

FINAL **Environmental Impact Statement for the** **Wright Area Coal Lease Applications**

Volume 1 of 2
Chapters 1 - 4



*West Loadout Facilities
Black Thunder Mine, Wyoming*



*Elk on Reclaimed Rangeland
Jacobs Ranch Mine, Wyoming*



*Elk on Reclaimed Rangeland
Black Thunder Mine, Wyoming*



*Loadout Facilities in Porcupine Creek Valley
North Antelope Rochelle Mine, Wyoming*

Wyoming State Office – High Plains District

July 2010



The BLM manages more land – 253 million acres – than any other Federal agency. This land, known as the National System of Public Lands, is primarily located in 12 Western States, including Alaska. The Bureau, with a budget of about \$1 billion, also administers 700 million acres of sub-surface mineral estate throughout the nation. The BLM's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

**WRIGHT AREA COAL LEASE APPLICATIONS
FINAL ENVIROMENTAL IMPACT STATEMENT**

Prepared by

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Sheridan, Wyoming**

Under the Direction of

**U.S. Department of the Interior
Bureau of Land Management
High Plains District Office
Casper, Wyoming**

and

Cooperating Agencies

**U.S. Department of the Interior
Office of Surface Mining
Reclamation and Enforcement
Denver, Colorado**

**U.S. Department of Agriculture
Forest Service
Medicine Bow-Routt National Forests and
Thunder Basin National Grassland
Douglas, Wyoming**

**Wyoming Department of Environmental Quality
Land Quality and Air Quality Divisions
Cheyenne, Wyoming**

**Wyoming Department of Transportation
Cheyenne, Wyoming**

**Converse County Board of Commissioners
Douglas, Wyoming**

**FINAL ENVIRONMENTAL IMPACT STATEMENT
WRIGHT AREA COAL LEASE APPLICATIONS
CAMPBELL COUNTY, WYOMING
ABSTRACT**

Lead Agency: USDI, Bureau of Land Management, High Plains District Office, Casper, Wyoming

Cooperating Agencies: USDI, Office of Surface Mining Reclamation and Enforcement, Denver, Colorado

USDA, Forest Service, Medicine Bow-Routt National Forests and Thunder Basin National Grassland, Douglas, Wyoming

Wyoming Department of Environmental Quality, Land Quality and Air Quality Divisions, Cheyenne, Wyoming

Wyoming Department of Transportation, Cheyenne, Wyoming

Converse County Board of Commissioners, Douglas, Wyoming

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This Final Environmental Impact Statement (EIS) assesses the environmental consequences of decisions to hold competitive, sealed-bid sales and issue leases for six federal coal maintenance tracts in Campbell County, Wyoming as a result of coal lease applications submitted by Ark Land Company, Jacobs Ranch Coal Company, and BTU Western Resources, Inc. As applied for, the Wright area coal lease-by-application (LBA) tracts include approximately 18,021.73 acres containing approximately 2.570 billion tons of federal coal. The tracts are referred to as the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine. The applicants propose to mine the tracts as maintenance leases for the existing adjacent mines, if lease sales are held and the applicant mines acquire the leases. At the time of application, the adjacent mines included Black Thunder, Jacobs Ranch, and North Antelope Rochelle.

This Final EIS describes the physical, biological, cultural, historic, and socioeconomic resources in and around the existing mines and the LBA tracts. The alternatives in the Final EIS consider the impacts of leasing the tracts as applied for, leasing reconfigured tracts in order to avoid bypassing federal coal or to increase competitive interest in the tracts, and not leasing the tracts. The focus for the impact analysis was based on resource issues and concerns identified during previous coal leasing analyses and public scoping conducted for these lease applications. Recent concerns related to leasing coal and its subsequent development include: impacts to groundwater, air quality, wildlife, cultural resources, paleontological resources, socioeconomics, loss of livestock grazing areas, conflicts with oil and gas development, cumulative impacts related to ongoing surface coal mining and other proposed development in the Wyoming Powder River Basin, greenhouse gas emissions, ozone, and climate change.

This Final EIS, in compliance with Section 7(c) of the Endangered Species Act as amended, identifies any endangered or threatened species which are likely to be affected by the Proposed Action.

The Final EIS is open for a 30-day review period beginning on the date that the U.S. Environmental Protection Agency publishes the Notice of Availability in the *Federal Register*. Comments that are postmarked or received on or before the end of the 30-day review period will be considered in the preparation of the Record of Decision.

EXECUTIVE SUMMARY

This Environmental Impact Statement (EIS)¹ analyzes the environmental impacts of leasing six tracts of federal coal reserves adjacent to the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines. All are operating surface coal mines in the southern Powder River Basin (PRB) of Wyoming, near the town of Wright. The operators of the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines filed four applications to lease the six tracts of federal coal included in maintenance coal tracts under the regulations at 43 CFR 3425, Leasing On Application.

The Division of Minerals and Lands at the Bureau of Land Management (BLM) Wyoming State Office reviewed all four applications and determined that the lease applications met the regulatory requirements for Lease by Applications (LBAs). These maintenance coal tracts, which would continue or extend the life of the applicant mines, are referred to as the North Hilight Field LBA Tract, the South Hilight Field LBA Tract, the West Hilight Field LBA Tract, the West Jacobs Ranch LBA Tract, the North Porcupine LBA Tract, and the South Porcupine LBA Tract. Figure ES-1 shows these six Wright Area Coal (WAC) LBA tracts, other currently pending LBA tracts, and the existing federal leases, including previously leased LBA tracts, in the Wyoming PRB.

On October 7, 2005, Ark Land Company (ALC) filed an application with the BLM for federal coal reserves in two separate tracts located north and southwest of and immediately adjacent to the Black Thunder Mine in Campbell County, Wyoming. The tracts are referred to as the North Hilight Field and South Hilight Field LBA Tracts. The North Hilight Field tract is located approximately 5.5 miles east of Wright, Wyoming and the South Hilight Field tract is located approximately 7 miles southeast of Wright (Figures ES-1, ES-2 and ES-3). The federal coal reserves were applied for as maintenance tracts for the Black Thunder Mine. BLM determined that the two tracts in the application would be processed separately and, if the decision is made to conduct a lease sale, would be offered for sale separately. ALC is a wholly owned subsidiary of Arch Coal, Inc. The Black Thunder Mine is operated by Thunder Basin Coal Company (TBCC), a subsidiary of Arch Western Resources, LLC. In this EIS, ALC is referred to as the applicant and TBCC is referred to in discussions of mine operations. ALC's coal lease application was assigned case file numbers WYW164812 (North Hilight Field) and WYW174596 (South Hilight Field).

On January 17, 2006, ALC filed an application with the BLM for federal coal reserves in a tract located west of and immediately adjacent to the Black Thunder Mine in Campbell County, Wyoming, approximately 4 miles southeast of Wright, Wyoming (Figures ES-1 and ES-4). The tract, which is referred to as the West Hilight Field LBA Tract, was assigned case file number WYW172388.

¹ Refer to page xxvii for a list of abbreviations and acronyms used in this document.

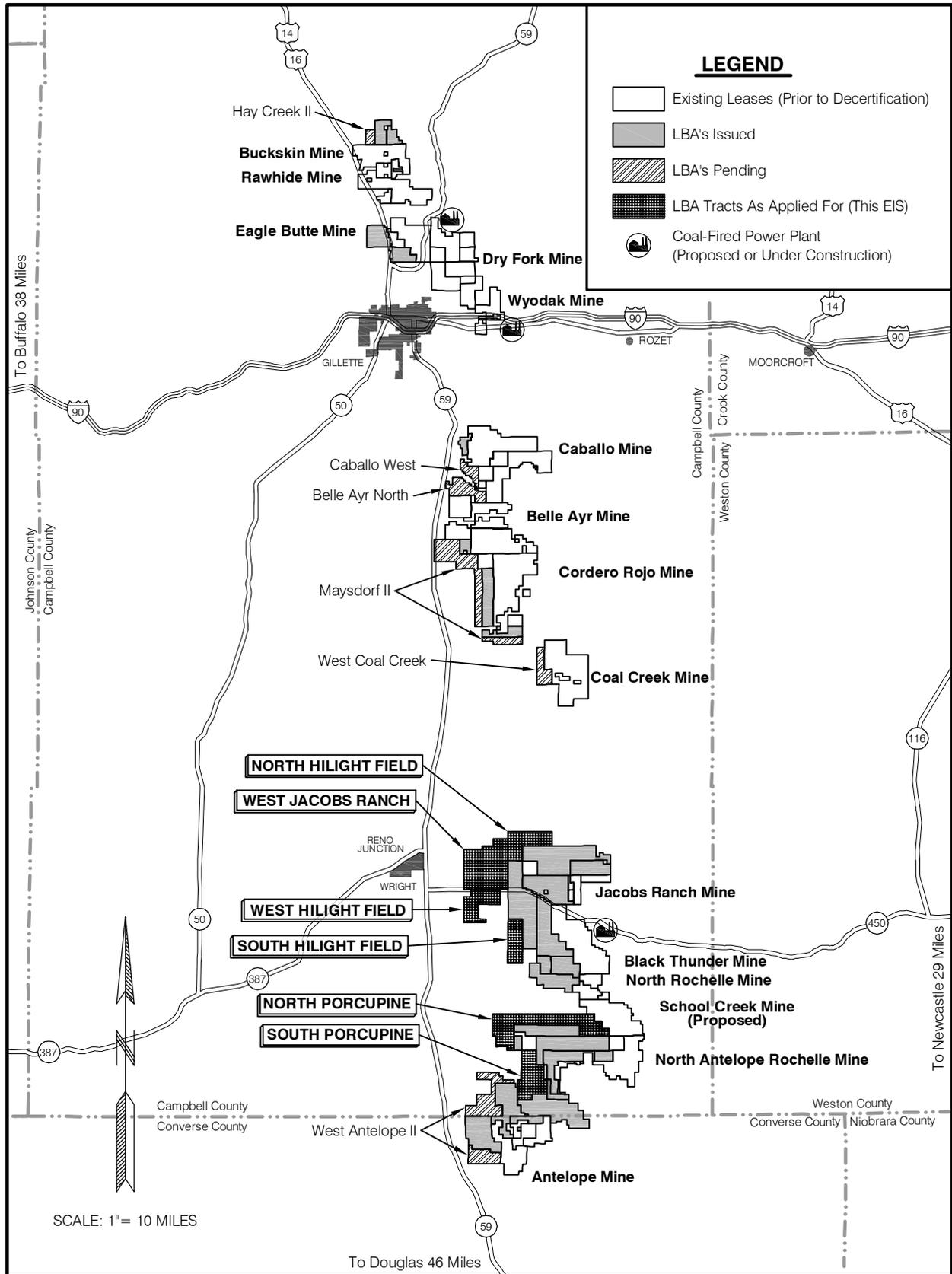


Figure ES-1. General Location Map with Federal Coal Leases and LBA Tracts.

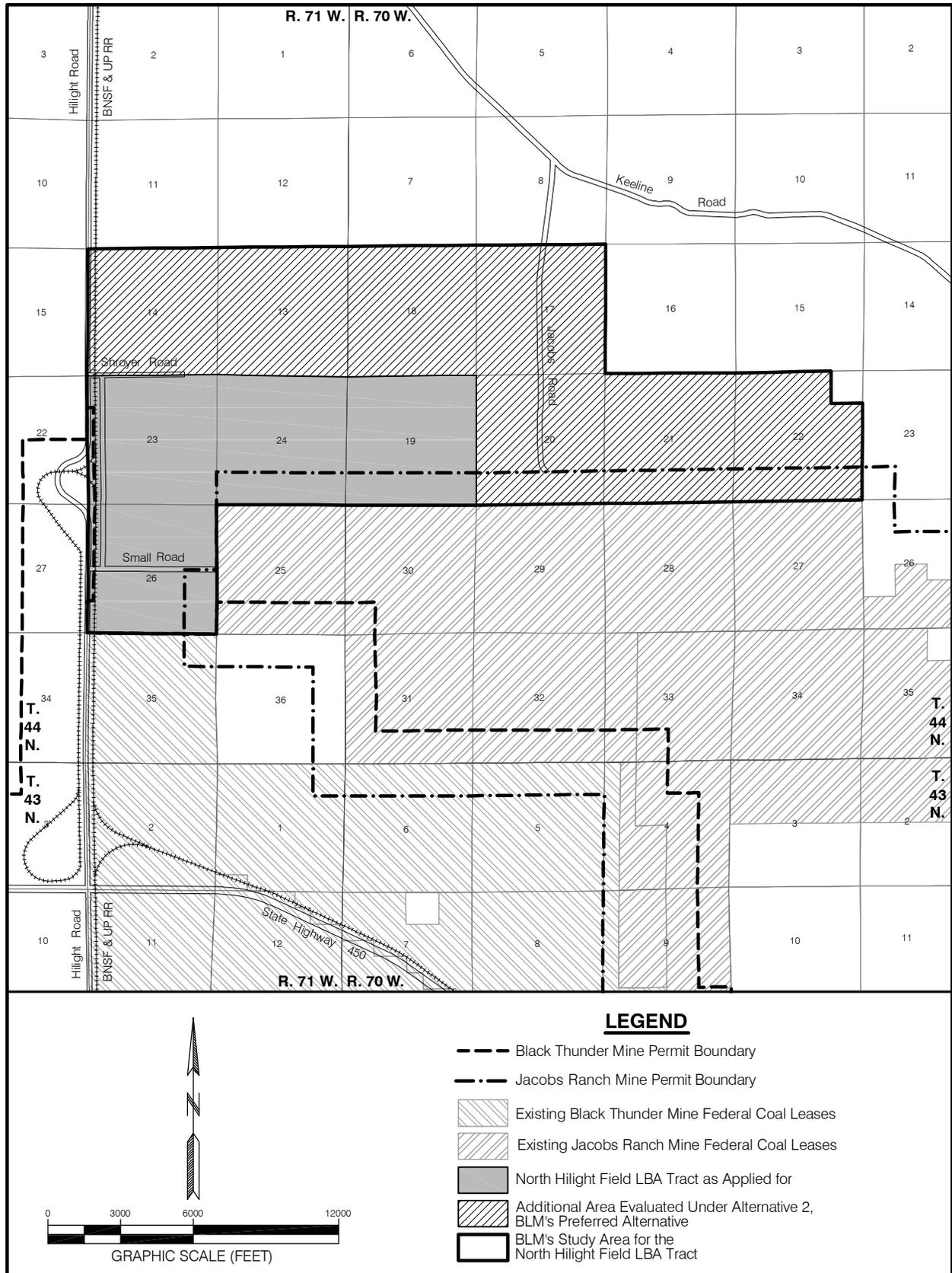


Figure ES-2. North Hilight Field LBA Tract Alternatives.

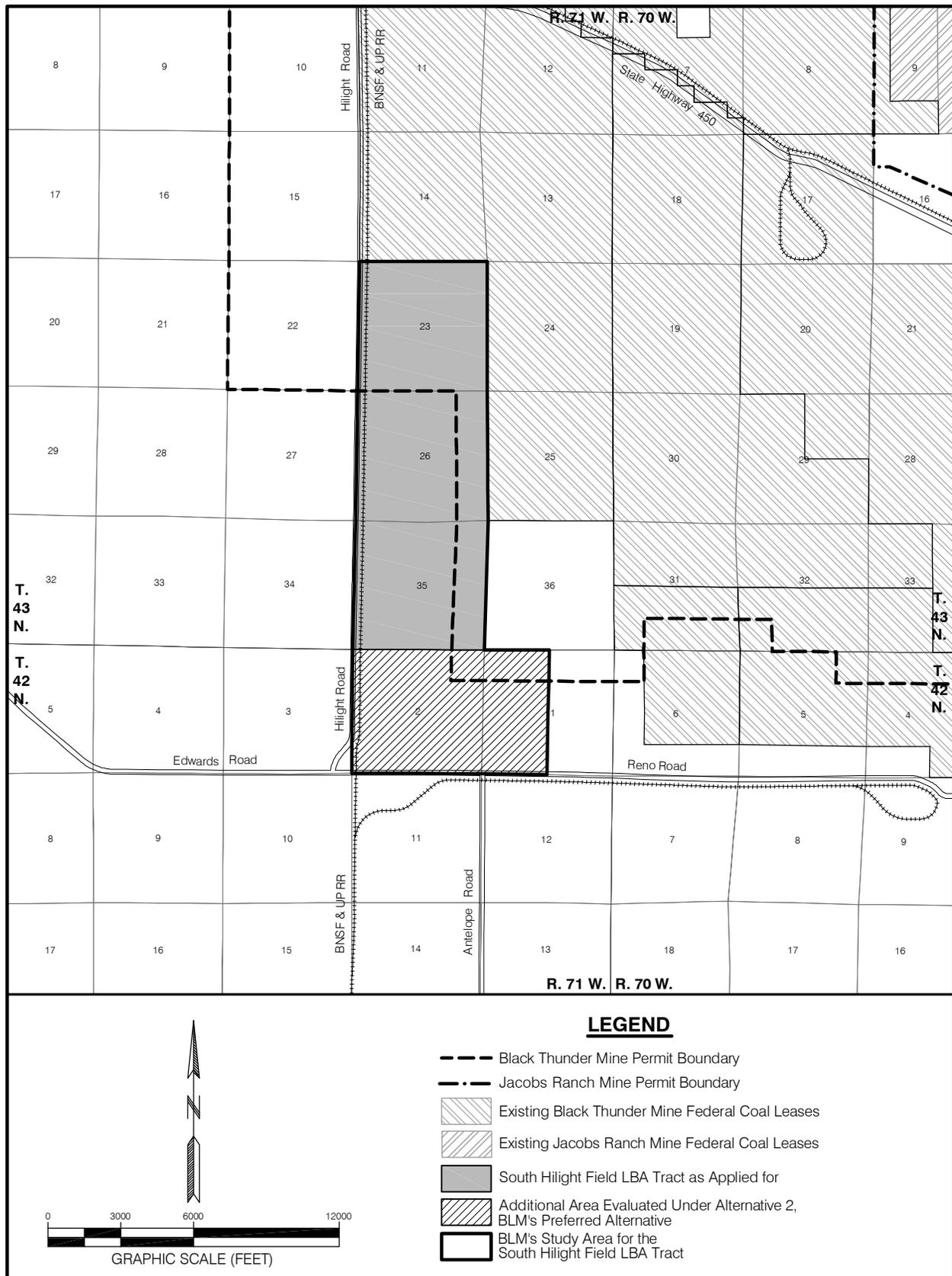


Figure ES-3. South Hilight Field LBA Tract Alternatives.

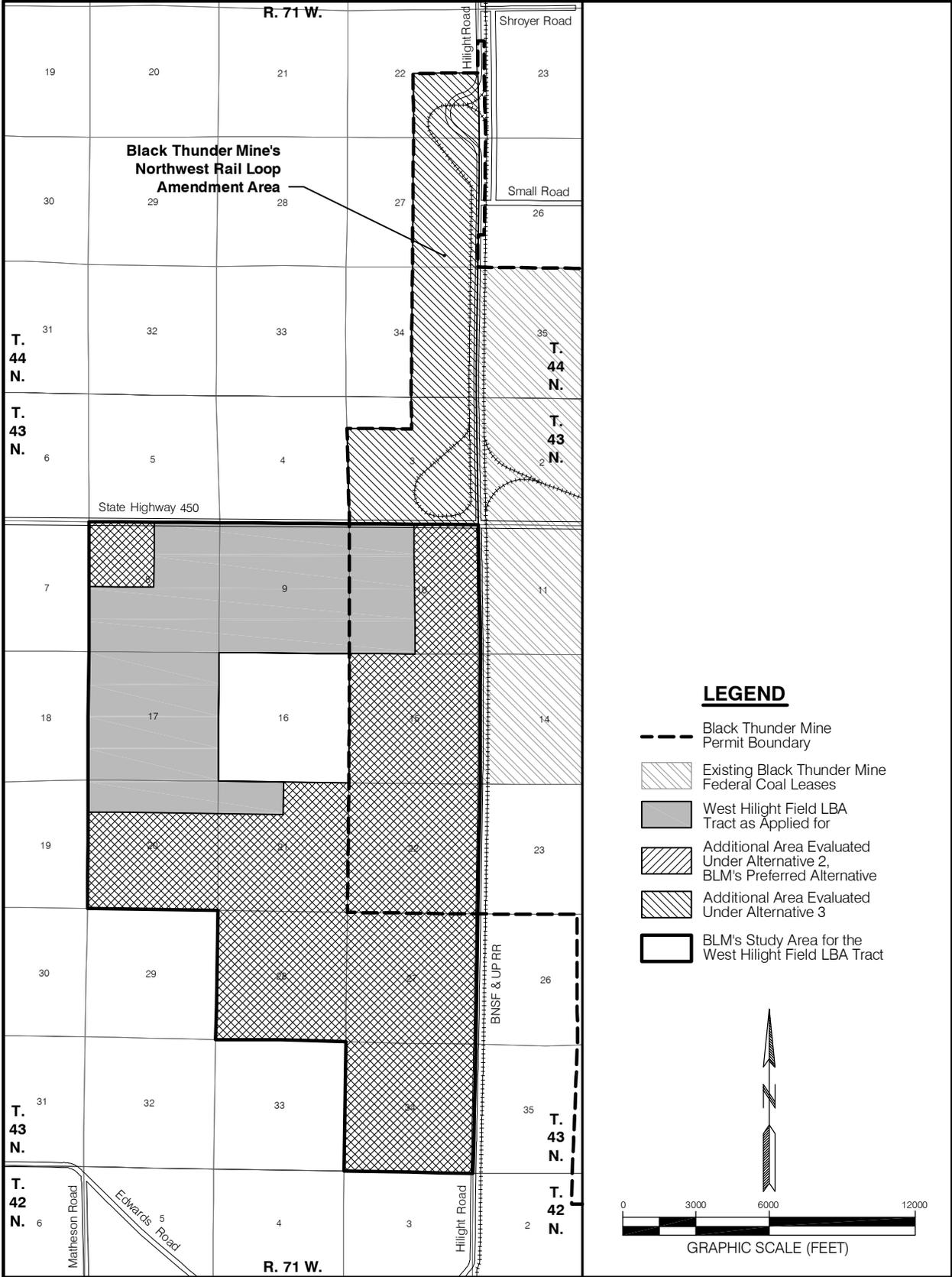


Figure ES-4. West Hilight Field LBA Tract Alternatives.

The federal coal reserves were applied for as a maintenance tract for the Black Thunder Mine.

On March 24, 2006, Jacobs Ranch Coal Company (JRCC) filed an application with the BLM for federal coal reserves in a tract located approximately 0.75 mile west of the Jacobs Ranch Mine in Campbell County, Wyoming. The tract, which is referred to as the West Jacobs Ranch LBA Tract, is located approximately 2.5 miles east of Wright, Wyoming (Figures ES-1 and ES-5). The federal coal reserves were applied for as a maintenance tract for the Jacobs Ranch Mine. On October 1, 2009, the Jacobs Ranch Mine was acquired by Arch Coal, Inc. ALC intends to consolidate the permits for the Jacobs Ranch Mine and the Black Thunder Mine in order to integrate the two separate mining operations. In this EIS, the applicant for the West Jacobs Ranch LBA Tract will be referred to as ALC. ALC's coal lease application was assigned case file number WYW172685.

On September 29, 2006, BTU Western Resources, Inc. (BTU) filed an application with the BLM for federal coal reserves in three separate tracts located west, northwest, and north of and immediately adjacent to the North Antelope Rochelle Mine in Campbell County, Wyoming. The two tracts on the north side of the mine were referred to as the North Porcupine LBA Tract, and the tract on the west side of the mine was referred to as the South Porcupine LBA Tract. On October 12, 2007, BTU filed a request with the BLM to modify the Porcupine LBA Tract configuration to increase the lease area and coal volume. The North Porcupine LBA Tract, which is located approximately 12 miles southeast of Wright, Wyoming, was combined into one tract and its size was increased with additional lands (Figures ES-1 and ES-6). The South Porcupine LBA Tract, which is located approximately 14 miles southeast of Wright, was also increased in size with additional lands (Figure ES-1 and ES-7). BLM reviewed the modified tract configuration and notified the company that their application had been modified. The federal coal reserves were applied for as maintenance tracts for the North Antelope Rochelle Mine. BLM determined that the two tracts in the application would be processed separately and, if the decision is made to conduct a lease sale, would be offered for sale separately. The North Antelope Rochelle Mine is operated by Powder River Coal, LLC (PRC), a subsidiary of Peabody Energy Corporation (PEC). BTU is also a subsidiary of PEC, and in this EIS, BTU is referred to as the applicant and PRC is referred to in discussions of mine operations. BTU's coal lease application was assigned case file numbers WYW173408 (North Porcupine) and WYW176095 (South Porcupine).

These federal coal lands are located within the Powder River Federal Coal Region, which was decertified in January, 1990. Although the Powder River Federal Coal Region is decertified, the Powder River Regional Coal Team (PRRCT), a federal/state advisory board established to develop recommendations concerning management of federal coal in the PRB, has continued to meet regularly and review all federal lease applications in the region. The PRRCT reviewed the North Hilight Field, South Hilight Field, West

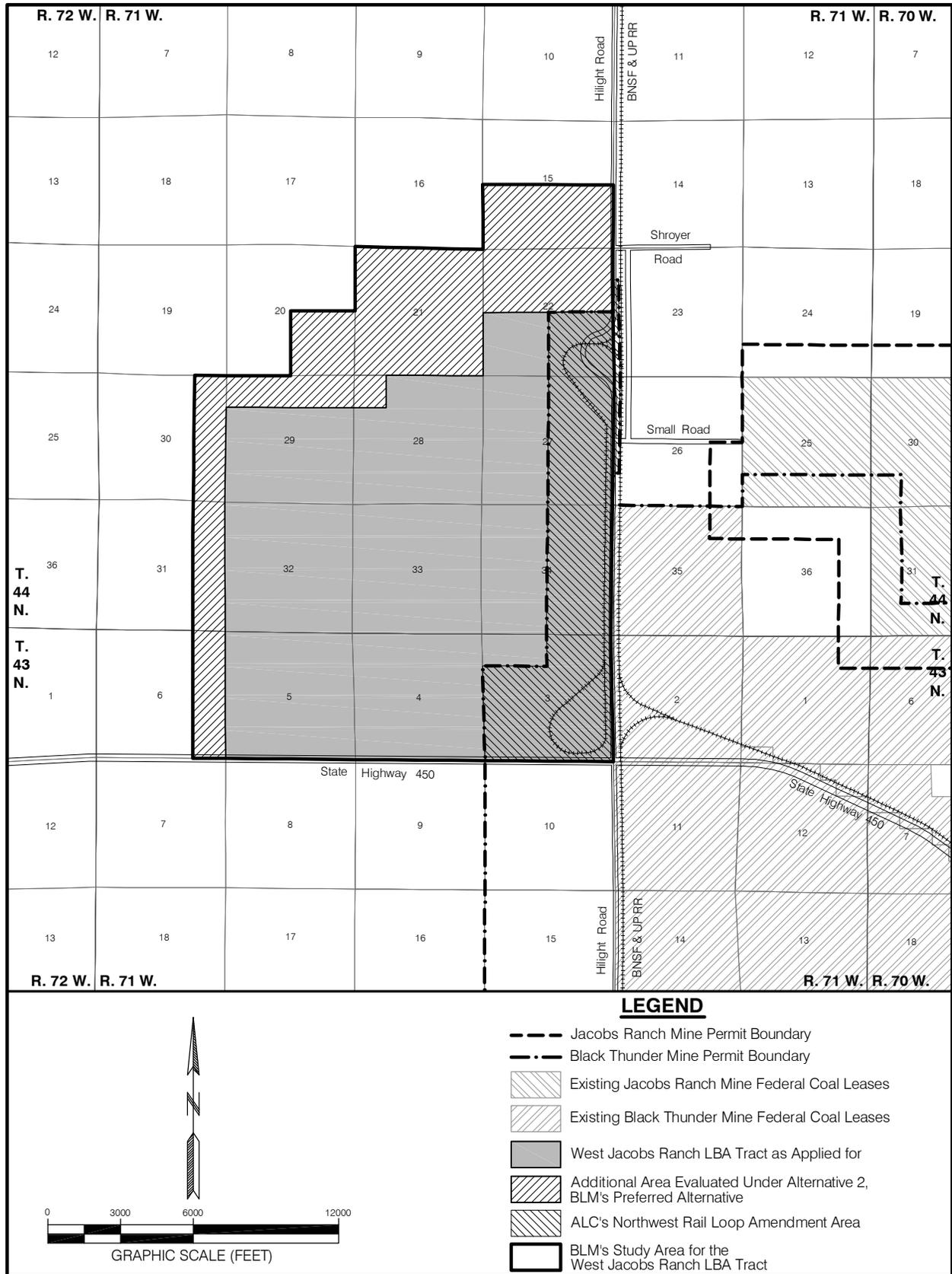


Figure ES-5. West Jacobs Ranch LBA Tract Alternatives.

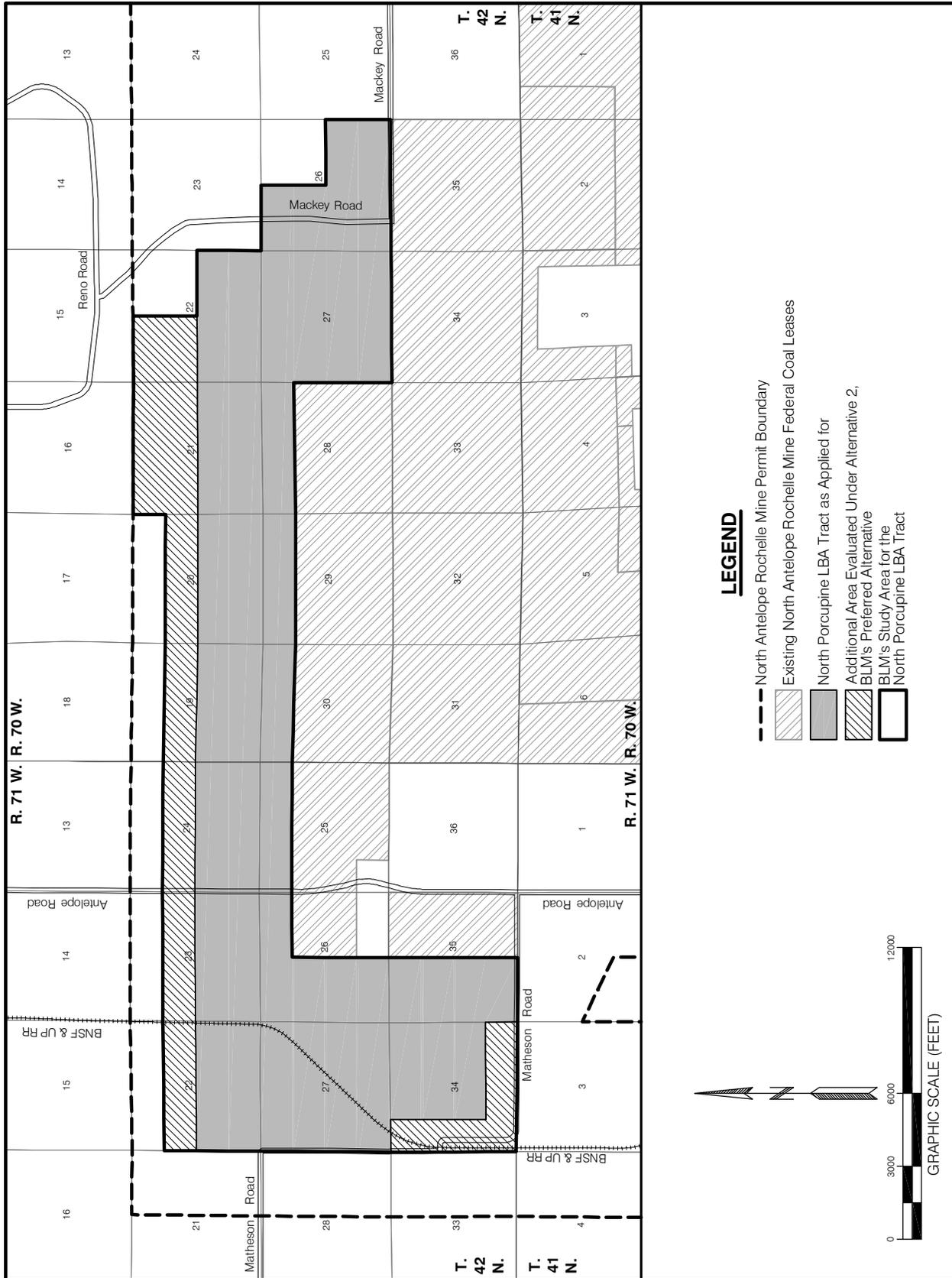


Figure ES-6. North Porcupine LBA Tract Alternatives.

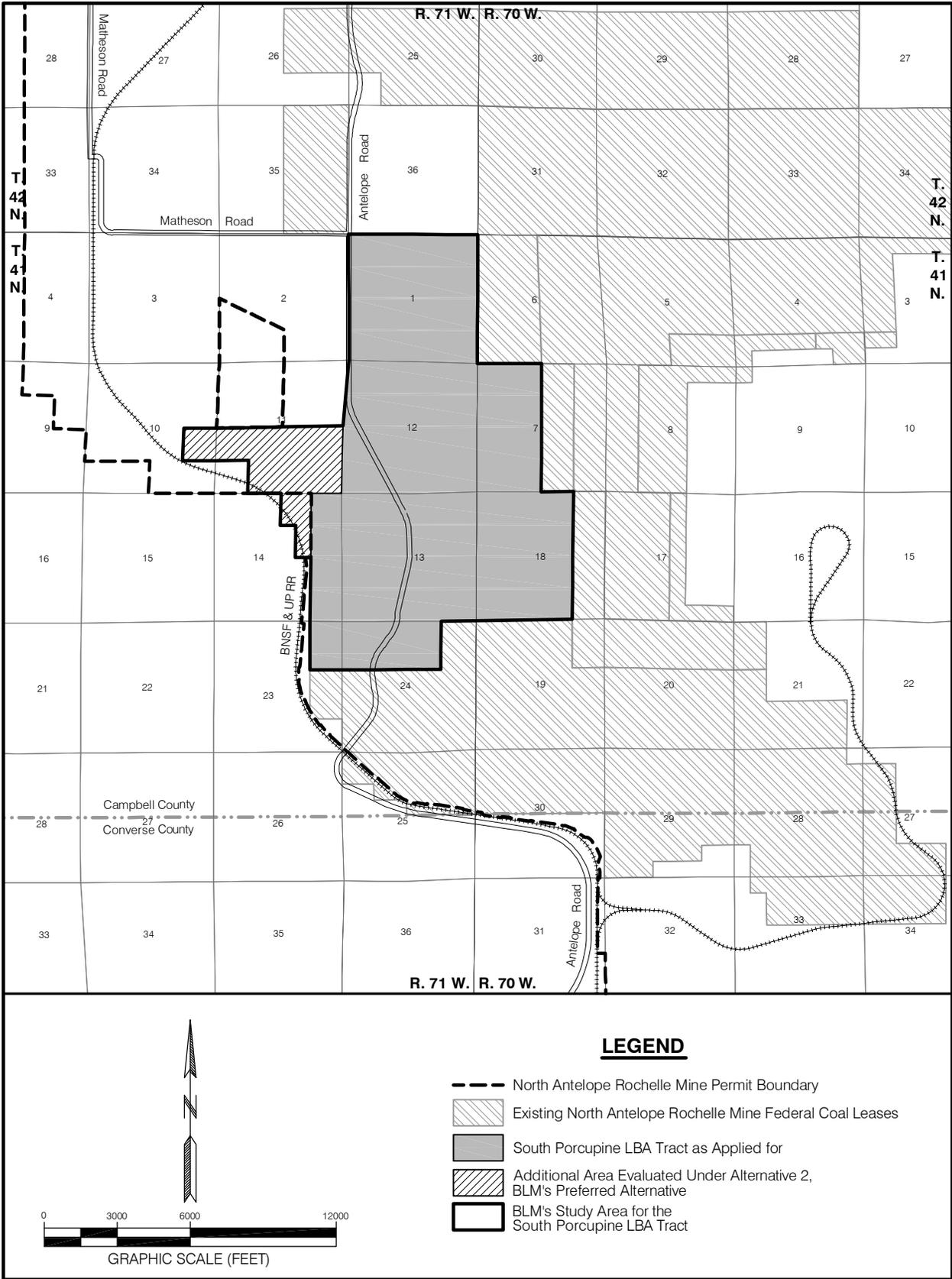


Figure ES-7. South Porcupine LBA Tract Alternatives.

Hilight Field, and West Jacobs Ranch maintenance coal lease applications at a public meeting held on April 19, 2006 in Casper, Wyoming. The PRRCT reviewed the Porcupine maintenance coal lease application at a public meeting held on January 18, 2007 in Casper, Wyoming. The PRRCT recommended that the BLM process all four lease applications at those respective meetings.

Evaluation Process

In order to process an LBA, BLM must evaluate the quantity, quality, maximum economic recovery, and fair market value of the federal coal and fulfill the requirements of the National Environmental Policy Act of 1969 (NEPA) by evaluating the environmental consequences of leasing the federal coal.

To evaluate the environmental impacts of leasing the coal, BLM must prepare an Environmental Assessment (EA) or an EIS to evaluate the site-specific and cumulative environmental and socioeconomic impacts of leasing and developing the federal coal in an application area. Due to the proximity of the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts, BLM made a decision to prepare a single EIS to evaluate the environmental impacts of coal mining that would be expected to result if leases are issued for these maintenance coal tracts. BLM does not authorize mining by issuing a lease for federal coal, but the impacts of mining the coal are considered in this EIS because it is a logical consequence of issuing a maintenance lease to an existing mine. Applicants must obtain permits from appropriate state and/or federal agencies to mine the coal.

The Environmental Protection Agency (EPA) published a notice announcing the availability of the Draft EIS in the *Federal Register* on June 26, 2009. The BLM published a Notice of Availability and Notice of Public Hearing for the Draft EIS in the *Federal Register* on July 8, 2009. The 60-day comment period on the Draft EIS ended 60 days following EPA's Notice of Availability (August 25, 2009). A public hearing was held on July 29 in Gillette, Wyoming to solicit public comments on the Draft EIS, the fair market value, the maximum economic recovery, and the proposed competitive sale of coal from the six LBA tracts. Two individuals representing organizations presented statements on the Draft EIS during the hearing, and written comments were received from 15 individuals, agencies, businesses, and organizations, as well as telephoned comments and hundreds of e-mails from interested individuals and entities during the comment period. A summary of the statements that were presented at the public hearing and the public comments, with agency responses, are included as Appendix I of this Final EIS.

BLM will use the analysis in this EIS to decide whether or not to hold a coal lease sale for each of the federal coal tracts and issue federal coal leases. The LBA sale process is, by law and regulation, an open, public, competitive sealed-bid process. If a sale is held for a tract, the bidding would be open to any

qualified bidder; it would not be limited to the applicant. If a separate lease sale is held for each of these six LBA tracts (North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine), the applicants (ALC and BTU) may not be the successful high bidders. If a lease sale is held for the federal coal included in each of the six LBA tracts, a federal sale panel selects the highest bidder at the sale. In order to be awarded a federal coal lease, the highest bid must meet or exceed the fair market value of the coal as determined by the BLM's economic evaluation, and if the U.S. Department of Justice determines that no antitrust violations would result from assigning the lease to the high bidder. Additionally, the high bidder cannot have any antitrust violations.

The successful bidder would then be required to submit a mine permit application, including detailed mining, monitoring, mitigation, and reclamation plans to the Wyoming Department of Environmental Quality/Land Quality Division (WDEQ/LQD) for review. The operator would also be required to submit a Resource Recovery and Protection Plan (R2P2) to the BLM for review. Before mining operations could begin in the new tract, the mining permit must be approved by WDEQ/LQD, the R2P2 must be approved by the BLM, and a Mineral Leasing Act mining plan must be approved by the Assistant Secretary of the Interior. In addition, a new coal mine, or a modification to an existing mine, must be permitted by the WDEQ/Air Quality Division (AQD).

Other agencies, including OSM, will also use this analysis to make decisions related to leasing and mining the federal coal in these six tracts. Cooperating agencies in the preparation of this EIS include the WDEQ, Office of Surface Mining Reclamation and Enforcement (OSM), U.S. Department of Agriculture-Forest Service (USFS), Wyoming Department of Transportation (WYDOT), and Converse County Board of Commissioners.

Not all of the coal included in the North Hilight Field LBA Tract as applied for is considered mineable at this time. Some of the coal included in the tract is located within the Burlington Northern Santa Fe & Union Pacific (BNSF & UP) railroad right-of-way (ROW). TBCC does not consider the coal underlying the railroad ROW to be recoverable at this time because the cost that would be associated with moving the railroad would make it economically unfeasible to recover the underlying coal. In addition to the railroad, two county roads border or cross some of the coal included in the North Hilight Field LBA Tract. The Small Road (Campbell County Road 89) crosses the LBA tract, and the Shroyer Road (Campbell County Road 116) borders the LBA tract. The Surface Mining Control and Reclamation Act of 1977 (SMCRA) prohibits mining within 100 feet on either side of the ROW of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected (30 CFR 761.11(d)). JRCC has obtained approval from the Campbell County Board of Commissioners, the authorized agency, to close the Small Road. The coal underlying the portion of Shroyer Road, its ROW and the 100-foot buffer zone within the North Hilight

Field LBA Tract is included for consideration for leasing because that coal could be mined if the Campbell County Commissioners determines that the road can be closed or relocated (43 CFR 3461.5(c)(2)(iii)). If the road is not moved, including the coal underlying the road in the lease would allow maximum recovery of all the mineable coal adjacent to the 100-foot buffer zone on either side of the road ROW.

Not all of the coal included in the South Hilight Field LBA Tract as applied for is considered mineable at this time. Some of the coal included in the tract is located within the BNSF & UP railroad ROW. TBCC does not consider the coal underlying the railroad ROW to be recoverable at this time because the cost that would be associated with moving the railroad would make it economically unfeasible to recover the underlying coal.

Not all of the coal included in the West Hilight Field LBA Tract as applied for is considered mineable at this time. A portion of Wyoming State Highway 450 borders the tract; therefore, the highway and its ROW overlie some of the coal included in the tract. SMCRA prohibits mining within 100 feet on either side of the ROW of any public road. However, the appropriate public road authority can allow the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected [30 CFR 761.11(d)]. For State Highway 450 west of the BNSF & UP railroad mainline, an unsuitability decision (43 CFR 3461) is deferred subject to a finding under this process (BLM 2001a). The coal underlying the portion of Highway 450, its ROW, and the 100-foot buffer zone within the West Hilight Field LBA Tract is included for consideration for leasing. That coal could be mined if the Wyoming Department of Transportation (WYDOT), the authorized agency, determines that the road can be moved [43 CFR 3461.5(c)(2)(iii)]. Including the coal underlying the highway in the lease would allow maximum recovery of all the mineable coal adjacent to the 100-foot buffer zone beside the highway ROW if the highway is not moved.

Not all of the coal included in the West Jacobs Ranch LBA Tract as applied for is considered mineable at this time. A portion of Wyoming State Highway 450 and a portion of the Hilight Road (Campbell County Road 52) overlie some of the coal included in the tract. SMCRA prohibits mining within 100 feet on either side of the ROW of any public road. However, the appropriate public road authority can allow the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected [30 CFR 761.11(d)]. For State Highway 450 west of the BNSF & UP railroad mainline (Figure ES-5), an unsuitability decision (43 CFR 3461) is deferred subject to a finding under this process (BLM 2001a). The coal underlying the portions of Highway 450 and the Hilight Road, their ROWs, and the associated 100-foot buffer zones within the West Jacobs Ranch LBA Tract is included for consideration for leasing. That coal could be mined if WYDOT and/or the Campbell County Board of Commissioners (authorized agencies), determine that the roads can be moved [43 CFR 3461.5(c)(2)(iii)]. Including the coal underlying the highway and

Hilight Road in the lease would allow maximum recovery of all the mineable coal adjacent to the 100-foot buffer zones beside the highway and road ROWs if the State Highway and Hilight Road are not moved.

Not all of the coal included in the North Porcupine LBA Tract as applied for is considered mineable at this time. Some of the coal included in the tract is located within the BNSF & UP railroad ROW. PRC does not consider the coal underlying the railroad ROW to be recoverable at this time because the cost that would be associated with moving the railroad would make it economically unfeasible to recover the underlying coal. Moreover, the coal beneath those portions of the BNSF & UP railroad ROW on federally administered surface lands in the North Porcupine tract was determined to be unsuitable for mining according to the coal mining Unsuitability Criteria (43 CFR 3461). Some of the coal included in the North Porcupine tract is located within the Teckla Substation layback buffer zone. Due to the requirement that no blasting operations be conducted within 500 feet of a substation, the coal underlying the substation buffer zone is not considered mineable at this time by PRC because the cost that would be associated with moving the substation would make it economically unfeasible to recover. In addition to the railroad and substation, three county roads cross or border some of the coal included in the North Porcupine LBA Tract. The Antelope Road (Campbell County Road 4) overlies the tract; the Matheson Road (Campbell County Road 70) borders the tract; and the Mackey Road (Campbell County Road 69, Alternate 1) crosses and borders the tract. SMCRA prohibits mining within 100 feet on either side of the ROW of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected (30 CFR 761.11(d)). The coal underlying those portions of these roads, their ROWs, and the associated 100-foot buffer zones within the North Porcupine tract is included for consideration for leasing because that coal could be mined if the Campbell County Board of Commissioners, the authorized agency, determines that the roads can be closed or relocated (43 CFR 3461.5(c)(2)(iii)). PRC has obtained approval from the Campbell County Board of Commissioners to close and relocate those portions of the Antelope and Matheson roads that cross and border the North Porcupine LBA Tract. If the Mackey Road is not closed or relocated, including the coal underlying the road in the lease would allow maximum recovery of all the mineable coal adjacent to the 100-foot buffer zone on either side of the road ROW. PRC is evaluating the feasibility of relocating the Mackey Road.

Not all of the coal included in the South Porcupine LBA Tract as applied for is considered mineable at this time. The BNSF & UP railroad line lies just west of the tract, and some of the coal included in the tract is located within a 1,000-foot wide layback buffer zone on the east side of the railroad ROW centerline. PRC does not consider the coal underlying the railroad layback buffer zone to be recoverable at this time because the cost that would be associated with moving the railroad would make it economically unfeasible to recover that coal. In addition to the railroad buffer, a portion of the Antelope Road (Campbell

County Road 4) crosses some of the coal included in the South Porcupine LBA Tract. SMCRA prohibits mining within 100 feet on either side of the ROW of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected (30 CFR 761.11(d)). The coal underlying the portion of Antelope Road, its ROW, and the 100-foot buffer zone within the South Porcupine LBA Tract is included for consideration for leasing because it could be mined if the Campbell County Board of Commissioners (authorized agency) determine that the road can be closed or relocated (43 CFR 3461.5(c)(2)(iii)). PRC has obtained approval from the Campbell County Board of Commissioners to close and relocate a portion (approximately 1.25 miles) of Antelope Road that crosses the tract. PRC plans to apply for approval to close and relocate the remainder (approximately 2.25 miles) of Antelope Road that crosses the South Porcupine tract. Including the coal underlying the 2.25-mile portion of Antelope Road in the lease would allow maximum recovery of all the mineable coal adjacent to the 100-foot buffer zone on either side of the road if the remainder of the road is not moved. PRC is evaluating the feasibility of relocating the remainder of this county road.

A decision to lease the federal coal lands in these applications would be in conformance with the *Approved Resource Management Plan for Public Lands Administered by the Bureau of Land Management Buffalo Field Office* (BLM 2001a) and with the *Land and Resource Management Plan for the Thunder Basin National Grassland, Medicine Bow-Routt National Forest* (USFS 2001).

Proposed Actions and Alternatives

The Proposed Actions and alternatives to those actions are analyzed in detail in this Final EIS.

- **Proposed Action** - The Proposed Action for each LBA tract is to hold a competitive coal lease sale and issue a maintenance lease to the successful bidder for the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts as applied for (Figures ES-2 through ES-7, respectively). The applicant mines' estimates of the coal reserve, lease area and surface disturbance area for each tract as applied for are included in Tables ES-1 through ES-12. The applicant mines' estimated future coal production, remaining mine life, and employment are also given in Tables ES-1 through ES-12.
- **Alternative 1** - Under Alternative 1, the No Action Alternative for each tract, the LBA tracts would not be leased, but the existing leases at the adjacent Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines would be developed according to the existing approved mining plans. The applicant mines' remaining coal reserves, lease areas, future coal production rates, and employments are included in Tables ES-1

Table ES-1. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for North Hilight Field LBA Tract and Black Thunder Mine – Shroyer Road is Not Moved and the Underlying Coal is Not Recovered.

Item	Alternative 1 - No Action Alternative (Existing Black Thunder Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,271.1 mmt	319.7 mmt	756.9 mmt
Mineable Coal (as of 1/1/09) ¹	1,271.1 mmt	286.3 mmt	709.6 mmt
Recoverable Coal (as of 1/1/09) ²	1,169.4 mmt	263.4 mmt	652.8 mmt
Coal Mined Through 2008	1,087.9 mmt	--	--
Lease Area ³	19,581.3 ac	2,613.5 ac	7,139.4 ac
Total Area To Be Disturbed ³	26,490.2 ac	5,053.0 ac	12,908.8 ac
Permit Area ³	29,212.0 ac	5,053.0 ac	12,908.8 ac
Average Annual Coal Production (by 2015) ⁴	135 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.3 yrs	2.0 yrs	4.8 yrs
Projected Number of Employees (by 2013) ⁴	1,324	0	0
Total Projected State Revenues (post-2008) ⁵	\$1,977.9 mm	\$488.5 – \$584.4 mm	\$1,210.5 – \$1,448.3 mm
Total Projected Federal Revenues (post-2008) ⁶	\$1,541.1 mm	\$390.1 – \$486.0 mm	\$966.8 – \$1,204.5 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath the BNSF & UP railroad ROW and associated buffer zone and Shroyer Road ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ The mine projects to increase production rate from 100 mmtpy after 2008 to 135 mmtpy by 2015. The mine projects to increase employment from 1,080 to 1,324 as projected production increases.

⁵ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁶ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

Executive Summary

Table ES-2. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for North Hilight Field LBA Tract and Black Thunder Mine – Shroyer Road is Moved and the Underlying Coal is Recovered.

Item	Alternative 1 - No Action Alternative (Existing Black Thunder Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,271.1 mmt	319.7 mmt	756.9 mmt
Mineable Coal (as of 1/1/09) ¹	1,271.1 mmt	295.8 mmt	727.5 mmt
Recoverable Coal (as of 1/1/09) ²	1,169.4 mmt	272.1 mmt	669.3 mmt
Coal Mined Through 2008	1,087.9 mmt	--	--
Lease Area ³	19,581.3 ac	2,613.5 ac	7,139.4 ac
Total Area To Be Disturbed ³	26,490.2 ac	5,053.0 ac	12,908.8 ac
Permit Area ³	29,212.0 ac	5,053.0 ac	12,908.8 ac
Average Annual Coal Production (by 2015) ⁴	135 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.3 yrs	2.0 yrs	5.0 yrs
Projected Number of Employees (by 2013) ⁴	1,324	0	0
Total Projected State Revenues (post-2008) ⁵	\$1,977.9 mm	\$504.6 – \$603.7 mm	\$1,241.1 – \$1,484.9 mm
Total Projected Federal Revenues (post-2008) ⁶	\$1,541.1 mm	\$403.0 – \$502.1 mm	\$991.2 – \$1,234.9 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ The mine projects to increase production rate from 100 mmtpy after 2008 to 135 mmtpy by 2015. The mine projects to increase employment from 1,080 to 1,324 as projected production increases.

⁵ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁶ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

Table ES-3. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for South Hilight Field LBA Tract and Black Thunder Mine – Reno Road is Not Moved and the Underlying Coal is Not Recovered.

Item	Alternative 1 - No Action Alternative (Existing Black Thunder Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,271.1 mmt	273.3 mmt	406.5 mmt
Mineable Coal (as of 1/1/09) ¹	1,271.1 mmt	232.2 mmt	330.8 mmt
Recoverable Coal (as of 1/1/09) ²	1,169.4 mmt	213.6 mmt	304.3 mmt
Coal Mined Through 2008	1,087.9 mmt	--	--
Lease Area ³	19,581.3 ac	1,976.7 ac	2,922.4 ac
Total Area To Be Disturbed ³	26,490.2 ac	1,126.0 ac	2,731.4 ac
Permit Area ³	29,212.0 ac	1,126.0 ac	2,731.4 ac
Average Annual Coal Production (by 2015) ⁴	135 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.3 yrs	1.6 yrs	2.3 yrs
Projected Number of Employees (by 2013) ⁴	1,324	0	0
Total Projected State Revenues (post-2008) ⁵	\$1,977.9 mm	\$396.1 – \$473.9 mm	\$564.3 – \$675.1 mm
Total Projected Federal Revenues (post-2008) ⁶	\$1,541.1 mm	\$316.3 – \$394.1 mm	\$450.7 – \$561.5 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone. Under Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath Reno Road ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ The mine projects to increase production rate from 100 mmtpy after 2008 to 135 mmtpy by 2015. The mine projects to increase employment from 1,080 to 1,324 as projected production increases.

⁵ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁶ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

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Table ES-4. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for South Hilight Field LBA Tract and Black Thunder Mine – Reno Road is Moved and the Underlying Coal is Recovered.

Item	Alternative 1 - No Action Alternative (Existing Black Thunder Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,271.1 mmt	273.3 mmt	406.5 mmt
Mineable Coal (as of 1/1/09) ¹	1,271.1 mmt	232.2 mmt	347.8 mmt
Recoverable Coal (as of 1/1/09) ²	1,169.4 mmt	213.6 mmt	320.0 mmt
Coal Mined Through 2008	1,087.9 mmt	--	--
Lease Area ³	19,581.3 ac	1,976.7 ac	2,922.4 ac
Total Area To Be Disturbed ³	26,490.2 ac	1,126.0 ac	2,731.4 ac
Permit Area ³	29,212.0 ac	1,126.0 ac	2,731.4 ac
Average Annual Coal Production (by 2015) ⁴	135 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.3 yrs	1.6 yrs	2.4 yrs
Projected Number of Employees (by 2013) ⁴	1,324	0	0
Total Projected State Revenues (post-2008) ⁵	\$1,977.9 mm	\$396.1 – \$473.9 mm	\$593.4 – \$709.9 mm
Total Projected Federal Revenues (post-2008) ⁶	\$1,541.1 mm	\$316.3 – \$394.1 mm	\$473.9 – \$590.4 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ The mine projects to increase production rate from 100 mmtpy after 2008 to 135 mmtpy by 2015. The mine projects to increase employment from 1,080 to 1,324 as projected production increases.

⁵ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁶ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

Table ES-5. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for West Hilight Field LBA Tract and Black Thunder Mine – State Highway 450 and Hilight Road are Not Moved and the Underlying Coal is Not Recovered.

Item	Alternative 1 –			
	No Action Alternative (Existing Black Thunder Mine)	Added by Proposed Action	Added by Alternative 2	Added by Alternative 3
In-Place Coal (as of 1/1/09)	1,271.1 mmt	440.4 mmt	1,147.9 mmt	1,373.4 mmt
Mineable Coal (as of 1/1/09) ¹	1,271.1 mmt	410.8 mmt	1,049.1 mmt	1,049.1 mmt
Recoverable Coal (as of 1/1/09) ²	1,169.4 mmt	377.9 mmt	965.2 mmt	965.2 mmt
Coal Mined Through 2008	1,087.9 mmt	--	--	--
Lease Area ³	19,581.3 ac	2,370.5 ac	7,191.3 ac	8,570.1 ac
Total Area To Be Disturbed ³	26,490.2 ac	6,351.4 ac	10,250.8 ac	10,250.8 ac
Permit Area ³	29,212.0 ac	6,351.4 ac	10,250.8 ac	10,250.8 ac
Average Annual Coal Production (by 2015) ⁴	135 mmt	0 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.3 yrs	2.8 yrs	7.1 yrs	7.1 yrs
Projected Number of Employees (by 2013) ⁴	1,324	0	0	0
Total Projected State Revenues (post-2008) ⁵	\$1,977.9 mm	\$700.8 – \$838.4 mm	\$1,789.9 – \$2,141.3 mm	\$1,789.9 – \$2,141.3 mm
Total Projected Federal Revenues (post-2008) ⁶	\$1,541.1 mm	\$559.7 – \$697.3 mm	\$1,429.4 – \$1,780.8 mm	\$1,429.4 – \$1,780.8 mm

¹ Under the Proposed Action, the mineable coal figure excludes all coal that would not be mined beneath State Highway 450 ROW and associated buffer zone. Under Alternatives 2 and 3, the mineable coal figure excludes all coal that would not be mined beneath State Highway 450 and Hilight Road ROWs and associated buffer zones. Under Alternative 3, the mineable coal figure excludes all coal that would not be mined beneath the Northwest Rail Loop Amendment Area.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ The mine projects to increase production rate from 100 mmtpy after 2008 to 135 mmtpy by 2015. The mine projects to increase employment from 1,080 to 1,324 as projected production increases.

⁵ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁶ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

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Table ES-6. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for West Hilight Field LBA Tract and Black Thunder Mine – State Highway 450 and Hilight Road are Moved and the Underlying Coal is Recovered.

Item	Alternative 1 – No Action Alternative (Existing Black Thunder Mine)	Added by Proposed Action	Added by Alternative 2	Added by Alternative 3
In-Place Coal (as of 1/1/09)	1,271.1 mmt	440.4 mmt	1,147.9 mmt	1,373.4 mmt
Mineable Coal (as of 1/1/09) ¹	1,271.1 mmt	440.4 mmt	1,147.9 mmt	1,147.9 mmt
Recoverable Coal (as of 1/1/09) ²	1,169.4 mmt	405.2 mmt	1,056.1 mmt	1,056.1 mmt
Coal Mined Through 2008	1,087.9 mmt	--	--	--
Lease Area ³	19,581.3 ac	2,370.5 ac	7,191.3 ac	8,570.1 ac
Total Area To Be Disturbed ³	26,490.2 ac	6,351.4 ac	11,629.5 ac	11,629.5 ac
Permit Area ³	29,212.0 ac	6,351.4 ac	11,629.5 ac	11,629.5 ac
Average Annual Coal Production (by 2015) ⁴	135 mmt	0 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.3 yrs	3.0 yrs	7.8 yrs	7.8 yrs
Projected Number of Employees (by 2013) ⁴	1,324	0	0	0
Total Projected State Revenues (post-2008) ⁵	\$1,977.9 mm	\$751.4 – \$898.9 mm	\$1,958.4 – \$2,343.0 mm	\$1,958.4 – \$2,343.0 mm
Total Projected Federal Revenues (post-2008) ⁶	\$1,541.1 mm	\$600.1 – \$747.6 mm	\$1,564.0 – \$1,948.6 mm	\$1,564.0 – \$1,948.6 mm

¹ Under the Proposed Action, the mineable coal figure excludes all coal that would not be mined beneath State Highway 450 ROW and associated buffer zone. Under Alternatives 2 and 3, the mineable coal figure excludes all coal that would not be mined beneath State Highway 450 and Hilight Road ROWs and associated buffer zones. Under Alternative 3, the mineable coal figure excludes all coal that would not be mined beneath the Northwest Rail Loop Amendment Area.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ The mine projects to increase production rate from 100 mmtpy after 2008 to 135 mmtpy by 2015. The mine projects to increase employment from 1,080 to 1,324 as projected production increases.

⁵ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming’s share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal’s 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal’s 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal’s 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁶ Federal revenues include black lung taxes and the federal government’s share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state’s 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state’s 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state’s 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

Table ES-7. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for West Jacobs Ranch LBA Tract and Jacobs Ranch Mine – State Highway 450 and Hilight Road are Not Moved and the Underlying Coal is Not Recovered.

Item	Alternative 1 - No Action Alternative (Existing Jacobs Ranch Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	403.6 mmt	957.0 mmt	1,269.0 mmt
Mineable Coal (as of 1/1/09) ¹	403.6 mmt	744.0 mmt	1,014.0 mmt
Recoverable Coal (as of 1/1/09) ²	379.4 mmt	669.6 mmt	912.6 mmt
Coal Mined Through 2008	671.1 mmt	--	--
Lease Area ³	7,381.0 ac	5,944.4 ac	8,076.2 ac
Total Area To Be Disturbed ³	15,261.5 ac	7,023.0 ac	9,370.0 ac
Permit Area ³	15,625.0 ac	8,066.0 ac	10,766.0 ac
Average Annual Coal Production (post-2008)	40 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.6 yrs	16.7 yrs	22.8 yrs
Projected Number of Employees	630	155	155
Total Projected State Revenues (post-2008) ⁴	\$641.7 mm	\$1,244.1 – \$1,493.4 mm	\$1,695.6 – \$2,035.3 mm
Total Projected Federal Revenues (post-2008) ⁵	\$500.0 mm	\$994.1 – \$1,243.3 mm	\$1,354.8 – \$1,694.5 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath State Highway 450 and Hilight Road ROWs and associated buffer zones.

² Assumes 94 percent recovery of mineable coal that occurs during normal mining operation under Alternative 1, and 90 percent recovery of mineable coal that occurs during normal mining operation under the Proposed Action and Alternative 2.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁵ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.0 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

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Table ES-8. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for West Jacobs Ranch LBA Tract and Jacobs Ranch Mine – State Highway 450 and Hilight Road are Moved and the Underlying Coal is Recovered.

Item	Alternative 1 - No Action Alternative (Existing Jacobs Ranch Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	403.6 mmt	957.0 mmt	1,269.0 mmt
Mineable Coal (as of 1/1/09) ¹	403.6 mmt	957.0 mmt	1,269.0 mmt
Recoverable Coal (as of 1/1/09) ²	379.4 mmt	861.3 mmt	1,142.1 mmt
Coal Mined Through 2008	671.1 mmt	--	--
Lease Area ³	7,381.0 ac	5,944.4 ac	8,076.2 ac
Total Area To Be Disturbed ³	15,261.5 ac	7,023.0 ac	9,370.0 ac
Permit Area ³	15,625.0 ac	8,066.0 ac	10,766.0 ac
Average Annual Coal Production (post-2008)	40 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.6 yrs	21.5 yrs	28.6 yrs
Projected Number of Employees	630	155	155
Total Projected State Revenues (post-2008) ⁴	\$641.7 mm	\$1,600.3 – \$1,920.9 mm	\$2,122.0 – \$2,547.2 mm
Total Projected Federal Revenues (post-2008) ⁵	\$500.0 mm	\$1,278.6 – \$1,599.2 mm	\$1,695.5 – \$2,120.6 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure includes all coal that would be mined beneath State Highway 450 and Hilight Road ROWs and associated buffer zones.

² Assumes 94 percent recovery of mineable coal that occurs during normal mining operation under Alternative 1, and 90 percent recovery of mineable coal that occurs during normal mining operation under the Proposed Action and Alternative 2.

³ The lease area figure includes federal coal leases only and does not include state and private coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁵ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

Table ES-9. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for North Porcupine LBA Tract and North Antelope Rochelle Mine – Mackey Road is Not Moved and the Underlying Coal is Not Recovered.

Item	Alternative 1 - No Action Alternative (Existing North Antelope Rochelle Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,049.9 mmt	756.9 mmt	955.8 mmt
Mineable Coal (as of 1/1/09) ¹	1,015.0 mmt	653.5 mmt	810.2 mmt
Recoverable Coal (as of 1/1/09) ²	933.8 mmt	601.2 mmt	745.4 mmt
Coal Mined Through 2008	1,230.8 mmt	--	--
Lease Area ³	16,666.1 ac	5,795.8 ac	7,366.8 ac
Total Area To Be Disturbed ³	27,443.0 ac	9,864.0 ac	11,444.0 ac
Permit Area ³	45,975.0 ac	1,760.0 ac	3,120.0 ac
Average Annual Coal Production (post-2008)	95 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.9 yrs	6.3 yrs	7.8 yrs
Projected Number of Employees	1,150	0	0
Total Projected State Revenues (post-2008) ⁴	\$1,579.4 mm	\$1,114.9 – \$1,333.8 mm	\$1,382.3 – \$1,653.7 mm
Total Projected Federal Revenues (post-2008) ⁵	\$1,230.6 mm	\$890.3 – \$1,109.3 mm	\$1,103.9 – \$1,375.3 mm

¹ Under the Proposed Action, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone, Teckla Substation buffer zone, and Mackey Road ROW and associated buffer zone. Under Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone, Teckla Substation buffer zone, a portion of Matheson Road ROW and associated buffer zone, and Mackey Road ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁵ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

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Table ES-10. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for North Porcupine LBA Tract and North Antelope Rochelle Mine – Mackey Road is Moved and the Underlying Coal is Recovered.

Item	Alternative 1 - No Action Alternative (Existing North Antelope Rochelle Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,049.9 mmt	756.9 mmt	955.8 mmt
Mineable Coal (as of 1/1/09) ¹	1,015.0 mmt	688.3 mmt	845.0 mmt
Recoverable Coal (as of 1/1/09) ²	933.8 mmt	633.3 mmt	777.4 mmt
Coal Mined Through 2008	1,230.8 mmt	--	--
Lease Area ³	16,666.1 ac	5,795.8 ac	7,366.8 ac
Total Area To Be Disturbed ³	27,443.0 ac	10,167.0 ac	11,767.0 ac
Permit Area ³	45,975.0 ac	1,760.0 ac	3,120.0 ac
Average Annual Coal Production (post-2008)	95 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.9 yrs	6.7 yrs	8.2 yrs
Projected Number of Employees	1,150	0	0
Total Projected State Revenues (post-2008) ⁴	\$1,579.4 mm	\$1,174.4 – \$1,405.0 mm	\$1,441.6 – \$1,724.7 mm
Total Projected Federal Revenues (post-2008) ⁵	\$1,230.6 mm	\$937.9 – \$1,168.4 mm	\$1,151.3 – \$1,434.4 mm

¹ Under the Proposed Action, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone and Teckla Substation buffer zone. Under Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone, Teckla Substation buffer zone, and a portion of Matheson Road ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁵ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.35 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

Table ES-11. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for South Porcupine LBA Tract and North Antelope Rochelle Mine – 2.25-Mile Section of Antelope Road is Not Moved and the Underlying Coal is Not Recovered.

Item	Alternative 1 - No Action Alternative (Existing North Antelope Rochelle Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,049.9 mmt	422.2 mmt	470.9 mmt
Mineable Coal (as of 1/1/09) ¹	1,015.0 mmt	336.6 mmt	368.8 mmt
Recoverable Coal (as of 1/1/09) ²	933.8 mmt	309.7 mmt	339.3 mmt
Coal Mined Through 2008	1,230.8 mmt	--	--
Lease Area ³	16,666.1 ac	3,186.0 ac	3,568.0 ac
Total Area To Be Disturbed ³	27,443.0 ac	3,366.0 ac	4,068.0 ac
Permit Area ³	45,975.0 ac	200.0 ac	400.0 ac
Average Annual Coal Production (post-2008)	95 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.9 yrs	3.3 yrs	3.6 yrs
Projected Number of Employees	1,150	0	0
Total Projected State Revenues (post-2008) ⁴	\$1,579.4 mm	\$574.3 – \$687.1 mm	\$629.2 – \$752.7 mm
Total Projected Federal Revenues (post-2008) ⁵	\$1,230.6 mm	\$458.6 – \$571.4 mm	\$502.5 – \$626.0 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone and 2.25-mile section of Antelope Road and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁵ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

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Table ES-12. Summary Comparison of Coal Production, Surface Disturbance, Mine Life, and Revenues for South Porcupine LBA Tract and North Antelope Rochelle Mine – 2.25-Mile Section of Antelope Road is Moved and the Underlying Coal is Recovered.

Item	Alternative 1 - No Action Alternative (Existing North Antelope Rochelle Mine)	Added by Proposed Action	Added by Alternative 2
In-Place Coal (as of 1/1/09)	1,049.9 mmt	422.2 mmt	470.9 mmt
Mineable Coal (as of 1/1/09) ¹	1,015.0 mmt	408.4 mmt	440.6 mmt
Recoverable Coal (as of 1/1/09) ²	933.8 mmt	375.7 mmt	405.4 mmt
Coal Mined Through 2008	1,230.8 mmt	--	--
Lease Area ³	16,666.1 ac	3,186.0 ac	3,568.0 ac
Total Area To Be Disturbed ³	27,443.0 ac	3,908.0 ac	4,610.0 ac
Permit Area ³	45,975.0 ac	200.0 ac	400.0 ac
Average Annual Coal Production (post-2008)	95 mmt	0 mmt	0 mmt
Remaining Life of Mine (post-2008)	9.9 yrs	4.0 yrs	4.3 yrs
Projected Number of Employees	1,150	0	0
Total Projected State Revenues (post-2008) ⁴	\$1,579.4 mm	\$696.7 – \$833.5 mm	\$751.8 – \$899.4 mm
Total Projected Federal Revenues (post-2008) ⁵	\$1,230.6 mm	\$556.4 – \$693.2 mm	\$600.4 – \$748.0 mm

¹ Under the Proposed Action and Alternative 2, the mineable coal figure excludes all coal that would not be mined beneath BNSF & UP railroad ROW and associated buffer zone.

² Assumes 92 percent recovery of mineable coal that occurs during normal mining operation.

³ The lease area figure includes federal coal leases only and does not include state coal within the permit boundary. The disturbed area exceeds the leased area (total federal and state) because of the need for highwall reduction, topsoil removal, and other mine support activities outside the lease boundaries. The permit area is larger than the leased or disturbed area to assure that all disturbed lands are within the permit boundary and to allow an easily defined legal land description.

⁴ Revenues to the State of Wyoming include severance taxes, property and production taxes (ad valorem), sales and use taxes, and Wyoming's share of federal royalty payments, AML fees and bonus bid payments. State revenues are based on \$0.4312 per ton estimate for severance taxes × amount of recoverable coal, plus \$0.372 per ton estimate for ad valorem taxes × amount of recoverable coal, plus \$0.0569 per ton estimate for sales and use taxes × amount of recoverable coal, plus a projected coal price of \$11.06 per ton × amount of recoverable coal × federal royalty of 12.5 percent minus federal's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus federal's 50 percent share, plus bonus bid payment on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus bid payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus federal's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

⁵ Federal revenues include black lung taxes and the federal government's share of federal royalty payments, AML fees, and bonus bid payments. Federal revenues are based on a projected coal price of \$11.06 per ton × amount of recoverable coal × black lung tax of 4.4 percent, plus \$11.06 per ton price × amount of recoverable coal × federal royalty of 12.5 percent minus state's 50 percent share, plus \$0.28 per ton for AML fees × amount of recoverable coal minus state's 50 percent share, plus bonus bid payments on LBA leased coal of \$0.30 to \$0.97 per ton (based on the range of bonus payments for the last 9 LBAs sold from 2004 through early 2009) × amount of mineable coal minus state's 50 percent share. These figures could change based on the outcome of recent legislation that changed the percent of distribution to states.

through ES-12. Rejection of the lease applications would not preclude applications to lease the tracts in the future.

- **Alternatives 2 and 3** - Under Alternative 2 for each of the six LBA tracts and Alternative 3 for the West Hilight Field LBA Tract, BLM would reconfigure the tract, hold a competitive coal lease sale for the lands included in the reconfigured tract, and issue a maintenance lease to the successful bidder for a tract that is larger than the applied-for tract.

BLM identified a study area for each LBA tract in order to evaluate the potential that an alternate configuration of the tract would provide more efficient recovery of the federal coal, increase competitive interest in the tract, and/or reduce the potential that some of the remaining unleased federal coal in this area would be bypassed in the future. The BLM study area includes the tract as applied for plus adjacent unleased federal coal, which is depicted as the additional area evaluated under Alternatives 2 and 3 in Figures ES-2 through ES-7. These different tract configurations are considered as Alternatives 2 and 3 in this EIS. Alternative 2, holding a competitive sale for a modified tract, is BLM's Preferred Alternative for each of these six LBA tracts. The applicant mines' estimates of the coal reserve, lease area and surface disturbance area for each tract under Alternative 2 and for the West Hilight Field tract under Alternative 3 are included in Tables ES-1 through ES-12.

The applicant mines' projected rates of coal production and employment would be similar to the Proposed Actions, although the life of the existing mines would be extended for a period of time, depending on if the public highway and/or county roads are or are not moved.

The analysis in this EIS assumes that ALC would be the successful bidder on the North, South and West Hilight Field LBA Tracts; ALC would be the successful bidder on the West Jacobs Ranch LBA Tract; and BTU would be the successful bidder on the North and South Porcupine LBA Tracts. Under the Proposed Actions and Alternatives 2 and 3, the leases would be subject to the standard and special lease stipulations developed for the PRB and for these tracts, which are listed in Appendix D of this EIS.

One alternative that was considered but not analyzed in detail included holding competitive coal lease sales and issuing leases for one or more of the LBA tracts to the successful bidder (not the applicants) for the purpose of developing new stand-alone mines. Another alternative that was not analyzed in detail called for delaying the competitive sales of one or more of the LBA tracts as applied for to increase the benefit to the public afforded by higher coal prices and/or to allow more complete recovery of the potential coal bed natural gas (CBNG) resources in the tracts prior to mining.

Environmental Concerns

Critical elements of the human environment (BLM 2008a) that could be affected by the Proposed Actions or Alternatives 2 and 3 include air quality, cultural resources, Native American religious concerns, threatened and endangered (T&E) plant and animal species, migratory birds, hazardous or solid waste, water quality (both surface and ground), wetlands/riparian zones, environmental justice, and invasive non-native species. Five other critical elements (areas of critical environmental concern, prime and unique farmland, floodplains, wild and scenic rivers, and wilderness) are not present in the general Wright analysis area and are not addressed further. In addition to the critical elements that are potentially present in the general Wright analysis area, this EIS discusses the status and potential effects of mining the LBA tracts on topography and physiography, geology and mineral resources, soils, water quantity and quality, alluvial valley floors (AVFs), vegetation, wildlife, land use and recreation, paleontological resources, visual resources, noise, transportation resources, and socioeconomics.

The environmental impacts of mining each of the LBA tracts would be similar under the Proposed Action and Alternatives 2 and 3.

The general analysis area for each of these six LBA tracts represents the maximum surface area that could be disturbed by mining activities analyzed in this EIS. More specifically, each LBA tract's general analysis area is defined as the BLM study area plus surrounding lands within a ¼-mile perimeter that could be disturbed by mining the coal within the BLM study area where future mining disturbance could occur. Surface disturbance occurs outside of a coal lease area as a result of activities including, but not limited to, overstripping, highwall backsloping (including catch benches), highwall reduction after mining to match undisturbed topography, and construction of flood- and sediment-control structures. For the purpose of this analysis, the general Wright analysis area is defined as the area encompassing all six of these LBA tracts' general analysis areas.

► Topography

The general Wright analysis area is located in the PRB, a part of the Northern Great Plains that includes most of northeastern Wyoming. The North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts are located in the southeastern part of the PRB, in an area consisting primarily of a gently rolling upland terrain of low relief, broken by minor drainages and internally-drained playa areas. Drainage densities are quite low, and the playas are common topographic and hydrologic features. Land surface elevations range from about 4,690 to 5,170 feet above sea level. Gently rolling uplands comprise most of the general Wright analysis area; most of the land surface (between 75 and 90 percent, depending on the particular LBA tract) seldom exceeds a 5 percent slope. The steepest slopes typically occur near the highest elevations along the

ridge lines and drainage divides, at the breaks or the broken land dissected by small ravines and gullies, or at the transitions between uplands and bottom lands.

The existing topography on each LBA tract that is leased would be substantially changed during mining. A highwall with a vertical height equal to overburden plus coal thickness would exist in the active pits. Following reclamation, the average surface elevation would be lower due to removal of the coal. The reclaimed land surface would approximate premining contours, and the basic drainage network would be retained; however, the reclaimed surface would typically contain fewer and gentler topographic features. This could contribute to reduced habitat diversity and wildlife carrying capacity on the LBA tracts. These topographic changes would not conflict with regional land use, and the postmining topography would adequately support anticipated postmining land use for each tract.

► **Geology**

The mineable coal seams in the PRB are part of the Tongue River Member of the Fort Union Formation. The nomenclature of the mineable coal seams in the Tongue River Member varies from mine operator to mine operator in the eastern PRB and are locally referred to as the Anderson and Canyon, Roland and Smith, Wyodak-Anderson, and Wyodak. Operators of the mines in the general Wright analysis area refer to the mineable coal zone as either the Wyodak (Upper Wyodak, Middle Wyodak and Lower Wyodak) or the Wyodak-Anderson. The number of coal seams varies from tract to tract. The combined average thicknesses of the mineable coal seams range between 61 feet within the North Hilight Field LBA Tract to 104 feet within the West Jacobs Ranch LBA Tract. Interburden thickness between the coal seams varies from 0 (West Jacobs Ranch) to around 94 feet (South Hilight Field), and average overburden thickness on each tract ranges from around 246 feet (North Hilight Field) to around 480 feet (West Jacobs Ranch).

The geology from the base of the coal to the land surface would be subject to considerable permanent change on each LBA tract under the Proposed Actions or Alternatives 2 and 3. After removal of the coal, the replaced overburden would be a relatively homogeneous mixture compared to the premining layered overburden.

► **Other Mineral Resources**

With the exception of developing continuous oil and gas resources via horizontal wells completed in source rocks many thousands of feet below the mineable Wyodak-Anderson coal beds, other minerals present on the LBA tracts could not be developed during mining. Some of these other minerals could, however, be developed after coal mining and reclamation are completed. Development of other minerals potentially present on the LBA tracts could not occur during mining but could occur after mining.

Conventional oil and gas resources in the general Wright analysis area have been extensively developed. According to the WOGCC database as of May 2008, a total of 74 conventional oil and natural gas wells have been drilled and 33 were capable of producing within the six LBA tracts as applied for and the lands added by the respective BLM study areas included in this analysis (WOGCC 2008a). No conventional oil or natural gas wells have been drilled within these six LBA tract study areas since 1990, so the area generally appears to be unfavorable for additional production from known conventional reservoirs. According to the January 2008 reserve estimate of conventional oil and gas resources that was prepared by Allen & Crouch (A&C) Petroleum Engineers, Inc. of Casper, Wyoming, of the 33 wells capable of producing oil or conventional gas that are located within the respective BLM study areas for these six LBA tracts, 16 wells are considered to have recoverable reserves using in-place recovery methods. The actively producing wells, as presently completed, appear to have exhausted most of their recoverable reserves. Estimated remaining recoverable reserves from these 16 wells are approximately 43,308 barrels of oil and 1.654 million cubic feet of natural gas (A&C 2008). Any conventional oil and gas wells on the tracts would have to be plugged and abandoned during mining but could be recompleted after mining if the remaining reserves justify the expense of the recompletion.

Extensive development of coal bed natural gas (CBNG) in the Wyodak-Anderson coal zone has occurred in the general Wright analysis area. According to the WOGCC database as of May 2008, a total of 287 wells have been drilled for CBNG production and 248 were capable of producing within the six LBA tracts as applied for and the lands added by the respective BLM study areas included in this analysis (WOGCC 2008a). Although CBNG has been produced in this area for about 10 years, there are still some undrilled 80-acre spacing units in and around the general Wright analysis area. However, there has been little recent interest in drilling additional wells for completion in the Wyodak-Anderson coal zone in this area. CBNG is also being produced locally from other deeper seams in the PRB (e.g., Cook, Wall, and Pawnee coal seams of the Tongue River Member of the Fort Union Formation), although no wells have been completed in the deeper seams on and immediately west of the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts (WOGCC 2008a).

The Wyoming BLM State Office-Reservoir Management Group (WSO-RMG) and the U.S. Geological Survey (USGS) have collected coal gas content data from coal cores near the mines and in other areas of the PRB. Measured gas content was minimal in all of the Wyodak-Anderson coal cores collected in 2000 at locations near the surface coal mines, indicating that the coal seams were already substantially depleted of CBNG in the vicinity of the mines at that time. Average total gas content from the core desorption analyses was approximately 6.8 standard cubic feet per ton (scf/ton) near the coal mines in 2000, compared with an average measured gas content of 37.6 scf/ton from coal cores taken outside the mining areas. Analyses by WSO-RMG, USGS, CBNG operators, and others have shown that dewatering of the coal beds, by both

CBNG production and mine dewatering, reduces the hydrostatic pressure in the coals and allows the CBNG to desorb and escape from the coal. These effects have been ongoing and it is likely that desorption has continued since 2000; as a result, coal gas content and the gas-in-place adjacent to the existing mines would currently be expected to be less than in 2000.

CBNG from the Wyodak-Anderson coal zone that is not recovered prior to mining, albeit slight, would be vented to the atmosphere and irretrievably lost when the coal is removed. CBNG production from coal zones underlying the Wyodak-Anderson coal zone would not be directly disturbed by surface mining operations and could be delayed as the parcel is mined. If production from these lower seams is established on the LBA tracts in the future, additional measures would be required to accommodate both mining and CBNG production. BLM's policy is to optimize recovery of both resources, ensure the public receives a reasonable return, and encourage agreements between lessees or use BLM authority to minimize loss of publicly owned resources.

The USGS reports significant undiscovered reserves of continuous oil and gas resources exist in the PRB of Wyoming and Montana. Drilling for these resources is currently occurring in the Keeline and Wild West Oil and Gas Units located just east of the Black Thunder and Jacobs Ranch mines. It is possible that horizontal wells could be drilled from surface locations outside of the LBA tracts and deviated to run horizontally beneath the tracts within source rocks that are many thousands of feet deeper than the mineable Wyodak-Anderson coal beds. Continuous oil and gas resources could be developed in this manner on the LBA tracts during mining.

► **Paleontology**

The two geologic formations that are exposed on the surface in the general Wright analysis area are the Eocene age Wasatch Formation and the Paleocene age Fort Union Formation. The Wasatch Formation has been known to produce abundant and significant paleontological resources in several basins throughout Wyoming (Delson 1971, Winterfeld 1978, EVG 2001). Occurrences of significant fossils in this formation within the PRB have been more sporadic and less common than in other basins. Outcrops of the Wasatch Formation in the PRB are not generally well-exposed and the conditions of deposition of the formation have contributed to a low preservation potential for fossils. Surficial geologic mapping of the general Wright analysis area by the USGS (Reheis and Coates 1987) indicate that unconsolidated surficial deposits (i.e., colluvial and eolian deposits) occur widespread over the area and actual outcrops of the Wasatch Formation that could be prospected for fossils occur infrequently. The landscape of the LBA tracts' general analysis areas is not particularly well suited to bedrock and paleontological exposure. The upper-most member of the Fort Union Formation, the Lebo Member, is less significant in regards to paleontological resources. Fossils occur sporadically and significant vertebrate specimens have rarely been reported from the PRB.

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The entire general analysis areas for each of the six WAC LBA Tracts were examined for the presence of fossils. Paleontological surveys on federal lands administered by the USFS were conducted in 2009 by qualified paleontologists with USFS approval to conduct paleontological resource surveys on the Thunder Basin National Grasslands (TBNG).

No fossils, scientifically significant or otherwise, were identified or collected during the survey of the North Hilight Field LBA Tract. No further paleontological work or specific mitigation measures prior to mining-related disturbances are recommended or required.

No scientifically significant or unique paleontological resources were identified or collected during the survey of the South Hilight Field LBA Tract. No further paleontological work or specific mitigation measures, aside from the notification of potentially interested researchers that a relatively common fossil was found at a locality that places it near the Paleocene-Eocene Thermal Maximum (PETM) boundary, prior to mining-related disturbances are recommended or required.

No scientifically significant or unique paleontological resources were identified or collected during the survey of the West Hilight Field LBA Tract. No further paleontological work or specific mitigation measures prior to mining-related disturbances are recommended or required.

No scientifically significant or unique paleontological resource localities have been recorded in the West Jacobs Ranch tract's general analysis area. No further paleontological work of mitigation measures prior to mining-related disturbances would be necessary.

Scientifically significant vertebrate fossil materials were identified and recorded at two localities in the Wasatch Formation during the survey of the North Porcupine LBA Tract. Specimens discovered on the surface at one of the localities were collected and will be repositied with the Denver Museum of Nature and Science. Because no in-situ sources for the discovered vertebrate fossil fragments were identified, further efforts to recover additional fossil material are considered to be unlikely. No additional paleontological work or specific mitigation measures prior to mining-related disturbances are recommended.

Ten new paleontological localities were discovered during the survey of the South Porcupine LBA Tract. Six of the localities contained fossil vertebrate material; three localities contained fossil invertebrate material; and one locality contained fossil plant impressions. Three vertebrate localities were discovered in the Wasatch Formation, while the remaining seven localities were discovered in the Lebo Member of the Fort Union Formation. Vertebrate specimens exposed on the surface that did not require excavation were collected from five localities. All collected specimens will be repositied with the Denver Museum of Nature and Science. None of the invertebrate or plant localities discovered

during the 2009 survey were considered rare or scientifically significant, and therefore no specimens were collected from them. No additional paleontological work or mitigation measures prior to mining-related disturbances are recommended for any of the invertebrate or plant fossil localities. Based on the field survey, it is highly likely that additional buried fossil material may be present at several vertebrate fossil localities. In order to avoid future impacts to potentially scientifically significant paleontological resources at these localities, it is recommended that mitigation efforts be conducted to determine if additional buried material is present, and to then collect any scientifically significant specimens. These mitigation efforts would ensure that mining operations would have no adverse effect on these localities.

Fossils with scientific significance could be present on the tracts but not exposed at the surface. Additional surveys for paleontological resources may be required if discoveries are made during mining. If the tracts are leased under the Proposed Actions or Alternatives 2 or 3, undiscovered paleontological resources that are not exposed on the surface or detected during mining would be permanently lost during mining.

► **Air Quality**

Particulate and gaseous emissions are the two primary types of air pollutants directly associated with surface coal mining in the PRB; both of which are associated with a variety of health and environmental impacts. Mining activities generate fugitive dust particulates and gaseous tailpipe emissions from large mining equipment. Specifically, activities such as blasting, excavating, loading and hauling of overburden and coal, and wind erosion of disturbed and unreclaimed mining areas produce fugitive dust. Coal crushing, storage, and handling facilities are the most common stationary or point sources of particulate emissions. Gases that contain nitrogen and oxygen in varying amounts are referred to as nitrogen oxides, or NO_x. These are the primary fugitive gaseous emissions produced during surface coal mining operations. Nitrogen oxides are generated from the tailpipe exhaust emissions from mining equipment and other vehicular traffic within the mine permit area.

Blasting is also responsible for another type of emission from surface coal mining. Overburden and coal blasting sometimes produces gaseous, orange-colored clouds that contain nitrogen dioxide (NO₂). Exposure to NO₂ may have adverse health effects. NO₂ is one of several products resulting from the incomplete combustion of explosives used in the blasting process.

Other non-mining air pollutant emission sources within the region include:

- CO and nitrogen oxides (NO_x) from internal combustion engines used at natural gas and CBNG pipeline compressor stations;
- CO, NO_x, particulates (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂), and volatile organic compounds (VOCs) from gasoline and diesel vehicle tailpipe emissions;

- Particulate matter (dust) generated by vehicle travel on unpaved graded roads, agricultural activities such as plowing, and paved road sanding during the winter months, as well as windblown dust from neighboring areas;
- NO₂ and PM₁₀ emissions from train locomotives used to haul coal;
- SO₂ and NO_x from power plants. The closest coal-fired power plants are the Dave Johnston plant, located about 40-60 miles south-southwest of these six LBA tracts, and the Wyodak, Wygen, and Neil Simpson plants, located about 35-55 miles north of these six LBA tracts; and
- Air pollutants transported from emission sources located outside the PRB.

Since 1989, the regulated particulate pollutant in Wyoming has been PM₁₀ (particulate matter with an aerodynamic diameter of 10 microns or less). Wyoming also adopted a fine particulate, PM_{2.5} (particulate matter with a mean aerodynamic diameter of 2.5 microns or less), standard in March 2000, but that standard is not yet part of the state's air quality monitoring requirements. EPA has revoked the annual PM₁₀ standard of 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) but retained the 24-hour PM₁₀ standard of 150 $\mu\text{g}/\text{m}^3$. Until the state of Wyoming enters into rulemaking to revise the Wyoming Ambient Air Quality Standards (WAAQS), the annual PM₁₀ standard of 50 $\mu\text{g}/\text{m}^3$ is still effective. The federal and Wyoming air quality standard for annual NO₂ is 100 $\mu\text{g}/\text{m}^3$. This criteria air pollutant is not currently regulated at surface coal mines, although the WDEQ/AQD does require an assessment of annual NO₂ impacts as part of an air quality permitting analysis for new surface coal mines and existing mine plan revisions.

Moderately adverse, short-term impacts on air quality are currently present at the Black Thunder Mine due to existing mine operations, and would be extended onto the North, South, and West Hilight Field LBA Tracts during the time the tracts are mined if leases are issued. Air quality modeling for the current Black Thunder Mine permit predicted no exceedances of the annual PM₁₀ particulate WAAQS and National Ambient Air Quality Standard (NAAQS) at the permitted production level of 135 million tons per year (mmtpy). The mine's anticipated production rate by 2015 is 135 mmtpy. The dispersion model showed a maximum concentration on the Black Thunder Mine LNCM (lands necessary to conduct mining) boundary of 49.96 $\mu\text{g}/\text{m}^3$ in 2017 (Figure ES-8), one of two projected worst-case years used for the model.

Moderately adverse short-term impacts to air quality are currently present at the Jacobs Ranch Mine due to existing mine operations, and would be extended onto the West Jacobs Ranch LBA Tract during the time the tract is mined if a lease is issued. Air quality modeling for the current Jacobs Ranch Mine permit predicted no exceedances of the annual PM₁₀ particulate WAAQS and NAAQS at the permitted production level of 55 mmtpy. The mine's current and anticipated future production rate is approximately 40 mmtpy. The dispersion model showed a maximum concentration on the Jacobs Ranch Mine

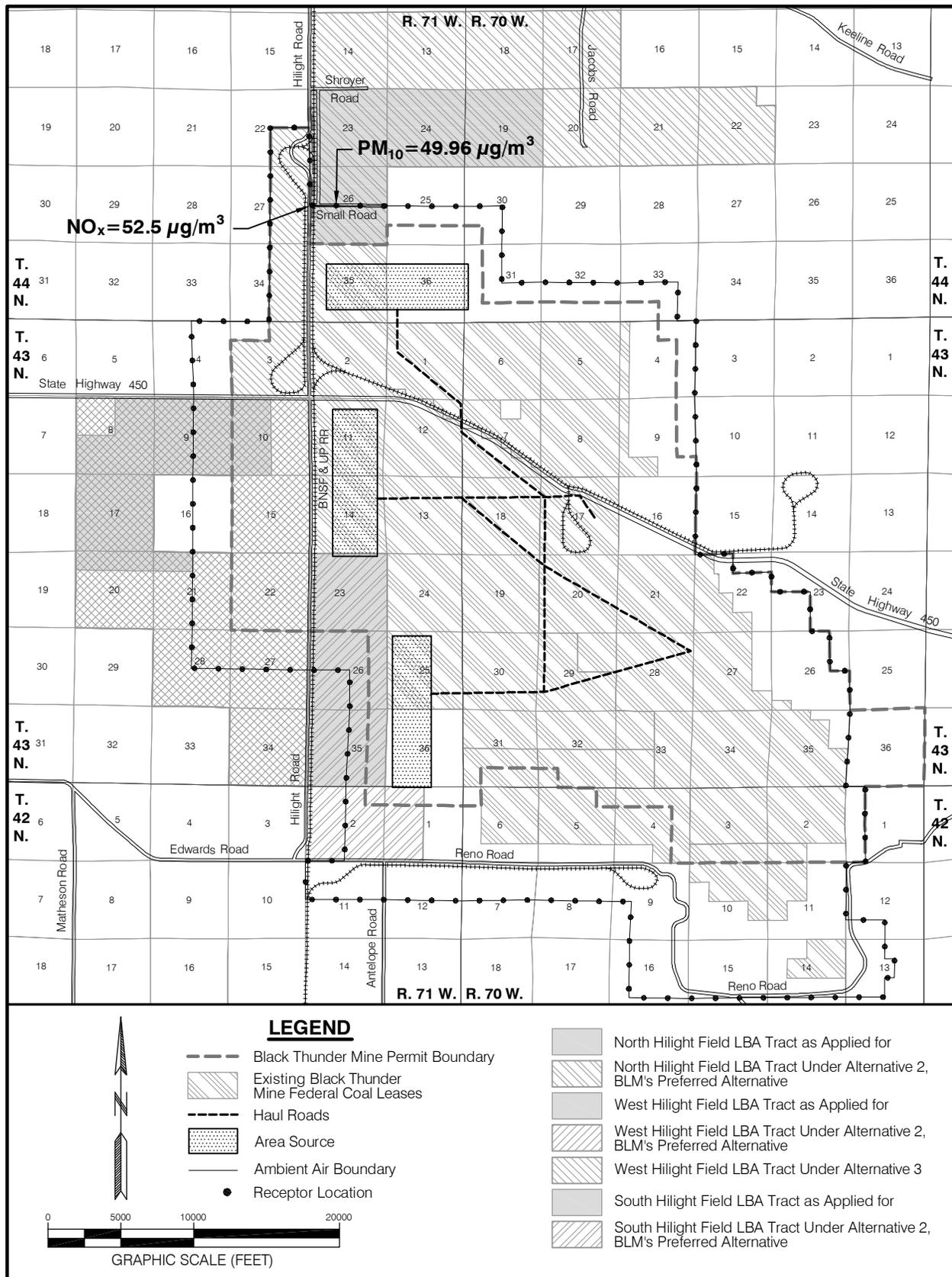


Figure ES-8. Maximum Modeled PM_{10} and NO_x Concentrations at the Black Thunder Mine Ambient Air Boundary for the Year 2017.

LNCM boundary of 49.61 $\mu\text{g}/\text{m}^3$ in 2015 (Figure ES-9), one of two projected worst-case years used for the model.

Moderately adverse short-term impacts to air quality are currently present at the North Antelope Rochelle Mine due to existing mine operations, and would be extended onto the North and South Porcupine LBA Tracts during the time the tracts are mined if leases are issued. Air quality modeling for the current North Antelope Rochelle Mine permit predicted no exceedances of the annual PM_{10} WAAQS and NAAQS at the permitted production level of 140 mmtpy. The mine's current and anticipated future production rate is approximately 95 mmtpy. The dispersion model showed a maximum concentration on the North Antelope Rochelle Mine LNCM boundary of 39.24 $\mu\text{g}/\text{m}^3$ in 2017 (Figure ES-10), one of two projected worst-case years used for the model.

There would be an increase in stripping ratio in each of the LBA tracts compared to the applicant mines' current leases, which could result in an increase in fugitive emissions per ton of coal mined from current levels due to the increased volume of overburden that would have to be removed to recover the coal. The increase in fugitive dust emissions could potentially be moderated somewhat if removal of the larger volume of overburden material results in a slower rate of mining advancement through the LBA tracts, thus decreasing the total annual disturbance acreage and causing haul distances to increase more slowly. Particulate emissions are nevertheless expected to remain within daily and annual limits.

There have been no exceedances of the annual PM_{10} standards documented by the Black Thunder Mine through 2009. There were a total of six exceedances of the 24-hour PM_{10} particulate standards at the Black Thunder Mine from 2001 through 2006. All six exceedances were associated with elevated wind speeds exceeding 20 miles per hour (mph). Prior to 2007, there was no mechanism in place to account for exceedances demonstrated to be the result of natural events. The WDEQ/AQD collaborated with the Wyoming Mining Association (WMA) to develop a Natural Events Action Plan (NEAP) for the coal mines of the PRB, based on EPA Natural Event Policy guidance. Under certain conditions, excessive PM_{10} concentrations resulting from dust raised by exceptionally high winds or other natural events will be treated as uncontrollable natural events. There was one exceedance of the 24-hour PM_{10} particulate standards at the Black Thunder Mine reported in 2007, which was designated as an exceptional event under the NEAP due to high winds and no violation was issued to the mine. There was one exceedance of the 24-hour PM_{10} particulate standards at the Black Thunder Mine in 2008, and the EPA determined that it was not an exceptional event and a notice of violation was subsequently issued. There were no exceedances of the 24-hour PM_{10} particulate standards reported by the mine in 2009.

There has been one exceedance of the 24-hour PM_{10} NAAQS since PM_{10} monitoring began at the Jacobs Ranch Mine and no exceedances of the annual PM_{10} NAAQS.

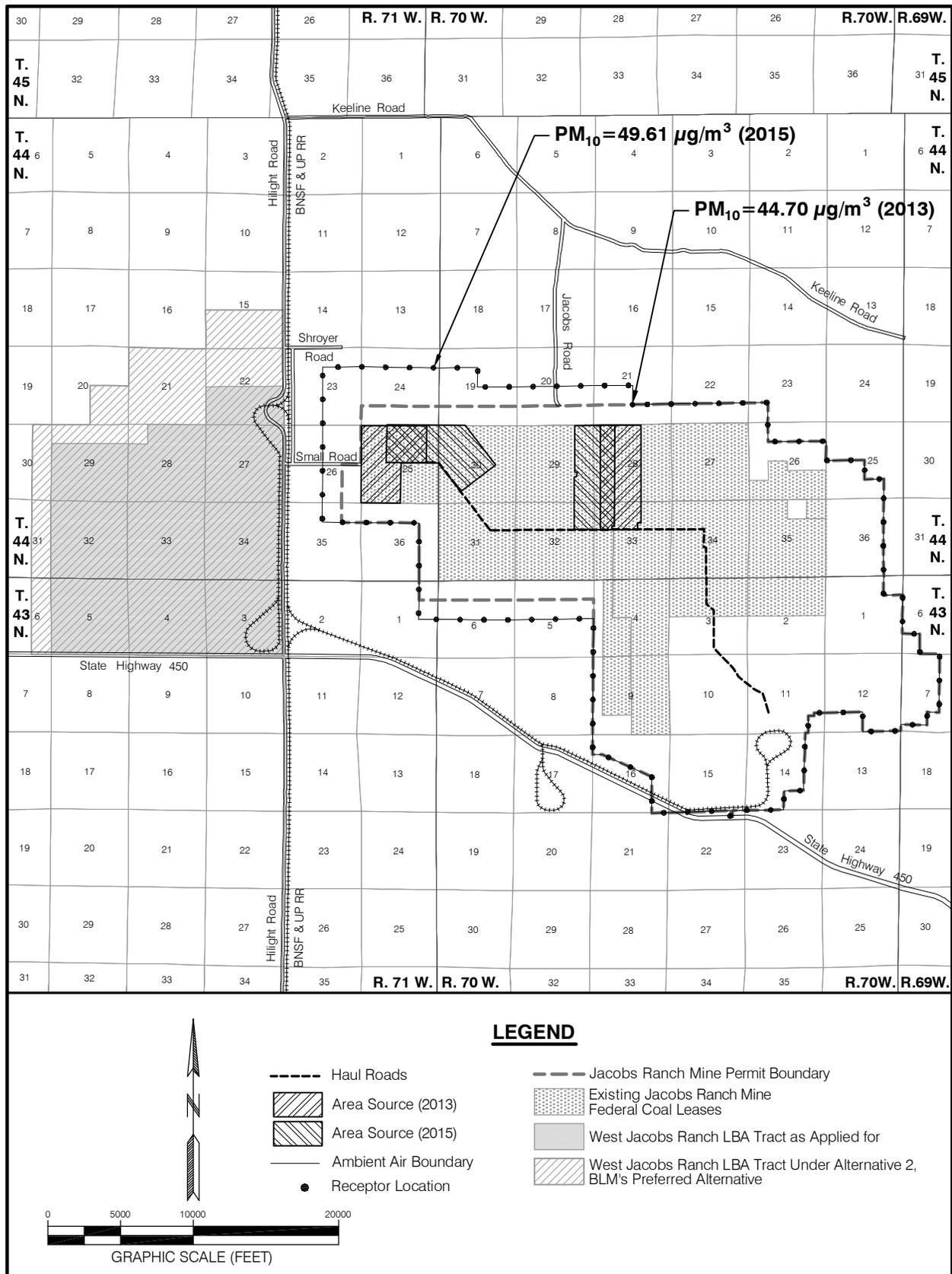


Figure ES-9. Maximum Modeled PM₁₀ Concentrations at the Jacobs Ranch Mine Ambient Air Boundary for the Years 2013 and 2015.

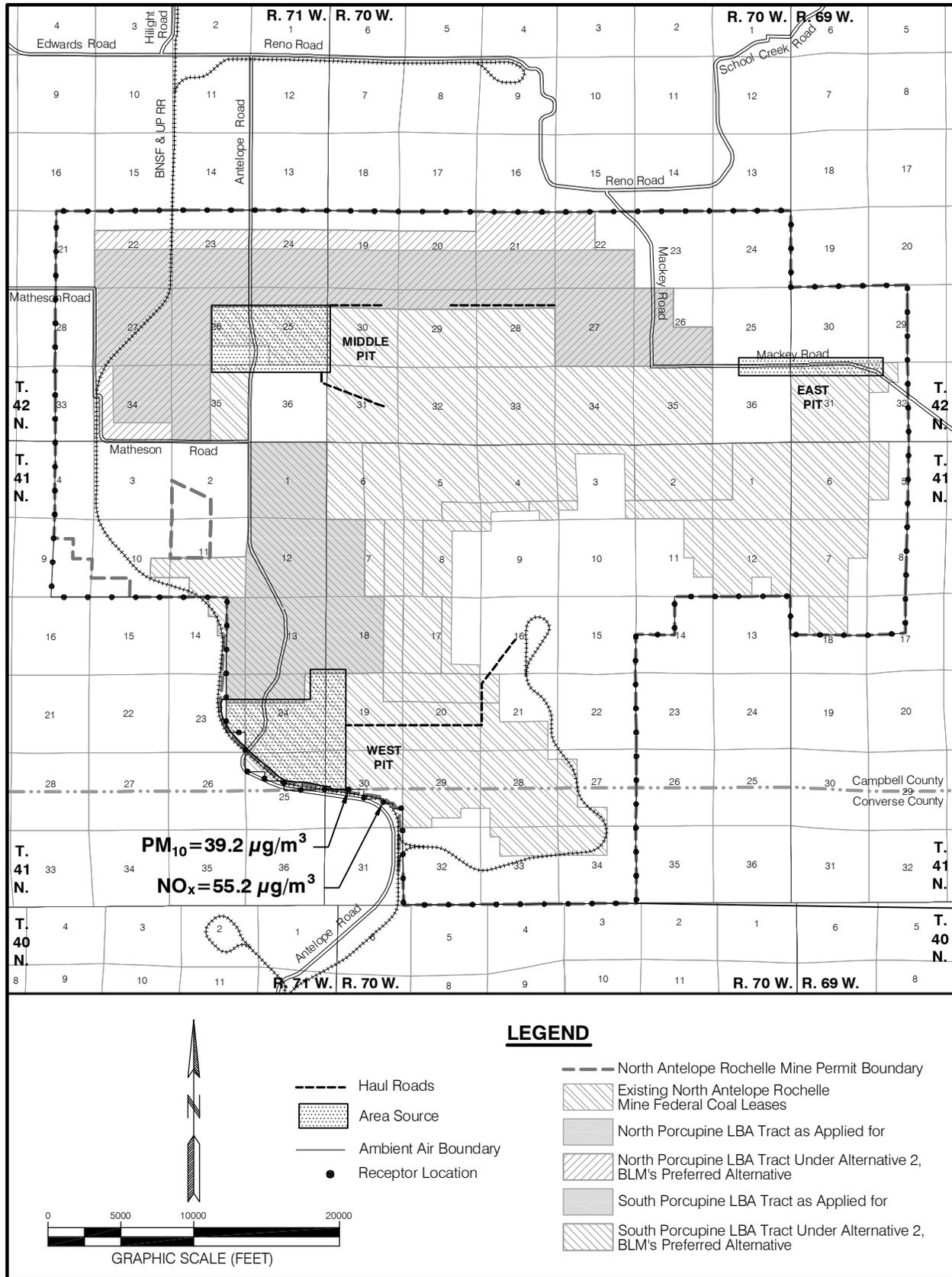


Figure ES-10. Maximum Modeled PM₁₀ and NO_x Concentrations at the North Antelope Rochelle Mine Ambient Air Boundary for the Year 2017.

There have been no exceedances of the annual PM₁₀ standards documented by the North Antelope Rochelle Mine through 2009. There were two exceedances of the 24-hour PM₁₀ particulate standards at the North Antelope Rochelle Mine from 2001 through 2006. Both exceedances were associated with elevated wind speeds exceeding 20 mph, which could have qualified as a high wind event under the NEAP. There were two exceedances of the 24-hour PM₁₀ particulate standards reported in 2007 at the mine, both of which have been designated by EPA as exceptional events under the NEAP and will not be considered when determining the region's air quality designation. There were no exceedances of the 24-hour PM₁₀ particulate standards reported by the North Antelope Rochelle Mine in 2008 and 2009.

Low-lying, gaseous orange clouds containing NO₂ that can be transported by wind can sometimes form from overburden blasting prior to coal removal. EPA has expressed concerns that NO_x levels in some blasting clouds may be sufficiently high at times to cause human health effects. Because of these incidents, WDEQ/LQD has directed some mines to take steps designed to mitigate the effects of NO₂ emissions occurring from overburden blasting. To date, there have been no reported events of public exposure to NO₂ from blasting activities at the Jacobs Ranch and North Antelope Rochelle mines. The WDEQ has not required the mines to implement any specific measures to control or limit public exposure to NO₂ from blasting, although the mines have instituted voluntary blasting restrictions to avoid NO_x impact to the public. Black Thunder Mine received several reports of public exposure to NO₂ from blasting prior to 2001. Measures to control or limit future such incidences, which are part of Black Thunder Mine's settlement agreement, have been instituted when large overburden blasts are planned at that mine. WDEQ/AQD has determined that an assessment of annual NO_x impacts must be included as part of an air quality permitting analysis for new surface coal mines and existing mine plan revisions. NO_x modeling was also conducted in support of the three applicant mines' most recent air quality permit applications, and impacts from the worst-case years fall well below the annual NO₂ NAAQS of 100 µg/m³.

Motor vehicle exhaust and industrial emissions, gasoline vapors, and chemical solvents as well as natural sources emit NO_x and VOCs that help form ozone (O₃). Ozone monitoring is not required by WDEQ/AQD at the PRB coal mines, but levels have been monitored by WDEQ/AQD at its ambient air quality monitoring sites in the PRB since 2001. No exceedances of the O₃ standard have occurred at either of the two monitoring sites when evaluated under the standard in place at the time the values were recorded.

Public exposure to emissions from surface mining operations is most likely to occur along publicly accessible roads and highways that pass through the areas of mining operations. Occupants of dwellings in the area could also be affected. Roads, highways, occupied dwellings, businesses, and school bus stops in the vicinity of the North Hilight Field, South Hilight Field, West Hilight

Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts are shown in Figure ES-11 through ES-16, respectively.

► **Groundwater**

Mining would disturb the coal aquifer and the aquifers in the overburden above the coal within the six WAC LBA tracts. The coal aquifer and any water-bearing strata in the overburden would be removed and replaced with relatively homogeneous, unconsolidated backfill.

A continuous cone of depression currently exists around the southern group of mines (Black Thunder, Jacobs Ranch, North Antelope Rochelle, and Antelope) due to their proximity to each other and the cumulative drawdown effects from pit dewatering and nearby CBNG development. Water level drawdowns have propagated much farther and in a more consistent manner in the Wyodak coal seam aquifer than in the overburden. Historical groundwater level monitoring data collected by the mines indicate that the groundwater flow directions in the Wyodak coal have been greatly influenced by surface mine dewatering and groundwater discharge associated with CBNG development. Groundwater levels observed near active mining areas prior to 1997 were likely due to mine dewatering alone and the groundwater flow direction within the coal aquifer was typically toward the mines where it would drain by gravity into the open pits. By year 2000, groundwater level decline rates had dramatically increased because drawdown caused by widespread CBNG development west of the mines was overlapping with drawdown caused by mining operations. Roughly 30 years of surface mining and the more recent CBNG development have resulted in complete dewatering of the coal aquifer in localized areas, particularly near the mines' pits and where the coal seams are structurally highest. The extent of drawdown in the coal aquifer west of each mine that is specifically attributable to mine dewatering can be estimated; however, the accuracy of those estimates cannot be tested or observed in the real world because drawdown related only to mining is a relatively small impact that is masked by the much larger drawdown that is due to CBNG development in the area.

The rate and extent of the actual drawdown in the coal is currently much greater than the life-of-mine drawdown predictions. This has occurred as drawdown caused by extensive CBNG development west of the existing mine permit areas has overlapped with drawdown caused by mining operations. Continued drawdown effects from CBNG withdrawals are probable; therefore, future drawdown to the Wyodak coal aquifer from mining the approved leases and the WAC LBA tracts would be expected to be negligible due to the fact that the coal seam has essentially been dewatered in the general Wright analysis area. The area of drawdown in the discontinuous overburden aquifers would be smaller.

Figure ES-17 depicts the extrapolated extent of the 5-foot cumulative drawdown contour within the Wyodak coal aquifer resulting from the group of

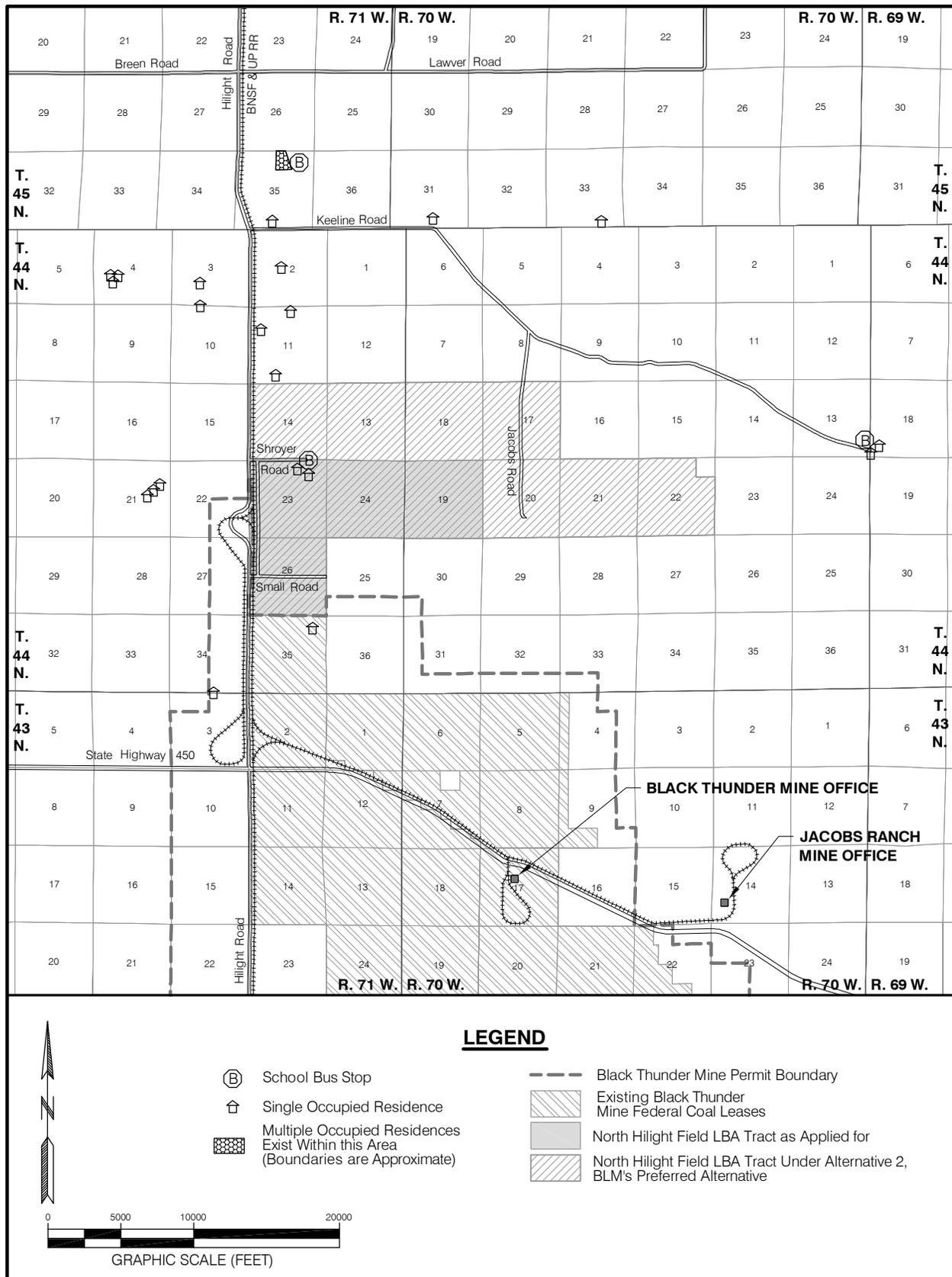


Figure ES-11. Residences, School Bus Stops, Public Roads, and Other Publicly Accessible Facilities in the Vicinity of the North Hilight Field LBA Tract Under Alternative 2.

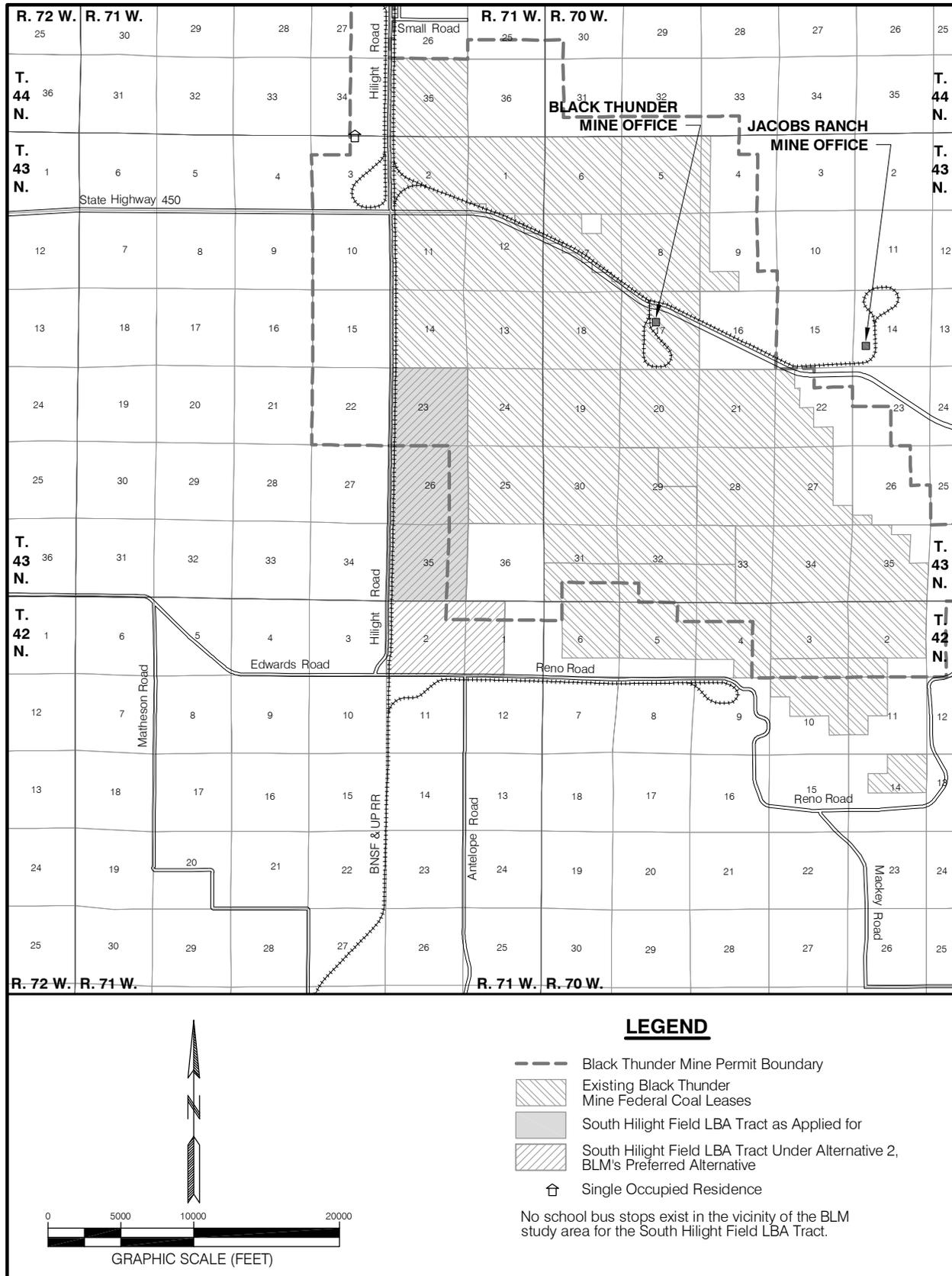


Figure ES-12. Residences, School Bus Stops, Public Roads, and Other Publicly Accessible Facilities in the Vicinity of the South Hilight Field LBA Tract Under Alternative 2.

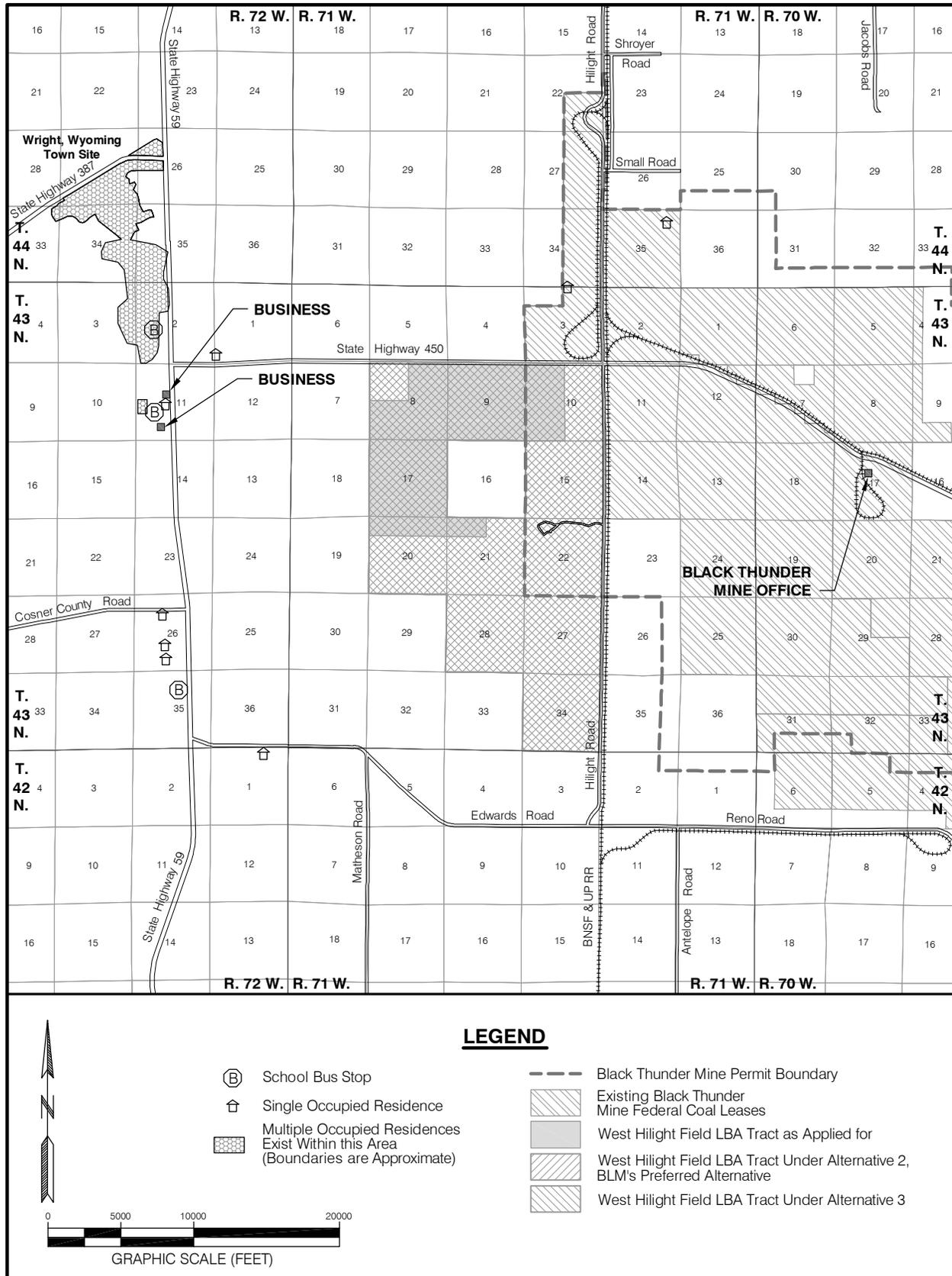


Figure ES-13. Residences, School Bus Stops, Public Roads, and Other Publicly Accessible Facilities in the Vicinity of the West Hilight Field LBA Tract Under Alternative 2.

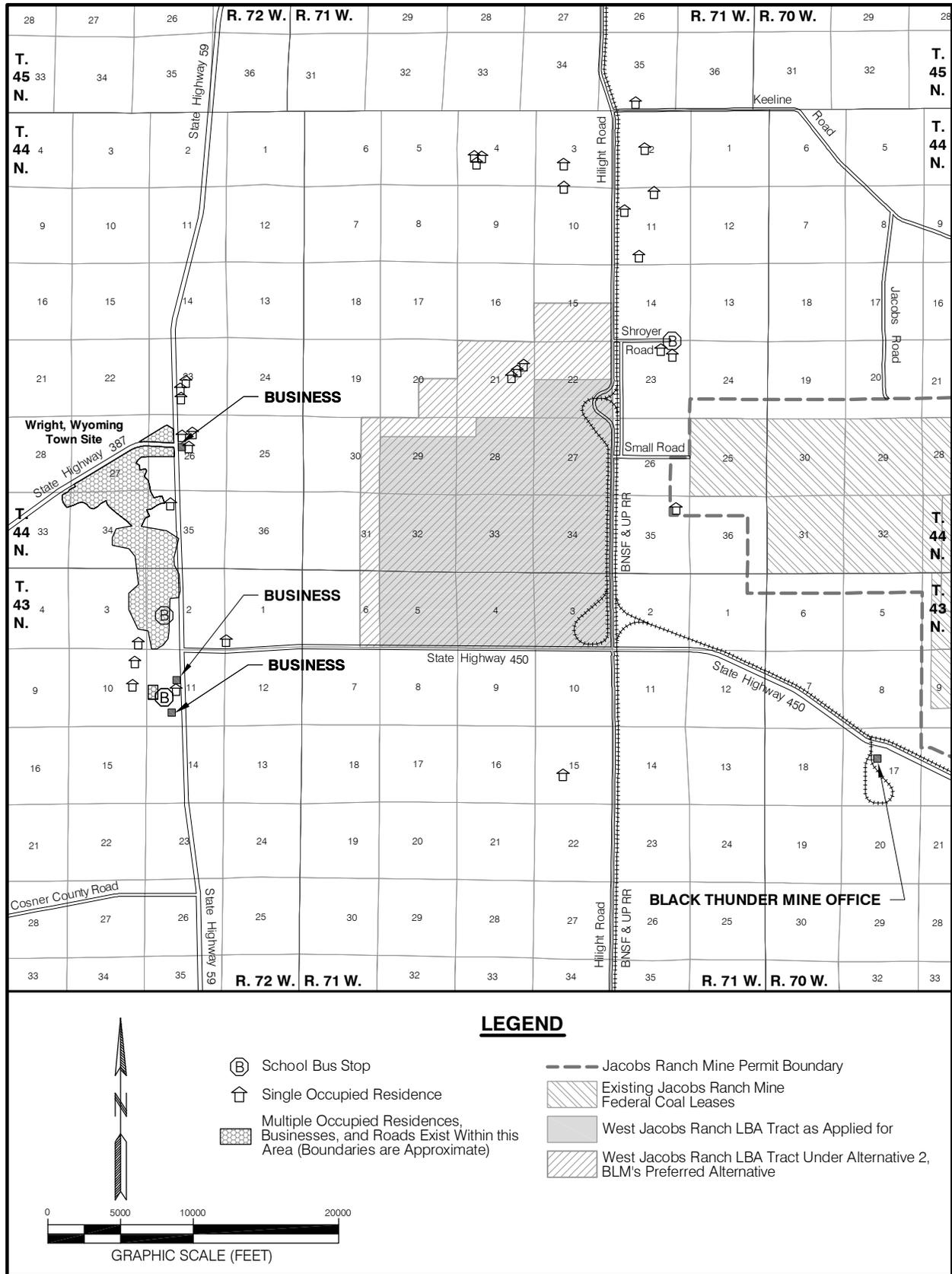


Figure ES-14. Residences, School Bus Stops, Public Roads, and Other Publicly Accessible Facilities in the Vicinity of the West Jacobs Ranch LBA Tract Under Alternative 2.

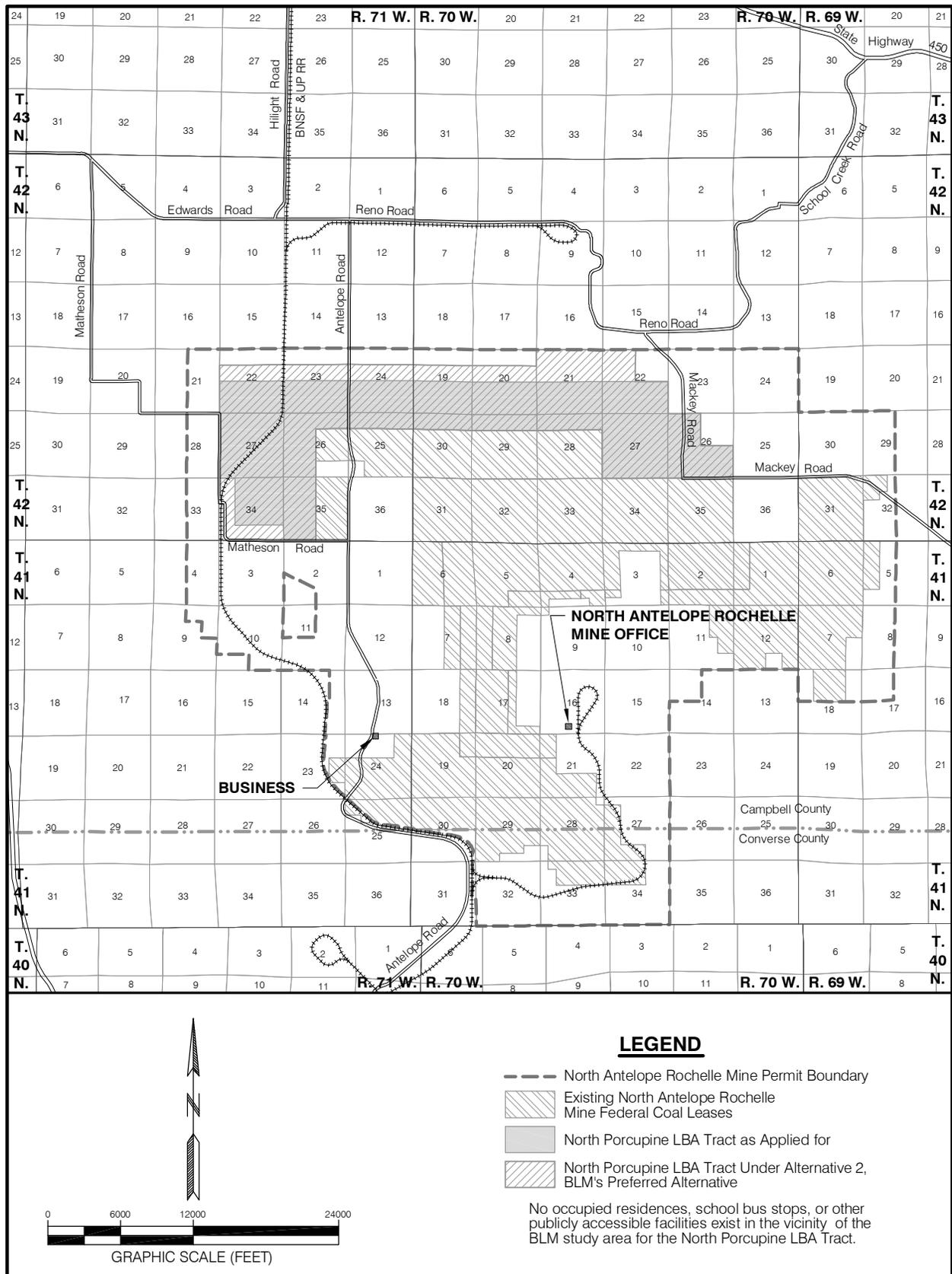


Figure ES-15. Residences, School Bus Stops, Public Roads, and Other Publicly Accessible Facilities in the Vicinity of the North Porcupine LBA Tract Under Alternative 2.

Executive Summary

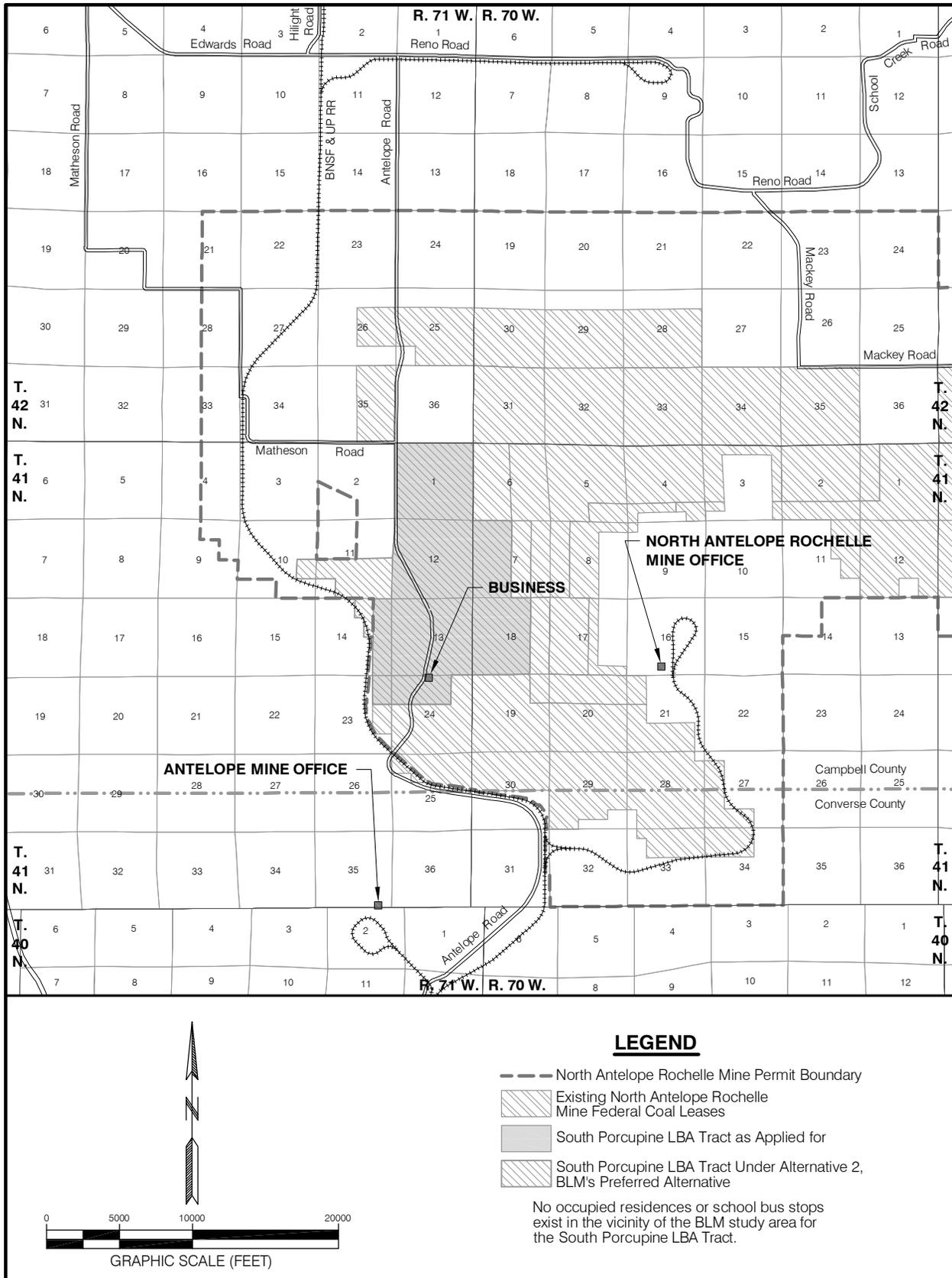


Figure ES-16. Residences, School Bus Stops, Public Roads, and Other Publicly Accessible Facilities in the Vicinity of the South Porcupine LBA Tract Under Alternative 2.

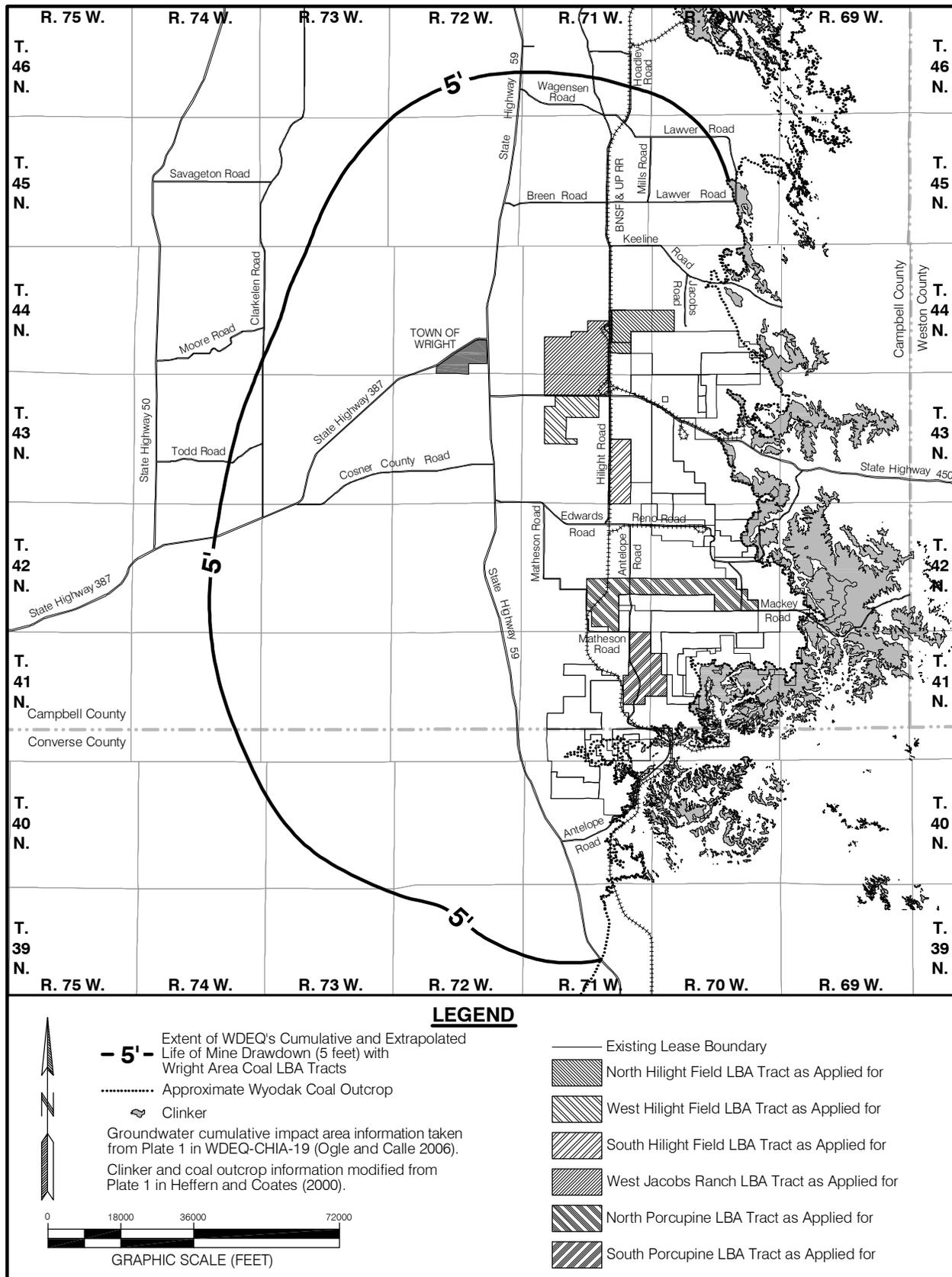


Figure ES-17. Extrapolated Extent of Life of Mine Cumulative Drawdown Within the Wyodak Coal Aquifer With the Addition of Wright Area Coal LBA Tracts.

four southern mines (Jacobs Ranch, Black Thunder, North Antelope Rochelle, and Antelope) in the Wright subregion with the addition of the six WAC LBA tracts. Analysis of the cumulative impacts as a result of mining was performed by qualitatively assessing the additive impacts of these mines. Each mine is required by WDEQ/LQD to evaluate the impacts to the hydrologic resources and will typically model groundwater level drawdown using the most conservative, worst-case scenario. The extent of the 5-foot drawdown contour is used by WDEQ/LQD to assess the extent of the impact to the groundwater system caused by mining operations. The predicted maximum 5-foot drawdown contour for the Wyodak coal aquifer from the four Wright area coal mines was superimposed by Ogle and Calle (2006) to generate the 5-foot cumulative estimate.

The data available indicate that, after reclamation, the hydraulic properties of the backfill would be comparable to the properties of the premining overburden and coal aquifers. Total dissolved solids (TDS) levels in groundwater from the backfill could initially be expected to be higher than in the premining overburden and coal aquifers, but would be expected to meet Wyoming Class III standards for use as livestock water.

Mining does not directly disturb aquifers below the mineable coal, but many PRB mines use them for industrial water supply wells. In a few cases there have been drawdowns in the subcoal aquifer due to leakage into mine pits, dewatering, and CBNG development (BLM 2001a). All three of the applicant mines located within the general Wright analysis area utilize water supply wells completed in aquifers stratigraphically below the Wyodak coal. If these six WAC LBA tracts are leased by the applicant mines, water would be produced from these wells for a longer period of time and the mines would probably not require additional sub-coal wells to mine and reclaim the LBA tracts.

► **Surface Water**

Tributary streams of the Cheyenne River drain the general Wright analysis area. From north to south, the general Wright analysis area is drained by Black Thunder Creek, North Prong Little Thunder Creek, Little Thunder Creek, Porcupine Creek, Horse Creek, and Antelope Creek. North Prong Little Thunder Creek is a tributary of Little Thunder Creek, which is a tributary of Black Thunder Creek. Porcupine Creek and Horse Creek are tributaries of the Antelope Creek. Black Thunder Creek and Antelope Creek are both major tributaries of the Cheyenne River. Typical of this semi-arid area, these streams, with the exception of Antelope Creek, are all ephemeral, receiving flow contributions primarily from convective thunderstorm runoff and, to a lesser extent, from snowmelt runoff in the spring. Surface water quality varies with flow and/or season. Playas that are formed by natural topographic depressions are common in the general Wright analysis area and portions of each tract's general analysis area are internally drained. Springs are uncommon in this area and none have been identified within the general analysis areas of these six LBA tracts.

Changes in runoff characteristics and sediment discharges would occur during mining of the WAC LBA tracts as a result of the destruction and reconstruction of drainage channels and the use of sediment control structures to manage discharges of surface water. In accordance with the SMCRA and Wyoming state statutes, once mining is complete the pits would be backfilled and drainage would be reestablished. Surface water drainages would be restored to approximate premine conditions and blend with the existing drainage system above and below the disturbance area. Surface water flow, quality, and sediment discharge would approximate premining conditions.

► **Alluvial Valley Floors**

AVF investigations conducted within and near the general Wright analysis area have identified AVFs that occur along Little Thunder Creek, North Prong Little Thunder Creek, and Porcupine Creek; however, those lands are located at considerable distances downstream of the six Wright area LBA tracts. Based on existing and preliminary AVF evaluations within the general Wright analysis area, AVF characteristics on drainages are negligible. An AVF assessment would be part of the mine permitting process if a tract is leased and proposed for mining, and formal declarations of the presence or absence of an AVF, its significance to agriculture, and the appropriate perimeter (areal extent) would be made by the WDEQ/LQD. AVFs that are not significant to agriculture can be disturbed during mining but must be restored as part of the reclamation process. It is reasonable to assume that the WDEQ/LQD would determine that no AVFs are present within any of the Wright area LBA tracts that are leased. Should declarations be made within any LBA tracts that are leased, it is reasonable to assume that mining would be permitted because all of the proposed lease areas consist entirely of undeveloped rangeland.

► **Wetlands**

Formal wetland delineations have been confirmed by the U.S. Army Corps of Engineers (COE) for wetlands and Other Waters of the U.S. (OWUS) included in the general analysis areas for the Wright area LBA tracts that lie within the applicant mines' existing permit areas. Preliminary wetlands inventories of the LBA tracts' general analysis areas that have not been formally evaluated, based on U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping, vegetation mapping, review of color infrared aerial photographs, and field survey reconnaissance were conducted in 2007 and 2008. Based on those previous wetland delineation surveys and the preliminary wetland inventories of the general analysis areas for the six Wright area LBA tracts, a maximum of approximately 602 acres of wetlands and OWUS would be disturbed if all the LBA tracts are leased and subsequently mined under Alternative 2, BLM's preferred alternative for each tract. These wetlands and OWUS were found within five general land categories: ephemeral streams, playas, ponds/reservoirs, isolated depressions, and excavated upland areas. At this time, a distinction has not been made between jurisdictional and non-

jurisdictional acreages of wetlands and OWUS since only the COE has the authorization to make such determination.

Formal wetland inventories covering the remainder of the general analysis areas for the LBA tracts that are leased would be conducted and submitted to the COE for verification as part of the process of obtaining a surface mining permit. In Wyoming, once the delineation has been verified, it is made a part of the mine permit document. The reclamation plan is then revised to incorporate the replacement of at least equal types and number of jurisdictional wetland acreages. Disturbed non-jurisdictional wetlands would be restored as required by the authorized federal or state agency or private surface land owner as specified in the mine permit, which would have to be approved by WDEQ/LQD before mining operations could be conducted on the LBA tracts that are leased.

► **Soils**

Baseline soil surveys cover the general analysis areas for these six LBA tracts. All soil surveys were completed to the Order 1-2 or Order 3 level of intensity in accordance with criteria contained in WDEQ/LQD Guideline No. 1.

Consequences from the salvage and redistribution of soils during mining and reclamation of each LBA tract that is leased would include changes in physical, biological, and chemical properties of the soil resources. Following reclamation, the soils would be unlike premining soils in texture, structure, color, accumulation of clays, organic matter, microbial populations, and chemical composition. In reclaimed areas, soil chemistry and soil nutrient distribution would generally be more uniform, and average topsoil quality would be improved because soil material that is not suitable to support plant growth would not be salvaged for use in reclamation. This would result in more uniform vegetative productivity on reclaimed land. The baseline soils analyses indicate that the amount of suitable topsoil that would be available for redistribution on all disturbed acres within the six general analysis areas during reclamation would vary from an average depth of 2-3 feet. The redistributed soil would be more uniform in type, thickness, and texture, and it would be adequate in quantity and quality to support planned postmining land uses (i.e., wildlife habitat and rangeland).

► **Vegetation**

The vegetation analysis area for each of the six LBA tracts is the respective tract's general analysis area. These vegetation analysis areas are either partially located within, contiguous to, or completely within applicant mines' existing permit boundaries. Consequently, portions or all of these vegetation analysis areas were previously mapped and sampled in accordance with the current WDEQ/LQD mine permitting requirements. The balance of the vegetation assessments were completed in 2007.

In terms of total acres of occurrence within the combined vegetation analysis areas, the predominant vegetation types are the Big Sage Shrubland (42.2 percent), Upland/Mixed Prairie Grassland (27.8 percent), and Crested Wheatgrass/Agricultural Pastureland (15.3 percent). The most common plant species on these types include Wyoming big sagebrush, western wheatgrass, needleandthread, blue grama, crested wheatgrass, red threeawn, Sandberg bluegrass, prairie junegrass, cheatgrass brome, sixweekgrass, and upland sedges. Wyoming big sagebrush is the dominant shrub in the Big Sage Shrubland and Upland/Mixed Prairie Grassland vegetation communities. Annual grasses and forbs, lichens, and manyspine plains pricklypear cactus are frequently large components of the vegetation cover.

Mining would progressively remove this native vegetation. Reclamation, including revegetation of mined areas, would occur contemporaneously with mining on adjacent lands. Reestablished vegetation would be dominated by species mandated in the reclamation seed mixtures, which are approved by the WDEQ/LQD. The majority of these species would be native to the LBA tracts. Initially, the reclaimed land would be dominated by grassland vegetation, which would be less diverse than the premining vegetation. Estimates for the time it would take to restore sagebrush to premining density levels range from 20 to 100 years. A reduction in shrubs would result in a long-term reduction of habitat carrying capacity for some species and may delay use of the reclaimed area by shrub-dependent species. Following completion of reclamation (seeding with the approved seed mixture) and before release of the reclamation bond (a minimum of 10 years), a diverse, effective, and permanent vegetative cover would be established on the LBA tracts. The decrease in plant diversity would not seriously affect the potential productivity of the reclaimed areas, and the proposed postmining land uses (wildlife habitat and rangeland) should be achieved even with the changes in vegetation composition and diversity. The reclamation plans for the LBA tracts would also include steps to control invasion by weedy (invasive, nonnative) plant species.

► **Wildlife**

Background information on wildlife in the general Wright analysis area was drawn from several sources, including Wyoming Game and Fish Department (WGFD) and U.S. Fish and Wildlife Service (USFWS) records, the Wyoming Natural Diversity Database (WYNDD), recent PRB federal coal lease application EIS documents (available for public review on Wyoming BLM's website at <http://www.blm.gov/wy/st/en.html>), and personal contacts with WGFD and USFWS biologists. Site-specific data for the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts were obtained from several sources, including baseline information contained in WDEQ/LQD mine permit applications and annual wildlife monitoring reports for the applicant mines and nearby coal mines. In accordance with the current WDEQ/LQD mine permitting requirements, wildlife baseline surveys and annual monitoring surveys extend 1 to 2 miles beyond the mine permit area, depending on the mine and the species.

Due to the proximity of the proposed lease areas to the adjacent applicant mine permit areas, the general analysis areas for these six LBA tracts have received some level of coverage annually since the early 1980s. Increasing percentages of the general analysis areas were included in annual monitoring efforts as survey areas for the adjacent mines have been expanding due to previous coal lease acquisitions and subsequent permit area amendments. In addition, TBCC conducted baseline investigations during 2006 and early 2007 specifically for the West Hilight Field LBA Tract with additional surveys targeting the North and South Hilight Field LBA Tracts in 2007 and 2008; JRCC conducted baseline investigations in 2007 and 2008 expressly for the West Jacobs Ranch LBA Tract; and PRC conducted baseline investigations during 2007 and early 2008 specifically for the North and South Porcupine LBA Tracts. These surveys covered the respective general analysis areas, and surveys for selected wildlife information such as raptor nest and Greater sage-grouse lek locations included in a 2-mile perimeter surrounding the general analysis areas. Site-specific surveys for each lease area and appropriate perimeters would be part of the mine permitting process if the tracts are leased.

Mining directly and indirectly impacts local wildlife populations. These impacts are both short term (until successful reclamation is achieved) and long term (persisting beyond successful completion of reclamation). Direct impacts of surface coal mining on wildlife occur during mining and are therefore short term. They include road kills by mine-related traffic, direct losses of less mobile wildlife species, restrictions on wildlife movement created by fences, spoil piles and pits, displacement of wildlife from active mining areas (including abandonment of nests or nesting and breeding habitat for birds), increased competition between animals in areas adjacent to mining operations, and increased noise, dust, and human presence. Habitat for aquatic species would also be lost during mining operations. Displaced animals may find equally suitable habitat that is not occupied by other animals, or occupy poorer quality habitat than that from which they were displaced. Indirect impacts are longer term and include alterations in topography and vegetative cover, particularly the reduction in shrub density, and could cause a decrease in carrying capacity for some species and a decrease in vegetation diversity. Mining companies have initiated efforts in recent years to increase the diversity of post-mine topography and to increase the amount of sagebrush in the reclamation.

The six Wright area LBA tracts do not include any unique or crucial big game habitat or migration corridors. The two big game species that are common in suitable habitat throughout the general Wright analysis area are pronghorn and mule deer. A resident elk herd resides in the Rochelle Hills east of the general Wright analysis area, and elk do wander from the protection of the hills to forage in native and reclaimed grasslands in the vicinity of the general Wright analysis area. As more lands are reclaimed from mining, elk are shifting their winter use to these areas. Habitat disturbance and big game displacement would be incremental, occurring over several years and allowing

for gradual changes in distribution patterns. Big game have continued to occupy areas adjacent to and within active mining operations, suggesting that some animals may become habituated to such disturbances.

Those raptor species that commonly nest in the general Wright analysis area are the golden eagle, ferruginous hawk, red-tailed hawk, Swainson's hawk, burrowing owl, and great horned owl. American kestrels, northern harriers, and short-eared owls intermittently nest in the area, as occasional sightings of recently fledged young indicate that such activities do occur within the general Wright analysis area for one or more of those species, though the nest sites themselves may not have been located. Habitat is limited for those species that nest exclusively in trees or on cliffs, but several species have adapted to nesting on the ground, creek banks, buttes, mine highwalls, or rock outcrops. Rough-legged hawks are winter residents in northeast Wyoming, and breed in the arctic regions. Mining the LBA tracts would not impact overall regional raptor populations; however, individual birds or pairs may be impacted. Mining within or near raptor territories would impact availability of foraging habitat for nesting birds. However, increased acreage of reclamation within the permit areas would offset new habitat loss as mining progresses. All three applicant mines operate under a current USFWS approved Monitoring and Mitigation Plan for raptors and other migratory bird species of management concern, and have successfully executed mitigation techniques to protect nest productivity. Their respective plans would be amended to include the associated LBA tracts if they are leased and permitted for mining. The amended plans would be subject to review and approval by the USFWS before the amended mine plans are approved.

Four upland game bird species have historically been documented within the general Wright analysis area. These species are the mourning dove, gray partridge, wild turkey, and Greater sage-grouse. The mourning dove, however, is the most prevalent upland game bird in this area, and the only species known to occur with any regularity. Based on annual lek searches since the late 1970's, sharp-tailed grouse do not appear to inhabit the surface coal mine region of the southern PRB.

The sage-grouse, is a species of concern throughout the West and is considered a "landscape species", which means that large expanses of unfragmented land are required in order to provide all the habitat components for their annual life cycle. Relying on sagebrush for food, cover, and shelter, sage-grouse require sagebrush habitat year-round and for every phase of their life cycle, and exhibit seasonal movements to utilize discrete sagebrush habitats. Since 1999, the USFWS has received eight petitions requesting that the sage-grouse be listed under the Endangered Species Act (ESA) as threatened or endangered. Three of the petitions requested that sage-grouse be listed as endangered across its entire range. On January 12, 2005, following a 12-month status review on the species, the USFWS concluded that listing was not warranted at that time. On December 4, 2007, U.S. District Court, District of Idaho, ruled that the USFWS 12-month petition finding on sage-grouse was in error and

remanded the case back to USFWS for further reconsideration. On February 26, 2008, the USFWS announced the initiation of another status review for the Greater sage-grouse. The USFWS announced on March 5, 2010 its decision to classify the Greater sage-grouse as a candidate species under the ESA. The USFWS found that listing the Greater sage-grouse (rangelwide) was warranted, but precluded by higher priority listing actions.

In 2007, Wyoming Governor Dave Freudenthal commissioned a Statewide Sage-grouse Implementation Team which emerged from the Governor's 2007 Sage-Grouse Summit. On March 17, 2008, the Implementation Team preliminarily identified and mapped recommended sage-grouse core breeding areas in Wyoming in an effort to better understand what types of habitat the grouse prefer and what areas should be protected. The general Wright analysis area is not located within the mapped core breeding areas. On August 1, 2008, the Governor Freudenthal released an executive order regarding sage-grouse core area protection (Office of the Governor of Wyoming 2008). The sage-grouse focus area protection concept came about as a result of work by the Sage-grouse Implementation Team. The Implementation Team developed a Core Population Strategy for the state of Wyoming "to maintain habitats and viable populations of sage-grouse in areas where they are most abundant." The BLM Wyoming State Office is in the process of developing a state-wide sage-grouse management policy and has incorporated sage-grouse focus areas based on the core area concept in the draft management policy.

The Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines have conducted surveys of known sage-grouse leks and searches for new leks as part of their wildlife baseline inventories and wildlife monitoring programs since the early 1980s. As a result, most of the general analysis areas for the six Wright area LBA tracts have been included in previous regular survey efforts. A total of 10 sage-grouse leks have been documented on and within 2 miles of the six combined general analysis areas. Four of the leks have been active during recent survey years and are classified as occupied; two leks have not been attended by displaying grouse for at least the last 10 years and are classified as unoccupied/abandoned; two leks have been removed by mining activities and are classified as unoccupied/destroyed; there has been no documented activity for the last 10 years at two leks, but survey information is insufficient to designate them as unoccupied, so they are classified as undetermined. Two of the four occupied leks likely represent a shift in lekking activity rather than two distinct leks.

When mining occurs in potential sage-grouse habitat, there is a short term loss of potential nesting habitat and potential disturbance to breeding activities, especially when mining operations occur in proximity to sage-grouse leks. If mining activities disturbed a lek, sage-grouse would have to use an alternative lek or establish a new lek site for breeding activities. Fidelity to lek sites has been well documented, but monitoring of sage-grouse activities has indicated that the birds may change lek sites. Following reclamation, there may be a long term loss of nesting and winter habitat, depending on the amount of

sagebrush that is restored relative to the amount of sagebrush that is present before mining. Should these six LBA tracts be leased, mined and reclaimed, alterations in the topography and vegetative communities would likely result in such changes in species composition from pre-mine conditions. Until sagebrush returns to its premining density levels, there would be a reduction in potential habitat for wildlife species associated with the habitat in the general Wright analysis area. However, given the limited presence of sage stands in the area, it is not likely that many sagebrush obligates would be affected. Estimates for the time it would take to restore shrubs, including sagebrush, to pre-mine density levels range from 20 to 100 years, which may delay sage-grouse repopulation in the reclaimed areas.

Two of the four occupied leks are within the BLM study areas for the North Hilight Field and North Porcupine LBA Tracts, and are therefore likely to be directly impacted if these two tracts are leased and mined under the Proposed Action and/or Alternative 2, BLM's preferred alternative. The 3-mile radii of concern for the other two occupied leks (which are likely only one strutting ground that has been relocated slightly), overlap the North Porcupine LBA Tract. If the North Porcupine LBA Tract as applied for and/or the additional areas evaluated by BLM under Alternative 2, the BLM's preferred alternative, is leased and mined, potential nesting habitat for grouse that were bred at these leks would likely be affected by mining activity in those areas.

► **Threatened and Endangered Species**

T&E plant and animal species that could be present in the general Wright analysis area include the Ute ladies'-tresses orchid (threatened) and blowout penstemon (endangered). The habitat requirements for, occurrences of, and potential project effects on these species are included in Appendix G.

Dormant Ute ladies'-tresses plants typically persist underground for one to many years and can only be reliably documented after several years of repeated surveys. Recent USFWS survey requirements therefore recommend that all potentially suitable habitat be surveyed annually for three consecutive years during the time of year that the orchids are known to flower.

Areas of potentially suitable habitat for Ute ladies'-tresses within the general analysis areas for the North, South and West Hilight Field LBA Tracts were surveyed by qualified professionals in August 2008 and August 2009, and no orchids were found. In order to satisfy the USFWS survey requirements for the species, the third consecutive annual survey of each tract's general analysis area is scheduled in 2010.

Areas of potentially suitable habitat for Ute ladies'-tresses within the general analysis area for the West Jacobs Ranch LBA Tract were surveyed by qualified professionals in August 2007, August 2008 and August 2009, and no orchids were found.

Areas of potentially suitable habitat for Ute ladies'-tresses within the general analysis areas for the North and South Porcupine LBA Tracts were surveyed by qualified professionals in 2005, 2006, 2007 and 2009, and no orchids were found. Those surveys covered only USFS lands (TBNG) and therefore did not include all areas of suitable habitat (on both USFS and private lands) within the general analysis areas for the North and South Porcupine tracts. In order to satisfy the USFWS survey requirements for the species, surveys of the tracts' general analysis areas are scheduled in 2010 and 2011.

The blowout penstemon, one of Wyoming's rarest native plants, is a regional endemic species of the Sandhills of west-central Nebraska and the northeastern edge of the Great Divide Basin in Wyoming. In Wyoming, the species is currently known from just three populations, which all occur in the Ferris Dunes area located in the northwestern part of Carbon County. The general Wright analysis area is located approximately 150 miles northwest of the known occurrences in the Nebraska Sandhills and approximately 150 miles northeast of the three known populations in Carbon County, Wyoming. The species is most common in the open, sandy habitats or wind-excavated depressions (crater-like blowouts) in dune tops. In Wyoming, blowout penstemon is found in sparsely vegetated sandy blowouts in the early stages of plant community development.

No areas of potentially suitable habitat for the blowout penstemon have been identified within the general analysis area for each of the six WAC LBA tracts. No blowout penstemon or plants commonly associated with the species (blowout grass, lemon scurfpea and thickspike wheatgrass) were found during the baseline vegetation surveys of all six tracts, which were conducted in 2007 and/or 2008 by qualified professionals.

► **Land Use and Recreation**

Leasing and subsequently mining the Wright area LBA tracts would preclude other land uses. The temporary reduction of livestock grazing, incremental loss of wildlife habitat (particularly big game), and curtailment of oil and gas development while the areas are being mined and reclaimed would result. This would include the incremental removal of all existing oil and gas surface and downhole production and transportation equipment and facilities. The loss of accessibility to these lands would be long term (during mining and reclamation), but not permanent.

The six Wright area LBA tracts configured under Alternative 2, BLM's preferred alternative for each tract, include approximately 12,481 acres of TBNG surface, which is administered by the USFS; approximately 7,288 acres of which are currently accessible to the public. None of the lands included in the West Jacobs Ranch LBA Tract under Alternative 2 are managed by the USFS; thus, no federal lands would be removed from public access if that LBA tract were leased. Access to the 12,481 acres of federal grazing leases on TBNG surface, which are currently held by the Thunder Basin Grazing Association, would be

suspended during mining and reclamation operations on the other five LBA tracts. According to the USFS Douglas Ranger District, each mine can close access in areas that are actively mined for human health and safety reasons. Hunting and other recreational activities on the LBA tracts, including the federal surface, would be eliminated during mining and reclamation. The federal lands actually represent a relatively small portion of the currently accessible public surface lands for recreational opportunity within TBNG. The cumulative impacts of energy development (coal mining, oil and gas) in the PRB will continue to contribute to a reduction in hunting opportunities for some animals (pronghorn, mule deer, and sage-grouse).

Within 10 years after initiation of each reclamation phase, rangeland and wildlife use (the historic land uses) would return to near premining levels. Following reclamation bond release, management of the privately owned surface would revert to the private surface owner and management of the federally owned surface would revert to the federal surface managing agency (USFS). Public access to federal lands would be restored after mining and reclamation are complete.

► Cultural Resources

The general analysis areas of the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts have been mostly surveyed for cultural resources at a Class III level. A total of 333 cultural sites have been document within the six combined general analysis areas (a total of approximately 43,445 acres). Of those 333 sites, 195 are prehistoric cultural remains, 101 historic cultural remains, 27 multi-component (both historic and prehistoric) remains, and 10 are of indeterminate age and cultural affiliation.

Of those 333 sites, there are a total of 233 sites that have been evaluated as *not eligible* for nomination to the National Register of Historic Places (NRHP) by the State Historic Preservation Office (SHPO) and no further work is required at those sites. Nineteen sites have been determined to be *eligible* for the NRHP by SHPO and will have to be avoided or a mitigation plan approved and implemented prior to any disturbance. The remaining 81 sites are currently considered *unevaluated* by SHPO and will require additional evaluation and/or Native American consultation. The *unevaluated* sites are to be given the same protections as *eligible* sites and are to be avoided until a determination of eligibility have been made. Data recovery plans are required for all sites recommended *eligible* to the National Register following testing and consultation with SHPO. Until full consultation with SHPO has been completed and agreement regarding NRHP eligibility has been reached, all cultural sites within each WAC LBA tract's general analysis area would be protected from disturbance.

No sites of Native American religious or cultural importance have been identified on the North Hilight Field, South Hilight Field, West Hilight Field,

West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts. If such sites or localities are identified at a later date, appropriate action must be taken to address concerns related to those sites.

► **Visual Resources**

Currently, mine facilities and mining activities at the southern group of mines (Jacobs Ranch, Black Thunder, North Antelope Rochelle, and Antelope) are visible from various public-use roads in the general Wright analysis area, including State Highway 450, Jacobs Road, Shroyer Road, Keeline Road, Hilight Road, Edwards Road, Reno Road, Antelope Road, Mackey Road, and Matheson Road.

Some mining activities on the North, South and West Hilight Field LBA Tracts would be visible from State Highway 450. Some of the existing mining operations at the Black Thunder and Jacobs Ranch mines are currently visible from this highway. Some mining activities on the West Jacobs Ranch LBA Tract would be visible from State Highway 450. Portions of the West Hilight Field and West Jacobs Ranch tracts may also be visible from State Highway 59. Not all of the mining activities on these four LBA tracts would be visible from these major highways because of the rolling terrain. Portions of these four LBA tracts would also be visible from Keeline Road, Jacobs Road, Shroyer Road, Hilight Road, Edwards Road, Reno Road, and Matheson Road.

Some mining activities on both the North and South Porcupine LBA Tracts would be visible from Antelope Road and Matheson Road. Some mining activities on the North Porcupine tract would also be visible from the Edwards Road, Reno Road, and Mackey Road. Some of the existing mining operations at the North Antelope Rochelle Mine are currently visible from these public roads.

Due to the existing mining activities in the general Wright analysis area, the predominant BLM visual resources management (VRM) class is Class IV. This classification would not be altered by the leasing and subsequent mining of the six WAC LBA tracts under the Proposed Actions or Alternatives 2 and 3. After reclamation of the LBA tracts and adjoining mines, the VRM Class IV conditions would be improved and the reclaimed land would resemble the surrounding undisturbed terrain. No unique visual resources have been identified on or near the WAC LBA tracts.

► **Noise**

Noise levels on the WAC LBA tracts would be increased considerably by mining activities such as blasting, loading, hauling, and possibly in-pit crushing. The BNSF & UP rail line currently borders and/or traverses all six LBA tracts; therefore, rail traffic noise on the tracts would continue to be proportionate to the rate of coal production from the PRB mines in the future. Due to the remoteness of the LBA tracts and because mining is already ongoing in the area, noise would have few off-site impacts. The five occupied dwellings that

are located within the tracts (two within the North Hilight Field tract and three within the West Jacobs Ranch tract) would be vacated prior to advancing mining activities. No occupied dwellings would experience adverse noise impacts from mining activities if the South Hilight Field, West Hilight Field, North Porcupine, and South Porcupine LBA Tracts are leased as applied for or under Alternative 2. The two occupied dwellings that are located immediately adjacent to the North Hilight Field tract would experience adverse noise impacts if mining activities (particularly blasting) occur within 2,500 feet of them. Wildlife in the immediate vicinity of mining may be adversely affected; however, anecdotal observations at surface coal mines in the area indicate that some wildlife may adapt to increased noise associated with coal mining activity. After mining and reclamation are completed, noise would return to premining levels.

► **Transportation**

Essentially all of the coal mined on the Wright area LBA tracts would be transported by rail system. Since the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts would be an extension of the operating applicant mines, the existing rail facilities and infrastructure would be used during mining of the proposed lease areas. BNSF & UP have upgraded and will continue to upgrade their rail capacities to handle the increasing coal volume projected from the PRB, with or without the leasing of these LBA tracts. The construction of the proposed DM&E Railroad expansion into this area is not dependent on leasing one or more of the six LBA tracts.

Some of the coal included in each of the six LBA tracts under both the Proposed Action and Alternative 2, BLM's preferred tract configuration, is overlain by portions of various public roads. SMCRA prohibits mining within 100 feet of the outside ROW line of any public road unless the appropriate public road authority allows the road to be relocated or closed after public notice, an opportunity for a public hearing, and a finding that the interests of the affected public and landowners will be protected. As a result, the coal underlying the public road ROWs and adjacent buffer zones has been determined to be unsuitable for mining; however, it would be included in the LBA tract that is offered for lease in order to allow efficient recovery of economically mineable coal outside of the ROW and buffer zone. Stipulations stating that no mining activity may be conducted in the portion(s) of the lease within the public road ROW(s) and buffer zone(s) unless the authorized public road authorities determine that the road(s) could be abandoned or relocated will be attached if a lease is issued for an LBA tract. The applicant mines are currently evaluating options to close and/or relocate several county roads in order to recover the coal in the proposed leases.

Vehicular traffic to and from the mines would continue at existing or slightly higher levels for an extended period of time, depending on which LBA tracts are leased and which alternatives are selected.

Active pipelines and utility/power transmission lines would have to be relocated in accordance with previous agreements, or agreements would have to be negotiated for their removal or relocation.

► **Socioeconomics**

Royalty and bonus payments for the coal in the LBA tracts would be collected by the federal government and split with the state. Assuming an average coal price of \$11.06 per ton recovered and a potential range of bonus payments of 30 to 97 cents per ton, the potential additional federal revenues from the six Wright area LBA tracts would range from approximately \$3.6 to \$7.2 billion, depending on the alternative selected and the bonus price at the time the coal is leased. The potential additional revenue to the state of Wyoming from the six LBA tracts would range from approximately \$4.5 to \$8.7 billion, depending on the alternative selected, the bonus price at the time the coal is leased, and the selling price of the coal. Mine life and employment (at or slightly above current levels) would be extended for over nearly 23 additional years, depending on the LBA tracts involved and which alternatives are selected.

► **Environmental Justice**

Economic and demographic data indicate that neither minority populations nor people living at or below the poverty level make up a “meaningfully greater increment” of the total population in Gillette, Wright or Campbell County than they do in the state as a whole. Potentially adverse impacts do not disproportionately affect minorities, low-income groups or Native American tribes or groups. No tribal lands or Native American communities are included in the general Wright analysis area, and no Native American treaty rights or Native American trust resources are known to exist for this area.

► **Greenhouse Gas Emissions**

Greenhouse gases (GHGs) are an issue because of global warming and climate change. Global warming is a theory that certain gases in the atmosphere impede the radiation of heat from the earth back into space, trapping heat like the glass in a greenhouse. This raises the average temperature of the surface of the earth and the lower atmosphere, which contributes to climate change. Among these GHGs are carbon dioxide, methane, water vapor, ozone, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. GHGs are not currently regulated, but there is a consensus in the international community that global climate change is occurring and that it should be addressed in governmental decision making.

Carbon dioxide equivalents (CO₂e) is a measurement for describing how much global warming a given type and amount of greenhouse gas may cause. The total annual CO₂e emissions are projected to increase at the Black Thunder, Jacobs Ranch and North Antelope Rochelle mines if the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine,

and South Porcupine LBA Tracts are added to the mining operations. The increases in CO₂e emissions are expected to result from the additional fuels (especially diesel) that would be used in consideration of the increased coal and overburden haul distances, as well as increased use of electricity and explosives related to increasing overburden thicknesses. Annual coal production rates may also increase over time at the applicant mines.

The Center for Climate Strategies estimates that activities in Wyoming will account for approximately 60.3 million tonnes of gross CO₂e emissions in 2010 and 69.4 million tonnes in 2020. The total CO₂e emissions from the three applicant mines in 2007 represents 2.22 percent of the 2010 state-wide emissions. With the addition of the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts, the estimated total CO₂e emissions at the three applicant mines would represent approximately 3.61 percent of the projected 2020 state-wide CO₂e emissions.

No Action Alternatives (Alternative 1)

Under the No Action alternatives for each tract, the coal lease applications would be rejected and the areas contained in the applications would not be offered for lease at this time. The tracts could be nominated for lease again in the future. Under the No Action alternatives, the impacts described in the preceding paragraphs to topography and physiology, geology and minerals, air quality, water resources, AVFs, wetlands, soils, vegetation, wildlife, T&E species, land use and recreation, cultural resources, Native American concerns, visual resources, noise, transportation, and socioeconomics would occur due to mining the existing Black Thunder, Jacobs Ranch, and North Antelope Rochelle mine coal leases, but these impacts would not be extended by mining onto the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine LBA Tracts.

Mitigation

The Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines currently approved mining permits include extensive baseline information, ongoing monitoring information and commitments, and mitigation measures that are required by SMCRA and Wyoming state law. Compliance, mitigation, and monitoring measures that are required by regulation are considered to be part of the Proposed Actions and Alternatives considered in this EIS. These regulatory requirements, mitigation measures and monitoring commitments are in place for the No Action Alternative as part of the currently approved mining and reclamation plans for the three applicant mines and would be included in the permitting processes that would be required to mine the six WAC LBA tracts.

If impacts are identified during the leasing process that are not mitigated by existing required mitigation measures, BLM can include additional mitigation

measures in the form of stipulations on a new lease, within the limits of its regulatory authority. Any special stipulations identified by BLM where additional or increased monitoring measures are recommended to be added to the BLM leases are included in Appendix D of this EIS.

Cumulative Impacts

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 can result from individually minor, but collectively significant, actions occurring over time.

Since decertification of the Powder River Federal Coal Region in 1990, 20 coal leases containing approximately 5.8 billion tons of federal coal have been issued following competitive sealed-bid sales. Three exchanges of federal coal in the Wyoming portion of the Powder River Federal Coal Region have also been completed. Twelve additional coal lease applications, including the North Hilight Field, South Hilight Field, West Hilight Field, West Jacobs Ranch, North Porcupine, and South Porcupine tract applications, are currently pending. The pending LBA applications contain over 3.8 billion tons of coal.

Recently, the BLM completed a regional technical study, called the PRB Coal Review, to help evaluate the cumulative impacts of coal and other mineral development in the PRB. The PRB Coal Review consists of three tasks:

- Task 1 identifies existing resource conditions in the PRB for the baseline year (2003) and, for applicable resources, updates the BLM's 1996 status check for coal development in the PRB.
- Task 2 defines the past and present development activities in the PRB and their associated development levels as of 2003 and develops a forecast of reasonably foreseeable development in the PRB through 2020. The reasonably foreseeable activities fall into three broad categories: coal development (coal mine and coal-related), oil and gas development (conventional oil and gas, coal bed natural gas, and major transportation pipelines), and other development, which includes development that is not energy-related as well as other energy-related development.
- Task 3 predicts the cumulative impacts that could be expected to occur to air, water, socioeconomic, and other resources if the development occurs as projected in the forecast developed under Task 2.

A series of reports have been prepared to present the results of the PRB Coal Review task studies. The Task 1, 2, and 3 reports represent components of a technical study of cumulative development in the PRB; they do not evaluate specific proposed projects, but they provide information that BLM is using to evaluate the cumulative impacts that would be expected to occur if specific projects or applications, such as the six WAC LBA tracts, are approved. The

PRB Coal Review is expressly not a NEPA analysis. It is a planning tool; a set of environmental impact analysis tools, and when maintained through time will provide a method to calibrate development projects and related estimation of effects. The results of the PRB Coal Review studies are summarized in Section 4.0 of this EIS. The Wyoming portion of the PRB is the primary focus of the PRB Coal Review, but the Montana portion of the PRB is included in some studies.

Due to variables associated with future coal production, two projected coal production scenarios (representing an upper and a lower production level) were developed for the PRB Coal Review. The projected development levels are based on projected demand, coal market forecasts, and availability of adequate coal transportation. The projected coal production levels at the Black Thunder, Jacobs Ranch, and North Antelope Rochelle mines during the baseline year and for 2010, 2015, and 2020 are included.

Cumulative impacts vary by resource, with potential impacts to air quality, groundwater quantity, wildlife habitat, and socioeconomics generally being the greatest concerns.

The PRB Coal Review air quality study documents the modeled air quality impact of existing operations during a baseline year, 2002, and of projected development activities in 2010. BLM updated the model and conducted the cumulative air quality impact analysis using a revised baseline year of 2004 with development levels projected for year 2015. BLM recently updated the model for the second time, and conducted the cumulative air quality impact analysis for the year 2020 using the same baseline year of 2004 with revised projected 2020 scenarios. The revised baseline year emissions inventory was developed using 2004 actual emissions data or emissions estimates and incorporated the recent analyses of emissions in Wyoming and Montana, which were not available when the 2010 modeling study was done. The model was used to evaluate impacts of existing and projected source emissions on several source groups, including near-field receptors in Wyoming and Montana, receptors in nearby federally designated “Class I” areas, and receptors at other sensitive “Class II” areas. The EPA guideline CALPUFF model system version 5.8 was used for the modeling analysis.

The existing regional air quality conditions generally are very good in the PRB, but the modeling showed substantial, localized impact of the 24-hour particulate concentrations, exceeding the national and state ambient air quality standards at some Wyoming near-field receptors for the baseline year (2004), as well as for both development scenarios for 2015 and 2020. Impacts at Montana near-field receptors would be in compliance with the national and state ambient air quality standards for all pollutants and averaging periods. Table ES-13 presents the maximum modeled impacts on ambient air quality at the near-field receptors in Wyoming and Montana for the baseline year (2004) and for both coal production scenarios for 2015 and 2020. The model results should not be construed as predicting an actual exceedance of any standard,

Executive Summary

Table ES-13. Projected Maximum Potential Near-field Impacts ($\mu\text{g}/\text{m}^3$).

Pollutant	Averaging Time	Base Year (2004) Impacts	2020 Lower Coal	2020 Upper Coal	NAAQS	Wyoming AAQS	Montana AAQS	PSD Class II Increments
			Development Scenario Impacts	Development Scenario Impacts				
Wyoming Near-field								
NO ₂	Annual	31.3	30.5	30.6	100	100	-- ¹	25
SO ₂	Annual	15.3	16.4	16.5	80	60	---	20
	24-hour	112.3	143.3	143.3	365	260	---	91
	3-hour	462.0	936.7	936.7	1,300	1,300	---	512
PM _{2.5}	Annual	13.4	16.3	16.3	15	15	---	---
	24-hour	87.6	218.4	218.4	35	35	---	---
PM ₁₀	Annual	38.4	46.6	46.6	---	50	---	17
	24-hour	250.4	624.1	624.3	150	150	---	30
Montana Near-field								
NO ₂	Annual	3.3	2.5	2.6	100	---	100	25
	1-hour	409.0	440.1	442.7	---	---	564	---
SO ₂	Annual	1.6	3.0	3.1	80	---	80	20
	24-hour	16.1	24.7	27.1	365	---	365	91
	3-hour	65.0	138.9	138.9	1,300	---	1,300	512
	1-hour	162.9	237.0	259.1	---	---	1,300	---
PM _{2.5}	Annual	1.0	0.9	0.9	15	---	15	---
	24-hour	10.2	10.2	10.2	35	---	35	---
PM ₁₀	Annual	2.8	2.5	2.6	---	---	50	17
	24-hour	29.1	29.3	29.3	150	---	150	30

¹ No standard or increment

Value units are microgram per cubic meter ($\mu\text{g}/\text{m}^3$)

Bold values indicate projected exceedance of AAQS

Source: PRB Coal Review Task 3A Update Report (BLM 2009c)

but are at best indicators of potential impacts. Table ES-14 lists the projected modeled visibility impacts for the baseline year (2004) and for the lower and upper coal production scenarios for all analyzed Class I and sensitive Class II areas. For the upper and lower coal production scenarios, it shows the number of additional days that the impacts were projected to be greater than 1.0 deciview (dv) (10 percent in extinction) for each site in 2015.

The PRB Coal Review provides an assessment of the cumulative impact to surface and ground water resources associated with future projected levels of coal mining, coal mine dewatering, CBNG groundwater withdrawal and surface disposal, and coal mine and conventional oil and gas surface disposal of groundwater. Several studies and modeling analyses have previously been conducted by various federal and state agencies, as well as the coal and oil and gas industries, to predict the cumulative impacts of surface coal mining and CBNG development on groundwater resources in the PRB. The most recent analysis, BLM's PRB Coal Review, summarizes the modeled changes in groundwater levels projected for 2010, 2015, and 2020. The base years used for comparison of groundwater impacts were 2002 (the year used for calibration of the groundwater model) and 1990 (a time period prior to CBNG pumpage and before major expansion by the eastern PRB coal mines). Information from earlier studies was incorporated into the modeling effort for the PRB Coal Review analysis. The cumulative effects groundwater model domain is within approximately 25 miles of the coal mines. As expected, modeling indicates groundwater impacts from CBNG development and surface coal mining are additive in nature and that the addition of CBNG development has greatly extended the area experiencing a loss in hydraulic head to the west of the mining area. Drawdown in the Upper Fort Union coal aquifers attributable to mining only from 1990 to 2020 ranges from 25 to 125 feet in the active mine areas with up to 125 feet of rebound in the reclaimed areas. At distances greater than 3 miles west of the southern group of mines, drawdowns attributed to mining only were projected to be less than 25 feet, from 1990 to 2010 as well as from 1990 to 2020. The effect of CBNG pumpage on the Upper Fort Union coal aquifers from 1990 to 2010 results in an extensive area of drawdown centered about 10 miles southwest of Wright, covering nearly 15 townships, and drawdowns range from 25 feet on the southern margin to 575 feet in the center of the depression. The modeled drawdown in the Upper Fort Union due to CBNG pumpage from 1990 to 2020 is also projected to primarily be located southwest of Wright, producing a groundwater depression of between 25 to 425 feet that covers roughly eight to nine townships.

In addition to conducting detailed analyses to assess the probable hydrologic consequences of mining as part of the mine permitting process, each mine must monitor groundwater levels in the coal and underlying and overlying aquifers. The monitoring programs track the extent of groundwater drawdown propagation to the west and the extent of recharge and quality of the water in the backfill areas of the mines. The monitoring data verify that recharge has occurred and is continuing in the backfill, and that the quality of water from the backfill will generally meet the state standard for livestock use. The PRB

Table ES-14. Modeled Change in Visibility Impacts at Class I and Sensitive Class II Areas.

Location	Base Year (2004)	2020 Lower Coal Development Scenario	2020 Upper Coal Development Scenario
	No. of Days >10%	Change in No. of Days >10%	Change in No. of Days >10%
Class I Areas			
Badlands National Park	218	44	44
Bob Marshall WA	8	0	0
Bridger WA	144	5	5
Fitzpatrick WA	91	6	6
Fort Peck Indian Reservation	105	20	21
Gates of the Mountain WA	55	4	4
Grand Teton National Park	70	6	6
North Absaroka WA	61	8	8
North Cheyenne Indian Reservation	243	59	60
Red Rock Lakes	42	3	3
Scapegoat WA	27	2	2
Teton WA	57	8	8
Theodore Roosevelt National Park	178	24	24
UL Bend WA	77	18	18
Washakie WA	83	8	8
Wind Cave National Park	262	28	31
Yellowstone National Park	84	5	5
Sensitive Class II Areas			
Absaroka Beartooth WA	101	10	10
Agate Fossil Beds National Monument	251	26	26
Big Horn Canyon National Rec. Area	331	1	1
Black Elk WA	236	47	47
Cloud Peak WA	126	29	30
Crow Indian Reservation	360	3	3
Devils Tower National Monument	274	31	32
Fort Belknap Indian Reservation	66	14	15
Fort Laramie National Historic Site	260	15	16
Jedediah Smith WA	79	3	5
Jewel Cave National Monument	261	36	37
Lee Metcalf WA	97	2	2
Mount Naomi WA	51	1	1
Mount Rushmore National Monument	222	49	52
Popo Agie WA	139	6	6
Soldier Creek WA	268	19	19
Wellsville Mountain WA	130	17	17
Wind River Indian Reservation	217	9	10

Source: PRB Coal Review Task 3A Update Report (BLM 2009c)

Coal Review predicts that resaturation of coal mine pit backfill to form backfill aquifers may take approximately 100 years after cessation of mining and is projected to result in the westward migration of groundwater with elevated TDS levels. Modeling of this westward migration indicates that TDS levels should be down to the average background (premine) value within 2,000 feet of the final westward extent of the coal mine boundaries. Thus, no impact to groundwater quality in either the Wasatch or Upper Fort Union aquifers is expected beyond approximately 2,000 feet west of the final coal mine boundaries.

The PRB Coal Review summarizes the cumulative impacts to surface water quality and stream channel stability as a result of surface discharge of groundwater by CBNG development and coal mine dewatering projected for 2010, 2015, and 2020 in the eastern PRB within approximately 25 miles of the coal mines. The base year used for comparison of surface water quality impacts was 2003. Projected cumulative surface water impacts primarily include the impacts of CBNG production water discharged to ephemeral drainages and the surface disturbance and subsequent reclamation of drainages that result from surface coal mining. For the coal mines, it was assumed that most, if not all, of the water produced was expected to be consumed during operation, and that any water discharged to nearby ephemeral drainages is in accordance with Wyoming Pollution Discharge Elimination System (WYPDES) permits. It was therefore projected that the primary source of water discharged directly to the receiving drainages in the PRB study area through 2020 would be limited to the production water from CBNG development.

The PRB Coal Review studies include an evaluation of the impacts to wildlife and aquatic species as of 2003 and an evaluation of the projected levels of disturbance in the PRB in 2010, 2015, and 2020, based on the projected development levels in those years. As discussed above, impacts to wildlife and fisheries can be classified as short-term and long-term. Short-term impacts are related to habitat disturbance during project development and operation. Long-term impacts result from changes in habitat after reclamation is completed. Habitat fragmentation can result from activities such as roads, well pads, mines, pipelines, and electrical power lines, as well as increased noise, elevated human presence, dispersal of noxious and invasive weed species, and dust from unpaved road traffic.

The cumulative impacts of energy development (coal, oil and gas) in the PRB are and will continue to contribute to a reduction in hunting opportunities for some animals (pronghorn, mule deer, and sage grouse).

The PRB Coal Review used the Regional Economic Models Inc. Policy Insight regional economic model to project cumulative employment and population levels and associated impacts in the PRB for the upper and lower coal production scenarios in 2010, 2015, and 2020. Table ES-15 presents the recent and projected population levels for the counties included in the PRB Coal Review socioeconomic analysis.

Table ES-15. Recent and Projected PRB Population.

Year	Campbell County	Converse County	Crook County	Johnson County	Sheridan County	Weston County	Six County PRB Total
Census							
2000	33,698	12,104	5,895	7,108	26,606	6,642	92,053
2003	36,381	12,326	5,971	7,530	27,116	6,665	95,989
2006	38,934	12,866	6,255	8,014	27,673	6,762	100,504
Lower Coal Production Scenario							
2010	45,925	13,103	6,542	8,389	28,459	7,108	109,526
2015	48,905	13,671	6,759	8,867	30,016	7,174	115,392
2020	50,995	14,193	6,989	9,326	31,467	7,208	120,178
Upper Coal Production Scenario							
2010	47,662	13,160	6,570	8,424	28,579	7,137	111,532
2015	51,558	13,763	6,802	8,924	30,214	7,219	118,480
2020	54,943	14,313	7,045	9,403	31,733	7,266	124,703

Source: U.S. Census Bureau (2006a) and PRB Coal Review Task 3C Report

The cumulative impacts of mining the coal are considered in this EIS because it is a logical consequence of issuing a maintenance lease to an existing mine. The use of the coal after it is mined is not determined at the time of leasing or mining; the use is determined by the purchaser and end user. However, almost all of the coal mined in the PRB is utilized and burned by coal-fired power plants located throughout the U.S. to generate electricity. When coal is burned, it results in the release of CO₂, a GHG, as well as mercury and other compounds and elements. GHGs, climate change, the potential impacts of worldwide GHG emissions, and coal combustion by-products are discussed at length in Section 4.2.14. The U.S. Department of Energy’s recent reports that project the nation’s current and future energy needs and power generation sources are also cited in the discussion.

This EIS presents BLM’s analysis of environmental impacts under authority of the NEPA and associated rules and guidelines. BLM will use this analysis to make a leasing decision. The decision to lease these lands is a necessary requisite for mining, but is not in itself the enabling action that will allow mining. The most detailed analysis prior to mine development would occur after the lease is issued, when the lessee files an application for a surface mining permit and mining plan approval, supported by extensive mining and reclamation plans, to the WDEQ/LQD.