



**United States Department of the Interior
Bureau of Land Management**



and

**Office of Surface Mining Reclamation
and Enforcement**

Preliminary Environmental Assessment

DOI-BLM-CO-S010-2011-0074-EA

June 8, 2017

**Federal Coal Lease (COC-62920) Modification and
Federal Mine Permit (CO-0106A) Revision and Renewal**

***Location:* King II Mine, La Plata County, Colorado**

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Abbreviations and Acronyms

°F	degrees Fahrenheit
°C	degrees Celsius
AADT	annual average daily traffic
ADT	average daily trips
AHMP	All Hazard Mitigation Plan
APCD	Air Pollution Control Division
AQRV	Air Quality Related Values
ASLM	Assistant Secretary of the Interior, Land and Minerals Management
BA	biological assessment
BCC	USFWS Birds of Conservation Concern
BLM	Bureau of Land Management
BMP	best management practice
BNSF	Burlington Northern Santa Fe
BO	biological opinion
Btu	British thermal units
CAA	Clean Air Act of 1970
CCR	Code of Colorado Regulations
CDPHE	Colorado Department of Public Health and Environment
CDRMS	Colorado Division of Reclamation, Mining and Safety
CDS	CDS Environmental Services, LLC
CDNR	Colorado Department of Natural Resources

Abbreviations and Acronyms

CDWR	Colorado Division of Water Resources
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	methane
CHIA	Cumulative Hydrologic Impact Assessment
CIAA	cumulative impacts analysis area
CMM	coal mine methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO _{2e}	carbon dioxide equivalent
Coal Act	Colorado Surface Coal Mining Reclamation Act of 1979
COGCC	Colorado Oil and Gas Conservation Commission
Colorado Coal Rules	Regulations of the Colorado Mined Land Reclamation Board for Coal Mining
COPIF	Colorado Partners in Flight
County	La Plata County, Colorado
CPW	Colorado Parks and Wildlife
CR	County Road
CRS	Colorado Revised Statute(s)
dB	decibels
dBA	A-weighted decibel
DOI	Department of Interior
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESA	Endangered Species Act
FLIGHT	Facility Level GHG Tool
FLMFPD	Fort Lewis Mesa Fire Protection District
FLPMA	Federal Land Policy Management Act of 1976
FONSI	Finding of No Significant Impact
GCC	GCC Energy, LLC
GHG	greenhouse gas
GWP	global warming potential
HAPs	hazardous air pollutants
Hg	mercury
HGCAP	Hay Gulch Citizen Advisory Panel
Hz	Hertz
IPCC	Intergovernmental Panel on Climate Change
km	kilometer
lbs.	pounds

Abbreviations and Acronyms

LPC	La Plata County, Colorado
LPCLUC	La Plata County Land Use Code
LSC	LSC Transportation Consultants, Inc.
LUP	Land Use Permit
m	meters
MBTA	Migratory Bird Treaty Act
MLA	Mineral Leasing Act of 1920
MMBtu	one million British thermal units
MP	mile post
MPDD	mining plan decision document
mph	miles per hour
MSHA	Mine Safety and Health Administration
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NH ₃	ammonia
NHPA	National Historic Preservation Act
NMPM	New Mexico Principal Meridian
NO ₂	nitrogen dioxide
NO _x	oxides of nitrogen
NRHP	National Register of Historic Places
O ₃	ozone
OEM	Office of Emergency Management
OPC	opinion of probable cost
OSMRE	Office of Surface Mining and Reclamation Enforcement
PaleoWest	PaleoWest Archaeology
PAP	Permit Application Package
Pb	lead
PFYC	Potential Fossil Yield Classification
PHC	Probable Hydrologic Consequences
PL	Public Law
PM ₁₀	particulate matter emissions that are less than 10 microns in diameter
PM _{2.5}	particulate matter emissions that are less than of 2.5 microns in diameter
ppm	parts per million
PRPA	Paleontological Resources Preservation Act of 2009
PSD	Prevention of Significant Deterioration
R2P2	Resource Recovery and Protection Plan
RCP	Representative Concentration Pathways
RF	radiative forcing

Abbreviations and Acronyms

RHS	Resource Hydrogeologic Services, Inc.
RIA	Road Improvements Agreement
RMP	Resource Management Plan
ROW	right-of-way
SCC	source classification code
SH	State Highway
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMCRA	Surface Mining Control and Reclamation Act of 1977
SO ₂	sulfur dioxide
SWCA	SWCA Environmental Consultants
T&E	threatened and endangered
TDF	tire derived fuel
TDS	total dissolved solids
Tg	teragrams
THPO	Tribal Historic Preservation Officer
TIA	Traffic Impact Assessment
tons/yr.	tons per year
TR	Technical Revision
TRFO	Tres Rios Field Office
U.S.	United States
UMU	Ute Mountain Ute
USACE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOCs	volatile organic compounds

1. Purpose and Need for Action

1.1 Introduction

On December 28, 2010, GCC Energy, LLC (GCC), a subsidiary of Grupo Cementos de Chihuahua, submitted an application to the Colorado State Director of the United States (U.S.) Department of the Interior (DOI) Bureau of Land Management (BLM) to modify Federal Coal Lease COC-62920 pursuant to regulations in 43 Code of Federal Regulations (CFR) 3410.2-1. The application was amended on October 17, 2014 to adjust the parcels submitted in the modification and to clarify legal land descriptions for a total modification request of 950.55 acres. As the agency charged with administering the affected federal mineral estate, the BLM must analyze the potential environmental impacts to determine whether to approve the proposed lease modification.

On March 20, 2017, GCC submitted a permit application package (consisting of a Permit Revision application and a Permit Renewal Application) to the DOI Office of Surface Mining Reclamation and Enforcement (OSMRE) to revise Federal Permit CO-0106A to mine the additional lease acreage proposed for the King II Mine. As the regulatory authority with jurisdiction by law to approve, disapprove, or conditionally approve the federal mine permit (including permit renewals and revisions), and to provide oversight authority of the Colorado Division of Reclamation, Mining and Safety (CDRMS) mine permit, OSMRE must analyze the potential environmental impacts to determine whether or not to approve the permit revision and renew the federal permit.

Both agencies recognized that it is of mutual benefit for the BLM and OSMRE to join as Co-Lead Agencies in preparing a single Environmental Assessment (EA) to disclose and analyze the potential environmental effects of GCC's proposed lease modification and mine plan revision (hereafter referred to as the "proposed project"). This EA is prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) and the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 CFR 1500-1508); DOI regulations for implementation of NEPA (43 CFR Part 46); DOI Departmental Manual Part 516; and OSMRE guidance, including the OSMRE Handbook on Procedures for Implementing NEPA (OSMRE 1989), and the BLM NEPA Handbook (H-1790-1) (BLM 2008). Information gathered from federal, state, and local agencies, GCC, publicly available literature, and in-house OSMRE and BLM sources were used in the preparation of this EA.

An EA is a site-specific analysis of potential environmental effects that could result in the implementation of the Proposed Action or an alternative. The EA will assist the BLM and OSMRE in project planning, ensuring compliance with the NEPA, and in making a determination as to whether any "significant" effects could result from the Proposed Action and Alternatives. Significance is defined by the NEPA and found in 40 CFR 1508.27.

An EA provides analysis for determining whether to prepare an environmental impact statement (EIS) or a "Finding of No Significant Impact" (FONSI). If following the EA analysis, the BLM and OSMRE determine that a project could have "significant" effects that cannot be mitigated to "less than significant," then an EIS will be prepared for the project. If not, then a Decision Record may be signed for the EA that describes the decision. The decision can consist of a single alternative or a combination of alternatives. The Decision Record and FONSI describe why the implementation of the selected alternative

would not result in significant environmental effects beyond those already addressed in the BLM Tres Rios Field Office (TRFO)/San Juan National Forest Final Environmental Impact Statement for the Final San Juan National Forest and Proposed TRFO Land and Resource Management Plan (USDI/USDA September 2013). Following issuance of a Decision Record and FONSI by BLM, OSMRE would prepare a separate FONSI and either approve, disapprove, or approve with conditions the permit renewal and revision applications for the King II Federal Permit CO-0106A under the Surface Mining Control and Reclamation Act of 1977 (SMCRA) and then prepare a recommendation for the Assistant Secretary of the Interior, Land and Minerals Management (ASLM) to either approve, disapprove, or approve with conditions the mining plan modification.

This chapter presents the purpose and need of the proposed project, as well as relevant issues such as human, natural, cultural, and environmental elements that could be affected by the implementation of the proposed project. In order to meet the purpose and need, the BLM and OSMRE have analyzed two alternatives: the Proposed Action Alternative and the No Action Alternative, both of which are presented in Chapter 2 (other alternatives considered but eliminated from detailed analysis are also included in Chapter 2). Chapter 3 describes the existing environment of the project area and describes the potential environmental effects from each alternative. Chapter 4 describes cumulative impacts.

1.2 Background

The King Coal Mine began operation in 1938 at the current location in Hesperus, Colorado, with the first federal coal lease for the mine obtained in 1941. Coal production has occurred and is currently occurring on land obtained through federal leases, fee owners, split estate, the Ute Mountain Ute (UMU) Tribe, and beginning in 2007, a State of Colorado lease. The King I Mine operated continuously from 1938 until 2009 from a single mine portal location south of La Plata County Road (CR) 120. The reserve that makes up the King II Mine was discovered in 1998 and lies north of CR 120. The King II Mine surface operation and portal were constructed in 2007, approximately 2 miles southwest of the King I Mine on the north side of CR 120. The operation is located in Section 36, Township 35, Range 12, New Mexico Principal Meridian on CR 120 approximately 6.5 miles west of Colorado State Highway (SH) 140. See the Vicinity Map in Appendix A, Map A-1.

GCC acquired ownership of the King Coal Mine in 2005 and obtained all applicable mining permits, including, but not limited to, permits from La Plata County (LPC), the Colorado Division of Reclamation, Mining and Safety (CDRMS), OSMRE, and the Mine Safety and Health Administration (MSHA). Both the King I and King II Mines were operated by GCC until 2009, when mining operations ceased at the King I site due to exhaustion of the coal resource. The current mine permit authorizes some mine refuse disposal from the King II operations at the King I site.

The existing King II Mine operations are currently within a 1,311.69-acre federal coal lease (COC-62920) and a 640-acre State lease (CO-3388), as shown on the Project Area Map (Appendix A, Map A-2). All surface facilities and disturbance for the King II Mine extension are located on the State land, and have been permitted under CDRMS permit number #C-1981-035 (refer to Permit Revision number #08, approved June 19, 2006; Technical Revision [TR] Number 15 [TR-15], approved March 15, 2010; TR-22 approved July 16, 2014; TR-24, approved August 29, 2016; TR-25, approved December 17, 2015; and TR-26, approved October 20, 2016). Surface facilities at the King II site cover approximately 25.5 acres,

with an underground mining operation of approximately 565 acres (as of July 2015). GCC has applied for modification to the existing federal coal lease to expand the leased area for underground operations at the King II Mine site by 950.55 acres, also shown on the Project Area Map in Appendix A. No new surface facilities are required at the King II Mine for the proposed lease modification.

As described in Section 1.1 Introduction, GCC submitted their original proposed lease modification to federal coal lease COC-62920 in 2010. The proposed modification was revised in 2014 because coal reserves within the original application had been bypassed during delays in the processing of the application. On January 15, 2016, the Secretary of the Department of the Interior announced Secretarial Order No. 3338, which placed a pause on the issuance of coal leases with limited, enumerated exemptions and exclusions while the BLM prepared a discretionary Programmatic Environmental Impact Statement to analyze potential leasing and management reforms to the current federal coal program. Because of the Secretarial Order, GCC filed a request for an exemption under the Pause using the emergency leasing criteria on February 26, 2016. At the time of their request there was approximately 2,890,000 total recoverable tons of coal remaining in lease COC-62920. However, of that reserve, only 2,050,000 tons could be recovered without permanently blocking access to adjoining reserves. Because federal coal reserves would be bypassed beginning in approximately May 2018, GCC requested that their lease modification be considered for exemption under the emergency leasing provisions § 3425.1(a)(1)(i)(ii) and (2)(b)(c). On July 12, 2016, the BLM Assistant Director for Energy, Minerals, and Realty Management informed the BLM Colorado State Director that GCC's lease modification action for COC-62920 should be continued to be processed during the pause as provided in Secretarial Order 3338 Section 6(a) and the Interim Processing Policy. On August 26, 2016, the BLM Colorado State Office informed GCC of their intent to continue processing the subject lease modification as an exemption under the emergency leasing provisions. Secretarial Order 3338 was repealed by Secretarial Order 3348 issued in 2017 which lifting the moratorium on coal leasing on federal lands.

The coal from the King II Mine is favored for its high heating value (12,300 British thermal units [Btu] per pound) and its low sulfur, ash, and alkali content. It is sold off-site in the southwest U.S. and Mexico and used in the manufacture of cement. There are small volume sales to regional steam-powered railroads and to a local concessionaire for home heating. As shown in Table 1-1, coal production at the King II Mine increased annually until 2015. Reductions in coal production in 2015 were primarily due to depressed regional coal markets. In 2016, LPC issued GCC a Class II Land Use Permit (LUP) (Project #2012-0089) that included a Road Improvements Agreement (RIA) that limited coal truck traffic along CR 120 to trip volumes for various phases of road improvements that GCC agreed to make as part of their LUP. The LUP, RIA and the LPC Planning Department staff report are publicly available on the LPC Planning Department GCC Energy Project web page at: http://lpcds.org/planning/gcc_energy_project. These LPC planning documents as well as more than 80 exhibits that support the LUP planning process are incorporated by reference throughout this EA. Prior to the RIA and LUP, actual annual production was driven by coal and alternative fuel markets.

Coal production at the King II Mine is currently limited by the number of allowable loaded coal trucks on CR 120 per the LPC RIA. The RIA allows an average of 80 loaded trucks per day through road improvement Phases 1, 2, and 3; 100 trucks per day after Phase 4 and 120 trucks per day after Phase 5 improvements are completed. Based on each loaded truck carrying approximately 28.5 tons, the maximum anticipated annual production after Phase 5 RIA improvements is approximately 1,067,040

tons per year (tons/yr.). The loading facilities for the mine are located off CR 120. The average daily number of truck trips on CR 120 for loaded and unloaded coal trucks as well as suppliers is also included in Table 1-1.

Table 1-1. King II Mine coal production and truck trips

Year	Coal Production (Tons)	Average Daily Truck Trips	Mine Employees ¹
2007	470,170	45 Loaded/90 Total	31
2008	392,348	38 Loaded/76 Total	81
2009	504,231	48 Loaded/96 Total	63
2010	523,413	50 Loaded/100 Total	88
2011	618,132	59 Loaded/118 Total	85
2012	639,003	61 Loaded/122 Total	106
2013	737,131	71 Loaded/142 Total	133
2014	970,790	93 Loaded/186 Total	139
2015	813,677	78 Loaded/156 Total	121
2016	628,953	70 Loaded/140 Total ²	89
Average	629,785	142	83

¹ Number includes employees working at both King I and King II.

² Truck trips limited to 6 days per week by LPC RIA.

Source: GCC Energy.

As is shown in Table 1-1, 629,785 tons/yr. represents an average production level annually, a volume of which 67 percent (421,000 tons/yr.) is delivered to GCC-owned cement plants in the U.S. and Mexico where the coal is used as a fuel source in the cement manufacturing process. These plants are in Pueblo, Colorado (105,000 tons/yr.), Tijeras, New Mexico (76,000 tons/yr.), and in Chihuahua and Samalyuca, Mexico (240,000 tons/yr.). Deliveries to the cement plants in the U.S. are directly trucked from the King II mine. Coal delivered to GCC’s Mexico cement plants are delivered via rail from the Gallup, New Mexico rail hub. An additional approximately 12,000 tons/yr. are delivered to the Durango & Silverton Narrow Gauge Railroad (3,600 tons/yr.), the Cumbres and Toltec Scenic Railroad in Chama, New Mexico (1,500 tons/yr.), and locally (7,000 tons/yr.) for home heating. On average, approximately 448,785 tons/yr. (including the GCC Mexico cement plant volumes) is transported by truck to the rail terminal in Gallup, New Mexico for delivery to GCC plants in Mexico and to variable cement plant buyers in the Southwest (depending on markets, alternative fuels, and coal supply). From year to year, actual coal production is based on several assumptions, foremost, that coal markets are favorable and that GCC has buyers to sell to. Another factor potentially affecting production levels has to do with the consistency of coal present within the existing mine lease areas.

1.3 Lead and Cooperating Agencies

The BLM and OSMRE are Joint Lead Agencies in this NEPA process and are both recognized as having jurisdiction by law. Federal coal regulations 43 CFR § 3432 and 3400 require the BLM to consider leasing federally owned minerals for economic recovery. The BLM decision to lease lands is a necessary

first step in a two-step process before a mine plan can be authorized and mining commence. Ongoing management of the existing leases, including permitting of associated mining and surface activities follows SMCRA, implementing regulations of BLM coal regulations at 43 CFR § 3400 and OSMRE regulations at 30 CFR § 700 respectively, as well as State of Colorado coal regulations.

OSMRE is responsible for reviewing plans to conduct coal mining and reclamation operations on lands containing leased federal coal. CDRMS is the regulatory authority for coal mines in Colorado that occur on federal and private lands and the OSMRE functions as an oversight authority. When a coal mining action occurs on federal lands, or there is federal mineral estate, OSMRE must determine if the action requires a mining plan decision document for Secretarial approval. If a mining plan decision document is deemed necessary, pursuant to 30 CFR 746, OSMRE must prepare and submit to the Assistant Secretary of Land and Minerals Management (ASLM) a mining plan decision document recommending approval, disapproval, or approval with condition(s) of the proposed mining plan modification. In addition, OSMRE has the regulatory authority for coal mining that occurs on Indian lands. Therefore, for the King II Federal Mine Permit CO-0106A OSMRE is recognized as having jurisdiction by law to approve, disapprove, or conditionally approve federal permit renewal and revision applications under SMCRA.740

As provided for under SMCRA, OSMRE worked with the State of Colorado to develop its own regulatory program to permit coal mining with OSMRE in an oversight role. CDRMS manages its own coal regulatory program under SMCRA and the Colorado Surface Coal Mining Control Act of 1976. CDRMS has the authority and responsibility to make decisions to approve SMCRA mine permits and regulate coal mining under regulations of the Colorado Mined Land Reclamation Board for Coal Mining and is therefore a cooperating agency.

Federal coal leaseholders in Colorado must submit a permit revision application to CDRMS for proposed expansion of existing mines that covers mining and reclamation on private and federal lands. The existing GCC CDRMS permit number is C1981-035. In addition, the State Board of Land Commissioners Coal Mining Lease number is CO-3388 for the state land in Township 36 where GCC has located its surface facilities (refer to Map A-2). CDRMS reviews the permit revision package to ensure that the application complies with the permitting requirements and that the coal mining operation would meet Colorado's performance standards. The OSMRE, BLM, and other federal agencies also review the application to assure it complies with the coal lease, the Mineral Leasing Act of 1920 (MLA), the NEPA, SMCRA and other applicable federal laws and regulations.

Collectively, CDRMS and OSMRE are responsible for managing the coal mine permitting and mining plan approval processes, which occur after leasing. Thus, if the King II lease modification is approved by BLM, the lessee or operator would be required to submit a PAP to CDRMS and OSMRE for required approvals before any mining could occur on the lease tract.

If the permit application does comply, CDRMS issues the applicant a permit to conduct site-specific surface coal mining operations. As part of this process, OSMRE reviews the PAP to ensure it contains the necessary information to comply with the coal lease, the MLA, the NEPA, as amended, and other applicable federal laws and their attendant regulations (refer to Section 1.8). The BLM has a review and concurrence role during this step. BLM's role in the mining plan decision document (MPDD) process is stated in 30 CFR 740.4(d). BLM's collaborative role with OSMRE is described in 740.13(d)(2) in the context of aiding in OSMRE's MPDD determinations.

While OSMRE is prohibited from implementing any function of the MLA, 30 CFR § 740.4(b) and 746.13 require the OSMRE to provide a MLA mining plan decision recommendation to ASLM. The OSMRE must decide whether to approve the proposed mine plan for the proposed increased lease area, as well as, evaluate whether to approve a renewal of Federal Permit CO-0106A for existing mine operations.

As stated above, the OSMRE is the agency responsible for making a recommendation to the ASLM regarding a decision on proposed mining plan modifications under MLA and SMCRA. For new mining plans, the OSMRE prepares a MPDD in support of its recommendation to the ASLM. For existing approved mine plans that are proposed to be modified, as is the case here, the OSMRE prepares a MPDD for a mining plan modification. The ASLM reviews the MPDD and decides whether or not to approve the mining plan modification, and if approved, what, if any, conditions may be needed. Pursuant to 30 CFR 746.13, the OSMRE's recommendation is based, at a minimum, upon:

- The Permit Application Package (PAP) (GCC 2017)
- Information prepared in compliance with the NEPA—including this EA
- Documentation assuring compliance with the applicable requirements of federal laws, regulations, and executive orders other than the NEPA
- Comments and recommendations or concurrence of other federal agencies and the public
- Findings and recommendations of the BLM with respect to the Resource Recovery and Protection Plan (R2P2), federal lease requirements, and the MLA
- Findings and recommendations of the CDRMS with respect to the mine permit application and the Colorado State program
- The findings and recommendations of the OSMRE with respect to the additional requirements of 30 CFR Chapter VII, Subchapter D

To assist with assuring compliance with other federal laws, regulations, and executive orders, the OSMRE also reviews, at a minimum, the following documents to make its recommendation to the ASLM:

- Information/correspondence concerning the U.S. Fish and Wildlife Service (USFWS) Section 7 consultation for threatened and endangered (T&E) species potentially affected by the proposed mining plan under the Endangered Species Act of 1973 (ESA)
- National Historic Preservation Act of 1966 (NHPA) Section 106 consultations for the affected area

The King II Mine is an underground, “room-and-pillar” type coal mine with surface facilities that cover approximately 25 acres regulated by CDRMS, and an underground mining operation regulated by the Federal Indian Program Branch of OSMRE that cover approximately 565 acres, as of July 2015.

Most of the land encompassed by both the existing lease COC-62920 and the proposed lease modification area are “split-estate” lands where the federal government has retained ownership of the subsurface coal (and other minerals), but has disposed of the surface estate. The UMU Tribe owns much of the split-estate surface in this area. While the split-estate surface owned by the UMU Tribe is not within a designated Indian Reservation, it does meet the definition of “Indian Lands” as defined by the SMCRA, and thus the

primary regulator of coal mining operations pursuant SMCRA for those lands is the OSMRE. Therefore, the OSMRE and CDRMS are jointly responsible for issuing permits for mining at the King II Mine.

La Plata County and the Colorado Department of Natural Resources (CDNR) are cooperating agencies for this EA based on their special expertise and jurisdiction. LPC's role is as a reviewing agency for the EA and to ensure conformance of the EA with GCC's Conditional Class II Land Use Permit (Project #2012-0089). CDNR's role is as a reviewing agency for the EA and to ensure conformance of the EA with the Colorado Surface Coal Mining Reclamation Act (34-33-101 et seq., Colorado Revised Statutes [CRS] 1973 as amended) (the Coal Act), the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (2 CR 407-2, 9/14/2005) (Colorado Coal Rules), and the policies and guidelines of the CDRMS' Coal Program.

1.4 Purpose of the Proposed Action

The BLM's purpose for the action is to decide whether to approve all or part of the lands in the application for modification to Federal Coal Lease COC-62920 or to not approve the application. The purpose of the Proposed Action is to allow the applicant access to federal coal reserves for efficient and economic recovery of the coal resource. This Proposed Action would allow for a logical progression of sequenced mining, to ensure that these resources are not bypassed, and achieve maximum economic recovery of the federal coal resource.

As established by the MLA of 1920 and the SMCRA, the OSMRE—a co-lead in the preparation of this EA—is the agency responsible for evaluating the environmental effects resulting from the mining and surface disturbance associated with the proposed lease modification to COC-62920, pursuant to the requirements of the NEPA, in order to make a recommendation to the ASLM on a decision to approve, disapprove, or approve with conditions the mining plan for the lease modification area. The ASLM will decide whether the mining plan modification is approved, disapproved, or approved with conditions.

Additionally, OSMRE is the regulatory authority that administers Federal Mine Permit CO-0106A, which covers the permitted underground mining beneath land owned by the UMU Tribe. As the regulatory authority, OSMRE must evaluate the environmental effects resulting from two Proposed Actions for the King II Federal Permit CO-106A.

- The OSMRE must decide whether or not to approve a Permit Revision Application Package consisting of a water monitoring program, Probable Hydrologic Consequences analysis, Right of Entry information, Subsidence Control Plan, and a Reclamation Plan.
- The OSMRE must decide whether or not to approve an application to renew Federal Mine Permit CO-106A. The permit would reauthorize operations associated with the mining of federal coal from the areas within Federal Coal Lease COC-62920 where the surface of the land is under the ownership of the UMU Tribe, but outside of the UMU Indian Reservation. The OSMRE has administratively delayed its decision on the permit renewal application.

1.5 Need for the Proposed Action

The need for the action is to provide the opportunity for GCC to exercise its valid rights if granted by the BLM under King II Federal Coal Lease Tract COC-62920 to extract coal from the federal coal lease to be issued by the BLM under the MLA of 1920, as amended.

The BLM is the agency responsible for fulfilling requirements, under the MLA, as amended by the Federal Coal Leasing Amendments Act of 1976 and the Federal Land Policy and Management Act of 1976 (FLPMA) to respond to a request to modify Federal Coal Lease COC-62920. Part of the outlined responsibility of the BLM includes encouraging development of domestic coal reserves to meet future energy needs, reducing dependence on foreign sources of energy and providing for dependable and affordable domestic energy while giving due consideration to the protection of other resource values. For the applicant's proposal, a lease modification would ensure that federal coal resources that cannot be mined by any other operation are not bypassed and that maximum economic recovery is achieved.

The OSMRE will (1) provide a recommendation to the ASLM to approve, approve with conditions, or disapprove the COC-62920 mining plan modification; (2) approve or disapprove the GCC SMCRA permit application to allow coal mining activities and reclamation activities in the proposed lease modification area; (3) approve or disapprove the permit application to renew the existing SMCRA permit (CO-0106A) for the King II Mine, which was administratively delayed on April 4, 2017.

1.6 Decisions to be Made

Based on the information in this EA, the BLM will decide whether to modify lease COC-62920 as described in the lease modification application submitted by GCC. In compliance with the MLA, the decision to be made is in what manner resource development should occur. The BLM Field or District Manager recommends the lease modification decision, and the Deputy State Director or higher signs the Decision Record. The recommendation may be to:

- Issue a Decision Record for the lease modification based on the analysis conducted within this EA;
- Issue a Decision Record for the lease modification, with additional mitigation measures;
- Analyze the potential effects of the proposed project in an EIS; or
- Deny the lease modification.

Based on the information in this EA, the OSMRE must:

- Decide whether or not to approve a Permit Revision Application Package consisting of a water monitoring program, Probable Hydrologic Consequences analysis, Right of Entry information, Subsidence Control Plan, and a Reclamation Plan.
- Decide whether or not to approve an application to renew Federal Mine Permit CO-106A. The permit would reauthorize operations associated with the mining of federal coal from the areas within Federal Coal Lease COC-62920 where the surface of the land is under the ownership of the UMU Tribe, but outside of the UMU Indian Reservation. The OSMRE has administratively delayed its decision on the permit renewal application.

- Make a recommendation to the ASLM regarding a decision on proposed mining plan modifications. The ASLM must decide whether to: (1) approve; (2) approve with conditions; or (3) deny a mining plan modification to incorporate the lease expansion into SMCRA Permit C-1981-035.

1.7 Conformance with Applicable Land Use Plan(s)

Pursuant to Title 40 of the CFR, parts 43 and 3400, this site-specific EA tiers to and incorporates by reference the information and analysis contained in the BLM Colorado Southwest District TRFO Resource Management Plan (RMP) and Record of Decision (USDO/BLM 2015a). Overall, coal leasing is in conformance with this RMP. As stated in the RMP, “all TRFO lands made available for lease are subject to standard lease terms, which require operators of leases, as well as leasable mineral permits and licenses, to minimize adverse impacts to air, water, land, visual, cultural, and biological resources. Special lease stipulations are applied to a lease if additional restrictions on the rights of lessees are required to protect environmental resources.” This EA addresses site-specific resource conditions and impacts that are not covered within the RMP and would be used to justify special stipulations for the lease modification.

1.8 Relationship to Statutes, Regulations, or Other Plans

Detailed in this section are other federal, state, and local statutes, regulations, and plans relevant to King II Mine operations, permitting requirements, and agency oversight.

1.8.1 Federal Agencies

This EA incorporates by reference the 1997 USDO/BLM and OSMRE Environmental Assessment CO-038-97-53 National King Coal, LLC Coal Lease Application East Alkali Tract, COC 62920 and the 2001 USDO/BLM and OSMRE Environmental Assessment CO-SJFO-00-102EA National King Coal, LLC Coal Lease Application East Alkali Tract, COC 62920.

Federal law mandates protection of some surface resources that are potentially affected by the development of the Proposed Action.

- Cultural resources affected by development are protected by the following legislative acts:
 - Antiquities Act of 1906 (Public Law [PL] 52-209)
 - NHPA of 1966 (PL 89-665), as amended (PL 52-209), and its regulations (36 CFR 800)
 - 1971 Executive Order 11593
 - Archaeological and Historical Act of 1974 (PL 93-291)
 - Archaeological Resources Protection Act of 1979 (PL 96-95) and its regulations (36 CFR 296)
 - American Indian Religious Freedom Act (48 [United States Code] USC 1996)
 - Native American Graves Protection and Repatriation Act of 1990 Compliance with Section 106 responsibilities of the NHPA are adhered to by following the BLM–Colorado State

Historic Preservation Office protocol agreement that is authorized by the National Programmatic Agreement among the BLM, the Advisory Council on Historic Preservation, the National Conference of Council of State Historic Preservation Officers, and other applicable BLM handbooks.

- Surface water resources are protected by the Federal Water Pollution Control Act (40 CFR 112). The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and other federal regulations are designed to control the releases of hazardous materials into the environment and to direct the responses to accidental spills.
- Threatened and endangered flora and fauna species are protected under the ESA of 1973, as amended (PL 94-325). Additionally, the Migratory Bird Treaty Act (MBTA) (16 USC 703-712) and the Eagle Protection Act (16 USC 668-668d) protect other sensitive wildlife species potentially occurring in the proposed project area.
- Executive Order 11312 of 1999, “Invasive Species,” establishes measures to prevent the introduction of invasive species and to provide for their control as well as minimize the economic, ecological, and human health impacts that invasive species cause. This Executive Order provides guidelines to federal agencies on how to cope with invasive species, create an Invasive Species Council, and implement an Invasive Species Management Plan.
- The Federal Plant Protection Act of June 2000 and the Federal Noxious Weed Act of 1974, Section 2814, provide for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or public health.
- Executive Order (EO) 12898 of 1994, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” states each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. EO 12898 requires federal agencies to ensure opportunities for effective public participation by potentially affected low-income populations, minority populations, or Indian tribes. As such, this document includes an assessment of the impacts from the project on minority and low-income populations.
- The BLM manages paleontological resources under various federal regulations. Principally, paleontological resources on BLM lands are protected under the Paleontological Resources Preservation Act of 2009 (PRPA) and Title 43, Subpart 8365.1-5 of the CFR, which prohibits the willful disturbance, removal, and destruction of scientific resources or natural objects. Subpart 8360.0-7 identifies the penalties for such violations. In addition, FLPMA (PL 94-579) requires that the public lands be managed in a manner that protects the "scientific qualities" and other values of resources under BLM management.
- Other applicable regulatory programs include: the Clean Air Act of 1970 (CAA); Clean Water Act of 1972, EO 11988, Floodplain Management, U.S. Environmental Protection Agency (USEPA), Clean Power Plan, Executive Order 11990, Protection of Wetlands, CEQ 1997:

Environmental Justice Guidance under the National Environmental Policy Act, Noise Control Act of 1972 (42 USC § 4910), Occupational Safety and Health Administration, Occupational Noise Exposure Hearing Conservation Amendment (29 CFR Part 1910.95), the Resource Conservation and Recovery Act of 1976 (42 USC § 6901), and the Toxic Substances Control Act of 1976 (15 USC § 2601).

The purpose of SMCRA is to establish a nationwide program to protect society and the environment from adverse effects of surface coal mining operations and to provide for the cooperation between the Secretary of the Interior and the states with respect to the regulation of surface coal mining operations, the acquisition and reclamation of abandoned mines, and for other purposes. SMCRA balances the need to protect the environment from the adverse effects of surface coal mining with the nation's need for coal as an essential energy source. It established coal mining and reclamation standards to ensure that coal mining operations are conducted in an environmentally responsible manner and that the land is adequately reclaimed during and following the mining process. Requirements of SMCRA are codified at 30 CFR Parts 700 to 999.

For this action, the BLM is the federal land managing agency that will participate with CDRMS and/or the OSMRE at all stages to determine the post-mining land use, protect non-mineral resources, and require appropriate terms and conditions for surface mining and reclamation within its jurisdiction. The BLM is responsible for monitoring, inspection, and enforcing terms and conditions of the lease and the R2P2 operations. The BLM is also responsible for reviewing and recommending the approval of the R2P2 and ensuring that maximum economic recovery requirements are met. The R2P2 approval is required by OSMRE in its preparation of the MLA mining plan decision document.

1.8.2 State Agencies, Laws and Regulations

Colorado's permanent regulatory program that implements the provisions of the SMCRA were codified in the Act and the Regulations of the Colorado Mined Land Reclamation Board for Coal Mining (Colorado Coal Rules). The SMCRA and its implementing regulations, along with the Coal Act and the Colorado Coal Rules, provide the framework under which actual coal mining activities, including surface uses, and their potential effects on the environment are managed. These requirements include protecting water resources, wildlife habitat, air quality, vegetation, and cultural and historic resources, among others. These requirements also include monitoring and mitigation, as well as meeting set standards for returning the land to acceptable uses after mining (termed post-mining land use). CDRMS and the OSMRE, through its oversight of the State program, are responsible for compliance and enforcement actions during the life of a mine.

CDRMS enforces the performance standards and permit requirements during the mine's operation for site-specific surface coal mining activities and has primacy in environmental emergencies. The OSMRE retains oversight responsibility of this enforcement. CDRMS conducts frequent inspections of operations for compliance with permits for individual mines and the Coal Act and Colorado Coal Rules. BLM is responsible for underground inspections of the federal coal.

Generally, mine permits in Colorado have a term of 5 years, but the permit is not necessarily static during this term. Mine operators work closely with CDRMS to adjust the permit to best meet the performance

standards and permit requirements according to the mine's current operating conditions. The mine permit is adjusted through a variety of permit revision and review documents, including revisions to the permit, mid-term reviews, minor permit revisions, and term reviews. For example, the King II Mine has submitted over 20 revisions to the permit since its current permit went into effect in 2009. Another mining permit requirement ensuring reclamation compliance for the King II Mine is a surety bond of more than \$900,000 held by CDRMS.

In addition to permit reviews, King II Mine is subject to regular and unannounced on-site inspections by CDRMS, MSHA, OSMRE, BLM, and other agencies. CDRMS conducts monthly inspections to ensure that performance standards and permit conditions are being met. MSHA conducts unannounced inspections totaling 2 to 3 weeks each quarter. The OSMRE conducts an annual oversight review of all CDRMS inspections and permit conditions to ensure that performance standards are being met.

In addition to CDRMS permit requirements, other State regulations applied to King II Mine include air quality standards, water quality standards, and water rights. Air quality standards in Colorado are under the jurisdiction of the USEPA and the Colorado Department of Public Health and Environment (CDPHE). Stationary sources at the King II Mine are regulated by CDPHE with Air Pollution Control Division (APCD) Permit Number 09LP0202F.

Water quality standards in Colorado are also under the jurisdiction of the USEPA and CDPHE. Discharges from the sediment pond at the King II Mine are regulated by CDPHE with Water Quality Control Division Permit Number COG850001.

The Colorado Division of Water Resources (CDWR) is empowered to administer all water rights per the Appropriation Doctrine (in short, first in time, first in right). Most of this work is done by Division Offices located in the seven major river basins of the State. These offices employ water commissioners to ensure the priority system is followed, enforcing the decrees and water laws of the State of Colorado. The Colorado Ground Water Law of 1957 established the permitting requirement of ground water wells, and, by 1969, surface and groundwater rights were administered together. The King II Mine holds rights to several water sources including ownership and lease of senior Class A ditch shares within the La Plata River watershed. These water rights are administered through the CDWR.

1.8.3 Local Agencies, Laws and Regulations

The King II Mine is in La Plata County, Colorado. The surface facilities and mine operations, including use of county roads for coal transport, are regulated by LPC (La Plata County Land Use Code [LPCLUC] Sec. 82-76, 82-161). Colorado statutes such as the *County Planning Code* (CRS § 30-28-101 *et seq.*) and the *Local Government Land Use Control Enabling Act* (CRS § 29-20-101 *et seq.*) independently authorize LPC to permit the land use, including and truck hauling operations on CR 120 for the King II Mine. The LPCLUC includes standards for compatible development that are applied to the facilities and operations for the mine. In addition, LPC maintains county road standards based on road characteristics and traffic levels that determine the requirements for road maintenance and traffic levels on county roads used by GCC.

In July 2012, GCC submitted a Class II Land Use Permit application to LPC for the King II Coal Mine. Since then, LPC has held six neighborhood meetings to solicit citizen feedback (Permit Application

Number Class II 2012-0089. La Plata County 2015a). In spring 2015, GCC formed a Citizen Advisory Panel to determine how to better mitigate the mine's neighborhood impacts and inform GCC's revised land use permit application to LPC, submitted July 31, 2015. Through a series of public hearings, LPC and GCC negotiated interim mitigation measures to improve public safety until the Board of County Commissioners takes formal action on the Class II Land Use Permit.

The LPC Planning Commission heard the GCC Class II Land Use Permit application on March 2-3, 2016, but continued the project to April 14, 2016 to allow time for County staff and GCC to prepare a Road Improvements Agreement to address traffic, dust and safety issues on County Road 120. Because of having achieved agreement between LPC and GCC on the RIA, LPC can consider the applicant *compliant, compatible, and consistent* with adopted Code and long-range plans. On April 14, 2016, the Planning Commission voted to recommend approval for the project to the Board of County Commissioners. The Board of County Commissioners heard the application on May 31, 2016 and continued the project to June 1, 2016 where they voted to approve the project with changes to the RIA and the findings and conditions. A Class II LUP was issued to GCC by LPC on July 8, 2016. The LUP and RIA are publicly available for review from LPC and have been made a part of the Administrative Record for this EA.

1.9 Scoping, Public Involvement, and Issues

The CEQ defines scoping as “an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a Proposed Action alternative” (40 CFR 1501.7). Scoping is the process by which the BLM and the OSMRE solicits internal and external input on the issues, impacts, and potential alternatives that will be addressed in the NEPA document. For the BLM's and OSMRE's NEPA analysis, an “issue” is a point of concern, identified through scoping, of a real or perceived anticipated environmental effect associated with the Proposed Action.

Scoping for this EA was conducted on several levels:

1. Internal scoping with resource specialists from the BLM/TRFO and the OSMRE in 2017.
2. External scoping completed by BLM specifically for this EA in 2012.
3. External scoping completed by OSMRE as part of their annual oversight program in 2015.
4. External scoping completed by LPC as part of their Land Use compatibility review and formation of a Citizen's Advisory Panel for the GCC Class II Land Use Permit Application from 2012-2016.
5. External supplemental scoping completed in February 2017 by the OSMRE and the BLM.

1.9.1 Internal Scoping BLM and OSMRE (2017)

Issues identified by the resource specialists with the BLM and the OSMRE during internal scoping included air quality impacts, climate change, hydrologic connectivity of the mine to nearby water wells and ephemeral drainages, as well as how to coordinate traffic and transportation issues related to coal transport with LPC.

1.9.2 External BLM Scoping (2012)

As outlined in the BLM NEPA Handbook, it is optional for the BLM to conduct external scoping on actions analyzed by an EA (BLM 2008, Section 6.3.2). While optional for an EA, the BLM conducted external scoping on November 23, 2012, by sending scoping letters to adjacent landowners and to other expressly interested parties including federal, state, and local agencies. In total, 21 scoping letters were sent, and eight scoping response letters/emails were received by the BLM. The TRFO sent 31 letters to regional tribes with recognized affiliation to the project area in November 2012. One response from the Hopi was received that provided recommendations on TRFO actions if cultural resources were encountered during implementation of the Proposed Action. Issues identified through public scoping completed by the BLM are summarized in Table 1-2.

Table 1-2. Bureau of Land Management external scoping summary

Commenter	Issues Identified
Connolly, Marjorie	"Additional mining is incompatible with surrounding land use."
Montezuma County Board of County Commissioners	Noted the importance of mineral resources in the regional economy including federal minerals managed by the BLM. The mine has a positive economic benefit on the region through jobs and tax revenue. Stated the importance of reasonable enforcement of best management practices and reclamation process to mitigate impacts on other resources.
San Juan Basin Health Department	Responded but did not have any comments at that time.
Vista de Oro Property Owners Association – contains comments of 35 landowners	<p>A formal letter of protest of the lease modification because of off-site impacts of mine operations that included the following statements:</p> <p>Mine operations affect quality of life, habitability, and property values as well as potential contamination of water wells.</p> <p>Existing vibration and noise from the mine’s coal trucks and coal conveyors is causing disturbance to adjacent landowners.</p> <p>Adjacent landowners are reporting coal dust and methane smell in well water.</p> <p>Expect that mine expansion will increase these detrimental effects and increase truck traffic along CR 120 to unacceptable levels.</p>
La Plata County Planning Department	Conveyed negative comments from Landowner meeting 9/11/2012 including: noise, water pollution, expansion concerns. LPC also articulated their role in local land use permitting.
Schmitz, Paul	<p>Stated that:</p> <p>That there have been violations of Public Due Process.</p> <p>Accurate water consumption figures and environmental chemicals impacts seem overlooked.</p> <p>That previous EAs or EISs don’t cumulatively account for the draw of waters from depleted subsurface flows.</p> <p>The mine is in an over-committed water decree system.</p> <p>Cumulative impacts have been overlooked by the agencies.</p>

Commenter	Issues Identified
San Juan Citizens Alliance	Issues identified included segmenting lease decisions from mining impacts; conformance with the TRFO RMP; cumulative impact analyses; and resource concerns related to climate change, public health, air quality, water quality and quantity, surface cracks (subsidence), erosion, wildlife, traffic/roads.

Notes: BLM = Bureau of Land Management; CR = County Road; EA = Environmental Assessment; EIS = Environmental Impact Statement; GCC = GCC Energy, LLC; TRFO = Tres Rios Field Office; RMP =Resource Management Plan.

1.9.3 Annual External Scoping by OSMRE (2015)

As part of its oversight process, the OSMRE annually sends an outreach letter to interested parties to gain feedback from the public on the effectiveness of the CDRMS coal regulatory program regarding land reclamation on coal mines, preventing off-site impacts to lands and waters adjacent to coal mine permit areas, and providing service to customers. The OSMRE received four letter responses to its February 2015 outreach letter regarding the King II Mine. Senior staff at OSMRE sent detailed responses to each commenter addressing each of their concerns. The commenters’ names have been withheld to protect the identity of private citizens but the issues raised by them and the responses by OSMRE to substantive comments relevant to the King II Mine lease modification are summarized in Table 1-3.

Table 1-3. OSMRE public comments and response to oversight outreach

Comments	Office of Surface Mining Reclamation and Enforcement Response
<p>The commenter stated that the area would benefit greatly by a more robust application process with an EIS completed by the OSMRE as well as higher reclamation bonds. Commenter requested the OSMRE conduct its own onsite subsidence reviews as there has been a subsidence that disrupted the irrigation ditch that went unreported.</p>	<p>The responder notes that NEPA requires federal agencies to consider potential environmental impacts of their Proposed Actions by preparing EAs or Environmental Impact Statements. The federal actions associated with the King Coal Mine included federal coal leases and amendments to existing leases that were evaluated with EAs led by the BLM and finalized on June 15, 1981; February 1, 1990; November 3 1997; November 10, 1999; and June 21, 2001. OSMRE is a cooperating agency on these past and current NEPA analyses for Proposed Actions at the King Coal Mine. Therefore, it is already involved in the environmental impact analysis process as specified by NEPA and the Council on Environmental Quality.</p> <p>Reclamation bond amounts are generally set higher than the estimated costs to reclaim all permitted disturbances associated with the King Coal Mine as required by Colorado’s coal mine regulations. In addition to the reclamation bond held by CDRMS of more than \$850,000; OSMRE holds a bond in the amount of \$10,200 for the UMU permit which has no anticipated surface disturbance and \$0 reclamation cost.</p> <p>Subsidence is monitored through monthly CDRMS inspections and periodic OSMRE oversight inspections. The subsidence monitoring program enforced by CDRMS and OSMRE requires that the permit holder fix subsidence monuments and report results to CDRMS quarterly. In addition, coal mine permit</p>

Comments	Office of Surface Mining Reclamation and Enforcement Response
	holders are required to adopt measures to prevent subsidence from causing material damage to the extent technologically and economically feasible. The OSMRE contacted the affected land owner where the irrigation ditch damage was said to occur. No damage was confirmed by the land owner.
<p>The commenter noted that since the last EA was conducted in 2001, coal production at the King mine has increased from 300,000 tons per year to 1.3 million tons per year. Commenter stated that CDRMS has been remiss in its responsibilities to require updated environmental assessment prior to issuing a permit. Commenter requested OSMRE take a stronger lead and make CDRMS more accountable.</p>	<p>The responder confirms that the last NEPA document prepared for the King Coal Mine was completed in 2001. Two proposed federal actions by BLM (this lease modification and proposed exploration wells) trigger NEPA, and OSMRE is a cooperating agency on the EA for the lease modification because it relates to the mine permit.</p> <p>As required under SMCRA, when a state develops a regulatory program that meets SMCRA requirements, it becomes the primary regulatory and OSMRE assumes an oversight role. In Colorado, CDRMS has “primacy” with regard to coal mine permitting, inspection, and enforcement activities, and OSMRE conducts oversight. However, OSMRE remains the primary regulator of coal mining operations on tribal lands and holds primary regulatory responsibility for that part of the King Coal Mine.</p>
<p>The commenter states that GCC is not a seasoned coal mine operator and doesn’t have experience in reclamation and hydrology to monitor for damage to adjacent land. Commenter raises concern about exposed waste and tailings piles from King II that are not capped and could be a source of acid or toxic drainage.</p>	<p>Previous experience mining is not a prerequisite for obtaining a permit under Colorado’s coal regulatory program. GCC must comply with all requirements of the regulatory program or risk receiving enforcement actions from CDRMS. Although GCC may not have experience implementing hydrologic monitoring programs, water quality testing procedures for the King Coal Mine were developed long before GCC acquired the operation and have continued under their tenure. Water samples are analyzed by a qualified laboratory.</p> <p>The permittee has approval for temporary coal mine waste storage where waste rock is brought up from the active underground mining area to the vicinity of the permanent waste disposal location. Prior to obtaining approval for this waste disposal area the permittee had to make a demonstration, to the satisfaction of CDRMS, that the material would not adversely affect water quality or flow, vegetation, public health, or stability of the disposal area based on hydrologic, geotechnical, physical, and chemical analysis. Because test results indicated that the materials in the waste piles could not generate acid or toxic leachate, CDRMS does not require special handling or storage practices under Rule 4.05.8. Water may percolate through the waste rock without causing harm to groundwater resources. Surface and groundwater is monitored immediately downgradient from the waste disposal site and any potential negative impacts would be detected. OSMRE is currently reviewing the material sampling analysis to determine if further analysis and monitoring is required.</p>

Comments	Office of Surface Mining Reclamation and Enforcement Response
<p>The commenter’s concern is that CDRMS appears to have done very little to prevent offsite impacts to surface and underground water. Commenter stated that runoff from disturbed areas washed down into Hay Gulch (a primary agricultural part of La Plata County) without being tested for specific constituents of coal waste.</p>	<p>Sediment control, hydrologic monitoring, and protection of the hydrologic balance are major precepts of Colorado’s approved regulatory program. Surface runoff from all areas other than ponds, ditches, water treatment facilities, small area exemptions, and roads approved for mining-related disturbance must pass through an approved sedimentation structure such as a sedimentation pond. CDRMS conducted a focused inspection on March 31, 2015, to ensure runoff is being routed as required and designed. CDRMS found surface runoff from the King I area being routed to that site’s sedimentation ponds as required. OSMRE is currently evaluating the water quality monitoring program in place at the King Coal Mine to ensure all requirements of the regulatory are being implemented appropriately. OSMRE is reviewing the permitted plan and collected water quality data as well as inspecting sample locations in the field. CDRMS is aware that OSMRE is conducting this evaluation. Commenters and the public will be informed of the results when the evaluation is completed.</p>

Notes: BLM = Bureau of Land Management; CDRMS = Colorado Division of Mining and Safety; EA = Environmental Assessment; EIS = Environmental Impact Statement; GCC = GCC Energy, LLC; NEPA = National Environmental Policy Act; OSMRE = Office of Surface Mining and Reclamation Enforcement; RMP =Resource Management Plan; SMCRA =Surface Mining Control and Reclamation Act of 1977

1.9.4 External Scoping La Plata County (2012-2016)

As part of its Class II Land Use Permit application, LPC held three Neighborhood Compatibility Meetings with the residents and adjacent landowners surrounding the King II Mine between September 2012 and April 2014. Public notices were sent for these meetings. Two additional neighborhood meetings hosted by GCC were held in conjunction with the land use permit application on December 14, 2014, and January 27, 2015. In March 2015, GCC working with La Plata County assisted in the formation of the Hay Gulch Citizen Advisory Panel (HGCAP) to inform their land use application. The HGCAP compiled the recommendations of adjacent landowners and other residents designed to minimize negative impacts to the health, safety, quality of life, and the natural environment from the King II Coal Mine. The HGCAP provided 21 recommendations for addressing their concerns related to traffic, water, health, noise, vibration, subsidence, regulatory compliance, and quality of life to LPC. These recommendations are summarized in Table 1-4.

Table 1-4. Hay Gulch Citizen Advisory Panel Recommendations to La Plata County

Number	Hay Gulch Citizen Advisory Panel Recommendations
1	Reduce impacts to CR 120 by decreasing the number of coal haul trucks using CR 120 to 2010 levels until improvements to this road have been completed.
2	Coal haul trucks will cease operations on CR 120 from 10 PM to 6 AM Monday through Saturday and from 10 PM Saturday through 6 AM Monday.

Number	Hay Gulch Citizen Advisory Panel Recommendations
3	If the number of coal haul trucks exceeds 144 per day, a separate coal haul road shall be installed and maintained by GCC.
4	As a contingency to approval of the Class II Land Use Permit, upgrades and improvements to CR 120 including replacing culverts, widening and paving the road surface from the mine entrance to State Highway 140 shall be immediately and be completed no later than January 1, 2017, at GCC's expense.
5	Additional measures shall be undertaken to reduce truck noise levels to 80 decibels or less. Continuous noise level monitoring shall be installed to ensure compliance.
6	On the gravel surface portions of CR 120, a speed limit of 25 mph will be established for trucks having a GVW of greater than 20,000 pounds. The speed limit of 35 mph will be established for all other traffic on CR 120. Additional GPS monitoring and speed enforcement should be required.
7	GCC should establish a dedicated phone number to report safety concerns or violations.
8	La Plata County should impose a road fee on GCC for the costs of maintaining CR 120 to levels safe for residents.
9	BLM should conduct a full EIS including a hydrological study to establish a baseline for quantity and quality of the aquifers surrounding the King II Mine and the Hay Gulch area.
10	GCC shall establish a minimum of six monitoring wells for the purpose of identifying contamination and depletion of aquifers below the mine and in the surrounding area.
11	Baseline establishment and continuous monitoring of water quality shall use guidelines established by the Colorado Mined Land Reclamation Division Table 1 (Groundwater) Section A (Suggested Water Quality Parameters). Additionally, the results of the chemical analysis shall be posted on a public access website at least monthly.
12	All regulatory agencies including La Plata County, CDRMS, OSMRE, and the BLM should strongly consider the impacts of the King II Mine plan on draw down of nearby non-tributary water zones.
13	GCC shall install a minimum of four continuous air monitors at various locations along CR 120 that will identify unhealthy air quality including particulates, dusts, fumes, vapors, and gases. Action levels consistent with National Institute for Occupational Safety and Health recommendations shall be established and specific action shall be taken to reduce thresholds to below accepted levels. Results shall be recorded and posted on a public access website.
14	Reduce noise levels of mine operations and truck traffic acceptable limits of no more than 80 decibels during the of 6 AM to 10 PM. Residential noise level limits of no greater than 50 decibels should be enforced between the hours of 10 PM and 6 AM. The use of "jake brakes" by truck drivers on CR 120 shall be restricted.
15	GCC shall establish an operations policy to ensure that vibration caused by the continuous miner and drilling is minimized to not impact nearby residents.
16	To reduce risk of impacts from subsidence to adjacent property, the boundaries of Tract E in the proposed lease modification should be reduced to no less than 1000 feet from the nearest residential structure.
17	As a condition for approval of the Class II Land Use Permit, GCC shall ensure that all local, state, and federal laws and regulations are in compliance and full transparency and availability of filings are made public. Any expansion of the mine operations shall require a new Class II Land Use permit.

Number	Hay Gulch Citizen Advisory Panel Recommendations
18	La Plata County should adopt the Colorado Department of Local Affairs 1041 policies to allow LPC greater control over development projects.
19	GCC shall be required to pay appropriate road impact fees and these fees shall be allocated directly to CR 120. LPC shall implement appropriate financial penalties for non-performance of any conditions to the Land Use permit or interim conditions.
20	GCC should do everything reasonably possible to mitigate those negative impacts to the surrounding community with focus on these recommendations.
21	GCC should begin discussion and negotiations with residents living on CR 120 regarding compensation for causing a decrease in property values and quality of life.

Notes: BLM = Bureau of Land Management; CDRMS = Colorado Division of Mining and Safety; CR = County Road; EIS = Environmental Impact Statement; GCC = GCC Energy, LLC; GVW = Gross Vehicle Weight; MPH = miles per hour; OSMRE = Office of Surface Mining and Reclamation Enforcement

In summary, the LPC LUP permit review process was extensive and inclusive, which included:

- Three neighborhood compatibility meetings held by GCC with LPC facilitating (respectively on September 11, 2012; December 19, 2013; and April 2, 2014);
- Two public meetings held by GCC (December 18, 2014 and January 27, 2015);
- One general public meeting held by HGCAP;
- Frequent, direct meetings with individuals and groups of neighbors by County Staff;
- Frequent, direct meetings with individuals and groups of neighbors by GCC;
- Frequent meetings between GCC and HGCAP;
- A significantly expanded public notification area; and
- The Fort Lewis Mesa Planning District group as a commenting agency.

1.9.5 2017 Supplemental Scoping Comment Summary

On January 6, 2017, the BLM and the OSMRE sent a notice of supplemental scoping to a mailing list of 133 interested parties comprised of local, state, and federal governmental agencies and representatives, adjacent landowners and/or attorneys representing the landowners, several departments within the UMU Tribe, and several environmental/conservation non-profit organizations. In accordance with the 2011 DOI Policy on Consultation with Indian Tribes and the National Historic Preservation Act of 1966, OSMRE sent a notice of supplemental scoping to 47 tribes from the Colorado Office of Archaeology and Historic Preservation directory of tribes with historic ties to Colorado. The Durango Herald also published an article about the proposed project including information on how to submit supplemental scoping comments; the article was available online on January 19 and on the front page of the newspaper on January 20, 2017. Supplemental scoping comments were accepted from January 6 until February 6, 2017.

During the supplemental scoping period, the BLM and the OSMRE received a total of 14 comment submittals all via the project email address, some comments were emailed in a letter format as an attachment. These submittals contained 80 individual comments. Of the 14 comment submittals, four of the submittals were almost identical. These four submittals were counted separately in the quantification noted in the discussion below.

Following the close of the supplemental scoping period, comments were compiled and analyzed to identify issues and concerns. Within each comment submittal, individual issues were identified, reviewed, and entered into an electronic database. A summary of the individual comments is presented below.

Table 1-5 is a list of the resource/issue categories mentioned in the scoping comments for consideration in the EA. The table is organized by resource/issue category and the number of times the issue was identified:

Table 1-5. Issues identified through scoping

Issue Identified	Number of Times Issue was Identified
Traffic and transportation	11
Air quality	10
Water quality	10
Climate change	8
Water quantity	7
Socioeconomic considerations	5
Public health and safety	4
Hazardous waste management	3
Noise	3
Surface Effects	2
Visual and Aesthetic Considerations	2
Wildlife	2
Energy and Mineral Development	1
Fish and Wildlife	1
Seismic	1
Threatened and Endangered Species	1
Vegetation	1

With few exceptions, the scoping comments received during the original scoping period in 2012 and the more recent 2017 scoping comments reflect the same themes (e.g., air quality and transportation). Preliminary resource issues identified during scoping will be used to inform resource baselines and impact analyses in the EA and to define alternatives and appropriate mitigation measures to minimize environmental impacts.

1.10 Resources Considered, but Eliminated from Further Analysis

Because the mining operation is conducted underground, surface resources above the coal lease and permit areas are only minimally impacted by surface activities such as exploration drilling. Over the course of normal mining operations, there are commonly permit revisions required by the OSMRE or CDRMS or proposed by the permittee. Should any potential future permit revisions create a need to disturb any surface areas within the lease or permit areas, the OSMRE and CDRMS would require

environmental review (i.e., cultural resources, sensitive species clearances) prior to approval of permit revisions that include ground-disturbing activities. This EA also analyzes the surface impacts associated with phased road improvements of CR 120 as outlined in the RIA (refer to Appendix B). The resources that are evaluated in detail in Chapters 3 and 4 are:

- Air quality
- Climate Change
- Geology and minerals (including subsidence)
- Paleontology
- Water resources
- Transportation
- Vegetation
- Wildlife
- Endangered, threatened and sensitive species
- Health and safety
- Land use
- Soils
- Noise
- Vibration
- Cultural resources
- Socioeconomics
- Environmental justice

Based on the internal and external scoping processes completed by BLM and OSMRE and the cooperating agencies, the following resource areas have been eliminated from detailed analysis in this EA; lands with wilderness characteristics, Wild and Scenic Rivers, social cost of carbon, fire management, floodplains and Rangeland Health/Standards for Public Lands Health. The reasoning for their exclusion are summarized below; and in most cases, were eliminated because they were not present in the project or analysis areas, or because the resource was not, or was only minimally impacted

Lands with wilderness characteristics – There are no proposed or designated wilderness areas in or near the proposed project area.

Wild and Scenic Rivers – There are no designated or proposed wild and scenic rivers within the proposed project area. Refer to Map A-3. Surface Water Resources in Appendix A and the TRFO RMP (USDA/USDI 2013).

Social Cost of Carbon – In this analysis, the agencies acknowledge that anthropogenic greenhouse gas emissions are contributing to climate change. The agencies present a qualitative discussion of the environmental effects of climate change. The agencies have used estimated GHG emissions associated with the Proposed Action as a reasonable proxy for the effects of climate change in this NEPA analysis. The agencies have placed those emissions in the context of relevant state emissions. The climate change analysis recognizes that there are adverse environmental impacts associated with the development and use

of coal and discusses potential impacts qualitatively. The analysis appropriately weighs the merits and the drawbacks of the Proposed Action and alternatives.

Other ways to characterize GHG emissions include estimating the monetized damages associated with an incremental increase in emissions of carbon dioxide, methane and other gases in a given year often discussed as “Social Costs of GHG Emissions.” It includes (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. Social Costs of GHG Emissions was developed to assist agencies in meeting EO 12866, which requires federal agencies to assess the cost and the benefits of intended regulations as part of their regulatory impact analyses. This project-level analysis does not include a regulatory impact analysis since it is not a rulemaking effort, therefore, it does not require a cost-benefit analysis.

The NEPA analysis for this EA does not include monetary estimates of any benefits or costs. The CEQ regulation states (in part), “...for the purposes of complying with the Coal Act, the weighing of the merits and drawbacks of various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations.” Unlike a cost-benefit analysis, the quantitative economic analysis presented in this EA (see socioeconomic section) is a regional economic impact analysis, which is used to estimate impacts on economic activity, expressed as projected changes in employment, personal income, or economic output. In regional economic impact analyses, changes in economic activity are not considered benefits or costs (Watson et al. 2007).

Fire Management – While there is no BLM surface jurisdiction or direct surface disturbance associated with the Proposed Action, the BLM is responsible for wildfire management in the region. MSHA requires fire suppression systems, firefighting plans, etc. for both underground and surface operations. Underground mines such as the King II Mine are regulated under the fire management regulations at 30 CFR 75.1100. There have been no fires associated with the King II Mine since operations began. There is no expectation of increased fire risk associated with the Proposed Action; therefore, no changes to the BLM’s current fire management plans or programs are warranted.

Floodplains – There are no mapped floodplains or perennial surface water resources in the proposed project area. Per Federal Emergency Management Agency flood hazard boundary data, there are no flood hazard boundaries within 3 miles of the proposed lease modification (USDHS/FEMA 2015).

Rangeland Health/Standards for Public Lands Health – The proposed lease modification area is almost entirely within an area managed by the UMU Farm and Ranch Enterprise as the Hay Gulch Ranch (refer to Map A-1, Appendix A). There is a small parcel of BLM-administered land along a steep slope immediately adjacent to the mine entrance that is not part of any grazing allotments. Accordingly, consideration of Standards for Public Lands Health does not apply as no mining activities affect BLM-administered surface lands.

2. Proposed Action and Alternatives(s)

2.1 Proposed Action

GCC has filed an application for a modification to existing Federal Coal Lease COO-62920 to incorporate four additional tracts adjacent to currently leased areas of the King II Mine. The proposed lease modification would add approximately 950.55 acres to the existing coal lease, which covers an area of 1,311.69 acres. The proposed lease modification areas are shown on Map A-2 in Appendix A.

The above existing and proposed lease modification lie contiguous to a State of Colorado fee lease obtained by GCC to the south of the BLM lease. The current BLM and fee leases and OSMRE permit area are accessed from the King II Mine's portals and underground workings constructed on the State of Colorado lease in T35 N, R12W New Mexico Principal Meridian (NMPM), North of Ute Line, Section 36. All surface facilities and disturbance for the King II Mine extension are located on the State land, and have been permitted under CDRMS permit number #C-1981-035. OSMRE is the regulatory authority that administers Federal Permit CO-0106A, which covers the permitted underground mining area beneath land owned by the UMU Tribe.

The cumulative total acres approved for disturbance at the King I Mine for 2016 was 23.60 acres. The cumulative total acres approved for disturbance at the King II Mine for 2016 was 24.99 acres; 22.89 acres of surface disturbance have been approved and constructed under the CDRMS permit and bond to date. Additionally, 3.29 acres of surface disturbance has been approved by OSMRE for exploration drilling. The disturbance has been reclaimed, and OSMRE currently holds a \$32,555 reclamation bond. Disturbed areas include surface facilities for King I and II, three sediment ponds, roads, a refuse pile (gob), and exploration drill pads.

As part of the Proposed Action, OSMRE is considering GCC's 2012 and 2017 permit renewals which are under an administrative delay pending analysis in the subject EA. The complete permit renewal application is publicly available from OSMRE. In addition to the renewal, GCC has submitted a PAP to revise Federal Permit CO-0106A to include mining the proposed additional lease acreage being considered by the BLM. The revision PAP also amends the permit to incorporate several CDRMS Technical Revisions (including installation of 5 groundwater monitoring clusters) into OSMRE permit CO-0106A; a Reclamation Plan; a Subsidence Control Plan; and an updated Right-of-Entry onto the UMU lands (consisting of a Surface Use Agreement between the UMU Tribe and GCC). The complete PAP is publicly available from OSMRE.

2.1.1 Legal Description of Lease Modification

The legal description for the COC-62920 modification tracts is as follows:

New Mexico Principle Meridian La Plata County Colorado

Tract A containing 220.00 acres more or less
T35N, R11W, Sec. 19, NE, S2SENW, and Sec. 20, NWNW

Tract B containing 360.55 acres more or less
T35N, R11W, Sec. 30, lots 1-4, E2NW, and NWNE;
T35N, R12W, Sec. 25, lots 3-8

Tract D containing 10.00 acres more or less
T35N, R12W, Sec. 26, SENENE

Tract E containing 360.00 acres more or less
T35N, R12W, Sec. 35, NENW, S2NW, SW, and S2SE

The modification area containing 950.55 acres more or less.

Table 2-1. Parcels proposed for addition to the existing coal lease

Tract	Legal Description	Area (Acres)
A	Township 35 North, Range 11 West, NMPM: Sec. 19, NE, S2SE, and Sec. 20, NWNW	220.00
B	Township 35 North, Range 11 West, NMPM: Sec. 30, lots 1-4, E2NW, and NWNE; Township 35 North, Range 12 West, NMPM: Sec. 25, lots 3-8	360.55
D	Township 35 North, Range 12 West, NMPM: Sec. 26, SENENE	10.00
E	Township 35 North, Range 12 West, NMPM: Sec. 35, NENW, S2NW, SW, and S2SE	360.00
TOTAL		950.55

Notes: NE = northeast; SE = southeast; SW = southwest; NMPM = New Mexico Principal Meridian; NW = northwest.

2.1.2 Coal Removal

Coal removal from the lease modification areas would occur in the same manner as current operations at the King II Mine using existing surface facilities and the mine plan as approved by the CDRMS and in accordance with OSMRE permit renewal and revisions requirements.

The type of mining utilized is the “room and pillar” method. The thickness of the coal seam ranges from 6 to 10 feet. The coal seam is mined using continuous mining machinery. After the coal is mined, it is brought to the surface via a conveyor into one of two stockpiles where it is crushed and prepared for transport. Coal refuse (underground development waste) from the King II Mine is transported less than one mile away to an approved refuse facility located on private lands at the King I Mine.

GCC is currently mining within an area defined by the initial development main tunnels or mains. The development mains and sub-mains, and subsequent mining panels, are oriented in a northeast-southwest direction, following the topography (and coal seam) defined by a mesa bounded by deep drainages on the northwest and southeast. Following the development of new mains, GCC plans to mine room and pillar

blocks, which would run in a perpendicular direction to the mains (northwest-southeast). The lease modifications would allow development of mains, sub-mains, and panels within the lease modification area. Pillars would be removed in panels (retreat mining) and full extraction of coal would yield approximately 60 percent recovery of in-place coal reserves. The BLM estimates the recoverable federal coal reserves included in the lease modification area to be approximately 4.66 million tons. Recoverable tons represent the total coal in the lease modification area less the amount that would be left in place due to mining logistics and economic factors.

The King II Mine now operates more than 2 miles of underground roadway with an interconnected grid work of nearly 6 miles of tunnels. GCC is not proposing to expand surface facilities or make modifications to current mining methods employed at the King II Mine as a result of the proposed lease modification. While no new surface disturbing activities are proposed in the mine plan revision, it is typical that minor amounts of surface disturbance will be necessary from time to time until the coal resource is exhausted. These surface disturbing surface-disturbing activities are subject to CDRMS and/or OSMRE oversight and are handled as technical revisions or minor permit revisions. Examples include the installation of five groundwater monitoring well clusters (associated with Technical Revision #26), potentially necessary surface stormwater and access road improvements, and disturbance associated with potential future exploration drilling activity within the permit and lease area. These potential surface disturbing activities are estimated to be cumulatively less than 5.0 acres for the duration of mining under the proposed mine plan revision. Both CDRMS and OSMRE require cultural and biological clearance surveys and reports when proposed disturbance locations are known. GCC has submitted an updated Reclamation Plan in anticipation of the possible future surface-disturbing activities. It is expected that ventilation of the new mine workings would be provided by the existing fan and ventilation system.

2.1.3 Coal Production and Transport

Annual coal production at the King II Mine has fluctuated from a low of 392,348 tons/yr. in 2008 to a high of 970,790 tons/yr. in 2014. From 2007 to 2016, the mine has produced on average, 629,785 tons/yr. as shown in Table 1-1. Coal produced at the King II Mine is hauled by truck to regional rail loading facilities where it is loaded for shipment by rail to cement production facilities in the southwestern U.S. and Mexico. Presently, trucks hauling coal from the King II Mine use La Plata CR 120 and SH 140 for both inbound and outbound trips to the mine (see Alternative Coal Haul Routes on Map A-4, Appendix A). The distance from the mine to the SH is 6.4 miles, approximately 3.9 miles of which are currently unpaved gravel surface. Due to the condition of CR 120 and the requirement that the mine be compatible with surrounding properties, the mine's LUP RIA requires imposition of phased limits on the average of outgoing trucks based on a monthly average (with Sundays excluded) and a maximum number of outgoing trucks on any single day. This fluctuation was allowed by LPC to accommodate matters such as inclement weather.

Accordingly, coal production at King II is limited by their LPC LUP and the associated RIA. Table 2-2 shows the loaded coal truck traffic allowed along CR 120 through each phase of the RIA. Following the completion of Phase 5 road improvements (scheduled for April 2022) GCC is authorized by LPC for an average daily loaded truck volume of 120 trucks per day, which equates to approximately 1,067,040 tons/yr. starting in 2022.

Table 2-2. Allowable loaded coal truck traffic along CR 120 through each phase of the RIA

Phase/Year	Coal Production (Tons)*	Average Daily Loaded Truck Trips
Phase 1, 2 /November 2017	711,360	80 Loaded/160 ADTs
Phase 3/November 2019	711,360	80 Loaded/160 ADTs
Phase 4/November 2020	889,200	100 Loaded/200 ADTs
Phase 5/April 2022	1,067,040	120 Loaded/240 ADTs

Note: ADT = Average Daily Trips.

*It is important to note that the volume of coal production is based on the size of haul trucks contracted by GCC and in no way is limited by LPC. LPC has no jurisdiction with regards to allowable coal production.

Table 2-3 shows the commensurate coal production volumes hauled to clients/markets in the southwestern U.S. and Mexico based on the BLM’s estimates of coal reserves (4.66 million tons) available within the currently proposed lease modification area.

Table 2-3. Estimated coal production through life of lease modification

Year	Coal Production (Tons/yr.)	Total Remaining Reserve
2017	711,360	4,660,000*
2018	711,360	3,948,640
2019	711,360	3,237,280
2020	741,000	2,496,280
2021	889,200	1,607,080
2022	1,025,145	581,935
2023	1,067,040	0 by May 2023*
7 yr Average	836,638	

*Based on the emergency leasing request, GCC estimated in February 2016 that they could mine until May 2018 before reserves in the proposed lease modification areas would be bypassed.

As stated above, most of the coal produced is transported by truck to a rail terminal in Gallup, New Mexico owned and operated by Burlington Northern Santa Fe (BNSF). Coal is delivered by the BNSF rail network directly to GCC owned cement plants in Mexico (240,000 tons/yr.) and to variable customers in Arizona and Texas determined by coal and natural gas market conditions and available coal supply from King II.

Based on the maximum average daily coal truck trips allowable under the LPC RIA, and because the contracted haul truck fleet have a 24.5 ton/truck capacity, approximately 1,067,040 tons/yr. can be hauled from the King II mine and delivered to the Gallup, New Mexico BNSF rail terminal once Phase 5 road improvements have been completed in 2023. Of that total, approximately 867,000 tons could be delivered to the Gallup BNSF rail hub, 181,000 tons/yr. would be delivered directly by truck to two GCC-owned and operated cement plants in Pueblo, Colorado (105,000 tons/yr.) and in Tijeras, New Mexico (76,000 tons/yr.) where the coal is used as a fuel source in the cement manufacturing process. Small coal volumes are sold for local residential heating (7,000 tons/yr. to Hay Gulch Coal Sales located on east end of CR

120 N) and to the Durango & Silverton Narrow Gage Railroad (3,600 tons/yr.) and to the Cumbres and Toltec Scenic Railroad in Chama, New Mexico (1,500 tons/yr.) locally. It’s important to note that the King II mine would be close to having exhausted the estimated coal reserves in the proposed lease modification by 2023.

Table 2-4. Coal transport delivery

Destination	Coal Delivered (Tons/year)	Truck Deliveries Per Year	Trucking Miles/Year
Known Delivery Location*			
GCC Pueblo Cement Plant	105,000	3,684 (12/day)	1,996,728
GCC Tijeras Cement Plant	76,000	2,666 (8.5/day)	1,215.696
Local home heating	7,000	n/a	n/a
DSNGRR	3,600	123 (0.4/day)	4,920
TCSRR	1,500	53 (0.2/day)	13,462
Gallup NM Rail Delivery			
Gallup NM	643,538** (Max 873,940***)	22,847 (73/day)	7,767,980

* Coal volumes based on known contracts directly trucked from King II to the customer. Estimates are conservative as natural gas usage offsets reduces coal volumes periodically.

Coal delivered volume to BNSF Gallup estimated based on **average estimated annual average between 2017 and 2023 (Table 2-3).

***The maximum potential delivered to BNSF is based on the maximum volume of coal hauled annually from King II after Phase 5 road improvements have been completed (2023). Based on the estimated reserves, this volume could only be produced for 1 year (Refer to Table 2-3).

For the environmental analysis completed in this EA, Table 2-4 shows the trucking miles of coal trucks taking coal to either be burned in a GCC-owned cement kiln or regional narrow gauge railroad; or delivering the coal to Gallup, New Mexico for national/international coal sales and delivery. The distance from the mine to rail loading facilities in Gallup, New Mexico is about 170 miles.

As documented in Section 1.9 Scoping and Identification of Issues, the transportation of coal from the King II facility to SH 140 was the most frequently identified issue of public concern. During the La Plata County LUP process, GCC proposed access via State Highway 140 to CR 120 and then approximately 6.4 miles south/west to the King II Mine site. The first 2.5 miles of CR 120 are paved and the road is approximately 22 feet wide. The last 3.9 miles of CR 120 are gravel and the road is approximately 24 feet wide. GCC’s proposed traffic accounts for approximately 99 percent of loading by weight on north CR 120 and approximately 67 percent by volume (660/983 trips, Traffic Impact Assessment, November 19, 2015). For this volume and load of traffic on north CR 120, the applicable road classification is “Local, 10 plus units” (LPCLUC Sec. 74-91.c). County standards require a Local 10 plus units road to be constructed to a minimum 24-foot wide paved road plus 3-foot shoulders and a 60-foot right-of-way (ROW). The adopted County code also addresses the need for safe road alignment and sight distance (LPCLUC Sec 74-91.d).

Anticipated traffic impacts along CR 120 were evaluated in the Traffic Impact Assessment (TIA) by Roadrunner Design Services dated November 19, 2015 (with earlier versions dated June 10, 2014 and

July 31, 2015). For CR 120 to accommodate the haul trucks, in compliance with the adopted La Plata County Land Use Code, Chapter 74, roadway improvements were deemed necessary by La Plata County. GCC provided Conceptual Road Design Plans by Roadrunner Design Services, dated November 17, 2015 and a Property Ownership Illustration dated September 1, 2015. At the time, LPC deemed the conceptual plans feasible.

To address the safety concerns and to bring the access and coal hauling portion of the project into compliance with LPCLUC, LPC chose to draft and execute a RIA with GCC. The RIA is a contract between the Board of County Commissioners and GCC. More specifically, the RIA addresses the following key topics:

- Acknowledgement of phased limits on the daily average for outgoing trucks (based on a monthly average and daily maximum);
- Right-of-way acquisition process and timing;
- Road construction development/standards;
- Construction phasing, timing and associated hauling allowances; and
- Ongoing road maintenance fees due to degradation of initial improvements through applicant's ongoing use.

The RIA as executed now complies with LPC's LUC requirements. Table 2-2 provides an overview of the allowable coal truck traffic authorized by the RIA per phase of road improvements completed. An average of 80 (96 maximum) haul trucks/day is the initial approved volume and loading during Phases 1, 2, and 3 of road improvements in the executed RIA. Upon completion of Phases 1, 2, and 3, haul truck traffic would be allowed to increase to an average 100 haul trucks/day (120 maximum) until Phases 4 and 5 are completed and accepted by LPC. Upon completion and County acceptance of Phase 5 improvements, GCC would be authorized to haul coal at a rate of 120 haul trucks/day (144 maximum). With respect to improvements to the intersection of CR 120 and SH 140; GCC is bound to the terms and conditions of their CDOT access permit that requires certain intersection upgrades when particular traffic volume thresholds are surpassed. Upon reaching the state highway, existing highway network is assumed to adequately support haul operations because existing traffic on SH 140 is 2600 Annual Average Daily Traffic count (AADT¹), which King II Mine traffic would only account for less than 10 percent of the total AADT on SH 140. Substantial detail around LPC's decision-making process and the rationale for the RIA is included in LPC's LUP Staff Report included in Appendix B.

2.1.4 Road Improvements to CR 120

The road improvements to CR 120 will be performed by GCC in conformance with all County standards and specifications in effect at the time of commencement of construction including, but not necessarily limited to those standards and conditions set forth in Section 82-161 and Chapter 74 of Subpart B of the

¹ CDOT Traffic Count Station ID 104631, 2015 value. Available at: <http://dtdapps.coloradodot.info/otis/trafficdata#ui/0/0/0/criteria//67/true/true/>.

LPCC, and in accordance with detailed plans and specifications of the proposed road improvements submitted to and approved by the LPC Engineer.

As described in Section 2.1.3, the RIA, among other things, defines construction phasing, timing, and associated hauling allowances along CR 120. The phasing and timing of specific road improvements is included in the RIA that is publicly available for review from LPC and has been made a part of the Administrative Record for this EA.

The road improvements include temporary paving in front of several residences, realignment of specified road sections, widening specified road sections, regrading and paving specified road sections; and reconstruction of the existing portion of paved road. By the completion of Phase 5 road improvements, the entire approximately 6.5 miles of CR 120 from SH 140 to the King II facility would be paved and in conformance with LPC road design and safety standards (LPCLUC Sec 74-91.c.d.).

Table 2-5 summarizes the anticipated new ground disturbance along CR 120 anticipated from implementation of the RIA. Because the road improvements are incremental over a 5-year period, and dependent upon the LPC Engineer’s approval of proposed engineering design and construction plans, exact locations of future ground disturbance are not precisely known. For analyzing potential impacts to environmental resources along the existing CR 120 alignment, the following conservative ground disturbance assumption is made.

Table 2-5. Anticipated new ground disturbance from CR 120 improvements

a. Reconstructed Roadway Width (feet)	b. Exist Estimated Average Road Width (feet)	c. Width of Disturbance (feet) (a. – b.)	d. Length of Road Improvements (miles)	e. Length of Road Improvements (d. * 5,280)	f. Approximate Area of Disturbance (square feet) (c. * e.)	Approximate Acres of Disturbance (f./43,560)
30	24	6	6.5	34,320	205,920	4.7

The estimate of approximately 4.7 acres of potential new ground along CR 120 is conservative because it assumes a 6-foot width of construction disturbance along the entire roadway. In actuality, there will be many areas where a narrower width of impact will occur and some areas where the disturbance area will be broader. The calculation of anticipated disturbance acreage in Table 2-5 represents a reasonable projection of anticipated ground disturbance. The road improvement construction process generally includes the following stages:

- Survey crews establish control lines (setting reference points in the existing pavement or ROW) to guide the construction crews.
- Vegetation within the ROW construction zone will be removed.
- Equipment needed to construct the improvements includes track hoes, bulldozers, dump trucks, graders, compactors, and loaders and similar heavy equipment. A water tender would also be used for compaction of the road surface and dust abatement during construction. Several corrugated metal drainage pipes may be required at larger dry wash crossings.

Many of the road improvements required in Phases 1-3 will have already been completed by the time the subject EA and decision is made. Each phase of construction is reviewed, approved and monitored for adherence to LPCLUC and adherence to approved plans throughout the construction process by the LPC Engineer. As part of the plan review process LPC requires that site-specific environmental reviews be prepared as part of plan review. Accordingly, site-specific clearances and, if necessary, permitting for crossing potentially jurisdictional areas of the U.S. Army Corps of Engineers (or other sensitive resource issues) will be completed under the purview of LPC at the time that site-specific road improvement construction plans are submitted to the LPC Engineer. Nonetheless, for the purpose of this analysis and consideration of road construction impacts, a “programmatically” level assessment of potential impacts to the environment is made to supplement or inform future site-specific approval by LPC.

As defined in the RIA, GCC is required to pay a road maintenance fee of \$0.12 per ton of coal removed from the mine project until January 1, 2018. Thereafter, the maintenance fee shall increase yearly in accordance with increases in the Annual Construction Cost Index published by the Colorado Department of Transportation. This fee will be used for road maintenance activities completed by LPC including the application of gravel, snow removal, signage, sign maintenance, blading, shoulder repairs, cleaning of drainage ditches and culverts, repair and replacement of culverts, restriping, repairs of erosion damage or embankment slopes, weed mitigation, dust control and stabilization, pavement preservation, pavement maintenance (including but not limited to asphalt crack sealing, pot hole repair, chip sealing, slurry or micro-surfacing, overlay or partial and/or full-depth repairs), pavement rehabilitation (including but not limited to structural enhancements that extend the service life of existing pavement and/or improves its load carrying capacity such as restoration treatments and structural overlays) and pavement reconstruction.

GCC is responsible for all work and costs associated with the reseeded and/or weed control of the improved portions of CR 120 for 1 year following the completion of any phase of the Road Improvements (Design Feature 5).

2.1.5 Water Supply

Water is used at the King II Mine primarily for dust suppression, as required by MSHA and other regulations for worker safety and mine operations. Since there is no water supply at the mine, water for the King II Mine is based on water rights owned and leased by GCC. Water is delivered to the King II Mine site through ditches on the private Huntington Ranch and then the Huntington pipeline. GCC and Huntington Ranch have completed negotiations with respect to water rights conveyance and easements. The water right decree in Colorado Water Court District 7 for Case Number 07CW100 provides raw water for mine operations and for treatment to provide potable water for offices and sanitary facilities. The decree provides up to 34.07 acre-feet annually from three sources of water: Huntington irrigation dry-up, diversion from the La Plata River, and well water. In 2015, GCC filed (2015CW3059) for supplemental water supply to meet the requirements of LPC’s land use code. The supplemental water supply is comprised of Huntington Class A Shares through dry-up of an additional 44 acres of previously irrigated Huntington-owned lands. This supplemental water supply required a “change of use” decree from the water court to allow irrigation water to be used at the mine. The supplemental water and “change of use” were approved by the District Court, Water Division No. 7 on January 6, 2017.

As part of GCC’s continued effort to reduce impacts to water resources, an existing 20-acre-foot underground reservoir was replaced in 2016 with an alternate storage reservoir with capacity of up to 40 acre-feet at the Huntington Ranch location through enlargement of an existing pond. Per the current decree, GCC may store its First Lease Water, Second Lease Water, or any other water rights decreed in Case Number 07CW100 in this reservoir. This additional storage will allow for a reliable water supply at the mine into the future.

2.1.6 Reclamation

After completion of mining the following sequence of reclamation events will occur as detailed in Table 2-6. These actions are estimated to take the specified amount of time but GCC Energy, LLC does not commit to any specified timeframe. Certain activities may be accelerated or delayed dependent on season and whether they can be carried on contemporaneously with other activities.

Table 2-6. Reclamation Timetable

Activity	Estimated Timeframe
Mine Portal Sealing	1 month
Demolition and Removal of Structures	4 months
Backfilling and Grading	6 months
Re-Establishment of Surface Drainages	2 months
Re-Topsoiling	2 months
Revegetation	1 Month
Removal of Sediment Control Structures, Re-Topsoiling, and Revegetation	2 months (through 2 years later)
Revegetation Monitoring	Biennially (estimated at 2-3 years until bond release)

Reclamation details including: soil removal, storage, and redistribution; soil suitability descriptions; revegetation; revegetation success criteria; and sealing mine openings are described in detail in the mine permit. All reclamation activities are in conformance with all information required under 30 CFR 784.13 through 784.26 and CDRMS Regulations of the Colorado Mined Land Reclamation board for Coal Mining.

2.1.7 Design Features

The design features included as part of the Proposed Action are measures intended to minimize impacts to the environment and to area residents. Many of these design features were included in GCC’s LPC LUP application or were negotiated or required by LPC during the LUP review process to meet LPC’s Code Standards for Compatible Development (Section 82-193(c) (2)(a) through (f) of the LPC Code of Ordinances) as required to obtain a Class II land use permit. These measures are summarized below and grouped by the issues that they address. These design features are included in the Proposed Action as GCC committed measures to eliminate, reduce, or monitor potential resource impacts associated with

mining activities at King II Mine. These and additional operating conditions are detailed in the LPC LUP Staff Report in Appendix B.

Design Feature 1a: Dust from facility and mining operations

Dust generated by surface coal handling activities is suppressed or contained by the design of processing equipment. For example, conveyors and transfer points and associated screening and crushing equipment are enclosed. The coal stockpile conveyors are discharged through stacking tubes rather than into open air. Coal is loaded into trucks with equipment designed to minimize fugitive dust emissions.

Design Feature 1b: Dust from truck traffic

Dust generated by coal truck traffic is minimized through a variety of measures including applying water and magnesium chloride solution to unpaved road surfaces, reducing truck speeds on unpaved surfaces, and covering coal loads to eliminate blown coal dust. Some of the specific measures that GCC has committed to as part of their LUP include:

- Temporary paving of approximately 1 mile from 2541 to 3230 CR 120 to occur by June 2016 (Phase 1).
- Until such time the entirety of north CR 120 between SH 140 and the King II Coal Mine is paved, GCC shall treat unpaved sections of north CR 120 with dust retardant such as water and/or magnesium chloride as determined by the LPC Public Works Director.
- Until such time that the entirety of north CR 120 between SH 140 and the King II Coal Mine is paved, GCC shall ensure trucks hauling coal from King II Coal Mine do not cause dust that rises any higher than a coal truck's wheels to be visually observed.
- GCC shall ensure that all coal trucks hauling coal from the King II Coal Mine cover their loads prior to leaving the mine site.

Design Feature 2: Groundwater Quality

To verify baseline conditions and monitor that the King II Mine is not adversely affecting the water wells of adjacent landowners, GCC is planning the following measures:

- GCC will install four monitoring well clusters (Technical Revision #26). Refer to Map A-8 for the locations of the monitoring well clusters. Each monitoring well cluster will include one well completed above the Menefee Formation "A" coal seam, one well completed in the "A" coal seam, and one well completed in the lower Menefee Formation below the "A" coal seam where groundwater is encountered. These clusters will be located upgradient and downgradient of the King II Mine. They will be used to meet the baseline and monitoring and data requirements for LPC, CDRMS, and the OSMRE related to groundwater quality and hydrologic balance. Data from these monitoring wells will also be used to support updates to the Cumulative Hydrologic Impact Assessment (CHIA) and Probable Hydrologic Consequences (PHC) for the King II Mine permit.
- GCC has committed to replacing the existing underground water storage with aboveground water storage as part of its supplemental water supply plan. Closure of the underground water storage

will further eliminate risk to groundwater and be reclaimed or recovered per requirements specified by CDRMS and the OSMRE as part of the associated mine permit.

Design Feature 3: Subsidence

Compliance by GCC with CDRMS Regulation 2.03.7(3), Relationship to Areas Designated Unsuitable for Mining, addresses risk of subsidence from underground mining to adjacent surface property. While this is not a typical design feature, it is highlighted here to directly address scoping issues raised by adjacent landowners. The regulation restricts mining to an area outside 300 feet of an occupied dwelling. Furthermore, CDRMS typically requires that “angle-of-draw” be considered in determining a distance where mining is not permitted. Angle-of-draw accounts for the possibility that the effects of subsidence may extend beyond the actual extent of mining, typically figured at a 35-45-degree angle extended to the surface. See the diagram below. For added assurance, GCC has agreed to the following design features:

- As a LPC LUP condition, GCC has committed to avoiding mining activity within 600 feet measured horizontally of a dwelling without an expressed waiver in writing executed by the dwelling owner.
- GCC has committed in its subsidence monitoring program prepared and undertaken pursuant to Rule 2.05.06(6)(c) of the *Regulations of the Colorado Mined Land Reclamation Board for Coal Mining* to include all dwellings within 1,000 feet measured horizontally of the mining activities.
- GCC has agreed to measure and monitoring on a quarterly basis the static groundwater level in the wells identified within CDRMS Technical Revision-26 or as amended, and within 10 days of measuring the static groundwater post the results on a publicly accessible website.

GCC is effectively providing both forms of subsidence measurements. The second form occurs via CDRMS required groundwater monitoring well locations for water quality and hydrologic regulations as evident in TR-26.

Design Feature 4a: Noise and vibration from the facility

GCC has implemented the following measures to minimize on-site and off-site noise and vibration from its mining operations and facilities.

- GCC limits operation of the coal crushing and screening facility on the surface to daylight hours. Coal crushing and screening on the surface is normally limited to 6 to 10 hours per day.
- The largest source of noise generated at the facility is the ventilation fan at the mine portal (Matheson Mining Consultants 2013). Although the 2013 noise study did not detect fan noise at nearby residences, it was reported anecdotally that under certain atmospheric and wind conditions, some mine noise could be detected as much as a few miles away. Additional noise studies were completed in 2015 by Aimone-Martin (hired by LPC) and in 2016 by Wave Engineering (hired by GCC) and Braslau Associates (hired by a landowner). In response to the findings in these studies (additional detail provided in Section 3.12 Noise and Vibration), GCC installed noise-reduction equipment on this fan in April 2015 and will install similar or newer technology noise-reduction equipment on other large fans that may be used at the mine in the future.

- GCC learned that noise from surface equipment startup alarms and backup alarms at the mine site could be heard at neighboring residences. Several subsequent actions were undertaken to eliminate or reduce alarm noise. Two alarms that emitted a loud two-tone chirp several hundred times daily were eliminated entirely. Alarms required for safety or by law were replaced or modified so as not to project sound beyond the site boundaries. Finally, all alarm sounds were reduced to the minimum level required to meet safety and legal standards.
- GCC also modified facility load-out procedures to reduce activation of truck backup alarms during the loading process.
- GCC has and will continue to solicit observations from neighbors to assist in identifying noise that has not otherwise been addressed.

Design Feature 4b: Noise and vibration from truck traffic

GCC has prepared a noise and visual buffering plan for site-specific conditions at 2541 and 3230 CR 120, which provide a definitive commitment to directly address this design feature. These residences are immediately adjacent to the road and thereby warranted buffering from noise and dust. Buffering measures included in the plan include sound walls, landscaping, and berming as the respective condition provides to directly address and achieve compatibility. Impacts directly mitigated with this plan include noise, traffic, dust, unsightly views and other negative impacts, which are perceptible by adjoining land uses along north CR 120. The noise and visual buffering plan will be implemented by GCC at the discretion of the respective landowners; and will be available for implementation from the time of approval of this project up until the completion of Phase 5 road improvements.

In addition to buffering and screening, which have the potential to mitigate certain impacts for those directly adjacent to the road, the following design criteria will be implemented for all residents along CR 120:

- At any time prior to the completion of Phase 5 road improvements, GCC shall reimburse La Plata County up to \$5,000 for expenses incurred hiring a consultant to determine the adequacy and efficacy of any buffering plan and/or installation required as part of this class II land use permit.
- Haul trucks must travel at no greater than 10 mph or as determined by the LPC Engineer on gravel portions of the road within 200 feet of residential structures, unless the La Plata County Public Works Director authorizes a faster speed in writing.
- Sound measurements at 50 feet from the edge of north CR 120 between State Highway 140 and King II Coal Mine attributed to trucks hauling coal from the King II Coal Mine shall not exceed 86 A-weighted decibels (dBA) at any time.

Design Feature 5: Traffic

To provide for the safety of the traveling public, residents, and mine traffic, the route proposed for use by haul trucks needs to be improved to minimum county standards as per LPCLUC 74-91(c), design standards. GCC proposes to achieve these minimum requirements via an executed RIA that captures the improvements within a phased (5 phases) development schedule. Executed in conjunction with the land use permit, each scheduled improvement under this agreement would provide improved and safer conditions to the roadway, while progressively achieving compliance with the land use permit.

To improve conditions on CR 120 related to traffic and road hazards created by the coal truck traffic, GCC has committed to the following measures, which are also illustrated in Map A-7, CR 120 N Roadway Current Conditions and Proposed Improvements in Appendix A:

- GCC will pave and improve CR 120. GCC will pave certain gravel portions of CR 120 beginning in 2015 with the widening of the 90-degree corner at mile marker 0.3 and continuing in 2016-17 with the paving of all gravel portions of CR 120. The first scheduled paving of the gravel portions of CR 120 will be adjacent to residences near the end of the existing pavement. The proposed schedule of paving and road improvements is detailed in the updated GCC Energy King II Coal Mine Traffic Impact Assessment dated July 31, 2015, in the RIA and included in GCC's revised land use permit application.
- GCC will also extend culverts for the Big Stick irrigation ditch and widen pavement at the curve and repaint centerlines on CR 120 at mile marker 0.3 from SH 140 to provide for better lane usage by haul trucks. This project was initiated in the spring of 2015, but was halted when the Big Stick ditch came on call (was flowing water) and will be completed after the 2015 irrigation season.
- Vegetation has been cleared along CR 120 in certain locations for purposes of improving sight distances for vehicles traveling along the road.
- GCC has a written policy that imposes speed limitations on all haul trucks on CR 120. Under this policy, trucks shall not travel faster than 25 mph on gravel sections of CR 120, shall reduce speed to 10 mph while passing residences on the gravel portions of CR 120, shall abide by advisory speed signs, and shall travel no faster than 5 mph below posted speed limits on paved sections.
- GCC has established a direct dial phone number that can be used to report safety concerns or violations.
- Haul trucks are not allowed to install or remove load tarps in CR 120 traffic lanes. Sufficient parking space is provided at the mine site for these activities.
- GCC shall be responsible for all work and costs associated with the reseeding and/or weed control of the improved portions of CR 120 for 1 year following the completion of any phase of the Road Improvements.
- GCC shall be responsible for all costs associated with LPC's acquisition of the ROW, either through eminent domain or threat of eminent domain, all costs (including but not limited to the cost of appraisers and expert witnesses) and reasonable attorney's fees associated therewith.
- GCC shall pay an annual Maintenance Fee for their usage of CR 120. Until January 1, 2018, the Maintenance Fee shall be \$0.12 per ton of coal removed from the Mine Project. Thereafter, the Maintenance Fee shall increase yearly in accordance with increases in the Annual Construction Cost Index published by the Colorado Department of Transportation.

Operational and Interim Mitigation Measures

In addition to the date specific road improvements and the respective upper (120 haul trucks/day) and lower (80 haul trucks/day) truck volume limitations, GCC will implement the following additional mitigation measures (Phase 1 road improvements have been completed by GCC, yet are described in this section to clarify measures taken to reduce resource impacts analyzed in this EA):

- GCC will temporarily pave from 2541 (McQue property) to 3230 CR 120 (Hunzeker property) for an approximate 1-mile stretch (Phase 1), to reduce dust, noise, and improve road safety.
- Concentration of permanent road improvements in 2017 to specifically address key areas of road safety. Phases 2 and 3 include realignment of the 90-degree corner, widening and repaving 2 miles from the edge of existing pavement (McQue residence) to King I providing paving for three residences and realignment by Wiltse's Barn and other constrained areas. The area known as the Narrows between King I and King II will be widened and regraded to improve line of sight and safe travel.
- Concurrent with Phase 1 road improvements, install automated, flashing warning lights and safety signage at locations known as the Narrows and Wiltse's Barn to increase driver awareness of truck traffic.
- Hauling is suspended on Sundays to provide a day of respite for the residential uses along the chosen haul route.
- The maximum number of outgoing haul trucks in a single-day is not to exceed 20 percent above the monthly average (e.g., $80 \times 20\% = 96$, $100 \times 20\% = 120$, $120 \times 20\% = 144$). This creates a cap on the degree to which truck traffic can peak on any given day.
- To minimize night-time hauling and associated safety (and noise) impacts, a maximum of 20 percent total haul trucks to run between 10:00 p.m. and 6:00 a.m. the next morning.
- To increase road safety and reduce dust, a speed limit for semi-trucks is 25 mph on gravel, 5 mph under posted limits on pavement. GCC is committed to ensuring that all contracted truck hauling businesses and drivers are aware of and adhere to said prohibition.
- To increase road safety, coal hauling trucks are prohibited from stopping or parking within the ROW along CR 120 or any other CR. Except in unforeseen circumstances or cases of emergency, the installation or removal of tire chains is not permitted anywhere within the CR 120 ROW. GCC shall be responsible for ensuring that all contracted truck hauling businesses and drivers are aware of and adhere to said prohibitions.
- To increase road safety, GCC shall ensure that no trucks haul coal from the King II Coal Mine anytime the permittee or the LPC Public Works Director, or his/her designee, determines that road conditions are, or will be in the near future, substandard for any reason such that continued coal hauling could create an unsafe condition for the traveling public; the permittee may resume allowing trucks to continue hauling coal from the King II Coal Mine only after the LPC Public Works Director, or his/her designee, verifies orally or in writing that it is safe to resume hauling operations.
- GCC shall require all coal haul trucks and trailers to have easily identifiable vehicle numbers to aid in reporting truck issues. GCC shall have a direct dial phone number (currently 970-247-7934) for the public to relay such information to GCC. GCC shall keep a log of truck transports and reports of truck issues for the purposes of addressing unsafe driving behavior. GCC shall be responsible for ensuring that all contracted truck hauling businesses and drivers are aware of and adhere to said condition. Upon receipt of a complaint, GCC shall investigate and take action to remedy any unsafe driving behavior.

- Should GCC seek increased transportation of coal trucks beyond the maximum number per day on CR 120, GCC shall apply for a major amendment to this Class II land use permit in accordance with the standards and process dictated by the applicable provisions of the LPC Code.

2.2 No Action

The BLM NEPA Handbook (USDI/BLM 2008) states that for EAs on externally initiated Proposed Actions, the No Action Alternative is generally to reject the proposal or deny the license. This option is provided in 40 CFR 1502.14. The No Action Alternative provides a useful baseline for comparison of environmental effects (including cumulative effects) and demonstrates the consequences of not meeting the need for the action.

Under the No Action Alternative, the coal lease modification would not be approved. Thus, federal coal reserves within the four tracts being applied for would not be recovered by GCC and approximately 4.66 million tons of recoverable coal would not be mined. The federal government would lose approximately \$17 million in royalties.

Coal production at the King II Mine would cease once coal reserves under existing leases were mined and reclamation activities would commence. Based on GCC and BLM estimates, reserves would be depleted prior to 2019; dependent upon how GCC staggered production as it began mine closure. Under the No Action Alternative, there would be no new surface disturbance, removal of coal, or other impacts associated with the activities described under the Proposed Action. Under this scenario, GCC would likely request renegotiation of the RIA with LPC as the currently required improvements could not be capitalized without the coal production authorized in the RIA. For this analysis, it is estimated that road improvements would be completed through Phase 3 (November 2019).

2.3 Alternatives Considered but Eliminated from Detailed Study

If an alternative is considered during the EA process but the agency decides not to analyze the alternative in detail, the agency must identify those alternatives and briefly explain why they were eliminated from detailed analysis (40 CFR 1502.14). An action alternative may be eliminated from detailed analysis if:

- it is ineffective (does not respond to the purpose and need);
- it is technically or economically infeasible (consider whether implementation of the alternative is likely given past and current practice and technology);
- it is inconsistent with the basic policy objectives for the management of the area (such as, not in conformance with the land use plan);
- its implementation is remote or speculative;
- it is substantially similar in design to an alternative that is analyzed; and,
- it would have substantially similar effects to an alternative that is analyzed.

Several alternatives to the proposed lease modification were considered, including alternative lease tracts as well as alternative coal removal and transport methods to minimize the impacts for efficient coal resource recovery.

2.3.1 Leasing and Mining Alternatives

The original submission for the lease modification submitted to the BLM in March 2012 included a Tract C that was removed by GCC in October 2014 because timing and coal quality issues would make it inaccessible from the active workings of the King II Mine. GCC requested that Tract A be modified to include additional acreage to replace the acreage removed. The result was the final lease modification being evaluated in this EA.

Potential alternative methods for mining the coal reserves in the lease modification area identified by GCC were either determined to be technologically unsuited to the topography and character of the coal seam (as underground long-wall mining requires significantly wide deposits [0.25 to 1.0 mile] of nearly uniform coal seams of a given height and character), or would result in significantly greater environmental disturbance (including open pit, contour, or other surface mining methods).

2.3.2 Coal Transportation Alternatives

Alternative coal transport options have been considered and analyzed by the BLM and the OSMRE and by the cooperating agencies—particularly LPC—since July 2012 when GCC submitted a Class II LUP application to LPC. During this time, there was also substantial input from GCC, the public, and a variety of expert witnesses as the LPC Planning process presented a platform for the exchange of ideas and debate. In 2014 Roadrunner Engineering, LLC, under contract to GCC, prepared a TIA. The TIA was an integral part of the LPC planning process and was revised/updated in July 2015 and again in November 2015 as directed by LPC or was necessary to respond to new information presented by the public during the LPC LUP review process. The TIA evaluated baseline traffic values and projected traffic volumes 20 years into the future using LPC data. The TIA also evaluated project area accident records, traffic volumes and loading, speed limits and sight distances, design criteria, and included an assessment of alternative haul road option assessment. The TIA is publicly available on the LPC Planning Department website under the GCC Energy Project link at: http://lpcds.org/UserFiles/Servers/Server_1323669/File/La%20Plata%20County's%20Community%20Development%20Services%20Department%20Migration/Planning/Oil%20and%20Gas/GCC%20Energy%20Project/1%20-%20GCC%20Energy%20King%20II%20TIA%20-Final%20151119.pdf.

The TIA performed an assessment of eight different haul route options to move coal product from the mine to SH 140. In addition to the transportation alternatives evaluated in the TIA and considered by LPC, there were variations of the TIA alternatives and new alternatives presented by the public and/or via expert testimony that frame the consideration of alternative coal transportation in this EA. These transportation alternatives, listed in Table 2-6, were the focus of 4 years of detailed LPC Planning Commission and Board of County Commissioners evaluation whereas 96 technical and/or communication exhibits were generated throughout the public participation and decision-making process.

Table 2-7. Transportation Coal Hauling Alternatives

No.	Alternative	Description	Source of Alternative
1	New North Bound Haul Road	This option included construction of a dedicated haul road north to a new intersection with U.S. 160. The roadway would be approximately eight miles in length.	TIA (2015) Public Comment (San Juan Citizen's Alliance)
2	Railroad Spur	This option is based on the development of a railroad spur line from Gallup to Farmington then north to the vicinity of King II Mine.	TIA
3	CR 120 North	All coal production transported via CR 120, northern route. This option reflects that both inbound and outbound transport vehicles (semi-trucks) utilize the northern segment of CR 120. This is the approved access road in the GCC Class II LUP recently issued by LPC; conditioned by the RIA.	TIA Public Comments (multiple)
4	Loop Route 1	Inbound (empty) transport vehicles utilize the southern segment of CR 120 and outbound (loaded) vehicles utilizing the northern segment of CR 120.	TIA Public Comments (multiple)
5	Loop Route 2	Inbound (empty) transport vehicles utilizing CR 119 with outbound (loaded) vehicles utilizing the northern segment of CR 120.	TIA Public Comments (multiple)
6	New Designated Haul Road	This option would utilize a newly constructed haul road (approximately 5.5 miles) across State of Colorado and private lands. This new haul road would support both inbound and outbound transport trucks and would tie into CR 120 near the King I Mine location. The short segment of CR 120 between King I and King II would continue to be used for coal transport.	TIA Public Comments
7	New Haul Road with Conveyor	This option would utilize a newly constructed haul road (approximately 5.3 miles) across State of Colorado and private lands. Coal would be transported by conveyor from the existing load-out to a new load-out constructed at the top of the mesa (approximately 0.7 mile). Transport trucks would receive at the new load-out and haul via the new haul road. The new haul route would tie into the County roadway approximately 0.2 mile from intersection of SH 140 and CR 120.	TIA
8	Coal Conveyor	This option utilizes a newly constructed conveyor from the existing King II load-out to a new load-out located adjacent to SH 140 (approximately 6.0 miles in length). The new load-out would tie into the CR 120 approximately 0.2 mile from intersection of SH 140 and CR 120.	TIA Public Comment

No.	Alternative	Description	Source of Alternative
9	Aerial Tram/Conveyor	Little detail was provided in the scoping comment. For the purpose of consideration of an aerial tram or elevated conveyor; it is assumed that the alignment would follow that of alternatives 6, 7, and 8.	Public Comment (Danielson)
10	Slurry Pipeline	Little detail was provided in the scoping comment. For the purpose of consideration of constructing a pipeline to slurry convey coal; it is assumed that the alignment would follow that of alternatives 6, 7, and 8.	Public Comment (Danielson)

As stated above, when considering alternatives to be carried through in a NEPA analysis, the alternatives must, among other criteria, meet the project purpose and need; be technically and economically feasible; and its implementation must not be remote or speculative.

2.3.3 Alternatives Eliminated Following Initial Screening

Of the ten transportation alternatives identified through scoping, four alternatives were initially screened and subsequently eliminated from future detailed consideration and analysis in the EA. A summary description of each of the alternatives follows, along with the pros and cons identified and considered, and the rationale for eliminating from detailed analysis in this EA

Alternative 1 – New North Bound Haul Road

This option would involve the construction of a dedicated haul road north to a new intersection with U.S. Highway 160. The roadway would be approximately 8 miles in length. This option was reviewed as a coal hauling alternative route that would eliminate the impacts to residents along CR 120 and CR 119. It would also reduce coal truck traffic along SH 140. The land north of the King II Mine to U.S. Highway 160 is forested ponderosa pine and spruce/fir woodlands at the higher elevations and piñon-juniper and Gambel oak at lower elevations. The King II Mine is at 7,200 feet in elevation. The terrain extending to the north is characterized by steep slopes climbing in elevation to approximately 8,500 feet before descending back down to U.S. Highway 160. The area is remote, largely undisturbed land with excellent wildlife and scenic values. Some of the canyons in this area contain suitable habitat for the Mexican spotted owl, a federally threatened species, although there are no records from the immediate area (refer to Section 3.10 Threatened, Endangered and Sensitive Species). There is a small network of primitive roads and/or 2-tracks that are likely used for hunting by area landowners. The land is mostly private all the way to the highway (minimum of eight private land parcels would be crossed). The access onto U.S. Highway 160 would be in the immediate vicinity of the Hesperus Ski Area creating a safety concern and impacts to the recreation experience. Once on U.S. Highway 160, coal trucks would need to travel westbound to U.S. Highway 491, either through the Cortez business district or via a newly constructed bypass.

The reasons for eliminating this alternative include the following:

- Economically infeasible. Development of a new 8-mile long haul road and constructing a likely Cortez bypass to mitigate coal truck traffic through the business district would cost millions of dollars.
- Logistically infeasible, due to the duration of time to construct this alternative.
- Environmental impacts would be greater than those under consideration for the Proposed Action and would add 10-15 additional one-way trucking miles per trip.

Alternative 2 – Railroad Spur

This option is based on the development of a railroad spur line from Gallup, New Mexico to Farmington, New Mexico. Several studies have estimated route options and costs. The most recent estimates to construct a railroad from Gallup, New Mexico to Farmington, New Mexico are in the range of \$550 million in 2013 dollars (NMDOT 2013). An additional length of railroad would be required to reach the Hesperus region. The original 99-mile spur plus the additional length to Hesperus does not change the findings of the Economic Feasibility Study that stated “in summary, it has been demonstrated that the heavy burden of the construction cost cannot be fully serviced by the cash flow generated by the railroad in the foreseeable future.”

In addition to the current economic infeasibility of building a rail line to Hesperus from Gallup, the majority of the land along the rail corridor between the Gallup/Thoreau area and Farmington crosses the Navajo reservation and federal lands. Even if the economics existed to support development of the Gallup-Farmington-Hesperus railroad, the environmental review alone (including a NEPA analysis) would take years to complete. Under this alternative, coal would be bypassed within the existing King II permit area and GCC would be unable to move potential future coal to markets.

The reasons for eliminating this alternative include the following:

- Economically infeasible
- Logistically (from a timing perspective) infeasible, as it would take years to develop this alternative
- Because of the very high costs, extension of the rail service to the project area would require multiple other rail users (customers/investors); making development of this alternative highly speculative and remote

Environmental impacts would be significantly greater than those under consideration for the Proposed Action.

Alternative 9 – Aerial Tram/Conveyor

Development of an aerial tram/conveyor was an alternative raised during supplemental scoping. Little detail was provided in the scoping comment other than to describe this alternative as having a “very high relative capital cost,” a “low relative operating cost,” a “medium” production volume capability (with medium undefined); and that in terms of environmental considerations it was stated that an aerial tram would be “quiet with a limited footprint.” For consideration of an aerial tram or elevated conveyor; it is assumed that the alignment would follow that of alternatives 6, 7, and 8.

Coal conveyors are commonly constructed with a supporting service road to facilitate operations and maintenance. Assuming a modest 50-foot-wide disturbance corridor to construct a conveyor for the approximately six-mile length of alternatives 6, 7, and 8, ground disturbance would be approximately 36.4 acres of permanent impact, an impact nine times greater than the Proposed Action. It is inaccurate to claim that aerial coal conveyors are “quiet.” While there have been some technological advancements to mitigate, noise generated from coal conveyors, several studies referenced below identify coal conveyors as one of the noisiest pieces of equipment at an underground coal mine.

The following information is excerpted from Conroy et al. (2014) in a United States Patent Office filing:

“Coal conveyors are widely used in the coal mining industry. They are used, for example to convey raw coal or coal ore stones. Coal conveyors can save labor and improve efficiency by moving large volumes of material. A common type of coal conveyor is a belt conveyor. Belt conveyors typically include a long belt supported by a support structure, such as a metal frame. Rollers often are disposed at least at ends of the system. The belt is looped around each of the end rollers, one or more of which is powered to drive the belt across the metal frame, thereby moving the material.

Typical coal conveyors can be expensive to implement. For example, a typical truss conveyor often has a large amount of structural steel. Typical coal conveyors also can be difficult to install. Because they are disposed on the ground and extend over a long span, it can be difficult to traverse roads and rough terrain. Installation can sometimes require the use of longer, alternative routes to avoid difficult to traverse areas. Coal conveyors also can have a significant environmental impact, especially relating to the generation of noise.”

In a study presented at Acoustics 2004 (Brown 2004), Brown concluded the following; “Large, outdoor belt conveyor systems for bulk materials are major sources of industrial noise and frequently become an environmental emissions issue for many existing and proposed plants. Deficiencies in the industry’s understanding of the complex, underlying conveyor noise generating mechanisms has meant there are relatively few practical and cost-effective noise management strategies.” In a “Coal Mining Planning and Design Institute, Survey Report” (2012), it was estimated that average noise generated by a belt conveyor system is about 89 decibels (dB). Elevating that continuous (day and night) noise 10-20 feet above the ground and along the mesa top east of Hay Gulch would serve to unnecessarily expand noise impacts to both area residents and wildlife.

From a logistical standpoint, it would be unreasonable to assume that a feasible alignment and associated ROW could be obtained; then the conveyor constructed before the King II current coal reserve is exhausted. The commenter acknowledged this fact in the following statement: “The issue that GCC Energy has is that they do not have permission to mine coal in the lease modification or the exploration area. This would leave them about 2.67 million tons to mine. This situation is a time problem given the schedule for permit modification assuming the lease modification can be issued within the next year.”

The reasons for eliminating this alternative include the following:

- Economically infeasible; the commenter acknowledged, “It is unlikely that use of a conveyor would be lower cost as compared with over-the-road or off-highway trucks on a single use road.”

The TIA reported an Opinion of Probable Cost (OPC) cost over 20-years at a cost more than 3.5 times that of the Proposed Action.

- Logistically (from a timing perspective) infeasible, could not be permitted and constructed before coal is bypassed and the current lease reserve exhausted; and
- Environmental impacts would be greater than those under consideration for the Proposed Action.

Alternative 10 – Development of a Slurry Pipeline

Development of a coal slurry pipeline was an alternative raised during supplemental scoping. Little detail was provided in the scoping comment other than to describe this alternative as having a “very high relative capital cost,” a “medium/low relative operating cost,” a “medium/high” production volume capability (tonnages undefined), and that in terms of environmental considerations it was stated that a slurry pipeline “requires water and dewatering systems, is quiet with a limited footprint.” For the purpose of consideration of a slurry pipeline; it is assumed that the alignment would follow that of alternatives 6, 7, and 8.

Coal transportation via slurry pipeline moves large quantities of coal suspended in water. Typically, the **volume of coal equals the volume of water**. In the West, water for suspending the coal is supplied by wells that pump water from groundwater aquifers; recharge of such aquifers is negligible relative to the rate of withdrawal (Gleick 1994). Assuming the estimated average annual production (over 7 years) as calculated in Table 2-3, GCC would need approximately 615-acre feet or about 200,509,222 gallons of water annually to slurry transport 837,126 tons of coal. Additionally, slurry pipelines usually terminate at a power plant where the water used to move the coal is recycled as cooling water for the power plant. In this case, the slurry pipeline would terminate at SH 140 where a dewatering facility would need to be designed and constructed. At this point recovered water would have to be either recycled, or reinjected into a water disposal well.

The reasons for eliminating this alternative include the following:

- Economically infeasible; the commenter acknowledged the “very high relative capital cost” and “medium/low relative operating cost.”
- Technically and logistically infeasible. There is not sufficient water available to GCC to develop a slurry line.

2.3.4 Coal Transportation Alternatives Evaluated in Detail

Six other options were reviewed for cost magnitude, feasibility (including timing to develop), public safety, and environmental considerations. Three options were alternative haul routes on existing roads (Alternatives 3, 4, and 5) and three options considered dedicated haul roads or conveyors that do not use county roads (Alternatives 6, 7, and 8). A short description of each alternative is provided in Table 2-6. Alternatives 3, 4, and 5 are also illustrated on Map A-4 included in Appendix A. Detailed engineering and cost analysis of each option is included in the TIA completed as part of GCC’s land use application with La Plata County and reviewed by La Plata County engineers (Roadrunner 2015).

Additional detail regarding the factors that LPC considered when evaluating each alternative are included in the 2016 Planning Commission staff report, in the 77 attachments to the staff report listed on pages 47-49 and within the 19 additional exhibits presented during the May 31, 2016 Board of County Commissioners hearing. Where appropriate, detail from the numerous exhibits is presented in the evaluation of each alternative below.

Alternative 3 – CR 120 North (Current LPC Permitted Transportation Route under the Proposed Action)

Under this alternative, all coal production from King II Mine would be transported via CR 120, northern route. This option reflects that both inbound and outbound transport vehicles (semi-trucks) utilize the northern segment of CR 120. This is the approved access road in the GCC Class II LUP recently issued by LPC; conditioned by the RIA.

During the LUP public review process expert testimony was presented by transportation experts from Roadrunner Engineering (GCC's consultant) and by LSC Transportation Consultants, Inc. (LSC). LSC was commissioned by the Law Offices of Luke Danielson, on behalf of Cross Creek Ranch. It should be noted that all parties participating in the discussions and debate around acceptable traffic volumes on CR 120 agreed that the condition of the road, at the time of GCC's Class II LUP application and prior, was unsafe as defined by the LPCLUC.

As stated above, Roadrunner Engineering evaluated this and other alternatives in the previously referenced RIA (Exhibit 4 in the LPC LUP staff report). LSC reviewed documents submitted and data provided by GCC, the mine's owner, their consultants, LPC, and other consultants retained by Cross Creek Ranch. LSC also conducted field evaluations, traffic counts, and technical analysis. Thus, LSC Technical Memorandum #154580 (Exhibit 34 in the LPC LUP staff report) summarized their analysis, findings, and recommendations. LSC made 11 recommendations regarding CR 120 improvements, all of which appeared to pertain to industry and/or LPC road engineering standards. Roadrunner Engineering (Exhibit 8 in the LPC LUP staff report) agreed with all the recommendations and provided additional reference to LPC Code Sec. 74-91.

In Exhibit 34, LSC made several recommendations pertaining to interim mitigation measures that should be implemented until such time as CR 120 is improved to LPC road engineering standards. The recommendations made by LSC included endorsing (with comments added) recommendations that had been made by the Hay Gulch Citizen's Advisory Panel (Exhibit 26 in the LPC LUP staff report). Included in the recommendations were to allow loaded truck trips at a level (2010 levels) less than was proposed by GCC and conditionally permitted by LPC with the RIA. The experts disagreed on what level of truck traffic is safe for CR 120. The RIA allows 80 loaded truck trips per day through phases 1, 2, and 3, increasing to 100 after Phase 4 and to 120 after completion of Phase 5 of road improvements. LSC recommended 55 loaded truck trips as a "reasonable compromise." The LPC Public Works Department issued a memo dated March 25, 2016 (Exhibit 58 in the LPC LUP staff report) that concluded that the CR 120 north alternative can safely accommodate the truck volumes negotiated in the RIA. Importantly, the required road improvements under this alternative can be completed within a timeframe that meets the purpose and need of the Proposed Action.

Environmental and public safety factors considered when evaluating this alternative included the following:

- Length of the access alternative (7 miles)
- Number of CR intersection (none)
- Number of SH intersections (1)
- Number of residence driveways along route (20)
- Steep grades (1)
- Acres disturbed: (4.7 acres, refer to Table 2-5)
- Environmentally sensitive areas (none)

Economic considerations included those detailed in the RIA. Estimated OPC cost over 20-years is \$10,790,947. This is the approved access road in the GCC Class II LUP recently issued by LPC; conditioned by the RIA and the transportation route described under the Proposed Action.

This alternative was carried through this EA for detailed analysis for the following reasons:

- Was deemed feasible and safe by LPC engineers
- Had lesser environmental impacts than Alternatives 4 and 5
- Fewer residences impacted by this alternative

It should be noted, that during the public review process of this alternative, there were various recommendations from the public to implement road improvements to CR 120 N sooner than was detailed in the RIA. LPC's stated position with regards to these recommendations was that GCC was an existing use and therefore it is necessary to bring GCC into compliance with the LPCLUC through a series of reasonably timed phases (Exhibit 78 in the LPC LUP staff report).

Alternative 4 – Loop Route 1

This alternative consisted of in-bound (empty) coal trucks utilizing the southern segment of CR 120 and out-bound (loaded) vehicles utilizing the northern segment of CR 120. The LSC Technical Memorandum (Exhibit 34 in the LPC LUP staff report) also recommended consideration of a reverse flow (empty trucks on CR 120 N and loaded trucks on CR 120 S) to this alternative and listed potential benefits of "one-way" hauling that included, among other potential benefits, the following:

- Reducing truck volume on CR 120 (N)
- The volume impacts of coal transport trucks would be more dispersed rather than concentrating impacts and along CR 120 (N)
- Eliminate coal trucks passing along a CR

LSC also suggested, citing the Mine Engineers, Inc. report (Exhibit 29 in the LPC LUP staff report) that southbound one-way coal haulage would be shorter and thus more cost effective for GCC. It was also suggested that southbound coal hauling would be less noisy due to "less mountainous terrain" and consequently a reduced need for noisy down clutching or braking. While these potential benefits may exist, the LSC Technical Memorandum recommended further evaluation of this option. This option was

evaluated in more detail by LPC and in the preparation of this EA. Whether traveling inbound or outbound on CR 120, there are four steep hill grades compared to one along CR 120 N; therefore, truck clutch and brake noise would be more frequent along CR 120 S. As described below, this alternative expands the impacts associated with Alternative 3 by increasing the number of residences affected and the magnitude of road improvements that would be needed to achieve LPC and CDOT road and intersection safety standards.

The increased public safety issues associated with this alternative were expressed and identified by the Durango 9-R School District and the Fort Lewis Mesa Fire Protection District (FLMFPD) over this CR 120 S route. Thus, in 2011 GCC decided to restrict coal truck traffic to the north end of CR 120. The following concerns regarding CR 120 S (Exhibit 42 in the LPC LUP staff report) were identified:

- Trucks turning onto CR 120 are obscured by the berm on the east side of SH 140 to south bound traffic creating a visibility issue.
- Turning onto CR 120 from SH 140 northbound is a severe angle and would present challenges for drivers negotiating the intersection especially in adverse weather conditions.
- This route has five hills to negotiate instead of one on the northern CR 120 route.
- This route has five 90 +/- degree turns as opposed to one on the northern CR 120 route.
- Increased population would be exposed to traffic.
- Five county road intersections.

Environmental and public safety factors considered when evaluating this alternative included the following (some duplicate factors identified by the FLMFPD):

- Length of the access alternative (7-9 miles);
- Number of CR intersection (5);
- Number of SH intersections (2);
- Number of residence driveways along route (70);
- Steep grades (4²);
- Acres disturbed: (4.7 to 6.5 acres);
- Environmental sensitive areas (Hay Gulch).

Economic considerations included those detailed in the RIA. Estimated opinion of probably cost over 20-years is estimated at \$21,430,194. When considering these factors, the reasons for eliminating this alternative include the following:

- Greater public health and safety concerns;
- Would impact more than triple the number of directly impacted residences from traffic, dust, noise, etc. compared to Alternative 3;

² Upon closer evaluation during the preparation of this EA, there are four steep grades as opposed to the five identified by FLMFPD.

- Would have greater environmental impacts compared to Alternative 3; and
- Would necessitate additional area road improvements and higher costs compared to Alternative 3.

Alternative 5 – Loop Route 2

This alternative consisted of in-bound (empty) coal trucks utilizing CR 119 with outbound (loaded) vehicles utilizing the northern segment of CR 120. This alternative essentially increases all of the impacts identified for alternatives 3 and 4 and would require reconstruction of the CR 119 bridge over the La Plata River. As with Alternative 4, LSC recommended evaluating having loaded truck traffic utilize CR 119 to access SH 140. This option was evaluated in more detail by LPC and in the preparation of this EA. This alternative would authorize coal truck traffic along a 9-R School District bus route. Additionally, a significant safety concern exists associated with the CR 119/SH 140 intersection being 0.12 mile from the entrance to Fort Lewis Mesa Elementary School. As a direct result of concerns expressed by the School District and the Fort Lewis Mesa FPD over use of CR 119, in 2011 GCC decided to restrict coal truck traffic to the north end of CR 120. These concerns, excerpted from Exhibit 42 in the LPC LUP staff report are listed as follows:

- “The intersection of SH 140 and CR 119 geometry supports passenger car and single- unit vehicle movements.
- Crossing highway routes trucks through a busy school zone and poor access angles off CR 130 onto SH 140.
- Route passes through five county road and two private road intersections.
- Route travels through two 90 +/- degree turns.
- Increased number of residents impacted.
- Increased length of county road impacted.
- Increased congestion in vicinity of elementary school.”

Environmental and public safety factors considered when evaluating this alternative included the following (some duplicate factors identified by the FLMFPD):

- Length of the access alternative (14-16 miles);
- Number of CR intersections (5);
- Number of SH intersections (2);
- Number of residence driveways along route (90);
- Steep grades (3);
- Acres disturbed: (10.2 to 11.6 acres);
- Environmental sensitive areas (Hay Gulch/La Plata River/Dry Gulch/FLM School/9-R bus stops).

Economic considerations included those detailed in the RIA. Estimated OPC cost over 20-years \$23,536,248. When considering these factors, the reasons for eliminating this alternative include the following:

- Greater public health and safety concerns relative to Alternatives 3 and 4;

- Would impact almost quadruple the number of directly impacted residences from traffic, dust, noise, etc. compared to Alternative 3;
- Would result is three times the amount of ground disturbance compared to Alternative 3;
- Crosses multiple perennial or intermittent water courses; and would necessitate additional area road and highway improvements and costs.

Alternative 6 – New Designated Haul Road

This alternative considers a newly constructed haul road (approximately 5.5 miles) across State of Colorado and private lands. The new haul road would support both inbound and outbound transport trucks and would tie into CR 120 near the King I Mine location. The short segment of CR 120 between King I and King II would continue to be used for coal transport. The benefit associated with this alternative is that it would eliminate much of the coal traffic along CR 120, concentrating the traffic in the immediate vicinity of the King I and King II locations. This alternative would require development of a steep road off the mesa top east of Hay Gulch. The alignment considered in this evaluation is depicted on alignment sheets prepared by Roadrunner Engineering and provided to LPC (Exhibit 4 in the LPC LUP staff report).

Challenges with this alignment are included in the TIA and consist of the following:

- Design and construction of new roadway;
- Permitting and approval of new roadway corridor;
- Increased acreage impacted by roadway(s);
- Reduction and/or modification to ranch/agriculture operations;
- Alignment still adjacent to a few existing residential;
- Increased noise exposure to mesa top residents; and
- Steep roadway grade from mesa top to gulch.

Design, ROW acquisition, permitting, and construction all represent significant timing considerations associated with this alternative. Specifically, the length of time required to complete these steps does not represent a reasonable alternative considering the BLM's evaluation of GCC lease modification under an emergency leasing exemption (refer to Section 1.2 Background). The current permit review and lease decisions around the subject lease modification are currently anticipated for late 2017 or approximately 6 months prior to GCC closing the King II Mine.

From an environmental standpoint, construction of a 6.5-mile-long dedicated haul road would impact approximately 39.5 acres (assuming a 50-ft-wide ROW and construction disturbance width). Current land use along the alignment is primarily agriculturally based, or undeveloped land. Approximately 2.4 miles of the alignment would traverse relatively undisturbed piñon-juniper woodlands and sagebrush flats along the eastern end of the alignment. The remaining approximately 4.1 miles would follow the property line between private landowners to the north, and State of Colorado-owned lands associated with the Fort Lewis Agriculture Test Center to the south. Overall, at least 12 private land parcels and four home sites would be affected by the haul road. The four home sites would be within 0.25 mile of the haul road.

From an economics stand point, the TIA estimated that the 20-year OPC for this alternative would be around \$19,401,710. In the Mine Engineers, Inc. assessment (Exhibit 29 in the LPC Staff Report), Mine Engineers, Inc. characterized this alternative as “low relative capital cost” and “medium/high relative operating cost.” This assessment was based on GCC contracting “off-highway trucks” that have individual capacity from “50 to 250 tons depending on type of units available. Typical capacity would be about 100 tons.” This compared to the current “over-the-road” trucks used that haul about 28.5 tons per load. An additional problem associated with using larger off-highway trucks to move coal along a designated haul road to SH 140 is the need to develop loading facilities at either end of the haul road. This potential additional cost was not calculated in the TIA as contracting or purchasing off-road trucks with a 50 to 250-ton payload is not economically or logistically feasible under current production or relative to the current life of the mine (with or without the proposed lease modification).

As summarized in the TIA, developing a dedicated haul road with or without a conveyor system (Alternative 7) would require negotiations with property owners including the State of Colorado for a ROW and would likely take 4 to 5 years before construction could commence (if the road and facility could be permitted). Furthermore, the substantially higher cost for these options would also require that the life of the mine was secured for 25 to 30 years to allow sufficient time to recover the additional investment which is infeasible because the proposed lease modification and permit revision would only authorize coal mining until approximately 2024. Accordingly, the reasons for eliminating this alternative include the following:

- Economically infeasible;
- Logistically (from a timing perspective) infeasible, that this alternative could facilitate the project purpose and need.

Alternative 7 – New Haul Road with Conveyor

This alternative would utilize a newly constructed haul road (approximately 5.3 miles) across State of Colorado and private lands. Coal would be transported by conveyor from the existing load-out to a new load-out constructed at the top of the mesa (approximately 0.7 mile). Transport trucks would receive at the new load-out and haul via the new haul road. The new haul route would tie into the County roadway approximately 0.2 mile from intersection SH 140 and CR 120. With the additional development of a loading facility close to SH 140, it is assumed that the ground disturbance would be similar to Alternative 6. A continuously operating conveyor taking coal from King II to a loadout on the top of the mesa south of the facility would likely introduce a new noise source to the area that would be audible at distances beyond that which current operations can be heard (refer to Alternative 9).

The reasons for eliminating this alternative are similar to those associated with Alternative 6. The difference being that OPC costs would be substantially higher (refer to Table 2-7 Comparison of Alternatives).

Alternative 8 – Coal Conveyor

This option utilizes a newly constructed conveyor from the existing King II load-out to a new load-out located adjacent to SH 140 highway (approximately 6.0 miles in length). The new load-out would tie into the CR 120 approximately 0.2 mile from intersection of SH 140 and CR 120.

The reasons for eliminating this alternative are like those associated with Alternative 6 and Alternative 9 (aerial conveyor). The difference being that OPC costs would be substantially higher (refer to Table 2-7 Comparison of Alternatives) making this alternative economically infeasible.

2.3.5 Comparison of Coal Transportation Alternatives Evaluated in Detail

Table 2-7 summarizes the comparison of transportation alternatives completed as part of this analysis. Alternatives associated with utilizing county roads other than CR 120 N were eliminated primarily due to increased risks to public health and safety, and because safety and environmental impacts would be spread out impacting more area residents. Cost was also a factor considered, although was considered less important relative to safety and environmental factors.

The Mine Engineers, Inc. report (previously referenced Exhibit 29) contains a section entitled “General Economics of the King II Mine and Available Coal Resources.” This section highlights the fact that the viability or reasonableness of transportation alternatives at King II (or any mine) is dependent upon the available and secured, future reserves. To reiterate a statement made in the report:

“The issue that GCC Energy has is that they do not have permission to mine coal in the lease modification or the exploration area. This would leave them about 2.67 million tons to mine. This situation is a time problem given the schedule for permit modification assuming the lease modification can be issued within the next year.”

Time, available reserves, and the potential for cost recovery of investment is what drives all mining operational decisions; King II is no different. GCC was issued an exploration license by the BLM in 2015 (BLM 2015) to drill 24 exploration core holes north of the current and proposed modified lease areas. Should these exploration activities identify coal reserves that are economically viable to recover, it is possible that GCC would apply in the future for another lease modification or may pursue a larger lease acreage under a Lease by Application.

Table 2-8. Comparison of Transportation Alternatives Evaluated in Detail

Alt. No.	Transportation Alternative	Pros	Con	Environmental Considerations	Alternatives Analyzed in Detail throughout the EA
3	CR 120 North	Limited length of county roadway impacted Reduced number of affected residents	CR 120 N residents experience 100 percent of truck burden	4.7 acres of new disturbance No perennial/intermittent waterways crossed	Analyzed under the Proposed Action
4	Loop Route 1	Affected residents	Increased length of county roadway impacted	4.7 to 6.5 acres of new disturbance	Eliminated from

Preliminary Environmental Assessment

Alt. No.	Transportation Alternative	Pros	Con	Environmental Considerations	Alternatives Analyzed in Detail throughout the EA
		receive 50 percent of truck burden	Increased number of affected residents	1 intermittent waterway crossed	Detailed Analysis
5	Loop Route 2	Affected residents receive 50 percent of truck burden	Increased length of county roadway impacted Increased number of affected residents Increased congestion at SH 140 intersection near Fort Lewis Elementary School operations Alignment still adjacent to a few existing residential Increased noise exposure to mesa top residents Steep roadway grade from mesa top to gulch	10.2 to 11.6 acres of new disturbance. Four perennial/intermittent waterways crossed	Eliminated from Detailed Analysis
6	New Designated Haul Road	No truck traffic on segment of county road adjacent to residents Limited length of county roadway impacted	Creation & Construction of new roadway Permitting and approval of new roadway corridor Increased acreage impacted by roadway(s) Reduction and/or modification to ranch/agriculture operations Alignment still adjacent to a few existing residential. Increased noise exposure to mesa top residents Steep roadway grade from mesa top to gulch	39.5 acres of new disturbance. Views to the south of 4 home sites, impacted by haul road. Wildlife habitat fragmented (2.1 miles) Conversion of agricultural lands to industrial use	Eliminated from Detailed Analysis
7	New Haul Road with Conveyor	No truck traffic on county road adjacent to residents	Creation and Construction of new roadway Permitting and approval of new roadway corridor Increased acreage impacted by roadway(s)/conveyor Reduction and/or modification to ranch/agriculture operations	Similar to Alternative 6 but greater noise impacts	Eliminated from Detailed Analysis

Preliminary Environmental Assessment

Alt. No.	Transportation Alternative	Pros	Con	Environmental Considerations	Alternatives Analyzed in Detail throughout the EA
			Alignment still adjacent to a few existing residential. Increased noise exposure to mesa top residents Maintenance of conveyor system Constant noise of operating conveyor Construction of new load-out facility		
8	Coal Conveyor	No truck traffic on county road adjacent to residents.	Same as Alternative 7	Similar to Alternative 7	Eliminated from Detailed Analysis

3. Affected Environment and Environmental Consequences

This chapter presents the affected existing environment (i.e., the physical, biological, social, and economic values and resources) of the affected area as identified during internal and external scoping and presented in Chapter 1 of this EA. As described within this chapter, a variety of intensive resource inventories, studies, and assessments have been within the project area. Some of the studies were commissioned by GCC, others by LPC and yet others were required as part of ongoing regulatory requirements associated with continued operation and agency regulatory oversight of the King II operations. The resources included for analysis in this EA include air quality and climate; greenhouse gases and climate change; health and safety; geology and minerals; paleontological resources; soils; water resources; vegetation; wildlife; threatened, endangered and sensitive species; access and transportation; noise and vibration; visual resources; cultural resources; land use; socioeconomics, and environmental justice.

This chapter also analyzes the potential environmental impacts of the Proposed Action Alternative and the No Action Alternative. It is assumed that the Proposed Action would be carried out as described with the design features specified in Section 2.1.6. Where appropriate, additional mitigation measures are presented in this Chapter to further mitigate potential impacts. The potential impact of each alternative is evaluated for the affected area for each resource in terms of direct, indirect, and residual effects.

- Direct effects are those that are caused by an action in the alternative and occur at the same time and place as the action.
- Indirect effects are those that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

Resource impacts are discussed in terms of the context of the intensity, duration, and type of impact. The intensity and type of impact (or “effect”) is described as negligible, minor, moderate, or major and as adverse or beneficial, defined as follows:

- Negligible – An adverse or beneficial effect would occur, but would be at the lowest levels of detection.
- Minor – The effect would be noticeable, but would be relatively small and would not affect the function or integrity of the resource.
- Moderate – The effect would be readily apparent and would influence the function or integrity of the resource.
- Major – The effect would be substantial and would result in severely adverse or exceptionally beneficial changes to the resource.

The duration of impacts is generally in terms of “short term” which is less than 5 years, or “long term” lasting beyond 5 years. Cumulative impacts are presented in Chapter 4.0. The maximum estimated surface disturbance associated with the Proposed Action is less than 10.0 acres (4.7 acres associated with CR 120 improvements, and less than 5.0 acres associated with surface activities resulting from the mine permit revision).

3.1 Air Quality and Climate

3.1.1 Affected Environment

Air quality for any region is influenced by the amount of pollutants that are released within the vicinity and up wind of the region, and can be highly dependent upon the contaminants chemical and physical properties. Additionally, an area's topography or terrain (mountains and valleys) and weather, such as wind speed and direction, temperature, air pressure (the resulting turbulence), rainfall, and cloud cover can all have a direct influence on how pollutants accumulate, form, or disperse in the local environment. Transportation is another important consideration, as some pollutants can be transported far from their origin (e.g., ozone, secondary PM_{2.5}, mercury).

The affected area for the air quality analysis of the direct effects of the Proposed Action includes La Plata and Montezuma counties, although most direct air quality impacts will be limited to the vicinity of the mine itself (see Map A-5 in Appendix A). Indirect effects associated with coal transport and combustion occur at numerous locations. Most of the coal produced (approximately 83 percent) is transported by truck to a rail terminal in Gallup, New Mexico. Approximately 1,067,040 tons/yr. can be delivered to markets in the southwestern U.S. via the Gallup rail hub. Of the total, approximately 181,000 tons/yr. are delivered by truck to two GCC-owned and operated cement plants in Pueblo, Colorado (105,000 tons/yr.) and in Tijeras, New Mexico (76,000 tons/yr.) where the coal is used as a fuel source in the cement manufacturing process. Small coal volumes are also sold and delivered by truck to the Durango & Silverton Narrow Gauge Railroad (3,600 tons/yr.), the Cumbres and Toltec Scenic Railroad in Chama, New Mexico (1,500 tons/yr.), and locally (7,000 tons/yr.) for home heating. The remaining approximately 873,940 tons is delivered by rail from the rail terminal in Gallup, New Mexico to GCC-owned cement plants in northern Mexico (240,000 tons/yr.) and to variable cement facilities in Arizona and Texas.

Pollutants and Regulatory Framework

The Clean Air Act (CAA) and FLPMA require BLM and other federal agencies to ensure actions taken by the agency comply with federal, state, tribal, and local air quality standards and regulations. FLPMA further directs the Secretary of the Interior to take any action necessary to prevent unnecessary or undue degradation of the lands [Section 302 (b)], and to manage the public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" [Section 102 (a)(8)].

Criteria Air Pollutants

The USEPA has established National Ambient Air Quality Standards (NAAQS) for criteria pollutants, which include carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter emissions that are less than 10 microns or 2.5 microns in diameter (PM₁₀ and PM_{2.5}, respectively), sulfur dioxide (SO₂), and lead (Pb). Exposure to air pollutant concentrations greater than the NAAQS has been shown to have a detrimental impact on human health and the environment, and thus ambient air quality standards must not be violated in areas where the public has access. All the criteria pollutants are directly emitted from a variety of source types, except for ozone and the secondary formation of condensable particulate matter (PM_{2.5}). Ozone is chemically formed in the atmosphere via interactions of oxides of nitrogen

(NO_x) and volatile organic compounds (VOCs) in the presence of sunlight and under certain meteorological conditions (NO_x and VOCs are ozone precursors). Secondary PM_{2.5} forms when certain products of combustion (SO₂ and NO_x) cool sufficiently enough to condense and form a solid or aerosol that can then be measured via traditional monitoring methods. Condensable particulate matter is primarily ammonium sulfate and nitrate, which is formed in the atmosphere from reacting gaseous emissions of any available ammonia (NH₃). In the western U.S., organic carbon is generally the largest estimated component of PM_{2.5} by mass.

Ozone and secondary PM_{2.5} are formed in the atmosphere via complex chemical reactions that are spatially and temporally dependent. The current technical approach for analyzing these pollutants requires the development of a photo-chemical grid model to simulate the entirety of Earth's atmosphere. As part of the Colorado Air Resources Management Modeling Study (CARMMS), BLM conducted photo-chemical grid modeling within a domain including the direct effects study area. The CARMMS modeling was developed to examine potential cumulative air quality impacts from BLM authorized activities including the King II mine. Detailed information from the CARMMS modeling including, ozone and secondary PM_{2.5} formations, is addressed in the cumulative impacts discussion where sufficient data exists.

The CAA established two types of NAAQS:

1. **Primary standards** set limits to protect public health, including the health of "sensitive" populations (such as asthmatics, children, and the elderly).
2. **Secondary standards** set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

The USEPA regularly reviews the NAAQS (every 5 years) to ensure that the latest science on health effects, risk assessment, and observable data such as hospital admissions are evaluated, and can revise any NAAQS if the data supports a revision. The Colorado Air Pollution Control Commission and the New Mexico Environment Department Air Quality Bureau, by means of an approved State Implementation Plan (SIP), can establish state ambient air quality standards for a criteria pollutant that is at least as stringent as, or more so, than the NAAQS. Ambient air quality standards must not be exceeded in areas where the public has access. Table 3-1 lists the federal and state ambient air quality standards applicable to the project area.

Table 3-1. Ambient Air Quality Standards

Pollutant	Standard	Averaging Period	Level	Form
Carbon Monoxide	Primary	1-hour	35 ppm (40,000 ug/m ³)	Not to be exceeded more than once per year
		8-hour	9 ppm (10,000 ug/m ³)	
Lead	Primary and Secondary	Rolling 3-month average	0.15 ug/m ³	Not to be exceeded
Nitrogen Dioxide	Primary	1-hour	100 ppb (189 ug/m ³)	98th percentile, averaged over 3 years

Pollutant	Standard		Averaging Period	Level	Form
	Primary and Secondary		Annual	53 ppb (100 ug/m ³)	Annual mean
Ozone	Primary and Secondary		8-hour	0.070 ppm (140 ug/m ³)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particulate Matter	PM _{2.5}	Primary and secondary	24-hour	35 ug/m ³	98th percentile, averaged over 3 years
		Primary	Annual	12 ug/m ³	Annual mean, averaged over 3 years
		Secondary	Annual	15 ug/m ³	Annual mean, averaged over 3 years
	PM ₁₀	Primary and secondary	Annual	150 ug/m ³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide	Primary		1-hour	75 ppb (196 ug/m ³)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary		3-hour	0.5 ppm (1,300 ug/m ³)	Not to be exceeded more than once per year

Source: National – 40 CFR 50, Colorado – 5 Code of Colorado Regulations (CCR) 1001-14.

Notes: FR = Federal Register; mg/m³ = milligrams per cubic meter; µg/m³ = micrograms per cubic meter, ppb = parts per billion, PM_{2.5} = particulate matter emissions that are less than of 2.5 microns in diameter; PM₁₀ = particulate matter emissions that are less than 10 microns in diameter; ppm = parts per million.

Table 3-2 shows recent ambient air quality monitor data for potential pollutants of concern from monitors located in or nearby the affected area. The primary pollutant of concern from the Proposed Action is particulate matter (as determined from the emissions inventory presented below). The area monitors also show that ozone levels are relatively close to the new standard promulgated by EPA in 2015. All the monitoring data is from the USEPA's AQS Data Mart (<https://www.epa.gov/outdoor-air-quality-data>), and excludes exceptional events. The database contains ambient air pollution data collected by USEPA, state, local, and tribal air pollution control agencies, and from various federal land managers from thousands of monitors. Monitoring data is limited, and all pollutants are not monitored at all monitoring locations, and thus data for a particular pollutant may not be available for all portions of the affected environment. For example, monitoring data for Pueblo County, CO is limited to PM₁₀ and PM_{2.5}. The location of air quality monitoring stations within the project analysis area are depicted on Map A-5 in Appendix A. The closest ozone monitoring is in El Paso County to the north, which is going to be more highly influenced (if not totally) by the Colorado Springs metropolitan area versus Pueblo area emissions sources. Air quality within the project area and within the vicinity of the indirect sources is generally considered good, and all identified areas are currently in attainment status for all criteria pollutants.

Table 3-2. Ambient Air Quality Monitoring Data Trends

County	Pollutant (Standard)	2011	2012	2013	2014	2015	Percent of NAAQS
La Plata	NO ₂ (1 hour - ppb)	38	29	35	24	25	28
La Plata	NO ₂ (annual - ppb)	6.8	5.5	5.6	4.7	4.5	10
La Plata	O ₃ (8 hour - ppm)	0.077	0.069	0.072	0.067	0.068	99
Montezuma	O ₃ (8 hour - ppm)	0.071	0.068	0.069	0.065	0.066	95
La Plata	PM ₁₀ (annual - µg/m ³)	50	59	34	34	37	29
La Plata	PM _{2.5} (annual - µg/m ³)	4.4	3.9	4.0	3.8	3.3	31
Montezuma	PM _{2.5} (annual - µg/m ³)	6.1	5.6	6.1	5.2	4.5	44
La Plata	PM _{2.5} (24 hour - µg/m ³)	11	10	29	10	8	45
Montezuma	PM _{2.5} (24 hour - µg/m ³)	15	12	12	9	10	30
Pueblo	PM ₁₀ (annual - µg/m ³)	52	50	62	77	46	31
Pueblo	PM _{2.5} (annual - µg/m ³)	5.7	6.6	6.5	5.7	5.3	49
Pueblo	PM _{2.5} (24 hour - µg/m ³)	14	17	17	12	22	49
Bernalillo	NO ₂ (1 hour - ppb)	50	49	45	42	43	43
Bernalillo	NO ₂ (annual - ppb)	13	14	12	12	11	22
Bernalillo	O ₃ (8 hour - ppm)	0.076	0.077	0.07	0.064	0.068	96
Bernalillo	PM ₁₀ (annual - µg/m ³)	153	145	120	143	126	84
Bernalillo	PM _{2.5} (annual - µg/m ³)	6.4	11.3	8.7	7.4	6.7	63
Bernalillo	PM _{2.5} (24 hour - µg/m ³)	29	25	20	23	21	61

Notes: NO₂ = nitrogen dioxide; ppb = parts per billion; O₃ = ozone; ppm = parts per million; µg/m³ = micrograms per cubic meter, PM_{2.5} = particulate matter emissions that are less than of 2.5 microns in diameter; PM₁₀ = particulate matter emissions that are less than 10 microns in diameter.

Where multiple monitors for single pollutant exist within the same county, the monitor with the highest values is presented to the reader for the purposes of this EA. For each pollutant with a multi year standard (O₃, NO₂, PM_{2.5}), the percent NAAQS is calculated for the most recent three year averaging period (2013-2015).

As stated above, air quality for any given area is influenced in part by the amount of pollutants released within and upwind of the area of interest (i.e., emissions loading). The following National Emissions Inventory Data (EPA 2014) presented in Table 3-3 shows the amount of pollutants released within the project and indirect source areas. Combined with the available monitoring data shown above, readers can get a sense of the localized atmospheric response to the emissions loading occurring in the vicinity of the ambient air quality monitors. Despite this fact, the areas remain in attainment for all of the NAAQS. The NEI data by default includes all of the project and indirect source emissions (as shown below), as these sources and supporting emissions generating activities have been in existence for several NEI reporting periods (the NEI is produced every 3 years). Despite this fact, the areas remain in attainment for all the NAAQS.

Table 3-3. 2014 NEI Data (tons/year)

County	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	SO ₂	CO ₂	CH ₄	N ₂ O	HAPs
La Plata	8,538	1,490	29,432	7,756	21,658	111	409,893	148	11	4,154
Montezuma	5,589	931	24,349	1,318	10,175	45	234,355	80	6	4,836
Pueblo	7,474	1,696	18,668	12,015	28,797	3569	926,481	97	35	4,453
Bernalillo	42,225	6,024	28,719	17,326	73,744	649	3,028,848	315	73	4,948

The 2014 NEI data includes all emissions generating activities (sectors) within a reporting area (county). Sector examples include agriculture, industrial processes, fuel combustion, mobile sources/road dust, waste disposal fires, and other retail operations.

Note: The greenhouse gas data (CO₂, CH₄, N₂O) data is limited to mobile sources and fires only.

Hazardous Air Pollutants

Other common pollutants include air toxics, otherwise known as hazardous air pollutants (HAPs). HAPs are chemicals or compounds that are known or suspected to cause cancer or other serious health effects, such as compromises to immune and reproductive systems, birth defects, developmental disorders, or adverse environmental effects and may result from either chronic (long term) and/or acute (short term) exposure. CAA Sections 111 and 112 establish mechanisms for controlling HAPs from stationary sources, and the USEPA is required to control emissions of 187 HAPs. Ambient air quality standards do not exist for HAPs; however, mass-based emissions limits and risk-based exposure thresholds have been established as significance criteria to require maximum achievable control technologies under the USEPA promulgated National Emissions Standards for Hazardous Air Pollutants for 96 industrial source classes. The majority of the HAPs emitted from the King II Mine's operations are the result of the on and off road vehicle use. The largest components of the HAPs emissions from these sources are typically various benzene compounds and formaldehyde.

Greenhouse Gases

Another group of emissions that are commonly emitted are the GHGs. These gases include carbon dioxide (CO₂), methane (CH₄), Nitrous Oxide (N₂O), and several fluorinated species of gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Carbon dioxide is emitted from the combustion of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and also as a result of other chemical reactions (e.g., manufacture of cement). Methane is emitted during the production and transport of coal, natural gas, and oil. Methane also results from livestock and other agricultural practices and by the decay of organic waste in the natural environment and in municipal solid waste landfills. Nitrous oxide is emitted during agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste.

All of the different greenhouse gases have various capacities to trap heat in the atmosphere, which are known as global warming potentials (GWPs). GWPs can be expressed for several different time horizons to fully account for the gases ability to absorb infrared radiation (heat) over their atmospheric lifetime. The BLM uses the 100-year time interval since most of the climate change impacts derived from the available climate modeling studies is expressed toward the end of the century. Carbon dioxide has a GWP of 1, and so for the purposes of analysis a GHGs GWP is generally standardized to a carbon dioxide equivalent (CO₂e), or the equivalent amount of CO₂ mass the GHG would represent. Methane has a

current GWP estimated to be between 28 (gas alone) and 36 (with climate feedbacks), and Nitrous Oxide has a GWP of 298. As with the HAPs, ambient air quality standards do not exist for GHGs.

Emissions, Source Classifications, and Regulatory Authority

Emissions sources are generally regulated according to their type and classification. Essentially all emissions sources fall into two broad categories, stationary and mobile. Stationary sources are non-moving, fixed-site producers of pollution such as power plants, petro-chemical refineries, manufacturing facilities, and other industrial sites such as oil and gas production pads. Stationary facilities emit air pollutants via process vents or stacks (point sources) or by fugitive releases (emissions that do not pass through a process vent or stack). Stationary sources are also classified as either major or minor. A major source is one that emits, or has the potential to emit, a regulated air pollutant in quantities above a defined threshold. Stationary sources that are not major are considered minor or area sources. A stationary source that takes federally enforceable limits on production, consumption rates, or emissions to avoid major source status are called synthetic minors. The Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD) has authority under their USEPA-approved SIP to regulate and issue Air Permits for stationary sources of pollution in Colorado. The King II Mine has been issued an APCD permit for its operations (Permit Number; 09LP0202F dated September 3, 2013) that classifies the facility as a minor source.

Mobile sources include any air pollution that is emitted by motor vehicles, engines, and equipment that can be moved from one location to another. Due to the large number of sources, which includes cars, trucks, buses, construction equipment, lawn and garden equipment, aircraft, watercraft, motorcycles, etc., and their ability to move from one location to another, mobile sources are regulated differently than stationary sources. In general USEPA and other federal entities retain authority to set emissions standards for these sources depending on their type (on-road, off-road, and non-road), classification (light duty, heavy duty, horse power rating, weight, fuel types, etc.), and the year of manufacture or in some circumstances their reconditioning. Mobile sources are not regulated by the state unless they are covered under an applicable SIP (usually as part of an inspection and maintenance program).

Airshed Classes and the Prevention of Significant Deterioration

The overall health of any region's air quality is determined by monitoring for a pollutant at ground level and determining if the measured concentration is below the applicable standard's design value. Areas where pollutant concentrations are below the applicable standard are considered to be in attainment with the NAAQS. Areas that currently violate a standard are designated as nonattainment. Two additional subset categories of attainment exist for those areas where a formal designation has not been made, i.e., Attainment/Unclassifiable (generally rural or natural areas where no monitoring data exists), and for areas where previous violations of the NAAQS have been documented, but the pollutant(s) concentration no longer exceeds the NAAQS design value(s), i.e., Attainment/Maintenance areas. As previously stated, air quality in the project area and within the vicinity of the indirect sources is generally considered good, and all of the identified areas are currently in attainment status for all criteria pollutants.

Further, all geographical regions are assigned a priority Class (I, II, or III), which describes how much degradation to the existing air quality is allowed to occur within the area under the Prevention of Significant Deterioration (PSD) permitting rules. Class I areas are areas of special national or regional

natural, scenic, recreational, or historic value, and essentially allow very little degradation in air quality, while Class II areas allow for reasonable industrial/economic expansion. There are currently no Class III areas defined in the U.S.

Although the PSD rule is only applicable to major stationary sources of air pollution, a PSD increment analysis can provide a useful measure to determine how likely a new source of pollution (major or minor) could have a significant impact on regional air quality. A PSD increment is the amount of pollution an area is allowed to increase while preventing air quality in the airshed from deteriorating to the level set by the NAAQS. The NAAQS is a maximum allowable concentration "ceiling," while a PSD increment is the maximum allowable increase in concentration that is allowed to occur above a baseline concentration for a pollutant within the PSD area boundary. The baseline concentration for a pollutant is defined as the ambient concentration existing at the time that the first complete PSD permit application affecting the boundary is submitted. PSD applicable sources are required to provide an analysis to ensure their emissions in conjunction with other applicable emissions increases and decreases within an area will not cause or contribute to a violation of any applicable NAAQS or PSD increment. Significant deterioration is said to occur when the amount of new pollution would exceed the applicable PSD increment. An official PSD increment analysis is the sole responsibility of the regulatory permitting authority, any subsequent analysis performed for NEPA purposes will be used for informational purposes only.

The closest Class I areas to the project area include Mesa Verde National Park, about 14 miles to the west, and the Weminuche Wilderness Area located 25 miles to the northwest. For the known indirect sources of significant emissions (the Pueblo and Tijeras cement facilities), the closest Class I areas are the Great Sand Dunes National Park and Preserve in Colorado (approx. 80km to the west south west), and the Bandalier National Monument and Pecos Wilderness Area in New Mexico (approx. 70km north of the facility).

In addition, the analysis required for PSD permitting must include an assessment of impacts to surface waters, soils, vegetation (i.e., deposition, ozone), and visibility, also known as Air Quality Related Values (AQRVs). Measuring AQRVs is particularly important at federally mandated Class I lands, which include areas such as national parks, national wilderness areas, and national monuments. Class I areas are granted special air quality protections under Section 162(a) of the federal Clean Air Act, and the federal land manager for any such area is responsible for reviewing PSD actions to ensure their goals for undue degradation to the resources are not impeded.

Deposition is the process by which pollutants are removed from the atmosphere via mechanical and chemical processes. When air pollutants such as sulfur and nitrogen are deposited into ecosystems, they may cause acidification, or enrichment of soils and surface waters. Atmospheric nitrogen and sulfur deposition may affect water chemistry, resulting in impacts to aquatic vegetation, invertebrate communities, amphibians, and fish. Deposition can also cause chemical changes in soils that alter soil microorganisms, plants, and trees. Although nitrogen is an essential plant nutrient, excess nitrogen from atmospheric deposition can stress ecosystems by favoring some plant species and inhibiting the growth of others.

Visibility impairment or haze is caused when sunlight encounters tiny pollution particles in the atmosphere, and is either absorbed or scattered which reduces the clarity and color of what can be seen. The ability of a pollutant to cause various degrees of visibility impacts is primarily a function of its

physical size, and chemical composition and properties. Visibility can be expressed in terms of deciview or standard visual range (kilometers [km]). A change of one deciview is approximately a 10 percent change in the light extinction coefficient (i.e., light that is scattered or absorbed and does not reach the observer), which is a small, but usually perceptible scenic change.

Climate Baselines

The terrain of the affected area is varied, with lands to the west dominated by mesas and canyons of the Colorado Plateau and the remaining lands dominated by mountains, foothills, and river valleys of the San Juan Mountains. The normal temperature range for the area is 14 to 40 degrees Fahrenheit (°F) in January to 55 to 86°F in July. The Durango area receives an average annual precipitation amount of approximately 20.84 inches. Average annual wind resultants are generally from the north, west southwest, and east northeast at speeds of approximately 4 to 8 mph. The fastest winds originate from the west (Meteoblue 2017).

There is broad scientific consensus that human actions are changing the chemical composition of Earth's atmosphere. Activities such as fossil fuel combustion, industrialization, deforestation, and other changes in land use are resulting in the accumulation of trace GHGs such as CO₂, CH₄, N₂O, and several industrial gases in the Earth's atmosphere. The following synopsis of current climate change baseline information has been summarized from the [Intergovernmental Panel on Climate Change \(IPCC\)](#). The IPCC is the leading international scientific body under the auspice of the United Nations charged with reviewing and assessing the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. IPCC assessments provide rigorous and balanced scientific information that reflect a range of views and expertise to ensure an objective and complete assessment of current information. The work done by the organization is therefore policy-relevant and yet policy-neutral, never policy-prescriptive.

Between 1750 and 2011, cumulative anthropogenic CO₂ emissions emitted to the atmosphere were approximately 2040 ± 310 GtCO₂. About 43 percent of these emissions have remained in the atmosphere (880 ± 35 GtCO₂); the rest was removed from the atmosphere and stored in natural terrestrial ecosystems (plants and soils – 29 percent) and in the oceans (28 percent). Although CO₂ levels in the atmosphere have varied perpetually throughout Earth's history (along with corresponding variations in climatic conditions), industrialization and the burning of carbon based fossil fuel sources has caused CO₂ concentrations to increase measurably, from approximately 280 ppm in 1750 to 400 ppm in 2015. The rate of change has also been increasing. This fact is demonstrated by data from the Mauna Loa CO₂ monitor in Hawaii that documents atmospheric concentrations of CO₂ going back to 1960, at which point the average annual concentration was recorded at approximately 317 ppm. The record shows that approximately 70 percent of the increases in atmospheric CO₂ concentration since pre-industrial times (1750) occurred within the last 55 years. The trend corresponds to an increasing population and rising standards of living and modernization around the globe. From pre-industrial times to present, emissions from fossil fuel combustion and cement production have released 375 [345 to 405] GtC to the atmosphere (68 percent), while deforestation and other land use change are estimated to have released 180 [100 to 260] GtC (32 percent). Concentrations of CO₂, CH₄, and N₂O now substantially exceed the highest concentrations recorded in ice cores during the past 800,000 years. Since pre-industrial times the

estimated concentrations of CH₄ have more than doubled (722 ppb to 1,803 ppb), while N₂O concentrations have increased by a fifth (270 ppb to 324 ppb)

Scientists believe that increases in atmospheric GHG concentrations results in an increase in the earth's average surface temperature, primarily by trapping and thus decreasing the amount of heat energy radiated by the Earth back into space. The phenomenon is commonly referred to as global warming. Global warming is expected in turn, to affect weather patterns, average sea level, ocean acidification, chemical reaction rates, and precipitation rates, all of which is collectively referred to as climate change.

Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over time spans of decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, and sea level has risen. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the Northern Hemisphere, 1983–2012 was likely the warmest 30-year period of the last 1400 years (medium confidence). The globally averaged combined land and ocean surface temperature data as calculated by a linear trend, show warming of 0.85 [0.65 to 1.06] °C, over the period 1880 to 2012.

Ocean warming has dominated the increase in energy stored in the climate system, accounting for more than 90 percent of the energy accumulated between 1971 and 2010 (high confidence). On a global scale, the ocean warming is largest near the surface, and the upper 75 meters (m) warmed by 0.11 [0.09 to 0.13] °C per decade over the period of 1971 to 2010. More than 60 percent of the net energy increase in the climate system is stored in the upper ocean (0–700 m), and about 30 percent is stored in the ocean below 700 m (40-year period from 1971 to 2010). The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia (high confidence). Over the period 1901 to 2010, global mean sea level rose by 0.19 [0.17 to 0.21] m. It is very likely that the mean rate of global averaged sea level rise was 1.7 [1.5 to 1.9] mm yr⁻¹ between 1901 and 2010, 2.0 [1.7 to 2.3] mm yr⁻¹ between 1971 and 2010, and 3.2 [2.8 to 3.6] mm yr⁻¹ between 1993 and 2010, a trend that is increasing.

The driver for the buildup in heat within the climate system is best described in terms of radiative forcing (RF). The term describes the energy balance that will occur (i.e., heating (+) or cooling (-)) in units of W m⁻². The total anthropogenic RF for 2011 relative to 1750 was 2.29 [1.13 to 3.33] W m⁻² (includes both heating and cooling parameter estimates). For well mixed GHG's the total positive forcing is estimated to be 2.83 [2.54 to 3.12] W m⁻². The largest contribution to total radiative forcing since 1750 is caused by the increase in the atmospheric concentration of CO₂. Emissions of CO₂ alone caused an RF of 1.82 [± 0.19] W m⁻² (64 percent), while CH₄ caused an RF of 0.48 [± 0.05] W m⁻² (17 percent). The data highlights methane's important role as a potent greenhouse gas, given its RF value in relation to its atmospheric loading trend, approximately 556 Tg yr⁻¹ (64 percent anthropogenic, 36 percent natural) and relatively short atmospheric lifetime (12 years). N₂O has the third largest forcing of the anthropogenic gases, at 0.17 [± 0.03] W m⁻² (6 percent). Collectively the three GHG's of concern account for approximately 87 percent of the positive forcing within the climate system.

According to the 2014 Climate Change in Colorado synthesis report (prepared by the CDNR Water Conservation Board), statewide annual average temperatures have increased by 2.0°F and 2.5°F over the past 30 and 50 years respectively. Warming trends have been observed over this period in most parts of the state, and show that daily minimum temperatures have warmed more than daily maximum temperatures. Additionally, temperature increases have occurred in all seasons. No long-term trends in

average annual precipitation (30-50 years) have been detected across Colorado, although since 2000 the state has experienced below-average annual precipitation and snow pack. The warming trends have contributed to an earlier shift in snowmelt and peak runoff timing in spring by approximately 1 to 4 weeks.

3.1.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The BLM has developed a statewide Air Resource Protection Protocol, which is a strategy to address air resource concerns consistently across district and field offices (USDI/BLM 2013). This protocol is followed in this EA to evaluate potential impacts to air resources. Under the Proposed Action, the King II Mine would continue to produce and transport coal at levels below the maximum allowable production limit of 1.3 million tons per year (limit is per CDPHE air quality Permit No. 09LP0202F, Final Approval – Modification 1, Condition No. 2, dated 9/3/2013). Nonetheless, for this air analysis, emissions calculations are based on the burning of 1.3 million tons per year until 2023.

Direct Emissions

With the exception of particulate matter, all of the directly emitted criteria pollutants from the King II Mine’s operations are from fuel combustion sources, such as mobile mining equipment, haul trucks, and stationary sources such as emergency generators, heaters. In addition, coal mine methane (CMM) may be directly emitted by the ventilation air handling system required by MSHA to reduce the combustion/explosion potential of the mine’s underground atmosphere. Due to the area’s naturally low occurrence of gas in the coal formation, overburden, surrounding strata as well as GCC’s room and pillar mining methods, this is the only methane ventilation system required at the King II Mine. The ventilation air methane emissions estimates are based on a single methane concentration measurement (the highest ever recorded by MSHA at the mine was 0.02 percent) and the main vent fan air flow used by CDPHE to estimate vent particulate matter emissions. Stationary sources (including any area and fugitive emissions) at the King II Mine are regulated by CDPHE and are authorized by APCD permit number 09LP0202F. As shown in Table 3-4, the permit provides thresholds and requirements for the mine’s air emission sources. Several pieces of stationary equipment at the King II Mine are also covered by New Source Performance Standard Subpart Y, which specifies emissions standards for coal preparation plants. The APCD permit only covers source of particulate matter. None of the other pollutants emitted by stationary sources are generated in quantities significant enough to warrant permitting.

Table 3-4. CDPHE Permit 09LP0202F Emissions

Source ID (AIRS Point)	PM₁₀ (tons/yr.)	PM_{2.5} (tons/yr.)	Emissions Type
001	16.0	2.1	Fugitive
002	0.4	0.1	Point
003	0.2	0.0	Point
004	10.3	1.6	Point

Source ID (AIRS Point)	PM ₁₀ (tons/yr.)	PM _{2.5} (tons/yr.)	Emissions Type
005	0.7	0.1	Point
010	0.5	0.0	Point
011	1.0	0.1	Fugitive
Totals	12.1	1.8	Point
	17.0	2.2	Fugitive

Mobile sources at the facility include underground mining equipment, listed under source classification code (SCC) 2270009010, aboveground construction equipment identified under SCC 2270002000, as well as light duty gasoline trucks and light and heavy duty diesel trucks. The underground mining mobile sources are specialized equipment designed to function in the unique environment of an underground mine. Above ground mobile sources would include heavy construction equipment used for material handling and stockpile management. To develop appropriate emissions estimates for the mobile sources the BLM utilized USEPA’s Nonroad Model (2008b) to generate SCC-specific emissions factors (grams per horsepower-hour) for Colorado. The BLM used estimated thermal efficiencies of the equipment engines along with the fuel data from the mine to provide for the overall emissions estimates. This data is assumed to be reasonably correlated to production volumes for the year the data was given (average of 2011 and 2012), such that the BLM can provide a projection of emissions associated with the maximum expected production rates given for the Proposed Action.

Table 3-5 summarizes the direct emissions estimated from permit exempt stationary and mobile sources for the Proposed Action alternative.

Table 3-5. Unpermitted Source Emissions (max tons per year)

Sources	PM ₁₀	PM _{2.5}	CO	NO _x	VOC	SO ₂	CO ₂	CH ₄	N ₂ O
Mine Ventilation (ventilation air methane) ¹	NA	NA	NA	NA	NA	NA	NA	503	NA
Misc. Permit Exempt Equipment	0.39	0.39	5.04	10.35	0.66	0.13	1,018	0.05	0.00
Underground Mining Equipment (mobile)	1.18	1.148	1.808	6.968	8.278	0.118	522.93	0.03	0.01
Surface Mining Equipment (mobile)	0.28	0.27	0.34	1.81	3.87	0.06	281.58	0.01	0.01
Total	1.85	1.81	13.82	22.50	12.81	0.30	1,823	503.09	0.02

¹The VAM is hardwired; therefore, there are no direct emissions from the VAM other than the CMM.

Indirect Emissions

Indirect air emissions from the Proposed Action were estimated for activities that are reasonably foreseeable, and include; coal transport (where a destination and quantity of delivered coal is known), CR 120 improvements (construction), mine worker commutes, and downstream coal combustion.

CR 120 Improvements

The indirect emissions from mobile sources were estimated using USEPA MOVES model emissions factors and BLM’s Emissions Modeling Inventory Tool (EMIT - BLM 2017). The results include fugitive dust from travel on paved and unpaved roads and vehicle exhaust emissions. Data from Tables 1-1, 2-2, 2-4 and that applicable design features from Section 2.1.7 (speed control, dust suppression, daily traffic restrictions, etc.) was used as input to populate the Emissions Modeling Inventory Tool and obtain the emissions estimates. Several conservative assumptions had to be made to quantify the CR improvement and worker commute emissions since little is actually known about these sources or the activity parameters that would drive emissions. For worker commutes it is estimated that 153 employees would be required to sustain the estimated maximum production rate (scaled from production/employee data in Table 1-1). It is further assumed that the average commute distance would be 50 miles (round trip) and that employees on average would make 1.25 trips per day, 6 days a week, for 52 weeks a year. For the CR improvements, it was assumed continuous construction activities that would last for approximately 30 days (non-consecutive). It was assumed daily operations of 10 pieces of off-road construction equipment of various sizes that averaged to 250 horsepower each. All equipment was assumed to operate at 50 percent capacity for 10 hours a day over the activity period. This equipment would be used to widen and grade the road, provide for any base improvements and asphalt paving operations. It was assumed a minimum of 1” of road base improvement and 3” of asphalt to support LPC requirements. It was estimated that roughly 400 haul trucks (20 tons each) would be needed to support equipment transport, fueling, base aggregate and asphalt deliveries, as well as watering/dust abatement operations during road construction. It was estimated that 120 loaded coal trucks would leave the King II mine per day, 6 days a week for 52 weeks a year. Coal haul truck emissions were estimated for transport to the Pueblo, Colorado and Tijeras, New Mexico GCC cement facilities, the Durango & Silverton Narrow Gage Railroad, the Cumbres and Toltec Scenic Railroad in Chama, New Mexico and to the Gallup BNSF rail hub. Rail emissions associated with the transport of coal from the Gallup BNSF rail hub were not estimated because the exact transportation routes are unknown and because the BNSF does not make dedicated coal hauls of GCC coal. Rather, GCC produced coal is hauled as part of regularly scheduled east-west cargo freight deliveries. Table 3-6 quantifies the indirect emissions from mobile sources.

Table 3-6. Indirect Mobile Source Emissions (max tons/year)

Sources	PM ₁₀	PM _{2.5}	CO	NO _x	VOC	SO ₂	CO ₂	CH ₄	N ₂ O
Worker Commutes (exhaust - phase 5, fugitive dust - phase 4)	17.73	1.81	20.97	2.22	1.55	0.02	997	0.1	0.05
Coal Haul Trucks (exhaust - phase 5, fugitive dust - phase 4)	39.91	8.68	4.33	89.26	26.30	0.26	37,045	1.01	0.05
CR 120 Improvements – Heavy Equipment (fugitive dust & wind erosion from disturbance)	3.54	2.54	NA	NA	NA	NA	NA	NA	NA

Sources	PM ₁₀	PM _{2.5}	CO	NO _x	VOC	SO ₂	CO ₂	CH ₄	N ₂ O
CR 120 Improvements – Heavy Equipment (exhaust)	0.16	0.15	0.74	1.77	0.19	0.06	298	0.00	0.01
CR 120 Improvements – Trucks (exhaust)	0.01	0.01	0.42	0.14	0.03	0.00	49.31	0.00	0.00

Note: Phase 4 represents the maximum potential generation for fugitive dust as CR 120 is not yet paved, while Phase 5 represents the maximum generation of mobile source emissions. To provide a conservative estimate maximum fugitive dust and mobile source emissions are combined regardless of which phase each will occur in. Detailed information on phases can be found in Section 2 Proposed Action and Alternative(s).

Downstream Emissions

As described in the Proposed Action, GCC Energy supplies approximately 193,100 tons (18 percent of max production) of coal to two cement kilns and two narrow gauge railroads directly, while the remainder of the coal is sold (via the Gallup, NM rail terminal) to GCC cement plants in Mexico (240,000 tons/yr.) and to variable cement facilities in Arizona and Texas (82 percent of max production). Both cement kilns operate under state issued air permits, and both facilities are subject to Title V permitting requirements (i.e., they are classified as major stationary sources).

The GCC Rio Grande Pueblo plant (Table 3-7) has a permit (#98PB0893) condition that limits annual firing fuel (coal and tire derived fuel [TDF]) to no more than 198,418 tons on a rolling 12-month basis. King II currently supplies 105,000 tons of coal annually (approx. 53 percent by weight) to the facility and expects this to remain constant going forward. The permit lists total site wide emissions limits for the facility, that cover numerous emissions sources and activities, including; the kiln, quarry operations, material transfer and storage, and other facilities equipment. The facility also has additional 12-month rolling fuel use limits for pipeline quality natural gas and propane of not more than 381,373 MMBtu. The cement kiln itself is subject to a multitude of control technologies and monitoring required under maximum achievable control technology LLL (the maximum achievable control technology for Portland cement manufacturing). For the purposes of this EA the agencies assume that the 53 percent primary fuel stock supplied by the King II mine is an appropriate surrogate for permitted emissions at the Pueblo facility. The King II coal feeds the kiln, without which the purpose of the plant would be void and thus it is reasonable to delineate the total site emissions required to support the kiln operations as attributable to the coal itself. The differences in the fuel compositions used at the Pueblo facility will provide for varying emissions profiles. The available literature suggests that on average TDF can provide for lower particulate matter emissions on an energy density basis. None of the other criteria pollutants were shown to have a statistically significant difference for TDF firing vs. traditional fuels (including coal). The agencies note that some of the literature suggests that CO₂ emissions from TDF would be reduced by 8-20 percent compared to traditional fuels. However, for this analysis we find the range of potential reductions (from tire types and computational methods) and equipment and firing practices associated with using TDF in the literature to be highly variable and thus too speculative to support any further delineation of emissions at the Pueblo facility (TDF 2017). Where the literature suggests a pollutant would be solely attributable to coal, that value will be disclosed (e.g., mercury [Hg]).

Table 3-7. Pueblo Facility King II Emissions (max tons/year)

PM ₁₀	PM _{2.5}	CO	NO _x	VOC	SO ₂	CO _{2e}	Hg (lbs/yr)
221	217	588	604	52	505	597,148	25

The GCC Rio Grande Tijeras plant (Table 3-8) has similar operations to that of the Pueblo facility and is covered under NM Title V permit #532. The permit and underlying construction permits provide for all of the same source requirements (controls and monitoring) as the Pueblo facility and is publicly available from the Albuquerque Environmental Health Department for review.

Unlike the Pueblo facility the Tijeras kiln is fired entirely on coal (a minor amount of natural gas is used for startup) and the kilns themselves do not appear to have a fuel throughput limits, but rather performance based clinker production limits (33.7 tons/hour). Similarly, the permit does not contain explicit limits for GHG and mercury emissions, but does provide for mercury monitoring requirements and performance based standards. Facility GHG emissions were obtained from the USEPA’s Facility Level GHG Tool (FLIGHT) for 2014. The data and methodology (subpart C, equation C-2a) that GCC utilized to report the facility’s GHG emissions allowed for back calculating the total coal throughput for the facility and the total clinker produced for the reporting year. We then obtained the facilities reported 2014 criteria emissions from USEPA’s inventory database to use as correlation parameters and provide for the upper level of emissions that the shipped Proposed Action coal would produce from the facility. To estimate the Hg emissions, the BLM multiplied the 2014 production data (derived from FLIGHT metrics) by the permit listed performance standard of 55 pounds (lbs.) of Hg per MM- tons of clinker produced. All of the 2014 emissions were corrected to account for the variance between the report year, and Proposed Action coal use levels.

Table 3-8. Tijeras Facility King II Emissions (max tons/year)

PM ₁₀	PM _{2.5}	CO	NO _x	VOC	SO ₂	CO _{2e}	Hg (lbs/yr)
135	66	790	772	79	21	167,662	10

Cement Production

The chemical reactions involved in the manufacture of clinker inherently produce or liberate CO₂ in the process. Unfortunately, USEPA’s FLIGHT data only provides speciated data for the Tijeras facility. The Pueblo facility is monitored by CEMS (continuous emissions monitoring system) as a single stream and would therefore include both the combustion and reaction related emissions. It is unclear if the CDPHE permit includes the calcification emissions in the limits (and by extension the emissions shown in Table 3-6 above), but based on the Tijeras calculations there appears to be a high likelihood that it does. For the purposes of disclosure, we are presenting calcification emissions for both facilities relative to the Tijeras facility given that the chemistry for clinker production is mostly equivalent regardless of where it is produced. The total CO₂ emitted from the calcification reaction is estimated to be 697,393 tons based on the relative production rates that the 181,000 tons of Proposed Action coal shipments (delivered to Pueblo and Tijeras) would provide in the maximum year.

General Combustion

This EA assumes that the remaining portion of the maximum year coal to be shipped (879,040 tons) from the King II mine is eventually combusted. Approximately 5,100 tons per year is combusted in two regional narrow gauge railroads. We assume that the remainder will be combusted in well controlled facilities, but potentially anywhere in northern Mexico and in the southwestern U.S. As can be clearly seen from the differences in the two GCC Rio Grande facilities detailed above, different plant configurations, locations, permitting authorities, age, etc., can have vastly different emissions for a relatively similar quantity of the same fuel. Given that the agencies have no way of knowing where King II coal will be combusted from year-to-year, or in what quantities (with the exception of coal delivered directly to GCC owned cement plants in Tijeras, and Pueblo) we are not providing any other criteria or hazardous air pollutant emissions estimates from *specific* locations in Mexico or the southwestern U.S.

Additionally, there currently is not a reliable method for producing emissions inventories of criteria pollutant from rail and residential coal combustion. The available emissions factors from EPA assume larger industrial facilities that employ a variety of firing practices and are typically well controlled. It is reasonable to assume that the rail and residential unit are simple stoker fired and are not controlled. The minor quantities of coal utilized by these sources is not expected to contribute to localized impacts to air quality, especially from the rail sources where emissions are spread out along the length of the line (tracks) in what is assumed to be a linear or uniform fashion. Further these emissions are temporally disperse, such that they would not accumulate for a given unit of time in any one area like stationary source emissions could under certain meteorological conditions. However coal analysis data was received that allowed for the estimation of mercury emissions for the Durango Silverton and Chama Narrow Gauge Rail Roads. The analysis data shows that the Hg emissions from the anticipated coal combustion would be 0.28 and 0.12 lbs/yr for each railroad respectively.

We can however produce reasonable estimates of GHG's from these sources (Table 3-9) given that there are far fewer parameters that affect those emissions compared to the criteria and hazardous air pollutants. To provide for these estimates the GHG emissions factors published by USEPA for use in their GHG reporting regulations were used (USEPA 2014). Additionally, the estimated calcination CO₂ emissions for the balance of the coal that is assumed to be combusted in other cement production facilities (approximately 880,940 tons per year). For this calculation the derived emissions factor from the Tijeras facility was used (from examination of EPA's FLIGHT data, metric tons of CO₂ per metric tons of clinker produced ~ 0.33). This was necessary due to the uncertainty of the fraction of lime contained in other facilities feedstocks, where the amount of lime directly affects the ratio of CO₂ liberated during production. Because the efficiency with which these other facilities can produce clinker from the amount of coal consumed, the coal to clinker ratio from the Tijeras facility was used to provide an approximate estimate. Again, this was necessary because the agencies do not know how much clinker these other facilities produce to allow the derived emissions factor to be applied directly.

Table 3-9. King II Remaining Coal Combustion Emissions (max tons/year)

CO ₂	CH ₄	N ₂ O	CO _{2e}
4,795,915	184,259	26,801	17,941.933

Direct Air Quality Effects

The region surrounding the Proposed Action alternative area is currently designated as attainment for all criteria pollutants. The attainment designation means that no violations of ambient air quality standard have been documented in the area. Air quality effects are measured by determining whether the area would continue to be in attainment or not.

A detailed air quality assessment of the mine was recently conducted by APCD to support permitting of the King II Mine at currently authorized production rates. According to APCD staff, the mine was not required to provide any dispersion modeling to support their application since their allowable emissions are so low (personal communication with Mr. Charles Pray – CDPHE Permitting Engineer, 3/7/14, re: 09LP0202F.FA1).

The King II Mine is primarily a source of PM₁₀ emissions. More so than other pollutants, PM₁₀ is a localized pollutant where concentrations can vary considerably. The proximity of any receptor to the mine and the area's topography between the mine and receptor will greatly influence the level of air quality impacts associated with PM₁₀. Design Feature 1a describes the measures implemented by GCC to minimize direct PM₁₀ emissions from mine facilities; therefore, PM₁₀ impacts would be minor and short-term.

With respect to potential ozone formation, the mine is not a significant source of precursors (NO_x and VOC). When compared to the National Emissions Inventory, precursor totals for La Plata County in 2014 shown in Table 3.2 above, the mine's emissions represent only 0.3 and 0.1 percent of the NO_x and VOC emissions respectively (excluding biogenic emissions from the NEI). Given that the mines precursor emissions are so low and that the photochemical reactivity potential of methane in the troposphere is considered negligible (40 CFR 51.100 (s)), the mine's operations are not expected to contribute significantly to any regional ozone formation potential. However, the BLM did analyze ozone culpability all of the mines that produce federal minerals in Colorado cumulatively, via the Colorado Air Resources Management Modeling study (CARMMS). The CARMMS model, the analysis scenarios, and results are all described in the cumulative impacts section below. The CARMMS model was also used to assess PM_{2.5} impacts (including secondary formation) from the mines producing federal minerals in Colorado.

Where a PSD source is located near a Class I airshed (within 30 miles) the AQRV's thresholds set by the applicable Class I controlling agency must be assessed to determine if an adverse impact on the area is likely to occur. Although the King II Mine is within 30 miles of two Class I areas, it is not a major PSD source. The King II mine is classified as minor source of emissions, and according to CDPHE it was not required to provide any air modeling to support its permit application. Given that the mine has very low emissions of AQRV impacting pollutants and that the primary pollutant of concern (particulate matter) is a highly localized pollutant (due to gravitational settling and topological impaction), any potential Class I area impacts are expected to be minor, with respect to direct impacts. The CARMMS analysis did consider AQRV impacting pollutants, which are discussed in section 4.3 Cumulative Impacts.

The miscellaneous facility equipment would be the only stationary sources to generate HAP emissions at the mine. The total HAP emissions from all sources at the mine is approximately 6.1 tons, and is based on the ratio of HAPs to VOC in EPA's NEI data for Non-Road Diesel Equipment for La Plata County. These source types represent the majority of the VOC emissions generated by the mine (see Table 3.5). A

majority of the mine's HAP emissions (68 percent) would be exhausted through the mine shaft ventilation system (this is true for the equipment's criteria emissions as well), and as such they are heavily diluted by the volume of make up air required to keep the mine's atmosphere free from methane that could accumulate in the underground environment as a result of exposing and removing the coal. Additionally, the mine shaft exhaust air has an initial inertial flux (i.e., vertical plume buoyancy, mechanically induced via the mine vent shaft fan) at the surface which provides for increased dispersion potential as compared to the surface based equipment exhaust. The EPA provides Regional Screening Level (RSL) values (https://www.epa.gov/sites/production/files/2016-06/documents/resair_sl_table_run_may2016.pdf) for diesel emissions (as a whole); including a Reference Concentration (RfC), defined as an estimate of a daily inhalation exposure to the human population (including sensitive groups) that is likely to be without an appreciable risk of deleterious effects during a lifetime ($5\mu\text{g}/\text{m}^3$). Given the minor magnitude of these emissions (including the rate they could be expected to be emitted, about 0.5 grams per second cumulatively across the facility—total HAP grams divided by 3000 operating hours (assumed minimum), divided by 3600 seconds per hour), and the overall dispersion expected to occur within the facility prior to reaching a fence line, it is highly unlikely ambient air quality would be impacted to a degree that the public (for which the nearest potential receptor is about a half-mile away) would experience an elevated exposure risk based on EPA's exposure assessment guidelines. Therefore impacts associated with HAP emissions would be negligible and short term.

According to the U.S. Global Change Research Program (2009), global warming is unequivocal, and the global warming that has occurred over the past 50 years is primarily human-caused. Standardized protocols designed to measure factors that may contribute to climate change, and to quantify climatic impacts, are presently unavailable. As a consequence, impact assessment of specific impacts related to anthropogenic activities on global climate change cannot be accurately estimated. Moreover, specific levels of significance have not yet been established by regulatory agencies. Therefore, climate change analysis for the purpose of this environmental assessment within this air quality section is limited to accounting for GHG emissions changes that would contribute incrementally to climate change. Qualitative and quantitative evaluations of potential contributing factors are included where appropriate and practicable.

Approximately 10.5 percent of U.S. emissions of methane come from underground coal mining activities (USEPA 2010). Based upon the national and state inventories of GHG emissions (CDPHE 2014, USEPA 2015b), the total CMM emissions in 2009 and 2005 were 70.10 teragrams (Tg) (Tg = one million metric tons), and 4.9Tg on a CO_2e basis for the U.S. and Colorado, respectively. Estimated total CMM emissions from the Proposed Action are approximately 593.3 metric tons of CO_2e (at full authorized production) or 0.012 percent and 0.0008 percent of the total calculated CO_2e emissions of CMM from Colorado and the U.S. Based on BLM's analysis, total annual GHG emissions from the Proposed Action (direct and indirect for maximum production levels) are estimated to be 0.5 Tg on a CO_2e basis. This represents approximately 0.0006 percent of the US's GHG emissions (USEPA 2015b).

Regardless of the accuracy of emission estimates, predicting the degree of impact any single emitter of GHGs may have on global climate change or on the changes to biotic and abiotic systems that accompany climate change, is not possible at this time. As such, the controversy as to what extent GHG emissions resulting from continued mining may contribute to global climate change, as well as the accompanying changes to natural systems cannot be quantified or predicted. The degree to which any observable

changes can, or would be, attributable to the Proposed Action cannot be reasonably stated at this time. Given the cumulative nature of the GHG and climate change issue, and a lack of project specific impacts, please see the cumulative section below for a general description of anticipated changes and impacts.

Methane emissions associated with the King II Mine are anticipated to be very low when compared to other Colorado underground coal mines. The geology of the surrounding strata and composition of the coal itself produce very little emissions during room and pillar mining. Implementation of the Proposed Action is estimated to contribute a maximum of 15,915 tons of directly emitted CO₂e annually and 69,506 tons for all of the recoverable coal estimates within the lease modification area. This is a minor fraction of the GHG emissions that will be generated over the same period within the affected environment area. For example, the 2014 NEI data shows that CO₂ emissions alone for La Plata County were 385,343 tons (excluding prescribed and wildland fire). On an annual basis, the mines CO₂e emissions are approximately 4.1 percent of just the counties CO₂ emissions. Given the nature of the climate change issue (i.e., it is a cumulative problem) the impacts (disclosed in the cumulative section below) would be expected to be the same with or without the Proposed Action. This action will incrementally contribute GHG emissions to the biosphere, which could contribute to climate change.

Indirect Air Quality Effects

Indirect air quality effects from the Proposed Action are generally related to coal transport and combustion, and to a lesser extent the CR 120 improvements. The mobile source emissions are a continuation of an existing activity, are relatively small and spread out geographically, such that they are not anticipated to cause any concerns to local or regional air quality. Several thousand more vehicles travel these routes daily and air quality is being maintained. Additionally, mobile source emissions for the affected area have been evaluated on a regional scale by the Four Corners Air Quality Group. This evaluation and forecast for the Four Corners region, including the direct affected area and the rail terminal location, found that emissions levels forecast for a 2018 scenario would not exceed the NAAQS (Environ 2009). Given that the mobile source emissions levels from the Proposed Action are incorporated into the 2018 scenario, these modeling results support the conclusion there would be minor and long-term indirect air quality effects for the Proposed Action, within La Plata and Montezuma counties.

The primary pollutant of concern for these sources is the fugitive dust they could generate on the unimproved portions of the CR 120 (approximately 3.9 miles). However, the planned improvement to the road, along with the design features to be implemented in the interim mean that there is little chance that these emissions could become a nuisance to area residence. Dust had previously been identified as a concern by property owners along CR 120. The BLM performed a screening assessment to estimate ambient PM₁₀ and PM_{2.5} concentrations along CR 120 for the Proposed Action using the emissions estimates shown in Table 3-5 (heavy duty, unpaved). The results from the screening tool are maximum ambient PM₁₀ or PM_{2.5} concentration levels estimated within a 0.6-mile (1 km) radius from the centerline of CR 120, and include a background concentration that was obtained from area monitoring data. The tool produces ground level concentration estimates along a 500-meter length of roadway where emissions are time varied to only occur during the daylight hours (concentrates emissions). As shown in Table 3-10, the levels are well within the form of the standard.

Table 3-10. Particulate Matter Concentrations Estimated for CR 120

Case/Emission level	PM ₁₀	PM _{2.5}	PM _{2.5}	PM ₁₀	PM _{2.5}	PM _{2.5}
	24-hour	24-hour	Annual	24-hour	24-hour	Annual
	µg/m ³			Percent of NAAQS		
CR 120 (unpaved w/design features)	112.86	18.17	7.04	75	52	59

Impacts from CR 120 improvements would be minor and short-term and are anticipated to be well controlled (i.e., no visible dust plumes, or offsite transport). These emissions are well below those modelled for haul truck traffic and as such they are not expected to cause any significant impacts.

The combustion related indirect effects from stationary sources are either unknown or are currently regulated by agencies with authority to set limits and conditions to provide for compliance with the applicable CAA regulations. Our analysis is limited to disclosing emissions and the permits where all the compliance obligations for the known sources is contained. The Proposed Action is not expected to change daily operations or the compliance obligations of these facilities (or the unknown ones for that matter). The Proposed Action would essentially represent a continuation of currently authorized activities. Any new activities as a result of this coal being made available are not foreseeable. The monitoring data for the known downstream facilities (as reported in AQS Data Mart, USEPA 2017) shows that air quality has been, and could be expected to continue to meet the NAAQS and therefore is considered to have minor, long-term impacts.

With respect to the indirect source’s impacts on climate change, the agencies do not possess appropriate tools or analytical methods to assess how these emissions could potentially affect the climate at local, regional, or global scales. Given the nature of the climate change issue (i.e., it is a cumulative problem) the impacts (disclosed in the cumulative section below) would be expected to be the same with or without the Proposed Actions effects on indirect sources. These indirect sources will incrementally contribute GHG emissions to the biosphere, and would contribute to climate change.

Mitigation Measures and Residual Impacts

None. All of the analysis and impacts are based on design features or regulated (i.e., controlled) activities, and none of the impacts have been deemed significant enough to require any additional mitigation

3.1.3 Impacts from the No Action Alternative

Direct and Indirect Impacts

Under the No Action Alternative, the mine would continue to operate under the current mine plan with a maximum permitted production level of 1.3 million tons per year until such time that all of the available coal reserves are exhausted. The levels of air emissions from the stationary and mobile sources at the mine would be roughly the same as those estimated and analyzed for the Proposed Action, but would end prior to 2019. It’s likely that the all of the indirect sources would continue operating regardless of the availability of the King II coal given their economic incentives to do so. The only indirect action that would not occur is the CR 120 improvements, due to the connected action nature of the project. These

indirect sources would continue to incrementally contribute GHG emissions to the biosphere, which could contribute to climate change.

Under the No Action Alternative, impacts to climate change would be the same or slightly less as 4.66 million tons of coal would not be mined from King II. It is not known whether end users of this coal would purchase other coal (i.e., same/similar GHG impacts) for fuel or whether alternative fuels would replace the coal used in cement kilns (i.e., natural gas, tires, etc.).

3.2 Health and Safety

3.2.1 Affected Environment

In this section, human health and safety are analyzed in terms of public health and safety concerns and in terms of the presence/absence of hazardous material and the management of these materials and solid waste.

Public Health and Safety

The LPC Office of Emergency Management (OEM) works to identify hazards that may affect life, property and the continuity of vital services in La Plata County. The OEM prepares the County government to be ready for possible disasters. OEM works to ensure coordination between the various response agencies like fire, law enforcement, search and rescue, snow plows and the 911 call center.

The OEM and the La Plata County Fire Chief's Association have developed a County-wide All Hazard Mitigation Plan (AHMP). The development committee includes representatives from Durango Fire and Rescue Authority, Fort Lewis Mesa Fire Protection District, Los Pinos Fire Protection District, Upper Pine River Fire Protection District and the La Plata County Office of Emergency Management. The AHMP identifies and profiles the natural and human-caused hazards to which LPC is vulnerable, assesses the vulnerability of the more significant hazards (e.g., flood, severe weather and wildfire), and includes goals and actions intended to mitigate the effects of these hazards.

There is no permissible public access to the proposed lease modification area or to the King II or King I mine sites. The mine facilities and workers are required to meet MSHA safety and training standards. Any visitors to the mine are also required to be safety trained if they plan on entering active mining areas. The mine is inspected quarterly per MSHA and other regulations. Public safety issues related to coal transport along CR 120 N are included in the detailed transportation analysis in Section 3.11.

Hazardous or Solid Wastes

Since the mine uses no process chemicals, there is no potential for impacts from this source, and further analysis is not warranted in this EA. Disposal of all coal and non-coal wastes from the mine site has been analyzed in the OSMRE and CDRMS mining and reclamation permits. Specifically, all debris, acid-forming and toxic-forming materials constituting a fire hazard are disposed of by a local waste removal company such as Waste Management or Baker Sanitation. Grease, lubricants, paints, flammable liquids, etc. are stored in the Fuel Storage Building with proper containment and are collected on a regular basis

by a certified hazardous material collection company such as Safety Kleen. All wastes are disposed of in a manner that ensures they are processed or contained in permitted and regulated facilities.

Periodically, surface exploration holes are drilled to assess coal characteristics in advance of mining. Each exploration hole, other drill or borehole, well, or other exposed underground opening will be cased, sealed, or otherwise managed, as approved by the OSMRE, to prevent any potentially toxic drainage from entering ground or surface waters, to minimize disturbance to the prevailing hydrologic balance, and to ensure the safety of people, livestock, fish and wildlife, and machinery in the permit area and adjacent area.

Surface water quality is protected by materials handling and runoff management to minimize additional contributions of sediments to streamflow. Runoff from surface facility areas is directed by berms, ditch and culverts to an unlined sediment pond with vertical spillways fitted with oil skimmers. Water captured in the runoff control pond is allowed to evaporate and infiltrate to alluvium.

During normal underground mining operations, shale and sandstone break away from the roof and floor of the coal seam. This material is removed from the King II Mine and placed in the existing approved mine waste (refuse) storage area at the King I Coal Mine. All mine refuse is contained within a constructed waste bank. The coal mine waste (refuse) storage area has increased approximately 5,000 cubic yards per year. As of July 2016, approximately 174,000 cubic yards exist. Anticipated refuse production from 2017 through 2022 is approximately 5,000 cubic yards per year. The waste bank is currently designed to accommodate up to 1,000,000 cubic yards. Details of design and construction are located in the CDRMS permit and are entitled Waste Bank Design Summary Report, November 1993, revised December 1997, by Don R. May, P.E. Standard Proctor tests and nuclear density tests are being performed regularly by GCC as detailed in Mr. May's aforementioned report to ensure that the waste pile continues to meet the designed compaction requirements. Should different types of strata be encountered during mining at the King II Mine, these tests will be repeated to ensure that no significant changes in compaction are allowed.

The OSMRE is conducting further analysis of samples taken from roof and floor materials that comprise the waste/spoils pile for King II Mine and are located on King I mine property. GCC has submitted a technical revision (TR-20A) to CDRMS to address additional testing and monitoring for continued use of this spoil pile location. GCC has found "reportable" levels of mercury and lead in the roof and floor material samples and has published these results in the Toxics Release Inventory. While the roof and floor material samples include these toxics, there is no indication that they are leaching or running off-site from the spoils pile. The proposed TR, specifically Minor Revision 41 (refer to CDRMS permit), is intended to collect King I refuse pile and King II roof, coal and floor samples in order to determine whether any remedial actions are warranted. The OSMRE and CDRMS are reviewing GCC's proposed monitoring plan in TR-20A to ensure that their performance standards and regulations are being met to protect water quality and public health.

Other hazardous materials used include diesel fuel and roof bolting resins containing styrene. The resin is a two-part epoxy which, when installed to support roof bolts, is mixed and becomes solid (like regular epoxy). This material is not required to be reported as part of the mine's Toxics Release Inventory.

3.2.2 Impacts from the Proposed Action

Direct and Indirect Impacts

There would be no substantive change to mine operations associated with the lease modification; therefore, public health and safety would be similar to baseline conditions described above and would have negligible impacts.

Mitigation Measures and Residual Impacts

The following health and safety measures are proposed as part of GCC proposed mine permit revision.

GCC's has developed contingency plans and measures to be employed to ensure that all debris, acid-forming and toxic-forming materials, and materials constituting a fire hazard are disposed of in accordance with 30 CFR § 817.89 and 30 CFR § 817.102. Acid- or toxic-forming materials will be handled and disposed of in accordance with 30 CFR § 816.41(b)(f), and 30 CFR § 816.102(e). As a result of these measures, potential health and safety impacts are expected to remain negligible for the life of the mine.

3.2.3 Impacts from the No Action

Direct and Indirect Impacts

With respect to mining activities, direct and indirect impacts under the No Action Alternative will be similar to those described under the Proposed Action Alternative except that coal production and operations would sharply decline around 2019 and site reclamation activities would begin.

Health and safety associated with coal transport along CR 120 N would improve sometime after 2019 when coal reserves are depleted within the existing lease area. At, and leading up that time, it is expected that loaded coal truck trips along CR 120 N will significantly diminish (refer to Section 3.11).

3.3 Geology and Minerals

3.3.1 Affected Environment

The affected area for geology and minerals is the existing and proposed coal lease held by GCC. This affected area is located at the northwest edge of the San Juan Basin within northwestern New Mexico and southwestern Colorado (NKC 1999). The sedimentary strata of the basin were deposited at the margins of a large sea occupying central North America during the late Cretaceous Epoch. During this time, extensive deposition of coal took place during the advance and retreat of the shorelines of the sea as it retreated to the northeast and eventually disappeared. This depositional environment resulted in an irregular wedge of non-marine sediments in the southwestern area of the basin intermingling with marine deposited sediments to the northeast.

Locally, the exposed sedimentary rocks of the late Cretaceous dip to the south and southeast and are deeply eroded to the north. The uppermost exposed formation is the Cliff House Formation, the upper member of the Mesa Verde Group. Of marine origin, it contains hard, calcareous sandstone mixed with fine sandstones, mudstones, and silty shale. Eroded at the top of the formation, the average thickness is 350 feet in the area.

Underlying the Cliff House sandstone is the Menefee Formation, the middle member of the Mesa Verde Group, which is made up of a complex of sandstones, black shales, and coal beds (as many as seven identified by the USGS). Locally, the average thickness is 300 feet. Below the Menefee Formation is the Point Lookout Formation, the lowest member of the Mesa Verde Group. It contains two distinct sandstone layers, the upper massive (found at the entrance to Mesa Verde National Park to the west) and the lower thin beds. Mancos Shale, a thick (2,000 feet) marine shale layer, underlies the Point Lookout sandstone and is found exposed locally approximately four miles north of the mine. Table 3-11 provides a description of the geologic resources within the proposed coal lease modification area.

Table 3-11. Stratigraphy of Coal Lease Modification Area

Geologic	Unit	Geologic Period	Description
Mesa Verde Group	Cliff House Formation	Cretaceous	Marine sandstone of irregular to lenticular ledges averaging 350 feet. Uppermost exposed stratum in coal lease modification area.
	Menefee Formation		Complex of cross-bedded sandstone, shales, and coal beds. Characterized by irregular bedding and rapid lateral changes in lithology.
	Point Lookout Formation		Upper member massive medium-grained sandstone 100 feet thick in project area. Lower member thin beds of sandstone, 300 feet thick in project area.
Mancos Shale			Marine shales to 2000 feet thick. Not found within the site but outcrops adjacent to the coal lease modification area.

The Colorado Geological Survey (CGS 2015) identifies the following as potential geologic hazards in Colorado: abandoned mine lands, avalanches, collapsible soils, corrosive soils, debris flows-fans, earthquakes, erosion, fires, floods, heaving bedrock, landslides, mudslides, naturally degraded waters, rockfall, radon, swelling soils, and ground subsidence (natural and mine). Faults are known within the local area (1-mile northeast of Hesperus, a fault with displacement of 33 feet is known), though none have been encountered in exploration drilling at the King II Mine. In 2006, the Colorado Geologic Society (CGS 2006) estimated the coal resource in the San Juan Basin to be 9.61 billion tons of coal. The lease modification would remove 0.05 percent of the coal resource, which would have a minor affect on the resource in the project area.

Subsidence

Subsidence is the gradual lowering of the ground surface after coal and support pillars are removed in a completed mining panel. After coal recovery, fracturing and settling of the overlying overburden may

yield surface expressions of subsidence in the form of subsidence cracks and a lowering of the ground surface. At the King II Mine, the coal seam is overlain by a thick, durable sandstone layer that fractures into large blocks, minimizing void spaces. The nature of the overburden reduces the risk for surface earth movement after underground mining than would result from a less durable stratum such as siltstone or shale. Prior coal mining at the GCC King I Mine revealed minor subsidence over 70 years of mining. At the King I Mine, surface expressions of subsidence averaged between 50 and 100 feet in length, less than 1 foot in depth, and 0.25 to 0.5 feet in width. Monitoring of these features by GCC contractors determined that they are self-healing within two seasons and have not expanded in size. Fewer than six of these subsidence features have been identified since GCC began mining in 2004.

Fluid Minerals

The King II Mine current and proposed lease area is located within the Paradox Basin/Gothic Shale Gas Play Area as designated in the Reasonable Foreseeable Development analysis in support of the TRFO RMP (USDI/BLM 2015a). There are no leases for fluid minerals in the current GCC lease area or within the proposed lease modification area.

Mapping by the Colorado Oil and Gas Conservation Commission (COGCC) (COGCC 2014) shows two plugged and/or abandoned oil and gas wells in the locality of the proposed coal lease modification area. One plugged and abandoned well is located immediately north of the King II Mine surface facilities in Section 36, T35N, R12W. The abandoned well is located in Section 35, T35N, R12W, approximately 0.5 mile west of the King II Mine surface facilities. There have been no oil and gas wells drilled and/or abandoned in the proposed coal lease modification area.

Future leasing of the fluid minerals beneath the coal resources leased by GCC is possible, but would be subject to site-specific NEPA analysis and conditions of the fluid mineral lease with consideration for prior removal of coal resource.

3.3.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The potential effects to geology and minerals in the affected area from the Proposed Action Alternative would be related to increased risk of geologic hazards caused by subsidence or rockfall. Subsidence is the gradual lowering of the surface after the large rectangular blocks/pillars of coal are removed underground during retreat mining. After coal recovery, fracturing and settling of the overlying overburden may yield surface expressions of subsidence in the form of subsidence cracks. Rockfall would result from loosening of bedrock by freeze/thaw action or heavy precipitation, resulting in bedrock falling from in situ strata.

In the King II Mine, the mined Upper Menefee coal seam is overlain by the massive Cliff House sandstone. The thickness and nature of this stratum provides a great deal of ground stability and generally prevents subsidence from reaching the surface after pillars are extracted (GCC 2006).

Data field measurements of subsidence cracks in the Mesa Verde Formation by Dunrud (1976) indicate subsidence cracks may develop through overburden thicknesses of up to 800 feet under unfavorable conditions. While unfavorable conditions cannot be defined exactly, they may include zones of weathered

coal and overburden. Overburden thicknesses over 800 feet have been classified as having a negligible risk of surface fracturing developing. This is a conservative upper limit under normal conditions.

Roof rocks primarily consisting of strong, thick sandstones of the Mesa Verde Group would cave into the mine in larger blocks than would shale roof rocks and would reduce the height of caving above the mine workings. These sandstones would generally reduce the amount of subsidence compared to shale. Sandstones at the surface would have larger displacements and may form cracks up to 1 foot wide and 25 to 50 feet deep on steep slopes. Formation of joints and fractures on steep slopes may contribute to slope instability and susceptibility to landslides and rockfalls. The current mine plan for the King II Mine does not include mining under steep slopes or daylighting along the steep drainages. Implementation of the Proposed Action would result in the removal of an estimated 4.66 million tons of coal at an average annual rate of production of approximately 836,126 tons from 2017 to 2023 (refer to Table 2.3). The removal of 4.66 million tons of coal from the subsurface would have a minor effect on the resource in the project area.

There would be negligible impacts to area geologic resources associated with CR 120 road improvements. Road improvements would benefit oil and gas operators potentially accessing fluid mineral development areas from CR 120. There would be no subsidence impacts to CR 120 as none of the underground operations are beneath CR 120.

Subsidence Impacts

The direct effects to geology and minerals are measured by the risk and extent of subsidence to occur in the locations and allowable methods for the proposed lease modification area and mine plan. The risk and extent of subsidence would depend upon many factors, including mine plans, coal seam thickness, geologic strata, and overburden depth. The overburden range for the coal lease modification area is from 100 feet to 300 feet (GCC 2006; NKC 1999). Assuming a coal seam thickness of 8 to 12 feet, surface lowering after retreat mining could be measurable and result in detectable surface subsidence impacts. Based on subsidence monitoring at the King I Mine 1 mile northeast, with similar overburden thickness, mining the same seam, surface subsidence features were rarely encountered. Those observed averaged 1-foot-wide/deep and 100 feet in length. The features were self-healing and not discernable after 2 calendar years. Accordingly, direct impacts associated with subsidence are expected to be minor and short to long term.

As described above, the thick Cliff House sandstone provides a great deal of ground stability and generally prevents subsidence from reaching the surface after pillars are extracted during mining. Nonetheless, it is possible that subsidence can occur post mining. To determine potential impacts from subsidence, the OSMRE requires an inventory of structures, renewal resource lands and the characterization of a “worst possible consequence of subsidence.” Based on ground surveys and review of publicly available site-specific aerial photography, the only structures and renewable resource lands observable are, a historic homestead in Alkali Gulch, barbed wire stock fences, stock ponds, and a two-track road system along the ridges within the permit area.

The two-track road system is the main “structure” above the existing and proposed lease modification area which could be damaged because of subsidence. If a surface subsidence crack was to intersect the road, it is possible that some repair of the road would be required to allow its continued use. This road is

used primarily by the UMU for access to rangelands, hunting, and firewood cutting. The historic homestead is on an edge of the lease boundary and at the toe of steep slopes associated with Alkali Gulch. There are no mining panels beneath this part of the lease and therefore no impacts from subsidence would occur to the homestead structure.

If subsidence cracks damage any barbed wire fence within the permit area (a fencepost could be dislodged or strands of barbed wire could stretch and break or sag), GCC will repair said fences without charge to the UMU Tribe, or will reimburse the UMU Tribe at reasonable costs for any necessary repairs. Potential impacts to structures from subsidence would be negligible.

Subsidence from mining could cause temporary minor alterations to surface water hydrology by altering surface water drainage patterns. This is discussed further in Water Resources (Section 3.7). Because there is little connection between groundwater flow regimes and surface water hydrology within the affected area, no indirect impacts to geology and minerals are anticipated for the Proposed Action.

Fluid Minerals Impacts

Potential impacts to fluid minerals for the Proposed Action would be dependent on the lease conditions and are unknown at this time. Further, any future fluid mineral development in the area would be subject to leasing and project-specific NEPA analysis.

Mitigation Measures and Residual Impacts

The Proposed Action could result in negligible short to long-term impacts to the surface resources from subsidence. These potential impacts are further mitigated by Design Feature 3 (risk of subsidence from underground mining to adjacent surface property by restricting mining to not within 300 feet of an occupied dwelling). Therefore, even though there is a risk of subsidence causing small, temporary surface damage, it is mitigated by Design Feature 3 to reduce the likelihood of this surface damage causing harm to residences or associated property.

3.3.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, there would be no lease modification or mining within the proposed 950.55 acres in the project area. An estimated 4.66 million tons of coal would remain in the ground and GCC would seek to renegotiate the RIA to terminate after Phase 3. Therefore, there would be no new impacts to geological and mineral resources.

3.4 Paleontological Resources

3.4.1 Affected Environment

The OSMRE does not have its own paleontological resource standards and uses the BLM's Potential Fossil Yield Classification (PFYC) to provide an assessment method to determine the potential for fossils in geologic units (BLM 2008).

The PFYC consists of five classes. Class 1 indicates very low potential and Class 5 indicates high potential for significant paleontological resources. Paleontological resources are associated with geologic units. Thus, class rankings are generally assigned to geologic formations or members at the surface.

From youngest to oldest, the following is a list of major formations or units that may be found in the proposed project area. Fossils that have been associated elsewhere with these units are noted. The PFYC rating or range of ratings is also noted.

- **Cliff House Sandstone** (PFYC ranges from 3 to 4.) – Marine invertebrates are relatively common (i.e., ammonites, crustaceans, clams, oysters, snails, starfish, sea urchins, shark teeth). Discovery of individual vertebrates such as turtles, mosasaur, plesiosaur have occurred very locally.
- **Menefee** (PFYC 4) – Leaf impressions, palm fronds, conifers, reptile bones, fossil tree trunks.
- **Point Lookout Sandstone** (PFYC 3) – Worms, crustaceans, clams, ammonites, various animal tracks, and driftwood.
- **Mancos Shale** (PFYC 3) - Oysters, fish scales, ammonites, clams, shark teeth, snails, worms, many invertebrate fossils, scaphites.

Descriptions for Classes 3 and 4 are as follows:

Class 3 – Moderate or Unknown. Fossiliferous sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence; or sedimentary units of unknown fossil potential.

Class 4 – High. Geologic units containing a high occurrence of significant fossils. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. Surface-disturbing activities may adversely affect paleontological resources in many cases.

Online research indicates that invertebrate fossils and shark teeth have been found in nearby Mesa Verde National Park (approximately 15 miles to the west). Specifically, they were identified in the Cliff House Sandstone, Point Lookout Sandstone, and the Mancos Shale. There is no mention of fossils located in the Menefee Formation (NPS 2005).

No paleontological resources were found during surface environmental (cultural and biological) surveys completed across the proposed lease modification surface area. A database search for paleontological sites on the Colorado Office of Archaeology and Historic Preservation database, COMPASS was conducted on March 17, 2017; no known sites were found in the project area which includes along CR 120 (to date).

3.4.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Surface disturbance and drilling activities can expose new fossil localities and provide additional information for scientific research. There is a low potential that potential future surface disturbance at the King II Mine from exploration drilling activities, access, or other ground-disturbing activities may encounter fossil resources.

Effects to paleontological resources were previously analyzed in the EIS for the TRFO RMP for activities including coal leasing (USDA/USDI 2013), which states “actions authorized by this LRMP/FEIS [Land Resource Management Plan/Final Environmental Impact Statement] should have negligible to minor impacts to paleontological resources, as the PRPA [Paleontology Resources Preservation Act of 2009] and related regulations, handbooks, and policy guidance provide for the identification, avoidance, or collection and documentation of paleontological resources prior to any ground-disturbing activities.”

Ground disturbance associated with phased road improvements of CR 120 N would be completed almost entirely within the previously disturbed CR ROW. There are no paleontological resource protections provisions in the LPC Land Use Code of Regulations. With that said, paleontological resources are not expected to be encountered during CR 120 road improvements. CDOT will sometimes require a paleontological survey or monitor during construction within a CDOT ROW—depending upon the potential to encounter paleontological resources in a project area. This assessment will be made by CDOT at the time they receive an application from GCC to improve the SH 140 intersection. Should paleontological resources be discovered in the course of compliance surveys, these discoveries would be considered a long-term, beneficial impact based on the scientific information yielded by the discovery. Based on the scarcity of known paleontological resources in the area, and along the previously disturbed CR 120 ROW, no impacts to paleontological resources are expected as a result of the Proposed Action.

Mitigation Measures and Residual Impacts

If paleontological resources are discovered during mining operations, GCC shall immediately notify the BLM and OSMRE and shall not disturb such discovered resources until the agencies issue specific instructions. Within 5 working days after notification, the agencies shall evaluate any paleontological resources discovered and shall determine whether any action may be required to protect or to preserve such discoveries. Should paleontological resources be encountered during the course of CR 120 or SH 140 intersection road improvements, LPC or CDOT will be consulted as appropriate. With these mitigation measures, there would be no impacts to paleontological resources from the Proposed Action.

3.4.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, there would be no lease modification or mining of the proposed 950.55 acres in the project area. No additional surface/subsurface disturbance would occur beyond that already permitted. Therefore, there would be no additional impacts to paleontological resources from new leasing

or mining. There have been no paleontological discoveries associated with the road improvements that have already been constructed following the approval of the LPC LUP.

3.5 Soils

3.5.1 Affected Environment

The soil resources that could be affected by the Proposed Action are located within the existing and proposed coal lease areas held by GCC, as well as the area along CR 120 N proposed for road improvements.

Soil survey information for the existing and proposed lease boundary areas was obtained from the NRCS and is summarized below in Table 3-12 (NRCS 2017). An NRCS report, including a detailed description of each soil type and associated soil maps, is included in Appendix 9 of the PAP (GCC, 2017). A soils map is also included as Map A-6 in Appendix A. There are 10 mapped soil types within the existing and proposed lease boundary. Soils along CR 120 are similar to those mapped within the existing and proposed lease boundary, although a degree of disturbance and soil mixing has occurred in association with the original construction and ongoing maintenance of CR 120.

Table 3-12. Mapped soil types within the existing and proposed lease boundary

Map Unit Symbol	Map Unit Name	Description	Limitations and Productivity
3	Weminuche like loam, 12 to 45 percent slopes	Colluvium derived from sandstone and shale. Usually found on mountain slopes.	Deep soil. Not prime farmland or hydric.
7	Archuleta-Sanchez, stony, complex, 12 to 65 percent slopes	Colluvium over residuum weathered from sandstone and shale. The complex is comprised of 45 percent Archuleta loam and 30 percent Sanchez very stony sandy clay loam. Remaining constituents are clays, loams, and rock. Usually found on dip slopes.	Deep soil. Not prime farmland or hydric.
30	Fortwingate-Rock outcrop complex, 6 to 25 percent slopes	Slope alluvium derived from sandstone and/or loess; slope alluvium derived from sandstone and/or loess. Typically found on mountain slopes.	Not prime farmland or hydric. Very low available water storage in profile.
39	Hesperus loam, 3 to 12 percent slopes	Medium-textured alluvium derived from mixed sources. Found in alluvial fans and valleys.	Deep soil. Not prime farmland or hydric. Very high available water storage in profile.
42	Lazear-Rock outcrop complex, 12 to 65 percent slopes	Northeast, south, and southwest facing drainage side slopes within the project area. This map unit comprises the Lazear series and exposed rock outcrops (in this area, sandstone and shales). The Lazear series is described as a	Not prime farmland or hydric. Very high runoff class. Low available water in profile.

Map Unit Symbol	Map Unit Name	Description	Limitations and Productivity
		loamy, mixed (calcareous), mesic Lithic Ustic Torriorthent. This series is shallow and well-drained, formed in residuum and alluvium derived from sandstone.	
47	Nutrioso loam	Medium-textured alluvium derived from mixed sources. Found on alluvial fans, valleys.	Deep soil. Not prime farmland or hydric. High available water storage in profile.
56	Pulpit loam, 3 to 12 percent slopes	Eolian deposits over residuum weathered from sandstone. Well-drained sandy to clay or silty clay loam derived from loess. Typical profile of loam to clay loam and silty clay loam to fine sandy loam, 0 to 88.9 cm (0–35 inches).	Not prime farmland or hydric.
69	Umbarg loam	Moderately fine-textured alluvium. Found within the level colluvial deposits between the bordering side slopes of the drainage basins. Fine-loamy, mixed mesic Cumulic Haplustolls. Typically forms in alluvium on fans and upland valley bottoms. Deep and moderately well drained.	Prime farmland if irrigated. Not hydric. No lands above the existing King II lease or proposed lease modification area are irrigated or farmed.
71	Valto-Rock outcrop complex, 12 to 65 percent slopes	Slope alluvium and/or residuum weathered from sandstone. Found on breaks, ridges, mountain slopes.	Not prime farmland or hydric. Very high runoff class.
79	Zau stony loam, 3 to 9 percent slopes	Residuum weathered from sandstone and shale. Found on mesas, mountain slopes.	Not prime farmland or hydric. High runoff class.
80	Zau stony loam, 9 to 25 percent slopes	Residuum weathered from sandstone and shale. Found on mesas, mountain slopes.	Not prime farmland or hydric. High runoff class.

Source: NRCS 2017.

3.5.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The lease modification itself would not include any direct or indirect impacts to project area soil resources. However, modifying the lease would commit an additional 950.55 acres for potential future mining, which could include impacts to soil resources. Future mining efforts would employ underground mining to access coal reserves. Expansion of underground mining could result in soil cracking related to subsidence, which is discussed in detail in Section 3.4 Geology and Minerals. Surface soil cracks in the project area would be expected to fill naturally by sloughing of surrounding surface soils. Therefore, potential impact to soils caused by subsidence from underground mining would be negligible to minor. Impacts from subsidence would be expected to persist for the duration of mining operations.

Construction and mining activities—including coal transport and improvements to CR 120 N—would require the presence and operation of vehicles and heavy equipment, which could result in accidental spills or leaks of petroleum products. Spills and leaks have the potential to impact surface soils; however, the risk of soil contamination would be mitigated by best management practices (BMPs) such as routine maintenance. Any spills or releases would be immediately contained, recovered and disposed of in accordance with the mine’s waste management procedures (refer to Section 3.3). While measures are in place to minimize impacts to soils from the release of hazardous materials, should a spill or leak occur, potential impacts could range from negligible to moderate, depending upon the size and duration of the release, and would persist for the duration of mining operations.

Installation of monitoring well clusters proposed in GCC’s permit revision application to OSMRE (GCC 2017) has already been approved as TR-26 under CDRMS Permit #C-1981-035. Each well location was subject to environmental clearance surveys and post development reclamation. No new roads were constructed for access to the monitoring well sites. There may be minor impacts associated with compaction from future overland vehicular/pedestrian traffic to monitor the wells into the future. There is also the potential for other future minor disturbance above the existing and proposed lease modification areas associated with exploration or core drilling needs. These activities typically require overland travel by a drill rig, minor ground surface level and limited vegetation clearing. Disturbance is usually confined to a 50 ft. x 50 ft. work area. Overall, no more than 5.0 acres of surface disturbance are anticipated as a result of the mine permit revision. These disturbances would have minor, short-term impacts to soil resources. Topsoil, if present, is salvaged and replaced about the completion of the activity. Further reclamation (i.e., seeding, mulching, etc.) is completed in conformance with the Reclamation Plan.

The proposed improvements along CR 120 N are expected to result in soil disturbance, mixing, and compaction over an estimated 4.7 acres; potentially resulting in reduced soil productivity and fertility adjacent to the County road. In addition, surface soil disturbance could increase the potential for erosion in disturbed areas. However, roadside soils currently exist in a disturbed condition due to periodic and ongoing road construction and maintenance. As such, impacts to soils along CR 120 from improvements are expected to be negligible to moderate and short term.

Mitigation Measures and Residual Impacts

Any surface-disturbing activities associated with the proposed lease modification, including work along CR 120 N, would utilize erosion control and BMPs to minimize soil erosion to the extent possible. The King II Mine holds a stormwater permit with the CDPHE, which details the mine’s efforts to decrease or eliminate the risk of erosion during storm events. CDRMS and the OSMRE require containment for stormwater and other potential run off as part of the mine plan. Disturbed areas would be reclaimed in accordance with the Reclamation Plan General Requirements as described in the PAP, which is publicly available from the OSMRE. Implementation of an effective stormwater management plan would serve to limit soil impacts to those that are negligible or minor.

3.5.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, no surface soil disturbance would be expected outside of the existing lease and permit area. Accordingly, the potential for erosion, soil mixing and compaction, and soil contamination from spills would continue at existing levels. Within the existing lease area, the risk for soil impacts related to subsidence would also continue at existing levels.

3.6 Water Resources

3.6.1 Affected Environment

The surface and groundwater resources that could be affected by the Proposed Action include the Hay Gulch and La Plata River watershed. Maps of surface water resources are included in Appendix A, Map A-3, and are referenced below with the description of the affected resources.

Surface Water

Map A-3, Surface Water Resources, shows surface water in the existing and proposed lease modification and is included in Appendix A. There are several ponds and multiple intermittent washes totaling less than one acre of potential wetlands on the surface of the proposed modification and existing lease area (USFWS/NWI 2015). Ponds are utilized by livestock and wildlife during periods of water availability after snow melt and rain events. Of these hydrologic features, only the unnamed intermittent wash that is immediately adjacent to the King II surface facilities has been assessed by the U.S. Army Corps of Engineers (USACE) to determine whether it is jurisdictional. In a letter sent by the USACE to GCC dated May 4, 2015, the USACE concluded that the subject drainage was not a jurisdictional water of the U.S. In addition, there are seven ephemeral washes that cross CR 120 N between King II and SH 140. These ephemeral washes, and the wetland and washes described above, have not been assessed to determine whether they are under the jurisdiction of the USACE as no past or current mining activities have necessitated impacting these features; and/or acquiring a Clean Water Act permit.

A description of the flow system that supports surface water in the mine lease area is included to define the affected area for surface water resources and is shown in Map A-8, “A” Coal Seam Outcrop and Upper Surface Contour Map. The following quaternary geologic deposits are unconsolidated in nature and found along the bottoms of ephemeral drainages in the area of the Proposed Action. Generally, these deposits can be considered one unconsolidated flow system, and they comprise the affected area for surface water resources for the Proposed Action.

Hay Gulch Alluvium

The Hay Gulch alluvium is composed of quaternary deposits of gravel, sand, silt, and clay. Based on available drilling and well completion data, the alluvium is on the order of 20 to 80 feet deep. This thickness will vary and generally thin towards the side slopes and be thicker in the original Hay Gulch

paleo-channel. The width is approximately 1,000 feet. The Hay Gulch Alluvium is located south and downgradient of King II operations.

Water quality in the Hay Gulch Alluvium has been monitored using two wells in the vicinity of King II since January 2005. The UMU Tribe well (CDWR Permit #210372) is upgradient from the mine and was drilled voluntarily by GCC. The National King Coal, LLC well (CDWR Permit #262656) is located downgradient from the mine and was required by CDRMS for the mine permit. These wells show expected seasonal variation in both depths to water measurements and water quality field and analytical results. Quarterly depth to water measurements conducted by GCC staff indicate water levels in 2014 averaging 7.25 feet below ground surface at the upgradient well and 4.83 feet below ground surface at the downgradient well. This demonstrates that the Hay Gulch Alluvium maintains a substantial degree of saturation. A summary water quality data for each well for the period of record are included here as Tables B-5 and B-6 included in Appendix B.

Water quality trend analysis of selected analytes is performed annually by CDS Environmental Services, LLC (CDS) and documented in the GCC Energy Annual Hydrology Report 2014 (GCC 2014). The results of annual water quality monitoring are publically available on the La Plata County Planning Department webpage at: http://lpcds.org/planning/gcc_energy_project/. The findings from this report are that the Hay Gulch alluvium receives water from two very different water sources, local precipitation infiltration and La Plata River water delivered seasonally by the Hay Gulch Irrigation Ditch. Approximately 10 years of data collection shows fairly substantial variability over time at both wells. The upgradient well showed linear increase in calcium, manganese, and magnesium. Total dissolved solids (TDS) were found to be stable, and there was a substantial reduction in sodium and iron levels. The downgradient monitoring well showed no increasing analyte trends but rather decreasing trends over the same time period, including decrease in TDS and manganese.

East Alkali Gulch and West Roberts Canyon Alluvium/Colluvium

East Alkali Gulch runs in northeast/southwest orientation immediately west and north of current and proposed King II underground mining and bisects the mined “A” coal seam. The “A” seam outcrops in East Alkali Gulch as the absolute western and northern mining boundaries to the King II Mine. West Roberts Canyon also follows a northeast/southwest drainage direction, but borders the King II Mine to the east. In particular, it is immediately adjacent to the existing northeastern most area of currently mined sections at King II and portions of the proposed new lease modification areas. West Roberts Canyon is similar to East Alkali Gulch with respect to “A” seam outcropping on all flanks and presents a boundary to underground mining to the east of King II. Geologic mapping conducted by a contractor for GCC and as presented in Map A-8, “A” Coal Seam Outcrop and Upper Surface Contour Map, in Appendix A, shows that these two drainages over the middle and lower portions of the Menefee Formation represent likely recharge areas that contribute to the water documented in wells and boreholes completed into the lower Menefee Formation. It is expected that the subsurface materials present in these drainages are composed of unconsolidated quaternary gravels, sands, silts and clays of derived from adjacent sandstone, siltstone, shale and coal outcropping.

Both drainages are tributary to the Hay Gulch, therefore the alluvial/colluvial materials of the respective ephemeral drainages are conceivably tributary to the Hay Gulch Alluvium depending on localized

potential infiltration into the Menefee Formation. However, no known data exists to substantiate presence of saturation of either East Alkali Gulch or West Roberts Canyon Alluvium/Colluvium.

Springs and Seeps

Groundwater can manifest at surface discharge as springs or seeps. The origin of this groundwater can be consolidated bedrock or unconsolidated alluvium and represents a discharge zone in the hydrologic system. Very limited presence of springs and seeps in the King II area supports interpretation of unsaturated hydrogeology of the Cliff House Formation overburden and the Upper Menefee Formation that includes the mined “A” seam. Several previously documented seeps were located in the Hay Gulch Alluvium adjacent to CR 120 near the King I and II mines (USGS 1985). The discharge from these seeps does not sustain flow to create surface water flow, but rather infiltrates into the Hay Gulch Alluvium.

At the direction of CDRMS, in December 2015 GCC initiated a spring and seep survey for specific areas surrounding the King II Mine. A spring and seep survey is a field reconnaissance to locate and inventory spring and seep conditions including flow rate, field water quality parameters, and to collect a water quality sample for submittal to an accredited analytical laboratory. This type of study characterizes groundwater discharge from one groundwater source at ground surface where it then either enters back into another groundwater system, into surface water, or evaporation into the atmosphere. The survey was conducted by Resource Hydrogeologic Services, Inc. (RHS) with the results included in the King I & II Coal Mine Area Hydrologic Study (RHS 2016).

While no springs or seeps were known to exist in this area, a reasonable expectation was that if springs or seeps relevant to the hydrologic characterization of the study area are to exist they would manifest either at the Cliff House/Menefee contact outcrop or at the “A” seam outcrop. As a result of hiking the outcrops, one seep was located and documented as SEEP-1 in an unnamed drainage approximately 2 miles northwest of the King II Mine surface facilities.

This spring and seep survey will continue quarterly for no less than a total of four quarters. Assessment will occur in a reasonable time following four quarters of data collection at these locations to shape the future GCC regulatory spring and seep monitoring requirements.

Groundwater

As shown on the Coal Seam Map in Appendix A, the proposed coal lease modification is located below and adjacent to a mesa bounded on the northwest and southeast by deeply incised ephemeral drainages. The proposed mining in the project area would not extend into or below these bounding drainages.

The affected area for groundwater resources includes those geologic strata above and below the existing and proposed mine lease area as considered within the hydrologic balance for the mine permit. The status of groundwater resources within the King II Mine lease is described for each of the geologic strata. These geologic groups are described starting with the geology closest to the surface in the proposed project area.

Mesa Verde Group

The strata overlying and underlying (listed from top to bottom) the coal seam at King II Mine are the Cliff House Sandstone Formation, the Menefee Formation (containing the “A” coal seam to be mined), and the Point Lookout Sandstone Formation.

Cliff House Sandstone Formation

The Cliff House Sandstone immediately overlies the Menefee Formation and is a fine grained massive sandstone layer approximately 250 to 300 feet thick near the King II Mine. The Cliff House Formation is the bedrock layer that manifests as the ridges and mesa tops. Previous exploration drilling of approximately 30 boreholes for the King II Mine coal delineation that penetrate the entire Cliff House Formation did not intercept any water-bearing intervals according to GCC Energy contract geologist Steve Korte (pers. comm, July 30, 2015).

Domestic water well completion records for wells penetrating the Cliff House Formation near the Mine also indicate lack of water bearing-intervals within the length of the borehole expected to be in that formation. In particular, the subset of relevant domestic water wells that were investigated for the study documented in the report titled Summary of Analytical Activities in Response to Neighborhood Comments in Conjunction with a Permit Expansion of GCC Energy, LLC King II Coal Mine (CDS 2013) documents drilling depths that extend past the Cliff House Formation and into the lower Menefee Formation in order to intercept sustainable water-producing intervals. These wells are located immediately southwest of the King II Mine at an approximate distance of 1 mile. General data taken from CDWR Well Construction and Test Reports publicly available at <http://www.dwr.state.co.us/wellpermitsearch/> were compiled for the previously mentioned 2013 CDS report and is presented as Table B-5 in Appendix B with corresponding location Map B-1. This data shows Well IDs 8, 9, 10, 12, and 18 with borehole penetrations beyond the expected approximate 300-foot maximum depth of the Cliff House Formation in this area. Also relevant is that the wells were completed such that the Cliff House Formation is open on the backside of the well casing as comingled with the lower water producing intervals. While in theory this construction practice may allow minor amounts of Cliff House Formation water to enter and contribute to the well if it was present, the reality is that this practice saves substantial time and materials when compared to grouting and sealing non-producing intervals on the backside of the casing, thus reducing the cost of the well installation.

Mining operations at King II Mine have occasionally encountered minor seeps as released from unsubstantial perched water-bearing intervals from the base of the Cliff House Formation when it presents as roof material after the “A” seam has been mined. In these cases, the total volume of water released from seep was on the order of 1 to 10 gallons, lasting a few minutes according to GCC King II Manager of Coal Services, Tom Bird (pers. comm., March 15, 2015). Additionally, BLM mine inspectors have filed quarterly inspection reports since mining operations first entered the COC 62920 lease in the King II Mine with development of the North Mains in October 2008 that do not document presence of water. With respect to water in King II Mine, the reports simply don’t mention what isn’t there (personal communication, BLM Mine Inspector, Desty Dyer, March 15, 2015). BLM monthly mine monitoring reports are available from the BLM.

Menefee Formation

The Menefee Formation is composed of alternating beds of fine-grained non-marine sandstone, shale, and coal and is over 250 feet thick. The mined “A” seam is in the uppermost portion of the Menefee Formation. The “A” seam mined at the adjacent King I Mine has been historically documented as dry, as well as during the exploratory drilling onsite at King II and at the Shalako Mine to the northeast. King II mining operations are conducted without need for groundwater discharge by dewatering systems or natural drainage exiting the mine. The “A” seam is exposed by outcrop throughout the ephemeral drainages surrounding the King II Mine. This is a solid explanation for the dry nature of the “A” seam as any paleo groundwater discharge would have occurred over geologic time through a combination of seeps at the outcrop and continued subsurface flow downgradient to the south. In the 8 years of active mining at King II, no water drainage from the Cliff House Formation to the Menefee Formation has been observed in the mined areas in any volume that would prompt alteration of GCC’s dry mining operations.

Despite the dry nature of the “A” seam and the upper Menefee Formation, the lower portion of the Menefee Formation is typically an aquifer and does apparently supply several wells investigated in the Summary of Analytical Activities in Response to Neighborhood Comments in Conjunction with a Permit Expansion of GCC Energy, LLC King II Coal Mine (CDS 2013). Regionally, the Menefee Formation has been documented as a productive aquifer (USGS 1985). A sequence of low permeability shale and siltstones immediately below the “A” seam apparently confine the lower Menefee Formation aquifer from the upper Menefee Formation. This sequence that naturally confines the lower aquifer effectively confines any fluids potentially introduced into the mined areas from above. According to data presented in the aforementioned 1985 USGS report, A.T. Massey Coal Company completed two successful dual-completion wells in the Menefee Formation near the King I Mine. At each well, the measured water levels in the respective completion intervals demonstrated an upward hydraulic gradient. This suggests that any potential leakage across the confining Menefee shale and siltstone sequence would be in the upward direction rather than the downward direction.

Point Lookout Sandstone Formation

The Point Lookout Sandstone is a fine to medium-grained marine sandstone with some shale interbeds estimated at more than 250 feet stratigraphically below the “A” seam at King II. The thickness of this formation can be greater than 250 feet thick. This unit is not widely used as a source of domestic water due to low yields and high dissolved solid content of the water. While no reliable discrete Point Lookout Formation wells have been identified in the King II Mine area, approximate 250 feet of low permeability shales and siltstones of the lower Menefee Formation with a potential upward hydraulic gradient are expected to naturally isolate this formation from mining impacts.

In the absence of measurable water levels at wells or boreholes discretely penetrating either the Cliff House or upper Menefee Formations in the immediate vicinity of King II, a potential groundwater flow direction or gradient cannot be determined. It could only be assumed that if groundwater was present or introduced to the bedrock units that the flow direction would be in the direction down-dip to the southwest and would likely flow preferentially through the most permeable available fracture networks. The dip of these bedrock units is approximately 2 to 3 degrees to the south-southwest based on extensive and current exploratory borehole delineation and mine mapping conducted by GCC as part of standard

operations. This unsaturated flow system would continue down-dip until eventually reaching a depth below ground surface that equals the potentiometric surface, thus transitioning to a fully saturated confined aquifer system generally to the south and away from King II.

A lack of measurable water level in deeper exploratory boreholes at and near King II indicate that the first saturated water-bearing interval is greater than 125 feet below the mined “A” coal seam. This is based on past GCC exploratory borehole drilling programs in 1998, 2013 and 2015 of over 30 holes to approximately 125 feet below the “A” seam without yielding measurable groundwater inflow. Documentation of these results is provided in a memorandum by Steve Korte, consulting exploration geologist on-site during each of these drilling programs and is on file with the BLM, the OSMRE, and CDRMS. The memorandum explains a drilling methodology where no water is added during air rotary drilling through the Cliff House Formation. Immediately upon intercepting the “A” seam, coring operations begin, and a fresh water mist is added to improve the drilling penetration and hole stability. While this drilling make-up water does remain in some holes prior to abandonment, field experience indicates that this is because low permeability conditions reduce or prevent infiltration beyond the borehole rather than formation water entering the borehole.

As discussed previously in this section, a subset of adjacent domestic water wells were investigated and documented in the report titled Summary of Analytical Activities in Response to Neighborhood Comments in Conjunction with a Permit Expansion of GCC Energy, LLC King II Coal Mine (CDS 2013). Well selection for this study was based on concerns expressed by landowners on the west side of the King II to GCC. Additionally, the #2 downgradient King II quarterly compliance sample was included for comparison. Water samples were collected from these wells through their respective permanent pumping systems for field parameter and laboratory analysis. A summary of these results are presented in Table B-7 in Appendix B. CDS concluded that the chemical analysis of these wells suggests the produced water from each well originates from different sources, whether that be a single source or mixture of sources due to comingled well completion design. Most of these wells are comingled completions, but surprisingly three wells investigated that are on the order of 750 feet from each other—Well IDs 8, 9, and 10—have very different chemical signatures. These wells have almost identical completion designs and depths into either the lower Menefee Formation or Point Lookout Sandstone Formation, which demonstrates the variability of the groundwater quality in these formations even within relatively short horizontal distances. Unfortunately, the CDWR Well Construction and Test Reports on file for these wells does not contain enough detailed Geologic Log information to confirm which formation these wells are completed in or make any accurate correlation to the detailed exploratory borehole records on file with GCC.

3.6.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The affected area for water resources includes the Hay Gulch and La Plata River watershed as connected to the existing and proposed lease modification areas for the King II Mine explained in Section 3.4. Direct and indirect effects to water resources are measured in terms of changes to water quality, water quantity, and the hydrologic balance of the affected area as determined by the OSMRE and CDRMS in the data from monitoring wells and their assessments of the CHIA and PHC for the King II Mine Plan.

Surface water resources would not be directly affected by the Proposed Action because there would be no surface-disturbing activities conducted within any ephemeral or intermittent drainages associated with the proposed lease modification area. Additionally, with the exception of “SEEP 1”, no perennial surface water is present in the lease modification area. Future possible ground-disturbing activities in the lease or lease modification areas would avoid this seep area.

Surface water is limited to the Hay Gulch Irrigation Ditch, which runs through Hay Gulch. GCC has monitored Hay Gulch Ditch water quality at the driveway entrance to King II from CR 120 since 2005. In March 2016, GCC added an additional Hay Gulch Irrigation Ditch monitoring location upstream from King II and King I to allow baseline data collection beyond any potential impacts from GCC site operations. The new monitoring site allows comparison of water quality and flow rate between the site downstream from King I and II and the site upstream from King I and II. No difference in water quality between the two monitoring sites has been observed in 1 year of observations that cannot be explained by normal usage of the irrigation ditch for flood irrigation which will vary flow and thus some constituent concentrations.

There would be negligible to minor short-term impacts to area surface water quality associated with road improvements along CR 120 N. The ground disturbance of approximately 4.7 acres during construction activities along the CR ROW may have minor short-term impacts associated with stormwater run-off and erosion entering drainage courses that cross the CR. These minor reductions in water quality would be mitigated by adherence to the LPC and CDOT required stormwater management BMPs.

Indirect effects to surface water resources associated with the Proposed Action would be from stormwater, subsidence, or groundwater emerging to the surface. Another indirect impacts to surface water quality is the combustion of King II coal at cement plants in the southwestern U.S. and Mexico and by regional narrow-gauge railroads to receiving waters (where present). This potential indirect impact is described in further detail in the Biological Assessment included in Appendix C and in Sections 3.1 Air Quality and Climate and 3.10 Threatened, Endangered and Sensitive Species. The King II Mine holds a stormwater permit with the CDPHE. CDRMS and the OSMRE require containment for stormwater and other potential run off as part of the mine plan. These agencies frequently inspect the integrity and sufficiency of these containment structures as well as monitor water quality and quantity.

Characterization and assessment of the PHC for the permit application package is required by the operator. The regulatory authorities for the King II mine permit, OSMRE and CDRMS, review and approve the PHC for the mine plan and prepared a CHIA for the watershed area. Design Feature 2 provides a mechanism to address concerns raised by adjacent landowners that their surface water is being adversely affected by King II Mine operations by increasing the number of monitoring wells and improving the data supporting the CHIA and PHC. With these results, the regulatory agencies would be better able to adjust the mine plan to ensure that surface water resources are protected. The Proposed Action would have the same effects to surface water as baseline conditions. However, with the implementation of Design Feature 2, the likelihood of detrimental effects to surface would be reduced with the installation of additional groundwater monitors and a better understanding of the hydrologic balance in the area. This would also allow the OSMRE and CDRMS to update the CHIA and PHC and adjust the Mine Plan to better manage potential risks to surface water resources.

The proposed coal lease modification area is located below and adjacent to a mesa bounded on the northwest and southeast by deeply incised ephemeral drainages. The mining in the Proposed Action would not extend into (daylight) or below the bounding drainages, therefore any potential impacts to groundwater would be limited to impacts from mining under the footprint of the mesa and any connecting strata below.

CDRMS (1997, 2006) addressed the affected environment in the PHC and CHIA for the Hay Gulch mining area. It was concluded that there are two potentially affected groundwater systems within and adjacent to the mining operation: the Menefee Formation (where mining occurs) and the Hay Gulch alluvial system. The conclusions regarding the interaction of the King II Mine with groundwater systems by CDRMS were as follows:

- As the mine does not discharge water, there is no potential for impacts to the quality of water in receiving drainages or underlying alluvium from mine discharge.
- A large capacity underground water storage sump was designed and sited in a sealed “A” seam gob. Some underground improvements to the gob were conducted to hold the water but given concerns with introducing water into otherwise dry mine workings, GCC has abandoned plans to utilize this underground water storage sump. As a result, no direct or indirect impacts will occur to groundwater.

Concerns regarding impacts of the Proposed Action to groundwater quantity and quality of adjacent domestic water wells were raised by adjacent landowners. GCC contracted CDS and Norwest Corporation to investigate these concerns. A report of the results is summarized below (CDS 2013). The results of the hydrologic investigation concluded that there was no potential for the mine to affect the adjacent residential water wells for the following reasons (CDS 2013);

3. As of 2013, based on 6 years of underground operations at the King II Mine, the miners, management, federal and state inspectors have observed that the mined “A” seam is dry. Therefore, no fluid transport mechanism exists to allow migration of potential contaminants from the mine. Specifically, this refers to the incapacity for advection, the process by which solutes are transported by the motion of flowing groundwater.
4. No dewatering systems are employed at the mine so there is no direct impact on local or regional groundwater levels.
5. The adjacent residential wells are completed in multiple comingled coal/shale water producing zones where coal fines, methane, hydrogen sulfide, and bio-sludge are generated. These constituents are often found in domestic well water completed in such zones.
6. The “A” coal seam mined at the King II Mine is projected to be positioned stratigraphically above the zones of completion of two of the adjacent domestic water wells and within the zones of completion for five of the adjacent residential wells investigated. While some of the domestic water wells may have completion intervals that expose the “A” coal seam mined at the King II operation, no data exists to determine if the “A” seam is water bearing at these locations.

In January 2016, GCC contracted Resource Hydrogeologic Services Inc. to compile and interpret all available hydrologic data for the Hay Gulch mining area (RHS 2016). The conclusions of this study indicate that because King I and King II Mines have historically been dry, hydrologic data relating to

background and to operations was somewhat sparse. Water quality data has been taken from domestic wells at some distance from the permit areas. Alluvial groundwater monitoring data exhibits spatial variability that has not yet been explained, although climatological variation may be implicated, and some new monitoring points upstream of King I mine were warranted. Since the preparation of this study, GCC installed a Hay Gulch alluvial monitoring well (refer to Map A-8) upgradient of King I in December 2016 and has started hydrologic data collection for groundwater level, field parameters, and laboratory analysis (primarily major ions and trace metals) at that site.

The 2016 RHS study also indicates that evaluation of available bedrock hydraulic data, including publicly available information from DWR Well Construction and Test Reports and GCC borehole data has determined that bedrock groundwater occurrence in the Hay Gulch area is controlled by drainage erosion of the Cliff House and upper Menefee Formations. The groundwater discharge areas created by the erosion of Hay Gulch, East Alkali Gulch, and the various reaches of Roberts Canyon, combined with the limited infiltration potential of the region, have apparently prevented any substantial groundwater accumulation and thus a dry trend from surface through the substantially drilled and mined upper Menefee coal seams. Domestic water wells to the south and southwest of the King I and II mines do present Cliff House groundwater in perched water bearing intervals, but DWR well reports indicated that it is not in large quantities as the wells are completed in the underlying lower Menefee or upper Point Lookout aquifer. Demonstration of confined conditions in this aquifer by quantification of the hydrostatic pressure has been presented as evidence for a substantial confining layer below the upper Menefee coal sequence, specifically relevant as the King I and II mine floor. Additional quantitative basis for the recognition of this Menefee confining layer has been presented with regional hydraulic testing results characterizing the interval as consistent with low permeability geologic materials. Information that is being collected during the installation of bedrock cluster monitoring wells currently ongoing at King II, as well as the data that will be generated from them through routine monitoring will assist with further hydrogeologic characterization.

The Proposed Action would not adversely affect the hydrologic balance in the affected area because:

- No considerable groundwater from bedrock sources has been observed as input or flow-through to the mine.
- No water is used during mining processes in quantities other than the minimum required for dust suppression; therefore, no water can be expected as output into the unsaturated bedrock.
- There is no alluvial groundwater withdrawn for mining operations or otherwise intercepted by mining operations or facilities.
- The surface water from the Hay Gulch Irrigation Ditch utilized for mine dust suppression operations is recaptured ahead of potential infiltration to the unsaturated bedrock exposed underground. This water source is also monitored and tested quarterly for water quality by GCC.
- Mining operation at the King II Mine does not discharge any water used at the mine into the surface water drainages so no surface water impact to the hydrologic balance could be expected.

To better support these conclusions and improve the PHC and CHIA for the King II Mine plan, Design Feature 2 includes a measure to implement a set of new monitoring wells in and around the lease area, which were installed in March 2017. A detailed explanation of the monitoring well approach and plan is included in Appendix B. In addition, to reduce potential risk to groundwater, Design Feature 2 also

includes a measure that closed the existing underground water storage reservoir and has replaced it with an expanded, surface reservoir at GCC's water source, the Huntington Ditch.

Therefore, the Proposed Action would have the same direct effects to groundwater resources as the baseline. The Proposed Action would have a lower likelihood of significant detrimental effects to groundwater resources than the baseline because additional monitoring data will improve risk evaluation and monitoring and result in a more protective mine plan.

Indirect effects to groundwater resources would be related to interchange between surface and groundwater systems through seeps and springs or stormwater infiltrating into the groundwater system through surface fractures caused by various types of subsidence. To better document potential indirect effects to the groundwater system, Design Feature 2 included a spring and seep investigation for the King II Mine area that would identify potential sources for groundwater infiltration. With Design Features 2 and 3, the Proposed Action would have the same indirect effects to groundwater resources as the baseline with reduced likelihood of significant detrimental effects to groundwater resources including adjacent water wells by improving groundwater monitoring and identifying potential infiltration sources.

The results of this spring and seep investigation conducted by Resource Hydrologic Services are currently being interpreted (RHS 2017) and will be submitted to the agencies when finalized. The summary results of the investigation were that only one seep was found in the affected area, which is approximately 3 miles north-northeast of the King II portal. The field investigation concentrated on the outcropping Cliff House and Menefee Formation geologic contact as well as the "A" coal seam outcrop, as the presence of springs or seeps in this stratigraphic horizon would be most relevant to potential mining impacts. Drainage bottoms below the outcrops were also investigated without any springs, seeps or surface water identified. The total distance hiked in and around the affected area was approximately 26 miles, repeated each quarter beginning in December 2015 and ending September 2016. The discovered seep flow is on the order of 1 gallon per hour and manifests as an area of approximately 10 feet by 20 feet of wet soil requiring a small hand-dug test pit for sample collection. Quarterly water quality samples were submitted for laboratory analysis primarily for major ions and trace metals since December 2015 and monthly field parameters (flow rate, temperature, pH, specific conductance, oxygen reduction potential) have been collected since March 2016. Seep location and chemical analysis suggest the source of the water is the Cliff House Formation given relatively higher sulfate ion concentration likely due to oxidation of pyrite present in the Cliff House. The sulfate concentration and resulting TDS generally exceed recommendations for livestock consumption. The seep monitoring will continue on a quarterly basis as part of the GCC King II hydrologic monitoring program to observe any significant changes to flow rate or water quality over time.

Mitigation Measures and Residual Impacts

Groundwater monitoring will be conducted at three alluvial wells, "Wiltse Well Monitoring Station", "Up-Gradient Monitoring Station", and "Down-Gradient Monitoring Station". Surface water monitoring will be conducted at "Hay Gulch Ditch, Upgradient Monitoring Station" and "Hay Gulch Ditch, Downgradient Monitoring Station." All water-monitoring locations are shown on "Map King II-004" in the CDRMS mine permit, and illustrated on Map A-8.

In addition to the aforementioned alluvial monitoring wells, Technical Revision TR-26 includes the installation of four groundwater monitoring well clusters, MW-1 thru MW-4 also shown on Map King II-004 in the CDRMS permit and on Map A-8. All of these monitoring well clusters were installed in late Spring 2017.

Additional surface-water monitoring is also proposed in TR-26 and will consist of a “spring and seep” survey of the southern edge of East Alkali Gulch. The “A” coal seam outcrop of the Menefee formation will be monitored as well as the contact between the Menefee formation and Cliffhouse Sandstone formation.

Two new hydrologic monitoring locations were added in 2016 and are provided (with justification) in the list below:

- Hay Gulch Ditch Upgradient – Added to supplement Hay Gulch Ditch monitoring with a location sufficiently upstream of both King II and King I operations
- SEEP-1 – Added during the 1-year (four quarter) King II spring and seep survey project as it is the only spring/seep that was located during the survey

All of the surface and groundwater monitoring described above is for the purpose of monitoring area water quality and to better understand where and if water is present. This information helps OSMRE and CDRMS to monitor potential impacts to water resources from implementation of the mine permits.

3.6.3 Impacts from the No Action

Direct and Indirect Impacts

The effects to water resources from the No Action Alternative would be similar to those described under the Proposed Action Alternative but would be lesser in extent and duration as the lease modification would not be approved and improvements to CR 120 N would be completed past Phase 3.

3.7 Vegetation

3.7.1 Affected Environment

Vegetation communities that could be impacted by the Proposed Action are those within the existing and proposed lease modification areas held by GCC, as well as the area along CR 120 N where road improvements are proposed. The vegetation resource study area includes approximately 2,370 acres and encompasses the existing and proposed lease modification areas (approximately 1,311.69 and 950.55 acres, respectively), as well as a 50-foot-wide buffer on either side of CR 120 N where road improvements are proposed (approximately 109 acres). The vegetation study area is entirely contained within the Western Range and Irrigated Land Resource Region of the Southwestern Plateaus, Mesas, and Foothills Major Land Resource Area (USDA/NRCS 2006). The study area contains moderately rugged terrain consisting primarily of mesas drained by Hay Gulch; elevations vary from approximately 7,200 feet to 7,900 feet above mean sea level (USGS 2013a, USGS 2013b, USGS 2013c). Vegetation analysis has been completed in portions of the Study Area, as summarized in the following baseline reports:

- Preliminary Environmental Assessment, DOI-BLM-CO-S010-2014-0025, GCC Energy Proposed Exploration License Application COC 76563 (USDI/BLM 2015b)
- Natural Resource Surveys at 2012-2013 Coal Exploration Drill Sites; Memorandum to GCC Energy, LLC. (Ecosphere 2016)
- Technical memorandum: Natural Resources Survey of Nine Proposed Drill Holes on State Land for the King II Mine, La Plata County, Colorado (SWCA 2014)

General Vegetation

Table 3-13 shows the land cover types in the vegetation study area, as mapped by the National GAP analysis program (USGS 2004). For the purposes of this analysis, land cover types are considered dominant when their acreages account for more than one percent of the vegetation study area. Dominant plant communities in the vegetation study area include Southern Rocky Mountain ponderosa pine woodland, Rocky Mountain Gambel oak-mixed montane shrubland, Colorado Plateau piñon-juniper woodland, agriculture, and Rocky Mountain montane dry-mesic mixed conifer forest and woodland (USGS 2004); these dominant cover types are discussed in greater detail below. Vegetation communities are shown on Map A-9 in Appendix A.

Table 3-13. Land Cover Types in the Vegetation Study Area

Land Cover Type	Area within Vegetation Study Area (acres)	Proportion of Vegetation Study Area (percent)
Southern Rocky Mountain Ponderosa Pine Woodland	1,178	50
Rocky Mountain Gambel Oak-Mixed Montane Shrubland	903	38
Colorado Plateau Piñon-Juniper Woodland	140	6
Agriculture	47	2
Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland	47	2
Rocky Mountain Lower Montane Riparian Woodland and Shrubland	24	1
Rocky Mountain Montane Mesic Mixed Conifer Forest and Woodland	19	1
Inter-Mountain Basins Semi-Desert Grassland	9	0
Southern Rocky Mountain Montane-Subalpine Grassland	2	0
Inter-Mountain Basins Semi-Desert Shrub Steppe	1	0
Inter-Mountain Basins Big Sagebrush Shrubland	1	0
Inter-Mountain Basins Greasewood Flat	0	0

Land Cover Type	Area within Vegetation Study Area (acres)	Proportion of Vegetation Study Area (percent)
Total:	2,370	100

Source: National GAP Analysis Program, USGS 2004.

Southern Rocky Mountain Ponderosa Pine Woodland

The southern Rocky Mountain ponderosa pine woodland community is generally observed at the higher elevations and cooler sites—such as drainages—within the vegetation study area. This series generally occurs on soils with good aeration and drainage, coarse textures, circumneutral to slightly acid pH, an abundance of mineral material, rockiness, and periods of drought during the growing season (USGS undated). The vegetation community is typically dominated by ponderosa pine (*Pinus ponderosa*), with Douglas-fir (*Pseudotsuga menziesii*), piñon pine (*Pinus edulis*), and juniper (*Juniperus* spp.) also present. Understory species commonly include Gambel oak (*Quercus gambelii*), serviceberry (*Amelanchier* spp.), snowberry (*Symphoricarpos* spp.), squirreltail (*Elymus elymoides*), slender wheatgrass (*Elymus trachycaulus*), Oregon grape (*Mahonia repens*), and buckwheat species (*Eriogonum* sp.). The ponderosa pine woodland community accounts for approximately 1,178 acres (50 percent) of the vegetation study area, making it the most abundant vegetation community present.

Rocky Mountain Gambel Oak – Mixed Montane Shrubland

The Rocky Mountain Gambel oak-mixed montane shrublands vegetative community accounts for approximately 903 acres (38 percent) of the vegetation study area. This community occurs mostly on rolling hills and above drainages in the vegetation study area. Vegetation within this series is typically dominated by Gambel oak with occurrences of serviceberry, big sagebrush (*Artemisia tridentata*), alderleaf mountain mahogany (*Cercocarpus montanus*), antelope bitterbrush (*Purshia tridentata*), and snowberry (USDI/BLM 2015b; USGS undated). Herbaceous vegetation includes species such as blue grama (*Bouteloua gracilis*), Arizona fescue (*Festuca arizonica*), smooth brome (*Bromus inermis*), and western wheatgrass (*Pascopyrum smithii*). Soils in this community range from calcerous, heavy, fine-grained loams to sandy loams, gravelly loams, clay loams, deep alluvial sand, or coarse gravel (USGS undated).

Colorado Plateau Piñon – Juniper Woodland

The Colorado Plateau piñon-juniper woodland community occurs on warm, dry sites (i.e., south-facing slopes and lower elevations) in the vegetation study area. Soils may vary in texture from stony, cobbly, gravelly sandy loams to clay loam or clay (USGS undated). This vegetation community is dominated by piñon pine and Rocky Mountain juniper (*Juniperus scopulorum*) with understory species such as Gambel oak, Indian ricegrass (*Achnatherum hymenoides*), lupine (*Lupinus* sp.), brome (*Bromus* sp.), sweetclover (*Melilotus officinalis*), black sagebrush (*Artemisia nova*), rabbitbrush (*Ericameria nauseosa*), and Utah serviceberry (*Amelanchier utahensis*). These areas also contain a minor component of alderleaf mountain mahogany, beardtongue (*Penstemon* sp.), Bigelow sage (*Artemisia bigelovii*), cheatgrass (*Bromus tectorum*), mullein (*Verbascum* sp.), and wild crab apple (*Peraphyllum ramosissimum*) (USDI/BLM 2015b; Ecosphere 2016; USGS undated). Colorado Plateau piñon-juniper woodlands make up approximately 140 acres (6 percent) of the vegetation study area.

Agricultural

Agricultural lands account for approximately 47 acres (2 percent) of the vegetation study area. Agricultural lands—including hay meadows and open pastures—dominate the bottom of Hay Gulch, where they are supported by the Hay Gulch Irrigation Ditch. Scattered patches of willow (*Salix* sp.), cottonwood (*Populus* sp.), and alder (*Alnus* sp.) occur along the Hay Gulch Irrigation Ditch.

Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland

The Rocky Mountain montane dry-mesic mixed conifer forest and woodland community occurs on west- and northwest-facing slopes in the existing lease and proposed lease modification areas. Dominant species include Douglas-fir, white fir (*Abies concolor*), and ponderosa pine (USGS undated). Understory species such as Arizona fescue, squirreltail, slender wheatgrass, Oregon grape, and snowberry are common. The Rocky Mountain Montane Dry-Mesic Mixed Conifer Forest and Woodland accounts for approximately 47 acres (2 percent) of the vegetation study area. Species composition in this vegetation community is highly variable based on specific-site conditions such as slope, aspect, and rainfall.

Forest Management

Timber resources in the project area include species such as piñon pine, ponderosa pine, juniper, and Gambel oak. These resources may occur in the forested vegetation communities as shown on Map A-9 in Appendix A. Project area forest resources are managed by the UMU Tribe; although there is no published forest or natural resources management plan developed for the area.

Invasive, Non-Native Species

Four invasive, non-native weed species have been observed within previously disturbed portions of the project area (USDI/BLM 2015b; SWCA 2014). Three of the weed species observed—Musk thistle (*Carduus nutans*), Canada thistle (*Cirsium arvense*), and redstem stork's bill (*Erodium cicutarium*)—are State of Colorado-listed and BLM-listed Class B species, which are managed for containment at the local government level. Common mullein (*Verbascum thapsus*) is a State of Colorado-listed Class C weed species. List C weed species are widespread and common within the state; however, they may be subject to control requirements if they pose a risk to agricultural lands. GCC is required to manage invasive species in accordance with state and local regulations. Noxious weed management efforts are described in detail in the PAP and include annual monitoring and any combination of control measures such as cultural, mechanical, biological, or chemical controls as developed in conjunction with local weed control district and/or the Colorado State Department of Agriculture.

Wetlands and Riparian Zones

Wetland mapping indicates the presence of less than one acre of potential wetlands scattered across the surface of the proposed modification and existing lease area, as shown on Map A-3 in Appendix A, Surface Water Resources (USFWS/NWI 2015). Potential wetlands are generally associated with man-made ponds and intermittent streams that may support wetland vegetation. Common wetland and riparian plant species that are expected to occur in the study area, especially in Alkali Gulch and Hay Gulch, include narrowleaf cottonwood (*Populus angustifolia*), narrowleaf willow (*Salix exigua*), water birch (*Betula occidentalis*), duckweed (*Lemna* spp.), rushes (*Eleocharis* and *Juncus* spp.), sedges (*Carex* spp.),

bentgrass (*Agrostis* spp.), and broad leafcattail (*Typha latifolia*). Within the existing lease and lease modification areas, several impoundments along unnamed intermittent drainages have been constructed to create small, seasonal ponds that may support wetlands. Alkali Gulch, located near the western boundary of the project area, contains an intermittent drainage and associated freshwater emergent wetland. The Hay Gulch Irrigation ditch runs roughly parallel to CR 120 and is mapped as an intermittent/seasonally flooded drainage (Cowardin classification R4SBC) and, in places, supports a freshwater forested/shrub wetland (Cowardin classification PSSA). There are scattered freshwater emergent wetlands and ponds in the agricultural lands at the bottom of Hay Gulch. Table 3-14 includes the Cowardin classifications of wetlands mapped in the project area and vicinity.

Table 3-14. Cowardin classifications of mapped wetlands in the project area and vicinity

Wetland Type	Cowardin Classification(s)
Riverine	R3UBH, R4SBA, R4SBC, R4SBCx, R5UBH, and R5UBFx
Freshwater emergent wetland	PEM1A, PEM1C
Freshwater pond	PABFh, PUSAh, PUSCh, and PUBFx
Freshwater forested/shrub wetland	PSSA

Source: USFWS/NWI 2015.

3.7.2 Impacts from the Proposed Action

Direct and Indirect Impacts

General Vegetation

The lease modification would add an additional 950.55 acres to the potential underground mining area at the King II Mine. While the lease modification would not directly impact vegetation resources in the project area, the mine plan revision would have a direct impact to vegetation associated with surface disturbing activities. In addition, parts of the Proposed Action—including improvements to CR 120 N—are expected to result in long-term vegetation disturbance in the project area.

The potential for future exploration drilling in the lease modification area would likely require vegetation removal at exploration drill sites, as well as along any new access routes to the drill sites. Effects from potential future exploration drilling would be subject to analysis, including biological and cultural clearances, by the OSMRE and CDRMS. There is also the potential for other future minor disturbance above the existing and proposed lease modification areas associated with exploration or core drilling needs. These activities typically require overland travel by a drill rig, minor ground surface level and limited vegetation clearing. Disturbance is usually confined to a 50 ft. x 50 ft. work area. Overall, no more than 5.0 acres of surface disturbance are anticipated as a result of the mine permit revision. These disturbances would have minor impacts to vegetation resources. Further, reclamation (i.e., seeding, mulching, etc.) is completed in conformance with the Reclamation Plan post-disturbance. Site reclamation would be expected to recover disturbed areas within 5 years, therefore these impacts are considered short term.

Subsidence resulting from future underground mining activities may impact small areas of vegetation through erosion, rock fall, and minor landslides that can damage, cover, and possibly result in the loss of vegetation. In most cases, any loss of vegetation would be difficult to detect or notice without prior knowledge of the area prior to subsidence. Vegetation communities are not expected to change on a landscape scale due to subsidence. Accordingly, the potential impacts to vegetation from subsidence are expected to be negligible and long term.

Construction and road improvements to CR 120 N would impact an estimated 4.7 acres of vegetation, consisting predominately of agricultural land and Rocky Mountain Gambel Oak-Mixed Montane Shrubland habitat with pockets of Rocky Mountain Ponderosa Pine Woodland and Inter-Mountain Basins Semi-Desert Grassland habitats. Vegetation trampling and removal would occur adjacent to the existing road. The expected increases in mining-related traffic associated with the Proposed Action would likely result in increased dust deposition on roadside plants; however, paving portions of CR 120 N would reduce the amount of airborne dust. Any reductions in soil fertility or productivity that may result from the Proposed Action have the potential to reduce vegetative cover in affected areas; however, this impact would be minimized by immediate containment, recovery, and disposal of contaminated soils in accordance with the mines waste management procedures (refer to Section 3.3). Impacts to vegetation along CR 120 would be minor and long term, as most native vegetation has already been altered along the CR ROW.

Forest Management

No changes in UMU forest management are expected to result from the Proposed Action; nor is removal of any marketable timber anticipated in the lease modification area. There is a possibility that a small number of trees on private property may require trimming or removal associated with the CR 120 N improvements. However, these potential minor impacts will not be known until final design plans are approved by LPC.

Invasive, Non-Native Species

The proposed lease modification would not directly result in surface disturbance. The potential for the introduction and spread of invasive, non-native species from future surface-disturbing activities related to underground mining would be an indirect impact caused by surface clearing and disturbance of area soils. This impact would be minor and would persist for the duration of mining activities. Impacts would be minimized by following the Reclamation Plan General Requirements as described in the PAP.

Surface disturbance, and a resulting increase in the potential for the spreading of noxious weeds, is expected along CR 120 N where improvements are proposed. GCC would minimize this impact by reseeding and/or implementing weed control measures along the improved portions of CR 120 N—as specified in Design Feature 5. Accordingly, potential impacts from the introduction of invasive weeds to the project area would be minor and short term.

Wetlands and Riparian Zones

Potential impacts to wetland and riparian vegetation would be similar to those described above for general vegetation. No direct impacts to wetland or riparian vegetation within the existing or proposed lease

modification areas are expected as a result of the Proposed Action. Site-specific clearances and, if necessary, permitting for crossing potentially jurisdictional wetlands or other waters of the U.S. would be completed under the purview of the U.S Army Corps of Engineers prior to commencing any site-specific road improvements in areas with potentially jurisdictional wetlands or waters of the U.S. present. Any potential impacts to riparian areas would likely be authorized under Nationwide Permit #14, Access Roads.

Mitigation Measures and Residual Impacts

Disturbed vegetation would be reclaimed in accordance with the Reclamation Plan General Requirements as described in the PAP, which is publicly available from the OSMRE. In addition, vegetation impacts resulting from spills or leaks would be minimized by following the mines waste management procedures (refer to Section 3.3). GCC would minimize the potential for the introduction or spread of invasive, non-native plant species as specified in Design Feature 5. Impacts to wetland or riparian vegetation would be subject to site-specific analysis and permitting in association with potentially jurisdictional wetlands or other waters of the U.S. Residual impacts to vegetation following these measures would be negligible to minor.

3.7.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, similar direct and indirect impacts are expected to the existing vegetation resources in the project area. Current conditions would continue, and vegetation would continue to be modified through the current land use activities. These impacts would be negligible to minor and last until coal reserves were depleted.

3.8 Wildlife (Aquatic and Terrestrial)

3.8.1 Affected Environment

The Project Area contains the following habitat/landscape features; rolling piñon-juniper woodlands along the edges of Hay Gulch Canyon; bottomlands are characterized by irrigated and non-irrigated pasture lands; there are small areas (less than 0.25 acre) of riparian vegetation along edges of irrigation channels and along Hay Gulch and Alkali Gulch; north of the mine (1 to 5 miles away) are deep, steep canyons that contain patches of Ponderosa pine and mature spruce-fir woodlands; micro-habitats including fruit trees, ornamentals, and exotic trees and shrubs are present at some of the residences along CR 120 N. The following sections describe wildlife with potential to occur in the vicinity of the King II Mine and along CR 120 N in the project area.

Aquatic Species

Aquatic resources in the project area are very limited, with less than approximately one acre of potential wetland habitats mapped (USFWS/NWI 2015). Based on the limited availability of aquatic habitats, aquatic wildlife are expected to occur infrequently in the project area. Reptiles and amphibians such as

bullsnake (*Pituophis catenifer*), variable skink (*Eumeces gaigeae*), and western chorus frog (*Pseudacris triseriata*) could potentially use pond margins and edge habitats along intermittent stream in the project area.

Game Species

Game species that could potentially utilize project area habitats include elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), mountain lion (*Puma concolor*), and wild turkey (*Meleagris gallopavo*).

The project area includes a resident elk population, as well as mapped winter range for elk (CPW 2016). A resident population refers to a group of animals that use the area all year. Winter range refers to the location of 90 percent of individuals for an average of 5 winters out of 10. The project area contains mule deer summer and winter range, and a portion of CR 120 N is within a mapped winter concentration area for mule deer (CPW 2016). No severe winter range or winter concentration areas for elk or mule deer have been identified in the existing lease area or the lease modification area. Per Colorado Parks and Wildlife (CPW), there are important migration corridors for mule deer and elk to the north and south of CR 120 N. Mule deer and elk use woodland areas for cover and can use a wide variety of other habitat types for browse.

Black bears are common and often sighted in the project area. Per CPW data, a portion of the project area is within black bear fall and summer concentration habitats (CPW 2016). Black bears and black bear sign were observed during field surveys in 2014 (USDI/BLM 2015b).

The project area is within mapped overall mountain lion range (CPW 2016) and mountain lions have been observed in the proposed project area (USDI/BLM 2015b).

Wild turkey overall range is mapped throughout the project area (CPW 2016). Wild turkey winter range, winter concentration, and production areas are mapped in portions of the project area. Several turkeys were observed during field surveys completed in 2014 (USDI/BLM 2015b).

Raptors

The project area contains bald eagle (*Haliaeetus leucocephalus*) winter range, as mapped by CPW (CPW 2016). There are three active bald eagle nests and several undetermined, unknown, destroyed, or inactive nests within 12 miles of the proposed project area (CPW 2016). Within 10 miles of the project area, CPW has also mapped bald eagle winter foraging, summer foraging, and winter concentration areas. Potential Peregrine falcon (*Falco peregrinus*) nesting areas are located within 5 miles of the project area (CPW 2016). No bald eagles or peregrine falcons were observed in the proposed project area during 2014 surveys; however, several other raptors were observed including red-tailed hawk (*Buteo jamaicensis*), northern harrier (*Circus cyaneus*), and American kestrel (*Falco sparverius*) nests (USDI/BLM 2015b). These past avian surveys were conducted to determine if Mexican spotted owl were utilizing the steeper canyon habitats north of the King II mine (Refer to Section 3.10 for additional detail).

Wild Horses

There are no known wild horse herds in the project area or vicinity.

Migratory Birds

Under the Migratory Bird Treaty Act (16 USC §703-712) and Executive Order 13186, “Responsibilities of Federal Agencies to Protect Migratory Birds,” federal agencies are directed to consider land management and planning impacts to migratory birds. The USFWS administers the MBTA, which prohibits the take of any active nest. While all migratory birds are protected by the MBTA, certain species have been determined to be at greater risk than others. OSMRE and USFWS entered into a Memorandum of Understanding in 2016 (USFWS 2016) to enhance collaboration between the agencies to strengthen migratory bird conservation. Bird species that are at greater conservation risk were considered according to the USFWS Birds of Conservation Concern (BCC) 2008 report (USFWS 2008) and the Land Bird Conservation Plan created by the Colorado Partners in Flight (COPIF) (COPIF 2000), listed in Table 3-15. Potential effects focus on bird species that have habitat in the project area and vicinity and are included on the BCC list and/or the COPIF Land Bird Conservation Plan.

Table 3-15. USFWS Birds of Conservation Concern – Region 16 (Southern Rockies/Colorado Plateau) and Colorado Partners in Flight Priority Species – Physiographic Area 87 (Colorado Plateau)

Species	Status ¹	General Habitat Description	Potential to Occur in or near the Project Area
American bittern (<i>Botaurus lentiginosus</i>)	BCC	Marsh, swamp, or bog	No
Bald eagle (<i>Haliaeetus leucocephalus</i>)	BCC	Nests in tall trees and near bodies of water	Potential foraging
Band-tailed pigeon (<i>Patagioenas fasciata</i>)	COPIF	Mature ponderosa pine and piñon pine	Potential breeding
Bendire’s thrasher (<i>Toxostoma bendirei</i>)	BCC	Open desert habitats including grasslands, shrublands, or woodlands with scattered shrubs or trees; sagebrush with scattered junipers	Potential breeding
Black rosy-finch (<i>Leucosticte atrata</i>)	BCC	Rock faces in alpine tundra	No
Black-chinned hummingbird (<i>Archilochus alexandri</i>)	COPIF	Open piñon-juniper woodland, lowland riparian woodland, and tall riparian shrublands, including Gambel oak	Potential breeding
Black-throated gray warbler (<i>Dendroica nigrescens</i>)	COPIF	Piñon-juniper obligates, preferring tall, dense piñon-juniper woodlands; occasionally use adjacent ponderosa pine and Douglas-fir habitats	Potential breeding
Brewer's sparrow (<i>Spizella breweri</i>)	COPIF, BCC	Primarily sagebrush, mixed shrublands	Potential breeding
Brown-capped rosy-finch (<i>Leucosticte australis</i>)	COPIF, BCC	Rock faces in alpine tundra	No

Species	Status ¹	General Habitat Description	Potential to Occur in or near the Project Area
Burrowing owl (<i>Athene cunicularia</i>)	BCC	Prairie dog colonies—grasslands, shrublands, and deserts	No
Cassin's kingbird (<i>Tyrannus vociferans</i>)	COPIF	Piñon-juniper woodlands, frequently in association with sagebrush and rimrock	Potential breeding
Cassin's finch (<i>Carpodacus cassinii</i>)	BCC	Mid-elevational forest, between 8,000 and 11,000 feet	Potential foraging
Chestnut-collared longspur (<i>Calcarius ornatus</i>)	BCC	Short and mixed-grass prairies with rolling topography	No
Common Poorwill (<i>Phalaenoptilus nuttallii</i>)	COPIF	Rocky sagebrush and mountain shrublands, piñon-juniper woodlands, and ponderosa pine woodlands	Potential breeding
Ferruginous hawk (<i>Buteo regalis</i>)	BCC	Grasslands and semi-desert shrub; winter resident in western Colorado	Winter only
Flammulated owl (<i>Otus flammeolus</i>)	COPIF, BCC	Open ponderosa pine forests; dry montane conifer or aspen forests	Potential breeding
Golden eagle (<i>Aquila chrysaetos</i>)	BCC	Open habitats including grasslands, sagebrush, farmlands or tundra	Potential foraging
Grace's warbler (<i>Dendroica graciae</i>)	COPIF, BCC	Ponderosa pine with scrub oak understory	Potential breeding
Grasshopper Sparrow (<i>Ammodramus savannarum</i>)	BCC	Open grassy and weedy meadows, pastures, and plains	Migrant only
Gray flycatcher (<i>Empidonax wrightii</i>)	COPIF	Piñon-juniper obligate	Potential breeding
Gray vireo (<i>Vireo vicinior</i>)	COPIF, BCC	Mesas, steep hillsides, canyons and wide valleys below 6,400 feet	No
Gunnison sage grouse (<i>Centrocercus minimus</i>)	COPIF, BCC	Sagebrush grasslands	No
Horned lark (<i>Eremophila alpestris</i>)	COPIF	Prefer treeless areas with short grass, forbs, and/or scattered short shrubs.	Migrant only
Juniper titmouse (<i>Baeolophus ridgwayi</i>)	COPIF, BCC	Piñon-juniper; cavity nester	Potential breeding
Lewis's woodpecker (<i>Melanerpes lewis</i>)	COPIF, BCC	Open ponderosa pine forests, riparian, and piñon-juniper woodlands	Potential breeding
Loggerhead shrike (<i>Lanius ludovicianus</i>)	COPIF	Utilize shrubby habitats in open country; tall desert shrubs or piñon-juniper edge habitats	Potential breeding
Long-billed curlew (<i>Numenius americanus</i>)	BCC	No potential for occurrence; analysis area does not contain suitable habitat.	No
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	COPIF, T	Mature to old growth mixed conifer stands on steep, north-facing slopes	Suitable habitat exists several miles north of

Species	Status ¹	General Habitat Description	Potential to Occur in or near the Project Area
			the proposed lease modification area. USFWS protocol surveys did not result in any detections in 2014 and 2015 (Ecosphere 2016a)
Mountain plover (<i>Charadrius montanus</i>)	BCC	Grazed shortgrass prairie and fallow plowed agricultural fields	No
Northern harrier (<i>Circus cyaneus</i>)	COPIF	Prefer large tracts of wetlands with dense vegetation; also utilize wet meadows, grasslands, sagebrush, and mountain shrublands	Potential breeding
Northern sage grouse (<i>Centrocercus urophasianus</i>)	COPIF	Sagebrush obligates, prefer large expanses of big sagebrush flat/rolling terrain, riparian meadows for brood and summer habitat	No
Peregrine falcon (<i>Falco peregrinus</i>)	COPIF, BCC	Cliffs, associated with riparian areas	Potential foraging
Piñon jay (<i>Gymnorhinus cyanocephalus</i>)	COPIF, BCC	Piñon-juniper woodlands	Potential breeding
Prairie falcon (<i>Falco mexicanus</i>)	BCC	Cliff faces in open country	Potential foraging
Sage sparrow (<i>Amphispiza belli</i>)	COPIF	Large, low elevation stands of big sagebrush or mixed big sagebrush and greasewood	No
Scott's oriole (<i>Icterus parisorum</i>)	COPIF	Low elevation piñon-juniper woodlands and juniper savannas	No
Short-eared owl (<i>Asio flammeus</i>)	COPIF	Open habitats including grasslands, marsh edges, shrub-steppe, and agricultural lands with tall grass cover	Potential foraging
Snowy plover (<i>Charadrius nivosus</i>)	BCC	Coastal beaches and shores of inland alkaline lakes with little to no vegetation.	No
Veery (<i>Catharus fuscescens</i>)	BCC	Dense riparian thickets, willow-riparian.	No
Virginia's warbler (<i>Vermivora virginiae</i>)	COPIF	Dense shrublands, piñon-juniper and oak woodlands	Potential breeding
Western bluebird (<i>Sialia mexicana</i>)	COPIF	Open ponderosa pine forests with large trees and snags with nest cavities	Potential breeding
Western kingbird (<i>Tyrannus tyrannus</i>)	COPIF	Open riparian forests, agricultural areas, and piñon-juniper woodlands	Potential breeding

Species	Status ¹	General Habitat Description	Potential to Occur in or near the Project Area
White-throated swift (<i>Aeronautes saxatalis</i>)	COPIF	Cliffs required for nesting; may forage over many different habitats within a few miles of the nest	Potential foraging
Willow flycatcher (<i>Empidonax traillii</i>)	BCC, E*	Dense, shrubby riparian vegetation	No
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	BCC, T	Riparian; gallery cottonwoods with a dense understory	No

¹Status codes: COPIF = Colorado Partners in Flight Priority Species (COPIF 2000), BCC = USFWS Birds of Conservation Concern (USFWS 2008), T= USFWS listed as Threatened, E= USFWS listed as Endangered, C= Candidate for USFWS listing, P= Proposed for USFWS listing

*The southwestern subspecies of willow flycatcher (*E. T. extimus*) is listed by the USFWS as Endangered.

3.8.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The lease modification in and of itself would not directly impact aquatic or terrestrial wildlife that may use the project area. However, surface-disturbing components of the Proposed Action—and future coal mining in the lease modification tracts—have the potential to impact wildlife resources in the project area. In general, wildlife that may utilize the project area have the potential to be impacted by surface-disturbing activities, human presence, light, and noise.

The extension of underground mining into the lease modification parcels would not result in noise or surface activity level increases; rather the existing levels would be extended in duration until the lease modification area coal resource is exhausted. This potential impact is expected to be minor, as area wildlife potentially utilizing the project area and vicinity are likely accustomed to the existing noise levels from the King II and historic mining in the area. The mine site itself is quite small; a prefab office building, a few out buildings, a portal; and a load out facility. Light produced by the facility has not been identified as an issue of concern or irritation by area residents. Similar to residences and farms, lights on at night attract flying insects and generally benefit feeding bats and birds in the area. These impacts would be expected to persist for the duration of mining operations.

Surface disturbance from potential future exploration drilling in the lease modification area could potentially impact wildlife; however, these effects would be subject to analysis by the OSMRE and CDRMS prior to implementation. Overall, no more than 5.0 acres of surface disturbance are anticipated as a result of the mine permit revision. Surface areas above the proposed lease modification tracts are primarily Rocky Mountain Gambel Oak-Mixed Montane Shrubland habitat. Subsidence has the potential to impact wildlife, primarily in relation to the potential for vegetation to be impacted.

Project related surface disturbance would result primarily from improvements along CR 120 N. As detailed in Section 2.1, the Proposed Action would include a relatively small loss of habitat along CR 120 N, increased human presence during construction of road improvements, and a phased increase in mine-related vehicular traffic along CR 120 N. Long-term habitat loss along CR 120 N would include an

estimated 4.7 acres of mainly agricultural land and Rocky Mountain Gambel Oak-Mixed Montane Shrubland habitat, with pockets of Rocky Mountain Ponderosa Pine Woodland and Inter-Mountain Basins Semi-Desert Grassland habitats. Wildlife are expected to disperse into adjacent suitable habitats during construction activities along CR 120 N, and would likely return to normal use patterns once construction is complete. However, individual mortality may occur, especially for small mammals or nesting birds. Impacts to wildlife from construction of road improvements would be minor and short term; impacts from habitat loss along CR 120 N would be negligible and long term.

Design Feature 5, Traffic, includes several measures to increase safety along CR 120 N. Vegetation clearing along CR 120 N could impact individual wildlife; however, the long-term risk of wildlife-vehicle collisions would be reduced by improving the line of sight for drivers. An increase in the length of paved surface on CR 120 N would allow haul trucks to travel at higher speeds for a greater portion of the roadway; however, trucks would continue to travel at least 5 miles per hour (mph) slower than posted speed limits, thereby reducing the risk of wildlife-vehicle collisions. Overall, the potential impacts described above would be negligible to minor for the duration of mine operations.

Aquatic Species

No direct impacts to aquatic habitats within the existing or proposed lease modification areas are expected as part of the Proposed Action. In addition, site-specific clearances and permitting (if necessary) for work in potentially jurisdictional wetlands or other waters of the U.S. would be completed under the purview of LPC at the time that site-specific road improvement construction plans are submitted to the LPC Engineer. Accordingly, potential impacts to aquatic species would be negligible.

Game Species

The Proposed Action would reduce the risk of wildlife-vehicle collisions along CR 120 N. Game species generally have large home ranges, therefore the minor vegetation loss associated with the Proposed Action is not likely to impact individuals. Any game species using the project area are likely accustomed to the existing noise level and human presence there, which would not be expected to change appreciably from implementation of the Proposed Action. These noise and mining related human activities would be extended for approximately 3-5 additional years until the lease modification area coal reserves are exhausted. Overall, the potential impacts described above would be negligible to minor for the duration of mine operations.

Raptors

Raptors that may forage in the project area may avoid the area during surface-disturbing activities; however, individuals are expected to utilize adjacent suitable habitats during construction and would likely return to regular use patterns once construction is complete. The Proposed Action is not expected to result in changes to existing noise levels or human activity on the ground surface; rather, these noise and mining related human activities would be extended for approximately 3-5 additional years until the lease modification area coal reserves are exhausted. This impact to area raptors would be negligible.

Wild Horses

Because there are no wild horse herds in or near the project area, no direct or indirect impacts are expected.

Migratory Birds

The ongoing impacts to migratory birds from mining operations are not expected to change appreciably based on implementation of the Proposed Action. Any surface-disturbing activities in the lease modification area would be analyzed and permitted by OSMRE and CDRMS prior to implementation.

Migratory birds may be displaced, injured, or killed during construction of the CR 120 N improvements; this impact would be minimized by completion of migratory bird nest clearance prior to any vegetation clearing. Vegetation removal would occur adjacent to the existing road and is not expected to increase habitat fragmentation. Direct impacts to migratory birds would be negligible and short term, as any future vegetation clearing would not occur during the breeding season.

Mitigation Measures and Residual Impacts

Design Features 4a and 4b would benefit project area wildlife by including efforts to minimize noise and vibration impacts from the mine facility and truck traffic (respectively). Design Feature 5 includes several safety measures that would reduce the potential for wildlife-vehicle collisions. Work in potentially jurisdictional wetlands or other waters of the U.S. would be permitted under the purview of LPC prior to implementation. To minimize impacts to migratory birds, all drilling actions would either be completed outside of the nesting season or appropriate nest clearance surveys would be conducted by experienced biologists prior to any disturbance—as specified in the PAP. In addition, nest clearance surveys would be completed prior to any vegetation removal along CR 120 N that is proposed within the nesting season. Based on the low (negligible to minor) level of potential impacts to wildlife discussed above, annual monitoring would not be performed.

3.8.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, mining would continue in the existing lease area under the current mining plan. Mine-related noise, human presence, and surface-disturbing activities would be expected to continue at existing levels until current coal reserves are exhausted around 2019. Impacts associated with currently ongoing road improvements to CR 120 N would be the same as those described under the Proposed Action alternative, although the impacts would also be for a shorter duration of time as road improvements would like cease after Phase 3 in 2019.

3.9 Threatened, Endangered and Sensitive Species

3.9.1 Affected Environment

Special Status Plant and Animal Species

There are 37 BLM sensitive species with potential to occur on lands managed by the TRFO (USDI/BLM 2015c); their basic habitat descriptions and potential to occur in or near the project area are included in Table 3-16. Based on the habitat preferences and known ranges, 5 of the 37 species have potential or are suspected to occur in or near the project area—these include (1) Allen’s big-eared bat, (2) fringed myotis, (3) bald eagle, (4) golden eagle, and (5) northern goshawk.

Table 3-16. Bureau of Land Management Listed Sensitive Species

Species	Habitat Requirements	Potential to occur in or near the Project Area ¹
Mammals (7)		
Allen’s big-eared bat (<i>Idionycteris phyllotis</i>)	Rocky and riparian areas in woodland and scrubland regions.	S; No roosts will be disturbed
Desert bighorn sheep (<i>Ovis canadensis nelsoni</i>)	Rocky canyons, grass, low shrub, open habitat with adjacent steep rocky areas for escape and safety.	NP; project area is outside of species’ known geographic distribution
Fringed myotis (<i>Myotis thysanodes pahasapensis</i>)	Piñon-juniper and other coniferous woodlands.	S; No roosts will be disturbed
Gunnison’s prairie dog (<i>Cynomys gunnisonii</i>)	High mountain valleys and plateaus at elevations of 6,000 to 12,000 feet; grasslands and semi-desert and montane shrublands, with scattered junipers and pines.	NP; No colonies in project area
Rocky mountain bighorn sheep (<i>Ovis canadensis</i>)	Prefers steep, high-mountain terrain. In Colorado, prefers habitat dominated by grass, low shrubs, rock cover, and areas near open escape routes.	NP; No suitable habitat in project area
Spotted bat (<i>Euderma maculatum</i>)	Piñon-juniper, shrub desert, and possibly riparian habitats.	NS; No roosts will be disturbed
Townsend’s big-eared bat (<i>Corynorhinus townsendii</i>)	Dependent on availability of abandoned or inactive mines or caves for roosting.	NS; No roosts will be disturbed
Birds (9)		
American Peregrine Falcon (<i>Falco peregrinus</i>)	Prefers open country and high vertical cliff areas for nesting (>200 feet).	NP; Cliff structure not present in project area
Bald Eagle (<i>Haliaeetus leucocephalus</i>)	Forested stands around aquatic settings.	S; Potential foraging habitat

Species	Habitat Requirements	Potential to occur in or near the Project Area ¹
Black swift (<i>Cypseloides niger</i>)	Vertical rock faces near waterfalls or in dripping caves.	NP; No suitable habitat in project area
Brewer's sparrow (<i>Spizella breweri</i>)	Primarily sagebrush but also in mixed shrublands (e.g., rabbitbrush, greasewood, etc.).	NP; No suitable habitat in project area
Columbian sharp-tailed grouse (<i>Pediocetes phasianellus columbianus</i>)	Oak/serviceberry shrublands, often interspersed with sagebrush; aspen forests; irrigated pasture.	NP; project area is outside of species' known geographic distribution
Ferruginous hawk (<i>Buteo regalis</i>)	Grasslands and semi-desert shrub; winter resident in western Colorado.	NS; Outside known breeding range of species
Golden Eagle (<i>Aquila chrysaetos</i>)	Open habitats including grasslands, sagebrush, farmlands, and tundra.	S; Potential foraging habitat
Northern goshawk (<i>Accipiter gentiles</i>)	Ponderosa pine, aspen, mixed-conifer and spruce-fir forests.	S; Raptor timing restriction to protect raptors
Western burrowing owl (<i>Athene cunicularia</i>)	Prairie dog colonies with vacant burrows; grasslands, shrublands, deserts.	NP; No suitable habitat in project area
Fish, Amphibians, and Reptiles (9)		
Bluehead sucker (<i>Catostomus discobolus</i>)	Found in runs or riffles with gravel or rocky substrates within small or mid-sized tributaries of the Upper Colorado River Basin. Tributaries of the Colorado and San Juan Rivers.	NP; No suitable habitat in project area
Boreal toad (<i>Bufo boreas boreas</i>)	Permanent ponds or wetlands with shallow sunny margins, adjoining willow thickets or shrub cover, and upland montane forests within an elevation range between 8,000 and 11,000 feet. Normally associated with lodgepole pine or spruce-fir forests.	NP; No suitable habitat in project area
Canyon Treefrog (<i>Hyla arenicolor</i>)	Intermittent streams and pools in deep rocky canyons.	NP; No suitable habitat in project area
Colorado River cutthroat trout (<i>Oncorhynchus clarki pleuriticus</i>)	Headwater tributaries, larger streams, and portions of main-stem rivers within the Colorado River Basin.	NP; No suitable habitat in project area
Flannelmouth sucker (<i>Catostomus latipinnis</i>)	Occurs in medium to large streams not heavily impacted by impoundments or other habitat degradation in the Upper Colorado River Basin.	NP; No suitable habitat in project area
Longnose leopard lizard (<i>Gambelia wislizenii</i>)	Shrublands with open ground, below 5,200 feet elevation.	NP; No suitable habitat in project area
Midget faded rattlesnake (<i>Crotalus viridis concolor</i>)	High, cold desert dominated by sagebrush with an abundance of rock outcrops and exposed canyon walls.	NP; No suitable habitat in project area

Species	Habitat Requirements	Potential to occur in or near the Project Area ¹
Northern leopard frog (<i>Rana pipiens</i>)	Springs, slow streams, marshes, bogs, ponds, canals, floodplains, reservoirs, and lakes; usually permanent water with rooted aquatic vegetation. In summer, commonly inhabits wet meadows and fields.	NP; No suitable habitat in project area
Roundtail chub (<i>Gila robusta</i>)	Stream reaches that have a complexity of pool and riffle habitats; relatively deep, low-velocity habitats that are often associated with woody debris or other types of cover. Tributaries of the Colorado and San Juan rivers.	NP; No suitable habitat in project area
Insects (1)		
Great basin silverspot butterfly (<i>Speyeria nokomis nokomis</i>)	Found in streamside meadows and open seepage areas with an abundance of violets in generally desert landscapes; mostly tied to springs.	NP; No suitable habitat in project area
Plants (11)		
Aromatic Indian breadroot (<i>Pediomelum aromaticum</i>)	Semi-desert shrublands and sagebrush shrublands; 4,800 to 5,700 feet.	NP; No suitable habitat in project area
Comb Wash buckwheat (<i>Eriogonum clavellatum</i>)	Shale soils in shadscale communities, 4,300 to 5,500 feet; known in the Four Corners area and adjacent Utah.	NP; No suitable habitat in project area
Cushion bladderpod (<i>Physaria pulvinata</i>)	Barren shale outcrops in piñon-juniper, semi-desert shrubland, and sagebrush communities.	NP; No suitable habitat in project area
Dolores River skeletonplant (<i>Lygodesmia doloresensis</i>)	Piñon-juniper, semi-desert shrublands with shadscale, and sagebrush communities on reddish, purple, sandy alluvium and colluvium of the Cutler Formation between the canyon walls of the Dolores River; 4,000-5,500 feet.	NP; No suitable habitat in project area
Fragile rockbrake (<i>Cryptogramma stelleri</i>)	Sheltered calcareous cliff crevices and rock ledges, typically in coniferous forest or other boreal habitats.	NP; No suitable habitat in project area
Gypsum Valley cateye (<i>Oreocarya revealii</i>)	Grayish, near-barren gypsum hills of the Paradox Member of the Hermosa Formation in Western Colorado; known from Mesa, Montrose, and San Miguel Counties in Colorado.	NP; No suitable habitat in project area
Jones' bluestar (<i>Amsonia jonesii</i>)	Runoff-fed draws on sandstone in piñon-juniper and desert shrub communities, 3,900-7,000 feet; Known from Montezuma County, Colorado (Heil et al. 2013).	NS; project area is outside of species' known geographical distribution
Kachina fleabane (<i>Erigeron kachinensis</i>)	Saline soils in alcove and seeps in canyon walls; 4,800-5,600 feet.	NP; No suitable habitat in project area

Species	Habitat Requirements	Potential to occur in or near the Project Area ¹
Lone Mesa snakeweed (<i>Gutierrezia elegans</i>)	Barren Mancos Shale outcrops and thin soil over shale in piñon-juniper, semi-desert shrubland, and sagebrush vegetation communities; known from Dolores County, Colorado.	NS; project area is outside of species' known geographical distribution
Naturita milkvetch (<i>Astragalus naturitensis</i>)	Sandstone mesas, ledges, crevices, and slopes, 5,000-7,000 feet.	NP; project area is outside of species' elevation range
Frosty bladderpod (<i>Lesquerella pruinosa</i>)	Mountain grasslands and mountain shrublands on soils derived from Mancos Shale (6,800-8,000 feet); Known from Archuleta County (Heil et al. 2013).	NS; project area is outside of species' known geographical distribution

Source: USDI/BLM 2015c.

¹Potential to occur in project area: NP = habitat not present; NS = habitat present species not expected to occur; S = suspected occurrence; K = known occurrence.

USFWS Threatened and Endangered Species

The USFWS Information for Planning and Conservation tool was used to review USFWS threatened and endangered species in La Plata County, Colorado; Pueblo County, Colorado; and Bernalillo County, New Mexico (USFWS 2017). Pueblo and Bernalillo counties were queried to assess if species were potentially present in the known areas of coal combustion from GCC-owned and operated cement plants. None of the listed species have suitable habitat in the Project area; near the King II Mine or along CR 120 N to SH 140. Several of the riparian obligate species, such as Yellow-billed cuckoo, Southwestern willow flycatcher and New Mexico jumping meadow mouse, are known to occur in La Plata County with the nearest potential habitats along the La Plata River. The King II Mine is about 4.5 miles from the La Plata River with no noise, air, or human activity impacts from the mine anticipated to affect habitats along the La Plata River. CR 120 N, at its terminus with SH 140 is approximately 0.3 mile from the La Plata River. No impacts are expected to habitats along the La Plata River, or to listed species potentially present, from coal trucks turning onto the SH 140.

Based on the lack of habitat in the project area, determinations of “no effect” were made for 12 of the 14 species listed for the three counties. The two-remaining species—greenback cutthroat trout and Rio Grande silvery minnow—have potential to be impacted by the Proposed Action from coal combustion in those counties. A project-specific Biological Assessment (BA) was prepared to analyze the direct, indirect, and cumulative effects of the Proposed Action on federally listed species. Table 3-17 summarizes the analysis and effects determinations for federally listed species included in the analysis.

Table 3-17. Summary of effects analysis for Federally Listed Species considered in the analysis of the Proposed Action

Species	Status* (Counties where listed)	Analysis Summary
Mammals		
Black-footed ferret (<i>Mustela nigripes</i>)	E (Pueblo)	No effect ; no prairie habitats would be impacted by the Proposed Action.
Canada lynx (<i>Lynx canadensis</i>)	T (La Plata, Pueblo)	No effect ; no impacts to montane or subalpine forests are expected from the Proposed Action.
New Mexico meadow jumping mouse (<i>Zapus hudsonius luteus</i>)	E (La Plata, Bernalillo)	No effect ; nearest potential riparian habitat is located along the La Plata River and would not be impacted by the Proposed Action.
North American wolverine (<i>Gulo gulo luscus</i>)	P, T (La Plata, Pueblo)	No effect ; high-elevation alpine habitats would not be impacted by the Proposed Action.
Birds		
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	T (La Plata, Pueblo, Bernalillo)	No effect ; Proposed Action would not impact suitable habitat. Suitable habitat consisting of mixed conifer stands on steep, north-facing slopes exists several miles north of the proposed lease modification area; however, USFWS protocol surveys did not result in any detections in 2014 and 2015 (Ecosphere 2016a).
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	E (La Plata, Bernalillo)	No effect ; nearest potential riparian habitat is located along the La Plata River and would not be impacted by the Proposed Action.
Western Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	T (La Plata, Bernalillo)	No effect ; nearest potential riparian habitat is located along the La Plata River and would not be impacted by the Proposed Action.
Fish		
Colorado pikeminnow (<i>Ptychocheilus lucius</i>)	E (La Plata)	No effect ; Proposed Action would not impact suitable aquatic habitats.
Greenback cutthroat trout (<i>Oncorhynchus clarki stomias</i>)	T (Pueblo)	May affect, not likely to adversely affect ; Discussed in further detail below.
Razorback sucker (<i>Xyrauchen texanus</i>)	E (La Plata)	No effect ; Proposed Action would not impact suitable aquatic habitats.
Rio Grande silvery minnow (<i>Hybognathus amarus</i>)	E (Bernalillo)	May affect, not likely to adversely affect ; Discussed in further detail below.

Species	Status* (Counties where listed)	Analysis Summary
Flowering Plants		
Chapin Mesa milkvetch (<i>Astragalus schmolliae</i>)	C (La Plata)	No effect; Known species distribution is limited to Chapin Mesa area in Montezuma County, Colorado (Anderson 2004).
Knowlton’s cactus (<i>Pediocactus knowltonii</i>)	E (La Plata)	No effect; Proposed Action would not impact alluvial deposits in piñon-juniper woodlands. Known Species distribution is limited to one population along the Los Piños River in northeastern San Juan County, New Mexico (USFWS 1993).
Insects		
Uncompahgre fritillary butterfly (<i>Boloria acrocneuma</i>)	E (La Plata)	No effect; Proposed Action would not impact alpine snow willow habitats.

Source: USFWS 2017.

Critical Habitat

Three counties were reviewed for the presence of proposed or designated critical habitat: La Plata County, Colorado; Pueblo County, Colorado; and Bernalillo County, New Mexico. There is no designated or proposed critical habitat in the project area; near the King II Mine, or along CR 120 N to SH 140 (USFWS 2017); therefore, no impacts to critical habitat are expected in La Plata County, Colorado.

Critical habitats in Pueblo and Bernalillo counties were included to assess potential impacts near the known areas of coal combustion from GCC-owned and operated cement plants. There is designated critical habitat for Mexican spotted owl in both Pueblo and Bernalillo counties, however these habitats are in remote forested and canyon areas 10 to 20 miles from the nearest cement plant; and therefore, would not be impacted by the Proposed Action. There is also proposed critical habitat for the yellow-billed cuckoo in Bernalillo County along the Rio Grande River; however, the small amounts of Hg released are not expected to impact riparian habitats.

However, because of the potential for Hg to enter the Rio Grande River aquatic system from the Tijeras Cement Plant, the potential for impacts to designated critical habitat for the Rio Grande silvery minnow warrant further analysis.

Critical Habitat: Rio Grande Silvery Minnow

The USFWS designated Critical Habitat for the Rio Grande silvery minnow in 2003 (USFWS 2003). Critical habitat includes portions of the Middle Rio Grande River and the Jemez River through four New Mexico counties: Socorro, Valencia, Bernalillo, and Sandoval. There are four primary constituent elements of Critical Habitat specific to Rio Grande silvery minnow; as described below:

1. A hydrologic regime that provides sufficient flowing water with low to moderate currents capable of forming and maintaining a diversity of aquatic habitats, such as, but not limited to the following: backwaters, shallow side channels, pools, eddies, and runs of varying depth and

velocity—all of which are necessary for each of the particular silvery minnow life-history stages in appropriate seasons;

2. The presence of low-velocity habitat within unimpounded stretches of flowing water of sufficient length that provide a variety of habitats with a wide range of depth and velocities;
3. Substrates of predominately sand or silt; and
4. Water of sufficient quality to maintain natural, daily, and seasonally variable water temperatures in the approximate range of greater than 1 degree Celsius (°C) (35° Fahrenheit) and less than 30°C (85° Fahrenheit) and reduce degraded water conditions (decreased dissolved oxygen, increased pH, etc.) (USFWS 2003).

The potential effects to Rio Grande silvery minnow critical habitat are discussed below.

3.9.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Because disturbances to the ground surface and vegetation are concentrated along the existing CR 120 N ROW, direct impacts to sensitive species are anticipated to be negligible to non-existent. Vegetation removal for road improvements would result in negligible, long-term impacts to species that may use these habitats. Ground-disturbing activities that may occur within the lease or lease modification areas are subject to CDRMS and the OSMRE sensitive species clearance surveys; accordingly, impacts to sensitive species, if present, would be avoided. Reclamation of disturbed areas (i.e., seeding, mulching, noxious weed management, etc.) would be completed post-disturbance in conformance with the Reclamation Plan. Site reclamation would be expected to recover disturbed areas within 5 years; therefore, these impacts are considered short term. Subsidence resulting from future underground mining activities may impact small areas of vegetation through erosion, rock fall, and minor landslides. These slight alterations to habitat have the potential, albeit very low, to displace or kill bats that may be present in rock outcrops, trees, or on the ground. Any impacts to sensitive species would be negligible and long term, and would be limited to individuals and would not be detectable at the population level. Indirect impacts would include the introduction of noise and human activity to the Project area. These impacts would likely be limited to disturbance of raptors that may nest, perch, forage, and/or roost in the area. Overall, potential impacts to sensitive species are expected to be negligible to minor and short to long term, based on the few sensitive species with potential to occur in the project area.

Special Status Plant and Animal Species

The Proposed Action may adversely impact individuals, but is not likely to result in a loss of species viability in the planning area, nor cause a trend to federal listing or a loss of species viability range wide for Allen's big-eared bat, fringed myotis, bald eagle, golden eagle, and northern goshawk. The Proposed Action would have no impact on the remaining 32 BLM sensitive species with potential to occur on lands managed by the TRFO.

U.S. Fish and Wildlife Service Threatened and Endangered

The Proposed Action is expected to have “no effect” on 12 of the 14 federally listed species considered in the effects analysis, as there are no surface-disturbing activities proposed in or near suitable habitat for these species. Two federally listed species, the Rio Grande silvery minnow and the greenback cutthroat trout, received determinations of “May affect, not likely to adversely affect” due to small amounts of Hg entering the aquatic systems associated with coal combustion at nearby GCC-owned cement plants. The Tijeras Cement Plant is located approximately 15 miles east of the Rio Grande River. The plant burns approximately 76,000 tons/yr., which releases approximately 25 pounds (lbs.)/yr. of Hg annually. Similarly, the Pueblo Cement Plant burns approximately 105,000 tons/yr., releasing approximately 10 lbs./yr. For both plants have air permits whereas federal Hg release is limited to 55 lbs./yr. per million tons of clinker produced.

During scoping, the OSMRE submitted a Formal Section 7 Consultation in accordance with the ESA, as amended (16 USC 1531 et seq.) and the Interagency Cooperation Regulations (50 CFR 402). The OSMRE was seeking concurrence that the Proposed Action “is likely to adversely affect the continued existence” of fish in the San Juan River Basin that are listed under the ESA. OSMRE’s determination was based on a proposed 34 acre-feet per year depletion from a San Juan River sub-basin. On April 30, 2015, USFWS responded stating that USFWS issued a biological opinion (BO) (USFWS 1999) determining that depletions of 100 acre-feet or less *would not* limit the provision of flows outlined in the Recovery Implementation Program for Endangered Fish Species in the San Juan River Basin (USFWS 1992).

As a result of this past water depletion BO, the Proposed Action would have no effect on the Colorado pike minnow and razorback sucker. Similarly, approximately 3,500 tons of King II coal are burned annually by the DSNRR in a San Juan River sub-basin, releasing an estimated 0.25 lbs./yr of Hg. This small quantity is considered part of the environmental baseline of the San Juan River as a result of the USFWS Consultation (No. 02ENNM00-2014-F-0064). This BO analyzed the depositional impacts of coal combustion from the Four Corners Power Plant in Kirtland, NM. Baseline water quality established in the BO include more than 100 years of DSNRR coal combustion along the Animas River in Colorado, that is tributary to the San Juan River.

The BA contains detailed analysis of federally listed species and their potential to occur in the project area or to be impacted by the Proposed Action; a summary of the findings in the BA is included in Table 3-13.

Critical Habitat

There would be no impacts to silvery minnow critical habitat constituent elements along the Rio Grande because of coal combustion from the Tijeras Cement Plant. Constituent elements of critical habitat for this species pertains to hydrologic flow, the seasonality of flow, water temperate and substrate materials. The coal combustion emissions from the Tijeras Cement Plants, 15 miles to east, would not affect any of these habitat characteristics; consequently, there would be no impacts to critical habitat.

Mitigation Measures and Residual Impacts

As the lead federal agency that conducted Section 7 consultation of ESA for the Four Corners Power Plant/Navajo Mine Expansion Project (Consultation No. 02ENNM00-2014-F-0064), OSMRE is required to evaluate and consult with the Service on all discretionary OSMRE permitting actions within OSMRE's authority that have the potential to deposit mercury (Hg) in the San Juan River. OSMRE will conduct this evaluation every two years and consult with USFWS upon completion of the evaluation. This requirement is addressed in detail in the BA.

For any proposed future ground-disturbing activities within the proposed lease and permit areas, GCC is required by their OSMRE and CDRMS mine permits to complete biological clearance surveys and obtain agency authorization prior to conducting any ground disturbances. LPC and CDOT have similar biological resource clearance requirements prior to any ground-disturbing activities within a LPC CR or SH 140 ROW.

GCC adherence to federal limits for releases of Hg in their Pueblo and Tijeras cement plant air permits will minimize potential impacts to listed fish in the Arkansas River (Pueblo County, Colorado) and in the Rio Grande (Bernalillo County, New Mexico).

3.9.3 Impacts from the No Action

Direct and Indirect Impacts

Same as under the Proposed Action but for a shorter duration (approximately 4-5 years depending upon coal sales).

Special Status Plant and Animal Species

The No Action Alternative would have direct and indirect impacts similar to those described for the Proposed Action. Under the No Action Alternative, impacts would be shorter in duration as existing mine coal reserves are depleted and the mine enters closure phases. Based on the low (negligible to minor) level of potential impacts to wildlife discussed above, annual monitoring would not be performed.

U.S. Fish and Wildlife Service Threatened and Endangered Species

Under the No Action Alternative, impacts to federally listed species would be similar to those expected from the Proposed Action. Minor quantities of mercury from coal combustion would continue to enter the Rio Grande and Arkansas rivers in Bernalillo County, New Mexico and Pueblo County, Colorado. However, under the No Action Alternative coal combustion would decline as the King II Mine exhausted remaining reserves and enters closure phases. It is not known if GCC would replace King II coal at their cement facilities with another coal source or whether they would replace the coal fuel with another alternative.

3.10 Access and Transportation

3.10.1 Affected Environment

Access and transportation resources consider the impacts to the capacity and safety of transportation infrastructure in the affected area. The affected area for transportation resources includes the 6.2-mile section of LPC road (CR 120) between the King II Mine access road and SH 140 as shown in Haul Road Map A-4. While there are other roads used by mine employees and suppliers, the affected area was specifically identified during scoping as being affected by mine operations. These resources are managed by LPC and CDOT. Multiple traffic studies were prepared by GCC consultants, by independent traffic engineers and by La Plata County Road and Bridge Department engineers. All of the traffic related studies and analyses are publicly available on the La Plata County Planning Department webpage at: http://lpcads.org/planning/gcc_energy_project/. Potential impacts to transportation resources are related to the condition and status of the roads as well as the traffic conditions relative to the number of truck trips required to transport the coal to market.

Current Road and Traffic Conditions

The road conditions for the affected routes are as follows:

SH 140 is a paved 2-lane road classified as a regional highway. The speed limit on SH 140 is 55 to 65 mph with a 45-mph speed limit through the towns of Kline and Red Mesa.

CR 120, starting at the intersection of SH 140 (mile post [MP] 0.0), the approximate existing roadway conditions on CR 120 are as follows:

- MP 0.0 – MP 2.5: Road width about 22 feet with asphalt road surface and 2-foot aggregate shoulders.
- MP 2.5 – MP 5.6: Road width 30 feet or greater with gravel surface.
- MP 5.6 – MP 6.4: Road width 24-feet with gravel surface. Irrigation and power lines run directly adjacent to roadway.
- MP 6.4 – MP 6.5: Road width 30-feet with gravel surface.

Traffic conditions are based on measurements of AADT. The AADT data are used in establishing roadway design criteria and applicable road maintenance standards. An AADT is defined as a one-way trip for the coal transport trucks or other vehicles. The AADT data for affected routes for the period 2008 to 2014 are shown in Table 3-18. Historically, vehicle trips associated the King II Mine comprise more than half of all vehicle trips and most of the truck trips recorded on CR 120.

Table 3-18. Average Annual Daily Trip Data for the Affected Area

Road Segment	Location	2008	2010	2012	2014
CR 120	At intersection with SH 140 (north)	652	681	814	870
CR 120	At intersection with SH 140 (south)	162	454	437	434
SH 140	At intersection with La Plata County Road 122 near Kline	2100	2500	2800	2500

Source: La Plata County Road and Bridge Department and CDOT 2017.

Another component of evaluating safety of a roadway section is to assess past accident records for causal factors. These causal factors may reflect opportunities for modification of the roadway geometry or characteristics that could improve public safety. An assessment of accident locations along CR 120 between 2005 and 2014 was included in the TIA prepared by GCC for LPC (Roadrunner 2015). Of 38 accidents that occurred during the 10-year period, eight were found to be related to GCC traffic. In evaluating the mapped records, accidents were found to cluster three locations.

1. MP 0.3 at the 90° corner.
2. MP 3.9-4.0, adjacent to Wiltse's Barn with impaired sight distance.
3. MP 12.4 at the 90° curve at Big Stick Ditch.

The TIA recommended modifications to the roadway at these locations to improve safety. GCC has agreed to complete the recommended modifications at the first two locations as part of its RIA with LPC (see Section 2.1.3 Coal Production and Transportation). The third location is outside the 6.4 miles of CR 120 used by GCC as a coal haul route. While GCC has not committed to modifying CR 120 at this location, it has agreed to pay an annual road maintenance fee to LPC that could be used to modify CR 120 at this location.

In addition to vehicle safety concerns related to road conditions on CR 120, public scoping comments raised the issue of wildlife-vehicles collisions. The modifications to CR 120 included in the RIA would reduce this risk by improving line of sight for drivers and reducing speeds on CR 120.

3.10.2 Impacts from the Proposed Action

The effects to transportation resources for the Proposed Action would be related to mine-related traffic along CR 120 N and modifications to the 6.4-mile section of CR 120 N used by GCC as a coal haul route. Mine-related traffic along CR 120 is limited, in part, by the RIA between GCC and LPC. The number of loaded coal-trucks that can travel on CR 120 are limited in the RIA per the status of scheduled improvements to CR 120. For the Proposed Action, it is assumed that GCC would complete Phase 1, 2, and 3 improvements as specified and scheduled in the RIA (see Section 2.1.3 Coal Production and Transportation). The maximum allowable loaded truck traffic is 80 trucks, which would correspond to 160 daily-trips. There would be additional vehicle trips on CR 120 associated with mine-workers and suppliers. For the Proposed Action, it is estimated that there would be a maximum of 300 daily vehicle trips on CR 120.

Direct and Indirect Impacts

In 2014, average traffic data for CR 120 showed about 870 daily vehicle trips along the northern segment of CR 120 used by GCC as a coal haul route. The Proposed Action would have an estimated maximum of 300 daily vehicle trips. This is lower than the long-term trend of King II Mine vehicle trips accounting for about half of all traffic along CR 120. On SH 140, King II Mine vehicle trips would comprise about one-eighth of total daily traffic under the Proposed Action.

The improvements to CR 120 that would be completed by GCC under the RIA are to increase road width and paved surface, reduce vehicle speed and loaded truck numbers, as well as improve sight distance to reduce risks for those traveling on CR 120. Therefore, the direct effects to transportation resources would be reduced traffic numbers and improved road safety. Overall, potential impacts to transportation in the project area would be minor to moderate and potentially adverse associated with maintained high traffic volumes and beneficial based on completion of required CR and SH intersection improvements. These beneficial impacts would be long term, lasting beyond the life of the mine. The adverse impacts would last until about 2023 when the coal resource in the lease modification area is exhausted.

The indirect effects would be related to ongoing road maintenance on CR 120 completed by LPC and funded in part by GCC's road maintenance fee as specified in the RIA of \$0.12 ton of coal produced at the King II Mine. The maintenance fee is set to ensure that improvements along CR 120 are maintained. The fee would be adjusted according to the RIA to include inflation and changes to road conditions. These impacts would be moderately beneficial lasting for the duration of mining associated with the Proposed Action.

Mitigation Measures and Residual Impacts

To provide for the safety of the traveling public, residents, and mine traffic, the route proposed for use by haul trucks needs to be improved to minimum county standards as per LPCLUC 74-91(c), design standards (refer to Design Feature 5). GCC proposes to achieve these minimum requirements via an executed RIA capturing the improvements within a phased development schedule. Every scheduled improvement, therefore, with such an executed agreement in conjunction with land use permit, creates an improved and safer condition of the existing roadway from the existing condition—while achieving progressive compliance per an established schedule. Ultimate completion of this schedule of improvements achieves ultimate compliance with the land use permit and correlates to the RIA.

In addition to the RIA, there are number of operational and interim mitigation measures described under Design Feature 5 that will further mitigate transportation impacts and improve safety along CR 120 N.

3.10.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, the King II Mine would continue to operate as currently permitted by LPC and in accordance with the RIA. However, under this scenario, GCC would likely request renegotiation of the RIA with LPC as the currently required improvements could not be capitalized without the coal production authorized in the RIA. For this analysis, it is estimated that road

improvements would only be completed through Phase 3 (November 2019). Accordingly, approximately 4.30 miles of CR 120 N would not be repaved and sections would not be widened. As the mine, would gradually shut down, traffic along the CR would revert to rural residential use only; and presumably to a level of safety compatible with LPC standards.

3.11 Noise and Vibration

3.11.1 Affected Environment

Noise

The King II Mine surface facilities are located at the confluence of two narrowly incised drainages nearly 7 miles from the nearest town of Hesperus—as shown in Map A-1 in Appendix A. The closest residences are located along County Road 120, as shown in Map A-8 CR 120 Roadway Current Conditions and Proposed Improvements, located in Appendix A, and in the Vista de Oro subdivision, located approximately 1.5 miles southwest of the mine surface facilities and as shown on Proposed Coal Haul Routes Map A-4 in Appendix A.

Measurable characteristics of noise are intensity (dB), frequency (the number of cycles per second or Hertz [Hz]), spectral content (intensity versus frequency over the entire time varying noise), duration (continuous or impulsive), number of noise events over a given time period and pattern of occurrence. Stationary noise sources associated with GCC mining operations have been identified as the air intake fan and coal processing equipment. Off-site noise sources include the coal haul trucks with noise generating components such as the engine, cooling fan, air intake, exhaust, transmission, and tires.

An initial sound study of mine operations was completed by Engineering Dynamics, Inc. (November 2013). The study, as well as a vibration study, were included in the Summary of Analytical Activities in Response to Neighborhood Comments in Conjunction with a Permit Expansion of GCC Energy LLC – King II Coal Mine by CDS Environmental Services LLC, dated May 8, 2014 (CDS 2014).

The studies were reviewed by Dr. Catherine T. Aimone-Martin of Aimone-Martin Associates on behalf of LPC. Dr. Aimone-Martin’s comments were presented in her report titled “Review of Noise and Vibration from CR 120 Truck Traffic and Mining Operations at the GCC Energy King II Coal Mine” dated September 7, 2015 (refer to Exhibit 15 of the LPC Planning Department staff report). Dr. Aimone-Martin suggested additional studies to evaluate the impact of coal mine haul truck noise on CR 120, and to provide additional data to aid LPC in its decision making.

Wave Engineering, Inc., was retained by GCC to perform an additional sound study as suggested in Dr. Aimone-Martin’s report. The additional work included background noise measurements without coal-hauling trucks running, measurements of haul trucks passing by on gravel and paved road surfaces, and computer modeling to assess the noise impact of haul trucks on residences along CR 120. The computer model was also used to evaluate the potential noise mitigation offered by sound barriers, speed limitations, and limiting the hours of trucks. Wave also prepared a supplemental analysis following LPC’s receipt of additional recommendations from their noise consultant Aimone-Martin Associates. All of the above referenced noise studies are available for public review on the La Plata County Planning

Department webpage at: http://lpcds.org/planning/gcc_energy_project/. The following items from Wave Engineering's report, King II Coal Mine Noise Assessment, dated January 4, 2016 are noted:

- Measurements were taken at approximately 50 feet from CR 120 centerline and at a second location near residences;
- Baseline noise at residences is well below noise from traffic, with the highest background value being recorded at 10 dBA, due to wind gusts exceeding 10 mph;
- As expected, travel uphill and with a loaded haul truck, increased noise considerably;
- The speed at which trucks travel has a significant effect on noise—approximately 8 dBA increase between 12 and 22 mph. During the study, trucks slowed to 10 mph on gravel road portions near residences;
- Haul trucks traveling at 10 mph on flat portions of the road did not have an alternative effect; and
- All haul trucks measured had noise levels below 86 dBA, a cited limit established by the State of Colorado.

There is no county or state code or ordinance that currently limits noise levels from trucks. Colorado Revised Statutes 25-12-107 allows counties to limit heavy truck noise levels to 86 dBA 50-feet from the centerline of the lane of travel. All trucks that were measured in the Wave study were well below this level. Background ambient noise levels was measured (without truck noise) at four locations along CR 120 N during a weekend, with continuous day and night measurements. Depending upon the location, ambient sound levels ranged from about 37 dBA to 52 dBA during the day and 29 dBA to 48 dBA at night.

Since LPC does not have an applicable noise standard for coal mine facilities, CRS Section 25-12-103 standards are used to establish maximum permissible noise levels in residential, commercial, and industrial locations. These standards set limits for residential properties of 55 dBA daytime (7:00 a.m. to 7:00 p.m.) and 50 dBA nighttime at 25 feet from the property line. The standards include further limitations for periodic, impulsive, or shrill noise such as back-up alarms and warning devices.

Vibration

Vibration studies have not confirmed a source at the surface facility or underground, but have been identified by adjacent landowners as being associated with the ventilation fan and underground miner.

This study also tested for the presence of vibration and sound emanating from mine activities near neighboring residences. Vibration studies reported no detectable ground motion near adjacent landowners' test locations and only low-level ground motion levels within 10 feet of the mine fan and conveyor. The study also indicated that this low-level ground vibration would not transmit beyond the immediate vicinity. In response to surrounding residents' requests, the study was extended to include acoustic analyses to test for low-frequency sound transmitted to neighboring residences—acoustic waves that would be perceived as a vibration. The study concluded that noise from the mine did not transmit low-frequency sound to nearby residences.

A supplemental vibration study was performed in December 2014 to address adjacent landowner concerns that measurements in the 2013 noise and vibration study were made too far from production

activity and covered too short of a time span. This supplemental study conducted noise and vibration measurements for 19 days continuously on the surface immediately above the active mining area where two continuous miners operated one or two shifts per day throughout the test period (CDS 2014). This study concluded that any vibration or noise attributable to mining activity was well below the threshold of human perception. The typical high levels reported were at or below one-quarter of the perception limit.

3.11.2 Impacts from the Proposed Action

Direct and Indirect Impacts

The noise and vibration effects of the Proposed Action are associated with mining and loading equipment operating at the mine's surface facilities and underground as well as from semi-trucks transporting coal along CR 120. The affected area for noise and vibration focuses on the sensitive receptors or residences that have identified noise and vibration issues during scoping.

Noise

Because an adjacent landowner expressed specific concerns about noise and vibration from the mine's operation, measures included in Design Feature 4a such as installing dampers on the ventilation fan, adjusting "back-up" warning signals, and eliminating mining within 300 feet of existing residences have been implemented to minimize noise and vibration effects.

The principal noise sources related to the continued mining operation of the surface facilities include the ventilation fan, conveyors, and warning signals on load-out equipment. Noise from mining operations were also demonstrated by LPC noise consultants to provide no impact (refer to Exhibit 15 of the LPC Planning Department staff report). Mitigation of mine-site noise is not required.

Indirect noise impacts are associated with the truck-traffic on CR 120 from coal transport. There are no published data measuring the noise or vibration associated with coal transport, but residents along CR 120 reported noise and vibration levels that adversely affect their quality of life during scoping. As described above state statute set noise limits for residential properties of 55 dBA daytime (7:00 a.m. to 7:00 p.m.) and 50 dBA nighttime at 25 feet from the property line. All haul trucks measured had noise levels below 86 dBA, a cited limit established by the State of Colorado. All noise measurements collected and/or reviewed by applicant and LPC noise consultants agreed with the results of noise monitoring results. Overall, it was determined that following GCC's implementation of noise mitigations (installation of noise barriers), that noise impacts would be negligible to minor, lasting for the duration of mining activities at the King II mine.

Vibration

Vibration studies did not find vibration to be above detectable levels at locations directly above the underground mining equipment and the surface facilities (CDS 2013). The County's consultant, Aimone-Martin Associates, indicated that the peak vibration at area residences was approximately eight times lower than the threshold for human perception (0.03 inches/second) and approximately 14 times lower than vibrations, which could cause hairline cracking in historic plaster walls (minimal) (Refer to Exhibit 12 in the LPC Staff Report).

In response to continued resident comment, GCC then took measurements on the ground surface directly above the continuous miner equipment—approximately 300 feet above the continuous miner. No induced vibrations were recorded. Aimone-Martin Associates indicated that in her experience vibrations drop below that detectable by human perception within 25 feet of this type of equipment (Refer to Exhibit 12 in the LPC Staff Report). Based on this information, it was determined that mine operation vibrations do not pose a significant impact from the proposed project, and therefore do not require further mitigation.

Mitigation Measures and Residual Impacts

Wave Engineering evaluated the potential effectiveness of noise barriers using a model that assumed a 12-foot high wall and a break for a driveway (which greatly decreases barrier effectiveness) and made conclusions as summarized below.

- At the Hunzeker residence, a barrier could reduce sound from the road by approximately 6 dBA;
- At the McCue residence, a barrier could reduce sound from the road by approximately 10 dBA;
- At the three residences, north of the barrier along the steep hill, there is already some screening by topography and partly due to this, no increase in benefit is shown to occur with a barrier; and
- Barriers may be constructed of wood, concrete, brick, masonry, or other materials.

GCC has prepared a noise and visual buffering plan for site-specific conditions at 2541 and 3230 (McCue and Hunzeker) CR 120, which provide a definitive commitment to directly address this design feature. These residences are immediately adjacent to the road and thereby warranted buffering from noise and dust. Buffering measures included in the plan include sound walls, landscaping, and berming as the respective condition provides to directly address and achieve compatibility. Impacts directly mitigated with this plan include noise, traffic, dust, unsightly views and other negative impacts, which are perceptible by adjoining land uses along north CR 120. The barriers to be constructed at the McCue residence provide about 4 to 7 dBA of noise reduction. The reduction is greater close to the road, and less as you move farther away. The barriers to be constructed at the Hunzeker residence provide about 5 to 6 dBA of noise reduction near the residence. The noise and visual buffering plan will be implemented by GCC at the discretion of the respective landowners; and will be available for implementation from the time of approval of this project up until the completion of Phase 5 road improvements.

Mitigation measures included in Design Features 4a, 4b, and 5, including those recommended by the HGCAP, such as restricting truck traffic on weekends and evenings, paving CR 120, and monitoring truck equipment such as mufflers, truck speeds, etc. are included in the Proposed Action to further minimize indirect noise and vibration effects.

3.11.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, the King II Mine would continue to operate as allowed by the current mine plan and impacts would be the same as those described for the Proposed Action. Under this alternative, no noise buffers would be installed and the King II Mine would begin shutting down around

2019. When coal reserves are completely depleted, there would be no coal-hauling truck traffic or associated noise and vibration along CR 120 N.

3.12 Visual Resources

3.12.1 Affected Environment

At the King II Mine, all surface facilities are located on state or private surface, while CR 120 N intersects private property for the entire length to SH 140. As such, BLM does not have visual resource management authority.

The visual setting is a rural part of western La Plata County. The Hay Gulch area, and particularly the CR 120 N road alignment and King II Mine site, is characterized by a well-defined canyon with agriculture lands on the bottomlands and canyon slopes vegetated with piñon-juniper woodlands. There are few residences along CR 120 N, and most property parcels have several acres of land separating them from neighbors.

The King II surface facility is located approximately 1,000 feet up a side-drainage above CR 120 entirely on State lands. The facilities are minimally visible from CR 120 and not visible from any adjacent properties.

3.12.2 Impacts from the Proposed Action

The visual resource management prescription applicable to the private surface on the existing and proposed lease modification areas are related to LPC's Land Use code and view compatibility standards (La Plata County Code of Ordinances Section 82-193(c) (2)(c)). These standards require that the King II Mine facility will not create adverse or unsightly views for neighbors or the travelling public.

Direct and Indirect Impacts

Residences along CR 120 N experience adverse impacts associated with noise, dust and views of high volumes of coal trucks utilizing CR 120 N. Residences that are very close to the road (McCue and Hunzeker) experience greater visual impacts than other residences along the road. Following the implementation of Design Feature 5 that includes implementation of a buffer plan; visual impacts are expected to be within the LPC code and view compatibility standards. Accordingly, visual impacts are expected to low and short term, lasting for the life of mine estimated under the Proposed Action.

Mitigation Measures and Residual Impacts

As described in Section 3.12.2, GCC has prepared a visual buffering plan for site-specific conditions at two residences along CR 120. These residences are immediately adjacent to the road and thereby warranted buffering from views, noise and dust. Buffering measures included in the plan include sound walls, landscaping, and berming as the respective condition provides to directly address and achieve compatibility. Impacts directly mitigated with this plan include noise, traffic, dust, unsightly views, which are perceptible by adjoining land uses along north CR 120.

3.12.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, impacts to visual resources would be the same those described under the Proposed Action. However, under this alternative impacts would last for a shorter duration.

3.13 Cultural Resources

3.13.1 Affected Environment

The project area is located within the Northern San Juan cultural region, on the periphery of the Colorado Plateau physiographic province. Several cultural traditions are represented in the region, from Paleoindian occupation to the Euro-American settlement of the area. This description characterizes both the existing King II lease and permit areas as well as the proposed lease modification area and the entire length of CR 120 N in the project area.

For a more in-depth discussion of the culture history of southwestern La Plata County, the reader is referred to Winter et al. (1986) as well as Lipe et al. (1999). Provided below is a summary of the past cultural resource inventory work completed in the project area.

Current Mine Lease and Permit Areas

Multiple Class III, or pedestrian, cultural resource surveys have been conducted within the current King II Mine COC-62920 lease and mine permit boundaries; at exploration drill sites on state lands associated with CDRMS TR-22; for as-built irrigation and drainage upgrades on state land completed as part of TR-25; and at the monitoring well sites associated with TR-26 on private and state lands.

In 2005, Complete Archaeological Service Associates of Cortez, Colorado conducted a cultural and historic resources survey for the mine entrance surface disturbance areas located on state of Colorado lands in Section 36, T35N, R12W south of the CO-62920 lease boundary (CASA 2005). This survey covered ditch and irrigation upgrade work conducted under TR-25, which is part of the current mine permit area. No significant cultural or historic resources eligible for listing on the National Register of Historic Places (NRHP) or other significant archeological sites that may be affected by surface disturbance (including subsidence) were identified in this survey (CASA 2005). The State Historic Preservation Officer (SHPO) concurred with the findings of this survey (Contiguglia 2005).

In 2010, SWCA Environmental Consultants (SWCA) completed a Class III inventory for the appended 160-acre lease area in Section 26, T35N, R12W (Eisenhauer and Wilcox 2010). Two previously unrecorded sites and four isolates were identified during this inventory. Only one of the sites was recommended as eligible for listing on the NRHP: Site 5LP9601, a homestead dating to the late nineteenth to early twentieth century. Isolates are not eligible for listing on the NRHP. No other significant archeological sites that may be affected by surface disturbance were identified in the survey (Eisenhauer and Wilcox 2010). The OSMRE determined that the potentially eligible site would be avoided by planned mining actions and requested concurrence from the SHPO on August 11, 2010 (Kirby

2010a) and from the UMU Tribal Historic Preservation Officer (THPO) on August 19, 2010 (Kirby 2010b).

In 2011, PaleoWest Archaeology (PaleoWest) completed a Class III inventory of five proposed exploration drill hole locations in Section 25, T35N, R12W (Gilpin 2011). This area is within the current lease and permit area of King II mine. This survey, which covered drill sites associated with TR-22, identified two isolated finds that are not eligible for listing on the NRHP. THPO concurrence was received for the site eligibility recommendations from this survey (Knight 2012).

In 2013, PaleoWest conducted a Class III block inventory of Sections 24 and 25 (T35N, R12W) and Sections 19 and 30 (T35N, R11W), that included the locations of 11 proposed exploration drill sites (Throgmorton and Clark 2014) all within the current mine lease and permit areas. This inventory resulted in the discovery of seven historic archaeological sites and 50 isolated finds. The historic sites included road segments, a collapsed historic shack, a historic camp, an intake segment, and two dam and reservoir sites with associated intakes. The isolated finds included a variety of historic and prehistoric resources. PaleoWest recommended all sites as either “Not Eligible to the National Register of Historic Places” or noncontributing segments of unevaluated resources. In a letter to the SHPO, OSMRE recommended that Sites 5LP.10276 and 5LP.10591, both road segments, need additional data recovery since they have not been completely evaluated (Iliff 2015). The SHPO recommended Site 5LP.10591.1 as a non-supporting segment of NRHP-eligible resource 5LP.10591, but determined that none of the other sites or isolated finds were eligible for listing on the NRHP (Turner 2015).

In 2014, SWCA performed a cultural resource survey of nine core drill sites addressed in TR-22 and located on state of Colorado lands in Section 36, T35N, R12W (Wesson and Mowrer 2014). One isolated find that consisted of two fragments of aqua bottle glass were identified during the survey. No cultural or historic resources eligible for listing on the NRHP or significant archeological sites that may be affected by surface disturbance were identified.

Based on the results of these studies within the current lease and permit boundary, two sites have been identified to date as eligible for listing on the NRHP:

- Site 5LP9601, a historic homestead is potentially eligible for listing on the NRHP. The site has been avoided to date and is within the current lease and permit area.
- Site 5LP.10591.1, a historic road segment located in the survey area, has been identified as a non-supporting segment of NRHP-eligible resource 5LP.10591. The SHPO has concurred with this recommendation. The site has been avoided to date and is within the current lease and permit area.

No other significant cultural sites have been identified to date within the lease and permit boundary.

Proposed Lease Modification and Permit Revision Areas

Surveys have also been completed specific to the proposed lease modification additional acreage tracts. With the exception of a portion the 2014 PaleoWest surveys completed for the GCC proposed exploration drilling license north of the current and proposed lease modification areas, all surveys were completed

within the project and analysis area associated with the proposed lease modification and the area analyzed for the SMCRA permit revision.

Within the proposed 950.55 acres of modified lease, approximately 580 acres received Class III intensive pedestrian surveys. The cultural resource inventory was completed by PaleoWest and consisted of a mixture of reconnaissance and intensive level surveys (which loosely corresponds to Class II and Class III surveys, respectively). The survey was completed in 2012 and the results are on file with BLM and OSMRE. No permission was granted by the private land owner to survey the remaining surface acreage in Tract E. No cultural resources recorded during the survey were determined to be eligible for listing on the NRHP. The BLM submitted a letter to the SHPO in December 2014 for informational purposes only with the determination that the proposed lease expansion would not affect any historic properties.

In 2016, Stratified Environmental and Archaeological Services conducted a Class III cultural resource survey outside of the current lease permit boundary for four groundwater monitoring well drill sites associated with TR-26. TR-26 represents a revision to current mine permit that would add several off-lease groundwater monitoring well locations to the permit area. One newly recorded prehistoric site (5LP.11050) was found during the intensive cultural resource inventory in the vicinity of one of the proposed monitoring well sites. Site 5LP.11050, a large Basketmaker III period encampment (ca. AD 600-750), is considered eligible for listing on the NRHP under Criterion D due to its significant data potential. The proposed monitoring well site was relocated more than 50 feet from the site boundary to avoid disturbing the cultural site. As Site 5LP.11050 has been avoided by more than 50 feet, no further cultural resource work was recommended. Information on SHPO concurrence for this survey was not available at the time this EA was prepared.

There are no known NRHP eligible sites within the proposed lease modification area. As all new lease and permit areas would be scattered around the edges of the current mine lease and permit areas, it is assumed that these areas also contain similar historic sites, isolates and fragments to those found within the current mine lease and permit areas. Overall, site density is considered low in the immediate area of the mine.

CR 120 Improvements

No cultural resource inventories have been conducted along the CR 120 easement or right-of-way. Clearance surveys would be completed prior to ground disturbing activities following LPC and or CDOT acceptance of road improvement engineering design plans.

Native American Religious Concerns

The BLM initiated cultural and Native American consultations on September 25, 2014, by sending scoping letters to 26 Native American tribes (NEPA scoping letters sent to 25 tribes on 11/23/2012. Tribal consultation letters mailed to 26 tribes on 4/26/2017). In accordance with the 2011 DOI Policy on Consultation with Indian Tribes and the National Historic Preservation Act of 1966, OSMRE sent a notice of supplemental scoping to 47 tribes from the Colorado Office of Archaeology and Historic Preservation directory of tribes with historic ties to Colorado.

No Native American religious concerns or potential traditional cultural properties within the permit area have been identified by the UMU Tribe, or by the THPO, or by any of the other tribes consulted.

3.13.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Proposed Lease Modification and Permit Revision Areas

Cultural resources, if discovered on the surface of the proposed lease modification tracts in the future, could be indirectly impacted by ground disturbing activities such as CR 120 road improvements, installation of groundwater monitoring wells, installation and maintenance of stormwater management controls, overland access and reclamation activities, etc., all have the potential to directly impact cultural resources (if present). With the exception of CR 120 improvements, direct impacts can be avoided or minimized by preactivity clearance surveys, and resource avoidance monitoring requirements. Overall, direct impacts to cultural resources associated with leasing and or future mining beneath the proposed lease modification tracts are expected to be minimal due to the absence of cultural resources in the proposed lease tracts.

Cultural resources, if discovered on the surface of the proposed lease modification tracts in the future, could be indirectly impacted by possible subsidence. This impact however is expected to be negligible to minor as no NRHP-eligible sites have been found within the proposed lease tracts. Subsidence could also adversely impact known or discovered sites within the current lease and permit areas. This potential impact is also expected to be negligible to minor as subsidence only occurs very infrequently at King II due to a variety of factors (Refer to Section 3.4 Geology and Minerals). Site 5LP9601, a historic homestead structure, would not be impacted from subsidence as it occurs on the edge of the existing lease areas in an area where no mining panels occur beneath it.

Resource avoidance associated with the widening and resurfacing of CR 120 may not be feasible due to engineering and/or ROW restrictions. Accordingly, direct impacts to cultural resources (if present) may be unavoidable. This direct impact however would be minor to moderate depending upon the nature of a discovered site and whether it can be avoided. Further, it is likely that if any NRHP eligible sites were discovered along the CR 120 right-of-way, that impacts would be mitigated by data recovery requirements by the SHPO.

Current Mine Lease and Permit Areas

Continued mining within the current lease and permit areas would continue to have minor potential direct impacts to known and/or future discovered resources under the Proposed Action.

Regulatory Requirements, Mitigation Measures and Residual Impacts

For any proposed future ground-disturbing activities within the proposed lease and permit areas, GCC is required by their OSMRE and CDRMS mine permits to complete cultural clearance surveys and agency authorization prior to conducting any ground disturbances. As described in the section addressing previously completed cultural resource inventories, avoidance of discovered cultural resources is a

common approach to avoiding or minimizing potential impacts to the resource. LPC and CDOT have similar cultural resource clearance requirements prior to any ground-disturbing activities within a LPC CR or SH 140 ROW. These clearances have already been obtained for the recently completed and ongoing construction activities associated with the Phase 1 and 2 road improvements. As a result of regulatory oversight, avoidance measures and when appropriate, data recovery, residual impacts to cultural resources would be negligible.

3.13.3 Impacts from the No Action

Direct and Indirect Impacts

Impacts under the No Action Alternative would be the same as under the Proposed Action but would be limited to the current lease and permit areas and would only occur for CR 120 N road improvements through Phase 3.

3.14 Land Use

3.14.1 Affected Environment

Land use within the project area and along the section of CR 120 N where improvements are proposed is largely dominated by agricultural, tribal, and transportation uses. The cultural history of the area is discussed in Section 3.14 Cultural Resources. The King Coal Mine began operation in 1938 at its current location in Hesperus, Colorado, approximately 2 miles northeast of the King II Mine. The King II Mine has operated from its current location since the surface operation and portal were constructed in 2007. A detailed description of the King II mining operation, including transport and support facilities, can be found in Chapters 1 and 2 of this EA. Surface ownership includes a combination of federal land managed by the BLM, as well as private, state, and UMU tribal lands, as shown on Map A-2 in Appendix A.

Farmlands, Prime or Unique

There are no prime or unique farmlands in the proposed project area (USDA/NRCS 2015) that would be affected by mining operations or road improvements along CR 120 N.

Agricultural Uses

The project area above the proposed lease area is entirely within an area managed by the UMU as tribal ranch properties, specifically Hay Gulch ranch properties. Cattle and horse grazing and fencing are evident in the project area; albeit usage is apparently not intensive, and no livestock were observed during any of the ground investigations completed in 2015 and 2016 associated with this EA. Along CR 120 N, there are mostly fenced pastures for hay production and grazing for livestock and horses.

Fire Management

While there is no BLM surface jurisdiction associated with the proposed lease modification, the BLM is responsible for wildfire management on BLM surface and federal lands in the region. As described in

Section 3.3 Health and Safety, the OEM and the La Plata County Fire Chief's Association have developed a County-wide AHMP, that among other hazards also deals with wildlife response.

Forest Management

Timber resources in the project area include species such as piñon pine, ponderosa pine, juniper, and Gambel oak. Project area forest resources are managed by the UMU Tribe. The UMU Tribe does not currently have a forest or Integrated Natural Resource Management Plan for the reservation or for their private ranch lands.

Recreation

There are no public recreational activities available in the project area, as nearly all the land in the Project area is private property. There are three small (40 to 80 acres each) BLM-administered land parcels within 2 miles of the King II Mine (refer to Project Area Map A-2) in Appendix A. The only access to these parcels is via UMU private roads that are closed to the public and patrolled by Tribal police. Access to UMU tribal and private lands is by tribal permit only. Accordingly, the only recreational opportunities in the project area are walking, running, or biking along CR 120 N, which is not a common activity due to the truck traffic present along the road. The private UMU lands are likely utilized by a small number of tribal members for seasonal hunting.

3.14.2 Impacts from the Proposed Action

Because there are no prime or unique farmlands in the Project area, and recreational opportunities are limited private residential properties and along CR 120 N, these land uses are not further analyzed below.

Direct and Indirect Impacts

Agricultural Uses

There would be no direct impacts to rangeland health or fencing on UMU ranch properties. It is possible that subsidence could damage a UMU range fence. According to the Surface Use Agreement between the UMU and GCC, this potential is mitigated by commitments within the agreement. There would be no surface impacts to any BLM or federally administered public lands. Accordingly, no impacts to rangeland health or to Standards for Public Land Health are expected from the Proposed Action. No changes or long-term impacts are expected to grazing and farming along CR 120 N. There may be short-term minor impacts associated with temporary fence removal and replacement should road improvements encroach on existing fence lines.

Fire Management

MSHA requires fire suppression systems, firefighting and evacuation plans for both underground coal and surface operations. Underground fire protection for mines such as the King II Mine are regulated under 30 CFR 75.1100. The King II Mine maintains a variety of fire suppression equipment onsite and underground to mitigate potential fire hazards. There have been no fires associated with the King II Mine since operations began. There is no expectation of increased fire risk associated with the Proposed Action; therefore, no changes to the BLM's current fire management plans or programs. Additionally, as stated

above, the OEM and the La Plata County Fire Chief's Association have developed a County-wide AHMP, that deals with wildlife response. There would be no impacts to area fire management as a result of the Proposed Action.

Forest Management

By the terms of GCC's Surface Use Agreement with the UMU, no trees may be cut without the express authorization of the UMU. Therefore, there would be no change or impacts to forest resource management in the project area as a result of the Proposed Action.

Recreation

By the terms of GCC's Surface Use Agreement with the UMU, GCC is required to coordinate access to UMU lands with the tribe in order to avoid and/or minimize potential impacts to tribal members seasonally hunting on the subject ranch properties. Accordingly, negligible to no impacts are expected to recreational opportunities in the project area.

3.14.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, impacts to land use would be the same as those described under the Proposed Action except that they would be shorter in duration.

3.15 Socioeconomics

3.15.1 Affected Environment

The area surrounding the King II Mine, known as Hay Gulch, has historically been a ranching and coal mining community. Many area ranches were established in the late 1800's, and mining operations have existed in the same area since approximately 1900. Coal mining at the King I Mine began in 1938 and continued in 1941 with the first federal coal lease occurring on land underlying Huntington Ranch. Most of the early residential development in Hay Gulch was associated with agricultural families and sparsely located along roadways and arable land. Since 1995, residential housing density increased in the Hay Gulch area with the establishment of several subdivisions, including Vista de Oro in 1998.

La Plata County has a long history of balancing natural resource and residential development. For example, in 2014 LPC had about 3,500 operating natural gas wells and was the second highest natural gas producer in Colorado (COGCC 2015). La Plata County was one of the first counties in Colorado to establish land use regulations that include compatibility standards for oil and gas development in and around residential areas (La Plata County 2009).

The affected area for socioeconomic impacts is determined by the communities that have experienced changes to employment, spending, and taxes from the King II Mine as well as scoping issues identified by nearby property owners. As such, the affected area defined for this socioeconomic analysis is La Plata and Montezuma counties. This affected area is generally rural, with the City of Durango in LPC and the City

of Cortez in Montezuma County serving as the county seats and commercial centers, as shown on the Vicinity Map (Map A-1) in Appendix A.

Table 3-19 shows the population for the affected area with comparison to Colorado as a whole. The total population for La Plata and Montezuma counties was about 81,000 in 2015. The affected area is projected to grow at about the same rate as the rest of Colorado (approximately 2 percent annually) and with a prospective total population of about 125,000 by 2040.

Table 3-19. Population for Affected Area

Year	La Plata County	Montezuma County	Colorado
2010	51,443	25,515	5,049,935
2015	54,907	26,139	5,456,584
2020	61,539	29,019	5,945,319
2030	74,470	34,360	6,912,413
2040	85,481	39,045	7,802,047

Source: Colorado Demography Office 2016.

Employment and income for the affected area are summarized in Table 3-20. Generally, LPC is similar in employment and income to Colorado. Montezuma County has a substantially lower median household income and higher unemployment and poverty rates than the state (USDC/USCB 2016).

Focusing on the mining sector, average mining wages of \$86,676/year or \$43.00/hr in were almost double the median household income for Montezuma County (Region 9 2015). Mining sector jobs are especially important when “livable wage” requirements in La Plata and Montezuma County are considered. A family of four renting a 3-bedroom home needed an hourly wage of more than \$28.00 to afford to live in Durango and an hourly wage of \$25.00 to afford to live in Cortez in 2015 (Region 9 2015a).

Table 3-20. Employment and Income for the Affected Area

Parameter	La Plata County	Montezuma County	Colorado
Unemployment Rate (2015 average)	3.5%	5.6%	5.3%
Median Household Income (2010-2014)	\$60,732	\$42,975	\$63,945
Poverty Percent All Ages (2015))	9.4%	19.3%	11.5%
Minority Population* (% of population) 2015	19.6%	25.5%	29.3%
Median Home Value (2010-2014)	\$333,100	\$184,300	\$239,400

Source: Unemployment BLS 2016; Median Home Value USCD/USCB 2016 Quickfacts; MHI and Poverty USCD/USCB SAIPE 2017.

*Minority population defined as part of total population that is not classified by the race/ethnicity category Non-Hispanic White Alone by the U.S. Census Bureau.

Housing prices in La Plata County were higher than the remainder of Colorado, as measured by median home value for the period 2010 to 2014 and shown in Table 3-20. Housing prices in the Hay Gulch area

as represented by median home prices in rural La Plata County increased by about 50 percent from \$219,000 in 2003 to a high of \$370,000 in 2007 (LPCRHA 2015). After the housing market downturn in 2008, median home prices in La Plata County for the period 2010-2014 have returned to 90 percent of the values reported in 2007.

GCC employed 91 workers to produce about 625,000 tons of coal in 2016. Based on payroll reported by GCC for 2016, the average annual wage or salary paid by GCC was over \$73,000, which was substantially higher than the median household income reported for the affected area, as shown in Table 3-20. In addition to labor, the other major expense reported by GCC is the \$5 million per year paid to a regional subcontractor for truck freight services to transport coal to the railhead in Gallup, New Mexico and to GCC's cement plants in Pueblo, Colorado and Tijeras, New Mexico.

Since the King II Mine is located in LPC, the county receives property tax revenues generated by the mine. In 2015, more than 40 percent of county property tax revenues were generated by natural resource extraction, primarily from natural gas production (Shinn 2016). However, with falling natural gas prices and production levels, revenue to LPC from natural gas has been steadily dropping and is expected to comprise only 30 percent of county property tax revenues in 2017 (Shinn 2016).

The federal government receives annual royalty payments from coal lease holders as specified in the lease. Generally, royalty payments are 8 percent of the value of the coal removed from an underground mine less allowable expenses (43 CFR § 3473). Half of the royalties from federal coal are distributed to the federal treasury and the remaining half is returned to the state where the coal was mined. In Colorado, half of the federal royalty revenue is distributed to schools and forty percent is deposited into the Energy and Mineral Impact Assistance Fund (Headwaters Economics 2015). This fund is managed by the Colorado Department of Local Affairs and distributed to counties, cities, and school districts through both direct distributions and impact grants to affected communities. Direct distributions are based on impact metrics such as employment in mining and measures of mineral activity. Between 2012 and 2014, GCC reportedly paid an average of \$2.8 million in federal coal royalties each year.

3.15.2 Impacts from the Proposed Action

The affected area for the socioeconomic impact assessment is La Plata and Montezuma counties, Colorado. The direct and indirect socioeconomic effects for the Proposed Action are related to changes to mine employment, payroll, expenditures, and tax payments associated with the Proposed Action.

Socioeconomic impacts were estimated using the IMPLAN model (www.implan.com) and 2015 dataset for Montezuma and La Plata counties. GCC's operation was modeled using Sector 22 (Coal Mining). Expenditures for coal transport and federal royalties are not included in the Sector 22 profile and were modeled separately.

Under the Proposed Action, it is assumed that GCC would adjust its coal production to the maximum levels allowed under the RIA with LPC (La Plata County 2016). According to the schedule in the RIA, by 2019, GCC would complete road improvements that would allow truck traffic on CR 120 of 80 average daily one-way loaded truck trips. These loaded truck trips correspond to an average annual coal production of 711,360 and the mine workforce of 91. Additional road improvements scheduled to be

completed by 2021 would allow GCC to increase annual coal production to more than 1 million tons annually. However, by that time, GCC would have mined most of the coal in the lease modification area.

To conservatively estimate these economic impacts for the Proposed Action with the IMPLAN model, an annual production level of 711,360 tons is used in the model. The economic impacts for the 4.66 million tons of coal produced under the Proposed Action are based on the results of the single year modeled with IMPLAN. At this conservative rate, the employment, income, and output would continue for about 6.5 years. These annual values are used to estimate socioeconomic impacts for the Proposed Action because GCC is limited in annual production by the RIA and other non-economic factor. Even if market demand warranted higher production and associated employment and spending, non-market factors restrict higher production and make this scenario most representative of future economic impacts of the Proposed Action.

Using the input assumptions listed above, the IMPLAN model results for the Proposed Action scenario are summarized in Table 3-21.

Table 3-21. IMPLAN Results for Proposed Action

Parameter	Direct	Indirect	Induced	Total
Employment	143	108	85	336
Labor Income	\$8,700,000	\$6,500,000	\$3,200,000	\$18,400,000
Output	\$17,700,000	\$17,800,000	\$10,400,000	\$100,000,000

In translating the IMPLAN results to direct and indirect socioeconomic effects for the Proposed Action, it is important to consider the definition of IMPLAN’s output parameters as noted below:

- Direct effects are based on the values for coal production, truck transport expenditures, and federal royalty payments that were used as input data for the Proposed Action scenario.
- Indirect effects are estimates of the impacts of local industries buying goods and services from other local industries in La Plata and Montezuma counties. In this case, the impact of GCC and truck transport company purchases for other goods and services in the local economy such as diesel fuel and gravel.
- Induced effects are the results of spending by GCC employees and other workers. Their income is recirculated through the local economy through household spending patterns simulated in the IMPLAN model.

Direct and Indirect Impacts

The direct socioeconomic impacts of the Proposed Action are measured in terms of the 143 jobs generated by 711,360 tons of coal production and associated transport services and royalties that it would generate. These 143 jobs include 91 jobs at the coal mine, 28 jobs in truck transportation, 15 state and federal government jobs as well as other jobs in service industries. Most of the direct jobs are in the relatively high-paying mining and transport industries.

The indirect socioeconomic impacts of the Proposed Action would be an additional 193 jobs supported by spending by GCC and its contractors in a variety of regional industries including construction, trade, and

retail. The indirect effects also include spending and taxes by GCC employees and contractors. The indirect socioeconomic effects of the Proposed Action amount to 1 percent of regional employment and 4 percent of labor income.

In addition to the direct and indirect economic benefits estimated by IMPLAN, federal, state, and local governments would benefit from tax and royalty revenues generated by coal production. For example, it is estimated that GCC would pay about \$300,000 in property taxes and \$80,000 in road impact fees to LPC annually under the Proposed Action. In addition, La Plata and Montezuma counties would receive sales taxes on purchases by GCC and its contractors as well as a portion of federal royalties.

It is estimated that the Proposed Action would generate about \$17 million in federal royalty payments for the 4.66 million tons of recoverable coal estimated in the lease modification area. The associated annual revenue stream would depend on coal production, sales price, and allowable deductions. On average, it is estimated that \$2 to \$3 million would be split annually between the federal treasury and state and local governments in Colorado.

The extension of mining operations made possible by the lease modification would also extend the annual payroll, local expenditures, and taxes and royalty payments by approximately 4 to 6 years depending on annual coal production rates.

Other potential socioeconomic impacts such as nuisance issues, changes to quality of life, and property values related to the Proposed Action were evaluated and addressed by LPC as part of its land use planning permit for the King II mine property. Currently, residential property development is dispersed on relatively large lots along CR 120 and in the subdivisions surrounding the King II mine property. Part of LPC's land use application process includes consideration for compatible development. This "compatibility review" is an integral part of GCC's Class II Land Use Application and documents the mitigation measures and programs that GCC has or will undertake to ensure that continued operation of the King II Mine will be compatible with surrounding residential and agricultural development. Compatibility for the King II Mine is evaluated in terms of traffic conditions, noise, dust, and vibration levels, water consumption, and character, including view and privacy. As a result of LPC's issuance of a Class II LUP, GCC will be required to implement mitigation measures to ensure that the character, privacy, view, and traffic from the Proposed Action will be compatible with surrounding development.

There are many factors that determine relative property value including location and condition of the property and property improvements such as home or irrigation systems as compared to similar properties, the character of surrounding properties, and other market conditions related to supply, demand, and mortgage interest rates. To isolate the influence of an individual variable such as the character of surrounding properties on property values in a specific location requires detailed statistical analysis that is beyond the scope of analysis for this EA. While the magnitude of detrimental impacts to property values from the Proposed Action cannot be estimated, the likelihood of significant detrimental effects is low because of the Design Features included in the Proposed Action and the mitigation measures in the RIA and other requirements of GCC's Class II LUP that will be monitored and enforced by LPC. Therefore, potential adverse impacts to quality of life and property values of surrounding residents will be mitigated by Design Features in the Proposed Action and monitoring and enforcement by LPC of its land regulations.

Overall, socioeconomic impacts would be minor to moderate and both adverse and beneficial lasting for the duration of mine operations.

Mitigation Measures and Residual Impacts

GCC is committed to implementation of Design Feature #5 under which GCC shall pay an annual Maintenance Fee for their usage of CR 120. Until January 1, 2018, the Maintenance Fee shall be \$0.12 per ton of coal removed from the Mine Project. Thereafter, the Maintenance Fee shall increase yearly in accordance with increases in the Annual Construction Cost Index published by the Colorado Department of Transportation. Other Design Features (4a, 4b, 1a, and 1b) all mitigate impacts to area residences to comply with LPC land use “compatibility” standards.

3.15.3 Impacts from the No Action

Direct and Indirect Impacts

Under the No Action Alternative, the BLM coal lease modification would not be granted, but coal mining at the King II Mine would continue under the current mine lease and plan to satisfy customer demand and contractual obligations until these reserves are depleted. Without the lease modification, an estimated 4.66 million recoverable tons of federal coal would be permanently bypassed. Reductions in jobs and associated salaries, local expenditures, royalty and tax payments would occur as coal production ceases. Since the demand for this coal resource would not be expected to change, GCC’s customers would either contract other coal mines for product or obtain coal from subsequent GCC mining operations.

If the BLM were to decline to issue the coal lease modification, GCC would need to find other sources of mineable coal, either in a location accessible from the existing King II Mine or at another location. If GCC were not able to lease additional coal reserves from the existing King II Mine, the operation would need to close and be reclaimed. Reclamation activities would have temporary socioeconomic benefits associated with the jobs and spending by GCC to complete reclamation of the mine.

The economic effects of the No Action Alternative would include the loss of the salaries and wages for coal mining and transport as well as royalty and tax payments to local governments when the mine ceased production. Given the employment and income estimates for the Proposed Action, this could amount to a loss of 1 percent of local employment and 4 percent of labor income. Federal, state, and local governments would forego about \$17 million in federal royalties from permanently bypassing 4.66 million tons of federal coal reserve.

3.16 Environmental Justice

3.16.1 Affected Environment

Executive Order 12898 of 1994, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” states each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on

minority populations and low-income populations. The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. EO 12898 requires federal agencies to ensure opportunities for effective public participation by potentially affected low-income populations, minority populations, or Indian tribes. As such, this document includes an assessment of the impacts from the project on minority and low-income populations.

For this EA, low-income populations in the affected area of La Plata and Montezuma counties are identified by the percentage of individuals living below the poverty level as reported by the U.S. Census Bureau Small Area Income and Poverty Estimates and shown in Table 3-20. Minority populations are identified by race and ethnicity as reported by individuals for the U.S. Census and shown in Table 3-20. Additionally, EO 12898 applies to federally recognized Indian Tribes. The Southern Ute and UMU reservations are located within the affected area and the UMU Tribe owns the surface land above the King II mine, though this land is not included on the Reservation.

To consider potential environmental justice issues as they pertain to Indian Tribes, and in accordance with the 2011 DOI Policy on Consultation with Indian Tribes and the National Historic Preservation Act of 1966, OSMRE sent a notice of supplemental scoping to 47 tribes from the Colorado Office of Archaeology and Historic Preservation directory of tribes with historic ties to Colorado including the UMU and Southern Ute Tribes. In response to this notice, no tribal responses were received expressing concerns for any potential impacts or environmental justice issues.

In reviewing the study area for vulnerable populations that could be disproportionately affected by the Proposed Action, Montezuma County which includes the UMU Indian Reservation has higher portions of persons living in poverty than the State of Colorado as a whole. This higher poverty rate identifies this population as potentially vulnerable to socioeconomic impacts associated with the Proposed Action.

3.16.2 Impacts from the Proposed Action

Direct and Indirect Impacts

Disproportionate adverse impacts to low-income populations in Montezuma County are reviewed for the Proposed Action. The economic impacts of the Proposed Action as measured in terms of employment, income, and government revenue would benefit Montezuma County residents and government agencies by providing annual revenue and employment opportunities for the duration of coal production (4 to 6 years). The socioeconomic impacts would be distributed across the affected area according to GCC's spending patterns and hiring practices. For example, sales tax revenues would be distributed according to the location where purchases are made. It is expected that GCC's spending patterns and hiring practices would not change in ways that would disproportionately affect Montezuma County residents under the Proposed Action.

Other socioeconomic impacts such as adverse impacts to quality of life or property value would not disproportionately affect low-income residents of Montezuma County because they would occur near the mine location in La Plata County and be mitigated by LPC land use regulations.

With respect to the UMU Tribe, there were no environmental justice issues raised during supplemental scoping and UMU Tribe maintain a Surface Use Agreement with GCC that among other things, financially compensates the UMU Tribe for surface impacts to the UMU-owned lands above the proposed lease modification acreage. Therefore, the UMU Tribe would not be disproportionately affected by the Proposed Action or future action associated with the King II Mine.

There are no environmental or resource related disproportional impacts to low-income or minority populations in the project area.

Mitigation Measures and Residual Impacts

Because there are no disproportionate adverse impacts to vulnerable populations in the affected area, no mitigation measures are warranted.

3.16.3 Impacts from the No Action

Direct and Indirect Impacts

The environmental justice impacts for the No Action Alternative would be the same as for the Proposed Action because the level of coal production and associated mining activities as well as jobs and revenue would be the same as for the Proposed Action but for a shorter duration as minable coal reserves are depleted earlier in time.

4. Cumulative Impacts

Cumulative effects are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes other such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1508.7)

For cumulative effects, baseline conditions include past, present, and reasonably foreseeable future conditions in the affected area. A summary of these conditions are included here since they are common for all resources. The past and present uses of the proposed lease modification area include coal mining, historic oil and gas exploration and limited development, livestock grazing, and wildlife habitat.

Reasonably foreseeable future activities include continued underground mining, continued coal exploration, continued area coal leasing, continued surface coal mine reclamation, continued oil and gas operations, wildfire, logging, vegetation management, agriculture and grazing, recreation, and wildlife habitat. These various activities are consistent with reasonably foreseeable future activities described in the TRFO RMP (USDI/BLM. 2015a). The affected area for cumulative effects varies by resource and is specified with the effects. Generally, the affected area for cumulative effects centers around the proposed and existing lease areas for the King II Mine and Hay Gulch community and along CR 120 N associated with proposed road improvements. For some resources, such as air and socioeconomics, the area of cumulative affect analysis is larger. Resources that are not impacted by the Proposed Action, such as recreation, environmental justice, land use, and health and safety, are not presented in this section.

4.1 Past and Present Actions

The primary existing (past and present) disturbances within or near the Project area, including the King I and II mine sites and along CR 120 to SH 140 are associated with mining, oil and gas development, agricultural practices and livestock grazing, and residential/subdivision development. Provided below are summaries of these past and present actions:

- Historic underground coal mining activities (there were no surface coal mines) over the past century included the following in the area (personal communication T. Bird. March 15, 2015):
 - Hesperus Mine
 - Burnwell #1 and #2 Mines
 - Hay Gulch Mine
 - Rasmussen Mine
 - Hunt Mine
 - Supreme Mine
 - Wright #1 and #2 Mines
 - Durkan Mine
 - Tipotsch Mine
 - Dunn Mine
 - Arness-McGriffin Mine
 - Peacock Mine
 - La Plata #1 Mine
 - King I Mine
 - Blue Flame Mine

Figure 3-3 in the King I & II Coal Mine Area Hydrologic Study (Resource Hydrologic Services 2016), shows the locations of these past underground mines. Generally, they were located immediately off CR 120 N on both the north and south sides of the CR from 1 to 5 miles east of the King II Mine.

Over the last century, there has been subsidence in a number of areas above the historic mines. However, there has been no known damage to overlying resources or to structures attributable to this subsidence. Subsidence may have aggravated or contributed to some landslide movements; this has been documented in the case of the Hesperus Mine along Colorado Highway 160 and the Blue Flame Mine in Hay Gulch. The Hesperus Mine was also the site of a fire in the coal seam. Both mass movement and fires are attributable to shallow overburden, steep slopes, and outcrops of the coal seam.

- Currently, the only mining presently occurring in the Hay Gulch area is the underground coal extraction occurring at the King II Mine.
- Past oil and gas activity within the region has included development of oil and gas wells. Wells adjacent to the coal lease modification area in Hay Gulch have been plugged and/or abandoned (COGCC 2015). Current oil and gas development is centered on drilling locations to the east and south in the San Juan Basin. There is some interest in drilling in the Mancos Shale in western La Plata and eastern Montezuma Counties, but little activity presently. The nearest current oil and gas wells are approximately 4 miles east of Hay Gulch.
- The surface over much of the existing and proposed lease area is owned by the UMU Tribe and operated by the UMU Tribe Farm and Ranch Enterprise. Presently, the tribe maintains a cattle herd of about 700 cows and bred heifers that are pastured at the Hay Gulch Ranch (UMUT 2015). Horses are also pastured at the ranch.
- Hay Gulch is a productive agricultural area with livestock and farming operations. Dry and irrigated agricultural activities contribute to air pollution through generation of dust and also impact area water sources. Ranching and farming (predominantly hay production) have taken place in the area for over a century.
- Dispersed residential development has occurred in the Hay Gulch area for over 100 years. In 1998, Vista de Oro, a 1,000+ acre ranch immediately west of the King II Mine was incorporated and permitted to develop 35 homesites. In about 2002, Vista de Oro was opened and residential development began; including the drilling of water wells, increased vehicle traffic and human activity in the area; and property fencing and fire mitigation occurred. Durango and LPC have been growing at a rate equal to that of the overall state of Colorado (2 percent per year). Montezuma County to the west has experienced a growth rate over the last 10 years of less than half of that of the state overall (refer to Section 3.16).
- There is a current La Plata West Water Conservancy District proposal to develop a domestic water supply pipeline to western LPC. The pipeline would be developed in multiple phases over the next 10 years—dependent upon available grant and private funding. All of the proposed water system would be south of the Project area. No water supply lines are proposed along CR 120. It is estimated that the project could temporarily disturb up to 100 acres along various other CRs on the west side of La Plata County.

- There is no developed recreation in the area as most of the accessible properties are private and access controlled.

4.2 Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions are focused on mining, oil and gas, livestock grazing, and residential/agricultural development.

- Underground coal mining is projected to continue at the King II Mine. The level of coal production would depend on market demand for cement and associated coal as well as availability of economically recoverable coal reserves in the immediate area. Under the Proposed Action, coal reserves would be increased by 4.66 million tons/yr., which would enable continue operation of the mine until around 2023. It is reasonable to expect that GCC will again propose modification of their federal coal lease and/or will apply for a lease by application to extend the life of the mine further into the future than can be done via a traditional lease modification. In 2006, the Colorado Geologic Society (CGS 2006) estimated the coal resource in the San Juan Basin to be 9.61 billion tons of coal. Under the terms of the SMCRA of 1977, the BLM conducted coal unsuitability assessments to determine the suitability of lands for surface coal mining, leasing and development operations. Based on the unsuitability assessments (BLM 1985; SJNF 1983), 46,000 acres are identified as acceptable for further consideration for coal leasing within the TRFO, with an estimated reserve of 1.5 billion tons. Of this estimated reserve, it is unknown how much is reasonably expected to be developed in the future.
- It is difficult to forecast future oil and gas development within the cumulative impact assessment region. In about 2012, the San Juan Basin experienced an increase in oil and gas development that exceeded the past average annual rate of development. Activity increases were due to changes in technology for the drilling and development of the conventional Mancos shale wells and further driven by high oil prices. Depressed oil and gas market prices stalled the short boom period in late 2014. Today, oil and gas development in the project area and in the region is as low as it's been in two decades. Leasing of federal oil and gas rights is not reasonably foreseeable due to (1) a decision to lease the rights has been deferred for an unknown amount of time, if leases are offered, (2) it is not clear that someone would lease parcels in the cumulative effects area, and (3) if leased, it is not certain that the properties would be developed.

The impacts of oil and gas developments, as well as other resource management actions, were addressed in the RMP/FEIS based on a reasonable foreseeable development (RFD) scenario of approximately 2,950 new wells in the next 15 years. Only twenty-two new wells have been approved in the eighteen months since the 2015 RMP was signed. This represents an average of 1.2 new wells every month, which is only 7 percent of the RFD's predicted monthly average. Thus, the impacts to date from oil and gas development are much lower than those anticipated under the approved plan, and are within the range of those analyzed in the RMP FEIS. (USDI/BLM. 2015a)

- Agricultural uses and ranching and livestock production are anticipated to continue in the area.
- Dispersed residential development will likely continue in Hay Gulch and adjacent areas of La Plata and Montezuma counties. According to a 2015 Regional Housing Alliance (Iverson 2015)

study, La Plata County is projected to grow 52 percent over the next twenty years, generating demand for an additional 15,700 housing units. That equates to about 2 percent population growth per year. According to the same study, demand will likely shift in the direction of more compact and more multi-family housing products closer to Durango where the job center is located.

4.3 Cumulative Impacts

The following section describes potential cumulative impacts to resources near the project area from the past, present, and reasonably foreseeable future actions in conjunction with the Proposed Action. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). Resources not expected to be impacted by the Proposed Action (refer to Chapter 3) are not carried through the cumulative impact assessment. The cumulative impacts analysis area (CIAA) varies by resource. It may be restricted to the immediate project area (e.g., for soil impacts) or an entire watershed (e.g., for water resources). For the analysis of the cumulative impacts, it is assumed that all design features and any applicable mitigation measures would be implemented.

4.3.1 Cumulative Air Quality and Climate

The cumulative impact assessment for air quality considers how air emissions from mine operations and coal transport when added to other past, present, and reasonably foreseeable future actions. The cumulative impacts to air quality in the King II Mine area would result primarily from emissions of PM₁₀ from the current and future activities occurring within the region.

To examine potential cumulative air quality impacts from activities that it authorizes, BLM initiated the Colorado Air Resources Management Modeling Study (CARMMS). The study was primarily concerned with assessing statewide impacts of projected oil and gas development (both federal and fee (i.e., private)) out to year 2021 for three development scenarios (low, medium, and high). Projections for development are based on either the most recent Reasonably Foreseeable Development (RFD) document (high), or a projection of the current 5-year average development pace forward to 2021 (low). The medium scenario includes the same well count projections as the high scenario, but assumes restricted emissions, whereas the high assumes current development practices and existing emissions controls required by regulations (2012). Each BLM field office was modeled with the source apportionment (SA) option, meaning that incremental impacts to regional ozone and AQRVs from development in these areas are essentially tracked to better understand the significance of such development on impacted resources and populations. The 2021 future year for all other sources of emissions (i.e., not oil and gas and mining) were based on EPA's 2020 projections used in the PM_{2.5} NAAQS rulemaking (EPA 2012).

The CARMMS project leverages the work completed by the WestJumpAQMS, and the base model platform configuration (CAMx), meteorology (WRF), and model performance metrics are based on those products. The complete report and associated data is available on our website at: https://www.blm.gov/sites/blm.gov/files/program_natural%20resources_soil%20air%20water_airco_quic k%20link_CARMMS.pdf. The CARMMS model domain has a minimum grid resolution of 4 km.

Because CAMx is a one-atmospheric dispersion model, it requires emissions inventories to be modeled accurately at both spatial and temporal scales. This fact allowed the BLM to leverage the study and apply

the source apportionment technology to all of the emissions from coal mines in Colorado that produce federal coal. Unfortunately, the Bureau did not have the resources to track each mine independently as was done for each field office's oil and gas development (which was the primary purpose of the CARMMS model), but rather all of the mines were tracked together as a single source group. The source group included the following existing and hypothetical mines:

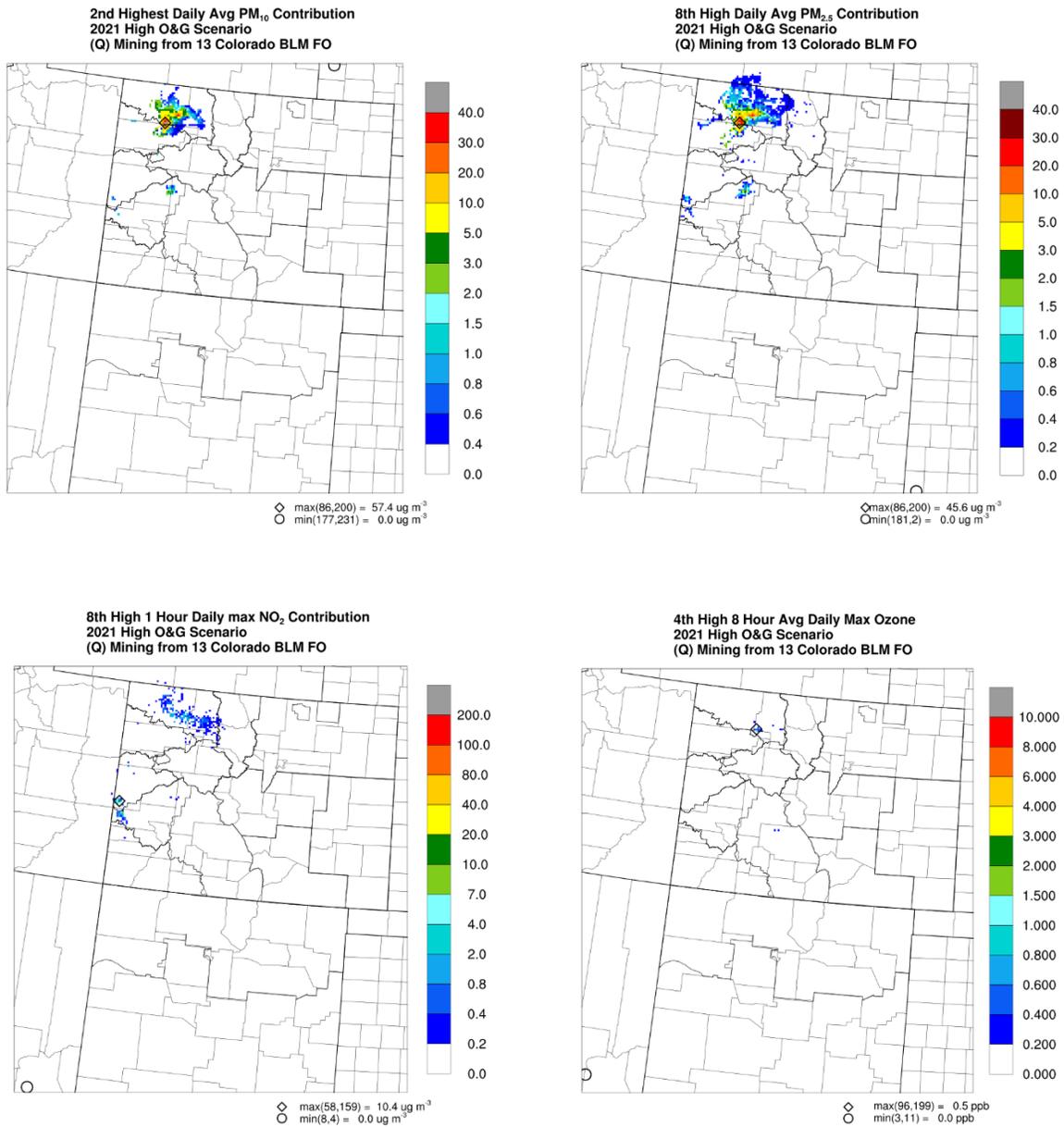
- Book Cliffs Area (Grand Junction)
- McClane (Grand Junction)
- Bowie (Uncompahgre)
- King II (Tres Rios)
- Foidel (Kremmling)
- Deserado (White River)
- Trapper (Little Snake)
- Colowyo (Little Snake)
- Sage Creek (Little Snake)
- West Elk (Uncompahgre)
- Elk Creek (Uncompahgre).

The study provided for a single mining scenario based on each mines maximum allowable emissions rate, which were estimated based on the CDPHE APEN database and available EISs and EAs prepared for previous authorizations. We note the most mines in Colorado are not currently producing at their maximum (i.e., what CARMMS analyzed) authorized capacities. EPA default chemical speciation profiles were used in the SMOKE emissions modeling for mining except that the EPA mining PM_{2.5} speciation profile was adjusted for abnormally high sulfur emissions that were erroneous for typical underground mining operations. The modelled emissions details are provided in the CARMMS report (web reference provided above) as Appendix D and D-1.

Although the predicted impacts are based on a future model year emissions (2021), the differences in the impacts between the scenarios and the base year provide insight into how mass emission changes impact the atmosphere on a relative basis, and are thus useful for making qualitative and quantitative comparisons with emissions levels at the current pace of development.

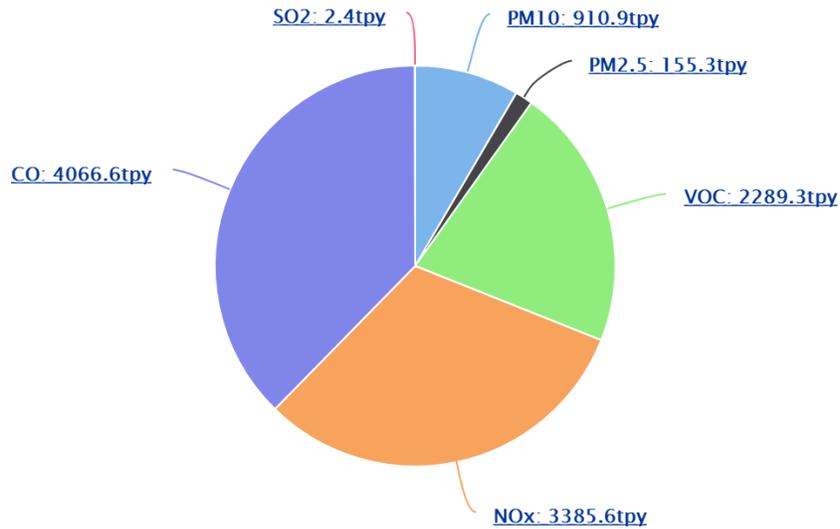
The results (Figure 4-1) show that PM emission impacts are primarily the result of surface mining facilities in the northern portion of the CARMMS analysis domain. In general, primary PM (the kind the mines emit) is a localized pollutant. The 4-km grid resolution of the model is less sensitive to settling and terrain impacts (i.e., plume depletion) for primary PM than a nearfield model would show. Although the PM concentrations are a bit high due to the model resolution, they are reasonable across the larger domain. The PM contributions from all of the mines appears to be fairly low around the King II facility (not more than 0.4µg/m³ for PM₁₀ and 0.2µg/m³ for PM_{2.5}). The other pollutants (NO₂ and O₃) are also equally minor impactors, although we note that the ozone predictions are a function of the mines direct NO_x and VOC contributions and does not include CMM VOCs since they are unknown.

Figure 4-1. CARMMS Mining Results



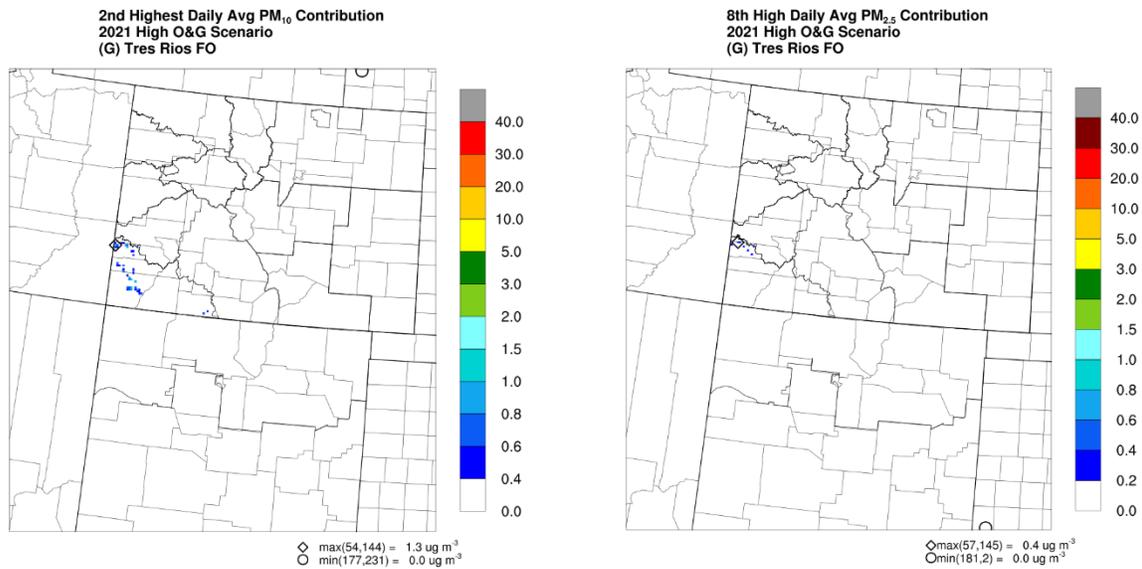
For the TRFO, we are disclosing the high CARMMS scenario (Figure 4-2) to account for all of the reasonably foreseeable future actions that could occur within the area (mostly oil and gas development), while noting that the area is currently tracking far below the low scenario.

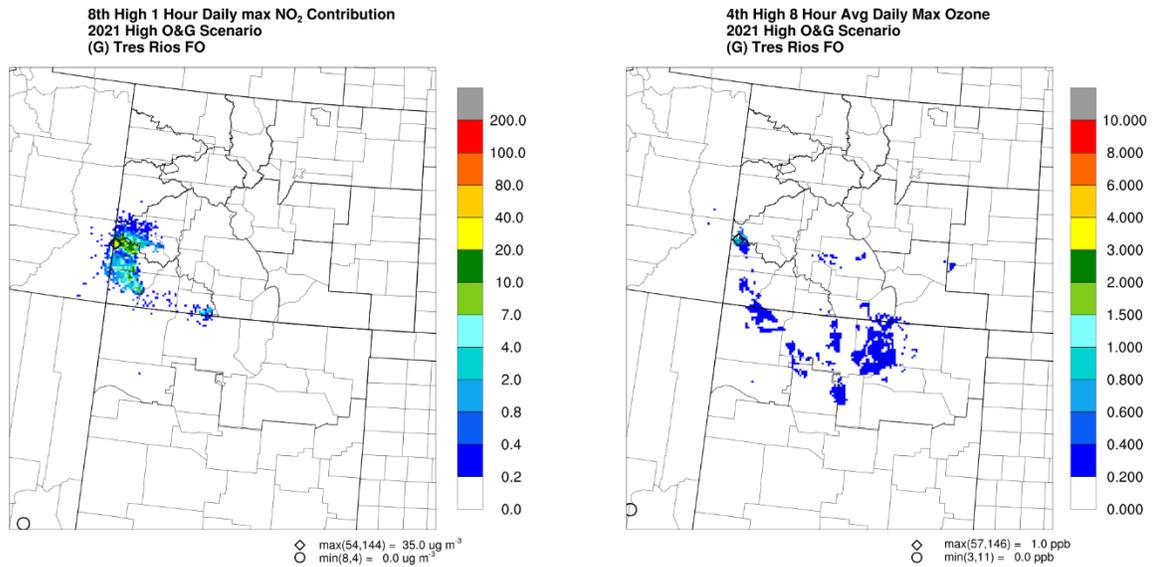
Figure 4-2. CARMMS 2021 TRFO High Oil and Gas Scenario Emissions



The high scenario oil and gas development emissions are large enough to account for all of the reasonably foreseeable activities outlined in the CARMMS report that have significant emissions generation potential (refer to Figure 4-3)

Figure 4-3. CARMMS TRFO Oil and Gas Results





As can be seen in the source apportionment results, the impacts are relatively minor, and are mostly the result of development in and proximate to the Gothic Shale Play area. The King II mine has far fewer NO_x and VOC emissions than that of the high oil and gas scenario, such that the mine itself would not be expected to contribute significantly to direct ozone formation. Several other data metrics produced by CARMMS to describe potential impacts to sensitive resources are disclosed in Table 4-1 below.

Table 4-1. Maximum Source Group Contributions

Source Group	Visibility Impacts			Deposition (kgN/ha-yr)	AQRV Impacted Area	Max Contribution to Exceedance	
	Max dv	Days > 0.5dv	Days > 1.0dv			O ₃	PM _{2.5}
CO Mines	0.125	0	0	0.0014	Mesa Verde	0.474	45.625
TRFO O&G	1.415	4	35	0.126	Meas Verde	0.381	0.036

As would be expected given the plots above the Colorado Mines (particularly the surface mines) contribute greatly to the PM related NAAQS and visibility impacts. Although the exact King II contributions cannot be teased out of the data, its highly unlikely that the mines emissions contribute a significant fraction of the modeled AQRV impacts shown above, given the isolation of the facility in relation to the impacted area and the localized nature of the PM emissions.

For the total cumulative results (rolled up source apportionment and total model outputs), the BLM is disclosing the low CARMMS scenario. Figure 4-4 below shows the tracked report year (2015) federal oil and gas development emissions contrasted to each CARMMS scenario, where the emissions levels of each pollutant are shown relative to the High scenario (i.e., the high scenario is 100 percent on the graph). In most cases the 2015 emissions are far below the low CARMMS scenario, such that this has been deemed the appropriate scenario to disclose given the likelihood or potential for emissions generating

activities to exceed the 2021 estimates in the short term. As noted above the mining emission were held constant in all future year scenarios such that those impacts are static regardless of the CARMMS oil and gas scenario.

Figure 4-4. CARMMS BLM CO Cumulative Oil and Gas Tracking (federal)

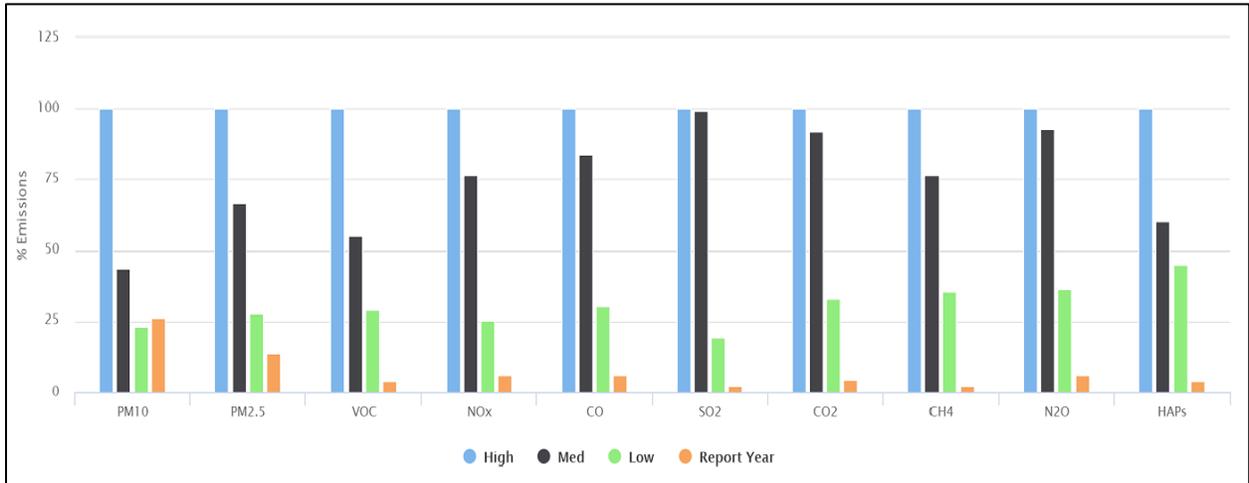
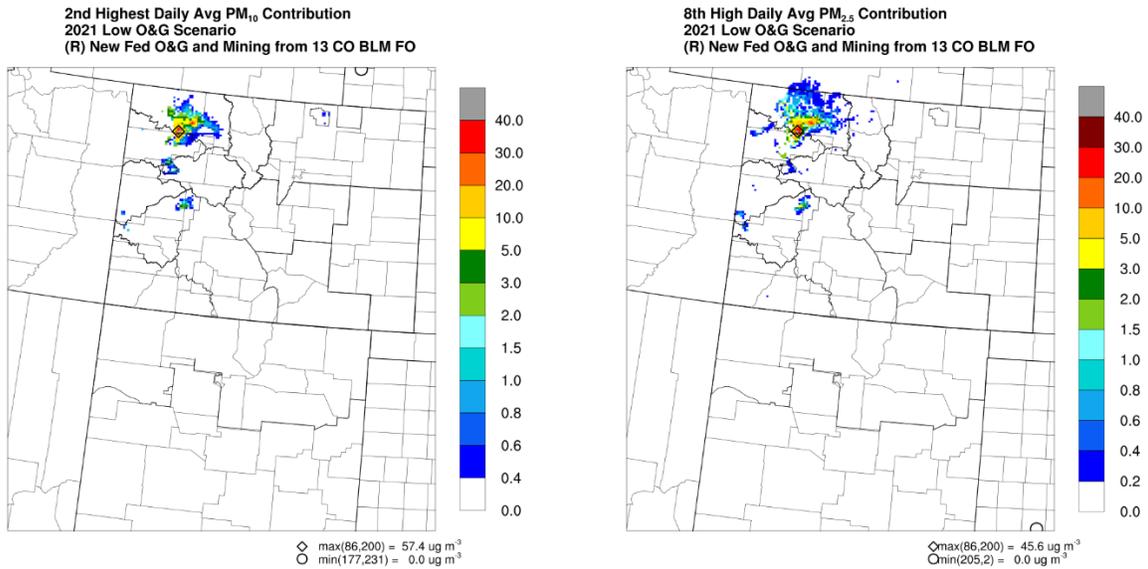
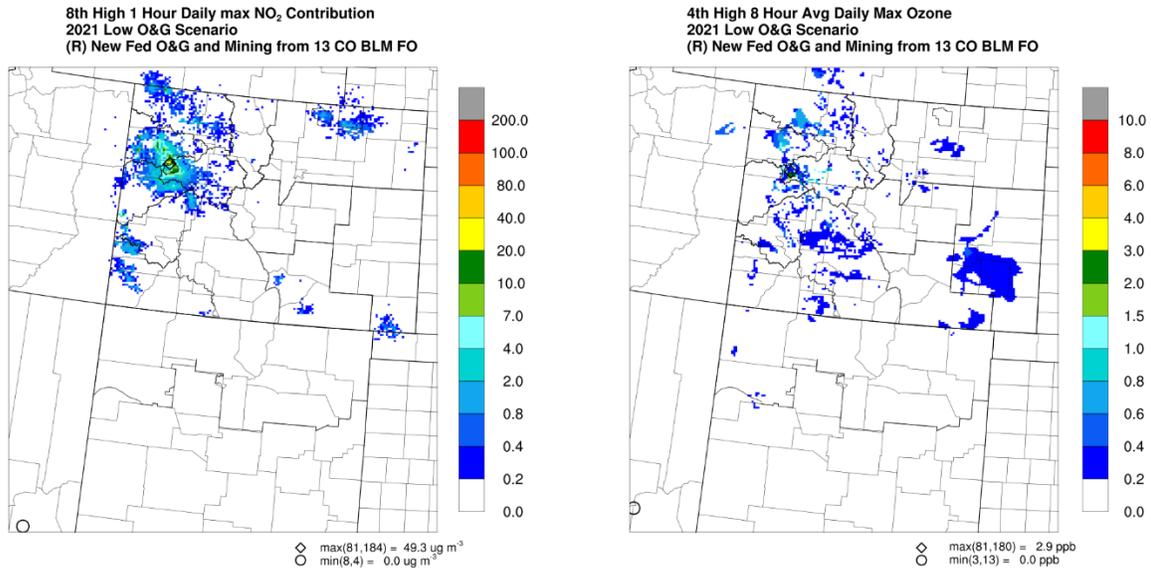


Figure 4-5. CARMMS BLM CO Results (federal)





As shown in Figure 4-5 above, it is fairly evident that the surface mines are driving the estimated PM impacts within the CARMMS model from all of the federal emissions. We also note that the impacts represent the maximum contributions recorded (in the form of the applicable standard), but that these maximums are not necessarily relative to any exceedance values that may have been modeled for a pollutant shown (refer to Table 4-2).

Table 4-2. Maximum Source Group Contributions

Source Group	Visibility Impacts			Deposition (kgN/ha-yr)	AQRV Impacted Area	Max Contribution to Exceedance	
	Max dv	Days > 0.5dv	Days > 1.0dv			O ₃	PM _{2.5}
CO O&G and Mines (federal)	0.655	16	0	0.043	Mount Zirkel (vis)/Flat Tops (dep)	0.621	45.737

The plots in Figures 4-6 and 4-7 show the maximum modeled concentrations and the expected changes from future emissions relative to the base year. As can be seen, the majority of the analysis area sees relatively modest decreases or no changes to ozone formation potential. Particulate matter impacts are mostly confined to the urban areas in Colorado, and can be attributed to the expected population increases projected to occur (which have occurred steadily since the CARMMS base year). Interestingly these areas also project some of the largest drops (undoubtable due to tighter mobile source standards). Another interesting model artifact is the high ozone predicted along the I-70 corridor north of the proposed project area. This region has always been a “hot spot” for the CAMx and CMAQ photo-chemical models (even in the updated Intermountain West Data Warehouse 2011b platform), for reasons which are currently unknown. Although we suspect the area’s topography, especially the rapid elevation gains along the Roan

cliffs, along with the limits of the CAMx and WRF meteorological model resolutions may have something to do with it. Ultimately, it has been shown that the model tends to over predict ozone in western Colorado. So the ozone results on face value should be considered conservative.

Figure 4-6. CARMMS Cumulative “one atmosphere” Results

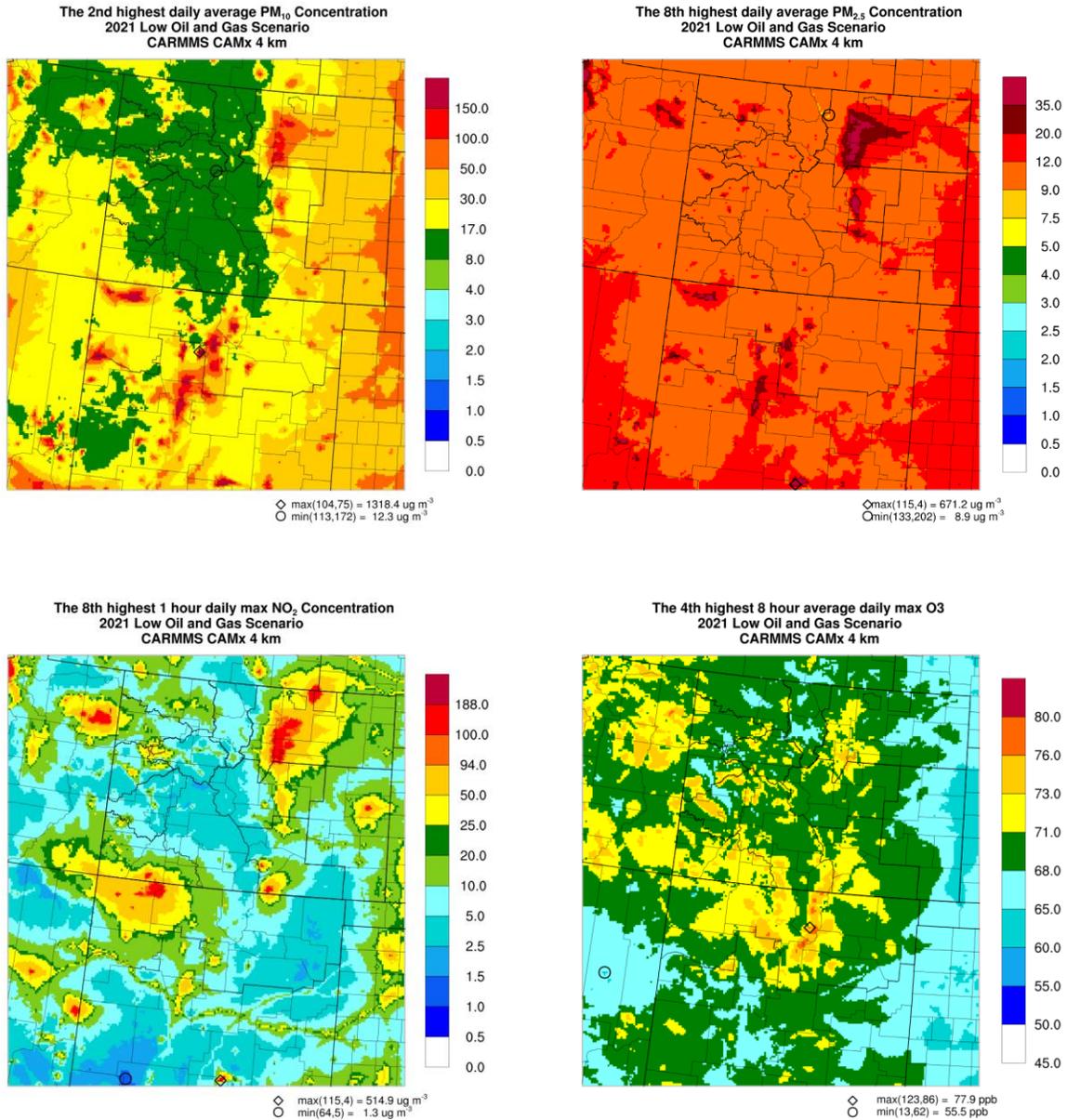
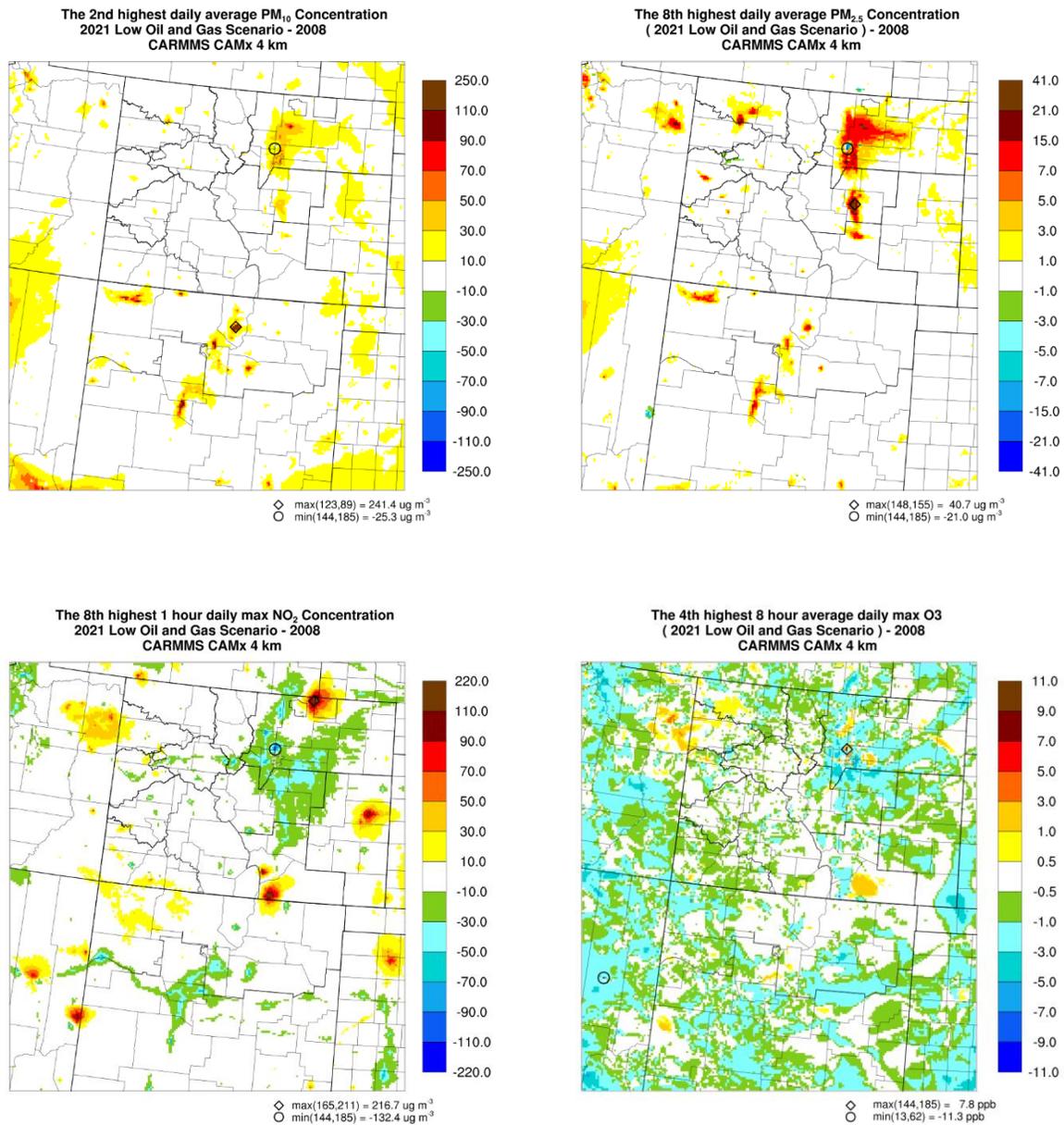


Figure 4-7. CARMMS Cumulative Changes (future minus base)



Greenhouse Gases and Climate Change

The following information on predicted climate change has been summarized from the [Intergovernmental Panel on Climate Change \(IPCC\)](#).

All of the climate change predictions made by the climate science community are predicated upon various global GHG emissions scenarios, known as Representative Concentration Pathways (RCPs) (refer to <https://tntcat.iiasa.ac.at/RcpDb/dsd?Action=htmlpage&page=welcome#intro>). RCPs are not fully integrated scenarios of climate feedback, policy, or socioeconomic projections, but rather a consistent set of projections of only the components of radiative forcing that are meant to serve as input for climate

modeling, pattern scaling, and atmospheric chemistry modeling (Refer to Figures 4-8 and 4-9). The RCPs provide a consistent analytical baseline from which climate science communities can start additional analysis from. For the purposes of this EA the BLM has chosen to focus on RCP's 2.6 and 4.5 (where data and analysis is available) as likely scenarios for analysis given the recent and reasonably foreseeable regulatory developments, policy changes, and actions that are being formulated or occurring at home and internationally in response to predicted climate change. Additionally, these scenarios are the only two that result in decreasing future emissions relative to the baseline. The RCP 2.6 pathway, developed by the IMAGE modeling team, is representative of scenarios leading to very low greenhouse gas emissions/concentration levels. Its radiative forcing level is predicted to peak at a value around 3.1 W/m^2 (Watt per square meter) mid-century before returning to 2.6 W/m^2 by 2100. The RCP4.5 pathway, developed by the MiniCAM modeling team, is a stabilization scenario where total radiative forcing is stabilized before 2100 by employment of a range of technologies and strategies for reducing greenhouse gas emissions. It should be noted that according to the IPCC, only projections following the lowest concentration pathway (RCP2.6) result in an estimated mean increase in global average temperatures below 2°C (the current internationally agreed upon target for limiting average surface warming). Equally important, IPCC scientists project warming will continue beyond 2100 under all RCP scenarios except for RCP2.6.

The RCP2.6 scenario provides for an abrupt and rapid decline in CO_2 emissions starting around 2020, with atmospheric concentrations of GHGs and subsequent radiative forcing stabilizing between 2040 and 2060. This scenario also provides for “negative emissions” starting in 2080, and essentially projects more carbon being removed from the atmosphere than is emitted. The curve suggests that emissions from fossil fuels and other sources would decline by approximately 3.5 percent per year until 2040, and then continue at a pace of approximately 10 percent per year until the emissions become negative between 2070 and 2080. The RCP4.5 scenario forecasts global emissions will increase until about 2040, with actual stabilization occurring between 2030 and 2050. Starting in 2050 RCP4.5 scenario emissions would start to decline at rates commensurate with the 2.6 pathway until 2080, when emissions stabilize again through the end of the century. As noted earlier, GHG concentrations and forcing would continue to rise under RCP4.5 scenario through the end of the century, although the rate of increase diminishes significantly around 2070.

Figure 4-8. Global GHG Emissions Projections

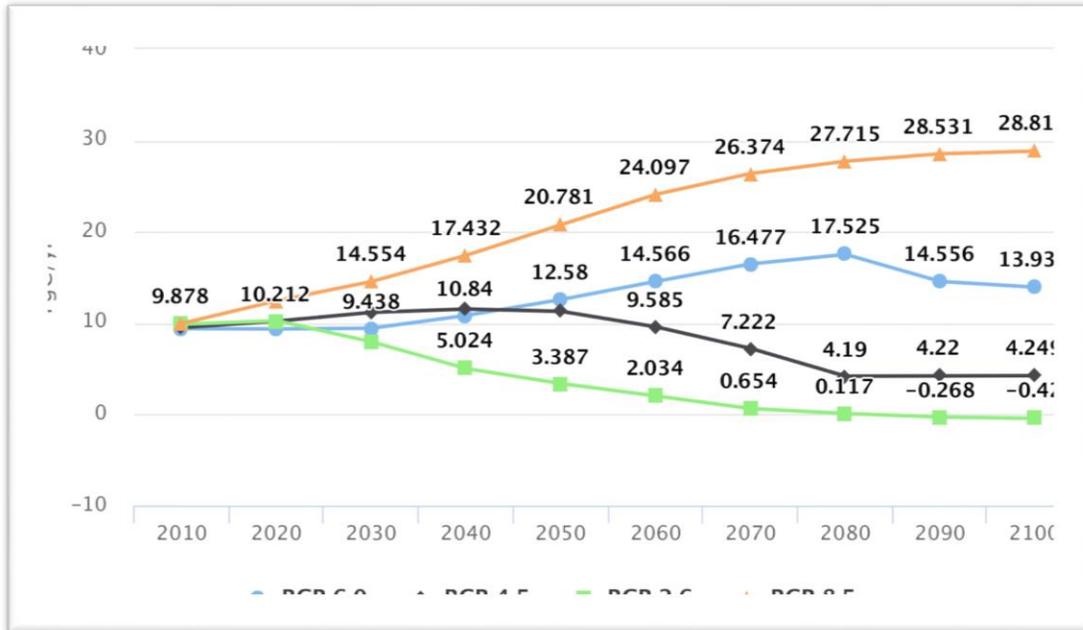
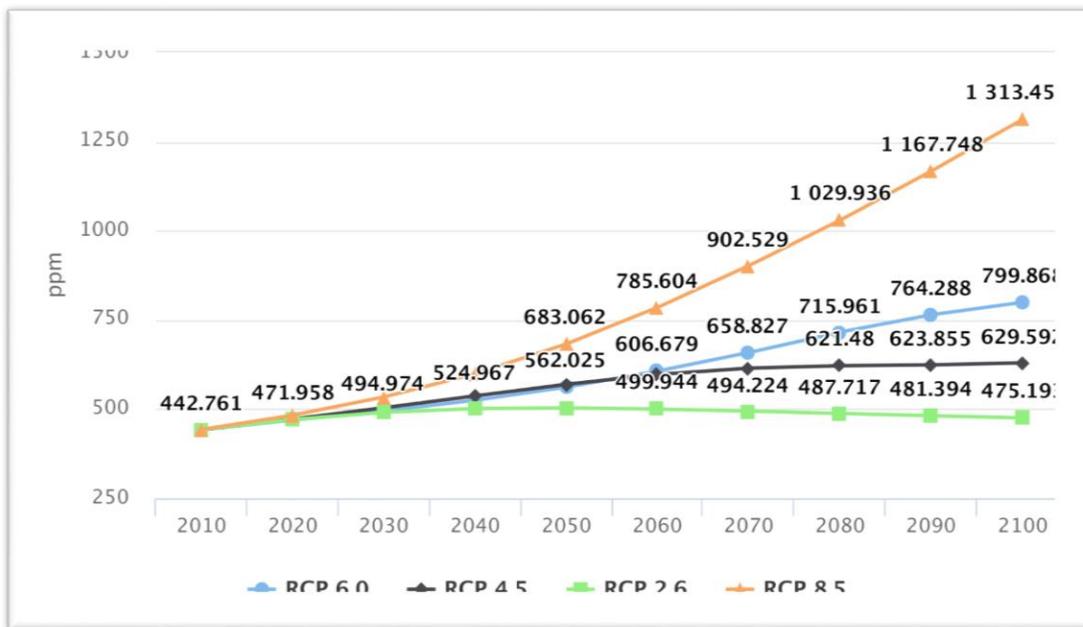


Figure 4-9. CO₂e Atmospheric Concentration Projections



Projected Climate Impacts

The future climate equilibrium is dependent upon warming caused by past anthropogenic emissions, future anthropogenic emissions, and natural variability. Global mean surface temperature change for the period 2016–2035 relative to 1986–2005 is similar for the four RCPs and will likely be in the range 0.3°C to 0.7°C (medium confidence). The projection assumes no major volcanic eruptions, changes in natural

emissions sources (e.g., CH₄ and N₂O), or unexpected changes in total solar irradiance. By 2050, the magnitude of the projected climate change is significantly affected by the overall emissions path the world is tracking along.

The projected increase of global mean surface temperature by the end of the 21st century (2081–2100) relative to 1986–2005 is likely to be 0.3°C to 1.7°C under RCP2.6, 1.1°C to 2.6°C under RCP4.5, 1.4°C to 3.1°C under RCP6.0 and 2.6°C to 4.8°C under RCP8.5. It is virtually certain that there will be more frequent hot and fewer cold temperature extremes over most land areas on daily and seasonal timescales, as global mean surface temperature increases. It is also very likely that heat waves will occur with a higher frequency and longer duration. Occasional cold winter extremes will continue to occur, due to the inherent variability within the climate system. Changes in precipitation patterns will not be uniform, but in general arid regions are expected to become dryer while wetter areas can expect more frequent exceptional precipitation events. Oceans will continue to warm, with the greatest impacts occurring at the surface of tropical and northern hemisphere subtropical regions. Models also predict ocean acidification will increase for all RCP scenarios, where surface pH can be expected to decrease by 0.06 to 0.07 (15 to 17 percent) for RCP2.6 and 0.14 to 0.15 (38 to 41 percent) for RCP4.5. Year-round reductions in Arctic sea ice are projected for all RCP scenarios and it is virtually certain that near-surface (upper 3.5 m) permafrost extent at high northern latitudes will be reduced (37 percent - RCP2.6 to 81 percent - RCP8.5) as global mean surface temperature increases. Global mean sea level rise will very likely continue at a faster rate than observed from 1971 to 2010. For the period 2081–2100 relative to 1986–2005, the rise will likely be in the ranges of 0.26 to 0.55 m for RCP2.6, and of 0.45 to 0.82 m for RCP8.5. It is very likely that the sea level will rise in more than about 95 percent of the ocean area, where about 70 percent of coastlines worldwide would experience a sea level change within ±20 percent of the global mean.

All climate model projections indicate future warming in Colorado. Statewide average annual temperatures are projected to warm by +2.5°F to +5°F by 2050 relative to a 1971–2000 baseline under RCP4.5. Under the high emissions scenario (RCP8.5), the projected warming is +3.5°F to +6.5°F and would occur later in the century as the two referenced scenarios diverge. Summer temperatures are projected to warm slightly more than winter temperatures, where the maximums would be similar to the hottest summers that have occurred in past 100 years. Precipitation projections are less clear, with individual models showing a range of changes by 2050 of -5 percent to +6 percent for RCP 4.5 percent, and -3 percent to +8 percent under RCP8.5. Nearly all of the models predict an increase in winter precipitation by 2050, although most projections of snowpack (April 1 Snow Water Equivalent) show declines by mid-century due to the projected warming. Late-summer flows are projected to decrease as the peak shifts earlier in the season, although the changes in the timing of runoff are more certain than changes in the amount of runoff. In general, the majority of published research indicates a tendency towards future decreases in annual streamflow for all of Colorado's river basins. Increased warming, drought, and insect outbreaks, all caused by or linked to climate change, will continue to increase wildfire risks and impacts to people and ecosystems.

The Office of Natural Resources Revenue, U.S. Department of the Interior data shows that in 2015 total federal (onshore) production of coal in the country stood at approximately 389,606,150 tons. As a whole (federal and non-federal), the U.S. produced approximately 896,940,563 tons of coal in 2105 (U.S. Energy Information Administration). Federal coal made up approximately 43 percent of the total 2015 production, and in general has continued to decline along with the total coal production nationally. On an

annual basis, the maximum production year for the Proposed Action would represent 0.27 percent of all federal coal produced nationally and 0.11 percent of all the coal produced in the U.S. relative to 2015. The emissions from the maximum projected King II production would be approximately 0.21 percent of the U.S. total relative to 2016, and 0.04 percent of the global GHG burden relative to 2011 on a worst-case year annualized basis.

Climate Change Mitigation

To meet the two-degree temperature target, the world needs to reduce annual GHG emissions at a rate of approximately 4 percent (until stabilization is achieved around 2080) to have a likely chance of meeting the target. The U.S. is the largest emitter in the world on a per capita basis, while China is number one in terms of mass emissions. All nations party to the Paris Agreement (international climate change treaty) have established different rates of reduction targets based on several socio-economic factors. The U.S. had previously set an aggressive goal to try and reduce emissions 83 percent relative to 2005 levels (7,228.3 Mt CO₂e, excluding land use and changes) by mid-century. It is impossible to say with certainty exactly how society and governments will modify and balance their behaviors, lifestyles, technologies, and needs at the global scales required to mitigate or avoid the predicted impacts of climate change. It is entirely possible that an energy or policy breakthrough could enable emissions declines for any number of scenarios that could ultimately support any RCP scenario presented. Irrespective, effective implementation for any such breakthrough will require careful planning, such that the changes could be made with the least amount of disruption to society and economies a whole (this would include accounting for the projected climate change impacts themselves). From a practical implementation standpoint, it seems unlikely that world nations would be able to radically shift their economies, infrastructure, and alter the way energy is produced and used by 2020 such that emissions would decline in accordance with the analyzed RCP2.6 rates. However, the longer-term viability of the scenario is possible with continuous technological and policy advancements. In general, the 2.6 and 4.5 scenario contributions to both forcing and concentrations track closely through 2030 (true for all RCPs), such that aggressive reductions in GHG emissions after 2030 could produce similar desired consequences regardless of the initial track. For the purposes of this analysis there is no basis from which we can find the Proposed Action to be significant in the context of climate change. No tools exist to predict the residual impacts of any mitigation that could be reasonable prescribed, up to and including denying the project, such that the resulting analysis would not be deemed to be arbitrary and capricious upon inspection.

4.3.2 Cumulative Geology and Minerals

The CIAA for geological resources is the project area associated with the mine lease area where subsidence has the potential to occur. The cumulative impacts from the Proposed Action would be the removal of coal and minor amounts of possible subsequent subsidence. Approximately 4.66 million tons of coal would be mined under the Proposed Action. This amount is approximately 0.05 percent of the estimated 9.61 billion tons (2006 estimate) in the San Juan Basin coal field. Other geologic formations/features in the area would remain in place and would not be impacted by the proposed continued mining. Other actions that may cumulatively impact geological resources are limited to future mining and oil and gas development. However, while future mining could possibly occur in the CIAA, political, regulatory, and economic factors limit the potential of new coal mines being developed in the

area. No other metal or mineral mines are likely to be developed in the CIAA. Oil and gas drilling in the CIAA has been historically very limited (refer to Section 3.4). As such, cumulative impacts from these activities would be minor as geologic resources are removed or altered.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. Consequently, cumulative impacts under the No Action would be incrementally less than under the Proposed Action due to a shorter timeline for continued mining.

4.3.3 Cumulative Soils

The CIAA for soils is the project area. Cumulative impacts to soil resources would come from underground mining and the minor amounts (less than 5.0 acres) of associated surface disturbance as well as along CR 120 N where approximately 4.7 acres of soils have potential to be disturbed. This amount of disturbance is less than 1 percent of the entire project area. Along with the past, present, and reasonably foreseeable future actions, mining in the project area is likely to result in minor cumulative impacts to soil resources in the region due to the small area of surface disturbance, as well as the general requirement for reclamation of disturbed areas when mining operations cease.

Mining and reclamation under the No Action Alternative would conclude sooner than under the Proposed Action. Consequently, cumulative impacts under the No Action Alternative are considered negligible.

4.3.4 Cumulative Water Resources

The CIAA for water resources is the Hay Gulch watershed.

Cumulative Effects to Surface Water Resources

Discharges of surface water from the mine operations have little potential to have cumulative effects, as these discharges are related to natural precipitation events, and are treated in accordance with Clean Water Act requirements. All discharges are regulated by the permits and compliance ensured by CDPHE and CDRMS and the Proposed Action would have the same or smaller detrimental cumulative effects to surface water resources as baseline conditions.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. Consequently, cumulative impacts under the No Action would be incrementally less than under the Proposed Action due to a shorter timeline for continued mining.

Cumulative Effects to Groundwater Resources

Cumulative effects to groundwater resources for the affected area are measured in terms of additive or subtractive changes to groundwater quality and the hydrologic balance related to the Proposed Action. Water used from the Hay Gulch Irrigation Ditch is utilized for mine dust suppression but is recaptured ahead of potential infiltration to the unsaturated bedrock exposed underground.

There would be negligible cumulative impacts to identified water resources from continued mining. As the King II Mine is not known to discharge water from the mining operation to underground areas that are

known to be hydraulically connected to users outside the mine area, there are no cumulative effects from mine water used in the operation. King II does not withdraw or intercept groundwater in the underground mine workings or in the alluvial deposits in the surrounding ephemeral drainages.

Discharges of surface water from the mine operations have little potential to have cumulative effects, as these discharges are related to natural precipitation events, and are treated in accordance with Clean Water Act requirements. All surface discharges are regulated by the permits and compliance ensured by the CDPHE and CDRMS. Other activities, including oil and gas development, residential development, ranching, agriculture, and other rural development may contribute additional cumulative impacts in the Hay Gulch area. Other development activities would have additive impacts due to surface disturbance and use of groundwater for their purposes. Uses of water from these developments could impact the quantity and quality available to downstream users in the primary downstream drainages.

Design Features 2 and 3 expand monitoring and characterization of the potentially affected groundwater system and will serve to reduce the likelihood of detrimental effects to groundwater quality or the hydrologic balance outside the existing permit or proposed lease area. Therefore, the Proposed Action would not have significant cumulative effects to groundwater resources.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. Consequently, cumulative impacts under the No Action would be incrementally less than under the Proposed Action due to a shorter timeline for continued mining.

4.3.5 Cumulative Vegetation

The CIAA for vegetation is the project area. Additional mining and CR 120 N road improvements under the Proposed Action would have the potential to cumulatively impact vegetation in the area. The impacts related to mining operations are minor as only infrequent small surface impacts occur associated with surface drilling and testing. These potential impacts are anticipated to be less than 5.0 acres. CR 120 N road construction has the potential to alter 4.7 acres of area vegetative communities along the CR ROW. Along with the past, present, and reasonably foreseeable future actions, mining and oil and gas development in the project area are likely to result in minor cumulative impacts to the region, due to the associated surface disturbance, reclamation of the area at the end of the life of the mine, and reestablishment of local vegetative communities. Overall, cumulative impacts are expected to be minor as the disturbance to vegetation associated with the operation of the King II Mine is very small, less than 10 acres (<1 percent of the project area); and because native and agricultural vegetation along CR 120 N has historically been altered when the road was originally constructed.

Mining and reclamation under the No Action Alternative would conclude sooner than under the Proposed Action. Consequently, cumulative impacts under the No Action Alternative are considered negligible.

4.3.6 Cumulative Wildlife (Aquatic and Terrestrial)

The CIAA for fish and wildlife resources is the project area, and an approximately 5-mile buffer zone around the disturbance areas to account for noise, traffic, and human activity.

When combined with past, present, and reasonably foreseeable future activities in the region, mining in the project area would cumulatively contribute to impacts to fish and wildlife species. This cumulative impact would be relatively minor, given the large amount of similar undisturbed habitat that occurs in the region and because most of the habitat disturbance area is associated with the widening of an existing CR.

Other activities in the region have the potential to cumulatively impact wildlife. Livestock grazing can create competition for grazing resources between cattle and big game species. Future oil and gas development would have the potential to displace wildlife species from an area for the life of those projects (USDI/BLM. 2015a). However, oil and gas development on both federal and state leases is generally strictly regulated—and subject to wildlife protection mitigation measures—and thus would be analyzed independently should such development occur (USDI/BLM. 2015a). Cumulative impacts from these activities would likely be negligible.

Mining under the No Action Alternative would conclude sooner than under the Proposed Action by several years. Consequently, cumulative impacts under the No Action are considered less than negligible.

4.3.7 Cumulative Threatened, Endangered and Sensitive Species

The CIAA for special status species is the project area plus a 1-mile buffer around the disturbance area. The CIAA for federally listed species is an approximately 25-mile radius around known coal combustion locations in the United States where emissions have the potential to impact listed species in proximity to the source. The reasonably foreseeable developments within 25-miles of the subject GCC-owned and operated cement plants are difficult to precisely quantify as both cement plants are located in industrial and/or high developed urban areas characterized by privately owned lands. Reasonably foreseeable developments include the following: agricultural activities (seasonal farming); urban development and sprawl; residential development and growth; commercial developments; road improvements; infrastructure improvements and/or redevelopment and industrial developments. All of these reasonably foreseeable developments are driven by regional growth and/or contraction based on economic factors. Future job growth over the next ten years in Tijeras, New Mexico is predicted to be 34.43 percent concentrated in the business, sales and manufacturing sectors (Sperling 2017). Pueblo, Colorado is also projected to grow at a rate similar to Tijeras and in the same market sectors (Sperling 2017).

Sensitive or special status species with potential to occur in the Project area and to be impacted by the Proposed Action are limited to several BLM-listed sensitive bat species and area raptors; specifically, northern goshawk and bald eagle. Based on the OSMRE, CDRMS, LPC, and CDOT biological clearance requirements prior to any ground-disturbing activities, potential cumulative impacts to area sensitive species is expected to be negligible as sensitive species would be avoided.

The Proposed Action would have no direct impacts to federally listed threatened, endangered, or candidate species. There would be indirect impacts to the silvery minnow in the Rio Grande River and to the green back cutthroat trout in Pueblo County, Colorado from coal combustion and associated mercury deposition at the GCC-owned Tijeras and Pueblo cement plants. Some portion of this mercury is reasonably likely to end up in the Rio Grande and in the Arkansas River or tributaries thereof, which would cumulatively impact these listed fish. Reasonably foreseeable developments in the Pueblo and Tijeras areas are anticipated to be based on small town growth associated with increases in the availability

of goods and services with minor amounts of new industrial development. These kinds of developments and activities will occur within or immediately adjacent to city limits where most habitats have already been altered or are currently impacted by noise, light, pollution and human activity. Accordingly, the Proposed Action, in conjunction with other past, present, and reasonably foreseeable future actions, would contribute negligible to minor long-term cumulative impacts to the listed fish and their habitats in the CIAA.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. The end users of King II coal however would not shut down their cement plants and railroads. Rather, deposition of air pollutants would continue and possibly increase depending upon the type and source of alternative fuels used for combustion (natural gas, used tires, industrial waste, etc.) in lieu of King II coal.

4.3.8 Cumulative Access and Transportation

The CIAA for transportation is the project area, including the length of CR 120 to SH 140. Cumulative effects to transportation resources for the Proposed Action are related to the road conditions and traffic on CR 120 and adjacent roadways, as well as interactions between coal transport trucks, residents, and users of CR 120 and adjacent roadways. The direct and indirect effects to transportation resources for the Proposed Action would intensify if additional uses of the affected roads increase with oil and gas development and/or additional residential development. Increases in area ranching and agricultural activities are not anticipated in the CIAA as all irrigable lands are currently being irrigated, and ranching occurs as it has in the area for the last 100 years. Projected population and residential growth in the region are unlikely to add to transportation impacts in the project area, as future growth is forecast closer to Durango. Additionally, existing high truck traffic on CR 120 N will also likely deter prospective land or home buyers from the CIAA.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. Consequently, cumulative impacts under the No Action would be incrementally less than under the Proposed Action due to a shorter timeline for continued mining.

4.3.9 Cumulative Noise and Vibration

The CIAA for noise is the project area, including the length of CR 120 to SH 140 and an approximately 1-mile buffer around the area. Cumulative noise and vibration effects for the Proposed Action would be related to changes in equipment use or number of truck trips. These cumulative effects could be additive if additional uses of the road system increase through oil and gas development, additional residential development, and increased ranching and agricultural activities.

Noise and vibration effects for the Proposed Action consider equipment use and truck trips for the maximum allowable coal production under the current mine permit. If GCC were to change equipment or desire to increase coal production above permitted levels, it would be required to apply for a permit revision with CDRMS and the OSMRE. These agencies would evaluate the potential noise and vibration effects associated with the proposed permit changes. Therefore, the cumulative noise and vibration effects for the Proposed Action are the same as baseline levels because noise and vibration levels allowed under

current mine plan would be enforced. The likelihood of adverse noise and vibration impacts would be reduced under the Proposed Action with implementation of Design Features 3, 4, and 5.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. Consequently, cumulative impacts under the No Action would be incrementally less than under the Proposed Action due to a shorter timeline for continued mining.

4.3.10 Cumulative Cultural Resources

The CIAA for cultural resources is the project area. Cumulative impacts to cultural resources would come from the potential for subsidence and from minor surface disturbances associated with CR improvements and on the surface of the mine. Along with the past, present, and reasonably foreseeable future actions, mining in the project area is likely to result in minor cumulative impacts to cultural resources in the region due to the small area of surface disturbance, as well as because potential impacts from the Proposed Action are considered negligible to minor lasting for the duration of mine operations.

Mining and reclamation under the No Action Alternative would conclude sooner than under the Proposed Action but with similar potential for impacts to cultural resources. Consequently, cumulative impacts under the No Action Alternative are also considered negligible to minor lasting for the duration of mine operations.

4.3.11 Cumulative Socioeconomics

The CIAA for socioeconomics includes La Plata and Montezuma counties. Cumulative socioeconomic impacts are measured by changes to employment, income, output, and government revenues associated with coal production under the Proposed Action. The direct and indirect economic impacts of the Proposed Action are 1 percent of employment and 4 percent of income in the CIAA for the duration of coal production in the lease area, approximately 4 to 6 years. Because coal production at King II mine is limited by non-market factors such as the Road Improvements Agreement and Class II Land Use permit with LPC, it is not possible for GCC to respond, for example, to coal price increases by increasing production beyond levels allowed by the non-market agreements. Therefore, GCC is limited in how fast it can increase employment levels at the King II mine and potentially exacerbate adverse socioeconomic conditions such as worker or housing shortages in the CIAA.

Non-economic impacts such as changes to quality-of-life associated with the Proposed Action are considered by LPC as part of the compatibility review in its land use regulations. LPC will monitor and enforce the measures and requirements included in GCC's Class II Land permit to determine on-going compliance and compatibility of GCC's King II mine with surrounding residents.

Overall, the relatively small direct and indirect economic impact (less than 5 percent of employment and income) of the Proposed Action on the CIAA and the on-going monitoring and enforcement by LPC the compatibility of mining operations makes the likelihood of adverse cumulative socioeconomic impacts low.

Under the No Action Alternative mining would conclude in approximately 2019 when the available coal reserves are depleted at the existing mine. Consequently, cumulative impacts under the No Action would be incrementally less than under the Proposed Action due to a shorter timeline for continued mining.

5. Supporting Information

5.1 Tribes, Individuals, Organizations, or Agencies Consulted

As described in Section 1.9 Scoping, BLM and OSMRE conducted external scoping by sending letters to adjacent landowners and to other expressly interested parties.

The BLM initiated cultural and Native American consultations on September 25, 2014, by sending scoping letters to 33 Native American tribes. In accordance with the 2011 DOI Policy on Consultation with Indian Tribes and the National Historic Preservation Act of 1966, OSMRE sent a notice of supplemental scoping to 47 tribes from the Colorado Office of Archaeology and Historic Preservation directory of tribes with historic ties to Colorado. Table 5-1 lists all persons, agencies, and organizations that provided input and consultation regarding this EA.

Table 5-1. List of all persons, agencies and organizations consulted for purposes of this EA

Name	Purpose and Authorities for Consultation or Coordination
Seth McCourt/Chris Dorenkamp GCC Energy	Mine operations and planning
Tom Bird GCC Energy	Mine operations and planning
Trent Peterson GCC Energy	Mine operations and planning
Connolly, Marjorie	Comment summary in Table 1-2
Montezuma County Board of County Commissioners	Comment summary in Table 1-2
San Juan Basin Health Department	Comment summary in Table 1-2
Vista de Oro Property Owners Association – contains comments of 35 landowners	Comment summary in Table 1-2
La Plata County Planning Department	Comment summary in Table 1-2
Clement J. Frost, Chairman, Southern Ute Indian Tribe	Requested permission to review and comment on Water Monitoring Program and Probably Hydrologic Consequences Analysis.
Leigh Kuwanwisiwma, Director Hopi Cultural Preservation Officer	Would like to be consulted if prehistoric sites are identified with the Proposed Action.

5.2 List of Preparers

BLM TRFO and Colorado State Office staff as well as OSMRE staff specialists who determined the affected resources and contributed further analysis in the body of this EA are listed below. Tables 5-2 and 5-3 lists agency and consultants that contributed to the preparation of this EA.

5.2.1 BLM and OSMRE Preparers

Table 5-2. List of Preparers

Name	Title
Connie Clementson	BLM/TRFO Field Office Manager
Justin Abernathy	BLM/TRFO Minerals Manager
Jennifer Maiolo	BLM/LSFO Mining Engineer
Jamie Blair	BLM/TRFO Minerals
Helen Mary Johnson	BLM/TRFO Minerals
Gina Jones	BLM/TRFO NEPA Lead
Nate West	BLM/TRFO Biologist
Bruce Bourcey	BLM/TRFO Archaeologist
Jessica Montag	BLM/Blue Sky Zone – CO, MT & WY Socioeconomics Specialist
Douglas Siple	Colorado State BLM Mining Engineer
Deborah Magee	Colorado State BLM Planning & Environmental Coordinator
Chad Meister	Colorado State BLM Air Quality
Marcelo Calle	OSMRE Manager Program Support Division
Mychal Yellowman	OSMRE Indian Program Branch Manager
Paul Clark	OSMRE Permit Coordinator/Hydrologist
Gretchen Pinkham	OSMRE NEPA Specialist
Nicole Caveny	OSMRE Environmental Protection Specialist
Christine Belka	OSMRE Sr. Regulatory Specialist
Jeremy Illiff	OSMRE Archaeologist
Ed Vasquez	OSMRE Aquatic and Biologist
Roberta Martinez-Hernandez	OSMRE Air and Climate Change
Jacob Mulinex	OSMRE Soils, Geology and Mineral resources
William Birchfield	OSMRE Biologist

Notes: BLM = Bureau of Land Management; TRFO = Tres Rios Field Office; LSFO = Little Snake Field Office

5.2.2 Cooperating Agencies

Table 5-3. List of Cooperating Non-BLM Preparers

Name	Title
Cooperating Agencies	
CDRMS	Daniel Hernandez, Sr. Environmental Protection Specialist Robin Reilley, Coal Specialist

Preliminary Environmental Assessment

Name	Title
	James Stark, Sr. Environmental Protection Specialist
La Plata County	Leslie Jacoby, La Plata County Engineering Department Daniel Murray, AICP, Sr. Planner, La Plata County Planning Department Sheryl Rogers, La Plata County Attorney Damian Peduto, La Plata County Community Development Director
Third-Party Contractors	
Mike Fitzgerald	Project Manager/Principal, Ecosphere Environmental Services, Inc. (Ecosphere)
Cindy Lancaster	Sr. Technical Editor, Section 508 Specialist, Ecosphere
Carolyn Dunmire	Sr. Project Manager and Socioeconomics Specialist, Ecosphere/Dunmire Consulting
Alison Rohwer	Biologist/Natural Resource Specialist, Ecosphere
Jerusha Rawlings	Biologist/Natural Resource Specialist, Ecosphere
Krista Dearing	Sr. Geologist and Project Manager, Ecosphere
Landon Cook	Principal Hydrogeologist, Resource Hydrologic
Mike Olson	Traffic Engineer, Roadrunner Engineering
Mike Savage	Geology, Savage Consultants

Notes: BLM = Bureau of Land Management; Ecosphere = Ecosphere Environmental Services, Inc.

6. References

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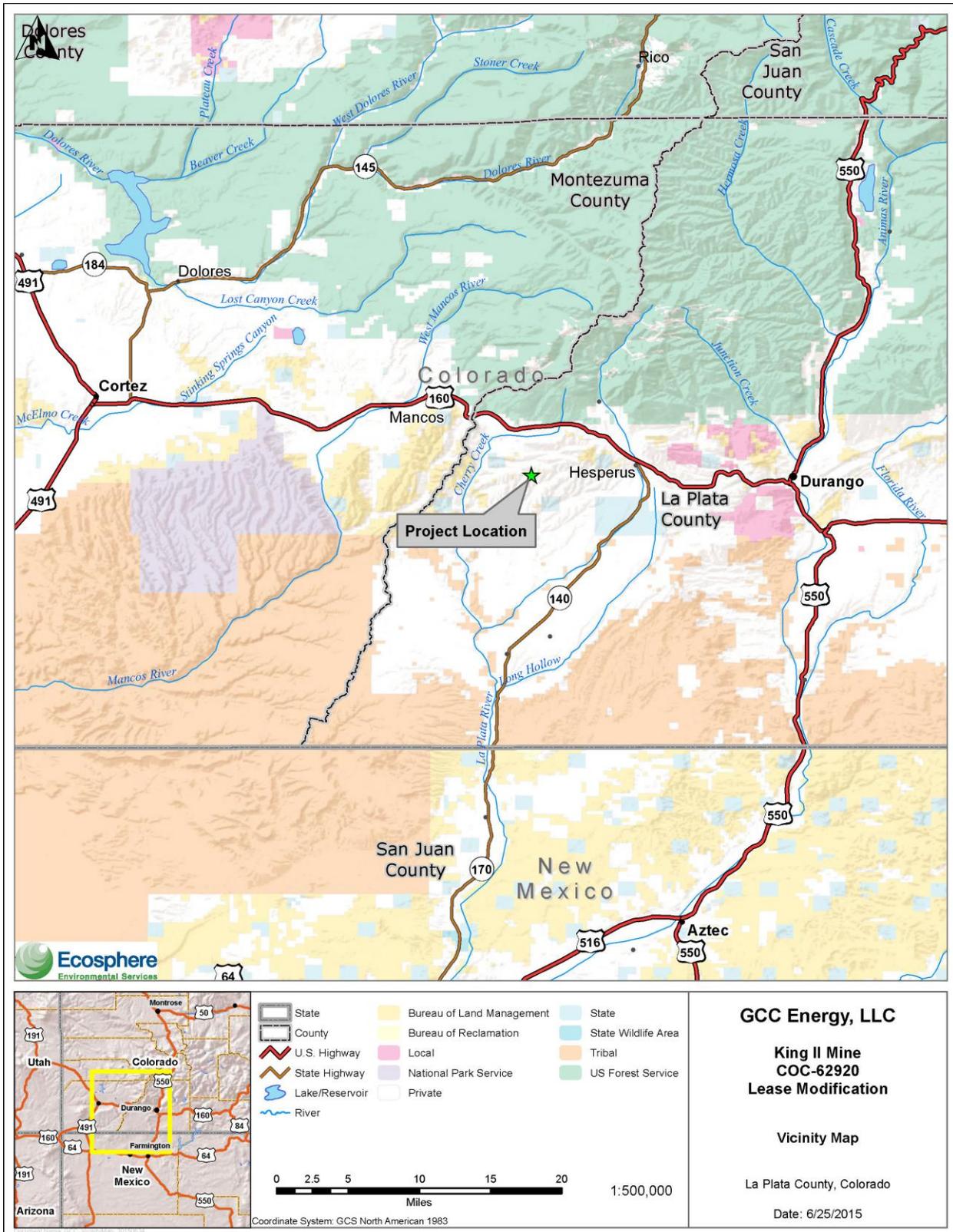
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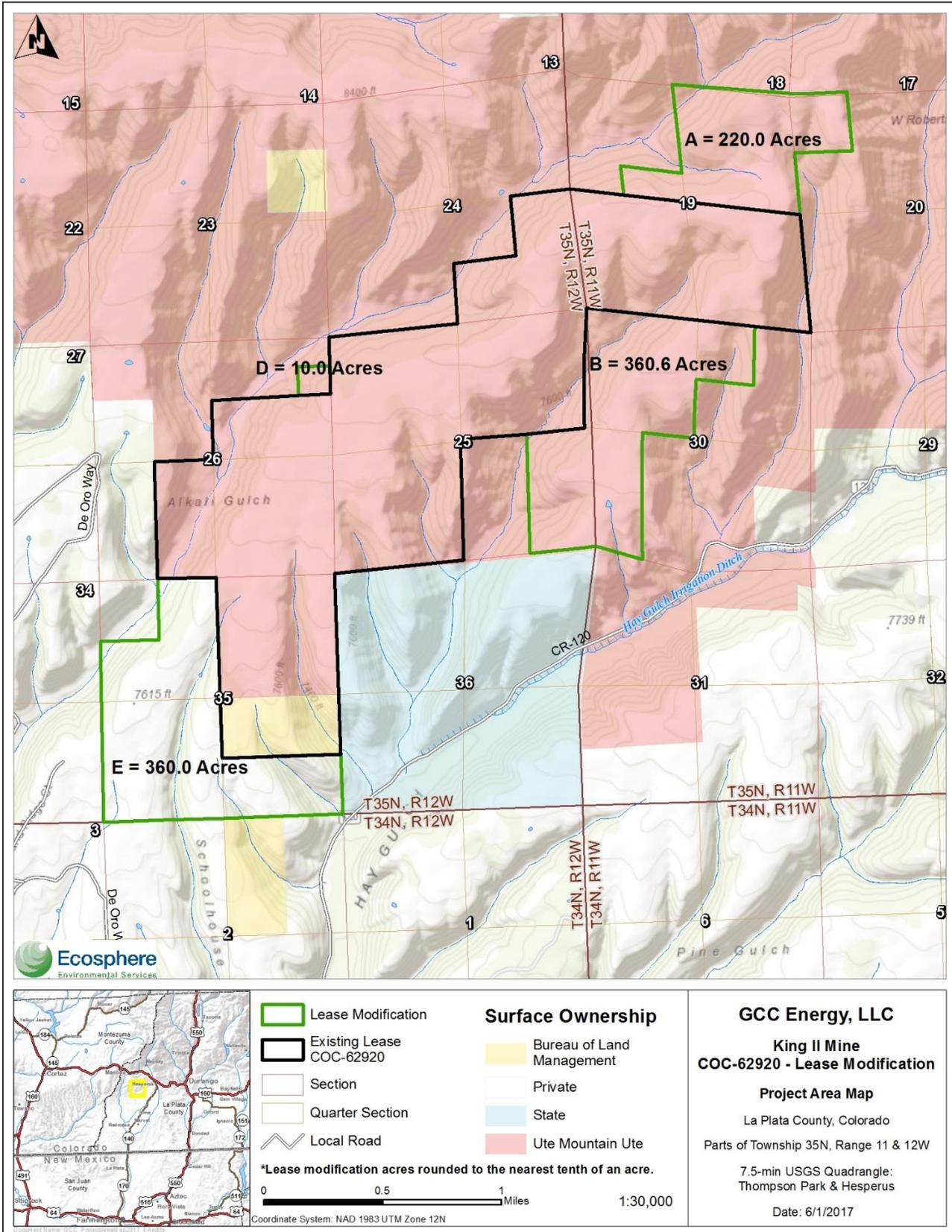
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Appendix A – Maps

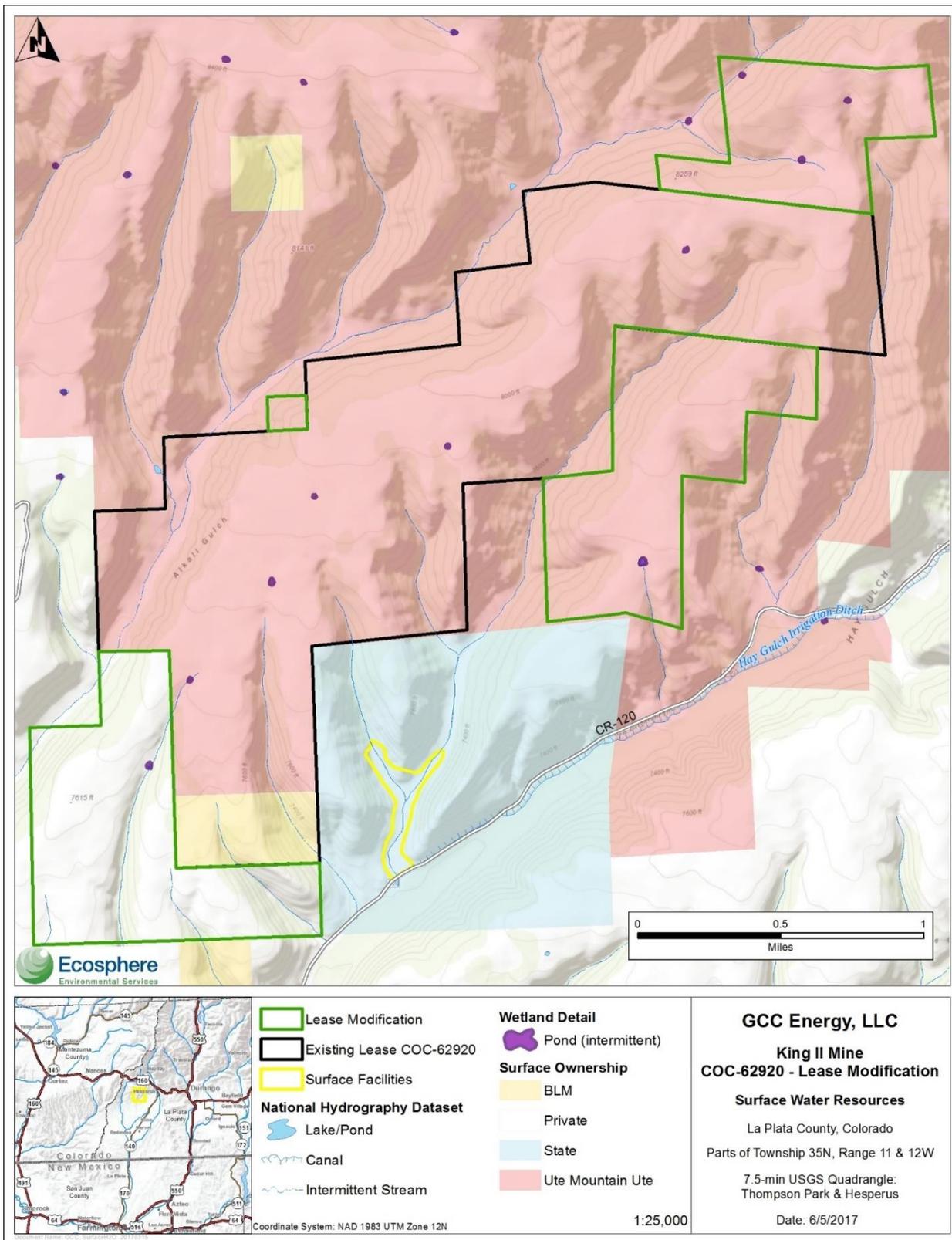


Map A-1. Vicinity Map

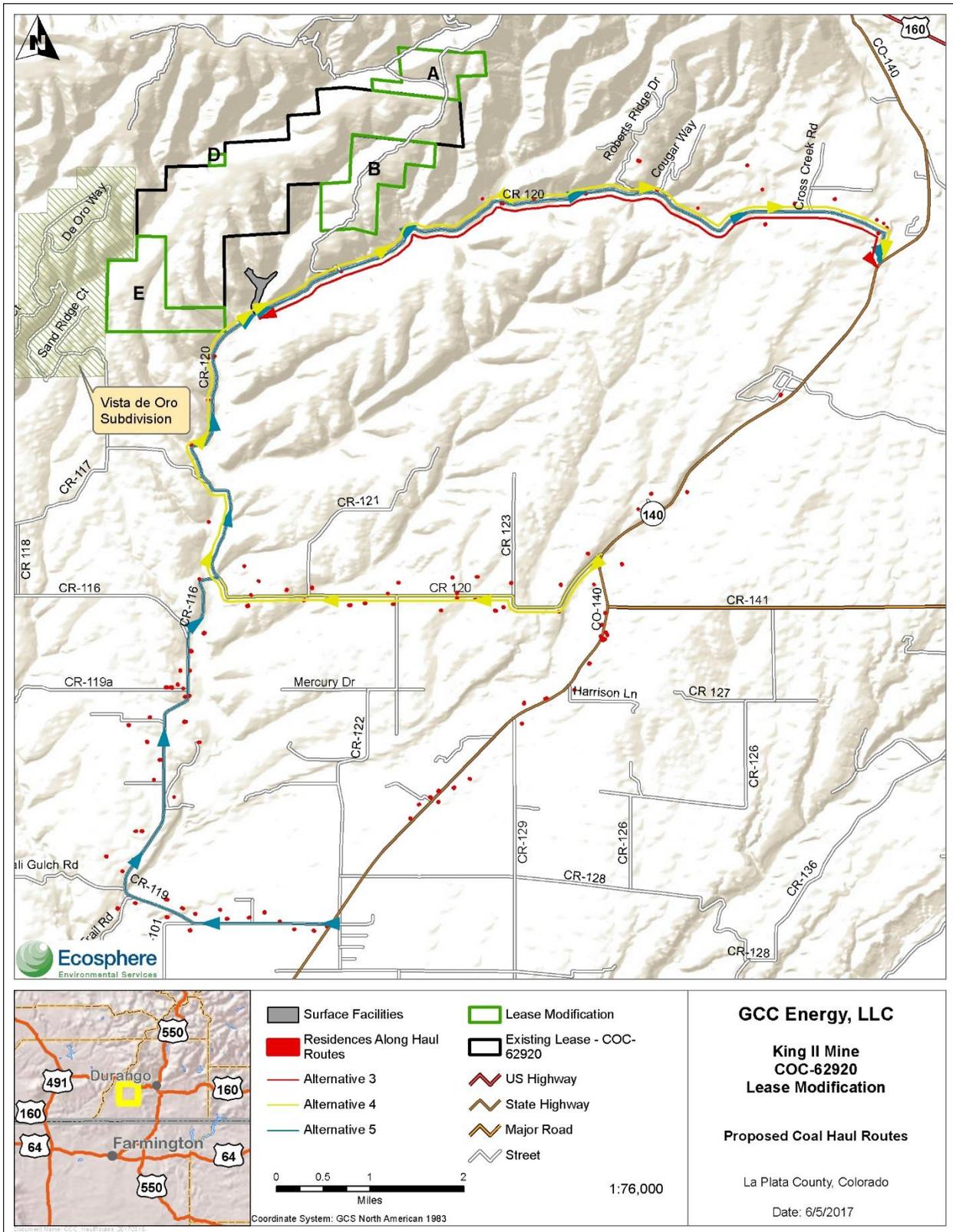
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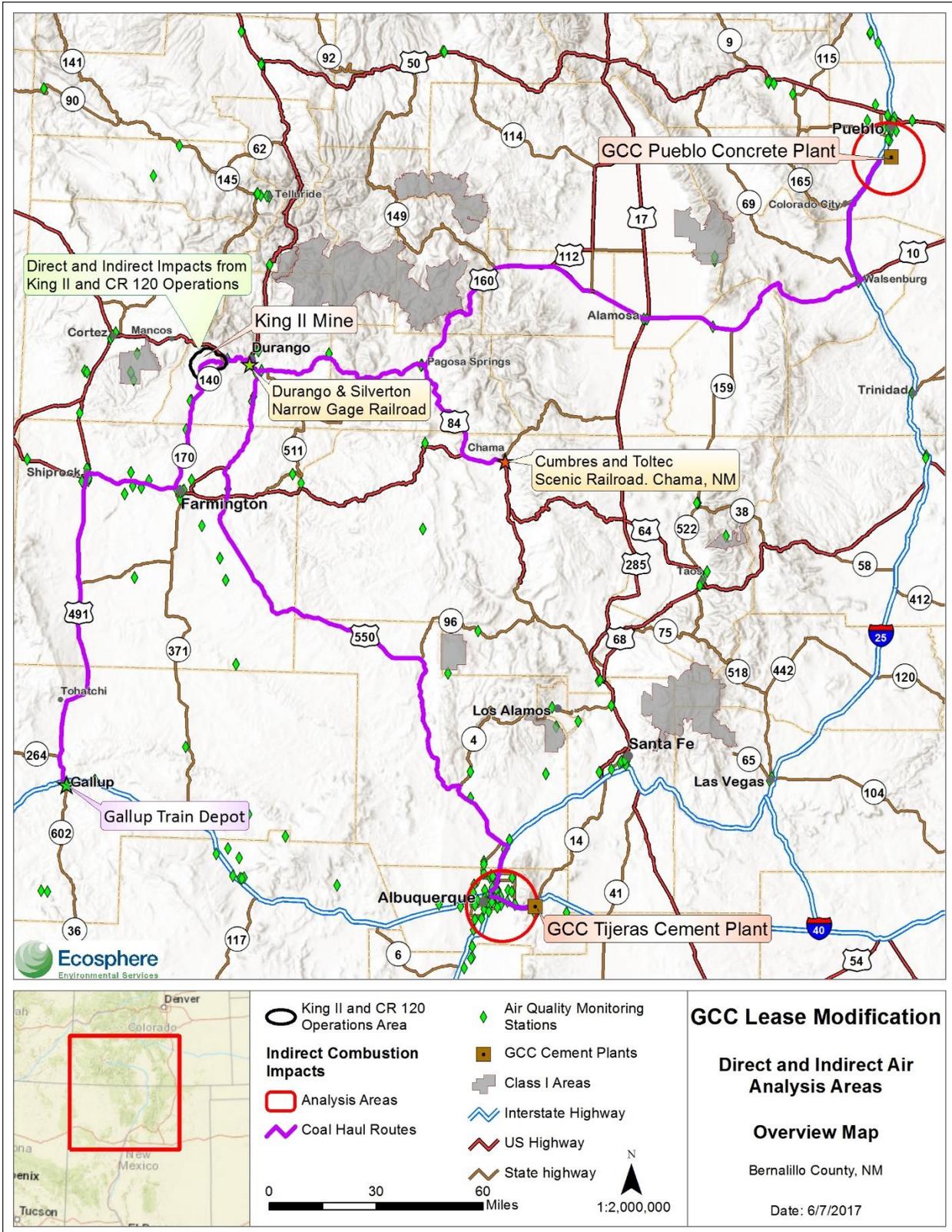
Map A-2. Project Area Map



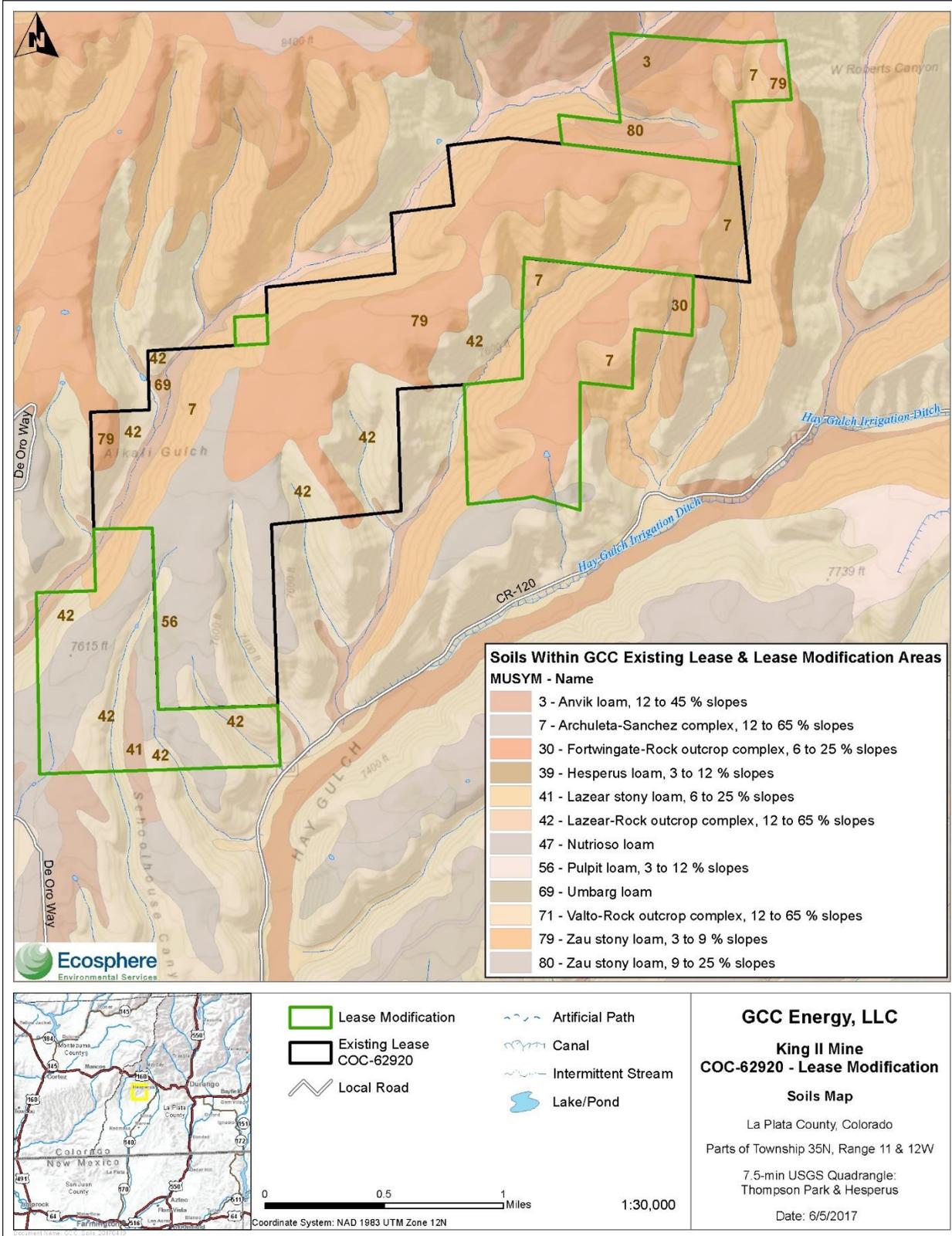
Map A-3. Surface Water Map



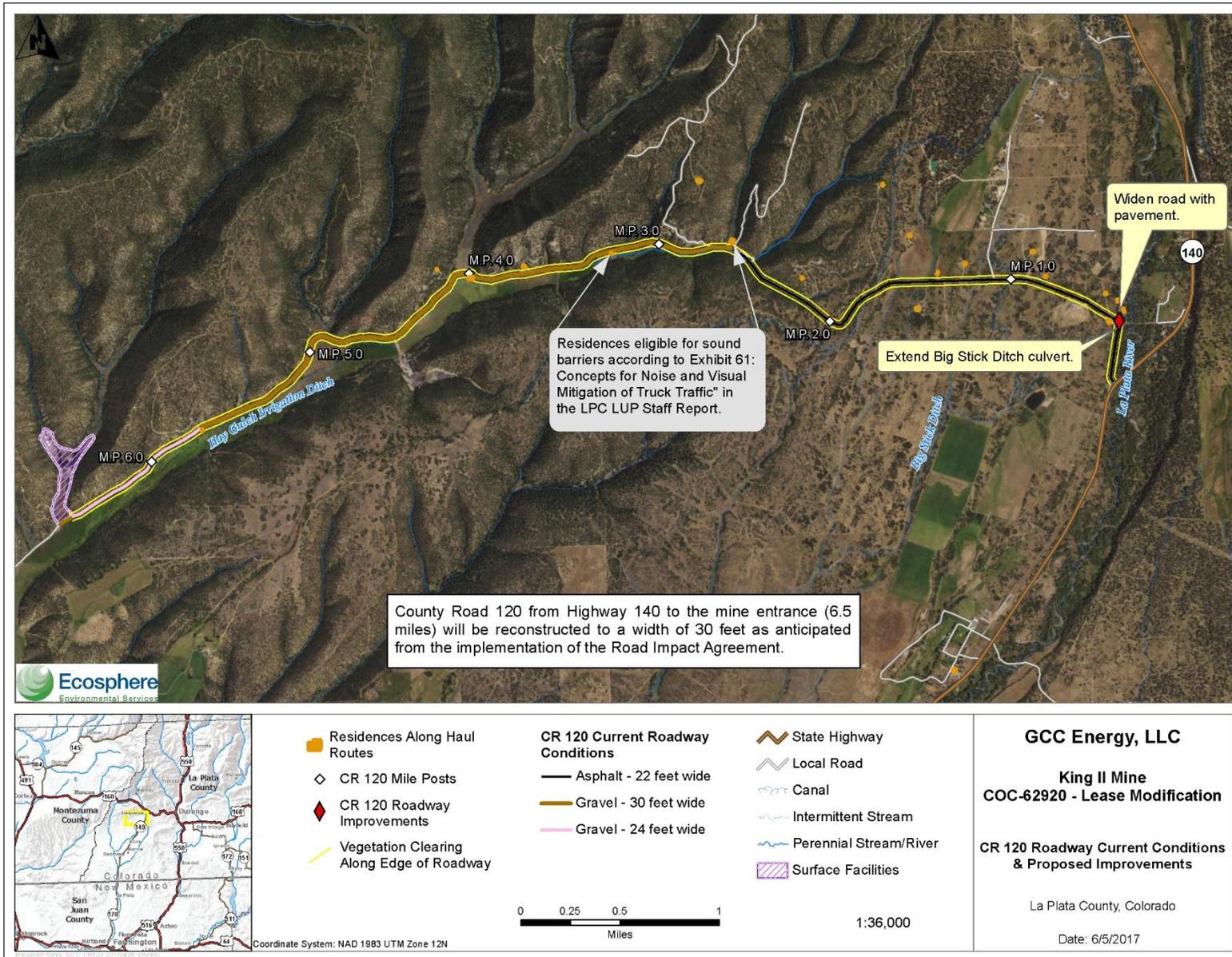
Map A-4. Proposed Coal Haul Routes



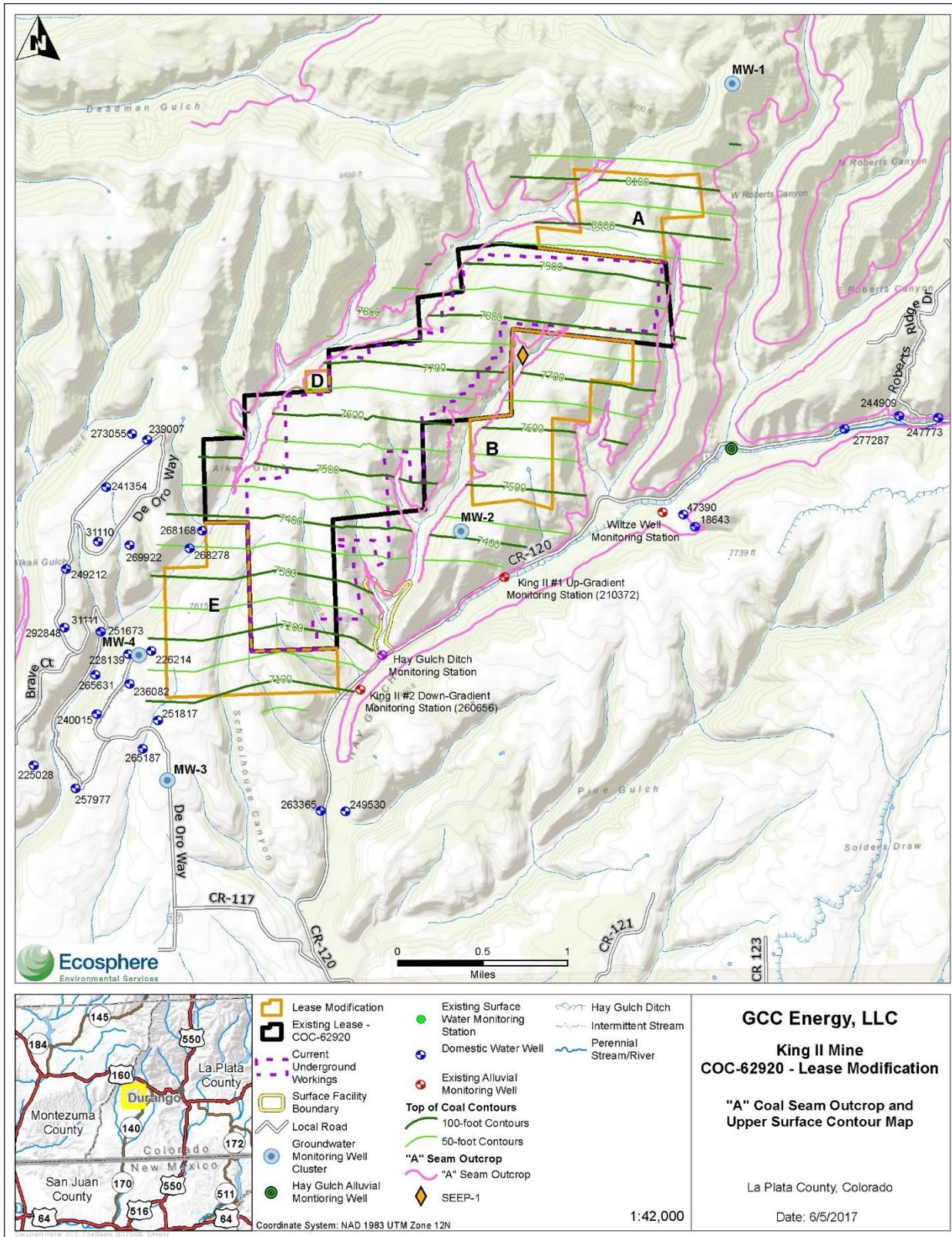
Map A-5. Direct and Indirect Air Analysis Areas



Map A-6. Soils Map

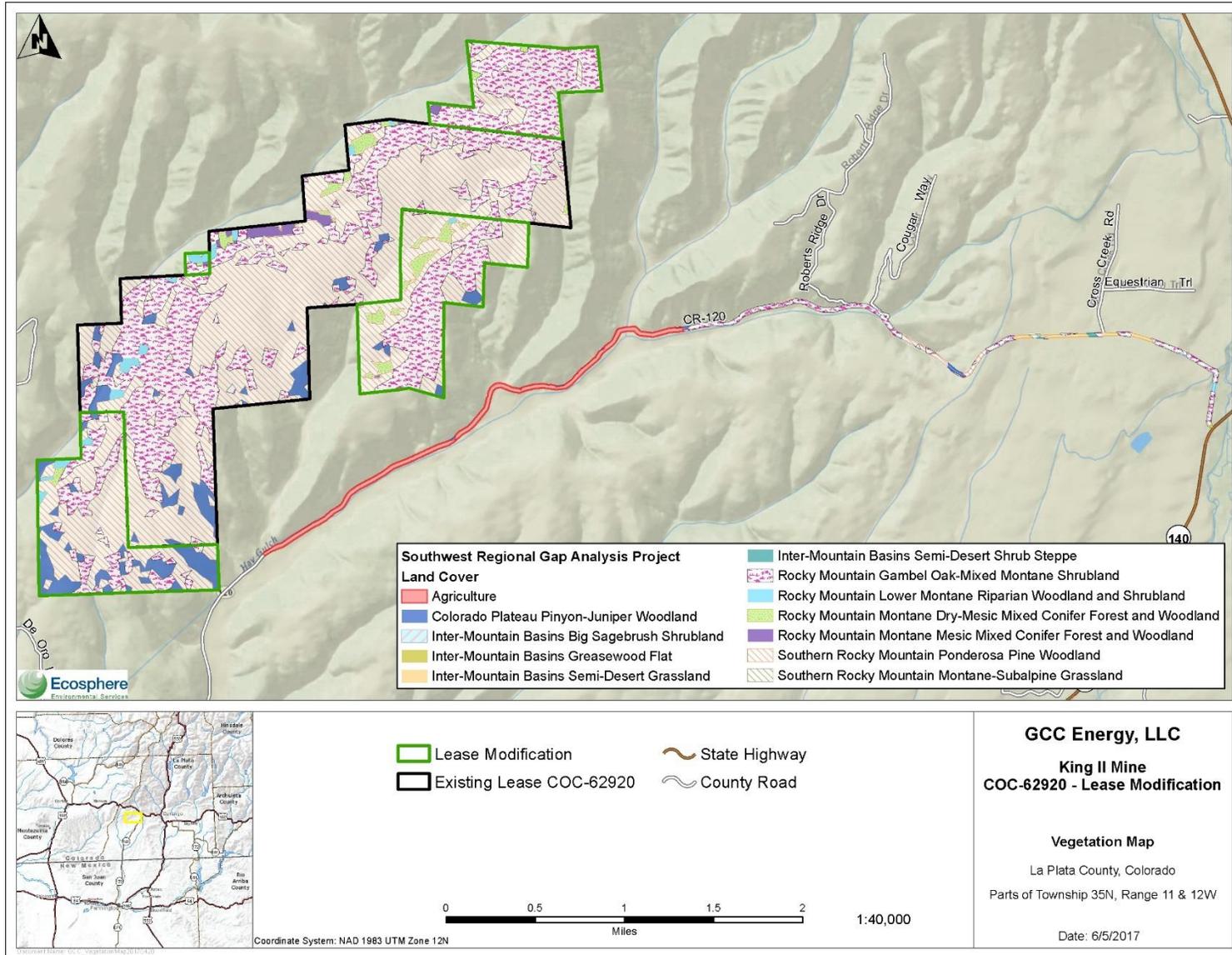


Map A-7. CR 120 Roadway Current Conditions and Proposed Improvements



Map A-8. "A" Coal Seam Outcrop and Upper Surface Contour Map

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Map A-9. Vegetation Map

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Appendix B – Water Resources Data

Water Resource Data

Design Feature 2 (expanded description)

To ensure that the King II Mine is not adversely affecting the water wells of adjacent landowners, GCC Energy installed (4) four monitoring well clusters. Each monitoring well cluster includes one well completed above the Menefee Formation “A” Coal seam, one well completed in the “A” Coal Seam, and one well completed in the lower Menefee Formation below the “A” Coal seam. The clusters are located up-gradient and down-gradient of the King II Mine. They will be used to meet the monitoring data requirements for La Plata County, CDRMS, and OSMRE related to groundwater quality and the hydrologic balance. Data from these monitoring wells will also be used to support updates to the Cumulative Hydrologic Impact Assessment (CHIA) and Probable Hydrologic Consequences (PHC) for the King II Mine Plan. The monitoring well clusters were installed over a period extending from February through May 2017.

The monitoring well clusters were installed at King II and monitored for the initial purpose of documenting presence of ground water in the relevant units above (Cliff House Formation), within the mined “A” coal seam and below (Lower Menefee). The surface spacing of the three wells in each cluster is approximately 20 linear feet apart. See Figure 1 for cluster monitoring well conceptual diagram. One (1) monitoring well cluster is located up-gradient and sufficiently north of King II to document ambient ground water conditions. Two (2) monitoring well clusters are constructed down-gradient of King II. One (1) additional well cluster is installed north of Hay Gulch Ditch between King I and King II mine areas. Water level and water quality sampling at each completed well occurs at least quarterly for a period of no less than 1 year to establish statistical and seasonal variation. The water quality analyte list is consistent with OSMRE requirements and the CDRMS standard ground water sampling suite applicable to bedrock aquifers with the samples submitted for analysis to an accredited analytical laboratory. Results of current monitoring since installation in of the well cluster in March 2017 indicate groundwater presence in each of the monitored wells at the two (2) clusters downgradient of the King II mine and no groundwater presence in the monitored wells in the one (1) cluster north of Hay Gulch between King I and King II mine areas. Groundwater samples were collected for the six (6) wet downgradient monitoring wells in March, however full interpretation of the laboratory results is not planned until the upgradient cluster wells are completed and sampled. This sampling will occur in June 2017.

In order to determine potential for vertical hydraulic communication between the overburden (Cliff House Formation), the mined “A” seam and the underburden, passive well testing was conducted at each monitoring well cluster as Design Criteria #2. If water is present in each of the three discretely monitored intervals, documentation of differing water levels tracking separately over time will generally demonstrate hydraulic isolation of the intervals. Measured water levels in each well relative to the documented water-bearing interval will determine if confined aquifer conditions exist. By definition, if confining aquifer conditions exist, there is some substantial degree of hydraulic isolation between that aquifer and overlying/underlying formations or aquifers.

The initial results indicate groundwater contribution to the downgradient Cliff House Formation wells is through minor seeps from fractures intersecting the boreholes that have been documented by downhole video logs. Following well development of the wet Cliff House wells, very slow recovery of water levels qualitatively indicates low hydraulic conductivity. The accumulated water column in the wells from the unconfined fracture seeps is on the order of several feet while the screened interval is approximately 300 feet in length. Continued monitoring will help determine if these groundwater sources are perched and/or seasonal or perennial. Analysis of

the groundwater quality results is not yet available but will be valuable in assessing the source and allow discrimination against water quality collected from other monitored formations in this program.

Initial evaluation of the wet “A” seam monitoring wells following well development indicates full confining conditions of the “A” seam based on measured water levels several feet above the top of the “A” seam. The measured water levels at the Cliff House wells and “A” seam wells are very similar in depth indicating either coincidence due to only minor Cliff House groundwater contribution to the bottom of the wells or possibly a hydraulic connection between the Cliff House Formation and the “A” seam at these locations. Further monitoring of these wells for level and level changes in relation to each other will help characterize the groundwater system. Likewise, comparison of the water quality data from each respective interval could determine if these systems are hydraulically connected.

The wet Menefee Interburden wells completed in the 20 feet interval below the “A” seam have presented confined conditions with measured water levels between 5 and 45 feet above the bottom of the “A” seam. This potentiometric level difference between the “A” seam and the immediate underlying interval suggests no or only limited hydraulic connection. As described above, continued monitoring of these wells for level and water quality shall provide information to better characterize this groundwater system.

Future well testing to further quantify any observed hydraulic communication between the wells could include production or injection testing methodology and would be properly designed and conducted if warranted.

Hay Gulch Alluvium is monitored by GCC for the King II mine at two alluvial monitoring wells, #1 Up-gradient and #2 Down-gradient. Water level, field water quality parameters and laboratory analysis is completed quarterly and interpreted and submitted to CDRMS as Annual Hydrologic Reports. The Annual Hydrologic Reports completed by CDS Environmental Services, LLC and Resource Hydrogeologic Services, Inc. do not indicate any direct or indirect effects on the Hay Gulch Alluvium by mining activities at King II.

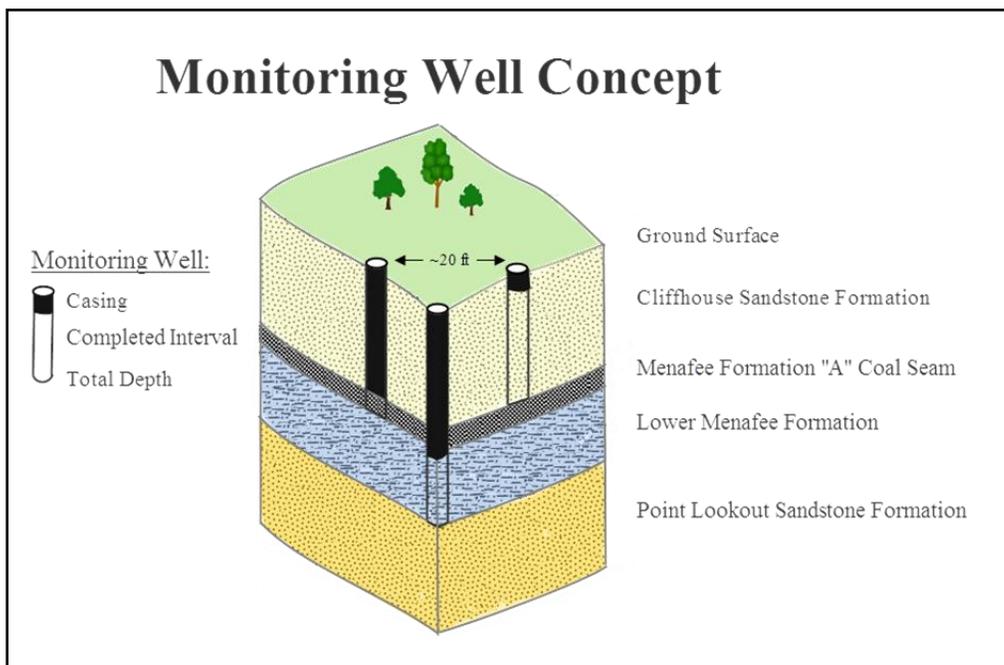
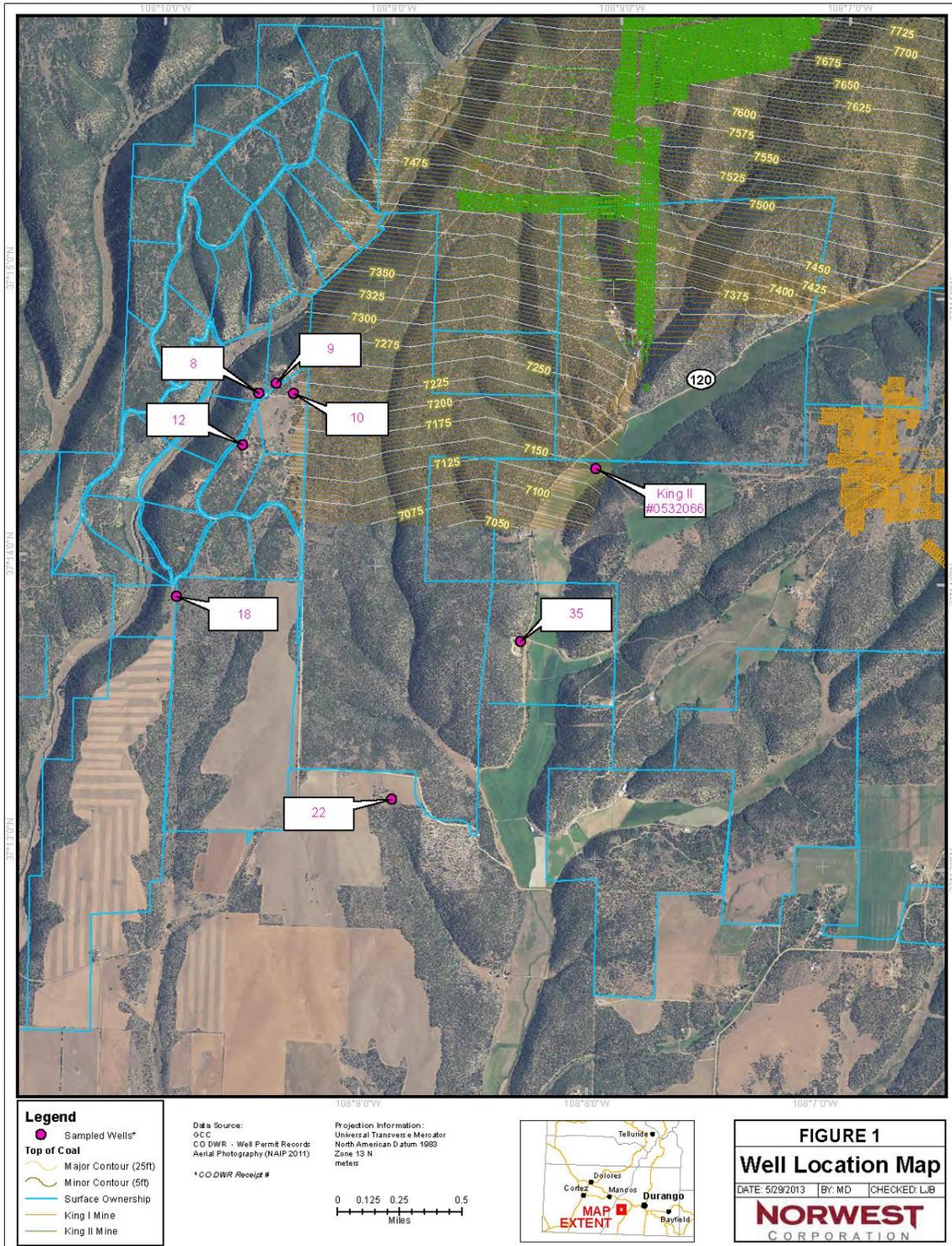


Figure 1. Bedrock Cluster Monitoring Well Concept

Supporting Data for Section 3.4



Map 1. Location Map for Wells Selected for Summary of Analytical Activities in Response to Neighborhood Comments in Conjunction with a Permit Expansion of GCC Energy, LLC King II Coal Mine (CDS 2013)

Table 1. Water Well Construction Information for Wells Selected for Summary of Analytical Activities in Response to Neighborhood Comments in Conjunction with a Permit Expansion of GCC Energy, LLC King II Coal Mine

WELL ID	DATE CONSTRUCTED	LONGITUDE	LATTITUDE	SURFACE ELEVATION (ftmsl from DEM 10x10m)	TOTAL WELL DEPTH (ftbgs)	TOP OF WELL SCREEN (ftbgs)	EFFECTIVE TOP OF WELL OPEN INTERVAL (ftbgs)	BOTTOM OF WELL SCREEN (ftbgs)	EFFECTIVE BOTTOM OF WELL OPEN INTERVAL (ftbgs)	EFFECTIVE TOTAL WELL OPEN INTERVAL (ftbgs)	INITIAL TEST PRODUCTION RATE (gpm)	INITIAL STATIC WATER LEVEL (ftbgs)	INITIAL STATIC WATER LEVEL ELEVATION (ftmsl)	TOP OF SCREEN (ftmsl)	EFFECTIVE TOP OF WELL OPEN INTERVAL (ftmsl)	BOTTOM OF SCREEN (ftmsl)	EFFECTIVE BOTTOM OF WELL OPEN INTERVAL (ftmsl)	DRILLER REPORTED SCREEN INTERVAL LITHOLOGY	DRILLER REPORTED WATER DEPTH (ftbgs)	COMMENTS
22	10/17/79	-108.148240	37.219730	7263.10	156	16	16	156	156	140	9	41	7222	7247	7247	7107	7107	Sandy shale	136-137	3/8" filter pack 16'-43' then open hole 43'-156'
9	8/1/03	-108.157680	37.243790	7573.50	680	360	40	480	680	640	14	360	7214	7214	7534	7094	6894	Sandstone	360-480	well overdrilled for sump, no filter pack
10	9/5/00	-108.156390	37.243220	7567.96	500	400	19	500	500	481	12	400	7168	7168	7549	7068	7068	shale	420	no filter pack
8	11/16/00	-108.158940	37.243180	7569.53	500	420	40	500	500	460	9	400	7170	7150	7530	7070	7070	Shale	420	no filter pack
12	5/29/02	-108.159980	37.240130	7522.12	600	340	40	560	600	560	2	240	7282	7182	7482	6962	6922	Mesa verde (Unknown but generally shale, SS, coal)	360 & 480	well overdrilled for sump and gravel filter packed 40'-680'
35	2/26/07	-108.139220	37.229200	7135.74	160	40	40	140	160	120	10	31	7105	7096	7096	6996	6976	SS, coal, shale	55-100	well overdrilled for sump, coal 100-105, telescoped PVC well with K-packer from surface casing, no filter pack
18	9/6/04	-108.164440	37.231170	7405.26	540	420	40	520	540	500	5	300	7105	6985	7365	6885	6865	Sandstone, coal	340	3/8" filter pack 320'-540' to include interval noted as coal, otherwise cement well seal only 1'-40'
King II	12/1/04	-108.134156	37.239417	7174.81	20	0	0	20	20	20	NA	8.3	7166	7175	7175	7155	7155	Alluvial	NA	No CDWR well construction & test report available, well information provided by GCC Energy

* Static water level measured quarterly, value reported here taken 12/11/12

Source: CDS 2013

Table 2. King II Mine #1 Up-gradient Monitoring Well Quarterly Water Quality Data Summary

GCC Energy, LLC
2014 Annual Hydrology Report
King II Mine

October 20, 2014

DATE	CALCIUM (mg/L)	IRON (mg/l)	Mg (mg/L)	Mn (mg/L)	SODIUM (mg/L)	Hardness, as CaCO3	Alkalinity, as CaCO3(mg/L)	Bicarbonate, as CaCO3(mg/L)	Carbonate, as CaCO3(mg/L)	Hydroxide, as CaCO3(mg/L)	pH	Sulphate (mg/L)	T.D.S. (mg/L)	Temperatue (NC)	Depth to Water (in.)	Conductivity: Field Data (mS/cm)
1/3/05	3.6	<.05	6.8	<.005	322	37	690	390	300	<10	9.51	<10	585	7.6	41	1157
3/17/05	2.9	0.23	5.5	0.005	253	30	620	520	100	<10	9.51	<10	620	8	30	1157
6/6/05	3.1	0.08	6	0.006	248	32	600	520	80	<10	9.45	<10	635	12.6	34	1103
8/5/05	2.9	0.28	7.8	0.01	234	39	590	410	180	<10	9.41	<10	600	14.7	49	1124
12/2/05	2.9	0.05	7.6	0.005	232	39	590	410	180	<10	9.13	<10	640	9.9	49	1125
3/27/06	2.9	0.23	7.5	0.00297	245	38	610	610	<10	<10	9.58	<10	590	8.6	46	1135
6/28/06	3	0.07	7.9	0.008	240	40	570	450	120	<10	9.42	<10	540	14.5	56	1085
8/30/06	3	<.05	7.5	0.005	245	38	620	580	40	<10	9.31	<10	465	16	62	1078
12/6/06	2.4	0.27	7.2	0.007	235	36	610	450	160	<10	9.26	<10	620	10.8	58	1069
3/12/07	3.1	0.09	9.2	<.005	232	46	620	460	160	<10	9.43	<10	520	8.9	66	1108
6/30/07	3.3	0.11	11.4	0.008	224	55	545	425	120	<10	9.35	<10	560	13	68	1072
9/2/07	3.5	<.05	11.7	0.007	224	57	590	490	100	<10	9.26	<10	550	15.1	78	1044
12/6/07	3.2	0.067	10.6	0.007	206	52	540	320	220	<10	9.31	<10	575	10.9	75	1068
3/31/08	3.7	0.08	17.4	<.005	210	81	590	370	220	<10	9.38	<10	495	9.7	61	1052
6/30/08	4.8	0.07	23.6	0.007	206	109	550	465	85	<10	9.39	15	560	12.1	69	1033
8/19/08	4.6	0.06	24.8	0.006	196	114	540	400	140	<10	9.31	18	500	13.4	72	1019
10/9/08	4.9	0.08	27.9	0.008	196	127	530	430	100	<10	9.29	13	535	14.2	80	1013
3/5/09	5.6	0.13	32.4	0.007	196	147	580	440	<10	<10	9.27	17	570	8.6	70	1022
5/21/09	6.4	<.05	36.3	<.005	172	165	525	315	210	<10	9.27	31	530	10.4	69	1018
9/8/09	6.4	0.06	42.9	0.011	177	193	530	450	80	<10	9.14	35	585	14.2	81	999
11/26/09	5.8	<.05	40.8	0.01	166	182	515	415	100	<10	9.1	33	485	12.1	77	951
3/31/10	7.8	0.15	52.4	0.011	146	235	490	420	70	<10	9.03	53	560	8.3	62	1033
6/28/10	7	0.16	51.5	0.009	136	230	475	405	70	<10	8.94	54	585	11.3	71	1009
9/30/10	6.7	<.05	52	0.013	141	231	485	455	30	<10	8.77	49	540	14.7	81	984
11/3/10	7.8	0.25	59.6	0.028	135	265	500	480	20	<10	8.67	39	540	15.7	80	996
3/18/11	8.2	0.2	60.7	0.014	136	270	530	470	60	<10	9.07	37	565	9.3	70	1035
6/28/11	7.58	0.625	63.4	0.017	141	280	515	465	50	<10	8.61	44	555	11.1	70	1017
9/30/11	8.51	0.06	60.3	0.013	135	269	470	470	30	<10	8.9	45	505	14.9	84	981
11/29/11	8.63	0	65.7	0.019	138	292	580	580	40	0	9.03	27	460	12.6	86	999
3/27/12	7.18	0	59.7	0.018	123	264	485	485	80	0	8.98	10	565	14	86	1050
6/27/12	6.59	0.061	57.6	0.021	120	253	540	540	60	0	8.89	0	505	18.8	89	1039
9/28/12	7.59	0.109	58.3	0.021	122	259	525	525	<10	<10	8.8	<10	445	13.7	84	1009
12/11/12	7.89	<.05	63.6	0.016	126	282	480	480	70	<10	8.97	<10	415	9	102	1016
3/13/13	6.83	0.061	62.5	0.02	123	275	525	525	<10	<10	8.98	<10	590	9.2	90	1053
6/5/13	6.99	<.05	61.9	0.028	124	272	570	570	20	<10	8.89	<10	485	12.8	79	1010
9/25/13	7.37	<.05	61.6	0.02	122	272	570	570	60	<10	8.82	<10	1800	18.1	79	958
12/19/13	8.56	<.05	69	0.029	133	306	590	590	<10	<10	8.93	<10	455	8.4	80	1029
3/28/14	8.02	<.05	62.4	0.032	122	277	532	408	124	<10	8.83	<10	510	11.1	77	1004
6/23/14	7.77	<.05	63.3	0.035	120	280	545	435	110	<10	8.79	<10	555	14.4	89	988
9/26/14	6.41	<.05	60.6	0.045	118	265	530	440	90	<10	8.68	<10	550	13.9	95	962

Analysis Data

#1 Upgradient Monitor Well

Table 3. King II Mine #2 Down-gradient Monitoring Well Quarterly Water Quality Data Summary

GCC Energy, LLC
2014 Annual Hydrology Report
King II Mine

October 20, 2014

DATE	CALCIUM (mg/L)	IRON (mg/l)	Mg (mg/L)	Mn (mg/L)	SODIUM (mg/L)	Hardness, as CaCO3	Alkalinity, as CaCO3(mg/L)	Bicarbonate, as CaCO3(mg/L)	Carbonate, as CaCO3(mg/L)	Hydroxide, as CaCO3(mg/L)	pH	Sulphate (mg/L)	T.D.S. (mg/L)	Temperatue (NC)	Depth to Water (in.)	Conductivity: Field Data (mS/cm)
1/3/05	97.3	<.05	99.3	0.377	31.9	652	405	405	<10	<10	7.81	190	505	4.7	26	1051
3/17/05	81.4	<.05	77.5	0.372	25.4	522	376	376	<10	<10	7.7	195	625	5.3	2	1061
6/6/05	66.2	<.05	60	0.257	23.6	412	324	324	<10	<10	7.69	126	495	16.4	11	827
8/5/05	55.9	<.05	53.1	0.192	19.4	358	286	286	<10	<10	7.81	108	410	16.5	79	752
12/2/05	76.4	<.05	73.2	0.189	23.4	492	362	362	<10	<10	7.52	176	610	9.8	83	992
3/27/06	78.5	<.05	75.7	0.04415	26.7	508	400	400	<10	<10	7.81	205	605	7.2	88	1051
6/28/06	72.6	<.05	73.5	0.212	25.2	484	362	358	<10	<10	7.8	185	540	13.9	101	987
8/30/06	75.9	<.05	75.9	0.123	25.7	502	388	372	16	<10	7.93	175	435	17.5	84	998
12/6/06	67.6	0.18	61.1	0.212	23.7	420	420	420	<10	<10	7.75	161	515	10.2	82	970
3/12/07	65.1	<.05	66.6	0.027	22.6	437	430	430	<10	<10	7.64	115	435	9	97	950
6/30/07	66.4	<.05	66.5	0.047	22.5	440	410	400	10	<10	7.66	115	495	15.9	97	917
9/2/07	70.3	<.05	69.3	0.933	23.8	461	420	410	10	<10	7.74	128	485	18.4	114	916
12/6/07	63.2	<.05	64.4	0.061	21.7	423	385	325	60	<10	7.88	130	485	10.5	116	930
3/31/08	63.2	<.05	69.5	0.032	21.9	444	410	410	<10	<10	7.68	134	440	8.1	96	931
6/30/08	63	<.05	70.2	0.014	24	446	400	400	<10	<10	7.91	138	515	17.9	22	901
8/19/08	66.2	<.05	72.4	<.005	24.4	463	400	400	<10	<10	7.79	128	460	20.4	89	905
10/9/08	69.4	<.05	74.9	0.117	23.8	482	430	410	20	<10	7.8	138	520	15.7	99	920
3/5/09	69.2	<.05	75.3	0.013	26.1	483	405	405	<10	<10	7.78	132	550	7.8	80	948
5/21/09	63.3	<.05	68.3	0.005	23	439	385	385	<10	<10	7.77	126	485	12.6	40	923
9/8/09	47.8	<.05	47.9	0.009	14.9	317	278	278	<10	<10	7.81	69	345	17.6	67	633
11/26/09	58.2	<.05	54.2	0.006	17.3	369	320	292	28	<10	8.4	102	355	11.5	72	388
3/31/10	75.8	<.05	74.5	0.0015	24.1	496	174	138	36	<10	7.9	150	565	6.9	19	495
6/28/10	49.8	<.05	44.1	0.01	14.6	306	266	292	<10	<10	7.79	83	400	17.3	12	653
9/30/10	56.5	<.05	51.4	<.005	13.6	353	288	284	<10	<10	7.58	102	400	15.6	58	700
11/3/10	65.6	<.05	57.7	0.015	14.6	401	320	320	<10	<10	7.9	104	405	14	55	754
3/18/11	76.7	<.05	67.4	0.017	22.8	469	378	378	<10	<10	7.75	108	500	8.1	60	921
6/28/11	50.8	<.05	43.1	0.013	13.5	304	265	265	<10	<10	7.81	76	310	18.5	41	587
9/30/11	49	<.05	41.9	0.012	12.8	295	226	226	<10	<10	7.79	76	305	15.8	71	590
11/29/11	68.4	<.05	57.4	0.005	15.8	407	312	312	<10	<10	8.01	100	335	11.7	62	770
3/27/12	58.4	<.05	51	0.078	19	356	310	310	<10	<10	7.95	88	495	14.6	72	735
6/27/12	56.7	<.05	49.7	0.005	19.2	346	320	320	0	0	7.84	84	210	15.7	92	733
9/28/12	60.1	<.05	52.6	0.396	19.1	367	328	328	<10	<10	8.05	92	320	14.1	83	771
12/11/12	69	<.05	63.4	0.014	21.8	434	358	358	<10	<10	8.19	100	360	9.6	112	970
3/13/13	64.4	<.05	62.8	0.007	21.5	419	348	348	<10	<10	8.07	100	565	10.2	100	847
6/5/13	68.5	<.05	62.8	<.005	20.3	430	334	334	<10	<10	8.23	104	420	12.4	65	805
9/25/13	65.2	<.05	62.3	<.005	19.8	419	336	336	<10	<10	8.34	88	455	16.6	54	812
12/19/13	92.3	<.05	86.3	0.005	24.9	586	396	396	<10	<10	7.87	172	495	7.1	69	1054
3/28/14	68.2	<.05	68.8	<.005	21.5	454	366	366	<10	<10	7.9	116	450	5.6	64	874
6/23/14	68.6	<.05	67.5	0.308	21.5	449	344	344	<10	<10	7.93	112	545	20.1	68	853
9/26/14	61.3	<.05	63.4	0.125	20.5	414	320	320	<10	<10	7.9	112	635	15.8	42	826

Analysis Data

#2 Downgradient Monitor Well

Table 4. Summary Water Quality for 2013 Domestic Water Well Investigation

Summary of GCC water well survey 2013 laboratory data - page 1 of 2												
Well ID	HCO3 mg/L	CO3 mg/L	Alk total mg/L	Chloride mg/L	EC uS/cm	Lang Index See note 1	pH units	SAR see note 2	SO4 mg/L	TDS mg/L	TSS mg/L	Hardness mg CaCO3/L
Luz	600	0.0	600	12.0	1920	1.180	8.11	6.93	630	905	5.44	412.0
Field data					2000		8.02					
Other data	long -108.15768 lat 37.24379		Well depth 680 feet		Static level 360 feet							
Oliger	540	20.0	560	11.0	1830	0.670	8.81	31.1	360	1030	<2.0	30.0
Field data					1840		8.91					
Other data	Long -108.15639 lat 37.24322		Well depth 500 feet		Static level 400 feet							
Dunlap	475	10.0	485	<10.0	1060	0.220	8.45	30.8	84	595	<2.0	9.7
Field data					1140		8.53					
Other data	Long -108.15998 Lat 37.24013		Well depth 600 feet		Static level 240 feet							
Coynes	500	0.0	500	11.0	2340	0.500	8.34	24.6	620	1440	<2.00	75.0
Field data					2300		8.36					
Other data	Long -108.15894 Lat 37.24318		Well depth 500* feet		Static level 400*feet							
Woodworth	690	20.0	710	<10	1370	0.260	8.82	68.4	17	895	22	<6.62
Field data					1390		8.83					
Other data	Long -108.16444 lat 37.23117		Well depth 540 feet		Static level 300 feet							
Paulek	900	40.0	940	50.0	2020	0.510	8.56	45.2	138	1220	3.59	23.1
Field data					1950		8.67					
Other data	Long -108.16444 lat 37.23117		Well depth 540 feet		Static level 300 feet							
Albert-Ader	1250	40.0	1290	14.0	2390	0.760	8.52	49.3	<10.0	1450	916	26
Field data					2300		8.44					
Other data	Long -108.16444 lat 37.23117		Well depth 156 feet		Static level 41 feet							
King II **	358	<10	358	NA	NA	0.680	8.19	1.47	100	360	NA	434
Other data	Long -108 08' 2.96" lat 37 14' 21.90"		depth? Static level? sampled at 10 feet									
Note 1 - Langlier Index - numbers above zero the water is not corrosive, below zero (-) are corrosive and will damage water plumbing												
Note 2 -SAR = Sodium Adsorption Ratio. The higher the number the less suitable for plants. In general above 12 is not good for plants												
* Data from permit or from owner, not measured ** King II down gradient monitoring well *** dissolved metals NA = not analyzed												

Preliminary Environmental Assessment

Summary of GCC water well survey 2013 laboratory data - page 2 of 2										
-----Cations dissolved-----										
Well ID	Fe (total) mg/L	Mn (total) mg/L	Ca mg/L	Mg mg/L	K mg/L	Na mg/L	Methane mg/L	H2S mg/L	Temp deg C	Comments
Luz	0.504	0.211	68.8	58.3	3.69	323				High sodium, iron, manganese
Field data							0.18	<0.1	9.1	Very hard water
Oliger	<0.05	<0.005	4.86	4.35	1.24	392				High sodium, High SAR
Field data							0.56	<0.1	9.6	
Dunlap	<0.50	<0.005	3.88	<1.00	1.22	255				High sodium, High SAR
Field data							2.97	<0.1	7.0	
Coynes	0.105	0.021	11.8	11	2.15	490				High sodium, iron High SAR
Field data							0.35	<0.1	12.4	
Woodworth	0.248	0.005	1.35	<1.00	1.37	346				High sodium, iron, High SAR
Field data							13.34 High	<0.1	7.0	Methand is high
Paulek	0.200	0.007	3.73	3.36	1.68	500				High sodium, iron, High SAR
Field data							0.12	> 5.0 high	12.6	H2S is high
Albert-Ader	80.6	0.807	5.48	2.99	2.62	578				High Na, Mn, SAR, very high iron
Field data							>30.0	>5.0	12.0	Methane is high, H2S is high
Other data	0.806***	0.007***								Iron sulfide particles very high
King II **	<0.050	0.014	69.0	63.4	NA	21.8	NA	NA	NA	Very hard water

Source: CDS 2