

CHAPTER 4.0 - ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

In accordance with 40 CFR 1502.16, this chapter of the FEIS includes a discussion of the potential environmental consequences of implementing the Proposed Action and the No Action Alternative. 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 may be beneficial or adverse, may be a primary result or secondary result of an action, and may be permanent or temporary in a long- or short-term duration. Impacts may vary in degree from a slightly discernible change to a total change in the environment. The significance of these impacts is determined using the criteria set forth by the CEQ (40 CFR 1508.27) and the professional judgment of the specialists doing the analyses. Impact significance may range from negligible to substantial and may be significant during mining but reduced to less than significant following reclamation. The context where impacts occur can be local, regional, and national.

4.2 TYPES OF IMPACTS

Direct and indirect impacts are the primary and secondary results, respectively, of the Proposed Action or No Action Alternative. In other words, direct impacts are caused by the action and occur at the same time and place. Indirect impacts from an action are later in time or farther removed in distance. An example of an indirect impact would be an increase in the demand for housing due to the direct impact of an increase in employment resulting from a project. The IAA for direct impacts for the majority of resources analyzed is the project area. Indirect IAAs for most resources include the project area and the adjoining Black Butte Mine. However, many resource analyses consider indirect impacts over a larger IAA, particularly where the mobility or interconnected nature of a resource makes the potential indirect impacts on the resource more widespread. The assessment areas identified in Chapter 3 include the IAAs for the anticipated direct, indirect, and cumulative impacts.

Residual impacts are impacts resulting from the Proposed Action after the application of mitigation measures (BLM 1988). These impacts would remain for some period of time, but would eventually subside or would be ameliorated by natural conditions and would not be permanent. For example, increased surface water erosion would eventually be reduced after disturbed soils are stabilized, native vegetation becomes re-established, and stream channels are stabilized. Residual impacts are different from irreversible and irretrievable impacts. Residual impacts would eventually subside and no longer result in adverse conditions, whereas irreversible and irretrievable impacts are permanent conditions that cannot be altered after they have occurred (e.g., extraction and use of federal coal from the project area).

Cumulative impacts result from the incremental impacts of an action added to other past, present, and reasonably foreseeable future actions, regardless of who is responsible for such actions. Cumulative impacts may result from individually minor, but collectively significant actions occurring over a period of time (40 CFR 1508.7). The boundaries of cumulative IAAs vary by the specific resource being analyzed. For example, the cumulative IAA for wild horses would include all project-specific, existing, and reasonably foreseeable future surface-disturbing activities on available forage in the Salt Wells HMA.

The relationship between the short-term use of the environment versus long-term productivity as it relates to the extraction of coal, and resource use sustainability are intertwined with direct and indirect effects. The mining of 34.6 million tons of coal from the project area would be a short-term use of the environment that would benefit the long-term productivity of the Black Butte Mine and the Coal Occurrence and Development Potential area (BLM 1997, Map 19) where the mine is located. WDEQ/LQD permitting of the project area would be required prior to the beginning of mining. This permitting is designed to protect the long-term productivity of resources after the cessation of mining.

Mining would alter many resources' ability to function naturally in the short term; however, the required topsoil salvaging and replacement, topographic recontouring, and revegetation would promote the following long-term resource effects:

- Soil productivity re-establishment;
- Native vegetation re-establishment;
- Wildlife rehabilitation;
- Livestock grazing and wild horses use;
- Groundwater resource recovery;
- Surface water and watershed function stabilization; and,
- Recreational use.

Function of these resources and resource uses would return to a condition approximating pre-mine conditions. To provide a clear context of the relationship between short-term use of the environment and long-term productivity, further discussions of these relationships are presented in pertinent resource direct and indirect impact analysis sections in this chapter.

Effects are quantified where possible, primarily by using GIS applications. In the absence of quantitative data, resource specialists use their best professional judgment. The effects are sometimes described using a range of the intensity in qualitative terms. The following standard definitions are used in the analyses:

- Negligible: The impact is at the lower level of detection; there would be no measurable change.
- Minor: The impact is slight but detectable; there would be a small change.
- Moderate: The impact is readily apparent; there would be a measurable change that could result in a small, but long-term to permanent change.
- Substantial: The impact is severe; there would be a highly noticeable, long-term to permanent change.

4.3 MITIGATION AND MONITORING MEASURES

All mining and reclamation operations would comply with SMCRA, Wyoming statutes, and BLM special lease stipulations. These regulations are designed to ensure that surface coal mining impacts are mitigated. This impact assessment considers all standing measures required by federal and state regulatory authorities as part of the Proposed Action and No Action Alternative. **Appendix J** presents a table summarizing existing federal and state mitigation and monitoring requirements inherent to the Proposed Action and No Action Alternative. After consideration of these requirements as well as those required in current Black Butte Mine permits and historic monitoring results in the mine's annual reports (BBCC 2005), the BLM has not identified additional special stipulations, mitigation, or monitoring measures for this project.

4.4 ANALYSIS ASSUMPTIONS AND GUIDELINES

This FEIS assumes that all applicant-committed measures, including federal and state mitigation and monitoring requirements, summarized in the Proposed Action and **Appendix J** would be successfully implemented. If such measures were not implemented, additional adverse impacts could occur.

Unless otherwise specified, "short term" is the period when the development of the mine and the mining of coal occurs and is anticipated to be 20 years. "Long term" is defined as those effects that would occur or remain after the cessation of coal mining and during the reclamation and monitoring period, also referred to as the bond release period. Long-term effects would occur for 20 to 40 years, beginning with the onset of mine development.

4.5 CUMULATIVE IMPACTS

The cumulative impact analysis evaluates the potential impacts associated with the alternatives, in combination with the potential impacts associated with other relevant activities that have occurred, are occurring, or may occur in the vicinity of the project area. Each resource analyzed has its own unique cumulative IAA with the exception of a few resources that share a common assessment area. Cumulative surface disturbance acreages vary by resource.

Projects with similar surface disturbing impacts to the Proposed Action are included in the applicable resource’s cumulative IAA and include mining activities at the Black Butte, Leucite Hills, and Bridger Coal Mines that were previously approved. Currently the total surface disturbance acreages within each mine’s permit boundary are Black Butte (6,743 acres), Leucite Hills (1,772 acres), and Bridger (6,532 acres). Cumulative analyses include consideration of other projects with surface disturbances as well as unrelated actions such as grazing management and incremental air quality changes. A list of known surface disturbance acreages for each resource assessment area has been previously presented in **Table 3.3**. **Table 4.1** presents reasonably foreseeable future actions and their attributes that would occur in some of the cumulative IAAs.

Table 4.1 Reasonably Foreseeable Future Actions

Project Name	Type of Disturbance	Acres Affected
Monell Enhanced Oil Recovery Project	126 wells	630
Creston/Blue Gap II Natural Gas Development Project ¹	1,000 well pads containing 1,250 wells	5,000
Hiawatha Regional Energy Project ²	4,208 wells (2,806 wells in RSFO)	14,030 (does not account for the existing infrastructure)
Black Butte Mine ³	Mine pits and roads	4,363
Bridger Coal Mine ³	Mine pits and roads	48
Evergreen Wind Energy Exploration ⁴	Exploratory monitoring stations	0.20
Salt Wells Basin Burn Block	Prescribed Fire	Up to 9,000
Vernal-Kanda Lateral Pipeline ⁵	Natural Gas Pipeline	502 ⁶
Overthrust-Wamsutter Expansion Project ⁷	Natural Gas Pipeline, 100-foot ROW, one compressor station	937.6 ⁶
Overland Pass Pipeline ⁸	Natural Gas Pipeline, 100-foot ROW, multiple compressor stations	1,341 ⁶
¹ Project is located within Rawlins Field Office area. ² Project area also extends into Little Snake Field Office area in Colorado. ³ Approved under the existing mine permit but not yet constructed or developed. ⁴ Potential wind energy exploration. The current proposal describes the location of two 0.1-acre monitoring stations. Development of future wind energy is pending the results of this monitoring data. ⁵ Enhancement of compression will be considered under the analysis associated with that project. ⁶ Acres developed based on linear feet within the largest IAA in which the action is proposed (action affects a larger are but falls outside the IAAs). Assumes a 100-foot right-of-way. ⁷ Route is located within the 3,500-foot-wide corridor identified in the West-Wide Energy Corridor Programmatic Draft EIS (under preparation). This pipeline also includes a possible addition of 15,000 horsepower natural gas driven compression station. Emissions from this station will be analyzed in the associated EIS and other on-going cumulative analyses (i.e., Hiawatha Regional Energy Project, Creston/Blue Gap). ⁸ Electrically powered compression stations will be associated with this pipeline. Effects will be considered under the analysis associated with that project.		

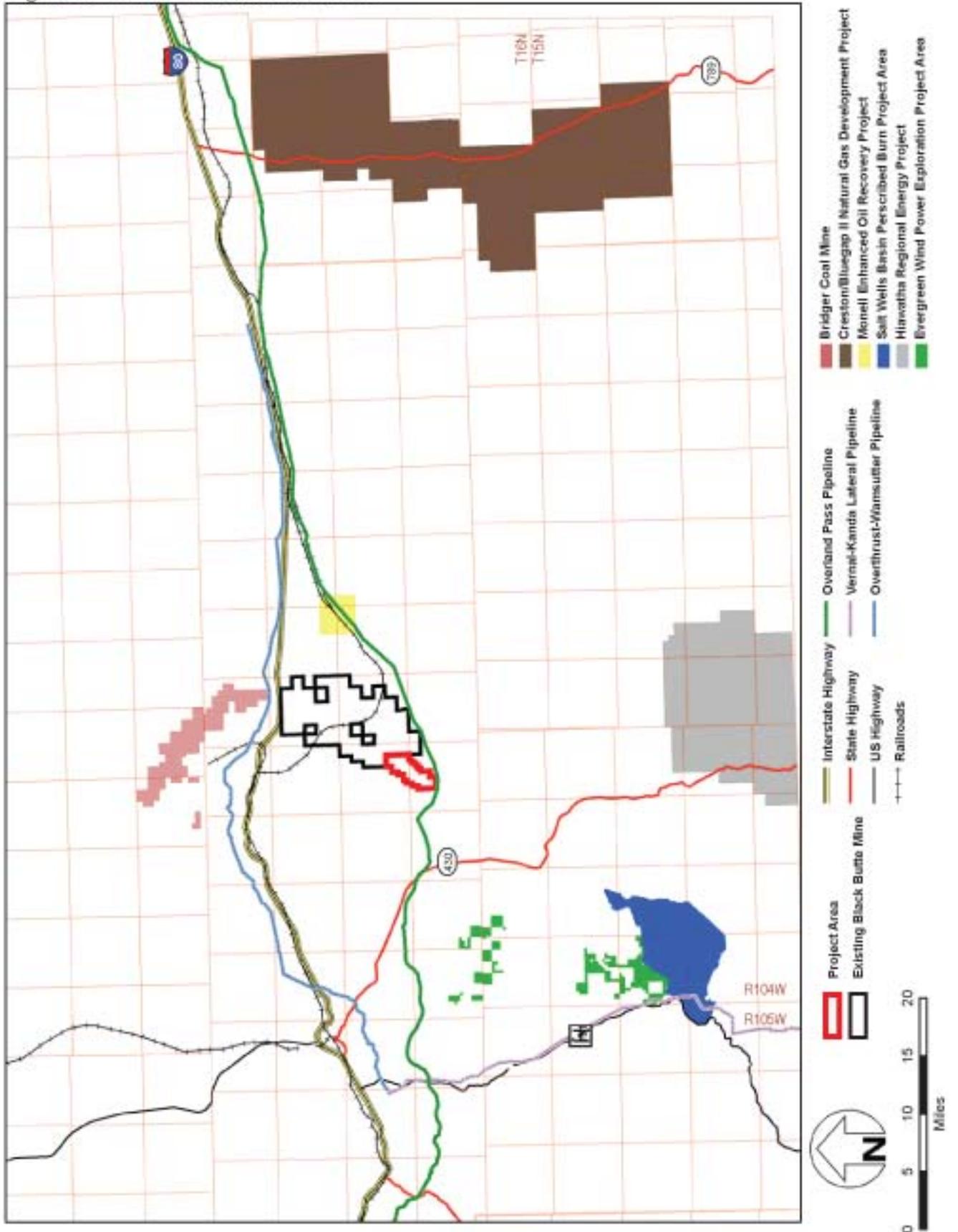
These proposed reasonably foreseeable future actions have, are, or will undergo separate NEPA and WDEQ analyses if applicable. **Table 4.2** presents an acreage summary by resource of known surface disturbances, surface disturbances associated with the Proposed Action, and the reasonably foreseeable future actions. A map showing the location of future reasonably foreseeable future actions is presented as **Figure 4.1**.

Table 4.2 Disturbance Levels for Existing Disturbance, Proposed Action, and Foreseeable Future Actions

Resource Value	IAA Size	Existing Disturbance		Proposed Action		Foreseeable Future Actions		Totals		Percent Increase ¹
		Acres	%	Acres	%	Acres	%	Acres	%	
Solid Leasable Minerals	277,120	21,931	7.91	2,250	0.81	4,703	1.70	28,884	10.42	31.71
Fluid Leasable Minerals	902,223	19,483	2.16	2,250	0.25	20,722	2.30	42,455	4.71	117.91
Soils	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Groundwater	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Surface Water	271,169	14,611	5.39	2,250	0.83	5,597	2.06	22,458	8.28	53.71
Vegetation (Including Special Status Plant Species and Invasive Species)	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Pronghorn	1,603,167	35,083	2.19	2,250	0.14	14,211	0.89	51,544	3.22	46.92
Mule Deer	1,134,282	14,108	1.24	2,250	0.20	27,696	2.44	44,054	3.88	212.26
Elk	1,453,728	18,574	1.28	2,250	0.15	8,680	0.60	29,504	2.03	58.84
Raptors	107,860	9,812	9.10	2,250	2.09	4,602	4.27	16,664	15.45	69.84
Special Status Animal Species	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Greater Sage Grouse	711,526	13,830	1.94	2,250	0.32	11,403	1.60	27,483	3.86	98.72
Fisheries	271,169	14,611	5.39	2,250	0.83	5,597	2.06	22,458	8.28	53.71
Wild Horses	1,170,717	21,014	1.79	2,250	0.19	27,725	2.37	50,989	4.36	142.64
Land Status and Prior Rights	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Livestock and Grazing	1,011,718	17,964	1.78	2,250	0.22	13,795	1.36	34,009	3.36	89.32
Recreation	1,572,997	18,329	1.17	2,250	0.14	18,604	1.18	39,183	2.49	113.77
Transportation and ROWs	4,359	3	0.07	2,250	51.62	0	0.00	2,253	51.69	75,000
Visual Resources	697,910	17,570	2.52	2,250	0.32	5,365	0.77	25,185	3.61	43.34
Cultural Resources	277,120	21,931	7.91	2,250	0.81	4,703	1.70	28,884	10.42	31.71

¹ Represents percent increase in surface disturbance if Proposed Action and foreseeable future actions are implemented

Figure 4.1 Future Foreseeable Actions



4.6 AIR QUALITY

4.6.1 Regulatory Framework

Air pollution impacts are limited by local, state, tribal, and federal air quality regulations and standards, and implementation plans established under the federal Clean Air Act (CAA) and the Clean Air Act amendments (CAAA) of 1990. As presented in Chapter 3, air pollution impacts in Wyoming are managed by WDEQ/AQD under the Wyoming Air Quality Standards and Regulations (WAQSR) and the EPA-approved state implementation plan. A fundamental requirement of both federal and state regulations is that ambient concentrations of specific criteria pollutants not exceed allowable levels, referred to as the National and Wyoming Ambient Air Quality Standards (NAAQS and WAAQS, respectively). The NAAQS and WAAQS are health-based criteria for the maximum acceptable concentrations of air pollutants at all locations to which the public has access. Selected ambient air standards were presented in **Table 3.5**.

The WDEQ/AQD administers a permitting program to assist the agency in managing the state's air resources. Under this program, anyone planning to construct, modify, or use a facility capable of emitting designated pollutants into the atmosphere must obtain an air quality permit. This requirement applies to coal mines.

In addition to the designations relative to attainment of the WAAQS and NAAQS, the CAA requires the EPA to place each airshed within the U.S. into one of three PSD area classifications. PSD Class I is the most restrictive air quality category. It was created by Congress to prevent further deterioration of air quality in national parks and wilderness areas of a given size which existed prior to 1977 or those additional areas which have since been designated Class I under federal regulations (40 CFR 52.21). All remaining areas outside of the designated Class I boundaries were designated Class II areas, which allow deterioration of air quality over that in existence in 1977, although still within the NAAQS. No Class III areas, which would allow air quality to degrade to the NAAQS, have been designated. The federal land managers have also identified certain federal assets with Class II status as "sensitive" Class II areas for which air quality and/or visibility are valued resources.

The federal CAA also provides specific visibility protection of mandatory federal Class I areas. Mandatory federal Class I areas were designated by Congress on August 7, 1977 and include wilderness areas greater than 5,000 acres in size and national parks greater than 6,000 acres in size. There are no mandatory federal Class I areas, tribal Class I areas, or sensitive Class II areas identified within 50 kilometers of the project area. Cumulative Impacts on air quality in the Bridger Wilderness have been identified as a concern for the Proposed Action. As shown in **Table 3.5**, the allowable incremental impacts for NO₂, PM₁₀, and SO₂ within PSD Class I areas are very limited.

All of southwest Wyoming outside of designated PSD Class I areas is designated as PSD Class II. Even though the development activities being considered in this FEIS would occur within areas designated PSD Class II, potential impacts are not allowed to cause incremental effects greater than the stringent Class I thresholds to occur inside any distant PSD Class I area.

Existing surface coal mining operations and those proposed for this project are not currently affected by the PSD regulations for two reasons. Surface coal mines are not on the EPA list of 28 major emitting facilities for PSD regulation, and point-source emissions from individual mines do not exceed the PSD emissions threshold. A new mine would be classified as a major source and subject to PSD review if potential emissions of any regulated pollutant equal or exceed 250 tons per year (tpy). Fugitive emissions are not included in the definition of potential emissions except for certain specified source types [40 CFR 52.21, (b)(1)(iii)]. Mining related fugitive emissions are exempt from the applicability determination. This NEPA analysis presents the modeled impacts for the proposed mine in terms of pollutant concentration.

Any comparisons with PSD increments do not constitute a regulatory PSD analysis. The modeling results for this project are presented strictly for informational purposes (**Appendix K**).

All sources being permitted within Wyoming must utilize best available control technology (BACT), not just sources subject to PSD review. During the NSR permitting process, a BACT analysis is performed for the proposed construction or modification. The BACT process evaluates possible control technologies for the proposed project on the basis of technical feasibility and economic reasonability. Decisions are made on a case-by-case basis of which technology to apply, and are mandated through the permit.

Major sources of air pollutants must obtain an operating permit from the WDEQ/AQD Operating Permit Program (also known as Title V). A "major source" is, generally, a facility that emits over 100 tpy of any criteria pollutant, 25 tpy of combined HAPs or 10 tpy of an individual HAP. The operating permit compiles all applicable air quality requirements for a facility and specifies compliance assurance in the form of testing, monitoring, reporting, and record keeping requirements. Currently, the Black Butte Mine does not have a Title V operating permit.

A new mine or a modification to an existing coal mine must be permitted by WDEQ/AQD under WAQSR Chapter 6, Section 2 and must demonstrate compliance with all applicable aspects of WAQSR.

When a company decides to construct a new surface coal mine or modify operations at an existing surface coal mine that would cause an increase in pollutant emissions, they must submit an application, which is reviewed by WDEQ/AQD NSR staff and the applicable WDEQ/AQD Field Office. A surface coal mining application would include the standard application, BACT measures that would be implemented, an inventory of point and fugitive sources in the area, and modeling analyses.

BACT must be used for all sources being permitted within Wyoming. WAQSR Chapter 6, Section 2(b) (v) lists BACT measures to be used (but not limited to) at large mining operations. An applicant uses these and other BACT measures in the development of their own PM₁₀ and NO₂ point and fugitive source inventories (see Chapter 2 for a discussion of mining BACT resource protection measures). During the application review WDEQ/AQD can also require further control measures through the BACT review process.

For the modeling analyses, an applicant must put together an emission inventory of PM₁₀ from their facility and surrounding sources. For PM₁₀ both point sources and fugitive dust emissions are quantified. The emissions are based on the facility's potential to emit in the highest production year. The applicant also examines the surrounding coal facilities and their previous air quality permits to determine the worst case emission year for those facilities, based on the potential to emit. Coal mines are also typically required to quantify NO₂ emissions from their facility. Dispersion modeling is required to demonstrate compliance with the ambient standard.

Long-term PM₁₀ modeling is conducted for the permit application to demonstrate compliance with the annual PM₁₀ standard. For both point and area sources, the Industrial Source Complex Model-Long-Term version three (ISCLT3) is used. Short-term PM₁₀ modeling is not required by WDEQ/AQD, nor does WDEQ/AQD consider it to be an accurate representation of short-term impacts. The CAAA (Section 234) mandates the administrator of the EPA to analyze the accuracy of short-term modeling in regard to fugitive particulate emissions from surface coal mines. A June 26, 1996 letter from EPA Region VIII to Wyoming State representatives detailed the results of a study where the short-term model failed to meet evaluation criteria and tended to over predict 24-hour impacts of surface coal mines. The memorandum of agreement of January 24, 1994 between EPA Region VIII and the State of Wyoming allows WDEQ/AQD to conduct monitoring in lieu of short-term modeling for assessing coal mining-related impacts. This regulatory procedure remains in place and in effect. Ambient particulate monitoring is required of each coal mine through conditions of their respective permits.

The application is reviewed by WDEQ/AQD to determine compliance with all applicable air quality standards and regulations. This includes review of compliance with emission limitations, review of compliance with ambient standards through modeling analyses, and establishment of control measures to meet BACT requirements. The WDEQ/AQD proposed permit conditions are placed on public notice for a 30-day review period after which a final decision on the permit is made.

4.6.2 Analysis Assumptions and Assessment Areas

An air quality impact assessment strategy was developed for quantifying potential air quality impacts from the Proposed Action and other development in the region. The criteria for evaluating the significance of potential air quality impacts were also addressed. The strategy was prepared with input and review from the State of Wyoming, EPA Region VIII, Forest Service, National Park Service and industry representatives, thereby ensuring that the assessment methodology was acceptable to federal land managers.

Potential impacts were analyzed for mining of up to seven million tons of coal per year (the maximum currently permitted coal production volume at Black Butte Mine). Two potential scenarios were examined: extension of the Black Butte Coal mining area in the project area (the Proposed Action), and no extension of mining activities (the No Action Alternative).

To demonstrate that mining operations would comply with all applicable aspects of the WAQSR, an air quality modeling analyses was conducted using the most recent mine plan data for planned and potential future mining activity at the Black Butte Mine as would be required by WDEQ/AQD for permitting.

The following assumptions were utilized in developing the model and assessing the direct, indirect, and cumulative impacts of the two alternatives:

Under the No Action Alternative, coal mining would continue at the Black Butte mine at current levels but would decrease as coal reserves were depleted.

Under the Proposed Action, the maximum permitted coal production level (seven million tons per year) was modeled to conservatively estimate the maximum emissions that could be potentially produced due to mining activities at the current Black Butte Mine and at the LBA tract. Because mining the LBA tract could not realistically result in coal production at the maximum permitted level, both reasonably foreseeable mining activities at the existing Black Butte Mine and mining at the LBA tract were modeled together with total production at the maximum permitted level (although the mine has never produced coal at that rate and does not foresee doing so).

The direct effects of the Proposed Action are assumed to be primarily PM₁₀ and NO₂ emissions. Impacts on air quality due to PM₁₀ and NO₂ emissions were assessed quantitatively using the ISC3LT model.

PM₁₀ and NO₂ emissions were modeled using the current mine plan and proposed mining activities. An emissions inventory was completed for both point and area sources at the mine. The year with maximum emissions was modeled for ambient impacts. Modeling was conducted by IML Air Science in Sheridan, Wyoming. A more detailed discussion of modeling assumptions, protocols, and outputs developed by IML is presented in **Appendix K**.

Emission factors used to estimate emissions from various sources were derived from EPA AP-42 and Wyoming DEQ/AQD. Meteorological data utilized in the model were collected at the Black Butte Mine between January 1, 2002 and December 31, 2004. Near-field modeling using ISC3LT utilized a rectangular receptor grid extending at least 10 kilometers in all directions from the project area, with a fine receptor grid (500-meter receptor spacing) extending five kilometers from the project area. Model outputs include top 10 receptor concentrations of annual average PM₁₀ and NO₂ in the maximum

emissions year and isopleth maps (contour lines of constant concentration) showing the extent and magnitude of near-field PM₁₀ and NO₂ concentrations.

To assess direct near-field impacts, modeled PM₁₀ concentrations were combined with mean annual ambient concentrations reported at the mine to evaluate impacts and compliance with annual WAAQS/NAAQS and PSD increments. Note that current ambient concentrations reported at the mine include impacts from current mining activity. Therefore, combining the model results with current monitoring data likely overestimates potential concentrations. When compared to annual WAAQS/NAAQS and PSD increments, the estimate of potential impacts is very conservative. Modeled NO₂ concentrations were combined with mean annual ambient concentrations reported for the region (BLM 2004b). The emissions inventory developed for PM₁₀ and NO₂ was compared to the NSR permit and 1999 NEI emissions inventories discussed in Chapter 3, and changes in emissions were evaluated as compared to current levels.

The indirect impacts of the Proposed Action include SO₂, mercury, and CO₂ emissions, as well as potential impacts on regional visibility, and atmospheric deposition. These impacts are assumed to be primarily far-field impacts associated with coal combustion and electrical power generation at the nearby Jim Bridger Power Plant.

The far-field impacts on air quality due to the Proposed Action, as well as the cumulative impact assessment, were assumed to be within the range of impacts identified and evaluated in the regional air quality modeling performed for the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006). The cumulative IAA includes a 50-kilometer area around the project area, as well as more distant areas identified as a potential concern (Bridger Wilderness Area). Air quality resource protection measures, as presented in Chapter 2, would be implemented under both the No Action and Proposed Action Alternatives.

If potential impacts are estimated to be insignificant, then actual impacts are likely to be acceptable. If potential impacts are estimated to be significant, then actual impacts may not be acceptable. In this case, BLM would notify the jurisdictional agency(ies) of the potential impact, and may estimate the effect of various mitigation measures on the identified significant impacts. Potential impacts may be considered significant if:

- Potential total near-field concentrations are greater than WAAQS or NAAQS;
- Potential total near-field concentrations are greater than PSD Class II increments;
- Potential cumulative far-field concentrations in Parks and Wilderness Areas in the region are greater than PSD Class I increments;
- Potential decrease in visibility in Parks and Wilderness Areas in the regions are anticipated to be greater than BLM applicable thresholds (change in visibility of one deciview (dv));
- Potential decrease in ANC in sensitive lakes in the region are anticipated to be greater than levels of acceptable change (LAC); or
- Potential increases in total deposition from the Proposed Action are anticipated to be greater than the established “green line” levels (acceptable level of total deposition).

4.6.3 Air Quality Impact Summary

4.6.3.1 Concentrations

Potential concentrations under both alternatives would be in compliance with applicable WAAQS and NAAQS (**Tables 4.4** and **4.5**). The maximum PM₁₀ concentration calculated in the model exceeds the PSD Class II increment (**Table 4.4**); therefore, impacts on air quality may be significant. The model

results, however, suggest that it would be unlikely that mining activities associated with the Proposed Action would have a significant impact on air quality beyond the project area boundary.

4.6.3.2 Visibility

Potential cumulative far-field impacts on visibility under both alternatives are anticipated to be greater than the BLM 1.0 dv threshold in the Class I Bridger Wilderness Area, but less than the threshold in the other Class I and sensitive Class II areas considered for this project (i.e., Yellowstone and Teton National Parks and Popo Agie and Fitzpatrick Wilderness Areas) (**Table 4.6**).

4.6.3.3 Atmospheric Deposition

Potential cumulative far-field atmospheric deposition and ANC impacts are anticipated to be less than deposition levels-of-concern and lake chemistry levels-of-acceptable-change under both alternatives (**Tables 4.7 and 4.8**).

4.6.4 Direct and Indirect Impacts of the Proposed Action

Direct impacts of the Proposed Action include near-field changes in PM₁₀ and NO₂ concentrations due to surface coal mining activities in the project area. An estimated annual emissions inventory of potential project emissions was developed to model pollutant dispersion in the project area in association with projected activity at the existing Black Butte Mine. Mine activity (both from ongoing mining activities and the Proposed Action) and the resulting emissions were determined to be highest during the year 2010. Estimated 2010 PM₁₀ and NO₂ emissions at the Black Butte Mine are presented in **Table 4.3**. Additional details of the Proposed Action and existing mine emissions inventory, as well as the model results, are presented in **Appendix K**.

4.6.4.1 Concentrations

The emissions inventory developed for 2010 (maximum emission year) was used to model pollutant dispersion in the project area and at Black Butte Mine.

Figures 4.2 and 4.3 present isopleth maps of average annual PM₁₀ and NO₂ concentrations, respectively, in the project area and at Black Butte Mine. These maps are based on the combined impacts of existing mining activity at the Black Butte Mine and the Proposed Action. The isopleth concentrations do not account for background concentrations or for impacts from other regional emissions sources.

Estimated maximum PM₁₀ and NO₂ on and within approximately 10 kilometers of the project area and Black Butte Mine (near-field) are included in **Table 4.4**. Estimated cumulative maximum PM₁₀, PM_{2.5}, NO₂, and SO₂ concentrations at the Bridger Wilderness Class I areas (far-field) as analyzed in the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006) are presented in **Table 4.5**.

The maximum project-specific near-field ambient PM₁₀ concentration was 25.37 µg/m³ and the maximum total near-field (project plus background) concentration was 48.29 µg/m³ (**Table 4.4**). These concentrations would be located in an area where the public would not have access. As presented in **Figure 4.2**, PM₁₀ concentrations greater than 0.5 µg/m³ would not extend more than a few kilometers from the project area.

The maximum project-specific near-field ambient NO₂ concentration was 12.86 µg/m³ and the maximum total near-field (project plus background) concentration was 16.86 µg/m³ (**Table 4.5**). These concentrations also would be in an area where the public would not have access. As presented in **Figure**

4.3, NO₂ concentrations greater than 0.1 µg/m³ would not extend more than a few kilometers from the project area.

Table 4.3 Total Estimated Maximum Black Butte Mine 2010 Annual Emissions

Area or Point Source Name	PM ₁₀ Emissions (TPY)	NO ₂ Emissions (tons per year)
Primary Crusher	1.53	--
Secondary Crusher	4.73	--
Train Loadout	29.4	--
Belt Transfer	12.06	--
Pit 8 Truck Dump	12.24	--
Main Stockpile	43.55	8.51
Pit 10 Haul Road	32.5	3.48
Pit 10 Production	4.19	0.19
Pit 11 Haul Road	62.5	4.23
Pit 11 Production	88.06	75.55
Pit 14 Haul Road	68.09	5.33
Pit 14 Production	88.31	46.35
Pit 3 Reclamation	6.58	4.24
Pit 8 Reclamation	1.14	0.74
Pit 8 Stockpile	42.34	0.53
Service Road	51.73	0.06
Access Road	--	0.06
Disturbed Acres	525.98	--
TOTAL	1,074.94	149.26

The far-field (and cumulative) effects of this project were not specifically analyzed; however, this proposed project is within the analysis domain of the Jonah Infill Drilling Project, and it is assumed that potential emissions impacts from this project are adequately included in the detailed analyses performed for the Jonah Infill Drilling Project (BLM 2006, TRC Environmental Corporation 2006).

While the Jonah project primarily assessed impacts of proposed natural gas drilling, it also included regional source scenarios (including existing and reasonably foreseeable developments) to evaluate cumulative impacts. Furthermore, the results of the Jonah Infill Drilling Project cumulative impact modeling and assessment address the far-field sensitive receptors and areas-of-concern identified for this Proposed Action. The results of the Jonah Infill Drilling Project impact analysis at selected far-field locations are provided herein as an assessment of the far-field cumulative impacts from this project.

Potential project near-field annual concentrations of criteria pollutants are in compliance with WAAQS and NAAQS. The maximum PM₁₀ concentration calculated in the model exceeds the Class II increment of 17 µg/m³. This suggests that a significant impact on air quality is possible due to the Proposed Action; however, as noted above, the model results indicate that it would be extremely unlikely that mining activities associated with the Proposed Action would have a substantial impact on air quality beyond the project area boundary.

Figure 4.2 Black Butte Mine Projected Average PM₁₀ Dispersion

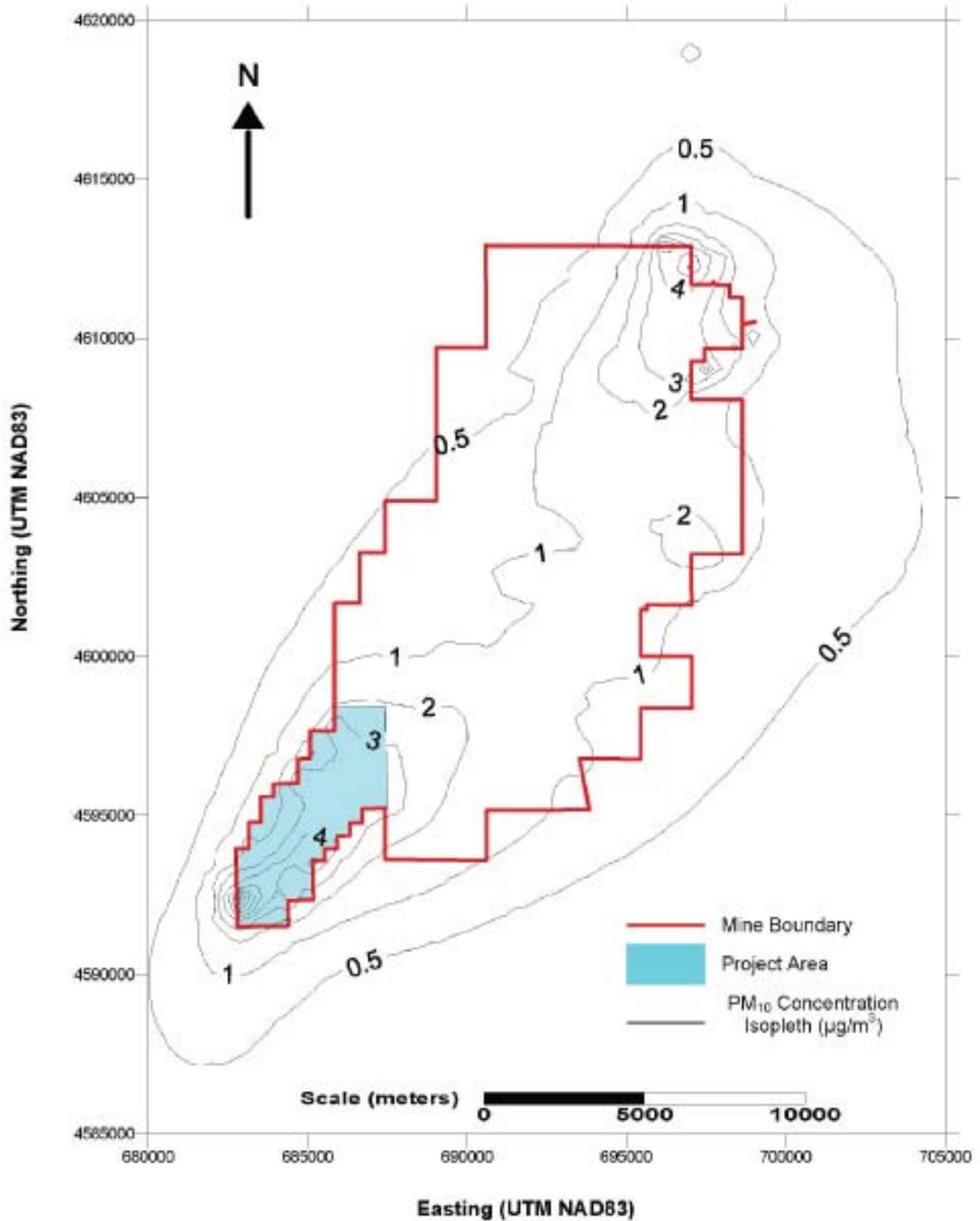


Figure 4.3 Black Butte Mine Projected Average NO₂ Dispersion

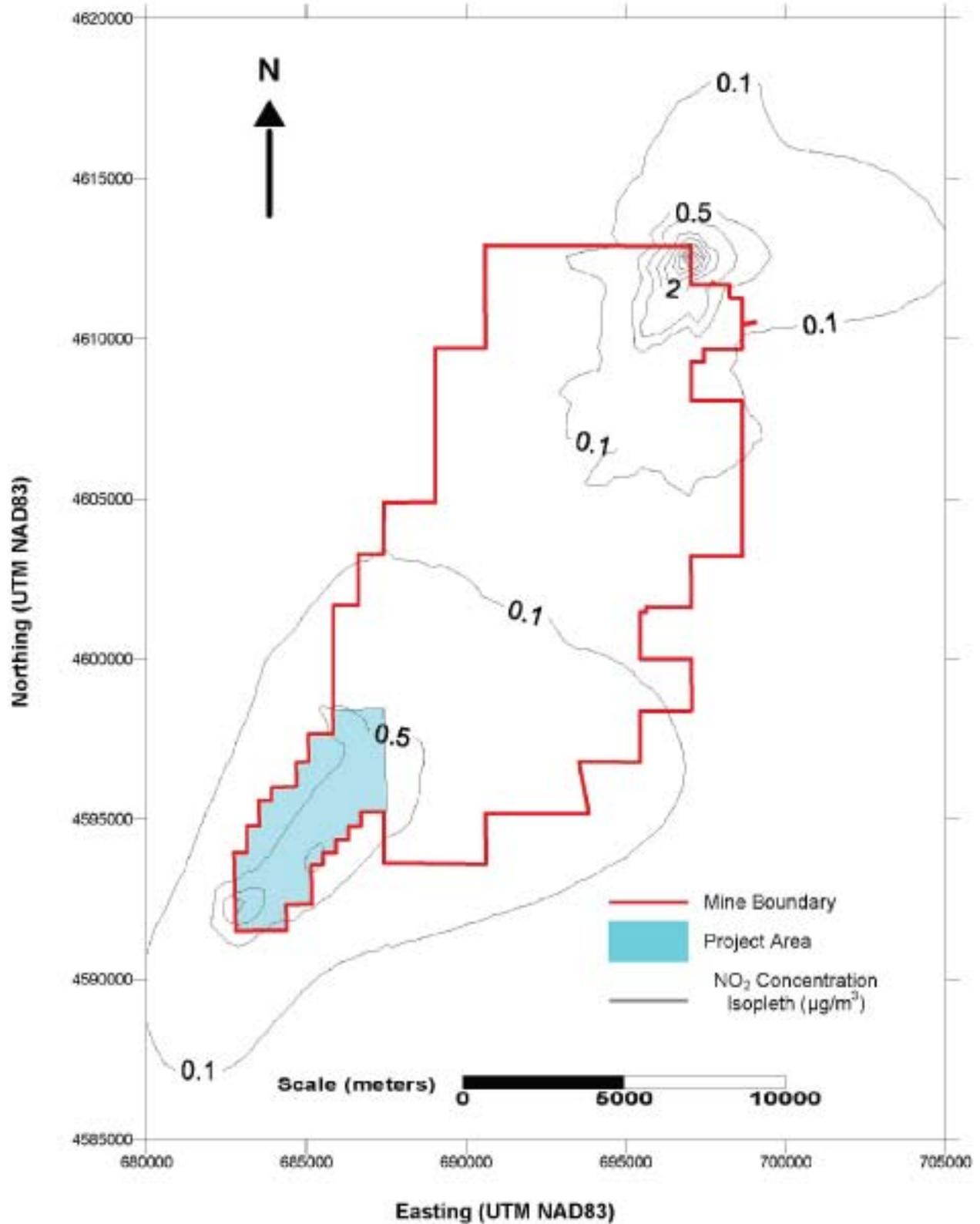


Table 4.4 Potential Near-Field Concentrations

Pollutant	Maximum Calculated Concentration (µg/m ³)	Monitored Background (µg/m ³)	Maximum Calculated + Monitored Background	NAAQS/WAAQS Annual (µg/m ³)	Class II PSD Increment (µg/m ³)
NO ₂ ¹	12.86	4	16.86	100	25
PM ₁₀ ²	25.37	22.9	48.29	50	17
¹ Mean NO _x – Green River Visibility Study, period of record 1996-1999 (BLM 2004b)					
² Mean PM ₁₀ - Black Butte Mine, Site PM ₁₀ 868-TEOM, from 2000 to 2004 (IML 2000-2004)					

It should be noted that the monitored background concentrations presented in **Table 4.4** include impacts from existing mining activity at the Black Butte Mine. Since the maximum modeled impacts also include existing activity at Black Butte, a portion of these impacts have been counted twice but still result in estimated pollutant concentrations below WAAQS/NAAQS. This provides an additional degree of conservatism.

Potential cumulative far-field concentrations of criteria pollutants (**Table 4.5**) are in compliance with WAAQS and NAAQS, as analyzed in the Jonah Infill Drilling Project DEIS for the PSD Class I Bridger Wilderness Area (BLM 2006, TRC Environmental Corporation 2006).

The indirect impacts of the Proposed Action may include changes in SO₂, mercury, and CO₂ emissions from coal combustion at the nearby Jim Bridger Power Plant. The Proposed Action is not likely to impact emission of these pollutants from Jim Bridger Power Plant due to numerous coal sources utilized by the power plant (if production at one facility decreases, other facilities would provide additional coal to meet the power plants needs). Changes in emission levels from the power plant are more likely to occur in response to changes in emissions regulations, such as the recent Clean Air Mercury Rule and Section 112 of the CAA or the installation of emission control devices at the facility, such as low NO_x burners.

Table 4.5 Estimated Potential Far-Field, Cumulative Concentrations at Bridger Wilderness

Pollutant	Averaging Time	Maximum Concentration (µg/m ³)	WAAQS (µg/m3)	NAAQS (µg/m3)
NO ₂	Annual	3.52 - 3.64	100	100
PM ₁₀	24 hour	33.79 - 34.82	150	150
	Annual	16.04 - 16.08	50	50
PM _{2.5}	24 hour	13.43 - 14.82	65	65
	Annual	5.02 - 5.08	15	15
SO ₂	3 hour	132.16 - 132.26	1,300	1,300
	24 hour	43.04 - 43.08	260	365
	Annual	9.00	60	80
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.				

4.6.4.2 Visibility

Direct impacts of the Proposed Action on near-field visibility were not explicitly modeled. While visible dust and/or smoke plumes may periodically affect local visibility and views, model results for both PM₁₀ and NO₂ dispersion (relatively low ambient pollutant concentrations) suggest that significant long-term impacts on local visibility beyond the project area due to the Proposed Action are unlikely (**Figures 4.2 and 4.3**). In addition, resource protection measures presented in Chapter 2 would mitigate potential short-term impacts on visibility resulting from the Proposed Action.

Potential project far-field cumulative visibility impacts, as presented in **Table 4.6**, are less than the BLM visibility thresholds in all sensitive areas except Bridger Wilderness, as analyzed for the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006). Visibility can be expressed in terms of Δv , a measure for describing perceived changes in visibility. One Δv is defined as a change in visibility that is just perceptible to an average person.

Far-field impacts on visibility are more closely associated with the indirect impacts of the Proposed Action (coal combustion) and are anticipated to remain at current levels regardless of activity in the project area.

Table 4.6 Potential Project Far-Field, Cumulative Visibility Impacts under the Proposed Action (FLAG background data)

Sensitive Area	Number of days with $\Delta v > 1.0$	Maximum Δv
National Park Service		
Yellowstone National Park	0	0.15 - 0.25
Grand Teton National Park	0	0.33 - 0.49
Forest Service		
Bridger Wilderness	3 - 11	1.69 - 3.65
Fitzpatrick Wilderness	0	0.42 - 0.76
Popo Agie Wilderness	0	0.49 - 0.85
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.		

4.6.4.3 Atmospheric Deposition

Direct impacts of the Proposed Action on near-field atmospheric deposition were not modeled. No areas sensitive to atmospheric deposition were identified in the project area or in the near-field assessment area.

Potential direct and indirect far-field cumulative atmospheric deposition impacts on sensitive lake ANC (**Table 4.7**) are less than the level of acceptable change at all sensitive lakes, as analyzed for the Jonah Infill Drilling Project DEIS (BLM 2006, TRC Environmental Corporation 2006).

Table 4.7 Potential Project Far-Field Cumulative Aquatic Atmospheric Deposition Impacts under the Proposed Action

Lake	Existing ANC ($\mu\text{eq/L}$)	Level of Acceptable Change ($\mu\text{eq/L}$)	Potential ANC Decrease ($\mu\text{eq/L}$)	Percentage ANC Change (%)
Bridger Wilderness				
Black Joe	67.0	6.7	0.085-0.185	0.127-0.276
Deep	59.9	6.0	0.087-0.196	0.144-0.327
Hobbs	69.9	7.0	0.042-0.062	0.060-0.089
Upper Frozen	5.0	1	0.091-0.227	1.826-4.532
Fitzpatrick Wilderness				
Ross	53.5	5.35	0.026-0.032	0.048-0.060
Popo Agie Wilderness				
Lower Saddlebag	55.5	5.55	0.096-0.222	0.174-0.397
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.				

Potential total (includes background) far-field cumulative direct and indirect impacts of atmospheric deposition (nitrogen and sulfur) on terrestrial ecosystems (**Table 4.8**) are less than “green line” levels (acceptable level of total deposition) at all analyzed areas, as identified in the Jonah Infill Drilling Project analyses (BLM 2006, TRC Environmental Corporation 2006).

Table 4.8 Potential Total Far-Field Cumulative Terrestrial Atmospheric Deposition Impacts under the Proposed Action

Location	Sulfur Deposition			Nitrogen Deposition		
	Total Impact (kg/ha-year)	“Green Line” Level (kg/ha-year)	Percent Green Line	Total Impact (kg/ha-year)	“Green Line” Level (kg/ha-year)	Percent Green Line
Bridger Wilderness	0.749	3	25.0	1.530 - 1.557	5	30.6 - 31.1
Popo Agie Wilderness	0.747 - 0.748	3	24.9	1.512 - 1.529	5	30.2 - 30.6
Fitzpatrick Wilderness	0.749	3	25.0	1.505 - 1.508	5	30.1 - 30.2
Source: Adapted from BLM (2006) and TRC Environmental Corporation (2006), and provides the range of maximum cumulative concentrations identified for all Jonah Infill Drilling Project alternatives.						

4.6.5 Direct and Indirect Impacts of the No Action Alternative

The No Action Alternative assumes that the existing air quality management on BLM-administered public land in the region would continue, the LBA tract would not be developed, and development would continue as currently approved on state, tribal and private land.

Direct and indirect impacts from the No Action Alternative on pollutant concentrations, visibility, and atmospheric deposition would occur due to ongoing regional surface coal mining, power plant operation, and other existing air quality management. These impacts would likely remain at current levels, with an eventual reduction of direct impacts in the area as coal reserves at Black Butte and other mines are depleted.

4.6.6 Cumulative Impacts

Assessment of the cumulative impacts of pollutant emissions in the immediate vicinity of the project were calculated by adding the potential emissions from the Proposed Action, reasonably foreseeable development sources (such as permitted disturbance that has yet to occur as the rest of the existing Black Butte Mine), known existing sources (such as Leucite Hills Mine, Jim Bridger Mine and Jim Bridger Power Plant, oil and gas exploration and production), and other reasonably foreseeable future action sources. Potential cumulative emissions identified as a concern for the Proposed Action include emissions of NO_x, PM₁₀, and SO₂ from sources that are within approximately 50 kilometers of the Proposed Action and for which detailed emission data are available.

Emissions inventory information for the Proposed Action and reasonably foreseeable development at the Black Butte Mine was developed to model pollutant dispersion as discussed above. As discussed in Chapter 3, an emissions inventory was compiled using the WDEQ/AQD NSR database identifying major and minor emissions sources within 50 kilometers (31.1 miles) of the project area. The emissions inventory identified facilities, facility owners, facility classification, most recent NSR permit or waiver number and issue date since 1996, as well as permitted (not actual) pollutant emissions for each facility (**Table 3.10**). Since November 2005 through June 2006, there have been minor emissions increases in comparison to that information contained in **Table 3.10** (WDEQ 2006). Approximately a one percent increase in permitted NO_x emissions and less than a one percent increase in both permitted PM₁₀ and SO_x emissions has occurred. A review of the 1999 NEI completed by the EPA was also conducted to assess estimated emissions and sources within Sweetwater County. The NEI is an estimate of actual

emissions from each facility considered a major source and includes emissions sources not included in the NSR above. A comparison of the estimated Proposed Action emissions with the currently permitted (NSR) and reported (1999 NEI) emissions is presented in **Table 4.9**.

Table 4.9 Estimated Proposed Action Emissions versus Current Emission Levels

Pollutant	Proposed Action Emissions (tons per year)	NSR Permit Emissions (tons per year)	1999 NEI Reported Emissions (tons per year)
Particulate Matter (PM ₁₀)	1,075	233	10,508
Nitrogen Compounds (NO _x) ¹	1491	5,949	51,857
¹ Calculated for NO ₂ for the Proposed Action			

The discrepancy between the NSR permit emissions and the 1999 NEI is believed to be due to the NSR database containing information regarding changes to permits recorded after 1996, whereas the 1999 NEI reports actual emission estimates. Based on a comparison with 1999 NEI information, the Proposed Action may represent a potential increase in cumulative PM₁₀ and NO₂ emissions in the region of approximately 10 and 0.28 percent, respectively. This is likely a substantial overestimate of a cumulative increase due to the 1999 NEI only including the largest pollutant sources in Sweetwater County.

As previously described, the indirect impacts associated with changes in SO₂, Hg, and CO₂ emissions are generally the same for both alternatives. The cumulative impacts of changes in these pollutant concentrations are also likely to be similar, as both alternatives have minimal effect on the near-field, far-field, and cumulative concentrations of these pollutants.

Far-field cumulative effects have been presented previously utilizing the extensive modeling results performed for the Jonah Infill Drilling Project (BLM 2006, TRC Environmental Corporation 2006). The cumulative impact assessment for the Jonah Infill Drilling Project reported that:

- Far-field cumulative pollutant concentrations are all below NAAQS and WAAQS, as well as PSD Class I and II increments.
- Cumulative visibility impacts on PSD Class I and sensitive Class II areas are projected to impact visibility in the Bridger Wilderness Area (BLM 2006). Contributions to cumulative far-field visibility impacts from the Proposed Action are anticipated to be insignificant due to the distance between the project area and the Bridger Wilderness.
- Cumulative impacts on atmospheric deposition and ANC are projected to be below specified levels-of-concern and levels-of-acceptable change for both nitrogen and sulfur deposition.

4.6.7 Irreversible and Irretrievable Commitment of Resources

Impacts on air quality are generally considered reversible. While the magnitude of the temporary impacts on pollutant concentrations, visibility and atmospheric deposition vary between the two alternatives, neither alternative would result in an irreversible commitment of air resources.

With pollutant concentrations increases, visibility decreases and atmospheric deposition increases, and mining activities under both the No Action Alternative and the Proposed Action, would cause an irretrievable, but temporary, impact on air quality.

4.6.8 Potential Mitigation and Monitoring Measures

BLM has established goals and objectives to measure its performance in meeting air quality requirements. The goals are qualitative descriptions of BLM’s desired condition of air quality, and the objectives are

measurable benchmarks of BLM's attainment of the goals. The reader should note that attainment of these performance objectives requires actions by many agencies, as well as BLM. The intent of the air quality goals and performance objectives is that BLM will:

AQ Goal 1a: Minimize the impact of management actions in the planning area on air quality by complying with all applicable air quality laws, rules and regulations.

AQ Objective 1a.1: Maintain concentrations of criteria pollutants associated with management actions in compliance with applicable WAAQS and NAAQS.

AQ Objective 1a.2: Maintain concentrations of PSD pollutants associated with management actions in compliance with the applicable increment.

AQ Goal 1b: Implement management actions in the planning area to improve air quality as practicable.

AQ Objective 1b.1: Reduce visibility-impairing pollutants, in accordance with the reasonable progress goals and time frames established within the State of Wyoming's Regional Haze State Implementation Plan.

AQ Objective 1b.2: Reduce atmospheric deposition pollutants to levels below federally established levels of concern and LAC.

BLM will apply AQ Goal 1a to concentrations of criteria and PSD pollutants, and AQ Goal 1b to atmospheric deposition and visibility.

4.6.8.1 Concentrations

BLM will:

- Continue to rely on WDEQ/AQD to determine whether exceedances constitute violations of the NAAQS
- Continue to work cooperatively with WDEQ, EPA, United States Forest Service, and the National Park Service to maintain concentration monitoring in the RSFO area. Existing concentration monitoring includes the SLAMS ambient PM₁₀ monitor in Rock Springs, as well as PM₁₀ monitoring at Black Butte Mine.
- The BLM may impose mitigation measures on federal lands beyond those inherent to the Proposed Action. No additional mitigation measures, however, have been stipulated at this time.

Potential cumulative concentrations were below applicable PSD increments (BLM 2005a). As noted above, the comparison of potential concentrations to PSD increments does not constitute a regulatory PSD Increment Consumption Analysis.

4.6.8.2 Atmospheric Deposition

BLM plans no additional mitigation focused on atmospheric deposition.

4.6.8.3 Visibility

BLM plans no additional mitigation focused on visibility.

4.6.9 Residual Impacts

No residual impacts on air quality would occur.

4.7 GEOLOGY AND MINERAL RESOURCES

4.7.1 Regulatory Framework

Leasable minerals are those that can be explored for and developed under the MLA of 1920, as amended, other leasing acts, and regulations at 43 CFR 3100, 3200, 3400, and 3500. They include energy mineral resources, such as oil, gas, coal, and geothermal fluids, and some non-energy minerals (e.g., trona). The BLM uses discretionary authority to decide whether or not to lease mineral resources for exploration and development. The holder of a mineral lease or permit has a contractual agreement with the government that grants exclusive rights to reasonable exploration and development of the leased commodity.

SMCRA gives OSM the responsibility to administer programs that regulate surface coal mining operations. In November of 1980, a program was approved (Section 503 of SMCRA) in which WDEQ was given permanent authority to regulate surface coal mining operations on nonfederal lands within the state. Additionally, in January of 1987 [Section 523(c) of SMCRA], WDEQ entered into a cooperative agreement with the Secretary of the Interior that authorized WDEQ to regulate surface coal mining operations on federal lands within the state.

Pursuant to the cooperative agreement, a federal coal leaseholder in Wyoming must submit a permit application package to OSM and WDEQ for any proposed coal mining and reclamation operations in the state. WDEQ reviews the permit application package to ensure it complies with permitting requirements, and that the proposed coal mining operation meets the performance standards of the approved program. OSM, BLM, and other federal agencies review the permit application package to ensure it complies with the terms of the coal lease, the MLA, NEPA, and other federal laws and regulations. If the permit application package does comply, WDEQ issues the applicant a permit (the first of two enabling actions) to conduct coal mining operations. Following the issuance of the permit, the applicant submits a license application and upon its approval can proceed with the project.

4.7.2 Analysis Assumptions and Assessment Areas

The direct IAA is contained within the project area boundary for both fluid and solid leasable minerals. The indirect IAA for solid leasable minerals includes the project area and the existing Black Butte Mine. The indirect IAA for fluid leasable minerals encompasses the project area, the existing Black Butte Mine, and the Bitter Creek and Copper Ridge projects. The cumulative IAA for solid leasable minerals is that portion of the east flank of the Rock Springs Anticline containing the existing Black Butte, Bridger Coal, and Leucite Hills Mines. The cumulative IAA for fluid leasables includes lands south of Interstate 80, and east of Highway 430 within the BLM RSFO boundary area.

4.7.3 Direct and Indirect Impacts of the Proposed Action

4.7.3.1 Geology

The mining operation would remove the coal and return non-coal material back into the pit on an estimated 1,570 acres. Other surface disturbances such as haul roads, storm water conveyances, and retention ponds would also be present (680 acres). The geology of the mine pit area would be permanently altered. The replaced interburden and overburden material would be similar to pre-mining lithologies. However, the physical characteristics including the permeability and stratigraphy of the subsurface materials would be altered through the placement of a mixture of sizes and rock types back into the mined-out pit.

Exposure of unsuitable (due to high selenium or other potentially adverse chemical constituents) backfill materials to surface water and reclamation soils would be avoided through state-mandated analytical

testing and subsequent designs incorporated in the mine operating plan. The processes and procedures for this work would be as specified in the WDEQ/LDQ-approved mine permit.

The topographical expression of the land surface would be permanently altered. Post-mining topography would be determined during the WDEQ/LQD permitting process. Unless a variance or exemption is granted by the WDEQ, post-mine topography would approximate pre-mine conditions. Alterations in the final topography may be approved to improve wildlife habitat for species such as greater sage-grouse and mule deer.

4.7.3.2 Solid Leasable Minerals (Coal)

The direct impact of the Proposed Action would be the removal of up to approximately 34.6 million tons of in-place coal from federal and private mineral reserves and the associated removal and replacement of overburden and interburden material in the project area. This represents the removal of 80 percent of the total in-place minable coal reserves in the indirect impact area. The surface disturbance of the mine in the project area would represent 13 percent of all existing and foreseeable future, reclaimed and unreclaimed mine-related surface disturbances in the indirect IAA.

Under the Proposed Action, the initiation of project area mining would coincide with a decrease in coal removal rates at the existing Black Butte Mine. This would allow for a transition in mineral resource management from existing pits to the operation of the Proposed Action. A local coal source for the Jim Bridger Power Plant would continue and tax revenues from the sale of the coal would be realized.

4.7.3.3 Fluid Leasable Minerals

There are no known conflicts between mining and conventional oil and gas development in the project area, due to the low likelihood of economically recoverable oil and gas reserves. All conventional oil and gas development on nearby lands is from deeper formations that would not be directly affected by mining. Oil and gas development can occur simultaneously with mining, but would require placement of wells where they would not conflict with on-going mining operations. This may require the use of directional drilling technologies.

If natural gas or CBNG development was pursued on standard 160-acre spacings and natural gas or CBNG development was restricted to non-disturbed areas within the project area, the construction of 13 standard wells could potentially be postponed. As with conventional oil and gas development, a CBNG reservoir could be accessed using directional drilling if the depth to the reservoir were sufficient to allow the use of this drilling technology.

Since conventional oil and gas reservoirs would be unaffected by mining, potential oil and gas development would be delayed only while mining proceeds. In the simplest case, if mining is already in progress, drilling or other activities would not be initiated until the subject lands have been mined. This could require some adjustment of the oil and gas lease-development requirements or other action for the oil and gas lease (e.g., lease suspension). In cases where oil and gas development has preceded mining, more complex accommodations may be required. Well(s) could be temporarily abandoned while the lands are mined then re-entered to continue production. While technically feasible, this imposes economic costs on the oil and gas operator, mine operator, or both. It is possible (and has been done in the Powder River Basin) for the coal mine operators to purchase the wells/reserves from the oil and gas operators and permanently abandon the wells or delay production until mining is completed. This also entails economic costs.

It is also possible for oil and gas leases/reserves to be drained by production from surrounding wells. If production is established on surrounding lands, leases within the project area could be affected. Federal oil and gas leases are required to protect their leases from drainage, either by drilling wells or paying

compensatory royalties. Leases can be wholly or partially relinquished if drainage protection is not possible.

No effect on the conventional oil and gas Brady and Churchill Deep Units is anticipated from the Proposed Action. The distance of the project area from the units' target reservoirs both laterally and vertically precludes effects on those fields.

A higher potential for conflict exists with CBNG resources in the Almond Formation coals from the direct mining of those coals as part of the Proposed Action. The removal of the Almond Formation coals would directly remove the potential for capturing CBNG from the formation in the mine area. Dewatering that may occur from mine operations would lower the hydrostatic pressure of water in the coal seams adjacent to the pit and allow methane to desorb from the coal and escape. The distance from the mine pit where this effect may occur has not been determined due to insufficient site-specific data on Almond Formation hydrodynamics and its groundwater potentiometric surface.

However, only marginal economic CBNG production has been established in the Almond Formation to the east of the project area. The shallow depth of the Almond Formation in the proposed pit (corresponding to a lower hydrostatic pressure should groundwater be present), and the short duration of production and marginal reserves in wells closest to the project area indicate the Proposed Action would minimally alter CBNG potential in the direct impact area. In addition, due to the lateral distance to the Bitter Creek, North Copper Ridge, and Copper Ridge CBNG units and the separation depth between the proposed mine and the typical CBNG extraction depth in these units, hydrostatic pressures are not expected to be significantly altered as a result of the Proposed Action.

Conflicts between CBNG and the mining industry have continued for several years in the Powder River Basin. In the unlikely event that similar conflicts arise, some or all approaches employed to manage these conflicts could be applied in the project area. In some cases the CBNG and mine operators have negotiated advance compensation for the CBNG resource losses caused by mining. In other cases CBNG development has proceeded in advance of mining so that most of the CBNG is recovered before mining.

4.7.4 Direct and Indirect Impacts of the No Action Alternative

4.7.4.1 Geology

Impacts would be moderate and permanent on the existing mine. The geology of the project area would remain unaltered since proposed mining activities would not take place. Geomorphological surface features, subsurface stratigraphy, and chemical and physical characteristics would continue to function in their current state.

4.7.4.2 Solid Leasable Minerals (Coal)

Mining of coal as proposed in the Proposed Action would not occur at the project area. Revenue to the federal government from the mining of coal would not be realized. The management of coal resources in the area would be altered and a source of nearby coal for local power generating facilities would be eliminated. The ability to economically extract the coal may be hindered, if in the future, interest in developing the project area is revived and the existing Black Butte Mine infrastructure is not available to process the coal. Impacts would be moderate and permanent on the existing mine.

4.7.4.3 Fluid Leasable Minerals

Impacts would be negligible and short term on the existing Black Butte Mine. Both conventional oil and gas and CBNG exploration and production activities in the project area could continue without interference from mining activities. Should economical quantities of CBNG be found in the Almond

Formation in or immediately adjacent to the project area, that resource would not be lost due to mining activities.

4.7.5 Cumulative Impacts

4.7.5.1 Solid Leasable Minerals (Coal)

Under the Proposed Action, an additional 34.6 million tons of in-place minable coal reserves would be added to the existing permitted in-place minable reserves of 133.7 million tons of coal (No Action Alternative) in the cumulative IAA. This would amount to a 26 percent increase in the amount of coal available for mining in the cumulative IAA relative to the No Action Alternative. The mines included in this area are the Bridger Coal, Leucite Hills, and Black Butte Mines. Once the 168.3 million tons of coal in the cumulative IAA are mined, it would no longer be available for future use.

Surface disturbance in the cumulative IAA (277,120 acres) includes 21,931 acres of existing disturbance (7.91 percent of the IAA), 2,250 acres associated with the Proposed Action (0.81 percent), and 4,703 acres of foreseeable future disturbances (1.70 percent). These combined actions would result in 28,884 acres of disturbance, or 10.42 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 31.71 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 9.61 percent of the cumulative IAA would have surface disturbances. These impacts would be moderate to permanent in the cumulative IAA.

4.7.5.2 Fluid Leasable Minerals

Production of coal in the project area is not expected to decrease the potential for oil and gas and CBNG production in the immediate area. This is due to the marginal potential for economic recovery in the project area. However, the potential delay in the construction of 13 wells in disturbed areas would represent a temporary loss from production of approximately one percent of the existing and reasonably foreseeable future wells located in the cumulative IAA. Oil and gas resources could potentially be accessed beneath selected areas (e.g., coal production, unincorporated towns) using directional drilling technology.

Surface disturbances in the cumulative IAA include 19,483 acres of existing disturbances (2.16 percent of the IAA), 2,250 acres associated with the Proposed Action (0.25 percent), and 20,722 acres of foreseeable future disturbances (2.30 percent), would total 42,455 acres or 4.71 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 117.91 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 4.46 percent of the cumulative IAA would have surface disturbances. These impacts would be minor and short term in the cumulative IAA.

4.7.6 Irreversible and Irrecoverable Commitment of Resources

The removal of up to 34.6 million tons of coal from the project area would represent an irreversible commitment of resources. The alteration of the Almond Formation geology in the mined and reclaimed pit would represent an irreversible change. CBNG that may potentially be present in the Almond Formation and that could be lost due to gas migration from dewatering, would represent an irreversible commitment of resources.

4.7.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures are proposed.

4.7.8 Residual Impacts

Topographic moderation would be a permanent consequence of mining. Geology from the base of the coal to the surface would be subject to permanent change. A loss of coal for future generations would occur.

4.8 SOILS

4.8.1 Regulatory Framework

Activities that affect soils are regulated through the WDEQ/LQD permitting process. The Green River RMP and ROD (BLM 1997) describe goals and objectives for the management of soil.

4.8.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative impact areas for soil resources are the project area. Soil protection measures would be incorporated into the Proposed Action through requirements specified in the WDEQ/LQD-approved mine permit.

4.8.3 Direct and Indirect Impacts of the Proposed Action

Activities occurring under the Proposed Action would result in approximately 2,250 acres of soil disturbance. Salvaged soils, stockpiled during mining and restored during reclamation, would have different physical, chemical, and biological characteristics than the pre-mining soils. Post-mining soil would be more uniform in type, thickness, and texture due to mixing soils during stockpiling and reclamation efforts. While WDEQ permit requirements would reduce erosion potential, direct impacts on soil resources from the Proposed Action would increase the potential for wind and water erosion and sedimentation until reestablishment of vegetation. Diversity of vegetation replaced during interim and final reclamation may be reduced due to the alteration of replaced soil physical and chemical components.

Average topsoil productivity in the project area would generally improve as soil that is not suitable for sustaining vegetation would not be salvaged and used in surface reclamation efforts. Chemistry and nutrient distribution would be more uniform within these soils. However, the diversity of vegetation the salvaged soil would support may be reduced. Special handling procedures for soils containing potentially harmful constituents (e.g., selenium) and the use of erosion control structures are required by state regulations and are considered part of the Proposed Action. The procedures would minimize mobilization of harmful constituents and erosion.

4.8.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no additional development beyond currently approved levels would occur; therefore, no additional impacts on soil resources would result. Within the adjacent Black Butte Mine Area, impacts to chemical and biological soil properties would continue to be moderate and long term to permanent. Some changes to physical properties would be beneficial. Existing two-track roads in the project area encompass three acres, which would continue to incur minor amounts of erosion related to OHV use on the roads.

4.8.5 Cumulative Impacts

Mining activities described in the Proposed Action are expected to have substantial long-term cumulative impacts on soil resources. Soil management practices required by state and federal agencies for mine permits stipulate that erosion control measures be incorporated in the mine operations plan. Soils within the disturbed area would eventually be able to support pre-mining uses. The majority of the two-track roads in the project area would be removed and eventually reclaimed. Following reclamation, erosion may occur due to OHV use or wildfire.

Surface disturbance in the cumulative IAA (4,359 acres) includes three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance, or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, no additional development beyond currently approved levels would occur in the cumulative IAA. Impacts to chemical and biological soil properties would continue to be moderate and long term to permanent within the adjacent Black Butte Mine area. Some changes to physical properties would be beneficial. Existing two-track roads in the project area encompass three acres, which would continue to incur minor amounts of erosion related to OHV use on the roads.

4.8.6 Irreversible and Irrecoverable Commitment of Resources

Changes to the physical, chemical, and biological properties of the soil resources due to stockpiling and reclamation activities represent an irreversible change to soil resources. The soil property changes would incur an irreversible loss of soil productivity in some areas; however, soil productivity following reclamation could increase in some formerly low-productivity areas.

4.8.7 Potential Mitigation and Monitoring Measures

No additional mitigation and monitoring measures are proposed for soil resources, based on this analysis.

4.8.8 Residual Impacts

Salvaged soils would be mixed and redistributed, and mining would disturb soil-forming processes. This would result in long-term to permanent alteration of soil characteristics.

4.9 WATER RESOURCES

4.9.1 Groundwater Quality and Quantity

4.9.1.1 Regulatory Framework

In addition to the permitting requirements established by the WDEQ/LQD, the Wyoming SEO regulates the use of groundwater and would require an application to appropriate groundwater for a groundwater resources impacted by the Proposed Action. No dewatering wells are planned for the Proposed Action. The Green River RMP and ROD (BLM 1997) describe goals and objectives for the management of groundwater in the project area.

4.9.1.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for groundwater are the project area.

4.9.1.3 Direct and Indirect Impacts of the Proposed Action

Mining activities occurring under the Proposed Action would impact both the quantity and quality of groundwater resources in the Almond aquifer in the project area.

Mining the project area would disturb approximately 1,570 acres of Almond Formation to depths ranging from 25 to 200 feet bgs. The mined Almond Formation would be replaced with undifferentiated overburden and interburden consisting of shale, mudstone, siltstone, and sandstone. The mine pit would be completely dewatered. The lateral extent of drawdown related to the dewatering in the mine pit would be limited due to the lack of lateral continuity of the water-bearing units in the affected formation.

WDEQ/LQD permitting requires determination of the predicted five-foot drawdown contour. Therefore, the necessary groundwater studies would be conducted to evaluate the site-specific mining-related drawdown in the Almond Formation during permitting. However, using available water level data for the Almond Formation from the Black Butte Mine Pit 8 operations and the associated ratio of drawdown to distance from the pit of 0.004 to 0.019 (BBCC 2005a), an inference to the project area can be approximated. Assuming a similar water level drawdown at the project area, the five-foot drawdown contour would extend from 263 to 1,250 feet from the pit walls at the pit's maximum depth (**Figure 4.4**).

Figure 4.5 shows a generalized cross section through the proposed pit area and the anticipated groundwater drawdown associated with the development of the pit (the pre-mining groundwater profile is provided in **Figure 3.9**).

Two concerns associated with potentiometric surface drawdown are: 1) the loss of use of individual wells, and 2) the length of time required for the aquifer potentiometric surface to recover following mining and backfilling activities. Wyoming Statutes 35-11-415 (b) (xiii) and 35-11-416 (b) require the replacement of a water supply affected by surface coal mining. The only listed Wyoming SEO wells in the vicinity are over two miles northwest of the project area. Groundwater recovery rates are unknown, however, once the backfilled aquifer water levels do recover, groundwater occurrence would approximate pre-mine conditions. Based on inferences from Black Butte Mine's existing permit, the drawdown of groundwater would likely have a negligible impact on existing wells and regional groundwater currently used.

Based on similar surface mining conditions in the Green River Basin, groundwater in the backfilled aquifer is predicted to exhibit an increase in TDS concentrations as backfilled materials are saturated. Over time the groundwater quality of the water in the backfill aquifer would return to near pre-mine conditions (Ogle and Wood 2004). It is expected that the water quality of the backfill aquifer would have the same use classification (Class III, livestock) as the groundwater in the area prior to mining.

The sub-coal aquifers in the Almond Formation and Ericson Sandstone would not be removed or disturbed by mining activities and, therefore, would not be directly impacted by the Proposed Action.

4.9.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no groundwater development would occur; therefore, no impacts on groundwater are anticipated. Within the existing mine, potentiometric surface drawdown and groundwater quality impacts would be minor and long term due to on-going mining.

4.9.1.5 Cumulative Impacts

Surface disturbances in the cumulative IAA (4,359 acres) would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Figure 4.4 Groundwater Five-Foot Drawdown Impact Extent

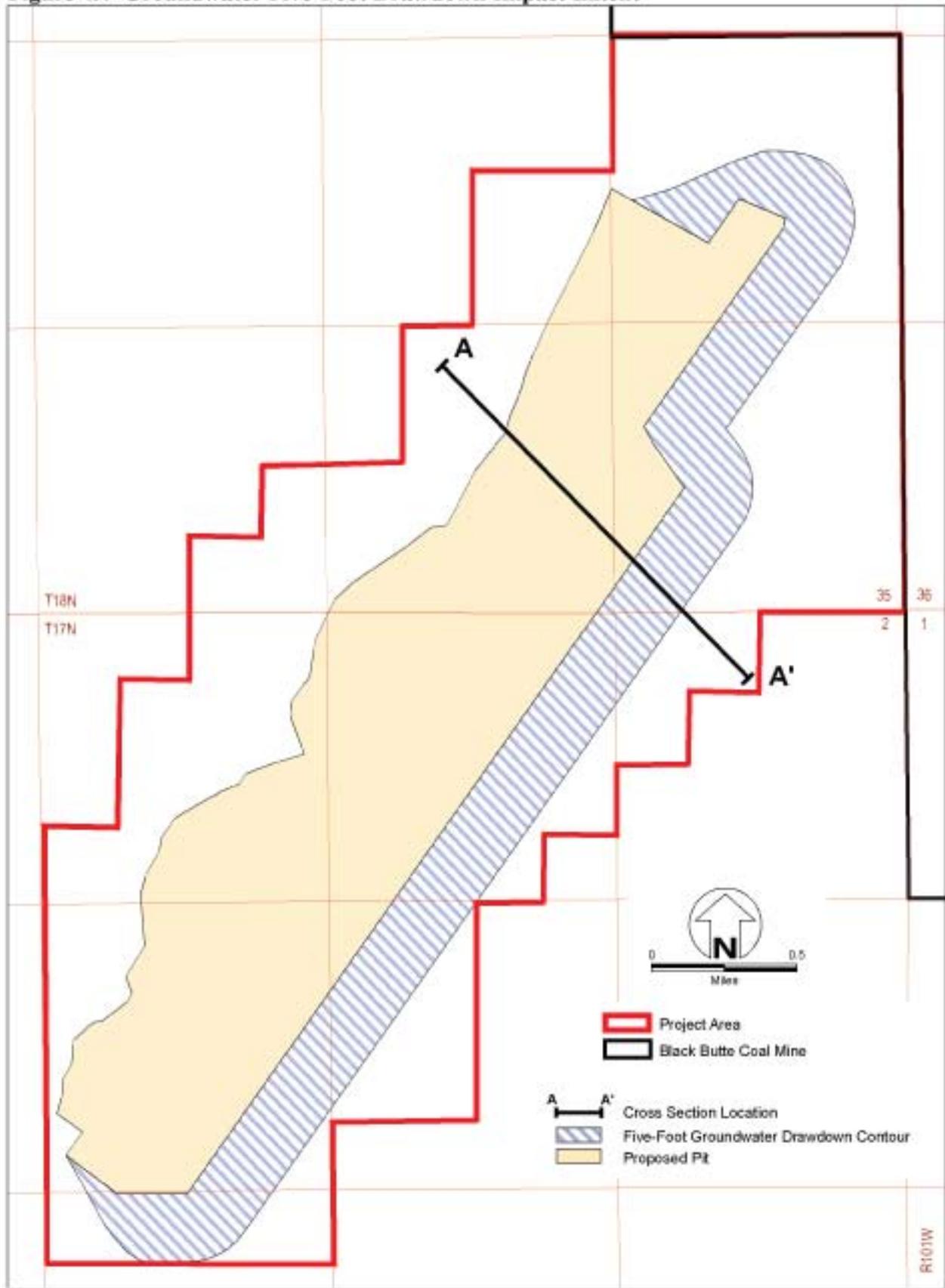
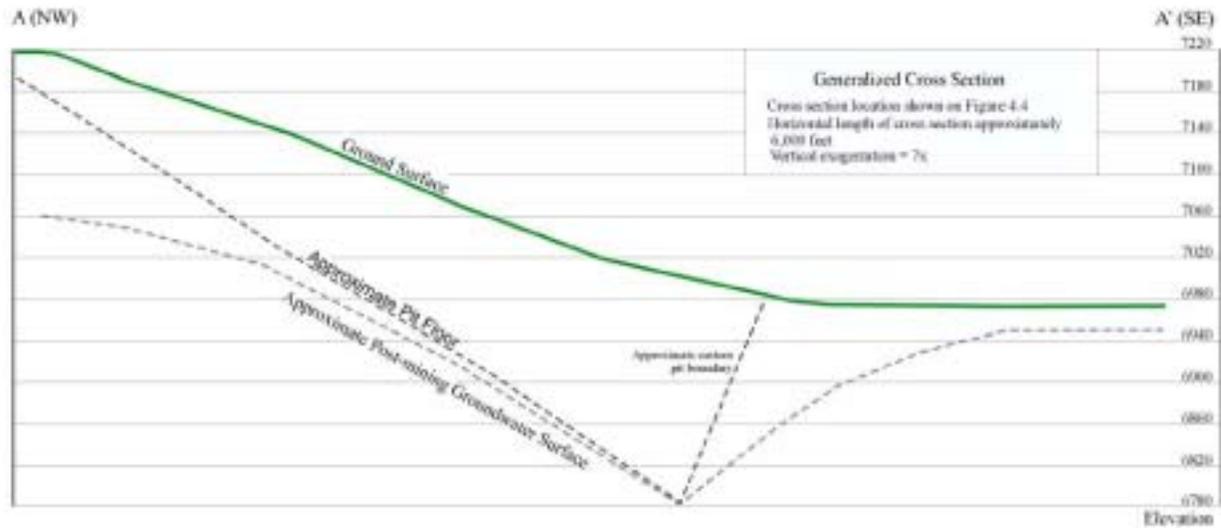


Figure 4.5 Cross Section Showing Approximate Maximum Groundwater Surface Drawdown



No past, present, or foreseeable future action beyond the Proposed Action are present within the project area that would create cumulative impacts on groundwater resources in the assessment area beyond the indirect and direct impacts discussed above.

Cumulative impacts if the No Action Alternative were implemented would represent continued localized, minor and short term impacts associated with potentiometric drawdown from on-going operations.

4.9.1.6 Irreversible and Irretrievable Commitment of Resources

Changes to the physical characteristics of the aquifers removed during mining activities and replaced with undifferentiated fill material would represent an irreversible change. The discharge of groundwater encountered during mining represents an irretrievable commitment of resources.

4.9.1.7 Potential Mitigation and Monitoring Measures

Based on the analysis of impacts, no mitigation or monitoring measures are proposed beyond those included in the Proposed Action.

4.9.1.8 Residual Impacts

The post-mining backfill would take many years to reach pre-mining water levels and water quality. Residual impacts on groundwater quality and water levels would decrease faster over time with distance from the mine pit in undisturbed materials.

4.9.2 Surface Water Quality and Quantity

4.9.2.1 Regulatory Framework

Activities that affect surface water quantity and/or quality are regulated through the permit process that is overseen by the WDEQ/LQD and WDEQ/WQD. Surface water resource protections would be incorporated into the WDEQ/LQD permit, which acts as a platform to ensure WDEQ/WQD National

Pollutant Discharge Elimination System (NPDES) compliance and water rights compliance. The permit process also ensures compliance with both the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin initiated by the USFWS on January 22, 1988, which establishes average annual depletion levels from the Upper Colorado River and the Colorado River Salinity Control Act of 1974. The Green River RMP and ROD (BLM 1997) describe goals and objectives for the management of surface water in the project area.

4.9.2.2 Analysis Assumptions and Assessment Areas

The direct and indirect IAAs include the two 5th order watersheds that include the project area. The cumulative IAA includes the affected portion of the 6th order watershed within the two 5th order watersheds.

Surface water runoff from the project area would be retained within the project area. Discharges from retention ponds may occur during large precipitation events or from enhanced pit dewatering activities; all discharges would comply with NPDES permit requirements. Retention of surface water during mining activities in the vicinity of the surface water divide would reduce the potential for transfer of surface water between 5th order drainage basins and would increase groundwater infiltration and recovery rates. Stream channel morphology and profiles would be recreated in disturbed areas in accordance with WDEQ/LQD permit reclamation requirements.

4.9.2.3 Direct and Indirect Impacts of the Proposed Action

Direct impacts on surface water resources from the Proposed Action include potential increases in runoff, turbidity, and sedimentation within the project area due to disturbances to vegetation and soil resources. Ephemeral drainages in proposed disturbance areas would be excavated and reconstructed upon backfilling and reclamation of the mine pit. Stream channel reconstruction and revegetation would minimize impacts on surface water, similar to pre-mining conditions and in some cases where pre-mining stream channel function is poor, may improve the erosion and sedimentation characteristics.

Direct and indirect impacts of mining activities on water quality downstream of the project area are unlikely since most runoff water would pass through the required sedimentation ponds, be treated, and then discharged into the undisturbed downstream channel.

The Proposed Action would create ponds to retain surface runoff from disturbed areas. Based on anticipated surface disturbances, it is anticipated approximately 3.2 acres of retention ponds would be created. Pursuant to USFWS (2002) the following calculations for the Proposed Action were performed in order to determine the potential depletion to the Colorado River system due to evaporative losses from the ponds:

Annual pan evaporation in the project area is estimated at 45 inches. Assuming an average annual pan coefficient of 0.70, average annual evaporation is approximately 31.5 inches (45×0.70). Assuming average annual precipitation is 8.84 inches and that 70 percent (6.2 inches) is lost to evapotranspiration prior to the proposed disturbance, the average net annual evaporative loss is 25.3 inches ($31.5 - 6.2$ inches). Assuming that the year-round surface area of the retention ponds is eight acres and is multiplied by 25.3 inches (2.1 feet) of evaporation per year, the average annual depletion for the Proposed Action is estimated to be 16.9acre-feet.

4.9.2.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no surface disturbance or development would take place. Surface water infiltration, evaporation and runoff would continue as it currently functions. These impacts would be

minor and short term to long term due to existing mining. Surface water depletion from the Colorado River system would continue to be moderate and short term on the existing mine and downstream.

4.9.2.5 Cumulative Impacts

When storm and snowmelt events occur at the project area and on other disturbances in the cumulative IAA, surface water retention systems would decrease the overall contribution to stream flow during and shortly after the event occurs. Discharge of treated water from the retention systems would delay the surface water contribution in downstream stream reaches from storm and snowmelt events. A corresponding decrease in the peak flows in downstream stream channel reaches would occur. Infiltration and evaporation of retained water would reduce the contribution of surface water from the disturbed areas to downstream channels. The intensity of impacts are difficult to quantify based on the spatial variability in storm events and the lack of documented retention systems discharge practices from other facilities utilizing retention basins. Under the No Action Alternative, surface water flows in the cumulative IAA would be affected by existing disturbances and retention systems with no additive impacts from the project area.

The project area represents 1.6 percent (4,359 acres) of the Bitter Creek-Patrick Draw and Black Butte Creek watersheds (271,169 acres). The specific runoff for the Bitter Creek watershed is between 0.1 to 0.2 inches per year (Busby 1966). Based on the specific runoff and the area of the cumulative IAA the specific runoff is calculated to be 2,260 to 4,519 acre-feet per year. Approximately 1.6 percent of the annual specific runoff is 36 to 72 acre-feet per year and represents the potential runoff affected by the Proposed Action. Under the No Action Alternative the 37 to 73 acre-feet of runoff would not be impeded from entering stream channels.

Surface disturbances in the cumulative IAA (271,169 acres) would include 14,611 acres of existing disturbances (5.39 percent of the IAA), 2,250 acres associated with the Proposed Action (0.83 percent) and 5,597 acres of foreseeable future disturbances (2.06 percent), totaling 22,458 acres or 8.28 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 53.71 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 7.45 percent of the cumulative IAA would have surface disturbances.

The average annual depletion to the Colorado River System for the existing operations at Black Butte Mine was established by the USFWS as 160 acre-feet in December 2003 (Kelly 2003). As areas of the existing mine are reclaimed, the depletions would decrease and additional depletions from the Proposed Action would have to be evaluated to determine the cumulative water loss to the Upper Colorado River as established by the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin.

The capture and treatment of disturbed area runoff in sedimentation/retention basins prior to discharge for the mining and oil and gas projects in the cumulative IAA would reduce the potential for TSS and related enhanced sedimentation impacts downstream from these disturbances. Road disturbances without retention ponds would continue to affect TSS concentrations in surface waterbodies. Under the No Action Alternative, surface water quality would be affected primarily by roads and other uncontrolled features in the cumulative IAA with minor to negligible differences compared to the Proposed Action implementation.

4.9.2.6 Irreversible and Irretrievable Commitment of Resources

Any reduction of streamflow would represent an irretrievable, but not irreversible commitment of resources.

4.9.2.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures are proposed based on the analysis of impacts on surface water resources beyond those proposed in the development plan and **Appendix J**.

4.9.2.8 Residual Impacts

No residual impacts are anticipated following reclamation and the associated revegetation reestablishment.

4.10 VEGETATION

4.10.1 Vegetation Range Sites

4.10.1.1 Regulatory Framework

Guidance for the management of vegetation on BLM-administered lands in Wyoming is provided by Standards for Healthy Rangelands and Guidelines for Livestock Grazing Management for Public Lands Administered by the BLM in the State of Wyoming, August 12, 1997. Additionally, the WDEQ/LQD permitting process requires baselines studies, range site monitoring, and reclamation in association with the implementation of mining projects. Results of studies, monitoring, and reclamation activities must meet pre-determined standards specific to the area for plant diversity and abundance, and indicate a lack of noxious weed infestation.

4.10.1.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for vegetation are the project area. Because no wetland or riparian vegetation is associated with the ephemeral drainages within the project area (BBCC 2004a; 2004b), impacts on these vegetation types would not occur.

A site-specific post-mining reclamation plan would be developed by BBCC in coordination with the WDEQ/LQD, BLM RSFO, and WGFD. The plan would include detailed specifications for reclamation activities such as grading, contouring, re-application of topsoil, reseeding, etc. The seed mix used for reseeding would likely include a diverse mix of native grasses, forbs, and shrubs (as defined by existing range sites) that would comprise a sagebrush steppe community type.

4.10.1.3 Direct and Indirect Impacts of the Proposed Action

The Proposed Action would result in the direct progressive impact and short-term removal of approximately 2,250 acres of vegetation within the project area, for the following developments: approximately 1,570 acres for Pit 14, approximately 101 acres for new haul-road development outside the pit, and approximately 579 acres for necessary facilities and temporary use areas (e.g., power lines, topsoil stockpiles, and retention ponds). **Table 4.10** identifies the approximate total number of range site acres that would be directly impacted by the Proposed Action.

Direct impacts from surface disturbance would leave 2,250 acres of vegetation communities unavailable for use as wildlife habitat and livestock forage during the life-of-operations (i.e., 20 years). Interim reclamation (conducted during operation associated with the Proposed Action on all disturbances) would occur gradually over the short term, and vegetation production could become established within approximately three to five years following reclamation of disturbed sites. Some disturbed areas could become available for use by wildlife during the life-of-operations. Following the life-of-operations, direct

impacts associated with the Proposed Action would cease, and remaining areas of disturbance would be reclaimed.

Table 4.10 Acres of Mine Development on Range Sites Found Within the Project Area

Range Site	Approximate Percentage of Project Area	Approximate Acres of Direct Impact	Approximate Percentage of Project Area Range Sites That Would Be Impacted
Shallow Loamy Big Sagebrush Shrubland	80	1,882	55
Saline Upland Subshrub	10	126	27
Rocky/Shale Shrubland	10	242	54
TOTAL	100	2,250 Acres	N/A

In addition to direct disturbance of approximately 2,250 acres of vegetation, direct or indirect impacts could occur anywhere within the remaining 2,109 acres of project area. Direct impacts could include removal or modification of vegetation. Indirect impacts could include modification to existing range sites (e.g., changes in plant make-up, distribution, and density) through invasive weed establishment or changes in land use (e.g., grazing and wildlife use). Despite the return of some re-established vegetation production within the short term, reclamation of disturbed range sites would continue through the long term to fully re-establish successful vegetation cover upon disturbed sites associated with the Proposed Action. This is due to the consideration of the re-establishment of sagebrush steppe community types, which due to local climatic conditions, are difficult to re-establish. This community type is a large component of the existing range sites and would be the target vegetation for reestablishment within the reclaimed range sites.

Prior to release of the reclamation bond (a minimum of 10 years following closure of the pit), establishment of a diverse, productive, and permanent vegetative community would be required. To achieve this, reclamation would be designed to facilitate the return of current, and/or anticipated post-mine land uses. Reclamation could produce range sites of equal or greater productivity than those found within the project area prior to mining development. Species diversity would initially be lower on reclaimed lands, with the shrub component of each range site requiring the longest amount of time to re-establish.

With careful seedbed preparation and timely seeding, as required by WDEQ/LQD, reclaimed lands could eventually support vegetation cover and production rates similar to pre-mine conditions. Species diversity would be emphasized with a diverse seed mix, and special planting practices for shrubs, particularly sagebrush, would encourage re-growth of this important ecosystem component.

4.10.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development within the project area would take place beyond current BLM authorizations. Therefore, impacts on vegetation within the project area would continue to follow existing trends, which generally includes negligible impacts in the project area. Vegetation impacts would continue to result in moderate, trending to minor and long term impacts within the Black Butte Mine area (outside of the assessment area).

4.10.1.5 Cumulative Impacts

Surface disturbances in the cumulative IAA (4,359 acres) would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance, or 51.69 percent of the cumulative IAA. This would represent a

75,000 percent increase in surface disturbance in the cumulative IAA. Because the cumulative IAA for vegetation is limited to the project area, cumulative impacts would be the same as the direct and indirect impacts described above.

Under the No Action Alternative, no project-related disturbance or development within the project area would take place beyond current BLM authorizations. Impacts on vegetation within the project area would continue to follow existing trends, which generally includes negligible impacts in the project area.

4.10.1.6 Irreversible and Irrecoverable Commitment of Resources

Because reclamation activities would be implemented to re-establish current vegetation condition (meeting or exceeding pre-mining conditions) and land uses, no irreversible commitment of vegetation resources would be anticipated. However, because vegetation production could be diminished in both the short and long term (i.e., following reclamation and during re-establishment of range sites), there would be an irretrievable loss of vegetation production and diversity during these time frames.

4.10.1.7 Potential Mitigation and Monitoring Measures

Because adequate interim and final reclamation planning, development and monitoring requirements, as required by the WDEQ/LQD, are in-place for the life of the operation process, additional mitigation and monitoring measures have not been identified for the Proposed Action. BBCC would develop a reclamation plan as required by the WDEQ/LQD that would identify adequate re-vegetation, including appropriate seed mixes, application and planting methods, monitoring schedules and success standards based on the evaluation of the current vegetation cover. Interim (during mining operations) and final reclamation (upon cessation of operations) monitoring of all disturbances would be conducted through the 40-year life of the project to monitor and measure revegetation success objectives to meet post-mine land use goals.

4.10.1.8 Residual Impacts

Interim and post-mine site reclamation activities and vegetation monitoring would provide for suitable and beneficial vegetation communities to provide adequate habitat for wildlife, livestock grazing forage, and other post-mine land uses. Though range sites would be restored to conditions equal to or better than pre-mining conditions (following post-mining recovery), reclaimed vegetation may never completely match the surrounding native plant communities.

4.10.2 Invasive Species

4.10.2.1 Regulatory Framework

Executive Order 13112 on Invasive Species directs federal agencies to prevent the introduction of invasive and noxious species and provide for their control, and minimize economic, ecological, and human health impacts that invasive species can cause. The Green River RMP and ROD (BLM 1997) provides management direction for noxious weed infestation. Additionally, the WDEQ/LQD permitting process requires baseline studies, range site monitoring, and reclamation in association with the implementation of mining projects. Results of studies, monitoring, and reclamation activities must meet pre-determined standards specific to the area for plant diversity and abundance, and indicate a lack of noxious weed infestation.

4.10.2.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for noxious weeds are the project area.

Per the Green River RMP and ROD (BLM 1997), noxious weed infestations would be controlled by livestock management or environmentally acceptable mechanical, chemical, or biological means. Additionally, grazing systems and wildlife management would be designed to maintain or improve plant diversity and restore disturbed or altered habitat with the purpose of attaining desired native plant communities.

A site-specific post-mining reclamation plan would be developed by BBCC in coordination with the WDEQ/LQD, BLM/RSFO, and WGFD for the Proposed Action. The plan would include detailed specifications for reclamation activities such as grading, contouring, re-application of topsoil, reseeding, and weed control. The seed mix used for reseeding would likely include a certified weed-free diverse mix of native grasses, forbs, and shrubs (as defined by existing range sites) that would comprise a sagebrush-steppe community type. The re-establishment of a self-perpetuating native plant community would limit opportunities for the establishment of invasive species and noxious weeds.

4.10.2.3 Direct and Indirect Impacts of the Proposed Action

Surface disturbance would increase the potential for the spread of invasive and noxious weeds that are currently found within the project area, (e.g., Canada thistle, perennial pepperweed, and black henbane). Disturbance would also have the potential to introduce new invasive and noxious weed species from outside the project area. Such introductions could result in infestation and consequent alteration of species distribution within a given range site. Alteration could include destruction of otherwise unaffected acres of existing range sites, and could complicate reclamation. However, because invasive species and noxious weeds are not abundant within the project area and mining and reclamation plans would include control measures to prevent the spread of invasive and noxious weed species, impacts from annual grass introduction or the establishment of other invasive and noxious weeds would be minimized.

4.10.2.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Impacts caused by the threat of noxious weeds would continue to follow existing trends, which would generally include the implementation of precautionary measures when there is potential to establish and spread invasive and noxious weeds (e.g., annual grasses and halogeton) from a contaminated area to a non-contaminated area.

4.10.2.5 Cumulative Impacts

Surface disturbances in the cumulative IAA (4,359 acres) would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance, or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Because the cumulative IAA for invasive and noxious weeds includes the project area, and no other reasonably foreseeable actions exist within the project area, any cumulative impacts from invasive and noxious weeds associated with the Proposed Action would be the same as the direct and indirect impacts described above.

4.10.2.6 Irreversible and Irrecoverable Commitment of Resources

Because reclamation activities would be implemented to re-establish current vegetation condition (meeting or exceeding pre-mining conditions) and land uses, no irreversible commitment of vegetation resources from the establishment of invasive or noxious weed species would be anticipated. Reclamation activities would be implemented to re-establish current land uses would be anticipated. If there were a

spread of invasive and/or noxious weed species following implementation of the Proposed Action, the option for noxious weed abatement would not be lost.

Because reclamation would not necessarily occur immediately following project-related disturbance, and invasive species and noxious weeds could have the opportunity to temporarily establish during that time, there could be an irretrievable loss of vegetation resources at any point during the short term (i.e., 20 year life-of-operations). Although the area would already be experiencing an irretrievable loss of vegetation resources from mine development, the potential for an additional irretrievable loss of vegetation would exist if the temporary establishment of invasive species or noxious weeds spread outside the area of direct impact.

4.10.2.7 Potential Mitigation and Monitoring Measures

Because reclamation and vegetation monitoring requirements exist through the WDEQ/LED permitting process, require post-mine vegetation to meet pre-mine standards (e.g., no noxious weed infestations) prior to bond release, and are inherent to the Proposed Action, mitigation and monitoring measures have not been identified for the Proposed Action.

4.10.2.8 Residual Impacts

No residual impacts would occur. Weed management and site stabilization techniques (e.g., re-vegetation, soil stabilization, etc.) previously conducted at the existing Black Butte Mine, and assumed to be incorporated into WDEQ/LQD requirements for the Proposed Action would require immediate site stabilization and control and containment of noxious and invasive weed establishment on all disturbed areas.

4.11 WILDLIFE AND FISHERIES

4.11.1 Big Game

4.11.1.1 Regulatory Framework

Big game species are managed by the WGFD, and BLM manages and protects big game habitat on BLM-administered lands. In addition, the Green River RMP and ROD (BLM 1997) establishes goals and objectives for species habitat within the project area. The WDEQ/LQD mine permitting process requires that mine and reclamation plans be developed that identify protective measures to minimize impacts on wildlife resources, including big game species.

4.11.1.2 Analysis Assumptions and Assessment Areas

The direct, indirect and cumulative IAAs for big game include the following: the project area for direct impacts, the project area plus the Black Butte Mine for indirect impacts, and the entire individual herd unit areas for cumulative impacts.

The Green River RMP and ROD (BLM 1997) indicates that high value big game habitats (i.e., crucial winter range and calving areas) would be maintained or improved by reducing habitat loss and alteration, applying appropriate spatial and temporal buffers, and applying appropriate rehabilitation standards. In an effort to avoid impacts on big game species, disturbed areas would be reclaimed with perennial grass, forb, and shrub species conducive to big game and sagebrush-obligate species use. Big game monitoring could also be utilized during implementation of the Proposed Action to further define potential areas of concern and identify any future mitigation needs.

4.11.1.3 Direct and Indirect Impacts of the Proposed Action

Approximately 4,359 acres of pronghorn winter/yearlong habitat are found within the direct IAA. Approximately 5,332 acres of pronghorn winter yearlong and crucial winter/yearlong habitat (including approximately 4,359 within the project area and 973 acres within the Black Butte Mine permit area) are found within the indirect IAA.

Approximately 3,256 acres of mule deer winter/yearlong and 1,103 acres of mule deer crucial winter/yearlong habitat are found within the direct IAA. Approximately 41,309 acres of mule deer winter yearlong and 1,103 acres of mule deer crucial winter/yearlong habitat are found within the indirect IAA.

Approximately 4,359 acres of elk undetermined habitat are found within the direct IAA. Approximately 42,412 acres of elk undetermined habitat are found within the indirect IAA.

Direct impacts on big game species would include loss of habitat and forage resources, and displacement to nearby suitable habitat. Increased stress and competition for remaining resources could cause reduced reproduction rates and a decline in physical condition. Direct impacts on big game species could also include the loss of life from animal/vehicle collisions, harassment (intentional or unintentional), an increased likelihood of poaching, and hunting. Increased susceptibility to hunting could also result as individuals are displaced from secure habitats into less secure habitats, and as densities of animals on available habitats increase. However, BBCC would restrict access to the project area for hunting and recreational use. Accordingly, non-disturbed land within the project area could serve as a refuge from hunting pressure in adjoining areas if the animals acclimate to nearby mining activities. Mule deer have been especially successful at utilizing developed areas with ongoing noise or disturbance.

Direct impacts from surface disturbance would leave 2,250 acres unavailable for use by wildlife during the life-of-operations (i.e., 20 years), and would include loss or modification of range sites. However, because reclamation would occur gradually over the short term, and vegetation production could become established within approximately three to five years following reclamation, some disturbed areas could become available for use by wildlife during the life-of-operations.

Following the life-of-operations, direct impacts associated with the Proposed Action would cease, and remaining areas of disturbance would be reclaimed.

Indirect impacts could include loss or modification of existing habitat (e.g., changes in species composition, distribution, and density, and loss of escape cover), forage losses from invasive weed establishment, changes in land use (e.g., grazing and wildlife use), or an increase in surface disturbing activities such as mining and reclamation.

Although the use of reclaimed areas by wildlife could impede reclamation success, it is anticipated that, in the long term, reclaimed lands would meet or exceed pre-mining levels of species production, diversity, and use. An emphasis on vegetation compositions that favor sagebrush would benefit sagebrush-obligate native species in the long term.

4.11.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Impacts on big game species would continue following existing trends associated with current hunting regulations and herd management goals. Continuing impacts resulting from displacement, habitat loss and forage availability would be minor to moderate and short term to long term within the Black Butte Mine area.

4.11.1.5 Cumulative Impacts

The cumulative IAAs for pronghorn, mule deer, and elk include the Bitter Creek, South Rock Springs, and Petition Herd Units, respectively. **Table 4.2** presents IAA and disturbance acreages associated with big game species.

Approximately 35,083 acres (2.19 percent of the IAA) of existing, 2,250 acres (0.14 percent) associated with the Proposed Action, and 14,211 acres (0.89 percent) of foreseeable future action surface disturbances would occur within the 1,603,167 acre pronghorn cumulative IAA. The total surface disturbance in the pronghorn cumulative IAA would be 51,544 acres or 3.22 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 46.92 percent increase in surface disturbance in the cumulative IAA. Impacts on pronghorn within the project area would contribute minimally to cumulative impacts on pronghorn throughout the Bitter Creek Herd Unit.

Approximately 14,108 acres (1.24 percent of the IAA) of existing, 2,250 acres (0.2 percent) associated with the Proposed Action, and 27,696 acres (2.44 percent) of foreseeable future action surface disturbances would occur within the 1,134,282 acre mule deer cumulative IAA. The total surface disturbance in the mule deer cumulative IAA would be 44,054 acres or 3.88 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 212.26 percent increase in surface disturbance in the cumulative IAA. Impacts on mule deer within the project area would contribute minimally to cumulative impacts on mule deer throughout the South Rock Springs Herd Unit.

Approximately 18,574 acres (1.28 percent of the IAA) of existing, 2,250 acres (0.15 percent) associated with the Proposed Action, and 8,680 acres (0.60 percent) of foreseeable future action surface disturbances would occur within the 1,453,728 acre elk cumulative IAA. The total surface disturbance in the elk cumulative IAA would be 29,504 acres or 2.03 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 58.84 percent increase in surface disturbance in the cumulative IAA. Impacts on elk within the project area would contribute minimally to cumulative impacts on elk throughout the Petition Herd Unit.

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Impacts within the cumulative IAA on big game species would continue following existing trends associated with current hunting regulations and herd management goals. Continuing impacts resulting from displacement, habitat loss and forage availability would be minor to moderate and short term to long term within the cumulative IAA.

4.11.1.6 Irreversible and Irrecoverable Commitment of Resources

Because of proposed reclamation activities within the project area, and anticipated re-establishment of current land uses, there would be no irreversible commitment of big game resources. There would exist, however, an irretrievable commitment of resources during the life-of-project (40 years) and until habitat restoration is completed. Because sagebrush ecosystems are typically slow to re-establish, there would exist an irretrievable commitment of sagebrush habitat until areas are completely reclaimed.

4.11.1.7 Potential Mitigation and Monitoring Measures

Mitigation and monitoring beyond those inherent in the Proposed Action have not been identified.

4.11.1.8 Residual Impacts

Although the project area would be reclaimed to near original conditions, there would be some residual wildlife impacts. Alteration of pre-mine topography and the long period to re-establish post-mine vegetation communities may result in a decrease of habitat diversity and alteration of wildlife use.

Likewise, the reclaimed post-mine landscape may result in an increase of habitat diversity and abundance of suitable wildlife forage.

4.11.2 Raptors

4.11.2.1 Regulatory Framework

Raptor nests are afforded legal protection under the following laws: the federal Migratory Bird Treaty Act of 1918, Eagle Protection Act of 1962 (as amended), ESA of 1973 (as amended), and U.S. Fish and Wildlife Coordination Act. In addition, the Wyoming BLM has identified spatial and temporal buffers (as described in the raptor subsection of Chapter 3) for raptor nest protection.

Many raptors are migratory, some are considered Migratory Birds of High Federal Interest, and some are special status species. Migratory birds are protected by the Migratory Bird Treaty Act of 1918, and special status species are protected by either the ESA of 1973 (as amended) under the jurisdiction of the USFWS, or by the BLM through direction contained in the BLM Manual 6840.

The WDEQ/LQD permitting process would require raptor protection and a mitigation plan as part of the mine plan.

4.11.2.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for raptor species include: the direct IAA includes active nest sites within the project area plus a one-mile buffer; the indirect IAA includes nest sites within the project area and the existing Black Butte Mine, plus a one-mile buffer; and the cumulative IAA comprises the project area, the existing Black Butte Mine, and a two-mile buffer (**Figure 3.15**).

In an effort to avoid impacts on raptor species, BBCC would provide ongoing monitoring of nests, active territories, and prey base. During the life-of-operations, raptors would be protected by BLM-developed spatial buffers designed to protect nesting raptors nesting periods. For the ferruginous hawk, the buffer is one mile; for all other raptors, the buffer is 0.5 mile (Dunder 2005a).

When disturbance would occur outside of the nesting period, a No Surface Occupancy stipulation would be specified to include avoidance of areas within 1,313 feet for the ferruginous hawk nests and 815 feet for all other raptor nests (Dunder 2005a). Raptors are also protected by laws listed in Chapters 2 and 3 of this FEIS.

4.11.2.3 Direct and Indirect Impacts of the Proposed Action

Fourteen active raptor nests are found within the direct IAA, and include: four golden eagle nests, three prairie falcon nests, three red-tailed hawk nests, two great horned owl nests, and two American kestrel nests. All active raptor nests are located outside of the project area, and 11 are located west of the project area and separated from it by a ridgeline and cliff. A spatial buffer of 0.5 mile for one of the American kestrel nests intercepts one of the proposed topsoil stockpiles, and the edge of the Pit 14 buffer; no other spatial buffers intercept a component of the Proposed Action. Because these 11 nests are geographically separated from the project area, there would likely be no direct impacts on them.

Three nests are located east of the project area within the indirect IAA, including two golden eagle nests and one prairie falcon nest. The spatial buffers of 0.5 mile for one golden eagle nest and the prairie falcon nest intercept the project area, but do not intercept a component of the Proposed Action (e.g., a stockpile, road, the pit, etc.). Because there are no geographical features separating these nests from the project area, it would be possible for them to incur line-of-sight impacts. Direct impacts on breeding raptors could include temporary or permanent displacement or nest abandonment from construction or operations noise

and activity; increased predation of eggs or young; loss of brood (i.e., egg or young); destruction or alteration of nesting or roosting habitat; and/or destruction or alteration of foraging habitat or resources.

Indirect impacts on raptors could include a decrease in available prey, such as small mammals that rely upon sagebrush habitats, and subsequent displacement, nest abandonment, or otherwise failed breeding attempts.

4.11.2.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Minor and moderate impacts on raptors would continue following existing trends associated with climatic changes, prey abundance, and current monitoring and management.

4.11.2.5 Cumulative Impacts

Approximately 9,812 acres (9.10 percent of the IAA) of existing, 2,250 acres (2.09 percent) associated with the Proposed Action, and 4,602 acres (4.27 percent) of foreseeable future action surface disturbances would occur within the 107,860 acre raptor cumulative IAA. The total surface disturbance in the raptor cumulative IAA would be 16,664 acres or 15.45 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 69.84 percent increase in surface disturbance in the cumulative IAA. Because the 2,250 acres of disturbance that would occur under the Proposed Action would be subject to the raptor protection and mitigation measures already in place for the existing Black Butte Mine (BBCC 2004c), the Proposed Action would likely contribute minimally to cumulative impacts on raptors throughout the assessment area.

4.11.2.6 Irreversible and Irrecoverable Commitment of Resources

Because of proposed reclamation activities within the project area, and anticipated re-establishment of current land uses, there would be no irreversible commitment of raptor resources. There would exist, however, an irretrievable commitment of resources during the life-of-operations and until habitat restoration could be completed. Because sagebrush ecosystems are typically slow to re-establish, there would exist an irretrievable commitment of sagebrush resources.

4.11.2.7 Potential Mitigation and Monitoring Measures

A raptor protection and mitigation plan has been developed for existing operations at the Black Butte Mine. If the project were approved, this plan would be expanded to include the new project area. As such, it is considered part of the Proposed Action. Mitigation measures beyond those inherent to the Proposed Action were not identified.

4.11.2.8 Residual Impacts

Although the project area would be reclaimed to near original conditions, there would be some residual raptor impacts. Alteration of pre-mine topography and the long period to re-establish post-mine vegetation communities may result in a decrease of habitat diversity and alteration of raptor use (e.g., nesting, roosting, and foraging). Likewise, the reclaimed post-mine landscape could benefit raptor use due to an increase of habitat diversity and an abundance of suitable small mammal habitat.

4.11.3 Special Status Wildlife and Fisheries Species

4.11.3.1 Regulatory Framework

Special status species are protected by either the ESA of 1973 (as amended) under the jurisdiction of the USFWS, or by the BLM through direction contained in BLM Manual 6840 and the goals, objectives, and techniques presented in the Green River RMP and ROD (BLM 1997). The Federal Migratory Bird treaty Act of 1918, Eagle Protection Act of 1962 (as amended), ESA of 1973 (as amended) for federally listed raptor species, and U.S. Fish and Wildlife Coordination Act also protect special status raptors and migratory birds. In addition, the WDEQ/LQD permitting process has requirements for protection of wildlife and fisheries, as well as their habitat.

Standards for water quality and quantity for the Colorado River are also required through the mine permitting process. The USFWS provides management guidance for endangered fish species that are found within the Upper Colorado River Basin, through a Recovery Implementation Program and an existing intra-service Biological Opinion. This management guidance for fish species subsequently provides management guidance for the basin.

4.11.3.2 Analysis Assumptions and Assessment Areas

The following BLM sensitive species have been carried forward for analysis: migratory birds (sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher), ferruginous hawk, greater sage-grouse, mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, swift fox, and fisheries. No ESA-related species have been carried forward for analysis. For additional discussion of impacts specific to raptors (including ferruginous hawk and burrowing owl), please see the raptor subsection of this chapter. Assessment areas and analysis assumptions for the BLM sensitive species analyzed in this section include:

Migratory Birds

The direct, indirect, and cumulative IAAs for the sage sparrow, Brewer's sparrow, loggerhead shrike, and sage thrasher include the project area.

As directed by the Green River RMP and ROD (BLM 1997), BLM sensitive species would be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss.

Ferruginous Hawk

The direct IAA for the ferruginous hawk includes nest sites within the project area plus a one-mile buffer, and the indirect IAA includes nest sites within the project area and existing Black Butte Mine, plus a one-mile buffer. The cumulative IAA for the ferruginous hawk comprises the project area and existing Black Butte Mine, plus a two-mile buffer. This IAA is the same as the raptor IAA.

The Green River RMP and ROD (BLM 1997) specifies that BLM sensitive species habitat will be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss. Additionally, a raptor protection and mitigation plan has been developed for existing operations and would include the project area as part of the mine permit for the Proposed Action.

In an effort to limit impacts on raptor species, BBCC would provide ongoing monitoring of nests, active territories, and prey base. During the life-of-operations, raptors would be protected by BLM-developed spatial buffers designed to protect nesting raptors during nest-building and incubation periods. For ferruginous hawks, the buffer is one mile; for all other raptors, the buffer is 0.5 mile (Dunder 2005a).

When disturbance would have potential to occur outside of the nest-building and incubation period, a No Surface Occupancy stipulation would be specified within 1,313 feet for the ferruginous hawk nest, 1,958 feet for golden eagle nests, and 815 feet for all other raptor nests (Dunder 2005a).

Greater Sage-Grouse

The direct IAA for the greater sage-grouse includes potentially suitable habitat within the project area, and the indirect IAA includes potentially suitable habitat within an 11-mile buffer surrounding the project area. The cumulative IAA for the greater sage-grouse comprises potentially suitable habitat within the following borders: Interstate 80 on the north, the Wyoming/Colorado state line on the south, the Baggs Road on the east, and Flaming Gorge Reservoir and the Green River on the west (**Figure 3.16**).

As directed by the Green River RMP and ROD (BLM 1997), BLM sensitive species habitat would be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss. Additionally, as directed by the Green River RMP, greater sage-grouse breeding and nesting areas would be generally protected, and aboveground facilities would be prohibited on or within $\frac{1}{4}$ mile of breeding grounds. Between approximately March 15 and July 15, from 6:00 pm to 9:00 am, disruptive activities would not be permitted in proximity to occupied breeding grounds. Seasonal restrictions between approximately March 1 and June 30 would prohibit disruptive activities within approximately two miles of greater sage-grouse nesting habitat.

In an effort to reduce impacts on the greater sage-grouse and its habitat, the following techniques could be implemented: re-establishment of shrubs on reclaimed lands, and grading of reclaimed lands to include swales and depressions. Monitoring of greater sage-grouse strutting grounds in the area before, during, and after mining would provide information on impacts of the project and success of reclamation. These and other measures would be further developed in the mine plan and WDEQ/LQD permit.

Mountain Plover, Burrowing Owl, Pygmy Rabbit, White-Tailed Prairie Dog, and Swift Fox

The direct, indirect, and cumulative IAAs for the mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, and swift fox include the project area.

As directed by the Green River RMP and ROD (BLM 1997), BLM sensitive species habitat would be managed to provide, maintain, or improve habitat, and habitat management plans would be developed, as necessary, for highly developed or disturbed areas in which there is habitat loss.

Active burrowing owl nest sites would have a raptor protection buffer of 0.5 mile (Dunder 2005a). When disturbance could have potential to occur outside of the nest-building and incubation period, a No Surface Occupancy stipulation would be specified within 815 feet of burrowing owl nest sites (Dunder 2005a).

Fisheries

The direct IAA for fisheries includes the project area. The indirect IAA area includes the project area and existing Black Butte Mine. The cumulative IAA comprises the project area, existing Black Butte Mine, and the combined Black Butte Creek and Bitter Creek – Patrick Draw 5th order watersheds.

As directed by the Recovery Implementation Program, recovery activities would be implemented for projects resulting in water depletions to the Colorado River.

4.11.3.3 Direct and Indirect Impacts of the Proposed Action

The Proposed Action would result in the progressive, short-term removal of approximately 2,250 acres of sagebrush-steppe habitat within the project area, for the following developments: approximately 1,570

acres for Pit 14, approximately 101 acres for new haul-road development outside the pit, and approximately 579 acres for necessary facilities and temporary use areas (e.g., power lines, topsoil stockpiles, mine pit buffer, and retention ponds). These disturbances would be direct. In addition to direct impacts on approximately 2,250 acres of vegetation, direct or indirect impacts could occur within the remaining 2,109 acres of project area. In the long term, habitat within the project area would be restored.

Impacts on BLM sensitive species could include direct loss of habitat, mortality, temporary or permanent displacement, and restriction of movement (caused by fences, the pit, haul roads, reduced water flows, etc.). However, to the extent that suitable, unoccupied habitat is available adjacent to the project area, populations would remain relatively unaffected. If suitable, occupied habitat is available nearby, individuals would likely still be able to utilize the cover and forage resources therein, but could suffer from the effects of competition if the areas became overused by displaced individuals.

Sagebrush-steppe habitat provides 2,250 acres of foraging, nesting, and roosting habitat for migratory bird species, ferruginous hawks, and burrowing owls known to occur in the project areas. It is expected that the direct habitat loss available to these species would indirectly displace them into surrounding sagebrush habitats near the Proposed Action. Direct impacts on breeding birds could include temporary or permanent displacement or nest abandonment from construction or operations noise and activity; increased predation of eggs or young; loss of brood (i.e., egg or young); destruction or alteration of nesting or roosting habitat; and/or destruction or alteration of small mammal and other foraging habitat.

Indirect impacts on raptors could include a decrease in available prey, such as small mammals that rely upon sagebrush habitats, and subsequent displacement, nest abandonment, or otherwise failed breeding attempts. Due to the extent that suitable sagebrush-steppe habitat is available surrounding the project area and IAAs, direct and indirect impacts on these species would be negligible.

Direct mortality of small animals (i.e., white-tailed prairie dog and pygmy rabbit) would likely be greater than mortality of mid-sized and larger animals, because small animals often have limited mobility. However, these losses would likely be counteracted by the rapid reproductive rate of the smaller species, and the lighter demand on forage and cover resources. Smaller species would likely return to pre-mining levels more readily following reclamation than larger species.

Because spatial and temporal buffers have been developed to protect breeding grounds and nesting areas, the greater sage-grouse would likely not be impacted by the proposed project. There are six active leks within the area of indirect impact. Although a portion of the proposed pit and pit buffer would intercept a seasonal buffer for one of these leks, birds could utilize suitable, unoccupied nesting habitat in the surrounding areas.

Alterations in topography and distribution of species within range sites, particularly the sagebrush type, would decrease carrying capacity and wildlife species diversity until successfully reclaimed. Because the re-establishment of sagebrush occurs slowly, sagebrush-obligate BLM sensitive species (specifically the sage thrasher, greater sage-grouse and pygmy rabbit) could be unable to fully use this area until habitat is fully restored.

The USFWS's Biological Opinion for the Black Butte Mine Modification Project determined that annual water depletions would require payment (as described in the "Reasonable and Prudent Measures" section of the biological opinion) to offset effects of the project. Payment and modification of the biological opinion, as necessary, would be determined at the time of lease approval.

4.11.3.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current authorizations. Negligible to moderate and long-term impacts on BLM sensitive wildlife species

and fisheries would continue following existing trends. Since minimal development currently exists within the project area, few impacts would result.

4.11.3.5 Cumulative Impacts

Surface disturbances in the special status animal species (sage sparrow, Brewer's sparrow, loggerhead shrike, sage thrasher, mountain plover, burrowing owl, pygmy rabbit, white-tailed prairie dog, and swift fox) cumulative IAA would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA. Impacts within the project area on these species would contribute noticeably to other impacts on these species and their habitat within the cumulative IAA.

Cumulative impacts if the No Action Alternative were implemented would represent continued negligible to minor impacts due to loss of habitat and displacement due to on-going and other proposed activities in the cumulative IAA. Impacts would likely impact, but are minor for Colorado River endemics in cumulative IAA. The USFWS has determined that any water withdrawal from the Colorado River system may constitute a may affect status and may jeopardize threatened and endangered endemics in this system.

Approximately 9,812 acres (9.10 percent of the IAA) of existing, 2,250 acres (2.09 percent) associated with the Proposed Action, and 4,602 acres (4.27 percent) of foreseeable future action surface disturbances would occur within the 107,860 acre raptor (ferruginous hawk) cumulative IAA. The total surface disturbance in the raptor cumulative IAA would be 16,664 acres or 15.45 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 69.84 percent increase in surface disturbance in the cumulative IAA. Because the 2,250 acres of disturbance that would occur under the Proposed Action would be subject to the raptor protection and mitigation measures already in place for the existing Black Butte Mine (BBCC 2004c), the Proposed Action would likely contribute minimally to cumulative impacts on raptors throughout the assessment area.

Approximately 13,830 acres (1.94 percent of the IAA) of existing, 2,250 acres (0.32 percent) associated with the Proposed Action, and 11,403 acres (1.60 percent) of foreseeable future action surface disturbances would occur within the 711,526 acre greater sage grouse cumulative IAA. The total surface disturbance in the greater sage grouse cumulative IAA would be 27,483 acres or 3.86 percent of the IAA. Implementation of the existing and foreseeable future actions would represent a 98.72 percent increase in surface disturbance in the cumulative IAA. Impacts on the greater sage-grouse habitat within the project area would contribute minimally to the cumulative impacts on greater sage-grouse habitat throughout the assessment area.

Surface disturbances in the fisheries cumulative IAA would include 14,611 acres of existing disturbances (5.39 percent of the IAA), 2,250 acres associated with the Proposed Action (0.83 percent) and 5,597 acres of foreseeable future disturbances (2.06 percent), totaling 22,458 acres or 8.28 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 53.71 percent increase in surface disturbance in the fisheries cumulative IAA.

Approximately 160 acre-feet of water are depleted annually from surface water sources (by mining) within the fisheries cumulative IAA (comprising approximately 271,169 acres of land). Approximately, an additional 17 acre-feet would be depleted annually from the assessment area if the Proposed Action were implemented. This would increase the total depletion by approximately 11 percent to approximately 177 acre-feet annually. Regardless of size, any water depletions are considered to be detrimental to the four endangered Colorado River fishes and, as such, are likely to contribute to adverse effects upon them.

4.11.3.6 Irreversible and Irrecoverable Commitment of Resources

Because of proposed reclamation activities, and anticipated re-establishment of current land uses, there would be no irreversible commitment of special status species resources after the project area is reclaimed. There would exist, however, an irretrievable commitment of resources during the life-of-operations and until habitat restoration could be completed, particularly for sagebrush-obligate species (such as the sage thrasher, greater sage-grouse and pygmy rabbit). Because sagebrush ecosystems are typically slow to re-establish, there would exist an irretrievable commitment of sagebrush resources.

4.11.3.7 Potential Mitigation and Monitoring Measures

Current and proposed wildlife monitoring and vegetation success monitoring for re-establishment of a sagebrush steppe community have, and would be developed under the Proposed Action to address the impact of mining and post-mine land use needs. Monitoring for migratory birds and migratory birds of high federal interest, raptors, and greater sage-grouse is currently on-going through the WDEQ/LQD permitting process for the existing Black Butte Mine and within the project area. BBCC would develop a reclamation plan as required by the WDEQ/LQD that would identify native vegetation to establish a sagebrush-steppe habitat, including appropriate seed mixes, application and planting methods, monitoring schedules and success standards based on the evaluation of the current vegetation cover. Interim (during mining operations) and final reclamation (upon cessation of operations) monitoring of all disturbances would be conducted through the 40-year life of the project to monitor and measure re-vegetation success objective to meet post-mine land use goals. Mitigation and monitoring measures beyond those inherent to the Proposed Action were not identified.

4.11.3.8 Residual Impacts

Although the project area would be reclaimed to near original conditions, there would be some residual impacts on special status species. Alteration of pre-mine topography and the long period to re-establish post-mine vegetation communities may result in a decrease of habitat diversity and alteration and elimination of wildlife use dependent upon key components of the sagebrush-steppe. Likewise, the reclaimed post-mine landscape may result in an increase of habitat diversity and abundance of suitable wildlife forage that may benefit raptor species (ferruginous hawk and burrowing owls).

4.12 WILD HORSES

4.12.1 Regulatory Framework

Wild horses and their habitat are managed by the BLM through objectives presented in the Green River RMP (BLM 1997), and are protected by the Wild Free-Roaming Horse and Burro Act of 1971.

4.12.2 Analysis Assumptions and Assessment Areas

The direct, indirect and cumulative IAAs for wild horses include the following: the project area for the direct IAA, the project area plus the Black Butte Mine for indirect IAA, and the Salt Wells Creek HMA for the cumulative IAA.

As directed by the Green River RMP (BLM 1997), wild horses would be managed at an appropriate management level with a site-specific activity plan that outlines RMP conformance objectives for vegetation management. Other resource uses within the HMA would be maintained and protected as long as they are not in conflict with the maintenance of viable wild horse herds at appropriate herd management levels (BLM 1997).

4.12.3 Direct and Indirect Impacts of the Proposed Action

Approximately 2,250 acres directly impacted by the Proposed Action would be disturbed in the short term, and forage production in this area would be lost for approximately 20 years during the life-of-operations. This loss of forage would displace individual wild horses to nearby suitable habitat. Because necessary resources for wild horses would be available adjacent to the project area, impacts on wild horse populations from displacement would be negligible. Additionally, because no range improvements or important water sources for wild horses exist within the project area, the Proposed Action would not impact them.

4.12.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, no project-related disturbance or development would take place beyond current BLM authorizations. Minor and short term impacts on wild horses would continue following existing trends, which would generally include the protection and maintenance of viable herds and appropriate herd management levels.

4.12.5 Cumulative Impacts

Surface disturbances in the wild horses cumulative IAA would include 21,014 acres of existing disturbances (1.79 percent of the IAA), 2,250 acres associated with the Proposed Action (0.19 percent) and 27,725 acres of foreseeable future disturbances (2.37 percent), totaling 50,989 acres, or 4.36 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 142.64 percent increase in surface disturbance in the wild horses cumulative IAA. Impacts on wild horses within the project area would contribute minimally to cumulative impacts on wild horses throughout the Salt Wells Creek HMA.

Within the cumulative IAA, minor and short term impacts from the No Action alternative would continue following existing trends. This would generally include the protection and maintenance of viable herds and appropriate herd management levels.

4.12.6 Irreversible and Irrecoverable Commitment of Resources

Because reclamation activities would be implemented, and re-establishment of current land uses would be anticipated, there would be no irreversible commitment of resources for wild horses. There would exist, however, an irretrievable commitment of forage resources during the life-of-operations and until habitat restoration is complete.

4.12.7 Potential Mitigation and Monitoring Measures

Mitigation and monitoring measures have not been identified.

4.12.8 Residual Impacts

No residual impacts would occur.

4.13 LAND USE

4.13.1 Land Status and Prior Rights

4.13.1.1 Regulatory Framework

The Green River RMP and ROD (BLM 1997) allows for coal leasing and development, other mineral leasing and locating, ROW and grazing permitting, recreational use, and provides land use guidance for those land uses within planning area.

4.13.1.2 Analysis Assumptions and Assessment Areas

The land status and prior rights direct, indirect, and cumulative IAAs are the project area. During construction and operation of the mine, the project area would be closed to recreation and grazing.

4.13.1.3 Direct and Indirect Impacts of the Proposed Action

In the short term, surface coal mining would restrict livestock grazing and reduce wildlife habitat, restrict public access and associated recreational use, and disrupt oil and gas development in the project area. There are no developed recreation areas or wilderness areas in the immediate vicinity of the existing Black Butte Mine or the project area.

In the long term, the surface and vegetation in the project area would be reclaimed and the land would be returned to a condition similar to its original status. The land would again be open to grazing, hunting, and other recreational opportunities. The land would also be available for oil or gas development. The land would be returned to BLM management for multiple use after the mine has received bond release. Private land would remain private.

4.13.1.4 Direct and Indirect Impacts of the No Action Alternative

If the No Action Alternative is selected, land status and prior rights to the project area would remain unchanged. The coal tract would not be developed. Impacts would continue to be moderate to substantial and short term to long term on the adjacent Black Butte Mine area.

4.13.1.5 Cumulative Impacts

There are no known past, present, or reasonably foreseeable projects that would change the land tenure in the project area. The land status and prior rights held by any party would remain unchanged. However, land use within the project area would be restricted. The mine would lease the federal surface and mineral estates from the BLM until the coal has been mined and the area has been reclaimed and released from bond.

Surface disturbances in the cumulative IAA would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA.

4.13.1.6 Irreversible and Irrecoverable Commitment of Resources

The loss of the coal in the project area would be irreversible. Measures would be implemented to return the area to a natural state when coal mining is complete, making the loss of opportunities for other land uses irretrievable, but not irreversible. The land status and prior rights to the land would remain unchanged during the life of the project.

4.13.1.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures are proposed beyond those inherent in the Proposed Action.

4.13.1.8 Residual Impacts

No residual impacts are anticipated.

4.13.2 Livestock and Grazing Management

4.13.2.1 Regulatory Framework

The Taylor Grazing Act of 1934, FLPMA of 1976, Public Rangelands Improvement Act of 1978, CFR, Subchapter D - Range Management (4000), 43 CFR 4000, and the Green River RMP and ROD (BLM 1997) contain the federal regulatory framework for grazing on lands administered by the BLM. The permit application package submitted to OSM and WDEQ/LQD would require reclamation, including revegetation of the coal mine.

4.13.2.2 Analysis Assumptions and Assessment Areas

The direct IAA for livestock grazing is the project area. The indirect IAA includes the project area and the existing Black Butte Mine permit area. The cumulative IAA includes the portion of the Rock Springs Allotment south of Interstate 80 and east of the Flaming Gorge Natural Recreation Area. It is assumed that the entire project area would be restricted from grazing when the mine starts operating in the area.

4.13.2.3 Direct and Indirect Impacts of the Proposed Action

Development of the project area would directly remove up to 4,359 acres of land from grazing use in the short term. Allocations of allotment use would have to be restructured by the BLM to accommodate the loss of forage and access available to grazing permittees. Approximately 221 AUMs would be lost as a direct result of leasing and subsequent mine expansion. Surface disturbance would alter approximately 2,250 acres of the project area's long-term forage productivity and diversity. The effects of mining in the project area would be most notable to those permittees who use forage production within the project area on an annual basis.

The project area provides approximately less than one percent (0.43 percent) of the total AUMs available in the indirect impact area portion of the Rock Springs Grazing Allotment South of Interstate 80. As portions of the adjoining Black Butte Mine are reclaimed and made available to grazing, the indirect impact of the loss of grazing in the project area would be reduced. There would be no additional loss of grazing area within the Black Butte Mine as a result of developing the project area.

4.13.2.4 Direct and Indirect Impacts of the No Action Alternative

The No Action Alternative would maintain the current situation for grazing. Forage production and diversity would remain the same and permittee access to the project area would continue. Impacts would continue to be moderate to substantial and short term on the adjacent Black Butte Mine area.

4.13.2.5 Cumulative Impacts

Surface disturbances in the livestock and grazing management cumulative IAA would include 17,964 acres of existing disturbances (1.78 percent of the IAA), 2,250 acres associated with the Proposed Action (0.22 percent) and 13,795 acres of foreseeable future disturbances (1.36 percent), totaling 34,009 acres or 3.36 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent an 89.32 percent increase in surface disturbance in the livestock and grazing management cumulative IAA.

Under the No Action Alternative 3.14 percent of allotment use and associated forage would not be available in the cumulative IAA. However, in both the No Action Alternative and the Proposed Action, reclamation and revegetation of surface disturbed sites will make many of these acres available for grazing in the short and long term. Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA.

4.13.2.6 Irreversible and Irrecoverable Commitment of Resources

No irreversible commitment of resources is anticipated in the project area. However, there would be an irretrievable commitment of resources during the short to long term. The project area would be closed to grazing until reclamation establishes vegetation to a level where grazing would not interfere with reclamation success.

4.13.2.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures have been identified beyond those inherent to the Proposed Action.

4.13.2.8 Residual Impacts

No residual impacts would be present.

4.13.3 Recreation

4.13.3.1 Regulatory Framework

BLM-administered public lands in the IAAs are managed for dispersed recreation. Goals and objectives for recreation are discussed in the Green River RMP and ROD (BLM 1997). WGFD sets hunting seasons and other regulations for hunting. Other recreational activities are guided by the Wyoming Statewide Comprehensive Outdoor Recreation Plan (Wyoming Division of State Parks and Historic Sites 2003).

4.13.3.2 Analysis Assumptions and Assessment Areas

The direct IAA for recreation is the project area, while the indirect IAA is the project area and Black Butte Mine. The cumulative IAA includes the project area, Black Butte Mine, and southern Sweetwater County south of Interstate 80.

4.13.3.3 Direct and Indirect Impacts of the Proposed Action

Due to safety concerns, the project area (4,359 acres) would be closed to the public, precluding recreational use. The restrictions would prohibit hunting, OHV use, camping, mountain biking, and hiking.

Indirect short-term effects from the Proposed Action to hunting could include displacement of big game, such as pronghorn, from the project area due to noise and habitat loss. Recreationists, including birders and nature photographers would find the visual quality of the outdoor experience diminished in the short term in areas with a view of the project area.

Upon project completion, the project area would be reopened to recreationists. Access for hunting, OHV use, camping, hiking, and mountain biking would be permitted in accordance with the applicable land use designations. Visual resource dependent recreation opportunities would be restored. BBCC would complete a site-specific, detailed reclamation plan in consultation with the WDEQ/LQD. One of the direct results of the reclamation would be restoration of native plant communities that support wildlife forage, nesting, cover, and the associated reestablishment of wildlife use for hunting opportunities.

4.13.3.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, there would be no direct loss of recreation areas within the project area. Hunters would not experience a disruption of large game behavior from additional mining activities, and access routes would remain unchanged. There would be no change in the visual quality of the outdoor experience. There would be no direct or indirect effects related to mining. Ongoing impacts in the adjacent Black Butte Mine area would be continue to be moderate and short term due to existing mining and other operations.

4.13.3.5 Cumulative Impacts

Surface disturbances in the recreation cumulative IAA would include 18,329 acres of existing disturbances (1.17 percent of the IAA), 2,250 acres associated with the Proposed Action (0.14 percent) and 18,604 acres of foreseeable future disturbances (1.18 percent), totaling 39,183 acres or 2.49 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 113.77 percent increase in surface disturbance in the recreation cumulative IAA.

Surface disturbing impacts would continue to displace big game species of interest to hunters. Some of these disturbances would increase motorized access to areas on roads developed for the project and others would restrict motorized and non-motorized access utilized by recreationists. The Proposed Action would not contribute to impacts on developed recreational facilities in the area. Dispersed recreation such as hunting and OHV use would still occur, but would be more concentrated on non-restricted areas.

Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA.

4.13.3.6 Irreversible and Irrecoverable Commitment of Resources

There is no identified irreversible commitment of recreation resources. However, the project area would be closed to recreation during operation of the mine, which would lead to an irretrievable loss of recreation opportunities. The project area would be reopened for recreation following reclamation activities.

4.13.3.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures have been identified beyond those in the Proposed Action.

4.13.3.8 Residual Impacts

No residual impacts would occur.

4.13.4 Transportation and ROWs

4.13.4.1 Regulatory Framework

The Green River RMP and ROD have a goal to make public lands available throughout the planning area for ROWs, permits, and leases for utility and transportation systems (BLM 1997).

4.13.4.2 Analysis Assumptions and Assessment Areas

The direct, indirect, and cumulative IAAs for transportation and ROWs are the project area.

4.13.4.3 Direct and Indirect Impacts of the Proposed Action

Approximately three miles of undesignated two-track road would be disturbed and inaccessible to the public in the project area. The undesignated two-track road bordering the eastern boundary of the project area could experience temporary visibility impacts during high wind and dry conditions.

4.13.4.4 Direct and Indirect Impacts of the No Action Alternative

If the No Action Alternative were selected then the existing two-track roads would remain unchanged. No new roads or ROWs would be constructed because the project area would remain undeveloped. Impacts would continue to be minor and short term from mining operations within the adjacent Black Butte Mine area.

4.13.4.5 Cumulative Impacts

Surface disturbances in the cumulative IAA would include three acres of known disturbance (0.07 percent of the IAA) and 2,250 acres (51.62 percent) associated with the Proposed Action, totaling 2,253 acres of surface disturbance or 51.69 percent of the cumulative IAA. This would represent a 75,000 percent increase in surface disturbance in the cumulative IAA.

Cumulative impacts if the No Action Alternative were implemented would represent continued minor to moderate impacts resulting from on-going mining and other existing and proposed oil and gas activities in the cumulative IAA. Minor erosion associated with two-track roads and OHV use would continue. The existing two-track roads in the project area would remain accessible with no change.

4.13.4.6 Irreversible and Irretrievable Commitment of Resources

An irretrievable and potentially irreversible commitment of resources, due to the loss of the two-track roads in the project area, would occur. An irreversible commitment of resources would occur if new two-track roads are not reconstructed.

4.13.4.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures have been identified beyond those inherent to the Proposed Action.

4.13.4.8 Residual Impacts

No residual impacts would occur.

4.14 VISUAL RESOURCES

4.14.1.1 Regulatory Framework

The Green River RMP and ROD have a goal to preserve the visual characteristics of or mitigate impacts on those characteristics throughout the planning area (BLM 1997). WDEQ/LQD permit requirements mandate that the topographic expression of a surface coal mine be reclaimed to a condition similar to pre-mining conditions.

4.14.1.2 Analysis Assumptions and Assessment Areas

The direct IAA for visual resource issues would be the project area. The indirect IAA is the project area and the Black Butte Mine permit area. The cumulative IAA for visual resources encompasses the checkerboard lands south of Interstate 80, and within the RSFO.

4.14.1.3 Direct and Indirect Impacts of the Proposed Action

The project area's Class IV VRM classification allows for disturbance such as mining to occur. Alterations to line, form, character, and texture would occur in the direct and indirect impact areas in the short term. The mining of Pit 14 would not be visible from any major travel routes. Portions of the project area and ancillary facilities in the Black Butte Mine would be highly visible from the Black Butte Mine Road and the two-track road that borders the eastern boundary of the project area during the short term.

In the long term as the land is reclaimed, the surface disturbance from mining would be recontoured with re-creations of existing landforms occurring where practical. Revegetation of land surfaces would buffer visual impact; however, until vegetation has matured, the lack of sagebrush would differentiate reclaimed areas from undisturbed areas. When the shrub component of revegetation matures (20 plus years) it would be difficult to distinguish reclaimed areas from undisturbed areas.

4.14.1.4 Direct and Indirect Impacts of the No Action Alternative

No impacts on line, form, character, or texture would occur in the project area under the No Action Alternative. Impacts to visual resource would continue to be moderate and short term on the adjacent Black Butte Mine area during mining. Impacts would be minor and permanent following reclamation.

4.14.1.5 Cumulative Impacts

Surface disturbances in the visual resource cumulative IAA would include 17,570 acres of existing disturbances (2.52 percent of the IAA), 2,250 acres associated with the Proposed Action (0.32 percent) and 5,365 acres of foreseeable future disturbances (0.77 percent), totaling 25,185 acres or 3.61 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 43.34 percent increase in surface disturbance in the visual resource cumulative IAA. Cumulative impacts to Class IV VRM areas would be minor.

Under the No Action Alternative 3.29 percent of the cumulative IAA would contain visible surface disturbances. Cumulative impacts following reclamation would be moderate and permanent in the cumulative IAA.

4.14.1.6 Irreversible and Irretrievable Commitment of Resources

Most visual impacts are irretrievable. Topographic modification of the project area would be an irreversible commitment of resources.

4.14.1.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures have been identified beyond those inherent to the Proposed Action.

4.14.1.8 Residual Impacts

A permanent moderation in line and form would occur following reclamation.

4.15 CULTURAL RESOURCES

4.15.1.1 Regulatory Framework

Cultural sites that are listed or eligible for listing in the NRHP would be managed under the guidelines of the National Historic Preservation Act (especially sections 106 and 110) and the Archeological Resources Protection Act. The Green River RMP and ROD (BLM 1997) sets goals and objectives for cultural resources in the planning area.

According to the Green River RMP:

In general, cultural sites on federal coal lands are avoidance areas for surface disturbing activities. As avoidance areas, cultural sites are open to consideration for coal leasing and development with appropriate measures to protect these resources (BLM 1997).

The following is a list of other rules and regulations that govern cultural resources:

- Wyoming Environmental Quality Act
- LQD Rules and Regulations; Coal Chapters II and IV
- The Antiquities Act of 1906
- The Historic Sites Act of 1935
- The Historic Preservation Act of 1966, as amended
- NEPA of 1969
- Executive Order 11593
- Procedures for the Protection of Historic and Cultural Properties of 1974
- Archeological Conservation Act of 1974
- SMCRA of 1977
- Archeological Resources Protection Act of 1979

4.15.1.2 Analysis Assumptions and Assessment Areas

The direct IAA for cultural resources includes portions of the project area that would be subject to ground disturbance. The indirect IAA includes the entire project area and the Black Butte Mine. The cumulative

IAA includes the portion of the east flank of the Rock Springs Uplift overlapping the Black Butte, Leucite Hills, and Bridger Coal mines.

4.15.1.3 Direct and Indirect Impacts of the Proposed Action

Direct impacts would primarily result from construction-related activities and would be considered substantial if lost information impeded efforts to reconstruct the prehistory or history of a region. A data recovery program has identified sites, including NRHP eligible, in the project area and recordation of attributes associated with those sites has occurred. Six sites have been excavated and removed. Based on this, the likelihood of cultural resources existing that have not been identified is low. A negligible impact on the future ability to reconstruct the prehistory and history within the project area would occur. Sites located within the pit area (the actual pit disturbance limit) would be destroyed during the implementation of activities related to open pit coal mining. Impacts on NRHP sites from other types of disturbances would be minor to moderate due to the implementation of avoidance measures when possible. No Native American Sensitive Sites were identified within the project area and based on this no impact would occur.

Indirect impacts include permanent the loss over a larger area of NRHP eligible sites in surface disturbances. These impacts may result in the future inability to revisit and analyze sites in the context of their aerial relationships. Indirect impacts on prehistoric and historic sites could result from unauthorized surface collecting of artifacts unrelated to the Proposed Action.

4.15.1.4 Direct and Indirect Impacts of the No Action Alternative

The No Action Alternative would not affect or increase the potential for impacts on cultural resources in the project area. Impacts would continue to be moderate and long term to permanent within the adjacent Black Butte Mine area.

4.15.1.5 Cumulative Impacts

Surface disturbances in the cumulative IAA would include 21,931 acres of existing disturbances (7.91 percent of the IAA), 2,250 acres associated with the Proposed Action (0.81 percent) and 4,703 acres of foreseeable future disturbances (1.70 percent), totaling 28,884 acres or 10.42 percent of the cumulative IAA. Implementation of the Proposed Action and foreseeable future actions would represent a 31.71 percent increase in surface disturbance in the cumulative IAA.

Under the No Action Alternative, 9.61 percent of the cumulative IAA would have surface disturbances. Impacts would be moderate and permanent in the cumulative IAA for known sites.

These surface disturbances would result in the loss of unidentified sites or artifacts that could otherwise add to the cultural information base. The likelihood of this is greatest on those private lands where cultural surveys are not performed prior to development. In these areas the loss or damage to unidentified cultural or historical sites or resources could be substantial. Such losses are not expected to increase in the cumulative IAA, due to the addition of the project area, since a Class III inventory and evaluative testing program has been completed.

4.15.1.6 Irreversible and Irretrievable Commitment of Resources

The project area and the actual pit disturbance area have already been field evaluated and six sites have been excavated and removed. The removal of the physical presence of these sites is an irreversible impact. However, data from these sites has been recovered. Additional sites that are located in areas that would experience surface disturbances would experience an irreversible commitment of resources.

4.15.1.7 Potential Mitigation and Monitoring Measures

No mitigation and monitoring measures have been identified beyond those inherent to the Proposed Action.

4.15.1.8 Residual Impacts

No residual impacts are expected.

4.16 SOCIAL AND ECONOMIC VALUES

4.16.1.1 Regulatory Framework

The Green River RMP and ROD (BLM 1997) provides goals and objectives for social and economic resources in the project area. The decisions contained in the Green River ROD guides the development of resources and resource uses that indirectly impact social and economic conditions in the planning area.

4.16.1.2 Analysis Assumptions and Assessment Areas

The IAAs for direct, indirect, and cumulative impacts are the same and are Sweetwater County. Most of the workforce for the project would be from existing mine-related workforces in Sweetwater County and at the existing Black Butte Mine in particular.

4.16.1.3 Direct and Indirect Impacts of the Proposed Action

During the operational phases of the project, economic impacts would include continued employment in the mining industry and secondary jobs in retail and service sectors. Property taxes and net proceeds of the mining taxes, as well as sales taxes would be paid to Sweetwater County. Continued mine employment would affect quality-of-life for workers and their families by providing income both directly to mine employees and indirectly to employees and owners of businesses providing personal and business support services. The State of Wyoming and the federal government would receive revenue resulting from continued mining.

BBCC employs approximately 170 people in Sweetwater County and would continue employment of approximately the same number of people. Most of the work force for the project would be from existing mine-related work forces in Sweetwater County. The Proposed Action could provide for stable employment levels for approximately 20 more years. Since it is expected that few new employees from outside the area would be needed, in migration due to the Proposed Action is anticipated to be negligible. No net change in Sweetwater County's socioeconomic resource base of employment, salary, and others is expected.

In 2004, the average annual wage for coal miners in Wyoming (not including benefits) was approximately \$64,000. As a result, the continued employment of the 170 BBCC employees would generate \$10.9 million in total annual wages. Assuming a 3.0 multiplier (secondary employment to primary employment), it is estimated that approximately 510 jobs (full-time equivalents) would potentially remain in the area of secondary employment associated with the mine. These jobs would be in the areas of wholesale and retail trade, local government, services, and other business and would have an estimated average annual wage of between \$16,000 and \$30,000 (BLM 2004).

The total estimated revenue at current market prices for in-place minable coal reserves (\$13.50 per ton for 8,800 btu per pound coal to \$34.35 per ton for 11,100 btu per pound coal) at the Black Butte Mine, Leucite Hills Mine, and Bridger Coal Mine, is between \$1.7 and \$4.5 billion. If the Proposed Action was

approved, the in-place minable reserves would increase this revenue an additional \$467 million to \$1.2 billion, or 26 percent increase over the life of the mine.

Approximately 34.6 million tons of in-place minable coal would be removed from the project area. Approximately 25 percent of revenues from the sale of coal would go to pay royalty, severance and ad valorem taxes. The resultant royalty and tax payments from revenues of coal sales would be between \$116 and \$300 million.

The majority of the remaining mine revenues would go to direct expenses associated with labor, equipment, maintenance, fuel, coal transportation, permitting, reclamation, sales and use taxes, lease bonus payment to the federal government, and property taxes. The remainder from this would be recognized as profit. Indirectly the operational and tax payments would benefit to local and national businesses supporting the coal mine and governmental programs. These economic impacts would be present in the short term and to a lesser extent into the long-term during reclamation activities.

The initial construction and operation of the mine is planned to be completed with Black Butte Mine's existing workforce. Therefore, no additive effects on housing and support services would occur from the Proposed Action.

Jim Bridger Power Plant would have a continuation of locally produced and inexpensive supply of coal of known quality available for purchase. This coal supply would stabilize electricity production costs.

4.16.1.4 Direct and Indirect Impacts of the No Action Alternative

Under the No Action Alternative, future contributions to state and local tax districts from ad valorem property and production taxes, abandoned mine land distributions, severance tax, sales tax, rents, and royalties, etc. would not occur that would otherwise be realized under the Proposed Action Alternative. This would amount to unrealized revenue emanating from the estimated \$10.9 million a year in personal income and the \$467 million and \$1.2 billion in total coal sales revenue. Employment beyond 2008 for the majority of the 171 individuals working at the Black Butte Mine would end. This would eliminate an income source for mine employees and support service employees.

A reduction in the demand for community support services and housing would occur. This would result in the re-evaluation of fire, medical, and educational service requirements in the county.

Jim Bridger Power Plant would have to acquire replacement contracts to supply coal, potentially increasing electricity production costs due to increased transportation and coal costs.

4.16.1.5 Cumulative Impacts

Implementation of the Proposed Action, reasonably foreseeable future projects, and continuation of existing projects would provide an increase in the tax base to the county, state, and federal governments. This increase would be realized through severance and ad valorem taxes, and royalty payments from existing and proposed mining, energy, and oil and gas projects. Employment opportunities would also be expected to increase. Based on this, the population of Sweetwater County is expected to increase over the next several years. The increase in population and the anticipated continuation of this trend, due primarily to increased non-coal mineral exploration development and production, would, in combination with a stable employment rate at the mine, continue to increase property values, the need for more schools, medical facilities, and other community services.

Implementation of the No Action Alternative would result in substantial and long term impacts in the cumulative IAA. The cessation of mining at the end of the Black Butte Mine's permitted reserves would create a negative and moderate impact that would decrease the rate of growth in population and personal

income levels. This may also slow growth impacts associated with known and reasonably foreseeable action in the cumulative IAA.

4.16.1.6 Irreversible and Irretrievable Commitment of Resources

No irreversible and irretrievable commitment of socioeconomic resources has been identified as a result of the Project.

4.16.1.7 Potential Mitigation and Monitoring Measures

No mitigation or monitoring measures have been identified for this resource.

4.16.1.8 Residual Impacts

No residual impacts on socioeconomics would occur.