

4.0 ENVIRONMENTAL IMPACTS

4.1 Introduction

The potential environmental consequences of construction, drilling, completion, and evaluation activities associated with both the Proposed Action and No Action Alternative are discussed for each potentially affected resource. An environmental impact is defined as a change in the quality or quantity of a given resource due to a modification in the existing environment resulting from project-related activities. Impacts can be beneficial or adverse; a primary (direct) result or a secondary (indirect) result of an action; long-term (more than five years) or short-term (less than five years); and can vary in degree from a slightly discernable change to a total change in the environment. In accordance with CEQ regulation 40 CFR 1502.16, this chapter includes a discussion of the potential impacts of the Proposed Action and the No Action Alternative. Possible conflicts between the Proposed Action and No Action Alternative and the objectives of the Great Divide and Lander RMPs as well as state and local land use plans and policies are identified if such conflicts exist.

Potential impacts are quantified when possible; however, when impacts are not quantifiable appropriate adjectives are used to best describe the level of impact. Impact assessment assumes that all applicant-committed practices will be successfully implemented. If such measures are not implemented, additional adverse impacts may occur. Additional mitigation measures are suggested if such measures are appropriate, and BLM will decide whether to include such additional measures in the Decision Record. The Decision Record will be the decision document for this proposed project.

The air quality analysis found in this document tiers to and incorporates by reference the Desolation Flats Natural Gas Field Development Project (BLM 2004b).

4.2 AIR QUALITY

4.2.1 Proposed Action

BLM has recently released the Final Environmental Impact Statement for the Desolation Flats Natural Gas Field Development Project (BLM 2004b). The northern boundary of the Desolation Flats Project (DFP) Area is located approximately 60 air miles south of the SLPA. Detailed air quality modeling was conducted for Alternative A of the Desolation Flats NEPA analysis and included the drilling of 592 gas wells, and both the successful completion and subsequent production of 385 gas wells. The results of the modeling studies for Desolation Flats indicate that no adverse impacts to sub-grid or near-field air quality would result from the proposed project and the DFP would comply with all state and national ambient air quality standards. The air quality modeling conducted for the DFP suggested the possibility of some contribution to far-field visibility reduction within the Class I airsheds when combined with all other human development in the analysis area.

The scope of the Scotty Lake project differs considerably from Desolation Flats in well numbers (18 versus 592), well-site equipment (conventional gas production versus coalbed natural gas), and

compression horsepower requirements (32,000 hp versus 50 hp/well), which will result in a dramatic reduction in overall emissions associated with the proposed SLPP as compared to the DFP.

Construction emissions associated with the Proposed Action would include PM₁₀, SO₂, NO_x, CO, and VOCs. These emissions would result primarily from construction, drilling and completion activities, would be temporary in nature and would occur in isolation at each individual well location. Considering that construction, drilling and operations within the SLPA would be conducted one well, the relatively small number of exploratory wells and facilities proposed in conjunction with the SLPP would generate a near-undetectable level of emissions that would be limited to the near-field with no impact in the far-field.

The use of Best Available Technology in the small engines to be utilized to power the generators and screw compressors at each individual well location would ensure the operator complies with applicable state and national ambient air quality standards. As indicated in Section 2.3.2, the Operator would take appropriate measures to minimize impacts to air quality. Non-particulate emissions would be minimized by ensuring that vehicles, rig engines, and generator, and screw compressors are maintained in proper operating condition. Watering of access roads (or the use of chemical dust suppressants) within the SLPA during periods of heavy vehicle traffic would also serve to reduce fugitive dust (PM₁₀) by 50% or more (BLM 2003a).

4.2.2 The No Action Alternative

Under the No Action Alternative, there would be no additional impacts to ambient air quality.

4.2.3 Mitigation and Monitoring

Please refer to Section 2.3.2 for Applicant-Committed Practices designed to reduce impacts to air quality within the overall analysis area. No additional mitigation is recommended.

4.3 CULTURAL RESOURCES

Cultural resources, including archaeological and historic sites, on lands subject to federal authority are protected by various laws and regulations commencing with the *Antiquities Act* of 1906. Specific directives concerning Cultural Resource Management can be found in *Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (Federal Register 1983) and BLM Manual Section 8100. Prior to the initiation of any federal action, cultural resources must be inventoried and evaluated to determine their eligibility for inclusion in the NRHP. NRHP criteria (36 CFR 60.4) for determining eligibility define four (4) criteria of significance based upon "...the quality of significance in American history, architecture, archaeology, and culture present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, and association; and that:

∉ are associated with events that have made a significant contribution to the broad patterns of our society; or

- ∉ are associated with the lives of persons significant in our past; or
- ∉ embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- ∉ have yielded, or may be likely to yield, information important in prehistory or history”.

Cultural properties are generally not eligible for inclusion in the NRHP if they lack diagnostic artifacts, subsurface remains, or structural features. Furthermore, sites that cannot be placed in a temporal context or shown to be related to other sites are usually not eligible and therefore are discharged from management.

4.3.1 Proposed Action

As indicated in Section 3.4, the records of the Wyoming State Historic Preservation Office (SHPO) indicate that approximately 578 acres have been inventoried for cultural resources within or directly adjacent to the SLPA. Six cultural sites were identified in conjunction with these inventories including 1 site which was considered as eligible for nomination to the NRHP (Albanese 2004). From these numbers, we may predict a site density of one cultural site per 96 acres and one potentially eligible cultural site per 578 acres. Predictions of site density within the SLPA are drawn from environmental factors within the study area including depositional environments, as well as past studies of cultural resources in the area. Certain environments are more likely to yield intact, buried cultural deposits than others. Most significant cultural resources are found along major ephemeral drainages and along the lower benches of escarpments found commonly throughout southern Wyoming. Certain topographic settings have higher archaeological sensitivity such as aeolian deposits (e.g., sand dunes, sand shadows and sand sheets), alluvial deposits along major drainages, and colluvial deposits along lower slopes of ridges.

Prior to initiation of any ground disturbing activity associated with exploration operations within the SLPA, a Class III cultural resource inventory would be completed on all areas that would be disturbed and any NRHP-eligible cultural resources identified would either be avoided or mitigated according to standard procedures. Likewise, any unanticipated discoveries of cultural resources made during construction activities would be mitigated according to standard procedures and project personnel would be prohibited from collecting any artifacts or disturbing any significant cultural resources in the area. As a consequence, impacts to cultural resources would likely be negligible to nonexistent.

4.3.2 The No Action Alternative

Under the No Action Alternative, there would be no project-related surface disturbances beyond those levels previously approved and impacts to cultural resources would remain at current levels.

4.3.3 Mitigation and Monitoring

Please refer to Section 2.3.3 for Applicant-Committed Practices designed to reduce impacts to cultural resources within the overall analysis area. No additional mitigation is recommended.

4.4 GEOLOGY AND MINERALS

4.4.1 Proposed Action

Potential oil/gas exploration activities within the SLPA would not have an adverse impact upon other mineral resources and would be consistent with management direction for the area as prescribed in the LFO and RFO RMPs. Conflicts which could interfere with the recovery of other mineral resources within the immediate project area, such as mining for gravel or uranium, would be subject to prior existing rights, thereby lessening the potential for future conflict. At this time, there are no other known mineral resources within the project area which are considered to be economically recoverable.

Minimum engineering standards established by *Onshore Oil and Gas Order Number 2* for oil/gas drilling and completion operations would ensure hole integrity and should preclude the possibility of downhole fluid migration between formations.

4.4.2 No Action Alternative

No additional impacts would result to the geology and mineral resources within the SLPP under this action alternative.

4.4.3 Mitigation and Monitoring

Please refer to Section 2.3.4 for Applicant Committed Practices and the Typical Drilling Prognosis contained in Appendix C for those measures designed to reduce impacts to geologic and mineral resources within the overall analysis area. No additional mitigation is recommended.

4.5 HYDROLOGY

A comprehensive Water Management Plan (WMP) has been prepared in conjunction with the proposed Scotty Lake Coalbed Natural Gas Pilot Project (Appendix D). The subject WMP not only discusses alternative methods for water disposal, but discloses the current hydrologic situation within the SLPA and discusses the impacts of the produced water discharge upon both the surface and subsurface hydrology of the area. Information contained in the WMP will be summarized below.

4.5.1 Proposed Action

Because there are no perennial streams, springs, or other sources of permanent surface water (stock water reservoirs) known to exist within the project area, the potential for degradation of existing

surface water quality in or adjacent to the SLPA resulting from implementation of the proposed action is considered to be remote.

4.5.1.1 Erosion and Sedimentation

The 106 acres of short-term surface disturbance within the SLPA would occur in the two watersheds defined in Section 3.6.1. Of this total, 76.49 acres (72 percent) of the surface disturbance would occur in the Red Creek watershed, with the remaining 29.55 acres (28 percent) occurring in the West Alkali Creek watershed, which would represent less than one percent (0.6 and 0.08) percent of each respective watershed.

The potential for off-site erosion and sedimentation throughout the SLPA would be reduced through the implementation of Best Management Practices (BMP) in the construction and subsequent reclamation of surface disturbances as referenced in the Master Field Permit (Appendix C). These reclamation techniques would be augmented on an as-needed basis through the incorporation of site specific reclamation requirements directly into the conditions of approval for those actions within the SLPA requiring federal authorization. Typically, these reclamation requirements would be developed during the permit review process (on-site inspection) and would be based upon site-specific concerns identified during the course thereof. Consequently, the potential for increased erosion and sedimentation within or directly adjacent to the SLPA is considered to be negligible when one considers the following:

- ∅ the total amount of surface disturbance which would result over the LOP from additional oil/gas exploration and development activity within the SLPA (106 acres of short-term disturbance) represents only 3.7 percent of the total land area within the SLPA;
- ∅ successful reclamation of disturbed areas not required for on-going production operations (57 acres) would result in an approximate 53% overall reduction in long-term or LOP surface disturbance, thereby further reducing the potential for erosion and off-site sedimentation (LOP disturbance for the SLPP = 49 acres); and
- ∅ the implementation of site specific “Best Management” reclamation practices designed to stabilize disturbed areas as quickly as possible, would result in a 94% overall reduction in erosion after the first year and a 95% reduction in erosion after five years (refer to Section 4.8.1).

4.5.1.2 Surface Water Discharge

Water produced in conjunction with the proposed SLPP is of good quality as indicated in Table 2a of the referenced WMP and will be discharged to the surface via one of three methods as discussed in Section 2.2.9 under an existing NPDES permit issued to Hudson Group, LLC by the WDEQ. Based upon analyses contained in the WMP, this water is expected to dissipate quite rapidly, irrespective of the discharge method. The WMP predicts that water discharged to one of three primary ephemeral drainages (drainage basins A, B and C) of Red Creek will dissipate within a maximum of 4.8 miles (drainage basin C) downstream of the discharge point due to conveyance loss (Babb 2004a). Flow rates for the discharged water would be less than two feet per second, with

most flows being less than one foot per second - which is below erosion thresholds (Babb 2004a). No water will be discharged into the West Alkali Creek drainage on the north side of Cyclone Rim.

4.5.3.2 Sub-Surface Hydrology

Chemical analyses contained in the WMP indicate that water produced from the Scotty Lake coals (Fort Union Fm) is geologically isolated from the fresh water aquifers in the shallower Wasatch Fm and also from the degraded Big Red aquifer within the Fort Union Fm below the Scotty Lake coals (Babb 2004a). These analyses confirm that there is no significant communication between the geologic horizons above or below the Scotty Lake coals and that said coals represent a confined aquifer within the Fort Union Fm (Babb 2004a).

In this regard, concern has been expressed regarding potential aquifer depletion and potential cross-contamination between aquifers. As indicated in Section 2.2.4, water is removed from the coal in order to depressure said coal and facilitate the desorption of gas from the coal facies. It is a popular misconception that the aquifer must be or is completely dewatered in conjunction with CBNG production - which leads to fears of subsidence and underground coal fires. Studies conducted in conjunction with CBNG production in Wyoming's Powder River Basin have shown that up to twenty percent of the entrained water must be removed from the aquifer in order to depressure the coal sufficiently to facilitate gas desorption (Babb 2004a). Once a pressure equilibrium has been reached and gas begins to flow into the well bore, water production falls off dramatically and, in many cases, ceases altogether. As a consequence, the concerns expressed regarding the potential dewatering of the aquifer are unfounded. Likewise, concerns regarding subsequent subsidence and underground coal fires are also unfounded as the Scotty Lake coals will not be dewatered, but only depressured to the extent that gas will desorb and flow to the well bore. Concerns regarding subsidence, underground coals fires and hydraulic fracturing have been addressed in Appendix B.

Drilling and completion techniques to be utilized by Hudson Group, LLC will ensure that no communication occurs between aquifers in the shallower Wasatch Fm and the Fort Union Fm which contains the Scotty Lake coals. As indicated in Section 2.2.3.2 and Appendix C, surface casing would be set to an approximate depth of 450 feet and cemented back to surface, with production casing set to total depth (TD) with cement circulated from TD back to a point located approximately 200 feet above the shallowest coal in the Fort Union Fm. Cement bond logs would be run to ensure that full cement coverage was obtained.

4.5.4 The No Action Alternative

Under the No Action Alternative, there would be no additional impacts to either the surface or sub-surface hydrology of the overall project area.

4.5.5 Mitigation and Monitoring

Please refer to Section 2.3.5 for Applicant-Committed Practices designed to reduce impacts to surface and sub-surface hydrologic resources within the overall analysis area. No additional mitigation is recommended.

4.6 RANGE MANAGEMENT

Actual construction of the individual well pads, access roads, pipelines, etc. would result in an overall reduction in livestock and wildlife forage and a subsequent reduction in the available animal unit months (AUMs) in each affected grazing allotment. For the purpose of assessing impacts to range resources, acres of disturbance were converted to a reduction in AUMs based upon an average of 7.2 acres/AUM for the overall project area (based upon the average AUMs in the Cyclone Rim allotment).

4.6.1 Proposed Action

The primary impact to range resources within the SLPA would be the initial loss of vegetation and vegetative (forage) production resulting from additional oil/gas exploration activity. As indicated in Section 2.2, routine activities associated with oil/gas exploration and development in the SLPA would result in approximate surface disturbances as follows:

- € 32.94 acres associated with the construction of 18 well locations;
- € 24.41 acres associated with access road construction and reconstruction;
- € 36.82 acres associated with installation of the gas/water gathering system; and
- € 11.88 acres associated with the installation of water retention pits at each individual well location.

Under these assumptions, the initial loss of approximately 106.05 (106) acres of vegetation would result in the short-term loss of 14.7 AUMs, which represents approximately 3.7% of the 400 average total AUMs (2,800 acres ÷ 7.2 average AUMs) available on surface lands within the SLPA. Reclamation of those areas not required for ongoing production and operations would place approximately 57.28 acres back into forage production within 1 to 2 years following the initial disturbance. Reclamation of these areas would result in a long term loss of 6.8 AUMs, which represents less than one percent of the total average AUMs available on surface lands within the SLPA. It should be noted that selection of a water discharge option other than the construction of 18 water evaporation (retention) would reduce the long-term (LOP) disturbance by approximately 11.88 acres, which would result in a concomitant decrease in the long-term AUMs lost from 6.8 to 5.1 as a result of project-related activities.

Selection of surface water disposal methods 2 or 3 (discharge into an unlined water retention pit with or without an overflow outlet) as defined in Section 2.2.9 could attract additional cattle to these discharge sites. Depending on the amount, duration, and specific location of the discharge, an estimated 100 to 200 head of cattle could drift from the GMCA south into the CRA across the unfenced boundary. This estimate is based on documented cattle observations at the two existing water retention pits (one fenced and one unfenced) within the SLPA during the 2003 and 2004 grazing seasons. Should the water retention pit option be selected for discharge, it is likely that additional cattle would be initially attracted to these sites. However, if these pits were properly fenced, the cattle would quickly learn that water at these sites was not available and would thus be

less likely to return. All three discharge options are likely to increase the number of cattle that would cross into the CRA from the GMCA; however, option #3 could exacerbate the current situation and create a long term range management problem that would require additional livestock control measures.

Additional impacts to the range resource within the SLPA would result from the invasion of newly disturbed areas by invasive non-native and/or noxious weed species. As indicated in Section 3.7, several species of invasive non-native weeds have become established on disturbed sites within the SLPA including halogeton (*Halogeton glomeratus*) and Russian thistle (*Salsola iberica*), with a possibility of invasion of disturbed areas within the SLPA by other non-native and noxious weed species. However, surface disturbances associated with the proposed SLPP would affect less than four percent of the combined surface acreage within the overall SLPA. As indicated above, selection of a water discharge option other than the installation of 18 water retention pits would reduce overall long-term (LOP) surface disturbance within the SLPA by approximately 11.2 percent, which would lessen the areas potentially subject to invasion by non-native and noxious weed species. Nonetheless, Hudson Group, Inc. intends to implement an aggressive weed management policy as indicated in Section 2.3.7 and Appendix C.

4.6.2 The No Action Alternative

Under the No Action Alternative there would be no further loss of vegetation with a concomitant reduction in available AUMs. Likewise, the invasion of disturbed areas by non-native species would be restricted to areas previously disturbed in conjunction with prior approvals.

4.6.3 Mitigation and Monitoring

Please refer to Section 2.3.7 for Applicant-Committed Practices designed to reduce impacts to the range resource within the overall analysis area. No additional mitigation is recommended.

4.7 SOILS

4.7.1 Proposed Action

Removal of native vegetation and disturbance of the underlying soil material as a result of surface disturbing activities associated with the Proposed Action would increase the potential for loss of the existing soil resource through erosion. This potential would increase proportionately as degree of slope increases. Overall, soils within the overall project area generally have an adequate amount of topsoil available to ensure satisfactory reclamation, assuming the use of proper techniques designed to control erosion and ensure revegetation of the reclaimed areas are utilized in the reclamation process and slopes throughout the project area are relatively gentle. Additional oil/gas exploration activity within the SLPA would result in the overall disturbance of approximately 106 acres of the soil resource, or less than four percent of the total surface estate included within the proposed project area.

Analyses conducted in conjunction with the Cave Gulch-Bullfrog-Waltman Natural Gas Development Project (BLM 1997) determined that implementation of BMP for reclamation and erosion control would result in a substantial reduction in erosion rates for surface disturbances associated with project activities (Grah 1997). While this was a project-specific analysis based upon information gathered in conjunction therewith, these calculations suggest that soil erosion resulting from additional CBNG exploration activity in the SLPA could be reduced to negligible levels with the application of BMP for reclamation and stabilization of disturbed soils as outlined in Section 2.3 and Appendix C. Site specific reclamation, erosion control, and revegetation recommendations would be developed on a site-specific basis in conjunction with the on-site inspections to be conducted on each individual well location (including access road and pipeline ROWs). These recommendations would be incorporated in the Conditions of Approval (COAs) appended to each APD. Subsequent construction and reclamation activities would be monitored and remedial action taken as necessary to ensure that all surface disturbances are properly reclaimed, erosion is minimized, and the disturbed areas revegetated.

4.7.2 The No Action Alternative

Under the No Action Alternative there would be no project-related disturbance of soils and soils would remain in their current state.

4.7.3 Mitigation and Monitoring

Please refer to Section 2.3.8, Applicant-Committed Practices, for measures designed to reduce impacts to soil resources within the overall analysis area. No additional mitigation is recommended.

4.8 VISUAL RESOURCES

Short-term visual impacts associated with implementation of the Proposed Action would include visual contrasts between the industrial character of the construction and drilling equipment and the somewhat natural surrounding landscape. In addition, potentially heavy volumes of sporadic truck traffic and the fugitive dust created as a result thereof, could produce negative visual impacts beyond the immediate project area. In this regard, both short-term and long-term impacts to the visual resource would be possible where patterns of line, form, color and texture in the existing characteristic landscape would be visually contrasted by drilling equipment and/or construction related disturbances to the existing topography or other readily visible site features. The severity of this impact would be dependent upon a number of factors including:

- ∅ the visual absorption capability of the surrounding landscape,
- ∅ distance from the most sensitive viewing area,
- ∅ reclamation potential of the landscape to be disturbed, and/or
- ∅ the level of disturbance to the visual resource to be created by the Proposed Action.

The duration of the impact would be a function of both the time required to complete the action and the time required for the disturbed site to return to a pre-disturbance condition. In general, the visual impact would be greatest on those sites where mitigation would be difficult and/or where the visual contrast would be highly visible to a potentially large number of viewers.

As indicated in Section 3.9, that portion of the project area north of Cyclone Rim falls under the jurisdiction of the Lander Field Office and is included in VRM Class IV. Under this VRM Class, changes may subordinate the original composition and character, but must reflect what could be a natural occurrence within the characteristic landscape. The majority of the project area south of Cyclone Rim falls within the jurisdiction of the Rawlins Field Office and is included in VRM Class III. Under this VRM class, changes in the basic environmental (topographic) elements caused by additional oil/gas exploration and development may be evident in the characteristic landscape; however, the changes should remain subordinate to the visual strength of the existing (land) character.

The following analysis of visual impacts will focus on a discussion of the visual landscape in terms of viewer proximity to intrusions related to additional oil/gas exploration and development from a foreground, middleground, and/or background perspective. For the purposes of this document, the terms *foreground*, *middleground* and *background* are defined as follows:

Foreground - Generally the area that lies within one-half mile of the viewer.

Middleground - The area between the foreground and background in a landscape. The area located from one-half mile to five miles from the viewer.

Background - The distant part of a landscape located from five miles to infinity from the viewer.

4.8.1 Proposed Action

The SLPA is located in a remote area of northeastern Sweetwater County far from established recreational areas, historic sites or other areas that would routinely attract visitors thereto. The distances from paved access to the SLPA are such that travel to/from the area would generally be restricted to periods of good weather by hardy individuals possessing vehicles suited to extended travel over dirt/gravel roads such as sport utility or other four-wheel drive (4WD) vehicles. The primary access route into the area would be via the Red Creek Road (BLM Road #3219). The westernmost boundary of the proposed pilot project is approximately one mile east of the Red Creek Road at its closest point thereto. Consequently, additional CBNG exploration activities within the SLPA would not affect the foreground perspective of viewers traveling along said road.

Depending upon the direction of travel on the Red Creek Road, surface disturbance and project-related facilities within the SLPA would primarily be visible from both a middleground and background perspective. Viewers traveling south on the Red Creek Road would view the SLPA primarily from a middleground perspective for a short time as they come over Cyclone Rim and were directly west of the project area. However, the viewer perspective traveling south from Cyclone Rim would be dominated in the background by a panoramic vista of the Great Divide Basin

including Bastard Butte. Viewers traveling north on the Red Creek Road would view the SLPA from both a background and middleground perspective depending upon their position on the road - with the perspective transitioning from background to middleground as the viewer moves closer to the SLPA area along the Red Creek Road. Again, the viewer perspective traveling north from Bastard Butte would be dominated by Cyclone Rim and the panoramic vistas associated therewith.

Short-term disturbances (construction, drilling and completion activities) associated with the proposed pilot project may well dominate the viewshed in the short-term. Removal of drilling/completion rigs and successful reclamation of the disturbed areas within the SLPA would reduce the long-term visual impact(s) of existing wells and would reduce the visual contrast (form and texture of the landscape) to a level that is subordinate to the visual strength of the existing, natural landscape. Moreover, mitigation measures recommended below would further minimize the visual impacts of oil/gas exploration activity to viewers from both the middleground and background perspective. As a consequence, the proposed Scotty Lake CBNG Pilot Project would not violate existing visual resource management direction for the area or produce contrasts beyond the degree allowed for in the stated VRM guidelines from either a foreground, middleground, or background perspective.

4.8.2 The No Action Alternative

Under the No Action Alternative there would be no project-related degradation of the viewshed resulting from the proposed action and visual contrasts in the area would remain as they are today.

4.8.3 Mitigation and Monitoring

While visual intrusions which would result from project activities are not inconsistent with the stated VRM management goals, the following mitigation measures are suggested in order to minimize the overall visual impact associated with additional CBNG exploration activity within the SLPA.

1. All permanent (on-site for six months or longer) above-ground structures constructed or installed on the individual well locations (including pumping units, tank batteries, etc.) should be painted a flat, non-reflective, earthtone color to match one of the standard environmental colors as determined by the Five State Rocky Mountain Interagency Committee.

Those facilities required to comply with *Occupational Health and Safety Act* (OSHA) rules and regulations would be excluded from this painting requirement.

4.9 WILDLIFE AND SPECIAL STATUS SPECIES

The overall project area provides habitat for many species of both game and non-game vertebrates, including antelope, elk mule deer, raptors, upland game birds, predators and furbearers. The principal impacts likely to be associated with additional CBNG exploration activity within the SLPA would include potential displacement of some wildlife species from preferred habitat and the potential loss of wildlife habitat as a result of project activities

Crucial habitat(s) for either big game or game bird species are not known to exist with the SLPA.

4.9.1 Proposed Action

Impacts on local wildlife populations would result from direct removal or alteration of habitat, increased human presence associated with additional CBNG exploration activity, and direct wildlife/human interaction. Activities associated with additional exploration and/or development activity within the SLPA would temporarily eliminate approximately 106 acres of wildlife habitat, consisting mostly of shrubs, grasses and forbs, until project reclamation occurs. This would result in a proportionate reduction in the amount of herbaceous and browse forage available to herbivorous species such as antelope and mule deer, as well as a reduction in nesting, feeding and security habitat for game birds (e.g., sage grouse) and those smaller vertebrate species that may inhabit the affected areas. These habitat losses can generally be classified as being either short-term or long-term in duration, with these terms defined below.

1. Short-term loss refers to disturbances that would be reclaimed immediately after exploration activities are completed.

Loss or alteration of habitats in grass-shrub meadows and/or on grassy slopes would be considered short-term and are expected to occur in conjunction with lease development.

2. Long-term loss would occur in areas that could not be returned to their original vegetative state within a reasonable period of time (3 to 5 years), such as producing well sites and access roads.

4.9.1.1 Habitat Loss and Displacement

Disturbances resulting from well pad, access road, and pipeline construction activity within the SLPA would result in the loss of smaller, less mobile species of wildlife, such as small mammals and reptiles until such time as reclamation has been accomplished. However, considering the relatively small geographic area of disturbance, the actual magnitude of this loss and any potential displacement of these species would be considered as minimal.

Rather than direct habitat loss, the greatest impact on wildlife populations would be from displacement of economically important wildlife species such as antelope, elk and mule deer from preferred habitats as a result of increased level(s) of human activity (including vehicular traffic) and associated noise. The extent of this displacement is difficult to predict when one considers that response to noise and human presence varies from species to species as well as among individuals of the same species. In some cases, wildlife species may habituate to noise and human presence after initial exposure, and begin to re-invade areas that were formerly avoided. It is commonly assumed that these effects are detrimental to individual species and numerous studies have examined the effects of human presence on big game species (Klein 1974; Irwin and Peek 1979; Ward and Cupal 1979; MacArthur *et al* 1982; Brekke 1985).

In addition to the avoidance response, an increased human presence intensifies the potential for wildlife-human interactions ranging from the harassment of wildlife to poaching and increased legal harvest. Likewise, increased traffic levels on existing access roads could increase the potential for wildlife-vehicle collisions. These collisions are most frequent where roads traverse areas commonly frequented by game species. Considering the relatively minimal road network to be constructed in association with additional CBNG exploration activity within the SLPA, the generally short duration of intensive field activities (i.e., construction, drilling, and completion operations), combined with the inconsequential amount of daily/weekly production traffic expected within the field, the potential for adverse wildlife-human interaction is considered to be minimal.

4.9.1.2 Big Game Species

The project area includes year-round habitat for several economically important game species including pronghorn antelope (*Antilocapra americana*), elk (*Cervus elaphus*), and mule deer (*Odocoileus hemionus*). While the project area includes year-round habitat for the above species, crucial habitat(s) for these species are not known to occur within the SLPA. Considering that no crucial wildlife habitat(s) will be affected by implementation of the Proposed Action, the potential for long-term displacement and/or individual losses (mortality) attributable to human activities within the SLPA are considered to be minimal. Since population numbers for both antelope and mule deer in their respective herd units (Red Desert, Steamboat and S. Wind River) are currently below objective levels as indicated in Table 3.6, implementation of the proposed SLPP should not cause a substantial increase in the current downward trend of these specific herds.

4.9.1.3 Greater Sage Grouse

As indicated in Section 3.10.2 there are no known leks within a two mile radius of the SLPA. The closest known leks to the project area would be the Bastard Butte lek located in Section 10, T25N, R97W (3.25 miles southwest of the southern project area boundary) and the Scotty Lake lek located in Section 17 (3.25 miles west/northwest of the western project area boundary). Both leks were active in 2003 (WGFD 2003b). Considering the distance of these leks from the exterior boundaries of the project area, it is questionable whether nesting is occurring within the SLPA, particularly considering that suitable patches of sagebrush with the appropriate height and density to support sage grouse nesting are rather discontinuous in nature throughout the overall project area. The relatively small percentage of total surface disturbance proposed within the 2,880 acre SLPA would suggest that the potential effects of the proposed pilot project upon sage grouse nesting will be minimal at best.

4.9.1.4 Raptor Species

As indicated in Section 3.10.3, five historic raptor nests are known to exist within or directly adjacent to the SLPA, with two of these five historic nests located within the 2,880 acre project area. These historic raptor nests were not active in either 2003 or 2004 (AEC 2004). It should be noted that the ferruginous hawk nest located in the NE¼ of Section 22 (FH26972201) is in close proximity to (within several hundred feet of) the proposed Scotty Lake #20 CBNG well. The subject nest was observed to be in very poor condition on June 23, 2004 (AEC 2004).

Raptors may utilize presently unoccupied nesting territories within the SLPA in future years. The implementation of seasonal timing restrictions (within a “buffer zone” around active nests) to avoid surface disturbing activities (including construction, drilling and completion operations) within a “buffer zone” around active nests should reduce impacts the nesting raptors within the overall project area (see Section 4.9.5). Currently, the BLM also attempts to relocate well pad facilities if they fall within a 1200’ distance of a ferruginous hawk nest and 825’ of any other raptor. The installation of additional infrastructure in conjunction with the proposed SLPP and the concomitant human activity associated therewith may prevent some raptors from utilizing potential nesting habitat during the life of the project.

4.9.1.5 Threatened and Endangered Species

€ **Bald eagle** (*Haliaeetus leucocephalus*) - Status: Threatened.

The SLPA does not contain suitable roosting/perching habitat, concentrated feeding areas (perennial streams), or other special (nesting) habitats which might result in increased eagle activity therein. While the general area may be opportunistically used by bald eagles in conjunction with wide-ranging foraging activities, these foraging activities would likely occur during times of the year when human activity within the project area is at seasonally low levels, which would minimize the potential impacts to eagles foraging in the area. Consequently, we would not expect any potentially significant impacts to occur to bald eagle populations as a result of activities associated with the proposed pilot project.

Determination: May affect, but not likely to adversely affect.

€ **Black-footed ferret** (*Mustela nigripes*) - Status: Endangered.

It is well documented that black-footed ferrets depend primarily upon prairie dogs (*Cynomys* spp.) for food and upon prairie dog burrows for shelter (Hillman and Clark 1980, Fagerstone 1987). Inventories within the SLPA conducted by AEC during the spring/summer of 2004 failed to identify any prairie dog colonies within the analysis area (AEC 2004). Considering the lack of both an available food source and suitable habitat for black-footed ferrets within the SLPA, impacts to this species are not anticipated.

Determination: No effect.

€ **Preble’s meadow jumping mouse** (*Zapus hudsonius preblei*) - Status: Threatened.

The SLPA is well outside of the limits of known habitat for the Preble’s Meadow jumping mouse. Considering that there are there are no perennial or intermittent streams with associated riparian habitats within the SLPA and the project area is not within the area of expected occurrence thereof, we do not expect any impacts to this species.

Determination: No effect.

€ **Ute ladies'-tresses** (*Spiranthes diluvialis*) - Status: Threatened.

As indicated in Section 3.10.3.1, the SLPA is outside of the expected area of occurrence for Ute ladies'-tresses. Considering the general lack of suitable habitat within the overall project area (seasonally moist soils and wet meadows associated with riparian habitats), we do not expect any impacts to this species.

Determination: No effect.

€ **Colorado River Species**

As indicated in Section 2.2.3.1, fresh water to be used in drilling operations would be obtained from existing water wells/produced water facilities within the SLPA which produce water from aquifers not connected to the Colorado, Green or Yampa River systems. As there will be no depletions to the Colorado River or its tributaries, impacts to the above-named species will not occur (see Section 3.10.4).

Determination: No effect.

€ **Black-tailed prairie dog** (*Cynomys ludovicianus*) - Status: Proposed for Listing.

As indicated above, there are no known prairie dog towns within the SLPA and the proposed project area is outside of the known range of the black-tailed prairie dog. Consequently, we do not anticipate any impacts to black-tailed prairie dogs as a result of project-related activities.

Determination: No effect.

4.9.1.6 Special Status Species

Mountain plover (*Charadrius montanus*) are considered to be a sensitive species and management decisions should consider impacts thereto. A review of the records maintained by the Wyoming Natural Diversity Database in April 2004 identified one recorded mountain plover sighting in Township 26 North, Ranges 97 and 98 West. Please refer to Section 3.10.4 for additional information in this regard.

There are areas within the SLPA which meet the habitat requirements for mountain plover breeding/nesting from a slope, aspect, vegetative height and density standpoint; however, patch size within the area is generally less than optimum and generally does not meet the 26-54 hectare polygon size believed to be the minimum requirement for brood rearing (Knopf 2004). Small patches of habitat may support nesting plovers if larger patches of suitable habitat are nearby; but, in general, the large contiguous habitats (open grasslands) preferred by mountain plover are lacking in the project area. Considering the relatively small amount of long-term surface disturbance within the SLPA, and the fact that existing plover habitat within the overall project area is relatively marginal, the potential impact to breeding/nesting mountain plovers would be slight.

4.9.1.7 Migratory and Non-Migratory Birds

Three of the species identified in Table 3.9 including ferruginous hawk, greater sage grouse, and mountain plover have been discussed elsewhere in Section 4.10 and will not be discussed further herein.

Surface disturbing activities associated with the Proposed Action would result in the initial disturbance of approximately 106 acres of shrub-steppe and shortgrass prairie habitat which would provide a source of food, security cover and nesting habitat for many of the species listed in Table 3.9. Approximately 54% of this disturbance would be reclaimed within five years of initial disturbance resulting in a long-term (LOP) loss of approximately 49 acres of habitat.

Considering the relatively small percentage of total surface disturbance proposed within the 2,880 acre project area, the actual magnitude of direct habitat loss and subsequent displacement would be minimal. The displacement of bird species to adjacent, undisturbed habitats, while difficult to predict, would be relatively short-term in nature given the overall duration of additional development activities associated with the Proposed Action.

4.9.2 The No Action Alternative

Under the No Action Alternative impacts to wildlife, raptor, and special status species populations in the area would continue at existing levels.

4.9.3 Mitigation and Monitoring

Please refer to Section 2.3.10 for a listing of Applicant-Committed Practices designed to minimize impacts to wildlife, raptor, and special status species populations within the SLPA. Additional mitigation is recommended as follows to minimize impacts to wildlife within the SLPA.

1. To protect important raptor nesting habitat, drilling and/or surface use will not be allowed within one-half (0.50) mile of occupied raptor nests during the period from February 1 to July 31.
2. If unusual maintenance is proposed within one-half (0.50) mile of an occupied nest between March 1 and June 15, the operator must contact the BLM Authorized Officer for prior approval of operations or maintenance which would be “unusual”. “Unusual” means extensive or significant operations, such as workover operations or other operations, which include loud noise or night-time activity. Emergency (safety) situations would not be restricted.
3. Casual use activities away from existing roads and facilities that are scheduled to occur between March 1 and mid-June should be coordinated with the BLM in order to minimize or avoid potential impacts to nesting raptors in the area. Casual uses include, but are not limited to, ground activities such as: (1) preliminary scouting of routes or sites, (2) land surveying and staking, and (3) cultural and wildlife surveys. Because casual use is generally not treated as a managed or permitted activity, there is a potential for causing impacts to nesting raptors.

4. The Operator would implement policies designed to control poaching and littering and would notify all employees (contract and company) that conviction of a major game violation could result in disciplinary action. Contractors would be informed that any intentional poaching or littering within the SLPA could result in dismissal.

Implementation of the following Best Management Practices (BMP) developed by Wyoming PIF (Nicholoff 2003) would reduce the impacts of surface disturbing activities within the SLPA on migratory and non-migratory bird species.

1. Relocate surface disturbing activities to avoid large sagebrush stands to the greatest extent possible in order to prevent habitat fragmentation within the shrub-steppe habitat type.
2. Where possible, restore or rehabilitate degraded and disturbed sites to native plant communities.
3. Maintain remaining biological soil crust communities by minimizing sources of soil disturbance such as off-road vehicle use.
4. In large disturbed areas, sagebrush and perennial grasses may need to be reseeded to shorten the recovery time and prevent dominance by non-native grasses and forbs.

4.10 WILD HORSE MANAGEMENT

As indicated in Section 3.11, the proposed SLPA falls within the Antelope Hills Horse Management Area (HMA) and is directly adjacent to both the Lost Creek and Great Divide Basin HMAs, which constitute a wild horse meta-population in this area of Wyoming. Horse populations in both the Antelope Hills and Great Divide Basin HMAs exceed the appropriate management level (AML) established for these areas, while populations within the Lost Creek HMA are within the established AML. The Lost Creek herd has been determined to carry a high percentage of genetic markers identified with the Spanish Mustang breed, while those horses in the Antelope Hills and Great Divide Basin HMAs have not been genetically tested as of this date.

4.10.1 Proposed Action

As discussed in Section 4.6.1, implementation of the Proposed Action would result in the loss of approximately 106 acres of short-term and 49 acres of long-term forage production which would affect grazing opportunities within the SLPA. However, considering the fact that the Antelope Hills HMA encompasses approximately 110,000 acres, the loss of 49 acres of long-term forage production is negligible by comparison. As indicated above, the wild horse population within the Antelope Hills HMA exceeds the upper end of the AML by a factor of two.

There has been some concern expressed about the possible commingling of horses from the three different HMAs, particularly considering that the Lost Creek horses are apparently descended from the horses (mustangs) originally brought to the new world by the Spanish Conquistadores. In this regard, fresh water discharged to the surface may represent an attractant to these horses which could, in turn, result in interbreeding between individual horses in these three herds. While horses in the Antelope Hills and Great Divide Basin herds have not been genetically tested, there is no reason to

believe that these horses are genetically different from the Lost Creek herd and that interbreeding has already occurred between these herds at some point or points in the past - particularly considering that there are no absolute physical barriers separating the horses in these three herds. These horses are considered by BLM to be a single meta-population, but have been divided into three sub-populations or HMAs solely for management purposes. So, while the discharged water may represent an attractant to horses in an otherwise dry landscape, this does not mean that interbreeding would occur where none has taken place in the past or that said interbreeding, if it did occur, would dilute the genetics of the Lost Creek herd. In this regard, it is worth noting that Osborne Spring is approximately four miles southwest of the SLPA and represents an unfenced natural source of perennial water that may already act as an attractant for horses in all three herds - particularly in drought years and in cases where an expanding population forces individuals to occupy new or non-traditional areas within the management area. Likewise, Picket Lake is approximately six miles northwest of the SLPA and also represents an unfenced perennial source of water in the area. There is seven miles of separation between Osborne Spring and Picket Lake and it is unreasonable to assume that horses would use one source of water to the exclusion of the other. Finally, it should be noted that the HMA boundaries are somewhat artificial and the horses may or may not respect these artificial boundaries. These populations are dynamic and it is likely that genetic testing of the Antelope Hills and Great Divide Basin herds will ultimately determine that all of these horse herds are inter-related as no physical obstacles occur within the overall area to preclude interbreeding. As a consequence, we do not anticipate any adverse impacts to wild horse populations in the area in general or a dilution of the unique genetic characteristics of the Lost Creek herd as a result of the Proposed Action..

4.10.2 The No Action Alternative

Under the No Action Alternative impacts to wild horse populations in the area would continue at existing levels.

4.10.3 Mitigation and Monitoring

No mitigation or monitoring is recommended.

4.11 CUMULATIVE IMPACTS

Pursuant to NEPA, the BLM must consider the cumulative impacts of the Proposed Action in conjunction with other ongoing oil/gas exploration and development activities within the general area. In addition, unrelated activities within the overall project area which might have an adverse impact upon existing natural resources in the area and, consequently, which would further contribute to the overall degradation of the human environment must be considered in the analysis of cumulative impacts as well. In this regard, the primary activity within the general area consists of past and present oil/gas exploration activity within the Picket Lake Unit as discussed in Section 3.5.2. Additional oil/gas exploration activity within the general area includes the following:

- ∄ Cabot Oil & Gas Corporation Osborne Spring Unit #32-14: SE¹/₄SW¹/₄ of Section 32, Township 26 North, Range 97 West. Drilled to 13,745 feet and completed in the Ericson Formation. Well is currently being placed on production.
- ∄ Davis Petroleum Corporation Picket Lake Federal #1-14: NW¹/₄SW¹/₄ of Section 14, Township 26 North, Range 87 West. Well proposed to 14,700 feet to test the productive potential of the Lewis Formation. The well was originally permitted in early 2001, was not drilled, and has been subsequently renewed on an annual basis since initial permit approval.

There are no other oil/gas exploration and/or development activities existing or proposed within a six mile radius of the SLPA.

Considering that the approving agencies (the WOGCC and BLM’s Lander and Rawlins Field Offices) have not received any proposals for additional resource development or major surface disturbing activity (e.g., mines, highways, and/or industrial sites) in or adjacent to the SLPA other than those referenced above, the Proposed Action represents the only reasonably foreseeable resource development in the overall project area.

For the purposes of this Environmental Assessment, an Area of Influence (AOI) has been defined for those resource components potentially affected by additional oil/gas exploration and development within the SLPA with the AOI adjusted for each specific resource. Table 4.1 provides a listing of each specific resource component discussed herein and the AOI as defined for each. Generally speaking, the AOI defined for most resource components consists of the project area as cumulative impacts to those resources would typically be confined to the area of impact. Certain notable exceptions exist for those resource components where impacts resulting from the proposed SLPP may migrate off-site or affect population dynamics in the case of wildlife.

Table 4.1

Area of Influence for Each Specific Resource Component

Resource Component	Area of influence
Air Quality	Great Divide Basin
Cultural Resources	Project Area
Geology and Minerals	Project Area + Buffer Including Above Wells
Hydrology - Surface	Watersheds
Hydrology - Subsurface	Scotty Lake Aquifer
Range Management	Grazing Allotments
Soils	Watersheds
Wildlife	Varies by Species - See Section 4.11.8
Wild Horses	Horse Management Area(s)

As indicated in Table 4.1, the AOI for Surface Hydrology and Soils has been defined by watersheds as discussed in Section 3.6.1 and in the Scotty Lake CBNG Pilot Project Water Management Plan (WMP). However, it should be noted that the WMP does not consider impacts to the West Alkali Creek watershed as no produced water will be discharged north of Cyclone Rim. Primary surface disturbance within the Red Creek watershed AOI includes the existing wells within the SLPA as discussed in Section 3.5.2, both the existing Cabot and proposed Davis wells discussed above, and the existing BLM roads in the area (including BLM Road numbers 3214, 3216, and 3219).

Disturbances associated with these three BLM roads will vary somewhat throughout the overall AOI. However, for the purposes of this document, we will assume that the long-term disturbance associated with each BLM road right-of-way is equal to forty feet. While this is an overstatement of currently existing disturbance for BLM roads 3214 and 3216, it is fairly accurate for BLM Road 3219. Routine maintenance of these roads and the frequency thereof will dictate long-term surface disturbance associated therewith as will use of BLM Road #3216 for access to the well proposed by Davis Petroleum Corporation. Consequently, we must assume that the road ROWs either have recently been bladed or will be bladed in the near future, which will result in a continuing level of disturbance to soils and subsequent plant growth thereon. Existing two-track trails within the CIAA are not being considered in this analysis as field inspections conducted on April 14 and again on June 23, 2004 indicated that area two-track trails are both stable and well vegetated. As these trails are not contributing to potential erosion and/or sedimentation and represent only a minor reduction in forage production within the CIAA they will not be considered herein.

Existing/proposed surface disturbance within the watershed AOI is quantified in Table 4.2 by disturbance type in each respective watershed. It should be noted that BLM Road #3216 follows Cyclone Rim, which generally represents the hydrologic boundary between Red Creek and West Alkali Creek and also represents the administrative boundary between the Lander and Rawlins Field Offices as mentioned previously. In this regard, both map and field inspections of existing surface disturbance within the SLPA suggests that most of the existing surface disturbance is situated on the south side of the hydrologic divide. For the purposes of this document, existing disturbance associated with BLM Road #3216 east/southeast of the Picket Lake Unit #3 will be allocated to the West Alkali Creek Drainage as well as surface disturbance associated with the existing Picket Lake Unit #3 well location and access road route.

Table 4.3 provides a summary of total surface disturbance by watershed including existing/proposed disturbance quantified in Table 4.2 and including additional surface disturbance associated with the Proposed Action.

4.11.2 Air Quality

The cumulative impact of emissions resulting from the implementation of the proposed 18 well Scotty Lake pilot project would be much the same as those discussed for similar oil and gas projects such as the Seminoe Road Coalbed Methane Pilot Project (BLM 2001), Lower Bush Creek Coal Bed Methane Exploratory Pilot Project (BLM 2003a), and Wind Dancer Natural Gas Development Project (BLM 2004c).

Table 4.2

Summary of Existing Surface Disturbance in the Area of Influence by Watershed

Name of Watershed	Facilities¹ (acres)	BLM Roads² (acres)	Collector Roads³ (acres)	Resource Roads⁴ (acres)	TOTAL (acres)
Red Creek	21.55	60.63	21.82	12.75	116.75
West Alkali Creek	1.00	6.89	00.00	0.45	8.34
Totals	22.55	67.52	21.82	13.20	125.09

- 1 Includes well pads (19.83 acres), existing compressor site (0.62 acres), and water retention pits (2.10 acres).
- 2 73,525' of road with a 40' total disturbed ROW width (66,025' in Red Creek and 7,500' in West Alkali Creek).
- 3 23,760' of road with a 40' total disturbed ROW width.
- 4 9,530' of road with a 40' total disturbed ROW width and 6,924' of road with a total disturbed ROW width of 28'.

Table 4.3

Summary of Total Surface Disturbance Anticipated in the SLPP Area of Influence by Watershed

Name of Watershed	Facilities (acres)	BLM Roads (acres)	Access Roads¹ (acres)	Pipelines² (acres)	TOTAL (acres)
Red Creek	53.92	60.63	54.02	24.67	193.24
West Alkali Creek	13.45	6.89	5.41	12.15	37.90
Totals	67.37	67.52	59.43	36.82	231.14

- 1 Includes existing collector and resource roads shown in Table 4.2 and proposed resource roads to be constructed in conjunction with the Proposed Action.
- 2 Includes both gas and water pipelines to be constructed in conjunction with the Proposed Action.

In depth air quality analyses have been conducted on three large-scale oil and gas exploration and development projects in southwest Wyoming including the Continental Divide/Wamsutter II Natural Gas Project EIS (BLM 1999a), Desolation Flats Natural Gas Field Development Project Final EIS (BLM 2004b), and the Pinedale Anticline Oil and Gas Exploration and Development Project EIS (BLM 1999b). Analyses contained in the Continental Divide/Wamsutter II air quality study found that both short and long term predicted pollutant concentrations would comply with applicable air quality standards (i.e., WAAQS and NAAQS) resulting from direct, indirect, and cumulative project emissions (including construction and operation). Likewise, analyses presented in the Pinedale Anticline air quality study found no significant impacts to near-field air quality standards at a predicted 40 acre well density (16 wells per section). Air quality analyses conducted in conjunction with the Desolation Flats EIS found no significant adverse impacts to air quality resulting from

either the Proposed Action (385 wells drilled with a 65% success rate) or from Alternative A (592 wells drilled with a 65% success rate). Clearly, the emissions from the 18 well pilot project would be inconsequential when compared to the level of development proposed in the Continental Divide, Desolation Flats and Pinedale Anticline projects and consequently would not violate applicable WAAQS and NAAQS air quality standards.

4.11.2 Cultural Resources

Both the surface and sub-surface mineral estate included within the AOI is in federal ownership. In this regard, the Class III cultural resource inventories that have been/would be conducted in conjunction with proposed surface disturbing activities therein would not only add to our knowledge of the distribution of such resources within the area but would serve to minimize if not prevent impacts to potentially eligible cultural sites. Because all known cultural resources would either be avoided or potential impacts thereto mitigated in accordance with BLM/SHPO recommendations, no adverse cumulative impacts would occur to cultural resources within the AOI.

4.11.3 Geology and Minerals

Existing, proposed and reasonably foreseeable future actions within the AIO would not add appreciably to the level of impact to geological and mineral resources therein. Development of oil and gas resources within the AIO would result in minor alterations to the existing topography with the bulk of these alterations occurring on surface/mineral estate owned by the United States of America and subject to BLM approval. Application of site-specific Conditions of Approval (COAs) at the time of permit approval would effectively mitigate these minor levels of topographic disturbance. Likewise, use of industry standard drilling procedures and application of BMPs would minimize potential impacts to the sub-surface mineral resources penetrated in conjunction with oil/gas exploration activity within the AOI.

4.11.4 Hydrology

4.11.4.1 Surface Hydrology

Additional oil/gas exploration and development activity within the SLPA would result in negligible impacts to surface waters and their applicable watersheds within the AOI. In this regard, Table 4.3 presents a summary of the cumulative surface disturbance which would be expected within each individual watershed and would include the surface disturbance associated with the construction and subsequent drilling of the 18 wells proposed in conjunction with the SLPP. Implementation of the Proposed Action would increase the cumulative surface disturbance in the Red Creek watershed by approximately 61 percent from 119.75 acres to 193.24 acres, with the cumulative surface disturbance equal to approximately 1.47 percent of the Red Creek watershed. Likewise, implementation of the Proposed Action would also increase the surface disturbance in the West Alkali Creek watershed by approximately 354 percent from 8.34 acres to 37.9 acres, with the cumulative surface disturbance equal to less than 1 percent (0.10%) of the West Alkali Creek watershed.

Surface disturbing activities associated with the Proposed Action would increase total surface disturbance in the 50,944 acre AOI by approximately 0.20 percent from 0.25 percent to 0.45 percent. An increase of less than 1 percent in overall surface disturbance within the AOI would be considered as a negligible impact upon the affected watersheds.

As there are no permanent sources of surface water within the SLPA or the AOI, we do not anticipate any cumulative impacts to surface waters or the surface hydrology of the AOI resulting from surface disturbing activities associated with the Proposed Action.

4.11.4.2 Sub-Surface Hydrology

Implementation of the Proposed Action would result in the removal of fresh water from the Fort Union Fm (Scotty Lake coals) at the rate of approximately 9,900 barrels of water per day (bwpd). As there are no known water wells within the AOI which are permitted to the Fort Union Fm (Scotty Lake coals) other than the existing CBNG wells referenced in Section 3.5.2, cumulative impacts to the sub-surface hydrology of the AOI will not occur. There are no other activities (either currently ongoing or proposed) within the AOI which would result in a cumulative impact to the ground water resources thereof.

4.11.5 Range Management

As indicated in Table 4.1, the Area of Influence (AOI) for the Range Management resource would consist of both the Cyclone Rim and Green Mountain Common grazing allotments. An analysis of cumulative impacts was conducted in conjunction with the Wind Dancer Natural Gas Development Project (BLM 2004c) which analyzed the cumulative impacts of oil/gas exploration and development activity within the Cyclone Rim grazing allotment. This analysis included the proposed Scotty Lake CBNG Pilot Project in the cumulative impact analysis and estimated that approximately 103 AUMs would be lost due to existing and reasonably foreseeable development therein, which amounted to 0.3 percent of the 40,661 total AUMs therein. This estimate is slightly inflated as approximately 30 acres of surface disturbance included within the proposed SLPP actually occurs within the Green Mountain Common allotment; however, this small error would only serve to reduce the impacts within the Cyclone Rim allotment proportionately and would be minor in comparison with the overall size of the Cyclone Rim allotment.

The Green Mountain Common allotment contains approximately 468,379 acres of public lands with a total of 47,729 AUMs. The cumulative disturbance of 37.90 acres in the reasonably foreseeable future would amount to a short-term loss of approximately 5.26 AUMs within the Green Mountain Common grazing allotment, or substantially less than one percent (0.01%) of the total AUMs available in said allotment.

Because non-native invasive and noxious plant species would be controlled by the Operator, it is unlikely that the Proposed Action would have any adverse cumulative impacts. However, any area(s) within the SLPA subjected to new surface disturbance would represent an opportunity for the establishment of these invasive non-native species.

4.11.6 Soils

As indicated in Section 4.6.1, surface disturbances associated with the Proposed Action would result in the short-term disturbance of approximately 106 acres of the soil resource within the SLPA, or approximately 3.7% of the overall project area. The addition of 125.09 acres of existing/proposed surface disturbance within the AOI would result in cumulative, short-term disturbance of 231.14 acres or less than one percent (0.45%) of the AOI as defined in Table 4.1.

Considering that oil/gas exploration activities within the SLPA, and directly under the control of Hudson Group, LLC, represents the primary surface disturbing activity within the overall AOI, quantification of these existing and proposed impacts will present a fairly accurate view of impacts to the soil resource within the Area of Influence. Addition of the 106.05 acres of surface disturbance attributable to the Proposed Action would increase the overall, short-term surface disturbance within the AOI by approximately 85 percent. However, implementation of BMP for reclamation and erosion control within the AOI would result in a commensurate reduction in overall erosion rates as discussed in Section 4.7.1. The successful reclamation of surface disturbance within the AOI combined with routine monitoring of reclamation success and implementation of remedial measures as necessary to correct any identified deficiencies would reduce the cumulative impacts to the soil resource to negligible levels.

4.11.7 Visual Resources

While implementation of the Proposed Action would increase the overall number of facilities within the viewshed, the cumulative impact of these facilities upon the landscape would remain consistent with the stated VRM designations for the overall project area.

4.11.8 Wildlife and Special Status Species

As indicated in Table 4.1, the Area of Influence (AOI) for wildlife will vary by species. Table 4.4 defines the AOI for those species to be discussed below, with these definitions based on previous analyses including the Wind Dancer Natural Gas Development Project EA (BLM 2004c).

Table 4.4

Areas of Influence for Analysis of Cumulative Impacts to Wildlife and Special Status Species

Species	Area of Influence	Rationale
Big Game (antelope, elk, and mule deer)	WGFD Herd Unit	Potential range of herd
Raptors	Project Area + 1 Mile Buffer	Current Nesting Stipulations
Sage Grouse	Project Area + 2 Mile Buffer	Current Lek Stipulations
Other Migratory Birds	Project Area + 1 Mile Buffer	Based on Raptor Stipulation

Surface disturbing activities within the AOI for the SLPP have already accounted for approximately 125.09 acres of short-term habitat loss (see Table 4.2). Implementation of the SLPP proposal and subsequent drilling of all 18 wells proposed in conjunction therewith would add an additional 106.05 acres of short-term habitat loss, resulting in a cumulative habitat loss of 231.14 acres of habitat as shown in Table 4.3. This total includes short-term disturbance associated with oil/gas exploration activity which has previously occurred within the overall project area (or is proposed to occur as in the case of the Davis well). These disturbed areas will be subjected to an indeterminate amount of reclamation in the near term resulting in an overall reduction in the amount of surface disturbance remaining over the long term (post reclamation disturbance) for the LOP. However, for the purposes of this analysis we will assume that this 231.14 acres of surface disturbance represents post reclamation (or long-term) disturbance.

4.11.8.1 Big Game Species

An analysis of cumulative impacts to big game species in the Great Divide Basin was conducted in conjunction with the Wind Dancer Natural Gas Development Project (BLM 2004c) which analyzed the cumulative impacts of oil/gas exploration and development activity within the Red Desert (antelope) and Steamboat (elk and mule deer) Herd Units. This analysis included the proposed Scotty Lake CBNG Pilot Project in the cumulative impact analysis and estimated that approximately 13,150 acres of wildlife habitat would be/have been lost to both existing and reasonably foreseeable oil/gas exploration and development activity within the Red Desert antelope herd unit (2.16 million acres). Likewise, approximately 11,150 acres of wildlife habitat would be/have been lost to both existing and reasonably foreseeable oil/gas exploration and development activity within the Steamboat elk and mule deer herd units (2.5 million acres) (BLM 2004c). Surface disturbances resulting from approval of the Proposed Action would affect less than one-tenth of one percent of the total acreage included in both herd units and would represent slightly less than one percent of the total surface disturbance predicted in the respective herd units.

While direct impacts resulting from the implementation of the SLPP would affect less than one percent of the total area included within the Red Desert and Steamboat Herd Units, the increase in human activity associated with both existing and proposed oil/gas exploration activity within the AOI has the potential to add a larger human “footprint” to an otherwise remote area, thereby increasing the indirect impact of human intrusion and associated disturbance to wildlife populations. Animals within the affected areas will be displaced into surrounding habitats, with this displacement occurring over an indeterminate area and for an indeterminate period of time. However, considering that there are no crucial habitats within the proposed SLPA, the cumulative impact of this additional human presence within these herd units is considered to be minimal.

As stated in Section 3.10.1, that portion of the SLPA lying north of BLM road #3216 is included in the South Wind River Herd Unit for mule deer. An additional 29.56 acres of habitat on the extreme southern edge of the South Wind River Mule Deer Herd Unit would be affected by activities associated with the Proposed Action, which represents substantially less than one percent (0.002%) of the total acreage included within the subject herd unit (1,229,793 acres). As indicated in Section 3.10.1, there are no crucial mule deer habitats known to exist within the overall SLPA. Large portions of the Wind River Herd Unit including hunt areas 91, 93, 94 and 95 have no existing or ongoing oil/gas activity therein, with limited activity occurring in hunt areas 92 and 160 consisting

mainly of old, existing fields. Considering the extremely small amount of additional disturbance proposed within the South Wind River Herd Unit to result from project related activities, no additional analyses will be undertaken as the cumulative impact of the Proposed Action on mule deer within said herd unit will be inconsequential, both from a direct (surface disturbance) and indirect (displacement) standpoint.

4.11.8.2 Greater Sage Grouse

There are no known leks within a two mile radius of the proposed SLPA. The closest leks to the actual SLPA boundary include both the Bastard Butte and Scotty Lake leks (see Section 3.10.2), which are approximately 3.25 miles southwest and 3.25 miles west/northwest respectively of the project area boundary. The AOI for sage grouse would encompass a two mile buffer zone surrounding the SLPA. Surface disturbance within the buffer zone surrounding the project area would be limited to pre-existing disturbance including the existing road network and reasonably foreseeable activity including the proposed Davis well - activities associated with the Proposed Action would not contribute to cumulative impacts to sage grouse nesting habitat within the AOI as defined in Table 4.4.

4.11.8.3 Raptors

Although historic raptor nests are known to occur within the AOI for the SLPP, inventories conducted in both 2003 and 2004 failed to identify any active raptor nesting within the project area. Mitigation measures suggested in Section 4.9.5, would serve to eliminate the cumulative impacts of additional CBNG exploration activity within the SLPA to these nesting territories by restricting surface disturbing activities within 0.5 miles of active nests during the period between February 1 and July 31 in any given year should an active nest be discovered. As stated in Section 4.9.1.4, BLM also attempts to relocate well pad facilities if they should fall within 1200 feet of a ferruginous hawk nest and 825 feet of any other raptor nest.

4.11.8.4 Migratory and Non-Migratory Birds

Direct impacts to migratory and non-migratory birds within the SLPA would include the cumulative loss of approximately 231.14 acres of habitat. Indirect losses would primarily involve the fragmentation of existing habitat within the 2,880 acre SLPA. As there are no reliable population data for migratory and/or non-migratory birds within the area, and considering that both direct and indirect impacts upon these bird populations are poorly understood, it would be difficult to accurately predict the cumulative impacts of the project thereon. The 106.05 acres of additional surface disturbance which would result from project implementation would increase cumulative surface disturbance within the SLPA by approximately 3.68 percent from 4.34 percent to 8.03 percent of the 2,880 acre project area. The impact of this 3.68 percent increase in cumulative surface disturbance to the migratory and non-migratory bird species identified in Table 3.9 would be negligible.

4.11.9 Wild Horse Management

The AOI for wild horses would be the Antelope Hills HMA, which encompasses approximately 110,000 acres in Fremont and Sweetwater counties. Cumulative impacts resulting from the loss of an additional 231.14 acres of forage production within the 110,000 acre HMA would account for less than one percent (0.21%) of available forage within the overall HMA, which is negligible in comparison to the total amount of forage available elsewhere within the HMA.

4.12 SHORT-TERM USE OF THE ENVIRONMENT VERSUS LONG-TERM PRODUCTIVITY

Short-term use of the environment during the life of the project would not detract from long-term productivity of the area. Even during the life of the project, only the small areas from which vegetation is removed would be unavailable for grazing and wildlife habitat. Once the project is completed and disturbed areas are reclaimed the same resources that were available prior to the project would be available once again, with the exception of the hydrocarbons that were extracted from the subsurface. While it may ultimately take up to 25 years to regenerate a mature, climax stand of shrubs (e.g., sagebrush) comparable to shrub populations present prior to project initiation, successful and ongoing reclamation of surface disturbance within the overall project area would introduce vegetative communities which would support wildlife and livestock grazing.

4.13 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The term “Irreversible Commitment of Resources” refers to the loss of future options which would result from additional exploration and development of those lands included within the SLPA and primarily applies to the resultant impacts upon:

- ∉ non-renewable resources such as minerals or cultural resources; or to
- ∉ processes or factors that are renewable only over long periods of time (e.g., soil productivity).

Likewise, the term “Irretrievable Commitment of Resources” refers to the loss of production, harvest, or use of natural resources. For example, some or all of the forage production from an area is irretrievably lost while the area serves as an oil/gas well pad. Although this forage production loss is irretrievable, the action is not irreversible and, if the land use changes though subsequent abandonment and reclamation of these facilities, forage production would resume.

4.13.1 Air Quality

No irreversible or irretrievable commitment of resources would occur to air quality. Short-term impacts to air quality resulting from additional CBNG exploration activity within the SLPA would be reversible. Similarly, these impacts would not be irretrievable since air quality is a transient characteristic subject to improvement through natural meteorological movements within the atmosphere.

4.13.2 Cultural Resources

Should cultural resource inventories fail to identify or inventory all sites and/or artifacts within the proposed area(s) of disturbance, there is a possibility that the cultural resource could be damaged or destroyed during subsequent construction activities. Such an impact would be both an irreversible and irretrievable commitment of the affected cultural resource. Likewise, the loss of contextual information that could have been retrieved from the undamaged cultural site would also be an irretrievable commitment of the cultural resource.

The loss of cultural properties as a result of vandalism or artifact collection would be both an irreversible and irretrievable commitment of the cultural resource as well.

4.13.3 Geology and Minerals

The removal natural gas from the Fort Union Fm would be both an irreversible and irretrievable commitment of resources. Once the hydrocarbons have been removed from the formation and put to other uses, the natural gas resource has been irreversibly and irretrievably lost.

4.13.4 Hydrology

No irreversible and only a minimal irretrievable commitment of resources would occur to the hydrologic environment of the project area. Water withdrawn from the Fort Union Fm in conjunction with CBNG operations in the SLPA would be discharged to the surface and would be irretrievably lost to the parent aquifer; however, the aquifer would be expected to naturally recharge over time so the loss to the aquifer would not be irreversible. Likewise, the water withdrawn from the Fort Union Fm would be potentially withheld from other uses (such as agricultural uses) and would be irretrievably lost to those uses that are not able to take advantage of the discharged water.

4.13.5 Range Management

The only potentially irreversible commitment of range resources would result from the direct mortality of individual plants resulting from surface disturbances associated with additional CBNG exploration activities, which would translate into a direct reduction of available forage for livestock, wild horse, and wildlife use. However, plants (both as populations and as communities) have the reproductive potential to renew themselves. Consequently, this loss of individual plants would be reversible in the long term as disturbed areas were reclaimed. Likewise, the interim loss of vegetative cover types and associated resources (AUMs) would represent a minor irretrievable commitment of resources. As above, this irretrievable commitment of resources (loss of forage) would persist until such time as the disturbed area(s) had been reclaimed and their original productivity restored.

4.13.6 Soils

Any loss of topsoil associated with surface disturbance resulting from additional CBNG exploration activities within the SLPA and the subsequent loss or reduction in soil productivity resulting there from would be considered as an irreversible commitment of the soil resource. However, this

commitment is expected to be quite small when one considers the relatively small amount of soil disturbance that would result from the Proposed Action. A minimal irretrievable commitment of the soil resource would result from the disturbance of previously productive soils in conjunction with surface disturbing activities such as road and well pad construction. This commitment of resources would last until final project abandonment and reclamation.

Soil disturbances associated with additional CBNG exploration activity within the SLPA could result in erosion and the subsequent discharge of sediments into ephemeral tributaries of both Red Creek and West Alkali Creek which would both an irreversible and irretrievable commitment of resources.

4.13.7 Visual Resources

Visual intrusions resulting from alterations to the natural landscape would represent an irretrievable commitment of resources. However, these visual intrusions on the landscape are not irreversible and would be eliminated upon final abandonment of project related facilities within the SLPA and subsequent reclamation of disturbed areas associated therewith.

4.13.8 Wildlife and Special Status Species

The only irreversible commitment of resources that could occur to wildlife populations within the SLPA would be the direct mortality of individual animals. Wildlife species have the reproductive capacity to renew themselves and thereby maintain their populations, given the overall availability of quality habitat within the general vicinity of the potential impact. Considering both the availability and diversity of wildlife habitat existing throughout the overall project area, no irreversible commitment of resources would be expected to wildlife populations in the affected area.

The loss of habitat use associated with project related activities resulting from displacement (alteration of behavioral patterns) due to human intrusion would be an irretrievable commitment of wildlife resources. However, with proper timing constraints in critical habitats, the magnitude of such a commitment would be small and the commitment would be reversible upon final project termination and reclamation.

4.13.9 Wild Horses

The irreversible and irretrievable commitment of resources that are defined above for Wildlife and Special Status Species (Section 4.13.8) would apply to wild horses as well.

4.14 RESIDUAL IMPACTS

The term “residual impacts” refers to those impacts remaining after all reasonable mitigation has been applied. The disturbance of approximately 106 acres of soil and related wildlife habitat resulting from construction associated with additional CBNG exploration activity within the SLPA would constitute a short-term impact, considering that approximately 54% of this initial disturbance (49 acres) would be reclaimed within two years following initial disturbance. The remaining 57 acres of initial surface disturbance would not be reclaimed until termination of the project and

would, therefore, represent a long-term (or residual) impact to the affected resources. This long-term impact to both the soil and related resources would also represent a residual loss of both domestic livestock, wild horse and wildlife forage, as well as associated wildlife habitat for a comparable period of time.

Construction of roads and drill pads, in conjunction with the installation of permanent production facilities on each individual well location would result in a long-term (or residual) impact to the visual resource of the area. Final abandonment of the project, plugging of each individual well, reclamation and revegetation of the remaining 57 acres of disturbed surface area and cessation of project related human intrusions into the area would effectively eliminate all of the above-referenced residual impacts associated with this project.