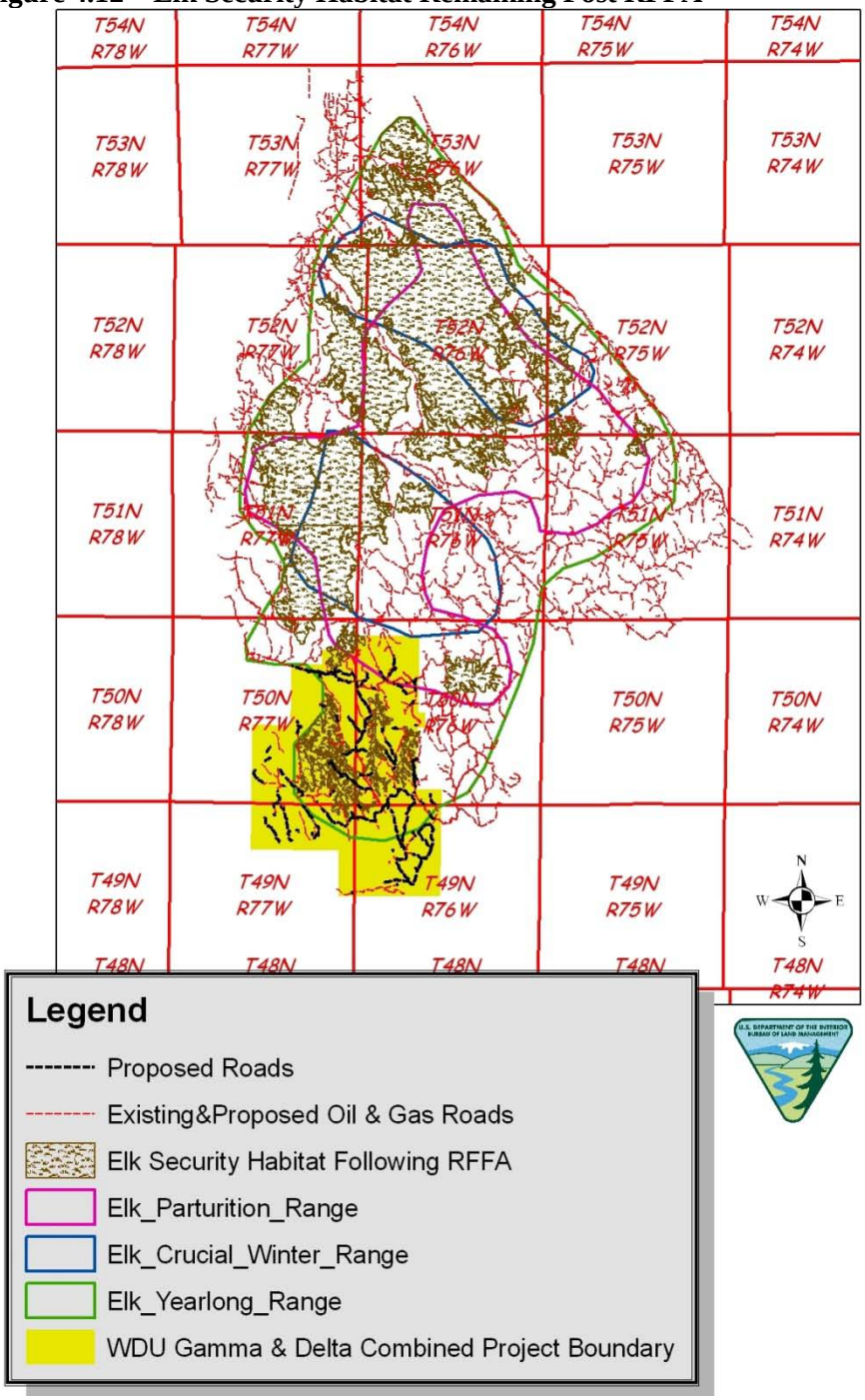
The total loss of elk security habitat predicted as a result of the implementation of alternative C is approximately 1,075 acres. Elk security habitat remaining within the "dual crucial" overlap areas will be reduce to 84% of that prior to the CIAA analysis. Likewise, elk security habitat remaining within the delineated crucial ranges (Parturition & Crucial Winter ranges) and the Yearlong range will be reduce to 84% and 66% respectively.

Table 4.4 Loss of Elk Security Habitat (ESH) Calculated within Identified Elk Ranges over Time

Time Line	Elk Range	Acres	%Total ESH lost	% Total EHS Remaining
Augusta Unit; Non-Fed. Development	All-ESH remaining	60000	6.4%	93.6%
	Yearlong	25139	0.0%	100.0%
	Parturition & Crucial Winter	21008	0.0%	100.0%
	Dual Crucial	16906	6.4%	94.1%
Augusta Unit Zeta POD (July 2009) Carr Draw III West POD (Sept. 2009) Carr Draw V add II POD (Sept.2009)	All-ESH remaining	52085	18.7%	81.3%
	Yearlong	18902	24.8%	75.2%
	Parturition & Crucial Winter	18151	13.6%	86.4%
	Dual Crucial	15032	16.3%	83.7%
Carr Draw IV POD (March 2010)	All-ESH remaining	50325	21.5%	78.5%
	Yearlong	17372	30.9%	69.1%
	Parturition & Crucial Winter	17921	14.7%	85.3%
	Dual Crucial	15032	16.3%	83.7%
WDU Gamma&Delta PODs (May 2010)	All-ESH remaining	49250	17.9%	76.8%
	Yearlong	16544	34.2%	65.8%
	Parturition & Crucial Winter	17674	15.9%	84.1%
	Dual Crucial	15032	16.3%	83.7%
Reasonably Foreseeable Future Development	All-ESH remaining	43954	26.7%	73.3%
	Yearlong	11483	54.3%	45.7%
	Parturition & Crucial Winter	17438	17.0%	83.0%
	Dual Crucial	15032	16.3%	83.7%

Impacts associated with the selection of alternative C will be less than those of alternative B. Although the decision not to authorize 44 wells is not based on impact to elk and their habitat, it will reduce direct habitat loss due to vegetation clearing by approximately 112 acres and indirect habitat loss due to fragmentation of habitat will be reduced.

Figure 4.12 Elk Security Habitat Remaining Post RFFA



4.1.4.4.2. Pattern of Habitat Use

Fortification Creek radio-telemetry and GPS collaring data collected since 2005, have shown elk avoid oil and gas development by moving to less developed areas. Disruptive activity is usually temporary in nature, however, and some studies have shown that elk returned to the area of disturbance once the source of disturbance and human presence was gone (Gussey 1986, WGFD 2000), albeit at 50% or less of the previous levels in forested environments (Hayden-Wing Associates 1990).

Continued use of radio-telemetry and GPS collaring data will show changes to the pattern of elk use arising from oil and gas development, natural causes, and from other land uses within the Fortification elk herd yearlong range. Projected loss of habitat and connectivity will affect past patterns of use, however due to the projected amounts of remaining security habitat and the imposed timing limitation stipulations (TLS), it is anticipated that the elk usage patterns will decrease initially in areas of development and then gradually return to 50% or less pre-disturbance levels after the facilities are constructed. However, since it is anticipated that big game will avoid those areas frequented by human activity during the production phase of the CBNG development; the level of human activity will determine the level of elk return.

As more information is gathered about the foreseeable future development (new APDs not received to date or permits relinquished etc), it is likely the foreseeable future development could change. As additional data is collected with the continued use of radio-telemetry and GPS collaring data, future site specific analysis will need to be done.

Figure 4.13 represents yearlong use, Figure 4.14 represents winter use, and Figure 4.15 represents parturition use as captured from the radio-telemetry and GPS collaring data.

Figure 4.13 Fortification Creek Elk Yearlong Range Use.

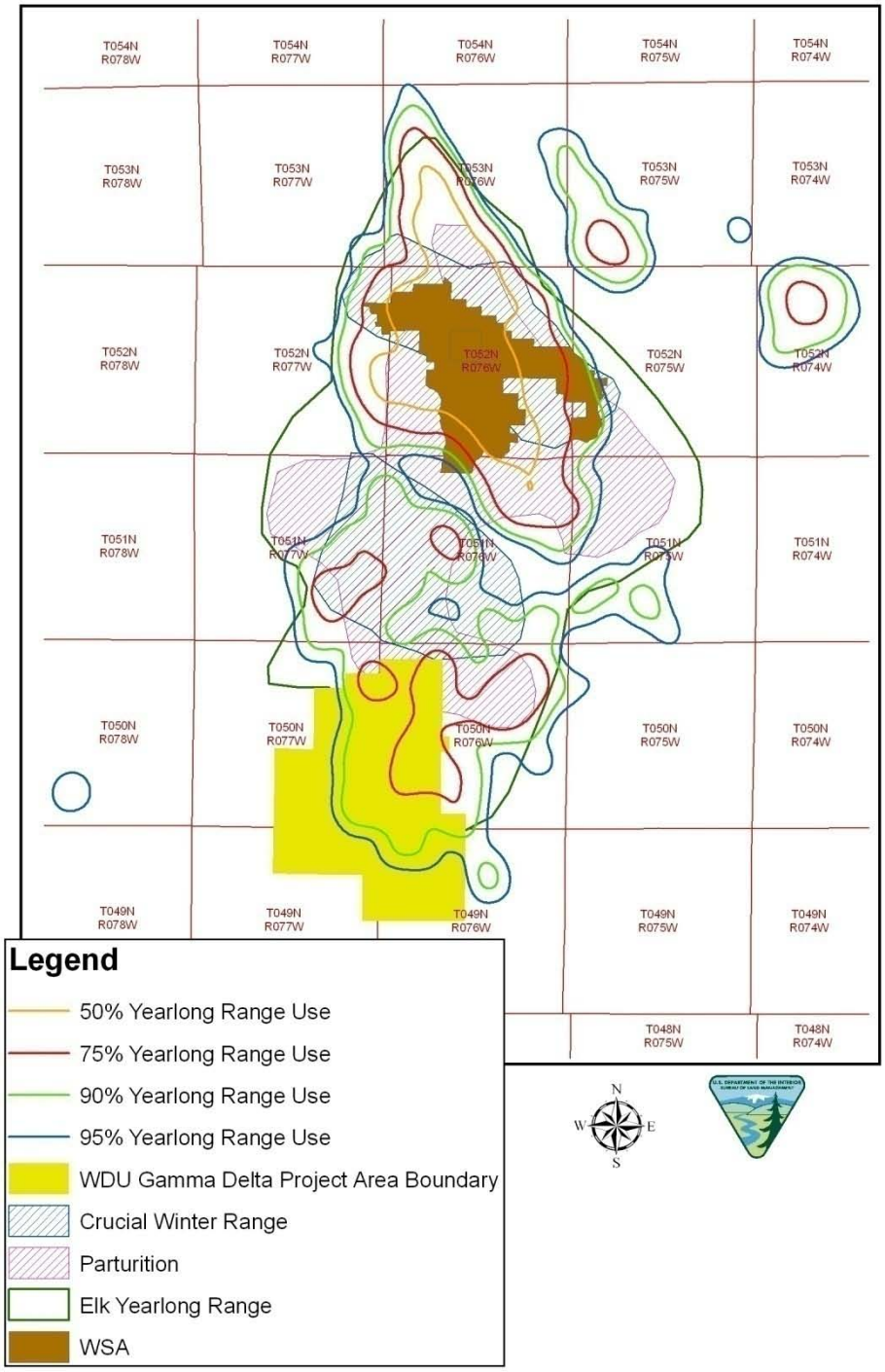


Figure 4.14 Fortification Creek Elk Crucial Winter Range Use.

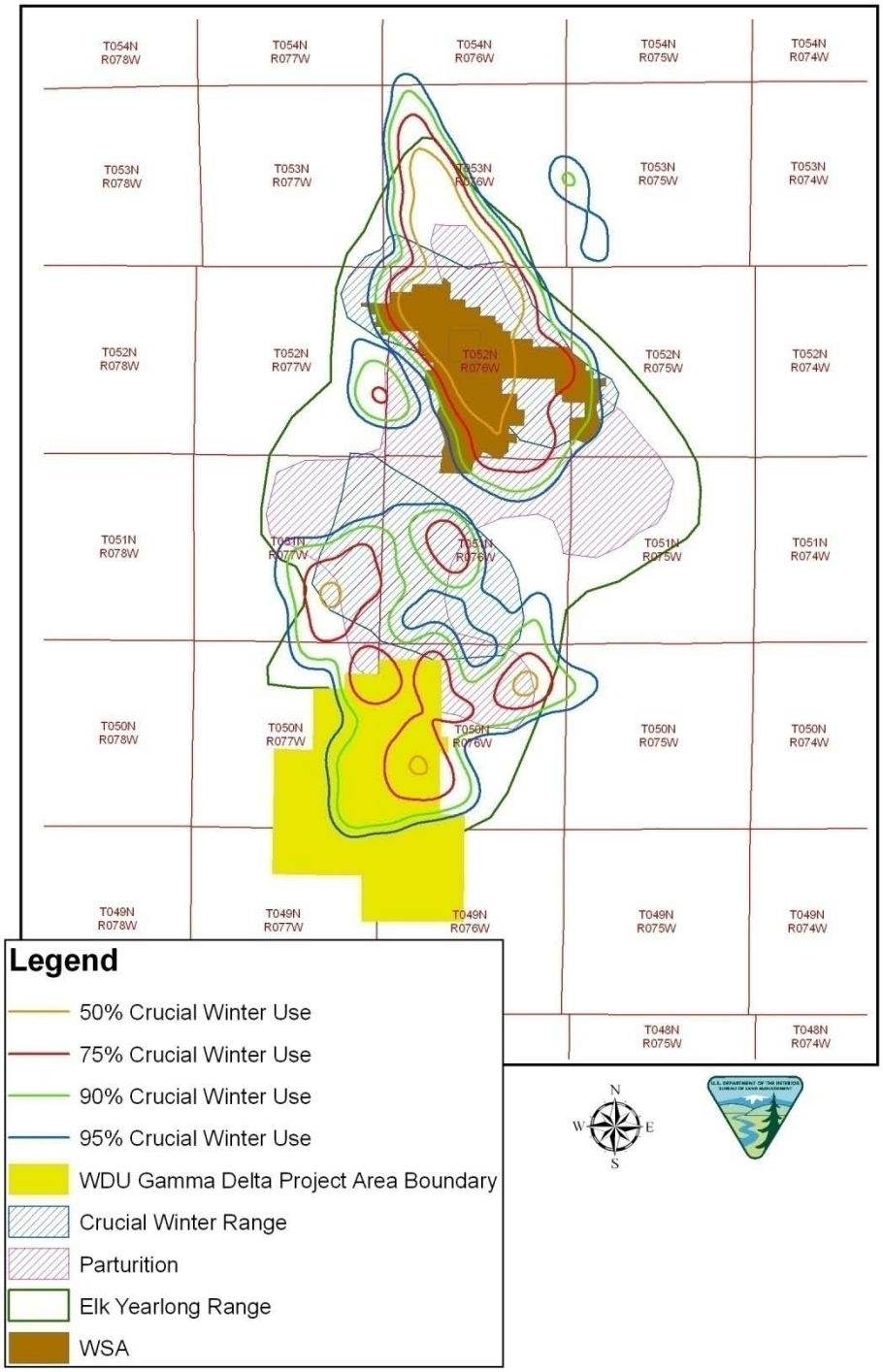
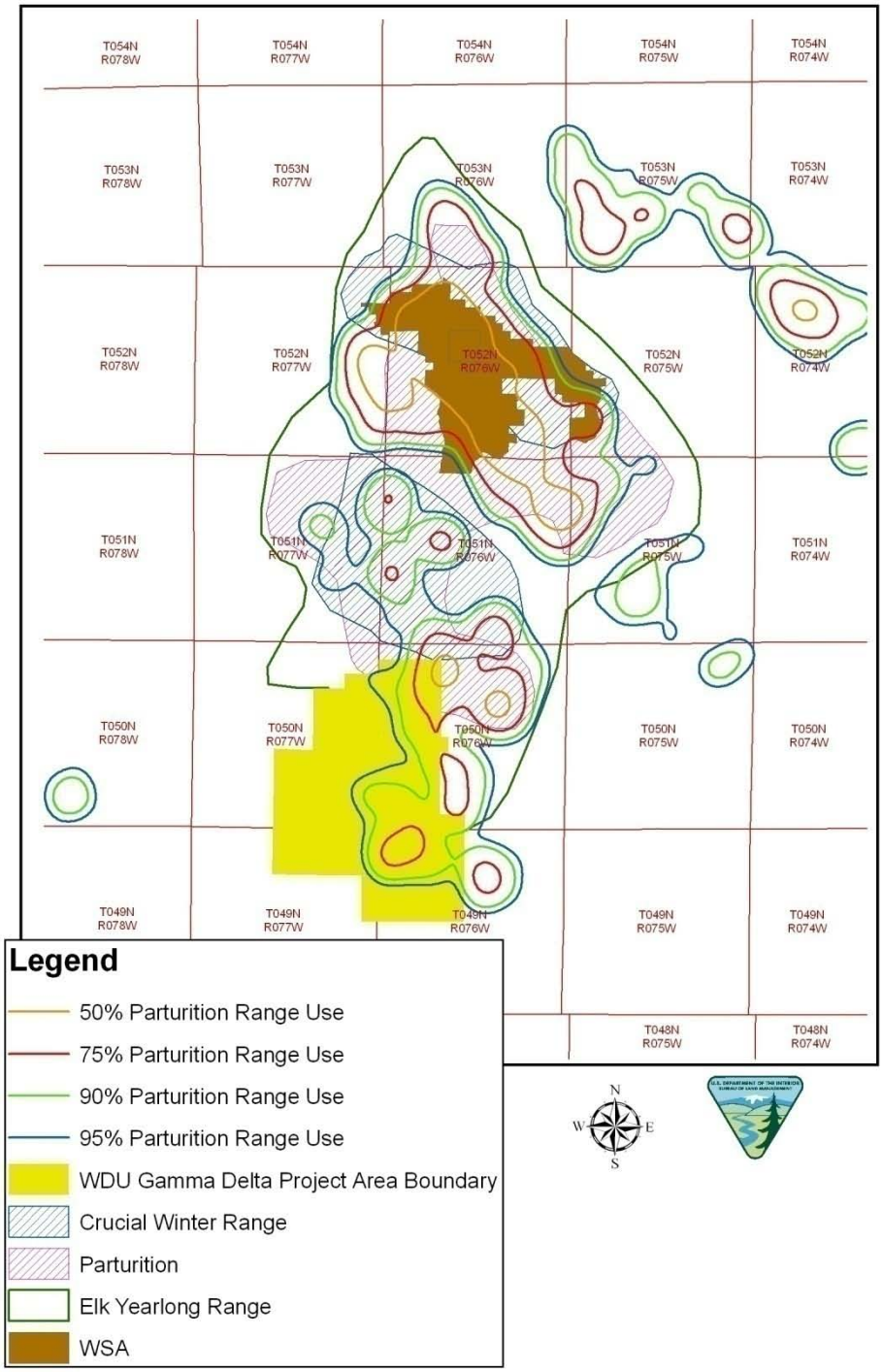


Figure 4.15 Fortification Creek Elk Parturition Range Use.



4.1.4.4.3. Population

Through on-going research with BLM's partners (WGFD and University of Wyoming); the impacts of development on the Fortification elk population will continue to be monitored. Response of elk to development will be evaluated and BLM will coordinate with WGFD to identify objectives for future management decisions.

Due to the loss of habitat effectiveness within and adjacent to the project area, the population is likely to be effected negatively.

4.1.4.4.4. Mitigation

In a letter dated August 31, 2009, WGFD commented to the BLM: "Efforts should be made to decrease disturbance on crucial winter and parturition ranges by implementing seasonal stipulations and/or limiting visits. Design of the gas field should be to avoid or reduce miles of roads and numbers of well pad sites within existing security habitat areas and/or remove unneeded roads to create security patches" (John Emmerich, WGFD Deputy Director, to Duane Spencer, BFO Field Manager, 2009).

No surface disturbing activity shall occur within identified elk calving range from May 1 to June 30. No timing limitation stipulations for drilling, construction and other activities will be applied to protect elk during critical winter as there are no project elements of the project area within the identified range that fall under the federal action. It is anticipated that elk will avoid those areas frequented by human disturbance during the production phase of the CBNG development since well monitoring and maintenance is not restricted by the timing limitation stipulation.

BLM's goal is to minimize impacts to wildlife and their habitat. Through management decisions we become more conscious of the mechanisms driving shifts in wildlife behavior and habitat selection, and further understand the resulting effects of these behavioral shifts on fitness. Consequently, to properly mitigate the impacts of energy development on wildlife we must accrue knowledge of direct and indirect disturbances associated with energy development. These understandings will assist in creating more efficient conservation and management plans while still meeting energy demands. Beginning June 2009, the BLM in conjunction with the University of Wyoming has initiated a study to identify levels of direct and indirect disturbances that influence habitat selection by elk in the Fortification Creek Area (FCA).

These findings will be documented in quarterly reports and along with the monthly work reports will facilitate adaptive management to minimize direct and indirect impacts on elk.

4.1.4.4.5. Residual Effects

It is anticipated that big game will be displace from these areas during the construction and drilling phase and continue to avoid those areas frequented by human disturbance during the production phase of the CBNG development. The effectiveness of the timing limitation stipulations is greatly reduce as they do not apply to maintenance and monitoring activities not do they apply to the non-federal wells located within the crucial ranges.

4.1.4.5. Aquatics

4.1.4.5.1. Direct and Indirect Effects

Impacts to aquatics are discussed in the PRB FEIS on pp. 4-235 to 4-247.

Produced water will be piped to water treatment facility and discharged to the Powder River and/or Baber CreekCreek at outfalls previously analyzed and approved (See page 4).

Because the WDU Gamma and WDU Delta PODs do not include any changes to existing or approved water management, no additional impacts to aquatic communities are expected to occur as a result of implementation of the Williams Draw Unit Gamma and Delta PODs.

4.1.4.5.2. Cumulative Effects

The cumulative effects associated with Alternative C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, (pp. 4-247 to 4-249).

4.1.4.5.3. Mitigation Measures

No additional mitigation measures are required.

4.1.4.5.4. Residual Impacts

Regardless of the federal actions, impacts to aquatic communities will result from the CBNG produced water discharge related to non-federal CBNG development.

4.1.4.6. Migratory Birds

4.1.4.6.1. Direct and Indirect Effects

Direct and indirect effects to migratory birds are discussed in the PRB FEIS (pp. 4-231 to 4-235).

Disturbance of habitat within the project area is likely to impact migratory birds. Native habitats will be lost directly with the construction of wells, roads, and pipelines. Reclamation and other activities that occur in the spring may be detrimental to migratory bird survival. Prompt re-vegetation of short-term disturbance areas should reduce habitat loss impacts. Activities will likely displace migratory birds farther than the immediate area of physical disturbance. Drilling and construction noise can be troublesome for songbirds by interfering with the males' ability to attract mates and defend territory, and the ability to recognize calls from conspecifics (BLM 2003).

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

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

4.1.4.6.2. Cumulative Effects

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

4.1.4.6.3. Mitigation Measures

Migratory bird species within the Powder River Basin nest in the spring and early summer and are vulnerable to the same effects as sage-grouse and raptor species. Though no timing restrictions are typically applied specifically to protect migratory bird breeding or nesting, where sage-grouse or raptor nesting timing limitations are applied, nesting migratory birds are also protected. Where these timing limitations are not applied and migratory bird species are nesting, migratory birds remain vulnerable.

No additional mitigation measures are required.

4.1.4.6.4. Residual Effects

Regardless of the federal actions, impacts to migratory bird will result from the CBNG produced water discharge related to non-federal CBNG development.

4.1.4.7. Raptors

4.1.4.7.1. Direct and Indirect Effects

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

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 and recommends all infrastructure requiring human visitation be located in such a way as to provide adequate biologic buffer for nesting raptors. A biologic buffer is a combination of distance and visual screening that provides nesting raptors with security such that they will not be flushed by routine activities.

Table 4.5 Proposed and existing infrastructure within 0.5 mile of documented raptor nests within the WDU Gamma and WDU Delta project area.

BLM ID	Proposed Well(s) and/or Infrastructure
1370	Wells 12-17-4976 23-17-4976, 2 proposed improved roads / proposed corridor segment 1existing improved road / multiple corridor segments 1 existing overhead power line US Interstate 90
2141	1 proposed improved road / proposed corridor segment 4 existing improved roads / multiple corridor segments 1 existing overhead power line 1 existing water treatment facility 6 existing CBNG wells US Interstate 90
2349	Wells 12-12-5077 2 proposed improved roads / proposed corridor segment 2 existing improved roads/ corridor segments 4 existing CBNG wells 1 existing overhead power line
2350	Wells 11-13-5077 2 proposed improved roads / proposed corridor segment 2existing improved road / corridor segments 5 existing CBNG wells 1 existing overhead power line
2352	Wells 32-12-5077, 33-12-5077 and 43-12-5077 3 proposed improved roads / proposed corridor segment 1existing improved road / corridor segments 2 existing CBNG wells

BLM ID	Proposed Well(s) and/or Infrastructure
2353	Wells 23-7-5076 and 32-18-5076 1 proposed improved road / proposed corridor segment 3existing improved roads / corridor segments 4 existing CBNG wells
2675	1 proposed improved road / proposed corridor segment existing improved road / multiple corridor segments 4 existing CBNG wells 1 existing overhead power line US Interstate 90
3197	1 proposed improved road / proposed corridor segment 4 existing improved roads / multiple corridor segments 1 existing overhead power line 1 existing water treatment facility 6 existing CBNG wells US Interstate 90
3202	1 proposed improved road / proposed corridor segment 5 existing improved roads / multiple corridor segments 6 existing CBNG wells
3203	1 proposed improved road / proposed corridor segment 6 existing CBNG wells
3205	1 proposed improved road / proposed corridor segment 7 existing CBNG wells
3732	1 proposed improved road / proposed corridor segment
3744	Wells: 31-3-4977, 21-2-4977, 34-34-5077, 43-34-5077, 12-35-5077, 23-35-5077, 24-35-5077 and 33-35-5077 6 proposed improved roads / proposed corridor segment
4146	Wells: 12-1-4977, 23-1-4977, 33-1-4977 and 43-2-4977 2 proposed improved roads / proposed corridor segment
5094	Wells: 11-26-5077 and 22-26-5077 1 proposed improved road / proposed corridor segment 1existing improved road / corridor segments
5095	Wells: 11-26-5077 and 22-26-5077 1 proposed improved road / proposed corridor segment
5160	1 proposed improved road / proposed corridor segment 5 existing improved roads / corridor segments 6 existing CBNG wells
5165	Wells: 32-1-4977, 41-1-4977, 43-1-4977, 11-6-4976, 12-6-4976, 13-6-4976, 22-6-4976 and 33-6-4976 4 proposed improved roads / proposed corridor segment 1 existing improved road / corridor segments
5166	Wells: 32-1-4977, 43-1-4977, 11-6-4976, 12-6-4976, 13-6-4976, 22-6-4976 and 33-6-4976 4 proposed improved roads / proposed corridor segment 1 existing improved road / corridor segments

BLM ID	Proposed Well(s) and/or Infrastructure
5167	Wells: 14-2-4977 and 34-2-4977 5 proposed improved roads / proposed corridor segment 4 existing improved roads/ corridor segments 5 existing CBNG wells
5168	Wells: 12-17-4976, 23-17-4976, 34-17-4976, 32-17-4976 and 43-17- 4976 2 proposed improved roads/ proposed corridor segment 2 existing improved roads / corridor segments 1 existing overhead power line US Interstate 90
5195	Wells: 23-13-5077, 34-13-5077, 21-24-5077, 41-24-5077, 14-18-5077 and 43-13-5077 4 proposed improved roads / corridor segments
5196	Well: 14-13-5077 2 proposed improved roads / proposed corridor segment
5197	Well: 23-7-5076 2 proposed improved roads / proposed corridor segment 5 existing improved roads / corridor segments 4 existing CBNG wells
5199	Wells: 43-13-5077, 14-18-5076, 23-18-5076 and 24-18-5076 2 proposed improved roads / proposed corridor segment 1 existing improved road / corridor segments 1 existing CBNG well
5200	Wells: 21-24-5077, 32-24-5077, 33-24-5077, 41-24-5077 and 42-24-5077 2 proposed improved roads / corridor segments
5201	Wells: 32-12-5077, 41-12-5077, 42-12-5077, 43-12-5077, 12-7-5076 and 23-7-5076 6 proposed improved roads / corridor segments
5202	Wells: 11-7-5076, 12-7-5076 and 21-7-5076 2 proposed improved roads / corridor segments 1 existing CBNG well
5450	Well: 34-17-4976 2 proposed improved roads / corridor segments 1 existing overhead power line US Interstate 90 1 existing CBNG well
5591	Wells: 33-8-4976, 41-8-4976 and 43-8-4976 2 proposed improved roads / corridor segments 1 existing improved road / corridor segments 4 existing CBNG well
5833	Wells: 24-34-5077, 32-34-5077, 33-34-5077 and 34-34-5077 2 proposed improved roads / corridor segments 2 existing improved roads / corridor segments 1 existing CBNG well
5846	Well: 41-7-5076 1 proposed improved road / corridor segments 2 existing improved roads / corridor segments 3 existing CBNG wells

BLM ID	Proposed Well(s) and/or Infrastructure
5847	Wells: 11-7-5076 and 21-7-5076 2 proposed improved roads / corridor segments 2 existing improved roads / corridor segments 2 existing CBNG wells
5848	Wells: 11-17-5076, 23-17-5076, 31-17-5076 and 41-17-5076 2 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 3 existing CBNG wells
5850	Wells: 32-12-5077, 33-12-5077, 41-12-5077, 42-12-5077, 43-12-5077 and 11-7-5076 6 proposed improved roads/ corridor segments 1 existing CBNG wells
5852	1 proposed improved road / corridor segments 1 existing improved road / corridor segments 2 existing CBNG wells
5857	Wells: 11-7-5076 and 21-7-5076 2 proposed improved roads / corridor segments 2 existing improved roads / corridor segments 1 existing CBNG wells
6086	7 proposed improved roads / corridor segments 2 existing improved roads / corridor segments 6 existing CBNG wells
6100	Wells: 14-29-5076, 41-31-5076, 43-31-5076, 12-32-5076 and 23-32-5076 5 proposed improved roads / corridor segments
6101	Wells: 41-1-4977, 12-6-4976, 11-6-4976, 14-31-5076, 22-31-5076, 23-31-5076 and 33-31-5076 6 proposed improved roads / corridor segments
6102	Wells: 12-31-5076, 14-31-5076, 23-31-5076, 33-31-5076 and 11-6-4976 3 proposed improved roads / corridor segments
6103	Wells: 44-25-5077, 14-30-5076, 21-31-5076 and 12-31-5076 3 proposed improved roads / corridor segments
6104	Wells: 32-25-5076, 41-25-5076, 44-25-5076, 12-30-5076, 21-30-5076 and 13-30-5076 4 proposed improved roads / corridor segments
6105	Wells: 41-25-5077, 14-19-5076, 23-19-5076, 34-19-5076 and 21-30-5076 5 proposed improved road s/ corridor segments
6106	Wells: 32-24-5077, 33-24-5077, 34-32-5077, 41-24-5077, 42-24-5077, 41-25-5077, 14-19-5076, 22-19-5076 and 23-19-5076 5 proposed improved roads / corridor segments
6107	Wells: 12-7-5076 23-7-5076 and 43-12-5077 3 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 4 existing CBNG wells
6108	Wells: 12-7-5076 23-7-5076 and 43-12-5077 3 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 4 existing CBNG wells

BLM ID	Proposed Well(s) and/or Infrastructure
6157	Wells: 32-7-5077 and 42-7-5077 2 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 4 existing CBNG wells
6162	Wells: 13-29-5076, 14-29-5076, 23-29-5076, 32-29-5076, 42-29-5076, 43-29-5076 and 44-29-5076 6 proposed improved roads / corridor segments
6163	Wells: 14-29-5076, 41-31-5076, 43-31-5076, 12-32-5076 and 23-32-5076 6 proposed improved roads / corridor segments
6164	Wells 23-17-4976, 32-17-4976, 34-17-4976 and 43-17-4976 2 proposed improved roads / proposed corridor segment 1existing improved road / multiple corridor segments 1 existing overhead power line 2 existing CBNG wells US Interstate 90
6165	Wells: 42-35-5077 and 43-35-5077 1 proposed improved road / corridor segments
6166	Wells: 41-31-5076, 31-32-5076, 13-29-5076, 14-29-5076, 23-29-5076, 43-29-5076 and 44-29-5076 6 proposed improved roads / corridor segments
6167	Wells: 41-31-5076, 31-32-5076, 13-29-5076, 14-29-5076, 23-29-5076, 43-29-5076 and 44-29-5076 6 proposed improved roads / corridor segments
6168	Wells: 13-29-5076, 14-29-5076, 21-29-5076, 23-29-5076, 32-29-5076, 42-29-5076, 43-29-5076 and 44-29-5076 6 proposed improved roads/ corridor segments
6169	Wells: 41-1-4977, 12-6-4976, 11-6-4976, 14-31-5076, 22-31-5076, 23-31-5076 and 33-31-5076 6 proposed improved roads / corridor segments
6170	Wells: 12-31-5076, 14-31-5076, 23-31-5076, 33-31-5076 and 11-6-4976 3 proposed improved roads / corridor segments
6171	Wells: 44-7-5076, 14-8-5076, 11-17-5076, 32-18-5076 and 43-18-5076 3 proposed improved roads / corridor segments 3existing improved roads / corridor segments
6172	Wells: 32-25-5076, 41-25-5076, 44-25-5076, 12-30-5076, 21-30-5076 and 13-30-5076 4 proposed improved roads / corridor segments
6173	Wells: 34-19-5076, 14-20-5076, 21-30-5076, 41-30-5076 and 43-30-5076 4 proposed improved roads / corridor segments
6174	Wells: 41-25-5077, 14-19-5076, 23-19-5076, 34-19-5076 and 21-30-5076 5 proposed improved roads / corridor segments
6176	Wells: 43-17-4976 and 34-17-4076 2 proposed improved roads / corridor segments 1 existing overhead power line US Interstate 90
6177	Wells: 11-26-5077 and 22-26-5077 1 proposed improved road / proposed corridor segment 1existing improved road / corridor segments

BLM ID	Proposed Well(s) and/or Infrastructure
6178	Wells: 13-25-5077, 23-25-5077 and 34-25-5077 2 proposed improved roads/ proposed corridor segment
6179	Wells 23-17-4976, 32-17-4976, 34-17-4976 and 43-17-4976 2 proposed improved road / proposed corridor segments Wells: 13-25-5077, 23-25-5077 and 34-25-5077 2 proposed improved roads / proposed corridor segment 1 existing overhead power line 2 existing CBNG wells US Interstate 90
6215	Wells: 12-13-5077, 13-13-5077, 14-13-5077, 23-13-5077 and 34-13-5077 3 proposed improved roads / proposed corridor segments 1existing improved road / corridor segments
6233	Wells: 23-1-4977, 32-1-4977 and 33-1-4977 3 proposed improved roads / proposed corridor segments
6234	Wells: 23-1-4977, 32-1-4977, 33-1-4977 and 13-6-4976 3 proposed improved road / proposed corridor segments
6235	Wells: 34-2-4977, 43-2-4977, 12-1-4977, 23-1-4977 and 31-1-4977 4 proposed improved roads / proposed corridor segments
6236	1 proposed improved road / proposed corridor segment
6237	Wells 12-17-4976 23-17-4976, 2 proposed improved roads / proposed corridor segment 1existing improved road / multiple corridor segment 1 existing overhead power line US Interstate 90
6345	1 proposed improved road / proposed corridor segment
6346	Wells: 41-31-5076, 31-32-5076, 13-29-5076, 14-29-5076, 23-29-5076, 43-29-5076 and 44-29-5076 6 proposed improved roads / corridor segments
6347	Wells: 23-20-5076, 32-20-5076, 34-20-5076 and 42-20-5076 3 proposed improved roads / corridor segments
6348	Well: 43-17-5076 1 proposed improved road / corridor segment
6506	1 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 7 existing CBNG wells 1 existing water treatment facility
6507	1 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 7 existing CBNG wells 1 existing water treatment facility
6508	1 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 7 existing CBNG wells 1 existing water treatment facility
6509	1 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 7 existing CBNG wells 1 existing water treatment facility

BLM ID	Proposed Well(s) and/or Infrastructure
6510	Wells: 31-3-4977, 21-2-4977, 43-34-5077, 12-35-5077, 23-35-5077, 24-35-5077 and 33-35-5077 6 proposed improved roads / proposed corridor segment
6635	Wells: 31-3-4977, 21-2-4977, 43-34-5077, 12-35-5077, 23-35-5077, 24-35-5077 and 33-35-5077 6 proposed improved roads / proposed corridor segment
8370	Wells: 34-17-5076, 43-17-5076 3 proposed improved roads / proposed corridor segment 1existing improved road / multiple corridor segment
8371	1 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 7 existing CBNG wells 1 existing water treatment facility
8372	1 proposed improved roads / corridor segments 4 existing improved roads / corridor segments 7 existing CBNG wells 1 existing water treatment facility

Well locations 23-17-4976 and 34-17-4976 do not provide for an adequate biological buffer to minimize adverse impacts to the following raptor nests with the corresponding BLM ID: 5168 (great-horned owl), 6164 (red-tailed hawk) and 6179 (unknown raptor). During the onsite visit, FWS and BLM biologists indentified that the proximately of the access road to the well locations poses a risk to the success of the golden eagle nest BLM ID 2675 as well as raptor nests1370 and 6237. These nests are indications of a golden eagle nesting territory. BLM recommended that LOG submit a transportation plan to minimize well visitation possibly in combination with centralized off-site metering to minimize impacts to the nest during the production phase of the wells. LOG did not accept the recommendation and failed to modify their POD to minimize impacts to the nest.

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

4.1.4.7.2. Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-221.

4.1.4.7.3. Mitigation Measures

No surface disturbing activity shall occur within 0.5 mile of all identified raptor nests from February 1 through July 31, annually, prior to a raptor nest occupancy survey for the current breeding season. Surveys to document nest occupancy shall be conducted by a biologist following BLM protocol, between April 15 and June 30. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. Surveys outside this window may not depict nesting activity. If a survey identifies active raptor nests, a 0.5 mile timing buffer will be implemented. The timing buffer restricts surface disturbing activities within 0.5 mile of occupied raptor nests from February 1 to July 31.

Nest occupancy and productivity checks shall be completed for nests within a 0.5 mile of any surface disturbing activities across the entire POD for as long as the POD is under construction. Once

construction of the POD has ceased, nest occupancy and productivity checks shall continue for the first five years on all nests that are within a 0.5 mile of locations where any surface-disturbing activities took place. Productivity checks shall be completed only on those nests that were verified to be occupied during the initial occupancy check of that year. The productivity checks shall be conducted no earlier than June 1 or later than June 30, and any evidence of nesting success or production shall be recorded. Survey results will be submitted to a Buffalo BLM biologist in writing no later than July 31 of each survey year. The nests that are checked each year is subject to change, pending surveys.

If an undocumented raptor nest is located during project construction or operation, the Buffalo Field Office (307-684-1100) shall be notified within 24 hours.

Well metering, maintenance and other site visits within 0.5 miles of raptor nests should be minimized as much as possible during the breeding season (February 1 – July 31).

The timing limitation COA applies only to surface disturbing activities during the construction and drilling phase of the CBNG project. Metering and maintenance activities are not restricted by the timing limitation. However, metering and maintenance activities occurring in close proximity to an active nest, at frequent intervals or of extended duration, may be disruptive to raptor production by flushing the adult from the nest leaving eggs or young chicks vulnerable to the weather and predators. Three of LOG's wells (23-17-4976, 34-17-4976 and 41-7-5076) were proposed within such close proximity to raptor nests that metering and maintenance activities would be expected to result in nest failure and eventual abandonment. LOG would not voluntarily minimize or avoid well visitation during the nesting season and alternative locations for the wells, acceptable to both BLM and LOG, were not available.

4.1.4.7.4. Residual Impacts

Regardless of the federal actions, impacts to raptors will result from the CBNG produced water discharge related to non-federal CBNG development. The effectiveness of mitigation measures applied is limited as timing stipulation limitations do not apply to well monitoring and maintenance while the wells are in the production phase which is anticipated to span 10 years or more.

4.1.4.8. Plains Sharp-tailed Grouse Effects

Sharp-tailed grouse are expected to be impacted by the proposed project because suitable habitat exists throughout the project area and has potential to support them.

4.1.4.9. Sagebrush Obligates

4.1.4.9.1. Direct and Indirect Effects

Construction and maintenance activities associated with development of the WDU Gamma and WDU Delta PODs project are likely to cause a decline in sagebrush obligate species. In Wyoming, existing oil and gas wells are located primarily in landscapes dominated by sagebrush, causing direct loss of this habitat. Associated road networks, pipelines, and powerline transmission corridors also influence vegetation dynamics by fragmenting habitats or by creating soil conditions facilitating the spread of invasive species (Braun 1998, Gelbard and Belnap 2003). Density of sagebrush-obligate birds within 100m of roads constructed for natural gas development in Wyoming was 50% lower than at greater distances (Ingelfinger 2001).

4.1.4.9.2. Sagebrush Obligates Cumulative Effects

Fragmentation of shrub steppe habitat is a major disruption that has consequences for sagebrush-obligate species (Braun et al. 1976; Rotenberry & Wiens 1980a). In fragmented habitats, suitable habitat area remains only as remnants surrounded by unusable environments (Urban and Shugart 1984; Fahrig & Paloheimo 1988). Sagebrush-obligate species decline because areas of suitable habitat decrease (Temple & Cary 1988), because of lower reproduction, and/or because of higher mortality in remaining habitats

(Robinson 1992; Porneluzi et al. 1993). Fragmentation of shrubsteppe has the further potential to affect the conservation of sagebrush-obligate species because of the permanence of disturbance (Knick and Rotenberry 1995). Approximately 455 acres of direct habitat impacts will result from the implementing this project. Indirect impacts will occur throughout the project area but will be most pronounced within the 2,072 acres adjacent to the proposed access roads. Several decades are required to reestablish ecologically functioning mature sagebrush communities. Due to this, sagebrush obligate species may not return for many years after reclamation activities are completed.

4.1.4.9.3. Mitigation Measures

A survey is required for sharp-tailed grouse between April 1 and May 7, annually, within the project area for the life of the project and results shall be submitted to a BLM biologist. If an active lek is identified during the survey, the 0.64 mile timing restriction (March 1-June 15) will be applied and surface disturbing activities will not be permitted until after the nesting season. The required sharp-tailed grouse survey will be conducted by a biologist following WGFD protocol. All survey results shall be submitted in writing to a Buffalo BLM biologist and approved prior to surface disturbing activities. If surveys indicate that the identified lek is inactive during the current breeding season, surface disturbing activities may be permitted within the 0.5 mile buffer until the following breeding season (April 1).

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

4.1.4.9.4. Residual Effects

The effectiveness of the mitigation measures are limited since the timing limitation stipulation (TLS) do not apply to well monitoring and maintenance while the wells are in the production phase. Impacts will span the life of the wells which is anticipated to be 10 years or more. What's more, the TLS fails to mitigate for impacts to sharp-tailed grouse nesting and brood rearing habitat beyond 0.64 miles of leks.

4.1.5. Water Resources

The operator has submitted a comprehensive WMP for this project. It is incorporated-by-reference into this EA pursuant to 40 CFR 1502.21. The WMP incorporates sound water management practices, monitoring of downstream impacts within the Upper Powder River watershed and commitment to comply with Wyoming State water laws/regulations. It also addresses potential impacts to the environment and landowner concerns. Qualified hydrologists, in consultation with the BLM, developed the water management plan. Adherence with the plan, in addition to BLM applied mitigation (in the form of COAs), would reduce project area and downstream impacts from proposed water management strategies.

For this project, LOG intends to add the water produced in association with CBNG to a network of existing infrastructure including 6 existing water treatment facilities with 9 associated water discharge points or into an existing pipeline for transport to Midwest, WY for use in enhanced oil recovery projects. The water discharge points are located to discharge directly into ephemeral, intermittent or perennial stream channels. The water management plan impacts were analyzed using the total number of APDs proposed. Thus, this analysis uses the maximum potential volume of water that could be produced and the greatest impacts that could be associated with this project.

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

The maximum water production is predicted to be 20.0 gpm per well or totals as listed below.

POD Name	Number of Wells	Volume of water per well, gpm	POD Total, gpm	POD Total, cfs	POD Total, Acre-ft/year
Williams Draw Unit Gamma	73	20	1460	3.25	2,355
Williams Draw Unit Delta	97	20	1940	4.32	3,124
TOTAL	**170**		**3400**	**7.57**	**5,479**

The PRB FEIS projected the total amount of water that was anticipated to be produced from CBNG development per year (Table 2-8 Projected Amount of Water Produced from CBM Wells Under Alternatives 1, 2A and 2B pg 2-26). For the Upper Powder River drainage, the projected volume produced within the watershed area was 88,046 acre-feet in 2009 (maximum production is estimated in 2006 at 171,423 acre-feet). As such, the volume of water resulting from the production of these wells is 6.2% of the total volume projected for 2009. This volume of produced water is within the predicted parameters of the PRB FEIS.

4.1.5.1. Groundwater

4.1.5.1.1. Direct and Indirect Effects

The PRB FEIS predicts an infiltration rate of 40% to groundwater aquifers and coal zones in the Upper Powder River drainage area (PRB FEIS pg 4-5). For this action, it may be assumed that a maximum of 1360 gpm will infiltrate at or near the discharge points and impoundments (2192 acre feet per year). This water will saturate the near surface alluvium and deeper formations prior to mixing with the groundwater used for stock and domestic purposes. According to the PRB FEIS, "the increased volume of water recharging the underlying aquifers of the Wasatch and Fort Union Formations would be chemically similar to alluvial groundwater." (PRB FEIS pg 4-54). Therefore, the chemical nature and the volume of the discharged water may not degrade the groundwater quality.

The PRB FEIS predicts that one of the environmental consequences of coal bed natural gas production is possible impacts to the groundwater. "The effects of development of CBM on groundwater resources would be seen as a drop in the water level (drawdown) in nearby wells completed in the developed coal aquifers and underlying or overlying sand aquifers." (PRB FEIS page 4-1). In the process of dewatering the coal zone to increase natural gas recovery rates, this project may have some effect on the static water level of wells in the area. The 47 permitted water wells in the area produce from depths which range from 8 to 1,500 feet compared to 1,250 to 2,000 feet to the Werner coal zone. As mitigation, the operator has committed to offer water well agreements to holders of properly permitted domestic and stock wells within the circle of influence (½ mile of a federal CBNG producing well) of the proposed wells.

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

4.1.5.1.2. 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 page 4-64).

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

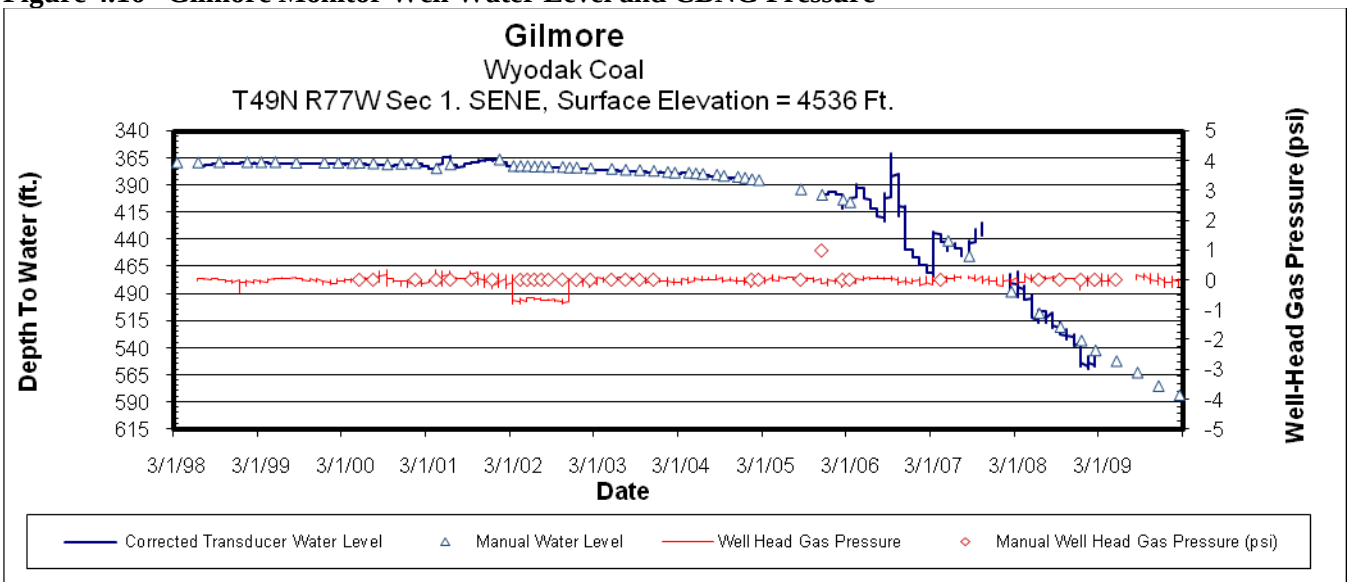
4.1.5.1.3. Mitigation Measures

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

4.1.5.1.4. Residual Effects

The production of CBNG necessitates the removal of some degree of the water saturation in the coal zones to temporarily reduce the hydraulic head in the coal. The Buffalo Field Office has been monitoring coal zone pressures as expressed in depth to water from surface since the early 1990's in the PRB. Based on groundwater monitoring information from the Gilmore monitor well, located in the SENE of Sec 1 T49N R77W, the Wyodak coal zone in this area showed signs of pressure decline as early as 2003. As of February, 2010, the water level here has declined from the initial 369 feet below surface to 584 feet below surface. This level of depressurization is within the potential predicted in the PRB FEIS which was determined through the Regional Groundwater Model for that document. For additional information, please refer to 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 on their website at http://www.wsgs.uwyo.edu.

Figure 4.16 Gilmore Monitor Well Water Level and CBNG Pressure



4.1.5.2. Surface Water

4.1.5.2.1. Direct and Indirect Effects

The following table shows Wyoming proposed numeric limits for the watershed for SAR, and EC, the average value measured at selected USGS gauging stations at high and low monthly flows, and Wyoming groundwater quality standards for TDS and SAR for Class I to Class III water. It also shows pollutant

limits for TDS, SAR and EC detailed in the WDEQ's WYPDES permit, and the levels found in the POD's representative water sample.

Table 4.6 Comparison of Regulated Water Quality Parameters to Predicted Water Quality

Predicted Values	**TDS, mg/l**	**SAR**	**EC,** μmhos/cm
Most Restrictive Proposed Limit		2.0	1,000
Least Restrictive Proposed Limit		10.0	3,200
Upper Powder River Watershed near Arvada, WY Gauging station 06317000			
Historic Data Average at Maximum Flow		4.8	1,797
Historic Data Average at Minimum Flow		7.8	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		
WDEQ Water Quality Requirement for WYPDES Permit # WY0056081 (River Road)			
At discharge point	NA	NA	7,500
Based on Assimilative Capacity Calculations			
Permit # WY0051275 (Barber Creek East)			
At discharge point Minimum*	2,000	NA	7,500
Maximum*	5,000		
Permit # WY0051276 (Barber Creek)			
At discharge point Minimum*	2,000	NA	7,500
Maximum*	5,000		
*Varies dependent on month			
Predicted Produced Water Quality			
Werner Coal Zone	2,320	28.8	3,530
Existing Surface Water Quality			
Elephant Spring Sec 30 T50N R76W	3,620	0.5	3,340

Based on the analysis performed in the PRB FEIS, the primary beneficial use of the surface water in the Powder River Basin is the irrigation of crops (PRB FEIS pg 4-69). The water quality projected for this POD is 2,320 mg/l TDS which is not within the WDEQ criteria for agricultural use (2000 mg/l TDS). However direct land application is not included in this proposal.

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

There are 9 existing and 1 approved unconstructed discharge points proposed for this project. They have been appropriately sited and utilize appropriate water erosion dissipation designs. Existing and proposed water management facilities were evaluated for compliance with best management practices during the onsite.

No new impoundments are proposed to be constructed within the project area. There are lined surge ponds associated with all the treatment facilities associated with this project. Those constructed over Federal minerals have been properly bonded for reclamation through with the BLM. All water management facilities were evaluated for compliance with best management practices during the onsite.

Alternative (2A), the approved alternative in the Record of Decision for the PRB FEIS, states that the

peak production of water discharged to the surface will occur in 2006 at a total contribution to the mainstem of the Upper Powder River of 68 cfs (PRB FEIS pg 4-87). The predicted maximum discharge rate from these 170 wells is anticipated to be a total of 3,400 gpm or 7.57 cfs to direct to the Powder River or tributaries or 11% of the predicted total CBNG produced water contribution. For more information regarding the maximum predicted water impacts resulting from the discharge of produced water, see Table 4-6 (PRB-FEIS pg 4-85).

In the WMP portion of the POD, the operator provided an analysis of the peak flows in the watersheds included in the project area. Based on the areas of the watersheds which include the WDU Gamma and Delta PODs (and an assumed density of 1 well per location every 80 acres, the potential exists for the development is included in the table below.

Table 4.7 Peak Flows in the Watersheds Included in the Project Area

	Barber Creek	**Sommerville Draw**
Area of Watershed, sq. miles	74.1	4.1
Number of Wells, max (80 acre spacing)	593	33
Maximum Water production, cfs	26.4	1.5
2 year Precipitation Event, cfs	448	140
10 year Precipitation Event, cfs	2,534	777

Natural storm event intensity exceeds the potential volume of water that could be produced through CBNG development. However, The BLM agrees with the operator that even the estimated peak production volume is not expected to occur because:

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

The operator has obtained three Wyoming Pollutant Discharge Elimination System (WYPDES) permits for the discharge of water produced from this project from the WDEQ. Permit effluent limits were set as follows:

	PVU EMIT	**Barber Creek East**	**Barber Creek**
	WY0056081	WY0052175	WY0052176
Chloride, mg/l	150	150	150
pH	6.5 - 9.0	6.5 - 9.0	6.5 - 9.0
Specific Conductance, EC µmhos/cm	7,500	2,000 to 5,000	2,000 to 5,000
Total Arsenic, µg/l	8.4	7	7
Total Barium, µg/l	1,800	1,800	1,800
Dissolved Iron, µg/l	300	1,000	1,000
Sulfate, mg/l	3,000	NA	NA
Dissolved Copper, µg/l	6	NA	NA
Total Recoverable Radium 226+228, pCi/l	1	NA	1
Total Radium 226, pCi/l	NA	5	NA

The WDEQ, in the approval of the WYPDES permit addresses existing downstream concerns, such as irrigation use, in these permits. The WDEQ has established maximum limits for Total Dissolved Solids

and sodium based on the program to assign assimilative capacity credits to CBNG produced water. This program is designed to protect irrigation rights through the control of water quality.

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

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

The development of coal bed natural gas and the production and discharge of water in the area surrounding Elephant Springs or any other existing natural spring may affect the flow rate or water quality of the spring. The operator will be required to sample the water quality and quantity of Elephant Springs twice a year for the duration of production.

In-channel downstream impacts are addressed in the WMP for the Williams Draw Unit Gamma and Delta PODs were prepared by WWC Engineering for Lance Oil and Gas. The primary downstream concern involves the volume of directly discharged treated and untreated water to the mainstem of the Upper Powder River and the resultant water quality. The WDEQ has primacy over waters of the state of Wyoming and regulate discharge water quality.

4.1.5.2.2. Cumulative Effects

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

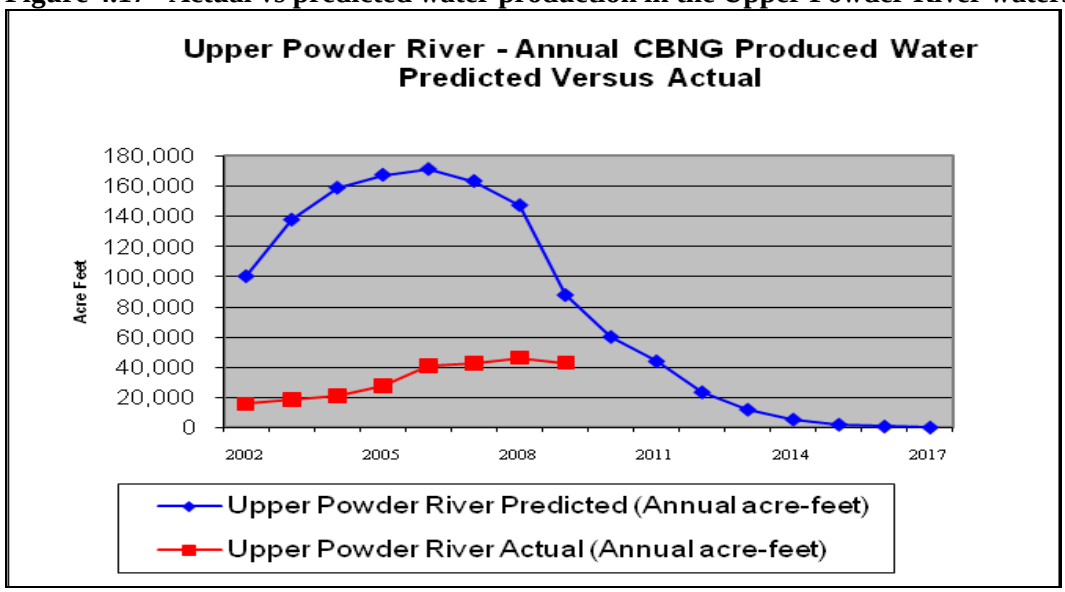
As of December 2009, all producing CBNG wells in the Upper Powder River watershed have discharged a cumulative volume of 255,531 acre-ft of water compared to the predicted 1,135,567 acre-ft disclosed in the PRB FEIS (Table 2-8 page 2-26). These figures are presented graphically in Figure 4.17 and Table 4.8 following. This volume is 22.5 % of the total predicted produced water analyzed in the PRB FEIS for the Upper Powder River watershed.

Table 4.8 Actual vs predicted water production in the Upper Powder River watershed *2009 Data Update 04-06-10*

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

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)	
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	43,009	48.8	255,531	22.5
2010	60,319	1,195,886				
2011	44,169	1,240,055				
2012	23,697	1,263,752				
2013	12,169	1,275,921				
2014	5,672	1,281,593				
2015	2,242	1,283,835				
2016	1,032	1,284,867				
2017	366	1,285,233				
Total	1,285,233		255,531			

Figure 4.17 Actual vs predicted water production in the Upper Powder River watershed



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

The PRB FEIS states, "Cumulative effects to the suitability for irrigation of the Powder River would be minimized through the interim Memorandum of Cooperation (MOC) that the Montana and Wyoming DEQ's (Departments of Environmental Quality) have signed. This MOC was developed to ensure that designated uses downstream in Montana would be protected while CBM development in both states

continued. However, this MOC has expired and has not been renewed. The EPA has approved the Montana Surface Water Standards for EC and SAR and as such the WDEQ is responsible for ensuring that the Montana standards are met at the state line under the Clean Water Act (CWA). Thus, through the implementation of in-stream monitoring and adaptive management, water quality standards and interstate agreements can be met." (PRB FEIS page 4-117)

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

1. They are proportional to the actual amount of cumulatively produced water in the Upper Powder River drainage, which is approximately 22.5% of the total predicted in the PRB FEIS.
2. The WDEQ enforcement of the terms and conditions of the WYPDES permit that are designed to protect irrigation downstream.
3. The commitment by the operator to monitor the volume of water discharged.

4.1.5.2.3. Mitigation Measures

Channel crossings by road and pipelines will be constructed perpendicular to flow. Culverts will be installed at appropriate locations for streams and channels crossed by roads as specified in the BLM Manual 9112-Bridges and Major Culverts and Manual 9113-Roads. Streams will be crossed perpendicular to flow, where possible, and all stream crossing structures will be designed to carry the 25-year discharge event or other capacities as directed by the BLM. Channel crossings by pipelines will be constructed so that the pipe is buried at least four feet below the channel bottom.

4.1.5.2.4. 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 pg 4-118).

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

4.1.6. Economics and Recovery of CBNG Resources

4.1.6.1. Direct and Indirect Effects

BLM petroleum engineers calculated the Original Gas in Place (OGIP) within the WDU Gamma and Delta project area based on 80 acres spacing and a coal density of 1,742 ton/acre foot. Original Gas in Place in Million Cubic Feet of Gas is [acres*(ton of coal/acre ft.)*(thickness of coal in ft)*(gas content scf/ton of coal)]/1000000]. The gas content is determined by finding the depth of ground water for a nearby monitor well and calculated based to the depth of the coal to determine the gas content. Gas content is calculated [(Coal depth-ground water depth)* (.433*.71+(.496*well elevation)]. When added together, the OGIP for each coal seam is added together for that well to get the total gas in place.

There is the potential to recover 124,400.29 Million Cubic Feet of Gas (MMCF) of CBNG from the 124 potential wells within the WWDU Gamma and Delta PODs. The 27 wells deferred under alternative C are included in this total.

Table 4.9 Potential recoverable CBM Gas with wells on 80 acre spacing

TWP	RNG	Sec	Well #	Unrecovered CBNG MMCF
50N	76W	7	11-7	1464.399
50N	76W	7	44-7	1464.719
50N	76W	8	14-8	1464.569
50N	76W	8	44-8	1464.349
50N	76W	17	11-17	1157.605
50N	76W	17	31-17	1157.244
50N	76W	17	41-17	1157.339
50N	76W	17	43-17	1157.522
50N	76W	18	14-18	1157.223
50N	76W	18	23-18	1157.388
50N	76W	18	24-18	1157.14
50N	76W	18	32-18	1157.511
50N	76W	19	14-19	1307.078
50N	76W	19	21-19	1307.731
50N	76W	19	22-19	1307.161
50N	76W	19	23-19	1307.093
50N	76W	19	34-19	1307.258
50N	76W	19	43-19	1307.216
50N	76W	20	12-40	1307.079
50N	76W	20	34-20	1307.021
50N	76W	29	13-29	1097.966
50N	76W	29	14-29	1097.849
50N	76W	29	21-29	1097.994
50N	76W	29	23-29	1097.833
50N	76W	29	32-29	1097.985
50N	76W	29	42-29	1097.974
50N	76W	29	43-29	1097.879
50N	76W	29	44-29	1097.856
50N	76W	30	12-30	1097.916
50N	76W	30	13-20	1097.961
50N	76W	30	14-30	1097.945
50N	76W	30	21-30	1098.041
50N	76W	30	33-30	1097.992
50N	76W	30	34-30	1097.998
50N	76W	30	41-30	1098.035
50N	76W	30	43-30	1098.007

TWP	RNG	Sec	Well #	Unrecovered CBNG MMCF
50N	76W	31	12-31	1097.862
50N	76W	31	21-31	1097.845
50N	76W	31	22-31	1097.869
50N	76W	31	23-31	1097.803
50N	76W	31	33-31	1097.902
50N	76W	31	41-31	1097.811
50N	76W	31	43-31	1097.828
50N	76W	32	14-32	1097.8
50N	76W	32	23-32	1097.823
50N	76W	32	31-23	1097.824
50N	76W	32	33-32	1097.805
50N	76W	32	41-32	1097.838
50N	76W	32	43-32	1097.787
50N	76W	32	44-32	1097.821
50N	77W	12	32-12	1200.077
50N	77W	12	33-12	1200.249
50N	77W	12	41-12	1200.024
50N	77W	12	42-12	1200.273
50N	77W	12	43-12	1200.587
50N	77W	13	11-13	1324.139
50N	77W	13	12-13	1324.111
50N	77W	13	13-13	1324.052
50N	77W	13	14-13	1324.035
50N	77W	13	23-13	1323.958
50N	77W	13	34-13	1323.866
50N	77W	13	43-13	1332.909
50N	77W	34	24-32	703.884
50N	77W	34	32-34	703.961
50N	77W	34	33-34	703.934
50N	77W	34	34-34	703.925
50N	77W	34	43-34	703.932
50N	77W	35	23-35	703.805
50N	77W	35	24-35	703.86
50N	77W	35	33-35	703.766
50N	77W	35	44-35	703.724
49N	76W	5	11-5	720.566
49N	76W	5	32-5	720.561
49N	76W	5	34-5	720.651
49N	76W	5	41-5	720.42
49N	76W	5	44-5	720.59

TWP	RNG	Sec	Well #	Unrecovered CBNG MMCF
49N	76W	6	11-6	1051.95
49N	76W	6	12-6	1051.922
49N	76W	6	13-6	1051.946
49N	76W	6	22-6	1051.869
49N	76W	6	32-6	1051.882
49N	76W	6	33-6	1051.875
49N	76W	6	44-6	1051.934
49N	76W	8	12-8	473.178
49N	76W	8	14-8	469.704
49N	76W	8	23-8	469.684
49N	76W	8	33-8	469.759
49N	76W	8	34-8	473.178
49N	76W	8	41-8	469.204
49N	76W	17	12-17	430.107
49N	76W	17	21-17	430.041
49N	76W	17	32-17	430.129
49N	76W	17	41-17	430.083
49N	76W	17	43-17	430.147
49N	77W	1	12-1	788.527
49N	77W	1	23-1	788.482
49N	77W	1	31-1	788.408
49N	77W	1	32-1	788.317
49N	77W	1	33-1	788.305
49N	77W	1	41-1	788.349
49N	77W	1	43-1	788.349
49N	77W	2	11-2	1186.288
49N	77W	2	14-2	1186.132
49N	77W	2	21-2	1186.279
49N	77W	2	23-2	1186.235
49N	77W	2	32-2	1186.245
49N	77W	2	34-2	1186.157
49N	77W	2	41-2	1186.165
49N	77W	2	43-2	1186.159
49N	77W	3	12-3	893.297
49N	77W	3	13-3	893.326
49N	77W	3	21-3	893.376
49N	77W	3	22-3	893.327
49N	77W	3	31-3	893.326
49N	77W	3	43-3	893.29
49N	77W	3	44-3	893.288

TWP	RNG	Sec	Well #	Unrecovered CBNG MMCF
50N	77W	24	21-24	1105.084
50N	77W	24	32-24	1104.995
50N	77W	24	41-24	1105.084
50N	77W	24	42-24	1104.988
50N	77W	25	13-25	530.488
50N	77W	25	23-25	530.808
50N	77W	25	32-25	530.436
50N	77W	25	34-25	530.437
50N	77W	25	41-25	530.398
			Total	**124,400.29**

4.1.6.2. Cumulative Effects

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

Assuming the surrounding wells are drilled at or near 80 acres spacing, here is the potential for 4,908.5 MMCFG of CBNG that will not be recovered as a result of selecting alternative C. Approximately 3.9% of the recoverable CBNG will remain in the formation.

Table 4.10 CBNG lost if surrounding wells are drilled at 80 aces spacing

TWP	RNG	Sec	Well #	Unrecovered CBNG MMCF
49N	76W	6	41-6	115.706
49N	76W	5	12-5	79.247
49N	76W	5	23-5	79.295
49N	76W	5	24-5	79.27
49N	76W	6	41-6	115.706
49N	76W	8	21-8	51.669
49N	76W	8	43-8	51.67
49N	76W	17	23-17	47.324
49N	76W	17	34-17	47.319
50N	76W	7	12-7	161.100
50N	76W	7	21-7	161.083
50N	76W	7	23-7	161.103
50N	76W	7	33-7	161.092
50N	76W	7	41-7	161.079
50N	76W	17	14-17	127.300
50N	76W	17	23-17	127.312
50N	76W	17	34-17	127.303
50N	76W	18	34-18	127.295
50N	76W	18	43-18	127.305
50N	76W	19	32-19	143.812

TWP	RNG	Sec	Well #	Unrecovered CBNG MMCF
50N	76W	19	42-19	143.792
50N	76W	20	13-20	143.793
50N	76W	20	23-20	143.785
50N	76W	20	32-20	143.766
50N	76W	20	31-20	143.790
50N	76W	20	41-20	143.803
50N	76W	20	42-20	143.865
50N	76W	31	14-31	120.778
50N	77W	12	12-12	132.019
50N	77W	24	33-24	121.548
50N	77W	24	34-24	121.53
50N	77W	24	14-24	121.531
50N	77W	25	21-25	58.338
50N	77W	25	44-25	58.349
50N	77W	26	11-26	98.608
50N	77W	26	22-26	98.598
50N	77W	26	23-26	98.595
50N	77W	26	24-26	98.589
50N	77W	27	32-27	105.412
50N	77W	27	42-27	105.402
50N	77W	35	12-35	77.406
50N	77W	35	21-35	77.410
50N	77W	35	42-35	77.405
50N	77W	35	43-35	77.402
			Total	**4,908.506**

4.1.6.3. Mitigation Measures

No additional mitigation measures are considered.

4.1.6.4. Residual Effects

Economics dictates the rate of recovery of the CBNG resource. At this time, the market price of CBNG is depressed due primarily to low demand as storage facilities are at capacity and infrastructure to transport the product from Wyoming to other markets does not exist. Many existing CBNG wells within the PRB are currently shut in reducing the rate of CBNG recovery. It is uncertain at this time when the market price of CBNG will increase.

4.1.7. Cultural Resources

4.1.7.1. Direct and Indirect Effects

No historic properties will be impacted by the proposed project. Following the Wyoming State Protocol Section VI(A)(1) the Bureau of Land Management electronically notified the Wyoming State Historic Preservation Officer (SHPO) on 3/2/2010 that no historic properties exist within the APE. If any cultural values [sites, artifacts, human remains (Appendix L PRB FEIS)] are observed during operation of this lease/permit/right-of-way, they will be left intact and the Buffalo Field Manager notified. Further discovery procedures are explained in the Standard COA (General)(A)(1).

4.1.7.2. Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-298.

4.1.7.3. Mitigation Measures

No additional mitigation measures are considered.

4.1.7.4. 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.

4.1.8. Air Quality

4.1.8.1. Direct and Indirect Effects

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-CBM 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.

4.1.8.2. Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-386.

4.1.8.3. Mitigation Measures

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

4.1.8.4. Residual Effects

Some increase in air pollution emissions would occur as a direct result of the development; however these direct impacts are predicted to be below applicable thresholds.

4.1.9. Recreation

4.1.9.1. Direct and Indirect Effects

CBNG development is changing the rural undeveloped nature of the Powder River Breaks to a rural industrial setting, decreasing the satisfaction levels of many hunters and other recreationists. Development results in direct habitat loss and habitat fragmentation for big game and could potentially impact local big game populations and the experience of the hunters that rely on healthy populations for a quality hunt.

Ongoing CBNG operations during the hunting season can impact nearby hunting success and satisfaction, which may result in long term decreased hunting activity in the area.

4.1.9.2. Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-328.

4.1.9.3. Mitigation Measures

Travel within the William Draw Unit Gamma POD, on all private roads that would access Federal land, will be restricted to authorized company personnel serving in their official capacity. Signs reading "Private Road - No Public Access" will be installed at the intersection of private and public roads within the project area. Contact the Outdoor Recreation Planner at BLM BFO for specific direction regarding signage and related materials. Gates may be required to be installed if necessary to prevent unauthorized travel. The signs and gates will be provided and maintained by the operator.

4.1.9.4. Residual Effects

Effects to quality of life may occur depending on an individual's point of view. For those who prefer the solitude and natural setting, their quality of life will be affected for the life of the project.

4.1.10. Travel Management

4.1.10.1. Direct and Indirect Effects

Conflicts between paying recreationists and CBNG activities may increase. With the increased roads and (private) access, illegal off-road vehicle use and trespass are likely to increase. Additional roads will likely result in increased trespass onto private lands within the project area and non-public roads on BLM managed surface. In the past, the BLM has received complaints from adjacent landowners stating that trespassing has increased with the additional roads constructed for CBNG development. Vandalism of wells and infrastructure may also increase with the additional roads.

The PRB FEIS states, "Impacts related to the construction of access roads used to extract CBNG include an increase in average daily traffic (ADT), increase in risk of traffic accidents from additional project-related vehicles as well as non-project-related vehicles, increased potential access to remote areas, an increased risk of vehicle collisions with livestock and wildlife, and visual intrusion of project-related vehicles and activities".

4.1.10.2. Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-302.

4.1.10.3. Mitigation Measures

In order to maintain the travel management objectives in the RMP and to reduce conflicts between the public relative to new roads in the project area, the company will sign the junctions of private and public roads.

In order to maintain the travel management objectives in the RMP and to reduce conflicts between the public relative to new roads in the project area, the company will sign the junctions of private and public roads.

Travel within the William Draw Unit Gamma and Delta PODs, on all private roads that would access Federal land, is restricted to authorized company personnel serving in their official capacity. Signs reading "Private Road - No Public Access" will be installed at the intersection of private and public roads within the project area. Contact the Outdoor Recreation Planner at BLM BFO for specific direction regarding signage and related materials. Gates may be required to be installed if necessary to prevent unauthorized travel. The signs and gates will be provided and maintained by the operator.

4.1.10.4. Residual Effects

There will be unavoidable long-term indirect adverse effects to the properties adjacent to the major access roads within the project area through increased traffic, noise and dust from project related vehicles.

4.1.11. Visual Resources Management

4.1.11.1. Direct and Indirect Effects

The visual resources will be impacted by construction of a new access road, pipelines, power lines, and the introduction of a new well to the area. Disturbance associated with access roads, pipelines, and power lines will create linear contrasts with the natural lines and the wells will contrast with the natural forms. However, considering the presence of other modifications (fences, stock water ponds), the impact is expected to be minor. Adherence with BLM applied mitigation (in the form of COAs) addressing these visual contrasts should minimize visual resource impacts to the Williams Draw Unit Gamma project area and keep the plan of development within the visual resource management Class II and Class IV requirements.

4.1.11.2. Cumulative Effects

The cumulative effects associated with Alternatives C are within the analysis parameters and impacts described in the PRB FEIS. For details on expected cumulative impacts, refer to the PRB FEIS, pg. 4-314.

4.1.11.3. Mitigation Measures

Lance Oil and Gas Company will mount lights at compressor stations on a pole or building at the minimum necessary height and direct them downward to illuminate key areas within the facility while minimizing the amount of light projected outside the facility.

Access roads must follow natural contours as closely as possible and will avoid approaching public roads at a perpendicular angle to prevent direction of the attention of a casual observer. Powerlines will be buried to prevent additional visual disturbance.

All permanent above-ground structures (e.g., production equipment, tanks, etc.) not subject to safety requirements will be painted to blend with the natural color of the landscape. The paint used will be a color which simulates “Standard Environmental Colors.” Temporary structures (i.e. generators, etc.) present for more than 90 days will be required to comply with visual resource mitigation. The color selected for the William Draw Unit Gamma and Delta PODs is Covert Green, 18-0617 TPX.

4.1.11.4. Residual Effects

Effects to quality of life may occur depending on an individual’s point of view. For those who prefer the solitude and natural setting, their quality of life will be affected for the life of the project.

5. CONSULTATION/COORDINATION

Contact	Title	Organization	Present at Onsite
Brad Rogers	Wildlife Biologist	U.S. Fish & Wildlife Service	yes
Bud Stewart	Energy Coordinator	WGFD	no
Heather Obrien	Wildlife Biologist	WGFD	no
Lynn Jahnke	Wildlife Biologist	WGFD	no

6. OTHER PERMITS REQUIRED

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

7. REFERENCES AND AUTHORITIES

Agnew, W. D. 1983. Flora and Fauna Associated with Prairie Dog Ecosystems. Unpublished thesis. Colorado State University, Fort Collins. 47pp.

Agnew, W. D. 1988. Arthropod Consumption by Small Mammals on Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Eighth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM 154. pgs. 81-87.

Agnew, W., D. W. Uresk. and R. M. Mansen. 1986. Flora and Fauna Associated with Prairie Dog Colonies and Adjacent Ungrazed Mixed-grass Prairie in Western South Dakota. Journal of Range Management 39, pgs 135-139

AHPIS, Animal and Plant Health Inspection Service. 2002. General information available online at http://www.aphis.usda.gov/lpa/issues/wnv/wnv.html.

Aldridge, C. L., and M. S. Boyce. 2007. Linking occurrence and fitness to persistence: a habitat-based approach for endangered greater sage-grouse. Ecological Applications 17:508-526.

Apa, A. D. 1985. Efficiency of Two Black-tailed Prairie Dog Rodenticides and Their Impacts on Non-target Bird Species. Unpublished thesis, South Dakota State University Brookings. 71pp.

Avian Power Line Interaction Committee (APLIC) 2006. R. Harness, contributing author to: Suggested Practices for Avian Protection on Power Lines: State of the Art in 2006. 207pp.

Bills, Thomas E. 2004. Powder River Basin Oil & Gas Project Semi-Annual Report: May 1, 2003 – October 31, 2003. BLM Buffalo Field Office. Buffalo, WY. 8pp.

Big Horn Environmental Consultants. 2008. Powder Valley Unit – Delta POD Wildlife Survey and Habitat Report. Sheridan, WY. 11pp.

Braun C. E. 1998. Sage-grouse declines in western North America: what are the problems? Proceedings of the Western Association of State Fish and Wildlife Agencies. 67:134–144.

Braun C. E., M. F. Baker, R. L. Eng, J. S. Gashwiler, and M. H. Schroeder. 1976. Conservation committee report on effects of alteration of sagebrush communities on the associated avifauna. Wilson Bulletin. 88:165–171.

Braun, C.E., O.O. Oedekoven, and C.L. Aldridge. 2002. Oil and Gas Development in Western north America: Effects on Sagebrush Steppe Avifauna with Particular Emphasis on Sage Grouse. In: Transactions of the 67th North American Wildlife and Natural Resources Conference. pp337-349.

Bromley, M. 1985. Wildlife Management Implications of Petroleum Exploration and Development in Wildland Environments. General Technical Report INT-191. USDA Forest Service – Intermountain Research Station. Ogden, Utah.

Bureau of Land Management. 2010. Instruction Memorandum No. WY-2010- 012; Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management (BLM) Administered Public Lands including the Federal Mineral Estate. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Bureau of Land Management. 2004. Instruction Memorandum No. WY-2005-057: Statement of Policy Regarding Sage-Grouse Management Definitions, and Use of Protective Stipulations, and Conditions of Approval. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Bureau of Land Management. 2008. Fact Sheet Greater Sage-Grouse Buffalo Field Office RMP Amendment. May 28, 2008

Bureau of Land Management. 2007. Environmental Report: Coalbed Natural Gas Effects on the Fortification Creek Area Elk Herd. September 2007. Bureau of Land Management, Buffalo Field Office. Buffalo, WY.

Bureau of Land Management. 1990. Instruction Memorandum No. WY-90-564: Resource Management Plan Action and Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities. Bureau of Land Management, Wyoming State Office. Cheyenne, WY.

Campbell, Thomas and Tim Clark. 1981. Colony Characteristics and Vertebrate Associates of White-tailed and Black-tailed Prairie Dogs. American Midland Naturalist, Vol. 105, No. 2 (April 1981). pgs 269-276.

Canfield, J. E., L. J. Lyon, J. M. Hillis, and M. J. Thompson. 1999. Ungulates. Chapter 6 in Effects of Recreation on Rocky Mountain Wildlife: A Review for Montana, coordinated by G. Joslin and H. Youmans. Committee on Effects of Recreation on Wildlife, Montana Chapter of The Wildlife Society.

Clark, T. W., T. M. Campbell, D. G. Socha, and D. E. Casey. 1982. Prairie Dog Colony attributes and Associated Vertebrate Species. Great Basin Naturalist 42: 572-582.

Code of Federal Regulations (CFR)

1. 40 CFR All Parts and Sections inclusive Protection of Environment. Revised as of July 1, 2004.
2. 43 CFR All Parts and Sections inclusive - Public Lands: Interior. Revised as of October 1, 2006.

Confluence Consulting, Inc. 2004. Powder River Biological Survey and Implications for Coalbed Methane Development. Bozeman, MT. 179pp.

Connelly, J. W., M. A. Schroeder, A. R. Sands, and C. E. Braun. 2000. Guidelines for management of sage grouse populations and habitats. Wildlife Society Bulletin 28:967-985.

Connelly, J. W., S. T. Knick, M. A. Schroeder, and S. J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Western Association of Fish and Wildlife Agencies. Unpublished Report. Cheyenne, Wyoming.

Cornish, Todd; Terry Creekmore; Walter Cook; and Elizabeth Williams. 2003. "West Nile Virus - Wildlife Mortality in Wyoming 2002-2003". In: The Wildlife Society Wyoming Chapter Program and Abstracts for the Annual Meeting at the Inn in Lander, WY November 18-21, 2003. Wildlife Society Wyoming Chapter. 17pp.

Cornish, Todd. Personal Communication. Wyoming State Veterinary Laboratory, University of Wyoming. Laramie, WY. (307) 742-6638. tcornish@uwyo.edu.

Dantzker, M. S., Deane, G. B. & Bradbury, J. W. 1999. Directional acoustic radiation in the strut display of male sage grouse Centrocercus urophasianus. Journal of Experimental Biology, 202, 2893–2909.

Danvir, Rick E. 2002. Sage Grouse Ecology and Management in Northern Utah Sagebrush-Steppe: A Deseret Land and Livestock Wildlife Research Report. Deseret Land and Livestock Ranch and the Utah Foundation for Quality Resource Management. Woodruff, UT.

Deisch, M. S., D. W. Uresk, and R. L. Lindor. 1989. Effects of Two Prairie Dog Rodenticides on Ground Dwelling Invertebrates in Western South Dakota. Ninth Great Plains Wildlife Damage Control Workshop Proceedings. USDA Forest Service General Technical Report RM. Pgs 171-181.

Dobkin D. S. 1994. *Conservation and management of Neotropical migrant landbirds in the northern Rockies and Great Plains*. University of Idaho Press, Moscow, ID.

Doherty, K.E., D.E. Naugle, B.L. Walker, J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. Journal of Wildlife Management. In press.

Fahrig, L., and J. Paloheimo. 1988. Determinations of local population size in patchy habitats. Theorectical Population Biology 34:194-213.

Fertig, W. 2000. *Status Review of the Ute Ladies Tresses (Spiranthes diluvialis) in Wyoming*. Wyoming Natural Diversity Database, Laramie, Wyoming.

Geist, V. 1978. Behavior. Big Game of North America; ecology and management. Stackpole Books, Harrisburg, Pennsylvania.

Gelbard J. L., and J. Belnap. 2003. Roads as conduits for exotic plant invasions in a semiarid landscape. Conservation Biology. 17:420–432.

Gibson, R. M. 1989. Field playback of male display attracts females in lek breeding Sage Grouse. Behavioral Ecology and Sociobiology 24: 439-443.

Gibson, R. M. and J. W. Bradbury. 1986. *Male and female mating strategies on sage grouse leks*. Pp. 379-398 in Ecological aspects of social evolution: birds and mammals (D. I. Rubenstein and R. W. Wrangham, eds.). Princeton Univ. Press, Princeton, New Jersey.

Grenier, M., B. Oakleaf, K. Taylor, and M. Hymas. 2004. *Inventory and Mapping of Black tailed Prairie Dogs in Wyoming – An Estimate of Acreage Completion Report*.

Grenier, M. 2003. An Evaluation of Black-footed Ferret Block Clearances in Wyoming: Completion Report. Wyoming Game and Fish Department. Lander, WY. 16pp

Hayden-Wing Associates. 1990. "Response of Elk to Exxon's Field Development in the Riley Ridge Area of Western Wyoming 1979-1990." Final report prepared for Exxon Company, USA and Wyoming Game and Fish Department. 33 pp.

Haug, E. A. and L. W. Oliphant. 1985. Movements, Activity Patterns, and Habitat Use of Burrowing Owls in Saskatchewan. Journal of Wildlife Management. 54(1):27-35.

Hazlett, D.L. 1996. *The discovery of Spiranthes diluvialis along the Niobrara River in Wyoming and Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.

Hazlett, D.L. 1997. *A 1997 search for Spiranthes diluvialis in southeastern Wyoming and western Nebraska*. Report prepared for the Bureau of Land Management Wyoming State Office.

Heidel, Bonnie. Botanist. Wyoming Natural Diversity Database. University of Wyoming. Laramie, WY

Hester, S. G. and M. B. Grenier. 2005. A conservation plan for bats in Wyoming. Report, Wyoming Game and Fish Department, Nongame Program. http://gf.state.wy.us/downloads/pdf/wybcp_ver1.0.pdf

Hiat, G.S. and D. Baker. 1981. Effects of oil/gas drilling on elk and mule deer winter distributions on Crooks Mountain, Wyoming. Wyoming Game and Fish Department.

Holloran, M. J, and S. H. Anderson. 2005. Spatial distribution of Greater Sage-Grouse nests in relatively contiguous sagebrush habitats. Condor 107:742-752.

Holloran, M J.; B. J. Heath; A. G. Lyon; S. J. Slater; J. L. Kuppiers; and S. H. Anderson. 2005. Greater sage-grouse nesting habitat selection and success in Wyoming. J. Wildl. Manage. 69(2):638-649.

Holloran, M. J., R. C. Kaiser, and W. A. Hubert. 2007. Population Response of yearling greater sage-grouse to the infrastructure of natural gas fields in southwestern Wyoming. Completion report. Wyoming Cooperative Fish and Wildlife Research Unit, Laramie, WY, USA. 34pp.

Hoogland, J. 1995. *The black-tailed prairie dog: Social life of a burrowing mammal*. Chicago: Chicago University Press.

Hubert, W. A. 1993. *The Powder River: a relatively pristine stream on the Great Plains*. Pages 387-395 in L. W. Hesse, C. B. Stalnaker, N. G. Benson, and J. R. Zuboy, editors. Restoration planning for the rivers of the Mississippi River ecosystem. Biological Report 19, National Biological Survey, Washington, D.C.

Ingelfinger, F., and S. Anderson. 2004. Passerine response to roads associated with natural gas extraction in a sagebrush steppe habitat. Western North American Naturalist 64:385-395

Ingelfinger F. 2001. *The effects of natural gas development on sagebrush steppe passerines in Sublette County, Wyoming*. M.Sc. thesis, University of Wyoming, Laramie, WY.

Jalkotzy, M.G., P.I. Ross, and M.D. Nasserden. 1997. The Effects of Linear Developments on Wildlife: A Review of Selected Scientific Literature. Arc Wildlife Services Ltd., Calgary, Alberta, Canada.

Jahnke, Lynn. 2006. Personal communication regarding status of, and impacts on, Powder River Basin big game populations relative to CBNG development in the Fortification Creek area. Wyoming Game and Fish Department. Sheridan, Wyoming.

Jellison, Bert. 2005. Sage-Grouse Restoration Project: Lake DeSmet Conservation District. Wyoming Game and Fish Department. Sheridan, WY.

Johnson, B.K. and D. Lockman. 1980. Response of Elk During Calving to Oil/Gas Drilling Activity in Snider Basin, Wyoming. Wyoming Game and Fish Department. Big Piney, Wyoming.

Kelly Brian T. 2004. Letter to interested parties: Black-footed ferret clearance surveys. U.S. Fish and Wildlife Service (February 2, 2004). Cheyenne, WY. 4pp.

King, J. A. 1955. Social Behavior, Social Organization and Population Dynamics in a Black-tailed Prairie Dog Town in the Black Hills of South Dakota. Contr. Lab. Vert. Biol., University of Michigan. 67pp.

Klute, D. S., L.W. Ayers, M.T. Green, W.H. Howe, S.L. Jones, J.A. Shaffer, S.R. Sheffield, and T.S. Zimmerman. 2003. *Status Assessment and Conservation Plan for the Western Burrowing Owl in the United States*. U.S. Department of the Interior; Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R6001-2003, Washington, D.C.

Knick, S. T., and J. T. Rotenberry. 1995. Landscape characteristics of fragmented shrubsteppe habitats and breeding passerine birds. Conservation Biology 9:1059-1071.

Knick S. T., D. S. Dobkin, J. T. Rotenberry, M. A. Schroeder, W. M. Vander Haegen, and C. van Riper III. 2003. Teetering on the edge or too late? Conservation and research issues for avifauna of sagebrush habitats. Condor. 105:611–634.

Knight R. L., and J. Y. Kawashima. 1993. Responses of raven and Red-tailed Hawk populations to linear right-of-ways. Journal of Wildlife Management. 57:266–271.

Knopf F.L. and J.R Rupert. 1995. Habits and habitats of Mountain Plovers in California. Condor 97:743-751.

Landry, R.E. 1979. *Growth and development of the Burrowing Owl*. M.S. thesis, California State University, Long Beach, CA.

Litzel, R. 2004. Personal communication [January 6 phone conversation with Jim Sparks]. Johnson County Weed and Pest District.

Lowham, H.W. Streamflows in Wyoming WRIR 88-4045 U.S. Geological Survey 1988

Lustig, Thomas D., March. 2003. Where Would You Like the Holes Drilled into Your Crucial Winter Range? Transactions of the 67th North American Wildlife and Natural Resources Conference.

Marra PP, Griffing SM, McLean RG. West Nile virus and wildlife health. Emerg Infect Dis [serial online] 2003 Jul. Available from: URL: http://www.cdc.gov/ncidod/vol9no7/03-0277.htm.

McCraken, J. G., D. W. Uresk and R. M. Mansen. 1985. Burrowing Owl Foods in Conata Basin, South Dakota. Great Basin Naturalist 45: 287-290.

McDonald, D., N.M. Korfanta, and S.J. Lantz. 2004. *The Burrowing Owl (Athene cunicularia): a technical conservation assessment*. USDA Forest Service, Rocky Mountain Region.

Meffe, G.K. and C.R. Carroll. 1994. *Principles of Conservation Biology*. Sinauer Associates, Inc. Sunderland, MA.

Miller, K.A Peak-Flow Characteristics of Wyoming Streams WRIR 03-4107 U.S. Geological Survey 2003

Mooney, A. 2004. Personal Communication [January 6 phone conversation with Jim Sparks]. Campbell County Weed and Pest District.

Moynahan, B. J. and M. S. Lindberg. 2004. *Nest Locations of Greater Sage-Grouse in Relation to Leks in North-Central Montana*. *Presented at* Montana Sage-Grouse Workshop, Montana Chapter of The Wildlife Society, Billings.

Moynahan, B. J.; M. S. Lindberg; J. J. Rotella; and J. W. Thomas. 2005. Factors Affecting Nest Survival of Greater Sage-Grouse in Northcentral Montana. J. Wildl. Manage.

Moynahan, B. J., M. S. Lindberg, J. J. Rotella, and J. W. Thomas. 2007. Factors affecting nest survival of greater sage-grouse in north-central Montana. Journal of Wildlife Management 71:1773-1783.

Naugle, D. E.; C. L. Aldridge; B. L. Walker; T. E. Cornish; B. J. Moynahan; M. J. Holloran; K. Brown; G. D. Johnson; E. T. Schmidtmann; R. T. Mayer; C. Y. Kato; M. R. Matchett; T. J. Christiansen; W. E. Cook; T. Creekmore; R. D. Falise; E. T. Rinkes; and M. S. Boyce. 2004. West Nile virus: Pending Crisis of Greater Sage-grouse. Ecology Letters. 7:704-713.

Naugle, David E.; Brett L. Walker; and Kevin E. Doherty. 2006. Sage Grouse Population Response to Coal-bed Natural Gas Development in the Powder River Basin: Interim Progress Report on Region-wide Lek Analyses. May 26, 2006. University of Montana. Missoula, MT. 10pp.

Nicholoff, S. H., compiler. 2003. Wyoming Bird Conservation Plan, Version 2.0. Wyoming Partners In Flight. Wyoming Game and Fish Department, Lander, WY. http://www.blm.gov/wildlife/plan/WY/menu.htm

Noss, R. F. and A. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Defenders of Wildlife and Island Press, Washington, D. C.

Oakleaf, Bob. January 13, 1988. Letter to BFAT: Preliminary BFF Reintroduction Site Analysis, Meeteetse Management Plan Assignments. Wyoming Game and Fish Department. Lander, WY. 10pp.

Olenick, B. E. 1990. *Breeding biology of burrowing owls using artificial nest burrows in southeastern Idaho*. Thesis, Idaho State University, Pocatello, Idaho, USA.

Paige, C., and S. A. Ritter. 1999. *Birds in a sagebrush sea: managing sagebrush habitats for bird communities*. Partners in Western Flight working group, Boise, ID.

Patterson, C. T. and S. H. Anderson. 1985. Distributions of Eagles and a Survey for Habitat Characteristics of Communal Roosts of Bald Eagles (Haliaeetus leucocephalus) Wintering in Northeastern Wyoming. Wyoming Cooperative Fishery and Wildlife Research Unit. University of Wyoming. Laramie, WY.

Powell, J.H. 2003. Distribution, Habitat Use Patterns, and Elk Response to Human Disturbance in the Jack Morrow Hills, Wyoming. A thesis – University of Wyoming. Laramie, Wyoming.

Porneluzi, P, J. C. Bednarz, L. J. Goodrich, N. Zawada, and J. Hoover. 1993. Reproductive performance of territorial Ovenbirds occupying forest fragments and a contiguous forest in Pennsylvania. Conservation Biology 7:618-622.

Primack, R.B. 1993. Essentials of conservation biology. Sinauer Associates, Sunderland, Massachusetts, USA.

Reading, R. P., S. R. Beissinger, J. J. Grensten, and T. W. Clark. 1989. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. Attributes of Black-tailed Prairie Dog Colonies in North Central Montana with Management Recommendations for the Conservation of Biodiversity. pgs 13-28.

Reading, R., and Randy Matchet. 1997. Attributes of Black-tailed Prairie Dog Colonies in Northcentral Montana. Journal of Wildlife Management 61(3): 664-673.

Rinkes, T. 2003. Personal communication [Draft notes from Annual Sage-Grouse and Sagebrush Species of Concern Meeting]. Bureau of land Management Wildlife Biologist/Sage Grouse Coordinator.

Robinson, S. K. 1992. *Population dynamics of breeding birds in a fragmented Illinois landscape*. Pages 408-418 in J. Hagan and D. W. Johnston, editors. Ecology and conservation of neotropical migrant land birds. Smithsonian Institution press, Washington, D. C.

Rogers, Brad. Personal Communication. Fish and Wildlife Biologist. U.S. Fish and Wildlife Service, Cheyenne Field Office. Cheyenne, WY.

Romin, Laura A., and Muck, James A. May 1999. Utah Field Office Guidelines For Raptor Protection From Human And Land Use Disturbances. U.S. Fish and Wildlife Service, Salt Lake City, Utah

Rotenberry J. T., and J. A. Wiens. 1980a. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. Ecology. 61:1228–1250.

Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.

Rowland, M. M., M. Leu, , S. P. Finn, S. Hanser, L. H. Suring, J. M. Boyd, C. W. Meinke, S. T. Knick, and M. J. Wisdom. 2005. Assessment of threats to sagebrush habitats and associated species of concern in the Wyoming Basins. Version 1.1, June 2005, unpublished report on file at USGS Biological Resources Discipline, Snake River Field Station, 970 Lusk St., Boise, ID 83706.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, G.M. Koehler, C.J. Krebs, K.S. McKelvey, and J.R. Squires. 1999. The Scientific Basis for Lynx Conservation: Qualified Insights. Ch16. USDA Forest Service Technical Report RMRS-GTR-30.

Saab, V., and T. Rich. 1997. *Large-scale conservation assessment for neotropical migratory landbirds in the Interior Columbia River Basin*. USDA Forest Service General Technical Report PNW-GTR-399, Portland, Oregon, USA.

Sawyer, H., R. Nielson, D. Strickland and L. McDonald. 2005. Seasonal distribution and habitat use patterns of elk I the Jack Morrow Hills Planning Area, Wyoming. Western EcoSystems Technology, Inc. Cheyenne, Wyoming.

Sawyer, H., R. Nielson, D. Strickland and L. McDonald. 2005. Sublette Mule Deer Study (Phase II) – Long-term Monitoring Plan to Assess Potential Impacts of Energy Development on Mule Deer in the Pinedale Anticline Project Area. Western EcoSystems Technology, Inc. Cheyenne, Wyoming.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Southerland, M. 1993. Habitat Evaluation: Guidance for the Review of Environmental Inpact Assessment Documents. Submitted to the U.S. Environmental Protection Agency – Office of Federal Activities. Dynamac Corporation Rockville, MD.

State wildlife agencies' ad hoc committee for sage-grouse and oil and gas development. 2008. Using the best available science to coordinate conservation actions that benefit greater sage-grouse across states affected by oil and gas development in Management Zones I-II (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming). Unpublished report. Colorado Division of Wildlife, Denver; Montana Fish, Wildlife and Parks, Helena; North Dakota Game and Fish Department, Bismarck; Utah Division of Wildlife Resources, Salt Lake City; Wyoming Game and Fish Department, Cheyenne.

Steenhof K., M. N. Kochert, and J. A. Roppe. 1993. Nesting by raptors and Common Ravens on electrical transmission line towers. Journal of Wildlife Management. 57:272–281.

Stinson, D. W., D. W. Hays, and M. A. Schroeder. 2004. Washington State Recovery Plan for the Sage-grouse. Washington Department of Fish and Wildlife, Olympia, Washington. 109 pages.

Temple S. A. 1986. Predicting impacts of habitat fragmentation on forest birds: A comparison of two models. Pages 301-304 in Wildlife 2000 (J. Verner, C. J. Ralph, and M. L. Morrison, Eds.). Univ. Wisconsin Press, Madison.

Temple S.A., and J. R. Cary. 1988. Modeling dynamics of habitat-interior bird populations in fragmented landscapes Conserv. Biol.2 :340-347.

Temple, S.A., and B.A. Wilcox. 1986. Introduction: Predicting effects of habitat patchiness and fragmentation. In *Wildlife 2000: Modeling Habitat Relationships of Terrestrial Vertebrates*, ed. J. Verner, M.L. Morrison, and C.J. Ralph, 261-62. Madison: University of Wisconsin Press.

The National Environmental Policy Act of 1969 (NEPA), as amended (Pub. L. 91-90, 42 U.S.C. 4321 et seq.).

Urban, D. L., and H. H. Shugart, Jr. 1984. Avian demography in mosaic landscapes: modeling paradigm and preliminary results. Pages 273-280 in J. Verner, M. L. Morrison, and C. J. Ralph editors. Wildlife 2000: Modeling habitat relationships of terrestrial vertebrates. University of Wisconsin Press, Madison.

U.S. Department of the Interior, Bureau of Land Management and Office of the Solicitor (editors). 2001. The Federal Land Policy and Management Act, as amended. Public Law 94-579.

U.S. Department of the Interior 2001, Bureau of Land Management, Buffalo Field Office. Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office April 2001.

U.S. Department of the Interior 2003, Bureau of Land Management. Powder River Oil and Gas Project Environmental Impact Statement and Resource Management Plan Amendment. April 30, 2003.

U.S. Department of the Interior 2010, US Fish and Wildlife Service. Endangered and Threatened Wildlife and Plants: 12-month Findings for Petitions to List the Greater Sage-Grouse (Centrocercus urophasianus) as Threatened and Endangered. March 4, 2010.

U.S. Department of the Interior 2007, US Fish and Wildlife Service. Reinitiation of Formal Consultation for Powder River Oil and Gas Project. March 23, 2007

U.S. Department of the Interior, Fish and Wildlife Service. 2002. Final Biological and Conference Opinion for the Powder River Oil and Gas Project, Campbell, Converse, Johnson, and Sheridan Counties (WY6633). U.S. Fish and Wildlife Service. December 17, 2002. Cheyenne, WY. 58pp.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS). 1989. Black-footed ferret Survey Guidelines for Compliance with the Endangered Species Act. Denver, CO and Albuquerque, NM.

Vander Haegen, W. M., F. C. Dobler, and D. J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conservation Biology 14:1145-1160.

Walker B, Naugle D, Rinkes T. 2003. The Response of Sage Grouse to Coal-bed Methane Development and West Nile virus in the Powder River Basin: Is There a Link ? Page 6 in: Program and Abstracts for the Annual Wildlife Society Meeting, Wyoming Chapter.

Walker, B.L., D. E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. Journal of Wildlife Management 71:2644-2654.

WDEQ, June 14, 2004. Compliance Monitoring for Ground Water Protection Beneath Unlined Coalbed Methane Produced Water Impoundments

Windingstad, R. M., F. X. Kartch, R. K. Stroud, and M. R. Smith. 1987. Salt toxicosis in waterfowl in North Dakota. Jour. Wildlife Diseases 23(3):443-446.

Wyoming Game and Fish Department (WGFD). 2009. Minimum Recommendations for Development of Oil and Gas Resources within Crucial and Important Wildlife Habitats on BLM Lands. WGFD. Cheyenne, WY

WGFD. 2003. Wyoming Greater Sage-Grouse Conservation Plan. WGFD. Cheyenne, WY

WGFD. 2004. Sheridan Region Wyoming Game and Fish Department: Annual Sage-Grouse Completion Report for 2004. Wyoming Game and Fish Department. Gillette, WY.

WGFD. 2005. Northeast Wyoming Local Working Group Area: Annual Sage-Grouse Completion Report for 2005. Wyoming Game and Fish Department. Buffalo, WY. 42pp.

WGFD. 2008. Hunting and Sage-Grouse: A Technical Review of Harvest Management On a Species of Concern in Wyoming. Wyoming Game and Fish Department. Green River, WY. 21pp.

WGFD. 2008. Job Completion Report; Fortification Creek (El 320) Hunt Area 2 2009 Hunting Season.

8. LIST OF INTERDISCIPLINARY TEAM PREPARERS AND REVIEWERS

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Attachment 1
Seed Mixes by Ecological Site

Shallow Sandy Ecological Site Seed Mix	
Species	**Lbs PLS***
Thickspike Wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*)	3.5
Bluebunch Wheatgrass (*Pseudoroegneria spicata* ssp. *spicata*)	3.5
Blue grama (*Bouteloua gracilis*) Or **Needleandthread** (*Hesperostipa comata*)	1.0
Prairie sandreed (*Calamovilfa longifolia*)	4.6
Prairie coneflower (*Ratibida columnifera*)	0.8
White or Purple Prairie Clover (*Dalea candidum, purpurea*)	0.8
Blue flax (*Linum perenne*)	0.8
Fourwing saltbush (*Atriplex canescens*) Or **Wyoming big sagebrush** (*Artemisia tridentata*) Or **Winterfat** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or **Green rabbitbrush** (*Ericameria teretifolia*)	0.5
Chapter 2 Totals	**16 lbs/acre**

Shallow Clayey Ecological Site Seed Mix	
Species	**Lbs PLS***
Western wheatgrass (*Pascopyrum smithii*)	2.4
Green needlegrass (*Nassella viridula*)	2.4
Blue grama (*Bouteloua gracilis*) Or **Needleandthread** (*Hesperostipa comata*)	1.0
American vetch (*Vicia Americana*)	1.0
Blue flax (*Linum perenne*)	0.2
Fourwing saltbush (*Atriplex canescens*) Or **Wyoming big sagebrush** (*Artemisia tridentata*) Or **Winterfat** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or **Green rabbitbrush** (*Ericameria teretifolia*)	0.5
Chapter 3 Chapter 4 Totals	**8.0 lbs/acre**

Clayey Ecological Site Seed Mix	
Species	**Lbs PLS***
Western wheatgrass (*Pascopyrum smithii*)	4.6
Green needlegrass (*Nassella viridula*)	5.2
Slender wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*)	1.8
Blue grama (*Bouteloua gracilis*) Or **Needleandthread** (*Hesperostipa comata*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpurea*)	0.8
Rocky Mountain beeplant (*Cleome serrulata)*	0.8
Fourwing saltbush (*Atriplex canescens*) Or **Wyoming big sagebrush** (*Artemisia tridentata*) Or **Winterfat** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or **Green rabbitbrush** (*Ericameria teretifolia*)	0.5
Chapter 5 Totals	**16 lbs/acre**

Loamy Ecological Site Seed Mix	
Species	**Lbs PLS***
Western wheatgrass (*Pascopyrum smithii*) Or **Thickspike wheatgrass** (*Elymus lanceolatus* ssp. *lanceolatus*)	3.9
Bluebunch wheatgrass (*Pseudoroegneria spicata* ssp. *spicata*)	1.5
Green needlegrass (*Nassella viridula*)	3.4
Slender wheatgrass (*Elymus trachycaulus* ssp. *trachycaulus*)	2.8
Blue grama (*Bouteloua gracilis*) Or **Needleandthread** (*Hesperostipa comata*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpurea*)	0.8
Rocky Mountain beeplant (*Cleome serrulata*)	0.8
Fourwing saltbush (*Atriplex canescens*) Or **Wyoming big sagebrush** (*Artemisia tridentata*) Or **Winterfat** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or **Green rabbitbrush** (*Ericameria teretifolia*)	0.5
Chapter 6 Totals	**16 lbs/acre**

Sandy Ecological Site Seed Mix	
Species	**Lbs PLS***
Thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*)	3.5
Prairie sandreed (*Calamovilfa longifolia*)	4.6
Indian ricegrass (*Achnatherum hymenoides*)	3.5
Blue grama (*Bouteloua gracilis*) Or **Needleandthread** (*Hesperostipa comata*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpurea*)	0.8
Blue flax (*Linum perenne*)	0.8
Fourwing saltbush (*Atriplex canescens*) Or **Wyoming big sagebrush** (*Artemisia tridentata*) Or **Winterfat** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or **Green rabbitbrush** (*Ericameria teretifolia*)	0.5
Chapter 7 Totals	**16 lbs/acre**

Lowland Ecological Site Seed Mix	
Species	**Lbs PLS***
Thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*) Or **Western wheatgrass** (*Pascopyrum smithii*)	4.8
Green needlegrass (*Nassella viridula*)	4.1
Basin Wildrye (*Leymus cinereus*)	3.5
Blue grama (*Bouteloua gracilis*) Or **Needleandthread** (*Hesperostipa comata*)	1.0
Prairie coneflower (*Ratibida columnifera*)	0.8
White or purple prairie clover (*Dalea candidum, purpurea*)	0.8
Fourwing saltbush (*Atriplex canescens*) Or **Wyoming big sagebrush** (*Artemisia tridentata*) Or **Winterfat** (*Krascheninnikovia lanata*)	0.5
Rubber rabbitbrush (*Ericameria nauseousus*) Or **Green rabbitbrush** (*Ericameria teretifolia*)	0.5
Chapter 8 Totals	**16 lbs/acre**