



June 12, 2023

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Mining and Minerals Division
Mining Act Reclamation Program
Via email at: kevin.barnes@emnrd.nm.gov

Subject: Revision Application for The Mine Closeout Plan at GCC Rio Grande Tijeras Mine and Mill (Permit No. BE001RE)

Dear Mr. Barnes:

GCC Rio Grande, Inc. ("GCC") requests a Revision to the Tijeras Mine and Mill Permit No. BE001RE in accordance with the provisions of the New Mexico Mining Act, Sections 69-36-1 through 69-36-20, New Mexico Statutory Authority (NMSA) 1978 and the New Mexico Mining Act Rules. In summary, GCC would like to provide an update Mine Closeout Plan for the Tijeras Mine and Mill.

Details and further discussion relevant to the 5- year Mine Closeout Plan are provided in this application. A summary of the existing permit and background information for the Tijeras Mine and Mill are presented in Section 1; Section 2 provides justification that the proposed changes at the Tijeras facility require a a revision of the existing permit; and Section 3 provides additional information required for the application. Sections 4 and 5 discuss the proposed reclamation standards. No change to the financial assurance (FA) is proposed. Facility Background and Relevant Permitting History

The Tijeras Mine and Mill (the facility) permit area consists of approximately 2,219 acres and is located at approximately 35.07171° North Latitude, 106.39780° West Longitude at 11783 State Highway, Tijeras, Bernalillo County, New Mexico. The Tijeras Mine and Mill has been in operation since 1959. Ideal Basic Industries began construction and development of the site in 1958. Holnam, Inc. acquired the property and its operations in 1990. In 1995, GCC purchased the site and the facility.

The New Mexico Mining Act, enacted in 1993 at 69-36-1 et seq., NMSA, requires existing mining operations to submit a permit application and a closeout plan. A permit application was submitted to the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) Mining and Minerals Division (MMD) (the agency), and the agency issued MMD Permit #BE001RE to GCC on May 23, 1996. This permit authorized GCC to conduct mining and reclamation operations at the facility. The required closeout plan was submitted to MMD as an amendment to MMD Permit #BE001RE. On June 30, 1998, MMD issued Permit Revision 98-1 approving the closeout plan and incorporating it as a permit requirement. On September 12, 2007, MMD approved Permit Modification 06-1, codifying the current design limits of Tijeras Mine and Mill. On July 6, 2015, MMD issued permit Modification 14-01, for financial assurance replacement. On August 19, 2015, MMD requested an update to the closeout plan and financial assurance for #BER001RE. On November 06, 2016, MMD approved Permit Modification 16-2 for new units in Quarries 357NE, 357NW and 19N totaling an additional 86.2 acres; On June 1 2017, MMD issued Permit Modification 17-1, which was a Modification to the FA instrument replacement. On October 10, 2019, MMD issued Permit Modification 18-1, which approved the new mine closeout plan and associated FA. On July 15, 2020, MMD issued Permit Modification 20-1, which defined exploration activities and off-spec coal management. On May 17, 2021, MMD issued Permit Modification 21-1,

which increased the total allowable hole depth for exploration drilling activities. On November 16, 2021, MMD issued Permit Modification 21-2, which increased the design limits by 270.17 acres in existing quarries 2, 4, 6, 8, 10, 15 and 18(19N) and new unit Quarry 17. MMD issued Permit Modification 22-01, establishes and stipulates new vegetative success criteria for reclamation associated with BE001RE.

1. Justification that Proposed Changes Require a Revision.

Section 19.10.5.505 of the New Mexico Administrative Code (NMAC) differentiates between the requirements for hard rock permit modifications and hard rock permit revisions. Applicable portions of the NMAC from Section 19.10.5.505 are included below in bold, followed by an explanation in red of why the Tijeras facility's proposed Mine Closeout Plan update changes is considered to be a permit revision.

(1) The Director shall consider the following factors and their level of impact to determine whether a permit modification would have a significant environmental impact:

(a) Whether the proposed change would authorize an expansion of design limits beyond that currently authorized by the permit that:

(i) Would be located in or is expected to have a direct surface impact on wetlands, springs, perennial or intermittent streams, lakes, rivers, reservoirs or riparian areas.

No tributary water courses, wetlands, wells, springs, stock water ponds, reservoirs, perennial or intermittent streams and ditches on the affected land and on adjacent lands will be affected by the 5-year Mine Closeout Plan.

(ii) Is expected to have a direct impact on ground water that has a total dissolved solids concentration of less than 10,000 mg/l.

There are no known water tables within the vertical profile of the area to be mined. Therefore, there will be no direct impacts to any groundwater from the proposed permit revision activities.

(iii) Is expected to result in point or non-point source surface or subsurface releases of acid or other toxic substances from the permit area.

There will not be any new point sources created by the 5-year Mine Closeout Update. Therefore, no new sources of potential release of acid or toxic forming materials into the hydrologic system at the quarry will occur.

(iv) Would be located in designated critical habitat areas as determined in accordance with the federal Endangered Species Act of 1973 or in areas determined by the Department of Game and Fish likely to result in an adverse impact on an endangered species designated in accordance with the Wildlife Conservation Act, Sections 17-2-37 through 17-2-46 NMSA 1978 or by the State Forestry Division for the Endangered Plants Act, Section 75-6-1 NMSA 1978.

Based on the information available from the U.S. Fish and Wildlife Service, no critical habitat areas are located within Tijeras mining site or within the proposed reference area. Therefore, designated critical habitat would not be affected by the proposed permit revision activities.

(v) Would adversely impact cultural resources listed on either the National Register of Historic Places or the State Register of Cultural Properties.

There are no cultural resources identified the National Register of Historic Places or the New Mexico State Register of Cultural Properties in the proposed mining site. All proposed activities take place within the disturbed or affected mining areas currently identified and approved in Permit No. BE001RE. Thus, cultural resources would not be affected by the proposed permit revision activities.

(vi) Would be located in a known cemetery or other burial ground.

No modification is proposed or has activities that are located in a known cemetery or burial ground.

(vii) Would be located in an area designated as a Federal Wilderness Area, Wilderness Study Area, Area of Critical Environmental Concern, or an area within the national Wild and Scenic River System.

The are no proposed permit revision activities will not occur in a Federal Wilderness Area, Wilderness Study Area, Area of Critical Environmental Concern, or an area within the national Wild and Scenic River System.

(b) Whether the proposed change would result in a significant increase in the amount of financial assurance as determined by the Director; or

The proposed permit revision activities will not result in a significant change in the financial assurance. The modification request is to change reclamation success criteria.

(c) Whether the proposed change would significantly depart from the nature or scale of the permit.

The proposed permit revision is to the mine closeout plan giving it the 5-year update. There will be no changes within the permit boundary for Permit No. BE001RE.

2. Application Checklist

19.10.5.502 PERMIT APPLICATION REQUIREMENTS:

A. A minimum of six copies of each application for a permit under this Part shall be submitted to the Director. The Director may require additional copies for distribution by the Director to other governmental agencies with an interest in, or jurisdiction over, elements of the proposed operation.

This application will be submitted electronically; one paper copy will be submitted to your office for MMD file per conversation.

B. All information submitted to the Director shall be made available for public inspection and copying at the Director's office, except as designated confidential. Information in the application which the applicant desires to keep confidential shall be clearly indicated and submitted separately from the rest of the application.

(1) If the operator designates as confidential an exploration map, financial information, information concerning the grade or location of ore reserves or trade secret information, the Director shall maintain the information as confidential and not subject to public records or disclosure laws.

(2) If a request is made for public review of the information held confidential, the Director shall notify the operator and provide a reasonable opportunity for substantiation of the claim that public disclosure of the information could harm the competitive position of the operator. If the claim is not substantiated to the satisfaction of the Director, the information shall be released.

(3) When a request is made for public review of information designated as confidential, the Director shall attempt to notify the operator within 24 hours of the request, and shall provide written notification by certified mail.

There is no information designated as confidential in current revision effort.

C. Each application shall be signed by an applicant or authorized agent of the applicant for the operation with the following certification made:

I certify that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate, and complete.

Please see certification and signature in Section 6 below.

D. Each application under this Part shall be in a format acceptable to the Director and contain the following:

(1) The name of the applicant to whom the permit will be issued.

GCC Rio Grande, Inc. (GCC)

(2) A map(s) and list, including names and addresses, of all owners of surface and mineral estates within the proposed permit area, as shown by the most recent county assessor's property tax schedule.

GCC owns all of the surface estate within the proposed permit boundary except for the United States Forest Service (USFS) property in the southeast portion of the permit boundary (see attached map, *Surface/Mineral Estate Ownership [from Special Warranty Deed]*) and the small rectangular-shaped notch in the northeast $\frac{1}{4}$ of Section 28. In the southeast portion of the Tijeras Mine and Mill, GCC maintains the indicated mining claims with the BLM annually. The small portion in the NE section of the proposed permit boundary represents a past encroachment onto USFS property. The area was mined for limestone and subsequently reclaimed; although the dates are uncertain, historical aerial photography indicates surface disturbance in the area in May of 1991

(3) A statement of the basis on which the applicant has the right to enter the property to conduct the mining and reclamation. The applicant will allow the Director to examine, if necessary, the documents which establish such basis.

Rio Grande Portland Cement Corp C/O Mexcement Inc. (GCC) retains both surface and mineral estate ownership; see item D (2) above and see attached map, *Surface/Mineral Estate Ownership (from Special Warranty Deed)*.

(4) The site assessment previously submitted pursuant to Section 69-36-5 of the Act shall be considered part of the application. If information in the site assessment requires updates to provide information necessary for evaluation of the permit or if the site-specific conditions at the time of the assessment significantly deviate from conditions at the time of submittal of the permit application, such updated information or deviations must be described in the application.

No updates to the site assessment are needed, as site specific conditions have not significantly deviated.

(5) A map(s) showing all existing and proposed pits, shafts, adits, stockpiles, waste units, impoundments, leach piles, processing facilities, and support facilities such as office buildings. The map(s) shall identify the proposed permit area and design limits of each unit of the operation.

This information is described in the 2023 Mine Closeout Plan

(6) A description of undisturbed vegetation including a comprehensive list of species and their relative abundance with regards to cover and production.

These data were collected and summarized in “GCC Rio Grande Inc., Tijeras Limestone Quarry, Vegetation Test Plots, 2008 Final Monitoring Report” by Habitat Management, Inc. and are incorporated by reference in the GCC Tijeras Mine and Mill Closeout Plan.

(7) Evidence that other applicable state and federal permits to be obtained either have been or will be issued before the activities subject to those permits begin.

GCC Rio Grande was issued an updated Title V operating permit on July 28, 2017. Information in Section 6 of the 2023 GCC Tijeras Mine and Mill Closeout Plan, Environmental Standards Compliance contains additional details.

(8) The applicant shall designate an agent and provide the agent's street address for the service of notices and orders in writing from the Director. This information shall be kept current if a permit is granted.

GCC Rio Grande Inc.'s agent in the matter is Samantha Kretz, Environmental Engineer, 11783 State Hwy 337 South, Tijeras, NM, 87059.

(9) A copy of the proposed form of notices required under 19.10.9 NMAC.

This application is for a 5-year renewal of the Mine Closeout Plan

(10) A permit fee as determined pursuant to 19.10.2 NMAC

The required revision fee of \$6,000.00 is enclosed.

(11) Any additional information necessary for evaluation of the permit application as required by the Director.

See the attached 2023 Mine Closeout Plan.

E. To avoid duplication and conflicting requirements, the applicant may include information from environmental permits relevant to the application. Permits issued by other governmental agencies shall be accepted by the Director to the extent such permits satisfy the requirements of the Act and 19.10 NMAC.

This information is detailed in Section 6 of the 2023 GCC Tijeras Mine and Mill Closeout Plan, Environmental Standards Compliance.

F. Where physically separate but interrelated mining operations are located in close proximity to each other and are under the control of the same owner or operator, the applicant may request or the Director may determine to issue one permit for all of the operations and require only one permit application and closeout plan.

There is no proposed permit revision. This is a 5-year revision update of the Mine Closeout Plan.

3. Mine Closeout Plan Renewal

GCC is submitting the 5-year update (2023 Mine Closeout Plan) to MMD for Tijeras Mine and Mill.

4. Financial Assurance

The revision of the Mine Closeout Plan will update the financial assurance to include all of the disturbed acreage. The financial assurance will increase from 9,369,176.00 to 12,152,220.00. See the attached bond calculation sheet for additional detail.

5. Permit Application Certification

GCC Rio Grande, Inc.
Tijeras Mine and Mill

I certify that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals responsible for obtaining the information, I believe the submitted information is true, accurate, and complete.

Samantha Kretz
Samantha Kretz, GCC Tijeras

6-12-2023
Date

Please don't hesitate to contact me if you have any questions or require any additional information.

Attachment A

June 2023

Closeout Plan

GCC Rio Grande – Tijeras Mine and Mill



Prepared for:

GCC Rio Grande, Inc. (“GCC Rio Grande”)
Tijeras Mine and Mill
P.O. Box 100
Tijeras, New Mexico, 87059

Prepared by:

Ecosphere Environmental Services, Inc.
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(505) 954-1570



Durango, CO
Cortez, CO
Pagosa Springs, CO
Santa Fe, NM
Farmington, NM

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Abbreviations and Acronyms

Cfs	cubic feet per second
EPA	U.S. Environmental Protection Agency
GCC Rio Grande	GCC Rio Grande, Inc.
MMD	Mining and Minerals Division
MSGP	multi-sector general permit
NMAC	New Mexico Administrative Code
NMSA	New Mexico Statutes Annotated
NPDES	National Pollutant Discharge Elimination System
TCLP	toxic characteristic leaching procedure

Executive Summary

GCC Rio Grande, Inc. (GCC Rio Grande) owns and operates the Tijeras Mine and Mill, consisting of a Portland cement plant and multiple open pit limestone quarries. The company projects that it has sufficient reserves to continue to operate the Tijeras Mine and Mill at current production levels for the next several more decades.

GCC is submitting this revised closeout plan to the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD) as a revision to MMD Permit # BE001RE, which authorizes mining and reclamation activities on the site. The goal of this plan is to provide for the re-establishment of a self-sustaining ecosystem on the permit area following closure that is consistent with the surrounding area and post-mining land use.

The Tijeras Mine and Mill located in Bernalillo County approximately 0.5 of a mile south of the Village of Tijeras, New Mexico, on approximately 2,119 acres. The facility is bordered on the west and east by U.S. Forest Service land within the Cibola National Forest. The U.S. Department of Energy also owns land adjacent to the southern boundary. The site is bordered by private land on the north and east.

GCC Rio Grande has a completed long term mining plan. To date, approximately 750 acres within the property have been impacted by past and current mining activities, including mined areas, the cement plant site, and haul and access roads. Of that total, approximately 74 acres have been reclaimed and additional 22 acres in the process of being reclaimed in 2023.

This closeout plan includes the following:

- A project description, a project explanation, and site history;
- Site specific characteristics, including a discussion of past and current mining, geology and hydrology, soils and vegetation, wildlife, and cultural resources;
- A discussion of post-closure land use;
- A statement that no waiver from either establishing a self-sustaining ecosystem or for the proposed post-mining closure land use is necessary, or being requested;
- A description of closeout activities;
- A discussion of how the facility complies with environmental standards;
- A schedule for closeout plan activities;
- A review of permitting requirements for site closure;
- Maps displaying the anticipated surface configuration upon completing the closeout plan; and
- A cost estimate to achieve final closure.

1. Project Description

1.1 Introduction

GCC Rio Grande, Inc. (GCC Rio Grande) owns and operates the Tijeras Mine and Mill, consisting of a Portland cement plant and multiple surface limestone quarries, located near the Village of Tijeras, New Mexico.

GCC Rio Grande is submitting this revised closeout plan to the New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (“MMD”) as a revision to MMD Permit #BE001RE, which authorizes mining and reclamation activities on the site. This plan has been prepared by GCC Rio Grande to meet the requirements of the New Mexico Mining Act, § 69-36-11, New Mexico Statutes Annotated (NMSA) and its implementing regulations including 19.10.5.506, New Mexico Administrative Code (NMAC).

The goal of this plan is to provide for the re-establishment of a “self-sustaining ecosystem” on the permit area following closure that is consistent with the surrounding area and post-mining land use. This plan describes the disturbances caused by mining operations and the measures that have been and will be taken to reclaim disturbances at the site, establish a self-sustaining ecosystem, and meet environmental standards.

1.2 History

The Tijeras Mine and Mill permit area consists of approximately 2,219 acres and is located at approximately 35.07171° North Latitude, 106.39780° West Longitude.

The Tijeras Mine and Mill have been in operation since 1959 at 11783 State Highway 337, Tijeras, New Mexico, 87509. Ideal Basic Industries began construction and development of the site in 1958. Holnam, Inc. acquired the property and its operations in 1990. In 1995, GCC Rio Grande purchased the site and the facility.

The New Mexico Mining Act, enacted in 1993 at 69-36-1 et seq., NMSA, required existing mining operations to submit a permit application and a closeout plan. A permit application was submitted, and the agency issued MMD Permit #BE001RE on May 23, 1996. This permit authorizes the permittee to conduct mining and reclamation operations at the facility.

The required closeout plan was submitted to MMD as a revision to MMD Permit #BE001RE. On June 30, 1998, MMD issued Permit Revision 98-1 approving the closeout plan and incorporating it as a permit requirement. Permit Revision 98-1 also required the permittee to submit an approved test plot plan and to provide erosion protection of soil stockpiles.

A test plot plan was submitted to MMD in 1999. After review, MMD issued Permit Modification 03-1 on November 24, 2003, which revised the closeout plan to allow for the construction and reclamation of test plots consisting of approximately 30 acres within Quarry 2.

On September 12, 2007, MMD approved Permit Modification #06-1. This modification approved retention of three post-mining highwall segments in Quarry 3, Section F & G with the following conditions:

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

- Installation of benches of no more than 30 feet wide, inclined 1 to 5 percent (0.57-2.86 degrees) toward the interior portion of the outslope face above, with a longitudinal slope not to exceed 5 percent (2.86 degrees); and
- Implementing public safety measures including limiting access to only authorized persons, posting warning signs, annual inspections of the highwall segments, and requirements to mitigate any identified hazard within 30 days.

On October 5, 2007, MMD approved Permit Modification #07-1, which modified the closeout plan to allow the reclamation of approximately 3.4 acres along the Corral Canyon according to a restoration plan approved by the U.S. Army Corps of Engineers.

On April 28, 2009, GCC Rio Grande submitted a report titled GCC Rio Grande Inc., Tijeras Limestone Quarry: Vegetation Test Plots 2008 Final Monitoring Report (2009) prepared by Habitat Management, Inc. The report documented the results of experimental reclamation on 48 test plots at Quarry 2 using “Redbed” material supplemented with organic amendment over a five-year period.

On July 6, 2015, MMD issued Permit Modification #14-01, which was a modification for FA instrument replacement of 3,750,000.

On August 19, 2015, MMD requested in a letter that GCC Rio Grande provide an updated closeout plan along with an updated cost estimate and related financial assurance. GCC Rio Grande is submitted this revised plan including the updated reclamation cost estimate in response to that request as a revision to MMD Permit #BE001RE.

On November 6, 2016, MMD approved Permit Modification #16-2, which approved new design limits of 86.2 acres, new units Quarry 357NE, 357NW and 19 N.

On June 1, 2017, MMD issued Permit Modification #17-1, which was a modification for FA instrument replacement of 867,000.00.

On October 10, 2019, MMD issued Permit Modification #18-1, which completed the August 19, 2015 requested from MMD updating the closeout plan and associated financial assurance.

On July 15, 2020, MMD issued Permit Modification 20-1, which defined exploration activities and off-spec coal management.

On May 17, 2021, MMD issued Permit Modification 21-1, which increased the total allowable hole depth for exploration drilling activities.

On November 16, 2021, MMD issued Permit Modification 21-2, which increased the design limits by 270.17 acres in existing quarries 2, 4, 6, 8, 10, 15 and 18(19N) and new unit Quarry 17.

On August 5, 2022, MMD issued Permit Modification 22-01, establishes, and stipulates new vegetative success criteria for reclamation associated with BE001RE.

2. Site-specific Characteristics

2.1 General

The Tijeras Mine and Mill are located in Bernalillo County in the East Mountain area approximately fifteen miles east of Albuquerque, New Mexico, near the Village of Tijeras. The Village of Tijeras has a population of nearly 600 residents. The community is situated along Interstate 40 and historic Route 66 within Tijeras Canyon at an altitude of 6,322 feet above sea level. The Tijeras area was originally settled in the 19th Century. The Village of Tijeras was not, however, incorporated until 1973.

The Tijeras Mine and Mill are situated south of the Village of Tijeras on approximately 2,118.67 acres, of which 1705.77 acres are patented claims, 119.19 acres are owned in fee, and 293.71 acres are leased. The cement plant is located in the S $\frac{1}{2}$ of the SW $\frac{1}{4}$ of SE $\frac{1}{4}$ of Section 22 and the N $\frac{1}{2}$ of the NW $\frac{1}{4}$ and NW $\frac{1}{4}$ of NE $\frac{1}{4}$ of Section 27, Township 10 North, Range 5 East. The quarry and the patented claim areas include parts of Sections 21, 22, 26, all of 27, and parts of Sections 33 and 34 of Township 10, Range 5 East and the North $\frac{1}{4}$ of Section 4, Township 9 North, Range 5 East.

The facility is bordered on the west and east by U.S. Forest Service land within the Cibola National Forest. The U.S. Department of Energy also owns land adjacent to the southern boundary. The site is bordered by open space to the north. Roosevelt Middle School, the Bernalillo County sheriff's department East Command Center a community center, and other development along historic Route 66 are located approximately 0.5 of a mile to the north. State Highway 337 runs approximately 0.5 of a mile east of the Tijeras Mine and Mill. The Sandia Ranger Station, the Tijeras Pueblo Archaeological Site, and both residential and commercial properties are located along Highway 337. A site location map is provided as Figure A-1.

The Tijeras Mine & Mill lies at the north end of the Manzano Mountains, in an area often referred to as the Manzanita Mountains. The permit area is situated on the eastern flank of these mountains ranging from 6,225 feet above sea level on the northern end of the property to 7,328 feet on the south. Natural slopes along the site are steep often ranging from 10 to nearly 40 percent (5.71 to 21.8 degrees). The physiographic features of the facility and surrounding area are shown in Figure A-2, developed from the United States Geological Survey 7.5-minute quadrangle for Tijeras, New Mexico.

2.2 Past, Current, and Planned Mining

Ideal Basic Industries began construction and development of the site in 1958, and the Tijeras Mine and Mill began operation in 1959. Holnam, Inc. purchased the facility in 1990. The Tijeras Mine and Mill were acquired by GCC Rio Grande in 1995.

Its operations include a Portland cement manufacturing plant equipped with coal-fired kilns. The cement plant produces various types of cement used in concrete, mortar, and other construction material. The primary raw material used in this process is limestone which is mined from its on-site quarries. Other raw materials include silica, alumina, and iron, which are transported to the site. Up to 750,000 tons of limestone can be mined each year, which produces about 500,000 tons of cement annually. Table 2-1 delineates the past and current plant activities.

Tijeras Mine and Mill Closeout Plan

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2-1. Location and reclamation status of various plant activities at the GCC Rio Grande Tijeras Mine and Mill

LOCATION	DISTURBED ACRES	RECLAIMED ACRES	RECLAIMED STATUS
PLANT FACILITIES	19.64	-	0.00%
PLANT ROAD ENTRANCE	6.60	-	0.00%
PLANT PATIOS	7.16	-	0.00%
HAULING ROADS	49.32	-	0.00%
SECONDARY ROADS AND EXPLORATION PADS	58.8	-	0.00%
CEMENT KILN DUST DISPOSAL			
	4.76	-	0.00%
QUARRY 1			
	45.00	-	0.00%
QUARRY 2			
	24.24	11.93	49.22%
QUARRY 3			
	104.4	12.06	11.55%
QUARRY 4			
	109.81	47.05	42.85%
QUARRY 5			
	41.61	-	0.00%
QUARRY 7			
	52.66	-	0.00%
QUARRY 17/18			
	18.5	-	0.00%
QUARRY 19			
	119.24	6.46	5.42%
WEST CAP QUARRY			
	31.68	5.80	18.31%
EAST CAP QUARRY			
	3.58	-	0.00%
TOTAL DISTURBED AREA (INCLUDING RECLAIMED)	697.00	83.30	11.95%
HISTORICAL RECLAMATION CAMPAIGNS			
LOCATION	ACTIVITY	AREA	DATE
WEST CAP QUARRY	Reclaimed USFS West Cap Quarry	3.25	Reclaimed (1994)
QUARRY 2	Reclaimed Quarry 2 & Test Plots	11.93	Reclaimed (2003)
QUARRY 4	Reclaimed Quarry 4 (East of haul road)	32.83	Reclaimed (2008)
QUARRY 4	Reclaimed Quarry 4 (West of haul road)	14.22	Reclaimed (2003)
QUARRY 19	Reclaimed Corral Canyon Drainage	6.46	Reclaimed (2007)
QUARRY 3	Reclaimed South End Quarry 3	12.06	Reclaimed (2011)
5 YEARS RECLAMATION PLAN			
LOCATION	YEAR START	YEAR COMPLETION	ACRES RECLAIMED
QUARRY 1	2019	2023	22.50
Quarry 5	2024	2028	41.61

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

Limestone for cement production is mined from the on-site quarries. Quarry locations include the West Cap Quarry and Quarries 1, 2, 3, 5, 4, 7, 17, and 19. Approximately 750 of the site's 2,119 acres have been disturbed during mining and production activities. Reclamation has occurred on about 74 acres. Bond release has not yet been sought for any of these areas.

Figure A-3 is a satellite map displaying areas the permit area and the current mine footprint impacted by the past and current mining activities, including mined areas, reclaimed areas, haul roads, and other access roads. The figure also shows the cement plant and the surrounding area.

GCC Rio Grande has a mine schedule completed for the next 5 years that was completed in 2022. The company projects that it has sufficient resources to continue to operate the Tijeras Mine and Mill at current production levels for several more decades. However, only those resources for which a mining plan has been defined are identified in this Closeout Plan. For the next 11 years (2-1), the mining footprint is expected to increase as shown in Figure A-3, located in Appendix A - Maps.

2-2. Planned Disturbance at Tijeras Mine and Mill.

QUARRY	YEAR	ACRES
Quarry 17N	2038	4.00
	2039	4.00
	2040	4.00
	2041	4.00
	2042	2.00
SUBTOTAL TO BE DISTURBED		18.00
Quarry 3	2023	4.00
	2024	4.50
SUBTOTAL TO BE DISTURBED		8.50
QUARRY 2 - ABO BLOCK	2035	3.00
	2036	3.20
SUBTOTAL TO BE DISTURBED		6.20
QUARRY 19	2026	3.00
	2027	3.00
	2028	4.00
	2029	4.00
	2030	4.00
	2031	4.00
	2032	4.00
	2033	4.00
	2034	4.00
	2035	4.00
	2036	4.00
2037	4.00	
SUBTOTAL TO BE DISTURBED		46.00
Total		78.70

GCC Rio Grande will propose to delay reclamation in areas subject to further mining until it is certain that these areas do not need to be re-disturbed. Finally, changes or expansions in the planned footprint of operations will be detailed in the next iteration of this Closeout Plan.

2.3 Exploration and Blasting Activities

The Tijeras Mine and Mills exploration activities are conducted only within the permit area of BE001RE Permit. If GCC plans to explore outside of the permit area, they will apply for separate exploration permit or a minimal impact exploration operation.

The Tijeras Mine and Mill exploration shall not exceed 2 acres of surface disturbance and a total hole depth of 7,170 feet at any given time. Once the exploration campaign is completed the drill holes will be reclaimed to MMD drill plugging standards or the Office of State Engineer.

Stratigraphic and structural geology is complex, continued exploration drilling is necessary in order to better understand the limestone deposit. Exploration drilling and mapping will be ongoing at the Tijeras Mine during the life of the operation. Tijeras Mine and Mill has a current exploration campaign in progress.

Tijeras Mine and Mill has ongoing blasting activities to maintain operations. GCC has two permanent seismographs onsite to measure all seismic activities. Tijeras Mine and Mills provides notification to the Village of Tijeras at least 24 hours prior to the scheduled blast occurring.

2.4 Climate

The Tijeras Mine and Mill is located in a transitional zone between mountain shrub and semi-arid coniferous forest ecosystems and is surrounded by steep foothills and rocky outcrops. The area is characterized by a semiarid climate with the high temperatures in July averaging 84.8 degrees Fahrenheit and low temperatures in January averaging 18.0 degrees (1939 - 2005, Western Regional Climate Center 2016). Historic annual precipitation for the Tijeras region averages 16.4 inches with the majority falling in July through October.

2.5 Geology

The Tijeras Mine and Mill permit area are situated above Tijeras Canyon. The ground surface consists of a thin cover of soil with frequent rock outcroppings. Beneath the permit area is the Madera Formation, consisting of sedimentary limestone from the Upper and Middle Pennsylvanian period and the Permian Abo formation. The geology is relatively complex with as a result of considerable folding and numerous faults and fractures. The most recent faulting occurred approximately 10 million years ago, and no active faulting has been identified (Holnam 1994).

Limestone for cement production is mined from the Madera Formation. The Madera Formation is typically divided into a lower grey limestone member and an upper arkosic limestone member. Present quarry locations include the West and East Cap Quarry and Quarry 1, 2, 3,4, 5, 7and 19.

Between the layers of limestone within the Madera Formation are a reddish claystone with embedded sandstone and shale of Pennsylvanian Age, known as "Redbed." The Redbed is salvaged during mining

operations to be used both as fill and in developing soil cover for disturbed areas. Its past use at the site indicates that the Redbed material performs well in minimizing erosion and as a plant growth medium.

Slopes are steep within the permit area, often ranging from 10 to nearly 40 percent (5.71 to 21.8 degrees), but generally stable to date. There is little indication of mass movement or concentrate erosion, such as rills or gullies, on undisturbed slopes. The quarries were developed along the slopes and, as a result, have had the effect of lowering the elevations of the mined terrain without significantly changing the area's natural topography.

2.6 Hydrology

The site and facility are situated in a semi-arid environment with an average annual precipitation of 12.5 inches. Precipitation, however, may range from 7 to 16 inches a year. More than one-half of the annual precipitation occurs during the "monsoon season" of July through early October usually as brief, but sometimes heavy thunderstorms. Winter precipitation is normally light. Surface water throughout the permit area is ephemeral in nature and only flows during and immediately after these heavy storm events.

Surface water runoff from the permit area flows into three major channels: Apachitos Canyon, Corral Canyon, and Cedro Canyon. Apachitos Canyon flows into Corral Canyon west of the cement plant, and then flows into Sediment Pond No. 1 (Outfall 001). Outfall 001 discharges into Corral Canyon which then flows into Tijeras Arroyo and eventually into the Rio Grande. Stormwater from the northeast corner of the plant site, encompassing less than 160 acres, discharges to Outfalls 002 and 003 (Figure A-3). Stormwater runoff from Outfall 002 flows northerly, eventually discharging into Tijeras Arroyo. Outfall 001 only rarely discharges; over the last 5 years, fewer than 5 discharges have occurred. The most recent discharge from "Sediment Pond No. 1" occurred in September of 2015

Outfall 003 is located in the northeast corner of the permit boundary, receiving runoff from the plant access road and discharging into Cedro Canyon. The Cedro Canyon Watershed is approximately 12,555 acres at its confluence with Tijeras Arroyo (Figure A-4), and about 476 acres of the Cedro Canyon watershed are within the Tijeras Mine permit boundary.

No water quality data is available for ephemeral or intermittent streams in smaller watersheds like Apachitos Canyon, Cedro Canyon and Corral Canyon. Designated uses for these drainages is livestock watering, wildlife habitat, marginal warm water aquatic life, and primary contact. The New Mexico Environment Department lists Tijeras Arroyo as not supporting warm-water aquatic life. Identified causes include nutrient, eutrophication, and benthic macro-invertebrate impairment.

The only known groundwater located within the permit area occur along fault zones and rock fractures in the Madera Formation and the underlying geologic units. Recharge of groundwater is by direct infiltration of rainfall and snowmelt into the fractured systems of rock up-gradient of the plant area.

Two wells within the permit area were drilled in 1958 to depths of approximately 1,150 feet. The wells produce water of sufficient quantity and quality to support plant operations.

The New Mexico Environment Department has determined the GCC Rio Grande does not require a discharge permit base on the test results found in Table 2-3. See the New Mexico Environment Department No Discharge Permit Required Letter in Appendix C.

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2-3: Field Parameters

Field Parameters	NMWQCC Standard	Well #3	Cooling Tower (CT) Out	Plant Water Drain
pH	6 to 9	7.4	8.7	8.4
SpC(μ S/cm)	None.	1.03	1.57	1.22
Temp ($^{\circ}$ C)	None.	25.8	19.2	20.6

Table 2-4-Drinking Water Analytical Results

Analyte	NM WQCC Standard	Unit	Well # 3	CT Out	Plant Water Drain
Aluminum	5	mg/L	<0.02	<0.02	<0.02
Arsenic	0.1	mg/L	<0.005	<0.0050	<0.005
Barium	1	mg/L	0.11	0.14	0.1
Bicarbonate (As CaCO ₃)	None	mg/L CaCO ₃	258.7	386.7	215.1
Boron	0.75	mg/L	0.08	0.2	0.084
Cadmium	0.01	mg/L	<0.002	<0.002	0.002
Calcium	None	mg/L	120	180	99
Carbonate (as CaCO ₃)	None	mg/L CaCO ₃	<2	86.48	<2
Chloride	250	mg/L	67	130	71
Chromium	0.05	mg/L	<0.006	<0.006	<0.006
Cobalt	0.05	mg/L	<0.006	<0.006	<0.006
Copper	1	mg/L	0.0012	0.0092	0.001
Fluoride	1.6	mg/L	0.24	0.98	0.51
Iron	1	mg/L	0.032	0.13	<0.02
Lead	0.05	mg/L	<0.0005	<0.0005	<0.0005
Magnesium	None	mg/L	38	82	38

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Analyte	NM WQCC Standard	Unit	Well # 3	CT Out	Plant Water Drain
Manganese	0.2	mg/L	<0.002	0.0088	<0.002
Molybdenum	1	mg/L	<0.008	0.029	<0.008
Nickel	0.2	mg/L	<0.01	<0.01	<0.01
Nitrogen, Nitrate (as N)	10	mg/L	4.2	4.5	3.9
Organic Carbon, Total	None	mg/L	1.1	9.6	2.2
Perchlorate	None	µg/L	1.9	3.6	1.7
pH	6 to 9	su	7.56	8.86	8.04
Phosphorus, Orthophosphate (As P)	None	mg/L	<0.5	<0.5	<0.5
Potassium	None	mg/L	2.2	5.6	6.3
Selenium	0.05	mg/L	0.0066	0.014	0.012
Silver	0.05	mg/L	<0.005	<0.005	<0.005
Sodium	None	mg/L	37	100	40
Specific Conductance	None	µmhos/cm	1,000	1700	950
Sulfate	600	mg/L	140	280	150
Total Alkalinity (CaCO ₃)	None	mg/L CaCO ₃	258.7	473.2	215.1
Total Dissolved Solids	1,000	mg/L	636	1,200	614

2.7 Soil and Vegetation

Native soils present within the Tijeras Mine and Mill permit area have been described as “Seis loams” by the U.S. Soil Conservation Commission. These native soils were gathered and evaluated during the preparation of the 1996 closeout plan to determine the feasibility of preserving them for use in reclamation. The soil investigation was carried out by Mr. Paul M. Boden in February and March 1996. One of the objectives of the investigation was to determine whether the native soils could be used as topdressing in reclamation. Another was to confirm the information provided by the U.S. Soil Conservation Service soil survey.

According to the site investigation, native soil within the permit area is only sufficiently deep to warrant salvage within the site drainages. The report states that in the upland areas, the soil is so thin that it is nearly unrecoverable after the vegetation is removed before mining. As a result, for the purposes of reclamation and

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revegetation, native soils are salvaged only from drainage areas disturbed by mining. Instead, topdressing material for reclamation consists of the Redbed geologic material. The site investigation states that Redbed is found throughout the permit area in sufficient quantities to provide an adequate rooting material for revegetation. It indicates that the Redbed claystone breaks down to a clay loam.

The Tijeras Mine and Mill is located in a transitional zone between mountain shrub and semi-arid coniferous forest ecosystems. The U.S. Forest Service classifies nearly all of the permit area as Piñon-Juniper Woodland. The agency indicates that only the highest 100 to 200 feet along the western and southern boundaries may extent into the Pine life zone. The U.S. Natural Resources Conservation Commission describes the permit area as a Limestone Hills Ranges Site, a Piñon-Juniper Woodland.

Undisturbed vegetation within the permit boundary indicates a principal plant community dominated by piñon pine (*Pinus edulis*) and juniper (*Juniperus monosperma*). The predominant grass is blue grama (*Bouteloua gracilis*). Other less frequent species include side-oats grama (*B. curtipendula*), black grama (*B. eriopoda*), hairy grama (*B. hirsuta*), bush muhly (*Muhlenbergia porteri*), sand dropseed (*Sporobolus cryptandrus*), mountain mahogany (*Cercocarpus montanus*), snakeweed (*Gutierrezia sarothrae*), cholla (*Cylindropuntia* sp.), prickly pear (*Opuntia* sp.), and yucca (*Yucca* sp.).

2.8 Wildlife

Wildlife in the area is similar to that found in other upland and mountainous areas of New Mexico. Mammal species often found in Piñon-Juniper Woodlands include, white-throated wood rat (*Neotoma albigula*), ring-tailed cat (*Bassariscus astutus*), rock squirrel (*Spermophilus variegatus*), the Western spotted skunk (*Spilogale gracilis*), piñon mouse (*Peromyscus truei*), ground squirrel (Sciuridae family), black bear (*Ursus americanus*), mule deer (*Odocoileus hemionus*), porcupine (Erethizontidae or Hystricidae families), striped skunk (*Mephitis mephitis*), Colorado chipmunk (*Neotamias quadrivittatus*), bobcat (*Lynx rufus*), coyote (*Canis latrans*), grey fox (*Urocyon cinereoargenteus*), mountain lion (*Puma concolor*), pocket gopher (*Thomomys* sp.), and several species of bats.

Migratory birds are common since the area is located along one of the major continental flyways. Birds often found in the area include the scrub jay (*Aphelocoma californica*), piñon jay (*Gymnorhinus cyanocephalus*), ash-throated flycatcher (*Myiarchus cinerascens*), mountain chickadee (*Poecile gamebeli*), mockingbird (*Mimus* spp.), raven (*Corvus corax*), juniper titmouse (*Baeolophus ridgwayi*), brown towhee (*Pipilio fuscus*), broad-tailed hummingbird (*Selasphorus platycercus*), red-shafted flicker (*Colaptes auratus*), grey-headed junco (*Junco hyemalis*), turkey vulture (*Cathartes aura*), and red-tailed hawk (*Buteo jamaicensis*). The golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*) may occur in the vicinity of the permit area as transient species but are very rare. Reptiles commonly found nearby include the patch-nosed snake (*Salvador hexalepis*), striped whip snake (*Masticophis taeniatus ornatus*), wandering garter snake (*Thamnophis elegans vagrens*), and rattlesnakes (Crotalinae subfamily).

The U.S. Fish and Wildlife Service list of threatened, endangered, and proposed species which may occur within the project area were reviewed to determine potential wildlife and plant species that may occur within the permitted area. No critical habitat for these species exists within the permitted area. Threatened, endangered,

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or proposed wildlife (special status) that may occur or have potential habitat in the project area listed in Table 2-5. Species whose habitats do not occur in the project area were not considered further.

Table 2-5. Special status species potentially occurring within the project area

Taxon	Status	Habitat Type
Southwestern willow flycatcher (<i>Empidonax traillii extimus</i>)	Endangered	Riparian – Occurs in lower elevation boggy riparian areas with an overstory of cottonwood and willows. This habitat does not occur within the analysis areas.
Rio Grande silvery minnow (<i>Hybognathus amarus</i>)	Endangered	Aquatic – There is no direct connection for water to flow from the project area into silvery willow habitat.
Mexican spotted owl (<i>Strix occidentalis lucida</i>)	Threatened	Mixed conifer – Occurs in mixed conifer and montane riparian habitat. This habitat does not occur within the analysis areas.
New Mexico meadow jumping mouse (<i>Zapus hudsonius luteus</i>)	Endangered	Riparian – Occurs in areas adjacent to flowing water with saturated soils dominated by tall sedges and forbs with relatively low canopy cover near uplands for hibernation.
Yellow-billed cuckoo (<i>Coccyzus americanus</i>)	Threatened	Riparian – Occurs in extensive, moist, lower elevation riparian habitat with large blocks of cottonwood and willows mixed with other shrubs. This habitat does not occur within the analysis area.

2.9 Cultural Resources

The following is a general description of the cultural resource setting in the general vicinity of the Tijeras Mill and Mine site.

Native American people lived in Tijeras Canyon, previously known as Cañon de Camué, approximately 700 years ago. Many ancient Indian villages located throughout Tijeras Canyon. An archeological survey identified three or four major pueblos along with 40 other archaeological sites (Bernalillo County PDS 2006).

The Tijeras Pueblo, located approximately 0.50 mile from the permit area, included about 200 rooms formed in a “U” shape. Pueblo Indians, migrating from the Four Corners region, constructed the Pueblo in the early 1300s. Most of the original inhabitants left around 1360 for unknown reasons. A second wave of inhabitants rebuilt the in the 1390s, but on a smaller scale. They permanently abandoned the Pueblo in about 1425. The site remains. Today it is managed by the Friends of Tijeras Pueblo.

After the Spanish arrived, Tijeras Canyon continued to serve as an important passage between the mountains for Native American, Hispanic, and Anglo travelers. Apache and Comanche raiding parties frequented the canyon, effectively discouraging Spanish settlement. In 1763, the Spanish colonial government issued the Cañon de Camué land grant, providing land ownership incentives to establish a buffer community to protect Spanish interests to the east. An Apache raid in 1770 ended that attempt, and the survivors fled back to Albuquerque. Despite raids that continued into the 1860s, efforts to settle the canyon in the early 1800s endured.

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The canyon was used by both Union and Confederate troops during the Civil War. In 1868, approximately 6,000 Navajo marched from Fort Sumner, where they had lived in exile for over four years, through Tijeras Canyon during their “Long Walk” home.

Fifteen families had settled near present day Tijeras, New Mexico, area by 1880s. Economic activities included farming and ranching along with a few small gold and silver mines.

A Catholic church, now Santo Niño, was constructed in present day Tijeras in 1870, and it is now listed on the National Register of Historic Places. The Santo Niño cemetery is located nearby. Also, several historic lime kilns were located in the area. The remains of three of these are still visible, and two of these are located near Tijeras. The third is near Sedillo, New Mexico. The kilns were made of sandstone and were used to burn limestone by early settlers to manufacture quicklime, which was used as mortar in buildings.

There are significant historic and cultural resources in the vicinity of the Tijeras Mine and Mill (Bernalillo County PDSO 2006). However, no known historic and cultural resource sites exist within the permit area. Likewise, no marked or unmarked human burial sites have been identified within the permit boundaries.

2.10 Other Site Aspects

There are no mine portals, vertical openings, subsidence, recurrent flooding, ground saturation, or water quality contamination issues that currently pose a concern or are likely to pose a concern in the future. Likewise, all mine equipment and associated facilities will be removed upon site closure.

Most industrial waste including used oil, greases, reagents, cleaning materials, and other chemicals are temporarily stored on-site in appropriate containers. All waste chemicals are removed and disposed offsite at approved facilities. Similarly, any remaining chemicals will be shipped offsite to permitted and approved facilities upon closure.

Cement kiln dust (CKD), which consists of a fine powder, is a byproduct of cement manufacturing and is managed in a fill area west of the plant. This material tends to absorb moisture and solidifies into a hard material resembling light grey shale. Samples of the material have been collected and analyzed to determine if they exhibit the hazardous characteristic of toxicity using the toxic characteristic leaching procedure (TCLP). The laboratory analysis revealed that the samples were all considerably below TCLP levels and are not regulated as a hazardous waste. The analysis also revealed that the cement kiln dust is high in calcium with significant levels of magnesium, aluminum, iron, and potassium. Concentrations of other heavy metals are very low and essentially insoluble.

Cement kiln dust is removed from the system by be loaded into a haul truck. The haul truck takes CKD material to be pelletized, nodulized or otherwise agglomerated to prevent fugitive dust in excess of 10 percent opacity, in these form CKD is allowed to be placed in the monofill. Vehicular traffic and compaction of the monofill will be avoided by periodic wetting with water sufficient to control emission from disturbed and undisturbed monofill surface. Weekly inspection is conducted to confirm fugitive dust emissions from CKD monofills are not visible at the property boundary. Areas with 6 months or more inactive monofill will be covered with at least 12 inches of overburden and wetted as needed to minimize exposed monofill area. GCC has developed this plan based on EPA’s solid waste guidance and regulations (e.g., EPA, Guide For Solid Waste Management, Classification

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of Solid Waste Management Disposal Facilities and Practices, 40 CFR Part 257, and Criteria For Municipal Solid Waste Landfills, 40 CFR Part 258). The groundwater monitoring program for each facility is based on the EPA's Guide for Industrial Waste Management, EPA530-R-03-001 (February, 2003). GCC Rio Grande had tested the kiln dust see results in Appendix B.

Around 1985, cement kiln dust was mistakenly disposed of on U.S. Forest Service land west of the West Cap Quarry. The agency was notified and agreed to allow the material to be stabilized in place. The site was reclaimed in the early 1990s.

The U.S. Environmental Protection Agency (EPA) identified bricks used in the Tijeras kilns as a potential concern because of the presence of chromium. These kiln bricks had apparently been disposed of in a closed section of the quarry in Section 27. Ideal Basic recovered approximately 24,000 cubic yards of the material and returned it to the raw feed stream of the plant and burned into "clinker."

The New Mexico Environment Department performed a preliminary site assessment and Hazard Ranking System pre-score site evaluation of the facility, under the federal Comprehensive Environmental Response Compensation & Liability Act. The agency recommended "no further action ... due to absence of evidence for the presence of hazardous waste." It also concluded that environmental hazards are "minimal."

A slope stability analysis and plan for the mine site is in developed. The mine has two slope failures on site see in Figure A-6. See Figure A-10 for slope stability analysis and plan approach and estimated timeline.

3. Post-closure Land Use

GCC Rio Grande manages the 2,119 acres of the property constituting the Tijeras Mine and Mill. The Tijeras Mill area including the plant and its entrance road, consisting of approximately 38 acres, is zoned by Bernalillo County, New Mexico, as "M-2 heavy manufacturing." The remainder of the GCC Rio Grande property is zoned as "A-2 rural agricultural" except that the mined and disturbed locations have been permitted as "special use" areas. According to Bernalillo County, the purposes of an A-2 rural agricultural designation are

"... [T]o preserve the scenic and recreational values in the National Forests and similar adjoining land, to safeguard the future water supply, to provide open and spacious development in areas remote from available public services...."

The current land uses of surrounding properties include:

- North – commercial, residential, and open space;
- East – residential and open space/federal land (U.S. Forest Service);
- South – federal land (U.S. Department of Energy); and
- West – federal land (U.S. Forest Service).

3.1 Proposed Post-Mining Land Uses

GCC Rio Grande has proposed the following final post-closure land uses for the permitted area: industrial/commercial, wildlife habitat, and recreation. Selected post-mining land uses are identified in Figure A-4. It is anticipated that the property will be reclaimed in increments while operations continue.

The proposed industrial designation is limited to the existing plant and entrance road area. The plant area will be reclaimed for industrial or commercial use, such as an industrial park. This is appropriate considering its proximity to the Village of Tijeras and a major transportation corridor, Interstate 40.

Areas with minimal disturbance, primarily old exploration roads, cover approximately 1,530 acres. The primary post-mining use for these areas is wildlife habitat with recreation identified as an associated compatible use.

Areas that have been significantly disturbed by mining activities comprise approximately 750 acres. The interim primary post-mining use for these areas is recreation and wildlife habitat. Recreation is identified as an associated, compatible use for the wildlife habitat areas.

3.2 Future Land Use and Ownership

No changes in zoning and land use are being proposed for the permitted area. The successful reclamation of the test plots demonstrates that reclamation of the property to meet its proposed land uses are feasible and can be fully achieved.

Once its operations cease and reclamation is successfully completed, GCC Rio Grande is not currently planning on retaining ownership of the permitted area. Future land ownership may include either a private party or a governmental agency. If current trends continue, the property could become desirable for residential use. However, if this occurs at some future date, it would occur after GCC Rio Grande sells the land and the next owner would be responsible for any development and costs associated with the land use revision.

4. Waiver from Self-Sustaining Ecosystem or Post-Mining Land Use

No such waiver is being requested. After reclamation, a self-sustaining ecosystem can be established and the identified post-mining land uses can be met.

5. Description of Closeout Activities

5.1 Plant Facilities

Commercial or industrial use has been identified as the primary post-mining land use for the plant area of the project site. Thus, all buildings and other structural components of the cement plant will be demolished at the end of plant operation except for the office building and warehouse, as well as the roads, underground utilities, and drainage systems that support them (Figure A-5). Foundations of removed buildings that are at or below grade will be left in place to serve as potential foundations for future new structures constructed by subsequent owners. Otherwise they will be covered with at least two feet of soil. Re-grading will be minimal and limited to the crusher pit, coal hopper pits, and other similar below-grade features that have no post-mining use.

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All plant components, including both stationary and mobile equipment, will be salvaged or scrapped for recycling into other materials or products off-site.

Clean fill debris, such as broken concrete, brick, rock, stone, glass, reclaimed or uncontaminated soil, will be disposed of on-site in a disposal area in the east part of quarry 1 (section B) directly west of the plant area. As the material is stacked in place, Redbed fill material or other clean fill, including rock, will be placed to form a matrix surrounding debris fragments. Alternatively, a weak soil-cement slurry grout may be used to encapsulate and stabilize the debris. After the demolition is complete and the debris is fully in place, the debris pile will be covered with at least two feet of soil, prepared, and revegetated (See section 5.3.4 – Revegetation).

While the preference is to dispose debris and demolition material on site as described above, if the selected quarry does not have the necessary capacity at the time of mine closure, offsite disposal will be required. As a conservative effort, the bond for the closeout plan has been adjusted to cover cost of disposal for all debris and demolition material at the time of closure.

Waste materials encountered during plant decommissioning will be properly collected, packaged, and transported off-site for disposal at a permitted facility. At this time, the only waste material that is anticipated to require off-site disposal is residual oil and sludge in the decommissioned 400,000-gallon oil tank. GCC Rio Grande, Inc. plans to use this decommissioned tank for a future purpose in operations.

5.2 Channel Restoration

In the Plant area, the final grading to the sediment basin (Sediment Pond 1) and Corral Canyon will be completed. Once reclamation is completed to the upgradient watershed, Sediment Pond 1 will not be necessary as a treatment feature. Sediment Pond 1 may remain as a wildlife feature; however, Corral Canyon will be restored such that it bypasses Sediment Pond 1. Therefore, Sediment Pond 1 will not interrupt sediment continuity of the restored Corral Canyon Channel.

Corral and Apachitos Canyons drain most of the permit area, with a total tributary area of approximately 2,000 acres. During Mine Closeout and post-restoration, Corral Canyon and its tributary Apachitos Canyon will be reconstructed and connected to an undisturbed reach of Corral Canyon near the downstream permit boundary. The conceptual design for channel restoration (Figure A-10, Figure A-11 and Figure A-12) was developed with consideration to the pre-mining drainage configuration of Apachitos Canyon and Corral Canyon. The pre-mining drainage configuration is visible in an aerial image from 1951, and a 1954 USGS topographic map provides relevant pre-disturbance contours (Figure A-13). Review of the pre-mining mapping indicates that Corral Canyon was most likely a combination sand- and gravel-bed ephemeral channel with a moderate longitudinal gradient between 3 and 4 percent. Furthermore, Corral Canyon appears to have had at least some reaches with a wide terrace or floodplain and a smaller, more sinuous inset channel. Apachitos Canyon drains a much smaller watershed (about 1/3 the size of Corral Canyon's) and did historically include a moderate nick point (3.2 percent bedslope transitioning to 5.0 percent bedslope) near its confluence with Corral Canyon. Given the regional setting and the aerial photography, Corral Canyon and Apachitos Canyon would have delivered significant sediment loading (and runoff) to downstream arroyos such as Tijeras Arroyo. The pre-mining channel dimensions shown in Table 1 include some error since they are based upon historic contour mapping with a 40-foot contour interval, hand-drawn stream centerlines, and channel shape features that are not clearly distinguishable on the 1951 aerial photograph.

Table 5-1. Pre-mining Stream Channel Widths

Stream Attribute	1951 Conditions
Corral Canyon Floodplain Width	60 ft to 160 ft
Corral Canyon Inset Channel Width	20 ft to 30 ft
Apachitos Canyon Floodplain Width	20 ft to 80 ft
Cedro Canyon Inset Channel Width	25 ft to 35 ft
Tijeras Arroyo Inset Channel Width	40 ft to 70 ft

Based on measurements from the 1951 aerial photograph, the pre-mining Corral Canyon channel bottom width varied from roughly 20- to 30-feet wide. The current conceptual channel design for Corral Canyon proposes a 20-foot bottom width, which is consistent with the channel’s pre-mining characteristics. Apachitos Canyon has a much smaller watershed area, approximately 1/3 as large as Corral Canyon’s, and the pre-mining channel bottom width was indistinguishable from the 1951 aerial photograph. The conceptual channel design for Apachitos Canyon includes a 10-foot wide bottom width.

The goals of restoration for Corral Canyon and Apachitos Canyon are to re-establish the channels and re-establish functions that were impacted from mining, specifically hydrologic continuity and sediment transport continuity. Historically, these channels had sand, or sand and gravel channel beds that would mobilize during significant storms, which is diametrically opposed to the theory of riprap installation where the goal is to prevent any movement of particles (stones). Therefore, the conceptual design restores Apachitos and Corral Canyon to their pre-mining geometry and longitudinal gradients so that riprap is not necessary for stabilization.

Apachitos Canyon will be restored to its approximate original alignment and gradient. Corral Canyon will be restored to a different alignment than pre-mining to minimize excavation, but with a longitudinal gradient similar to pre-mining conditions. Given that Apachitos Canyon and Corral Canyon will be restored with channel dimensions and longitudinal gradients similar to pre-mining conditions, riprap should not be necessary to stabilize the channels. Anywhere the restored channels deviate from the pre-mining alignments, those deviations do not result in a significantly steeper channel or include an abrupt change in channel gradient that would produce a severe nick point.

Channel width was variable prior to mining, and the final design channel width should be similar to values observed during pre-mining times (20- to 30-feet wide for Corral Canyon). The reconstructed side slopes in Corral Canyon and Apachitos Canyon may vary to fit the terrain. It is recommended that the reconstructed side slopes not be steeper than 3h:1v for construction safety; however, the restored channel side slopes should be allowed to adjust after flow events have occurred.

The restored channel beds will be densely compacted; however, the restored channel side slopes should not be compacted so densely that it inhibits riparian vegetation development. The channel substrate will likely change after construction as a result of episodic storm events that produce sediment. The restored channels should be

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allowed to migrate laterally and develop point bars and cut banks which are normal processes for ephemeral streams in this environment.

Hydrology estimates will be supported by at least one of the methodologies described below. Methods for hydrologic modeling may include USGS Regional Regression Equations developed for New Mexico by the USGS (Waltemeyer, 2008), or rainfall runoff methods that use unit hydrograph methodology and rainfall distribution curves developed specifically for New Mexico (such as SEDCAD 4.0™ with the New Mexico Type II-70 rainfall distribution), or other methodologies provided they are documented for each design situation. If rainfall runoff relationships are used for hydrologic calculations, then rainfall depths from NOAA Atlas 14 (Bonnin, et al, 2004) should be used for calculations (Figure 1), unless site specific data become available.

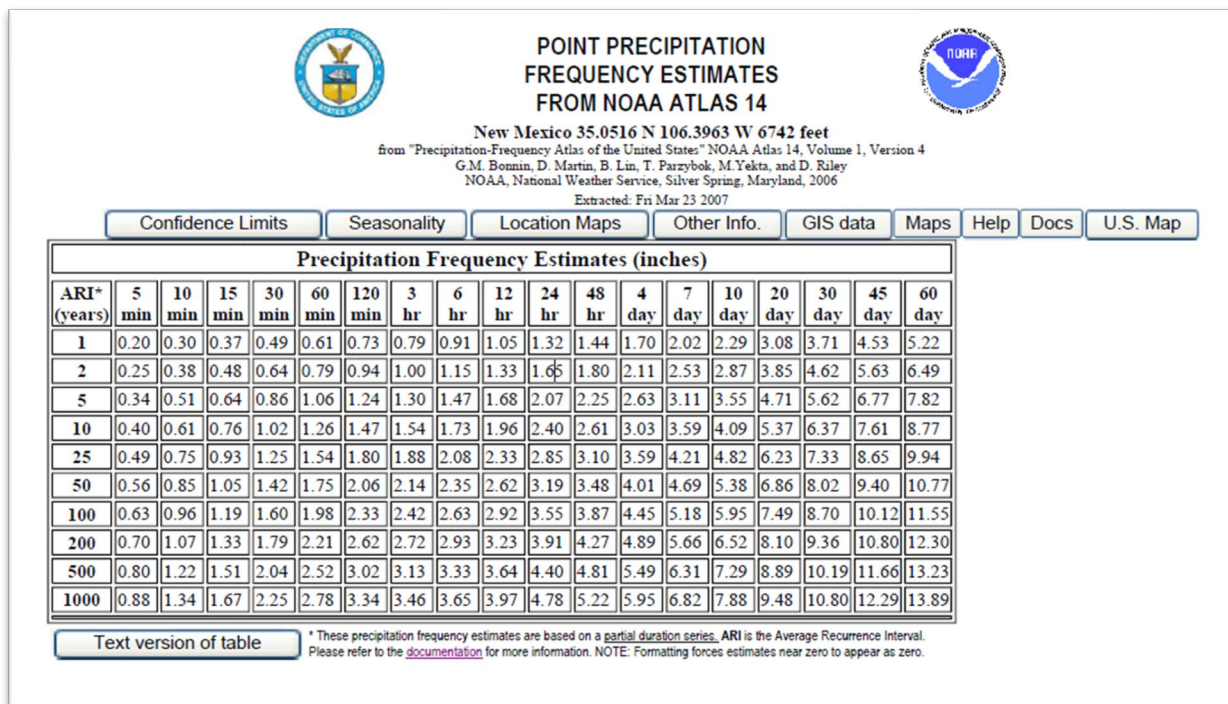


Figure 1. NOAA Atlas 14 Precipitation Estimates for GCC Tijeras Mine.

Riprap is one possible treatment for stabilizing eroding channels, among a suite of design options. Riprap is not a sustainable, long-term solution for stabilizing the relatively large drainages such as Corral Canyon and Apachitos Canyon due to its interference with the normal fluvial process of sediment transport. Additionally, riprap channel lining is unlikely to remain in place during major storm events. However, mining activities, and subsequent reclamation work may result in steep channel gradients for tributary channels to Corral Canyon and Apachitos Canyon. In these cases, due to the relatively smaller watershed size, riprap may be used as a stabilization measure. Stable riprap implementation requires accurate hydrology estimates as discussed in Section 5.2.2, and suitable riprap sizing equations for design, and proper installation techniques.

Riprap sizing methods include software such as SEDCAD 4.0™ (which has been previously used for hydrology and riprap design at the GCC Tijeras Mine), or laboratory or empirical equations may be applied manually, such as Equation 1 (Abt and Johnson, 1991) shown below.

$$D_{50} = 5.23S^{0.43}q^{0.56}$$

Where: D_{50} is the median riprap particle size (inches);

S is the longitudinal channel gradient (ft/ft); and

q is unit discharge (cfs/ft). Unit discharge is equal to total discharge divided by flow width.

Riprap may be installed as traditional rock riprap, or as Soil Riprap. Soil Riprap is a mixture of native soil and riprap that approximately consists of 35 percent soil and 65 percent riprap, by volume.

5.3 Quarries, Roads, and Kiln Dust Disposal Area

Reclamation of active mining areas at the Tijeras Mine and Mill has occurred and will continue to occur concurrently with mining operations up to the time of closure. Thus, the procedures outlined below will be performed to simultaneously achieve an interim wildlife habitat post-mining land use and a final post-mining land use of wildlife habitat with recreation identified as an associated, compatible use once active mining operations have ceased.

5.3.1 Geomorphic Grading and Backfilling

As described above, the limestone members that are quarried for cement production are oriented such that quarrying advances along dip slopes, leaving behind a surface which is similar to, but lower than, the original ground surface. Therefore, very little backfilling or other earthfill will be needed to recreate original surface forms and mimic the natural drainage patterns of Corral and Apachitos Canyons. Some sections, such as the southern portion of quarry 3 NE section D and the middle portion of quarry west cap section E (Figure A-4), may require some shape modification to achieve the goals of geomorphic reclamation, i.e. to create functional watershed systems like those that develop naturally; to produce landforms that do not require on-going maintenance to prevent erosion; and to produce a finished site that is in a stable hydrologic equilibrium that minimizes soil erosion, is visually appealing, and promotes a self-sustaining ecosystem. Geomorphic techniques will also be applied in Quarry 3, 5 and 7, where nearly all Redbed materials will be excavated to allow the quarrying of the upper portion of the Knobby Member of the Madera Formation. Precise terrain modification needs will be determined when quarrying has exposed the final rock surfaces.

Highwalls (vertical or very steep slopes 20 feet or more in height) will be created by operations in Quarries 3, 5 and 7, 4, and 19 (Figure A-4) in competent limestone that should support vertical faces without substantial raveling or risk of mass movement. These should fit in well with the numerous natural cliffs that form the local Sandia and Manzano limestone mountain scarps and provide ample raptor habitat. Thus, highwalls may be left behind when the limestone quality is inadequate for the cement manufacturing process. The main concern is the potential risk of gravity sliding. Sliding occurs when a given rock mass has open fractures up-dip from the highwall and the toe of the rock mass has been removed. To date, no new open fractures have been located, making the removal of the toe the main issue of concern. This is easily solved by back-filling the abandoned quarry with overburden, Redbed, or other material, blocking the open space in front of the quarry highwall. This procedure “restores” the toe of the potential block and effectively stops any subsequent gravity sliding.

Rock slopes other than highwalls will be evaluated to determine their potential for long-term instability. The evaluation will include a review of observed movements in the history of quarry operations, as well as on-site observations that will include the presence of toe slope rock debris, visible displacements of rock blocks along rock fracture surfaces, and other physical evidence of rock slope displacement. Any slopes that are identified as potentially unstable will be flattened to final slopes not steeper than 2.5 horizontal to 1 vertical (2.5H:1V), with the exception that any rotational or translational mass movement that has been identified may require flattening of the rock slope to a final configuration of not steeper than 3 horizontal to 1 vertical (3H:1V) or to another configuration determined by a qualified professional engineer. Surface water runoff will be diverted as necessary to minimize the development of hydrostatic pressures within unstable slopes.

The maximum slope gradient of 38 degrees applies to all reclamation areas, not only to rock outcrops that will be left. The maximum height of the outcrops will be 10 meters. Safeguarding the crest of an outcrop will be achieved by leaving the “arroyo-facing scarp” untouched, while the “pit-facing scarp” can be stabilized with red bed by creating an artificial toe.

All haul roads adjacent to reclaimed active mine areas will be regraded to match the surrounding landform. Roads that are not adjacent to quarries (exploration roads) typically follow the existing, adjacent undisturbed contour. These will be scarified and seeded according to the methods outlined below; otherwise, exploration roads will be shaped to mimic nearby, undisturbed portions of Corral and Apachitos Canyons. Redbed material used for road construction will be redistributed and spread as part of the soil cover. All haul roads will be blocked to prevent any further disturbance to the area; further detail will be provided with each reclamation plan.

Kiln dust generated during the operations of the Tijeras cement plant is encapsulated in the West Cap quarry (Figure A-3). These areas will be graded, covered with 2 feet of soil material, and reclaimed along with the surrounding quarry sections.

5.3.2 Soil Cover Excavation, Stockpiling, and Placement

After a stable and natural topographic geomorphology has been achieved, a soil cover of 2 feet of Redbed material will be placed over all disturbed or exposed rock surfaces, except highwalls, steep rock slopes, and bottoms of drainage features.

Cover soil will be exported from Quarry 3,5 and 7 for placement in Quarries 4 and 19 (Figure A-3), in the Plant area, and in some locations of roads and exposed rock where local soil is absent or not able to support vegetation. Imported soil cover is not required in the West Cap Quarry and other sections of Quarry 3,5 and 7. In these quarries, Redbed occurs naturally and will be derived from the exposures of Redbed within the quarry areas, provided that the Redbed material in such locations is at least two feet thick. Where the remaining in-place Redbed is not at least two feet thick, the material may be obtained from other sections or redistributed within the same section from locations where the Redbed is naturally thicker than 2 feet. Where Redbed occurs naturally, the final Redbed surface—i.e., the surface left after the removal of the limestone resource—must be ripped to a depth of at least 12 inches and allowed to weather at least one year prior to final grading and revegetation.

Excavated material not needed in the near term will be stockpiled at locations in the quarry of origin, at location in the destination quarries, or both. To encourage weathering of the Redbed material to soil consistency, the stockpiles will be relatively low in height with larger footprints and will be shaped to retain rain water rather than shed it. Where run-on from uphill slopes is a concern, stockpiles will be revegetated and further protected from erosion by larger rock or hay bales.

5.3.3 Surface Water Runoff and Erosion Control

Because the Redbed materials proposed for use as a plant growth medium are susceptible to erosion from concentrated surface flow and are essentially devoid of organic material, it is important that care be exercised to ensure that the newly-contoured acreage is adequately protected against excessive erosion. Concentrated flows will be routed through reclamation areas in suitably protected channels and potentially disruptive overland flow from areas above the reclamation areas will be diverted similarly as necessary. In quarry 19 section J operational diversions will be left in place for reclamation. They may be lined with rock riprap with a D_{50} of at least 3.0 inches and a total rock layer thickness of not less than two times the D_{50} . Alternatively, the channel bed may be established on the in-place rock surface of the quarry floor, with riprap as described above placed on the soil cover banks of the diversion structures. Rock used to form channel bed and bank protection will be placed to create a uniform surface to avoid causing flow concentrations and turbulence. The primary surface water diversion channels that run along the toes of the north and south highwalls in quarry 19 section J will be routed to the existing quarry 19 pit at the toe of the slope of section J. This pit will serve as a stilling basin and sedimentation basin for discharge from the section J slope and will discharge and, in turn, into the restored channel of Corral Canyon.

Where excessively long reclaimed slope lengths are created, fascines or erosion blanket vegetative filters may be placed, either singly or in combination, to control such erosion and runoff within the reclamation area. These types of surface structures have demonstrated their adequacy to control excessive erosion and runoff on other reclaimed areas in New Mexico.

Based on previous soil and test plot studies, it has been demonstrated that preparing a stable, suitable plant growth medium is the most important goal for quarry reclamation. Providing a fertile, stable growth medium for the germination, establishment and normal growth of plant species adapted to the area is critical to establishing vegetation cover that will stabilize soil material and is capable of supporting the designated post-mining land uses and meeting revegetation success standards. Therefore, reclamation at the Tijeras Mine and Mill will be focused on methods, practices and techniques that will serve to improve the fertility, suitability and stability of the Redbed material as a plant growth medium.

5.3.4 Revegetation

5.3.4.1 Background

The Tijeras Mine and Mill was first permitted in Bernalillo County after substantial earth disturbing activities had already occurred. A reference area has been selected and approved in 2022.

5.3.4.2 Methods

Seed Bed Preparation – The geomorphic methods described in Section 5.3.1 above will result in range of slopes reflective of the original pre-mining topography with a two-foot deep Redbed topdressing. The 2008 test plot study indicated that the application of fertilizer or organic amendments is not cost effective and that the native Redbed soils is a suitable, effective plant growth medium (Habitat Management 2009). Thus, the re-contoured surface will be conditioned only by surface roughening. A rough final surface facilitates seed entrapment, moisture retention, and erosion control. Surface roughening operations can be conducted either immediately before (contour furrowing) or after (land imprinting) broadcast seeding. Seed will be adequately covered and the seedbed firmed up through the land imprinting process. Localized and natural sloughing, and movement of the soil will also assist in “setting” the seedbed if contour furrowing is used. All sites with a final geomorphic grade will be scarified using a bulldozer equipped with small harrows. Scarification will be done in two perpendicular passes with the final pass on the contour for added erosion control.

Seeding – A 1994 site assessment, the 1996 revegetation study, and the 2008 test plot study were used to support the development of seed mixtures. Seed will be as locally-sourced as possible and weed-free certified, with each seed bag tagged and labeled with certification information. If primary plant species in Table 5-1 are not available at time of purchase, replacement species will be also native to the area. All revegetation areas will be broadcast seeded as soon as practicable after Redbed materials have been prepared for planting with three native seed mixtures at a rate of 40 pure live seeds per square foot (Table 5-). These rates are significantly lower than traditionally recommended application rates; however, they are based upon observation of plant density at the site, expected germination failures and seedling mortality, and the physical characteristics of seeds typically included in arid and semi-arid rangeland revegetation seed mixtures. Mature vegetation communities on arid and semi-arid lands normally have five or fewer plants growing within one square foot.

Due to seed size variability and slope variability, most areas will be hand-seeded. Rice hulls will be used as a seed extender to allow for the even application of the seed. Smooth, medium and large sized seeds that are easily broadcast will be placed in one sub-mixture. Species with small seeds will be placed in their own sub-mixture to avoid differential settling during planting. This facilitates more even distribution of all seed materials across the planting area. Seeds that have physiological adaptations that inhibit their even flow through the broadcaster will be planted in the third sub-mixture. This sub-mixture will be applied separately (different broadcasters or at different times) from sub-mixtures 1 and 2 in an effort to ensure the even distribution of plant seeds across the reclamation areas. Seed will be applied during the summer before monsoon rains establish, likely in June. A second window of opportunity exists in early November to seed.

Table 5-2. Reclamation Seed Mixture

Species	Common Name	Desired %	PLS/ SqFt	Lbs. PLS/ Acre
Grasses				
<i>Pascopyrum smithii</i>	Western wheatgrass	5	1	.396
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	5	2	0.622

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Species	Common Name	Desired %	PLS/ SqFt	Lbs. PLS/ Acre
<i>Andropogon hallii</i>	sand bluestem	5	1	0.385
<i>Bouteloua curtipendula</i>	sideoats grama	5	2	0.456
<i>Bouteloua gracilis</i>	blue grama	5	2	0.106
<i>Pleuraphis jamesii</i>	James's galleta	5	1	0.274
<i>Achnatherum hymenoides</i>	Indian ricegrass	5	1	0.309
<i>Sporobolus cryptandrus</i>	sand dropseed	5	2	0.016
<i>Stipa neomexicana</i>	New Mexican feathergrass	5	1	0.379
Grass Total		45	9	2.94
Forbs				
<i>Achillea millifolium</i>	western yarrow	3.5	2	0.031
<i>Dalea purpurea</i>	Purple Prairie Clover	3.5	1	0.207
<i>Gaillardia aristata</i>	Indian blanket flower	3.5	1	0.104
<i>Linum lewisii</i>	Lewis (Blue) flax	3.5	2	0.66
<i>Lupinus argenteus</i>	silver mountain lupine	3.5	2	4.760
<i>Fallugia paradoxa</i>	Apache Plume	3.5	2	0.224
<i>Penstemon angustifolia</i>	narrow-leaf penstemon	3.5	2	0.224
<i>Ratibida columnifera</i>	coneflower	3.5	1	0.0354
<i>Sphaeralcea coccinea</i>	scarlet globemallow	3	2	0.174
Forb Total		31	6.2	6.49
Shrubs				
<i>Atriplex canescens</i>	four-wing saltbush	3	1	0.837
<i>Krascheninnikovia lanata</i>	winterfat	3	1	0.768
<i>Cercocarpus montanus</i>	mountain mahogany	3	2	1.476
<i>Ericameria nauseosa</i>	rubber rabbitbrush	3	1	0.109
<i>Chrysothamnus viscidiflorus</i>	yellow rabbitbrush	3	1	0.056
<i>Purshia mexicana</i>	New Mexico cliffrose	3	2	1.348
<i>Purshia tridentata</i>	antelope bitterbrush	3	2	5.808
<i>Rosa woodsii</i>	Wood's rose	3	2	1.923
Shrub Total		24	4.8	12.326

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Species	Common Name	Desired %	PLS/ SqFt	Lbs. PLS/ Acre
	Seed Mixture Total	100	40	21.764

Notes: pure live seeds = PLS; % = percent

Monitoring - Sampling and monitoring methods accepted and recommended by the Mining and Minerals Division will be used to evaluate seedling germination and establishment and vegetation community development. Vegetation monitoring within each reclamation year will be performed according to the schedule presented in Table 5-3 (adapted from MMD 1999).

Attributes that will be monitored include cover, diversity, woody plant and shrub density. The development of vegetation after it has germinated and established on all reclamation areas will be monitored using the methods described below. Sampling transects will be located and configured to obtain unbiased samples from the reclamation year areas where they are taken. The number of transects measured within each reclamation year (sampling adequacy) will be determined after collecting a set of preliminary samples, testing the data for normality, and calculating the Cochran formula for sample adequacy.

Table 5-3: Revegetation monitoring schedule

Years*	Evaluation Method
1-3	Visual evaluation of germination, growth, establishment, and species composition of revegetated areas.
4	Percent cover of perennial grasses, forbs, and shrubs.
5	Visual evaluation of cover and shrub density.
6	Percent cover, shrub density, and diversity.
7	Visual evaluation of cover and shrub density.
8+	Percent cover, shrub density, and diversity.

* The number of years after seeding is completed

Cover will be measured using the line intercept method. Transect locations and azimuths will be determined randomly using tools contained in the ArcGIS software suite. A measuring tape, subdivided into 1.0-foot intervals, is stretched between two points at the position found on the map. Typically, for large continuous areas on the order of hundreds of acres, a 100-foot-long transect is used. In the case of the reclamation and reference areas at the Tijeras Mine & Mill, which vary from 1 to 29 acres, a 25-foot-long transect is proposed. The sampler moves along the line and for each interval, records the plant species found, as well as litter, rock, and bare ground, and the distance it covers along that portion of the line intercept. Measurements of individual plants are read to the nearest inch. The sampler considers only those plants or seedlings touched by the line or lying under or over it. For floral canopies below eye level, the distance each species covers along the line at ground level will be measured. For canopies above eye level, the distance covered by the downward projection of the foliage will be measured. Two vegetation levels are included for cover

measurements: basal and canopy. Cover measurements include absolute cover, relative cover, frequency, and relative frequency. These data will be used to evaluate species diversity on the plots. Also, an inventory of plant species observed within each reclamation year, but not necessarily measured in the transect, will be recorded. Woody plant density will be evaluated by moving down one side of the tape and returning on the other counting the number of all individuals of shrubs/woody species in an area three feet perpendicular to the tape. This samples an area 6 feet wide by 25 feet long, or 150 square feet. Data are reported as number of shrubs per acre. The Simpson’s index will be used to estimate species diversity (Simpson 1949). Simpson’s index emphasizes the dominant and abundant species rather than the rare species that vary in their occurrence from place to place (Barbour et al. 1987).

$$C = \frac{s}{\sum_{l=1}^s (p_l)^2}$$

where: C = the index number,

s = the total number of species in the sample, and

p_l = the proportion of all individuals in the sample (plot, transect) that belong to species l .

Evaluation of Revegetation Success – Beginning in the 10th year after seeding, revegetation success will be tested against the approved reference area.

5-4. Proposed vegetation success criteria

Category	Standard
Foliage or Basal Cover	equal to 90% of the reference area to within a 90% statistical confidence
Shrub Density	80% statistical confidence
Diversity	considered reasonable based on physical environmental

The parameters to be measured on the reclaimed sites shall be equal to or greater than the approved performance standard. The appropriate test is a one-tailed t test with a 90% confidence interval. The test statistic is:

$$t = \frac{x_r - 0.90(x_h)}{\frac{S_r}{\sqrt{n_r}}}$$

Where x_r is the reclamation mean

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x_h is the approved performance standard
 s_r is the reclamation standard deviation
 n_r is the reclamation sample size

If the mean values of the sample parameters from the reclaimed sites are equal to or greater than those of the reference area with the appropriate confidence level, the revegetation shall be deemed successful. To use the above test, the assumptions must be valid that the data is drawn from a normal population. Fortunately, the t test remains relatively valid for non-normal populations which possess a mound shaped probability distribution.

6. Environmental Standards Compliance

6.1 Air Quality Standards

GCC Rio Grande was issued a Title V operating permit, AIRS #NM/001/00008, for its Tijeras Mine and Mill under the federal Clean Air Act from the Albuquerque/Bernalillo County Air Quality Control Board on May 30, 2012. Total potential criteria pollutant emissions for the facility are shown in Table 6-1.

6-1 Total potential criteria pollutant emissions

Pollutant	Emissions (tons per year)
Nitrogen oxides (NOx)	1,526.72
Carbon monoxide (CO)	1,493.23
Particulate matter (TSP)	645.28
Particulate matter (PM10)	252.90
Particulate matter (PM2.5)	116.19
Volatile organic compounds (VOC)	78.68

Tijeras Mine and Mill is situated in the eastern portion of Bernalillo County. The EPA currently considers this area to be an attainment area for total suspended particulate matter, particulate matter of less than 10 microns (PM10), and particulate matter of less than 2.5 microns (PM2.5). See 40 CFR § 81.332.

Closure of the Tijeras Mine and Mill will result in shutdown, disassembly, and removal of the cement manufacturing plant. Once plant operations cease, the primary source of gaseous and particulate air emissions associated with project will terminate.

Likewise, once disturbed areas within the quarries have been reclaimed and cover vegetation has been reestablished, fugitive particulate emissions will be reduced to natural background levels. This will further reduce particulate emissions below current levels, which are already below established standards.

6.2 Surface Water Quality

GCC Rio Grande has obtained permit coverage for water discharges from the Tijeras Mine and Mill under the federal Clean Water Act from the EPA, Region 6 under:

1. An individual point source National Pollutant Discharge Elimination System (NPDES) permit, #NM000116; and
2. The multi-sector general permit for stormwater discharges associated with industrial activity (MSGP).

NPDES permit, #NM000116 became effective on June 1, 2021, and will expire on May 31, 2026. Important changes in the new permit term include the removal of Outfall 004 from the permit that was never constructed. MSGP #NMR053190, which includes Outfall 002 and Outfall 003 located on the northeastern end of the plant site near the facility's access road.

The facility discharges into Corral Canyon, and then into Tijeras Arroyo, an intermittent stream, which is a tributary to the Rio Grande Basin. Designated uses for intermittent streams include wildlife habitat, livestock watering, marginal warm water aquatic life, and primary contact. See § 2.6.4.98, NMAC.

The EPA indicates that the Tijeras Arroyo has been impacted by nutrient, eutrophication, and benthic macro-invertebrate impairment. The probable causes have been identified as channelization, drought-related impacts, on-site treatment systems, rangeland grazing, wastes from pets and unknown sources. The EPA states that it does not consider GCC Rio Grande as a probable contributor to the impairment because of the nature of operation and the frequency of discharges.

Discharges from the Tijeras Mine and Mill will continue to be covered under these permits until reclamation is completed and revegetation cover has been established. GCC Rio Grande will continue to capture and manage surface water discharges until the site returns to natural conditions and MMD releases the property. At that time, the capture of sediment will no longer be necessary. Once the reclamation is completed, the existing NPDES and MSGP permits will longer be necessary, unless required for a post-mining land use by a future landowner.

6.3 Ground Water Quality

The only known groundwater located within the permit area occur along fault zones and rock fractures in the Madera Formation and underlying geologic units. Recharge of groundwater is by direct infiltration of rainfall and snowmelt into the fractured systems of rock up-gradient of the plant area.

Two wells within the permit area have been drilled to depths of approximately 1,150 feet. GCC Rio Grande has maintained a routine ground water sampling and testing program. No adverse impacts to ground water quantity or quality have been identified from plant or mining operations.

7. Closeout Plan Schedule

See Closeout Plan Spreadsheet.

8. Closeout Plan Permitting Requirements

GCC Rio Grande projects that it has the reserves to continue operating the Tijeras Mine and Mill at current production levels for several more decades. However, only those resources for which a mining plan has been defined are identified in this Closeout Plan. For the next 14 years, the mining footprint is expected to increase as shown in Figure A-3. GCC Rio Grande will propose to delay reclamation in areas subject to further mining until it is certain that these areas do not need to be re-disturbed. The Closeout Plan for the Tijeras Mine and Mill will be updated 5 years after the approval of this plan.

Technology and market conditions could change significantly in the next several decades. Likewise, the federal and New Mexico environmental regulatory and permitting requirements applicable to a quarry and cement plant could be very different than the existing regulatory scheme. The following discussion describes current requirements potentially applicable to a closure based upon existing regulatory and permitting standards.

8.1 Mined Land Reclamation Requirements

The Tijeras Mine and Mill was an “existing” mining operation when the New Mexico Mining Act was enacted. It was, therefore, required to submit a mining permit application and a closeout plan to continue to conduct mining and reclamation operations at the facility.

The permit and plan describe the measures that have been, and will be, taken to reclaim the property, establish a “self-sustaining” ecosystem, and meet environmental standards.

8.2 Air Quality Requirements

The Tijeras Mine and Mill is considered a “major source” under the federal Clean Air Act and, as a result, has obtained a Title V air quality permit, AIRS #NM/001/00008, from the Albuquerque/Bernalillo County Air Quality Control Board, which must be renewed every five years.

The permit describes emission controls and practices that GCC Rio Grande is required to implement to reduce and mitigate air emissions including fugitive emissions from mined and disturbed areas. Compliance with these requirements will continue until the site has been successfully reclaimed and the vegetative cover has been established.

The Albuquerque/Bernalillo County Air Quality Board has adopted regulations potentially applicable to facility closure and building demolition activities. These regulations require a permit for the demolition of:

- Any building of over 10,000 square feet, and
- Any paved surface of over 0.75 of an acre.

8.3 Water Quality Requirements

The Tijeras Mine and Mill currently holds two permits under the federal Clean Water Act. Both have been issued by EPA, Region 6 and must be renewed every five years.

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One permit is NPDES permit #NM000016, which covers discharges of process water from the cement plant into Corral Canyon and then into Tijeras Arroyo. The permitted discharges include non-contact cooling water, plant storm water runoff, vehicle and equipment cleaning water, and artesian well water flowing to the process area.

The second is the general stormwater permit, or MSGP #NMR053190, which covers discharge of storm water from mined or disturbed areas. One of the requirements of the MSGP is developing a stormwater pollution prevention plan, which describes "best management practices" that must be undertaken minimize pollutants in storm water runoff.

Compliance with these permits will be required until reclamation has been completed and vegetative cover has been successfully established.

8.4 Waste Management

The federal Resource Conservation and Recovery Act established the regulatory framework to regulate solid wastes throughout the country including hazardous waste, universal waste, used oil, electronic waste, and municipal solid waste. The State of New Mexico has also established additional regulatory standards for managing special wastes within the state. Special wastes are defined to include asbestos wastes, industrial solid waste, and petroleum contaminated soils.

The Tijeras facility is currently regulated as a conditionally exempt small quantity generator of hazardous waste and manages all wastes at approved facilities. As the facility nears final closure, GCC Rio Grande will conduct a comprehensive review of potential wastes, including materials generated from closure and demolition activities, and recyclable materials to ensure that all wastes and materials are managed in accordance with federal and New Mexico requirements.

9. References

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Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

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10. List of Preparers

Name	Title	Role
Keith Fox	Project Manager	<ul style="list-style-type: none"> Project Management
Paul Nazaryk	Project Lead	<ul style="list-style-type: none"> Regulatory framework review Environmental permit review
Jerusha Rawlings	Biologist	<ul style="list-style-type: none"> Fieldwork planning and supervision Project Support Vegetation Wildlife Threatened and Endangered Species Technical Review GIS Support/Mapping
Danielle Sullivan	Senior Technical Editor	<ul style="list-style-type: none"> Document Formatting Editing Quality Control
Samantha Kretz	GCC Environmental Engineer	<ul style="list-style-type: none"> Environmental Editing Updating Information
Quentin Vandal	GCC Quarry Manager	<ul style="list-style-type: none"> Mining Oversight Editing Updating Information

Appendix A – Maps

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

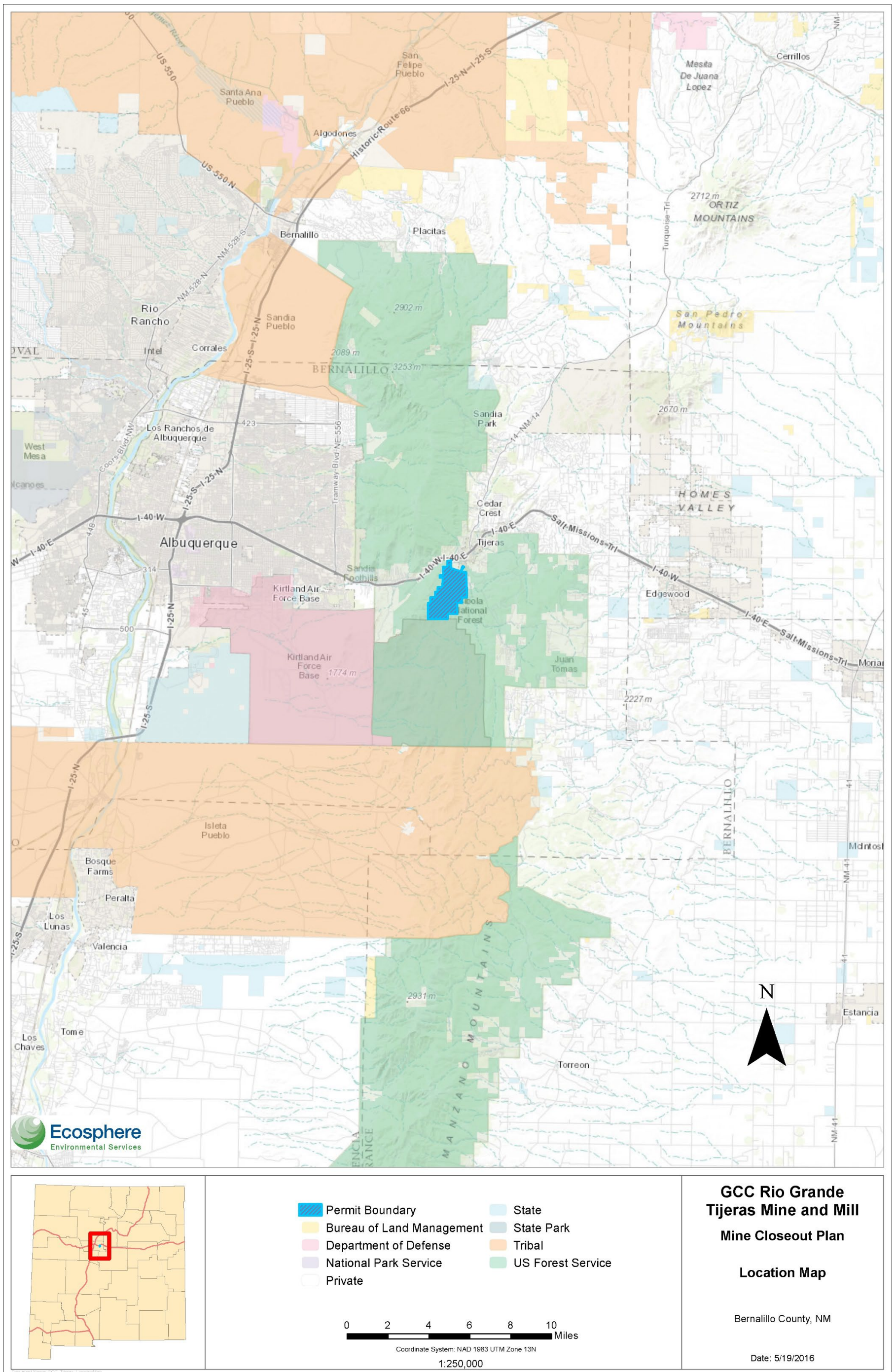


Figure A-1. GCC Tijeras Mine and Mill Location Map

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

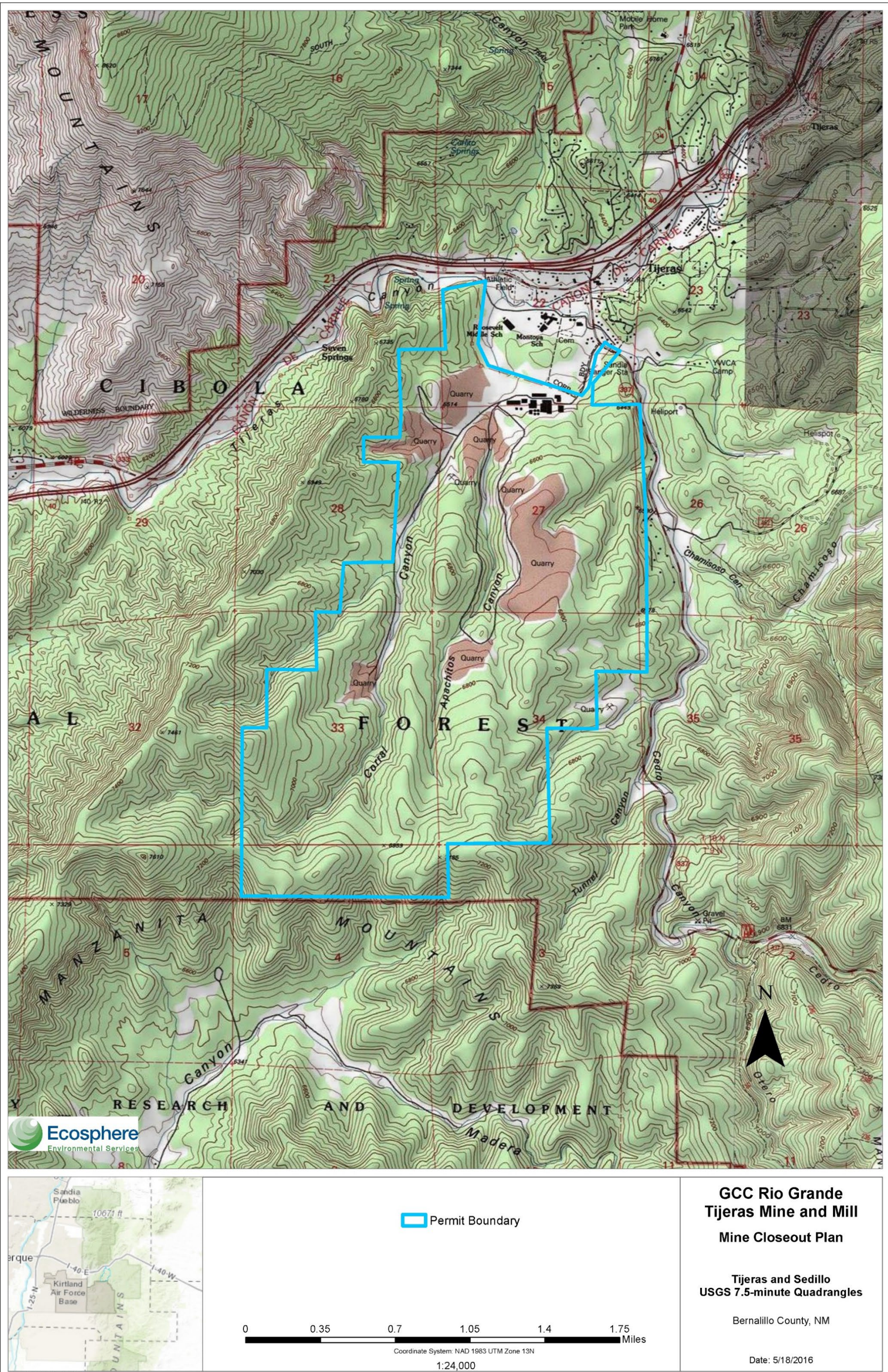


Figure A-2. GCC Tijeras Mine and Mill Area Map

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

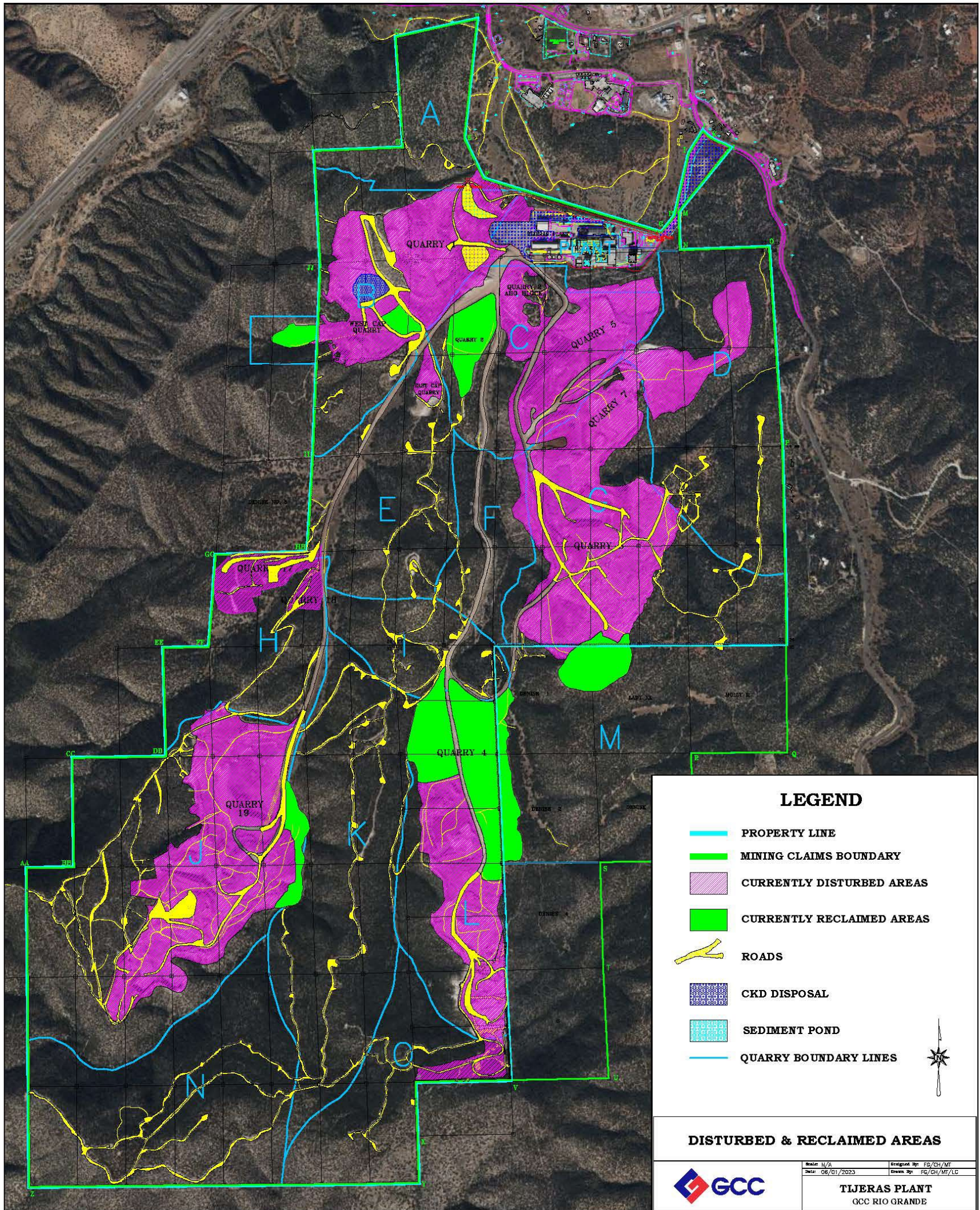
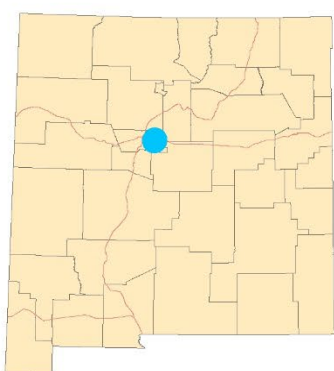
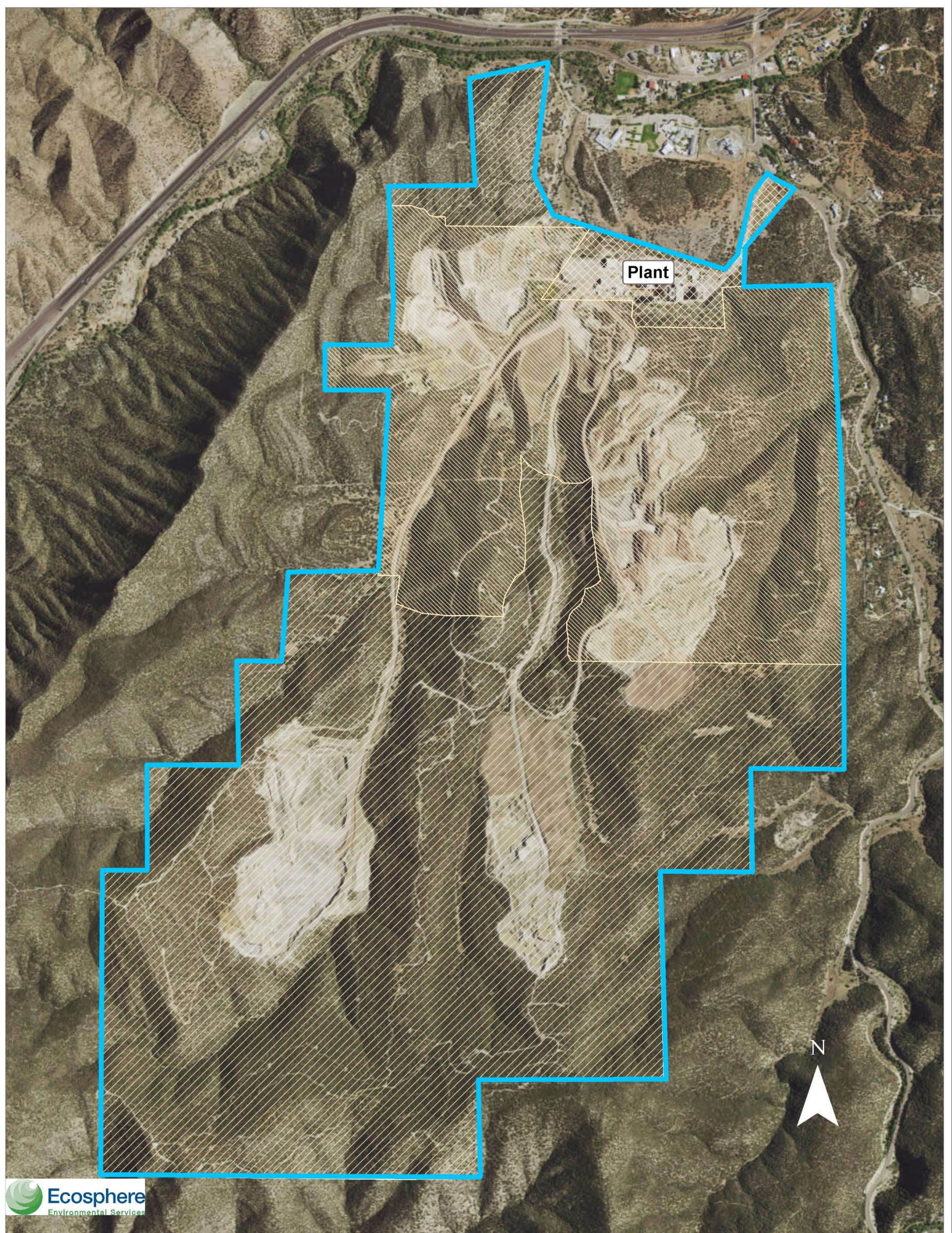


Figure A-3. GCC Tijeras Mine and Mill Site Map - Aerial



- Permit Boundary
- Post-mining land uses**
- Industrial/Commercial
- Recreation
- Wildlife habitat



Coordinate System: NAD 1983 UTM Zone 13N

1:14,050

GCC Rio Grande Tijeras Mine and Mill Mine Closeout Plan

Post-Mining Land Uses

Bernalillo County, NM

Date: 6/10/2016

4 **Figure A-4. GCC Tijeras Mine and Mill Post-mining land uses**

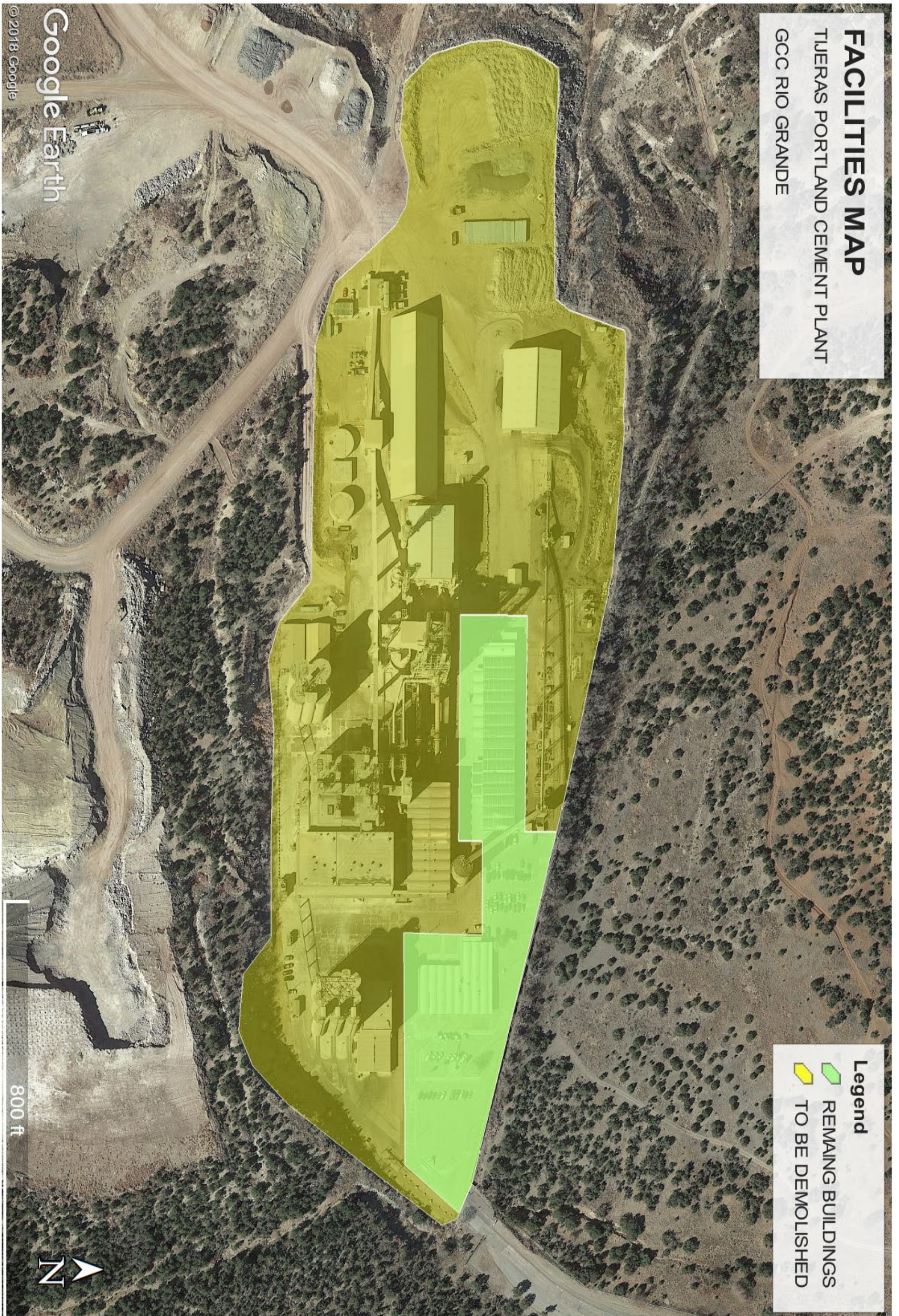


Figure A-5 GCC Tijeras Mine and Mill Demolished and Remaining Structure Map

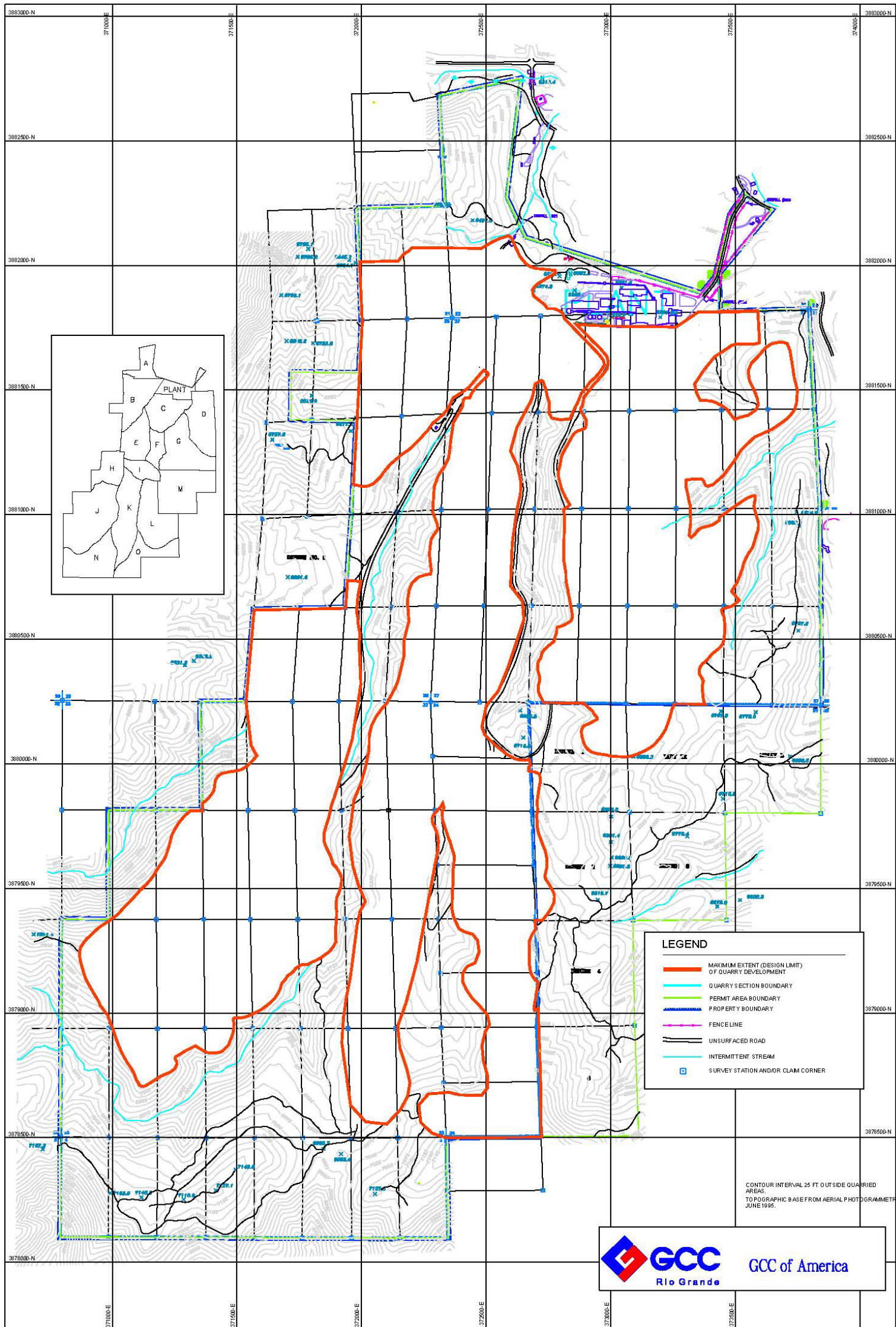


Figure A-6 Sections and Units

Appendix B- Test Results of Kiln Dust

ILFC LABORATORY REPORT

FOR:

GCC Rio Grande Inc.

ATTN: Jose Madera

Project PO No.: Not Given

Project No.: Not Given

Project Name: CKD

ILFC Batch No.: 2726

Prepared By: Cindy Krizovsky Date: March 15, 2010

Page 1 of 3

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

International Lubrication and Fuel Consultants Inc.
521 Quantum Rd, Rio Rancho, NM 87124

Phone # 1-800-237-4532
Fax # 1-505-892-9601

Client ID: GCC Rio Grande Inc.	Project Name: CKD	Sample ID: CKD
Project Number: Not Given	CKD	TCLP
ILFC, Inc Batch Number: 2726	Laboratory Number: 12567	Date Sampled: 2/2010
% Moisture: 0.1%	Temperature upon delivery: 19°C	Time Sampled: Not Given
Matrix: <input type="checkbox"/> Soil <input type="checkbox"/> Other <input type="checkbox"/> Water		Date Received: 03/08/10
Reporting in: <input checked="" type="checkbox"/> Dry Weight <input type="checkbox"/> Wet Weight <input type="checkbox"/> N/A		Time Received: 3:30 PM

<u>Client I. D.</u>	<u>ILFC Lab#</u>	<u>Method</u>	<u>Test</u>	<u>Results</u>	<u>RL</u>	<u>Units</u>	<u>Date Completed</u>
CKD	12567	1311 6010B	As	< 0.2	0.2 ppm	mg/kg	3/12/2010
			Ba	0.249	0.1 ppm	mg/kg	3/12/2010
			Cd	<0.2	0.2 ppm	mg/kg	3/12/2010
			Cr	<0.1	0.1 ppm	mg/kg	3/12/2010
			Pb	<0.1	0.1 ppm	mg/kg	3/12/2010
			Se	<0.2	0.2 ppm	mg/kg	3/12/2010
			Ag	<0.1	0.1 ppm	mg/kg	3/12/2010
CKD	12567	1311/7471A	Hg	< 0.001	0.001	mg/kg	3/10/2010

Page # 2 of 3

These laboratory results are intended to be helpful and informative. They are based on our experience, current industry testing procedures, proper sampling procedure and information provided with the sample, which we believe to be reliable. We cannot assume responsibility for any loss or accident that may result from the use of the information given here. This report shall not be reproduced except in full, without the written approval of our laboratory.

Date: 3/15/2010
Time: 3:21 PM

Figure A-7 Kiln Dust Results Page 2

Tijeras Mine and Mill Closeout Plan

Ecosphere Environmental Services, Inc.

International Lubrication and Fuel Consultants Inc.
521 Quantum Rd, Rio Rancho, NM 87124

Phone # 1-800-237-4532
Fax # 1-505-892-9601

Client ID: GCC Rio Grande Inc.		Project Name: CKD		Sample ID:	QC Summary
Project Number: Not Given					TCLP
ILFC, Inc Batch Number: 2726		Laboratory Number: N/A		Date Sampled:	N/A
% Moisture: N/A		Temperature upon delivery: N/A		Time Sampled:	N/A
Matrix: ___ Soil <u> X </u> Other ___ Water				Date Received:	N/A
Reporting in: ___ Dry Weight ___ Wet Weight ___ N/A				Time Received:	N/A

<u>Client I. D.</u>	<u>ILFC Lab#</u>	<u>Method</u>	<u>Test</u>	<u>Recovery</u>	<u>Date Completed</u>
Method Blank	N/A	1311 6010B	As	< 0.2 ppm	3/12/2010
			Ba	< 0.1 ppm	3/12/2010
			Cd	< 0.2 ppm	3/12/2010
			Cr	< 0.1 ppm	3/12/2010
			Pb	< 0.1 ppm	3/12/2010
			Se	< 0.2 ppm	3/12/2010
			Ag	< 0.1 ppm	3/12/2010
Method Blank	N/A	1311/7471A	Hg	< 0.001 ppm	3/10/2010

				<u>% Recovery</u>	
Matrix Spike	N/A	1311 6010B	As	103	3/12/2010
			Ba	101	3/12/2010
			Cd	104	3/12/2010
			Cr	102	3/12/2010
			Pb	103	3/12/2010
			Se	111	3/12/2010
			Ag	64	3/12/2010
Matrix Spike	N/A	1311/7471A	Hg	146	3/10/2010

Matrix Spike Duplicate	N/A	1311 6010B	As	102	3/12/2010
			Ba	100	3/12/2010
			Cd	103	3/12/2010
			Cr	101	3/12/2010
			Pb	102	3/12/2010
			Se	111	3/12/2010
			Ag	59	3/12/2010
Matrix Spike Duplicate	N/A	1311/7471A	Hg	97	3/10/2010

Page # 3 of 3

These laboratory results are intended to be helpful and informative. They are based on our experience, current industry testing procedures, proper sampling procedure and information provided with the sample, which we believe to be reliable. We cannot assume responsibility for any loss or accident that may result from the use of the information given here. This report shall not be reproduced except in full, without the written approval of our laboratory.

Date: 3/15/2010
Time: 3:22 PM

Figure A-7 Kiln Dust Results Page 3

Appendix C– NMED No Discharge Permit Letter



SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO ENVIRONMENT DEPARTMENT

Ground Water Quality Bureau
1190 South St. Francis Drive (87505)
P.O. Box 5469, Santa Fe, New Mexico 87502-5469
Phone (505) 827-2900 Fax (505) 827-2965
www.env.nm.gov



BUTCH TONGATE
Cabinet Secretary

J. C. BORREGO
Deputy Secretary

January 23, 2018

Sarah Vance, Environmental Engineer
svance@gcc.com
GCC Rio Grande
Tijeras Mine and Mill
PO Box 100
Tijeras, NM 87509

RE: Response to Notice of Intent to Discharge; Discharge Permit Not Required for Tijeras Mine and Mill

Dear Ms. Vance:

The New Mexico Environment Department (NMED) sent a request for a Notice of Intent to you regarding discharges associated with the GCC Rio Grande Tijeras Mine and Mill (site) on February 17, 2017 in response to observations made during a site inspection on January 25, 2017. The site is a limestone mine, milling operation, and cement production facility located approximately one mile southwest of the village of Tijeras, in Sections 21, 22, 27, 28, 33, and 34 of Township 10N Range 5E, of Bernalillo County. Groundwater beneath the site is at a depth of 5 to over 100 feet and has a total dissolved solids concentration of less than 10,000 milligrams per liter.

The notice satisfies the requirements of Subsection A of 20.6.2.1201 NMAC, Ground and Surface Water Protection regulations, 20.6.2 NMAC.

The observed discharge is briefly described as unlined ponds receiving a mixed stream of impacted Storm Water and Mill Process Water.

Based on the information provided in your Notice of Intent, multiple sampling events and communications, NMED has determined that a Discharge Permit is not required as long as the discharge is as described and characterized. A Discharge Permit is not required at this time because the information provided indicates it is unlikely that the discharge will adversely affect ground water quality.

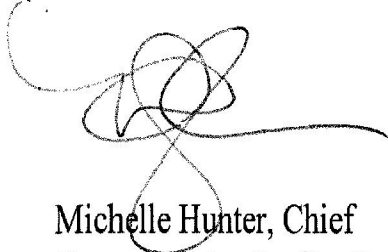
Vance
January 23, 2018
Page 2 of 2

Although a Discharge Permit is not being required at this time, for the site, you are not relieved of liability should your operation result in actual pollution of surface or ground waters. Further, this decision by NMED does not relieve you of your responsibility to comply with any other applicable federal, state, and/or local laws and regulations, zoning requirements, and nuisance ordinances.

If at some time in the future you intend to change the amount, character or location of your discharge, or if observation or monitoring shows that the discharge is not as described in your Notice of Intent, you must file a revised Notice of Intent with the Ground Water Quality Bureau.

If you have any questions, please contact either Amber Rheubottom at (505) 827-2754 or amber.rheubottom@state.nm.us or Kurt Vollbrecht, Program Manager of the Mining Environmental Compliance Section, at (505) 827-0195.

Sincerely,



Michelle Hunter, Chief
Ground Water Quality Bureau

MH:ar

cc: Kurt Vollbrecht, NMED, Program Manager MECS, kurt.vollbrecht@state.nm.us
Sarah Holcomb, NMED, Program Manager SWQB, sarah.holcomb@state.nm.us
Abe Franklin, NMED, Program Manager SWQB, abraham.franklin@state.nm.us
John Rhoderick, NMED District I Field Office, Manager, john.rhoderick@state.nm.us
Holland Shepherd, MMD Program Manager, holland.shepherd@state.nm.us

Appendix D- Hydrology

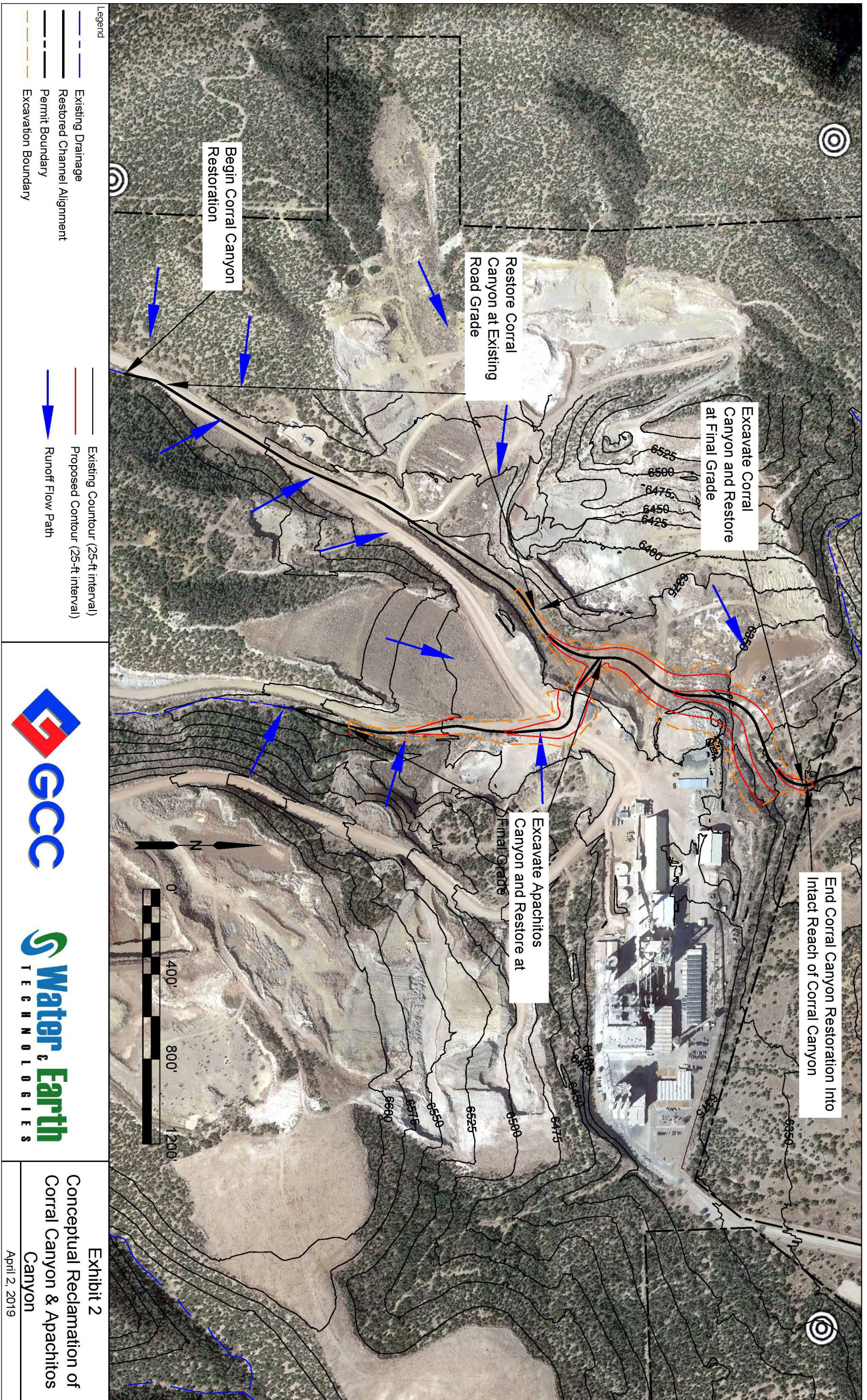


Figure A-10: Conceptual Reclamation of Corral Canyon and Apachitos Canyon

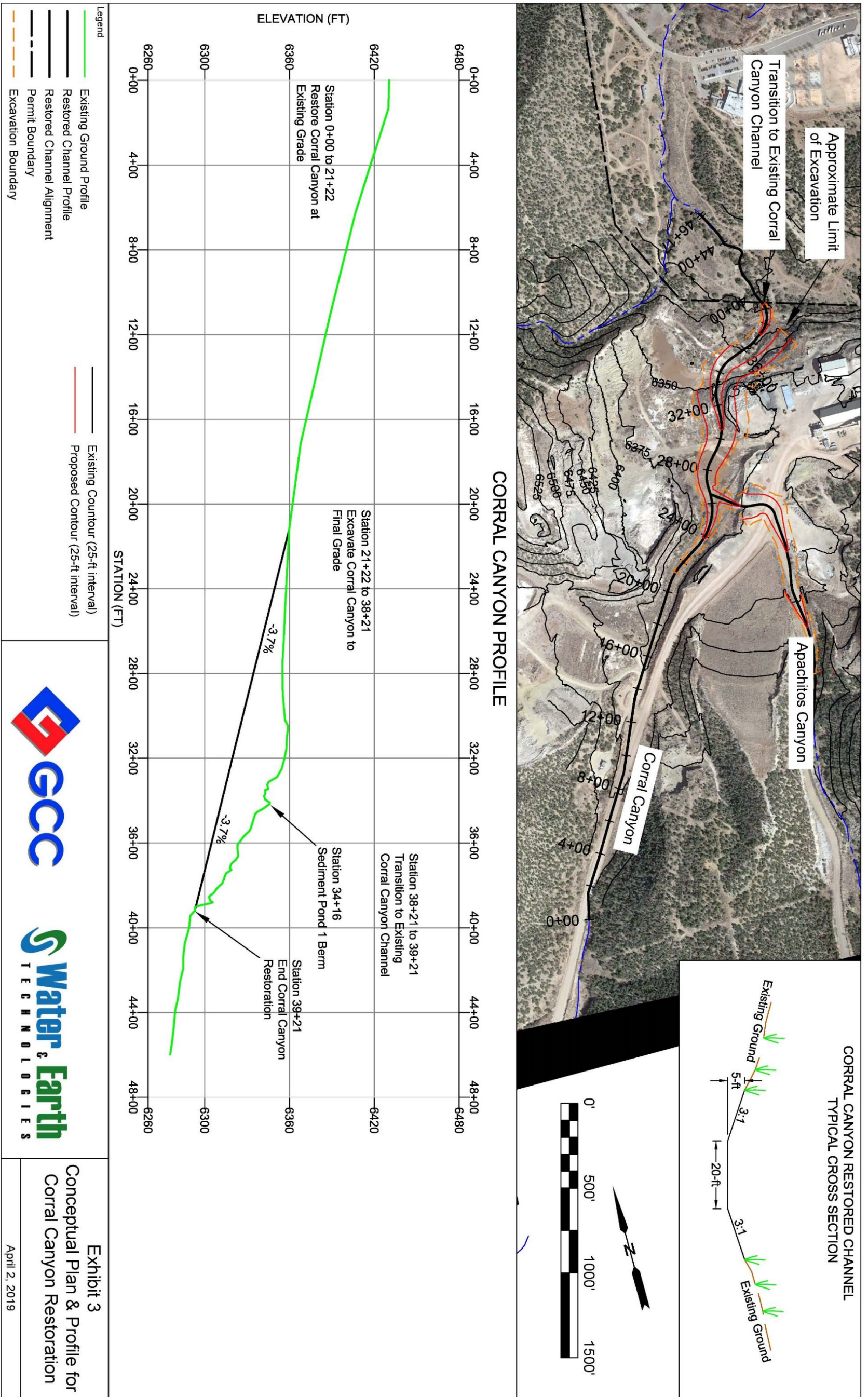
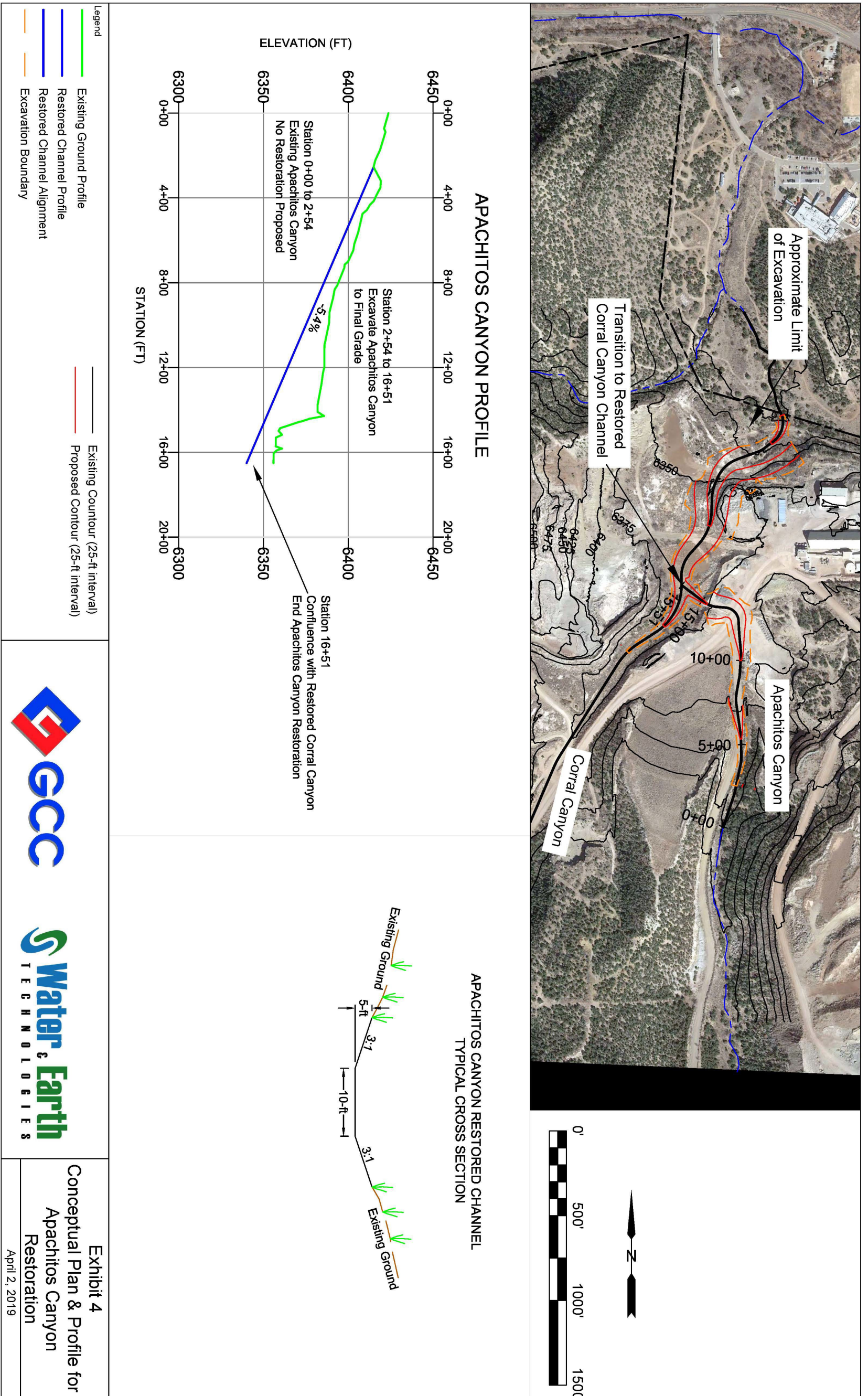


Figure A-11: Conceptual Plan & Profile for Corral Canyon Restoration



Exhibit 3
Conceptual Plan & Profile for
Corral Canyon Restoration

April 2, 2019



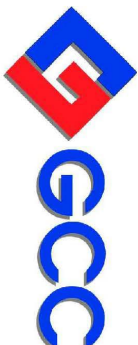
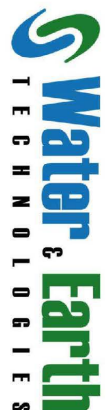



Exhibit 4
Conceptual Plan & Profile for
Apachitos Canyon
Restoration
 April 2, 2019

Figure A-12: Conceptual Plan & Profile for Apachitos Canyon Restoration

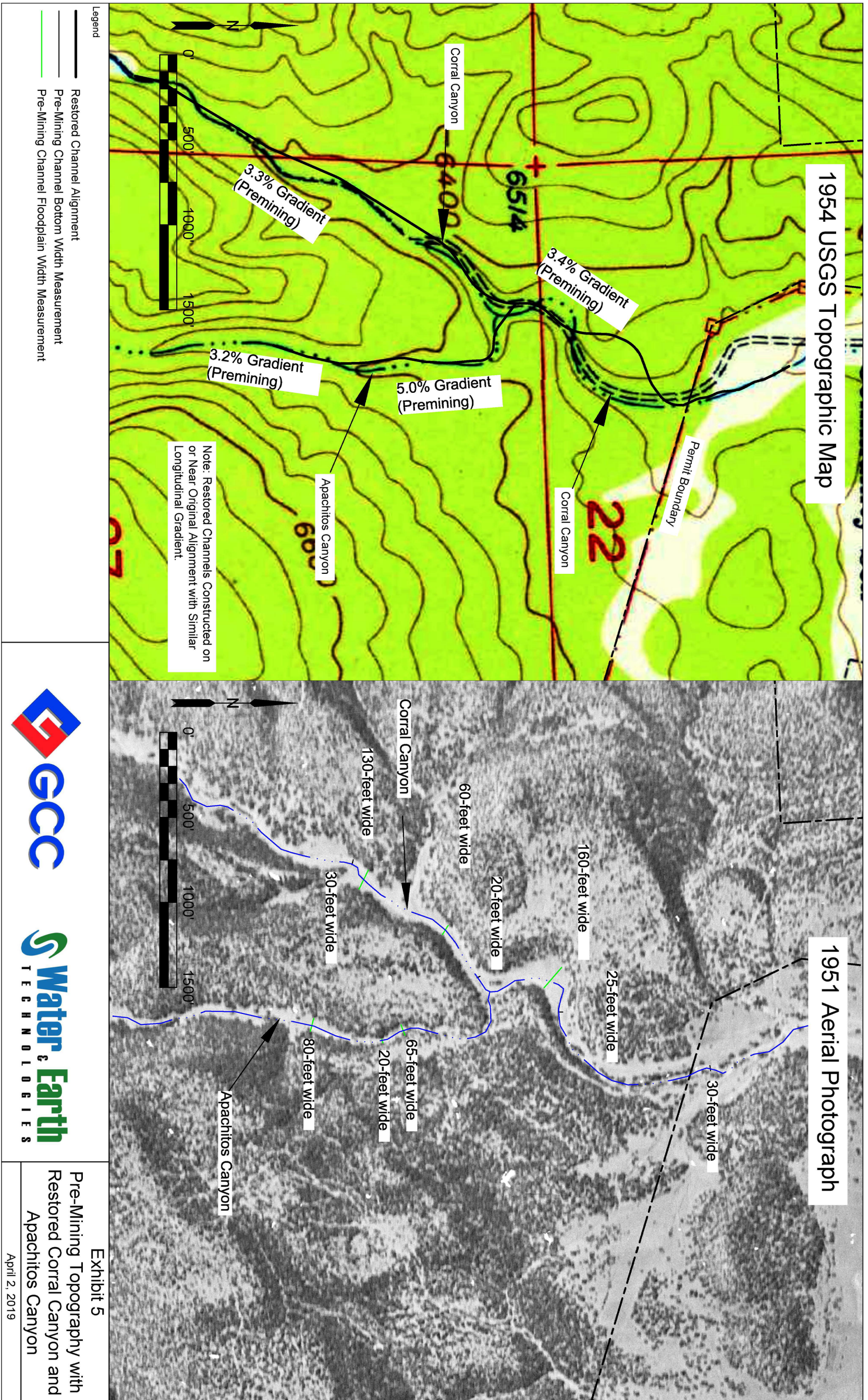


Exhibit 5
Pre-Mining Topography with Restored Corral Canyon and Apachitos Canyon
April 2, 2019

Figure A-13: Pre-Mining Topography with Restored Corral and Apachitos Canyon

Appendix E: Slope Stability Approach and Monitoring

Attachment B

BOND AMOUNT CALCULATION
New Mexico Mining and Minerals Division
General Information

Tijeras Cement Plant
06/09/23

Applicant	GCC Rio Grande, Inc. PO Box 100 Tijeras, NM 87059-0100	Contact: Samantha Kretz 505-286-6081
Permit Number	BE001RE	
Number of Acres	750.00 acres 2022 distrub	
Type of Operation	Cement/Regular/Existing	
Location	Bernalillo County	
Prepared by	Eduardo Villa	
Recommended Bond	\$12,152,220	

Describe worst-case reclamation scenario:

Remove buildings, sheds, equipment, tanks, fuel, and foundations

Demolish buildings, process debris, and dispose on-site

Demolish heavy concrete structures, process debris, and dispose onsite

Earthmoving

Scrapers transport redbed from locations where exposed to all areas

Local haul by dozers in each Quarry Section to cover edges and steep areas

Loaders and trucks transport rock from Quarry 3 and 7 to all areas

Ripping

Dozers rip haul roads, service roads, and plant area

Grading

Dozers spread, grade, and shape redbed soil

Dozers spread and track-in rock

Revegetation

Reveg all disturbed areas (fertilize, seed, mulch, crimp, etc.)

Other

Mobilization is 2% on 1-5% range due to close proximity to

Albuquerque where contractors and equipment are available.

Quarry Sections K are not included because they are not scheduled to be disturbed until year 2027 or later.

Plant underground infrastructure will remain after demolition.

Office building and warehouse will remain after demolition.

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Structure Demolition and Disposal Cost Summary

Tijeras Cement Plant
 Worksheet #2
 06/09/23

Location Adjust.	Albuq.	101.7%
Subtotals	Buildings	\$69,336
	Other	\$1,482,303
	Disposal	\$1,667,963
Total Cost		\$3,219,601

Description	Material	Standing Building Volume			Quantity	Unit	Unit Cost (\$/unit)	Item Cost (\$)
		Dimensions (ft)						
Buildings to be demolished:								
Storage Bldg	steel frame	80	50	15	60,000	cf	0.51	30,600
Warehouse	steel frame	80	50	15	60,000	cf	0.51	30,600
Pump House	concrete	38	30	12	13,680	cf	0.51	6,977

Other items to be demolished:

		Structural Component Volume				Item Cost (\$)
		Wall (cf)	Unit Cost (\$/unit)	Roof (cf)	Unit Cost (\$/unit)	
Crusher Bldg	concrete	1600	1.14	625	1.14	2,545
Screen Bldg	concrete	2,533	1.14	595	1.14	3,578
Mill Bldg	concrete	23,000	1.14	8,333	1.14	35,845
Burner Floor	concrete	9,180	1.14	4,800	1.14	15,993
Kiln Cover	concrete	7,650	1.14	3,348	1.14	12,582
Clinker Tower	concrete	5,388	1.14	269	1.14	6,472
Conveyor Galleries (2)	concrete	5,270	1.14	11,475	1.14	19,156
Raw-Clinker Silos (16)	concrete	181,941	1.14	348,927	1.14	607,313
Coal Storage	conc/steel fr	4,000	1.14	7,455	1.14	13,105
Material Storage	steel frame	18,769	1.14	11,229	1.14	34,318
Preheater Bldg	concrete	14,963	1.14	938	1.14	18,191
Pack House	concrete	8,800	1.14	2,625	1.14	13,070
Sack Storage	steel frame	1,437	1.14	1,572	1.14	3,442
Kiln Dust Collector Bldg	concrete	11,917	1.14	4,875	1.14	19,210
Kiln Feed Bldg	concrete	15,960	1.14	1,067	1.14	19,479
Coal Silo	concrete	16,022	1.14	1,780	1.14	20,365
Blending Silos (4)	concrete	46,286	1.14	28,484	1.14	85,537
Substation	concrete	1,950	1.14	1,734	1.14	4,214
Cement Stor Silos (9)	concrete	157,418	1.14	81,112	1.14	272,878
Crushing Transport			1.14			
Primary Belt Piers(11)	steel	7,150	1.14			8,180
Conveyor Piers(5)	concrete	8,970	1.14			10,262
Belt Housing	steel	808	1.14			924
Coal Tunnel	concrete		1.14	2,860	1.14	3,272

Kiln Dust Convey suprts	steel	320	1.14			366
Elevators			1.14			
at storage silos	concrete	949	1.14			1,086
at mill bldg			1.14			
raw grind (2)	concrete	1,515	1.14			1,733
blending-kiln feed(2)	concrete	1,650	1.14			1,888
blending-kiln feed(3)	concrete	2,723	1.14			3,115
at clinker handling	concrete	578	1.14			661
at kiln dust collector(2)	concrete	1,089	1.14			1,246
at kiln dust collector	concrete	619	1.14			708
at kiln dust collector	concrete	495	1.14			566
at kiln dust collector	concrete	396	1.14			453
at finish grind (2)	concrete	1,515	1.14			1,733
at finish grind (2)	concrete	908	1.14			1,039
at pack house (3)	concrete	1,535	1.14			1,756
Kilns (2)	steel	3,513	1.14			4,019
Liners	brick	7,027	1.14			8,039
Piers (4)	concrete	8,640	1.14			9,884
Piers (2)	concrete	6,650	1.14	6,125	1.14	14,615
Piers (2)	concrete	10,560	1.14			12,081
Oil Tank	steel	178	1.14	82	1.14	297
Water Tank	steel	89	1.14	82	1.14	196
Cement Stor Silos (4)	concrete	113,223	1.14	28,484	1.14	162,113

Debris Handling and Disposal Costs:

Plant Disposal, Sec. B	conc/steel	(included in above)	37,400	cy	43.88	1,641,100
Delete 20 mile haul	conc/steel	(delete from above)	232	cy	43.88	(1,018)
for bldg disposal						
using 10 cy trucks						

Total Cost

\$3,165,783

Date Sources:

<http://www.buildingjournal.com/commercial-construction-estimating-demolition.html>

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Material Handling Plan Summary Sheet

Tijeras Cement Plant
 Worksheet #3
 06/09/23

Item	Description	Volume (cy)	Origin	Destination	Haul Distance (ft)	Grade	Equipment	
1	Move Redbed	148,476.30	Quarry 3	Quarry 1	5,300	10%	CAT 631-G	
2	Move Redbed	607,378.40	Quarry 3	West Cap Quarry	7,000	0%	CAT 631-G	153,331.20
3	Move Redbed	753,114.60	Quarry 3	Quarries 3, 5 & 7	500	0%	CAT 631-G	607,378.00
4	Move Redbed	156,809.10	Quarry 3	Quarry 4	5,000	10%	CAT 631-G	3.96
5	Move Redbed	319,120.56	Quarry 3	QUARRY 17/18	10,500	10%	CAT 631-G	
6	Move Redbed	389,646.60	Quarry 3	Quarry 19	12,000	10%	CAT 631-G	
7	Move Redbed	55,440.00	Quarry 3	Exploration Drill Pads	5,000	10%	CAT 631-G	
		2,429,986	loose cy	=	1,943,988	bank cy		
8	Move Redbed	14,848	Quarry 3	Quarry 1	350	20%	CAT D-8T Dozer w/SU Blade	10%
9	Move Redbed	60,738	Quarry 3	West Cap Quarry	200	10%	CAT D-8T Dozer w/SU Blade	10%
10	Move Redbed	37,656	Quarry 3	Quarries 3, 5 & 7	100	-5%	CAT D-8T Dozer w/SU Blade	5%
11	Move Redbed	31,912	Quarry 3	QUARRY 17/18	10500	10%	CAT D-8T Dozer w/SU Blade	10%
12	Move Redbed	15,681	Quarry 3	Quarry 4	350	20%	CAT D-8T Dozer w/SU Blade	10%
13	Move Redbed	38,965	Quarry 3	Quarry 19	200	5%	CAT D-8T Dozer w/SU Blade	10%
14	Move Redbed	5,544	Quarry 3	Exploration Drill Pads	100	5%	CAT D-8T Dozer w/SU Blade	10%

BOND AMOUNT CALCULATION
New Mexico Mining and Minerals Division
Earthwork Quantity Worksheet

Tijeras Cement Plant
Worksheet #4
06/12/23

NOT USED

Description: Spread 20% redbed in steep areas of Quarry 1 after scrapers

Equipment: **CAT D-8T Dozer w/SU Blade - Quarry 1**

Volume	14,848 cy	Time	166 hours
		Productivity	90 cy/hr-dozer
PERFORMANCE FACTORS			0
material	1.20	operator	0.75
grade	0.55	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	250 cy/hr	direct drive trans.	1.00

Description: Spread 20% redbed in steep areas of West Cap after scrapers

Equipment: **CAT D-8T Dozer w/SU Blade - West Cap**

Volume	60,738 cy	Time	291 hours
		Productivity	208 cy/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	0.80	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	400 cy/hr	direct drive trans.	1.00

Description: Spread 10% redbed in 3,5,7 after scrapers

Equipment: **CAT D-8T Dozer w/SU Blade - 3,5 & 7**

Volume	37,656 cy	Time	75 hours
		Productivity	502 cy/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	1.10	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	700 cy/hr	direct drive trans.	1.00

Description: Spread 20% redbed in steep areas of Quarry 4 after scrapers

Equipment:

CAT D-8T Dozer w/SU Blade - Quarry 4

Volume	15,681 cy	Time	175 hours
		Productivity	90 cy/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	0.55	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	250 cy/hr	direct drive trans.	1.00

Description:

Spread 20% redbed in steep areas of Quarry 19 after scrapers

Equipment:

CAT D-8T Dozer w/SU Blade - Quarry 19

Volume	38,965 cy	Time	166 hours
		Productivity	235 cy/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	0.90	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	400 cy/hr	direct drive trans.	1.00

Description:

Spread 20% redbed in steep areas of expl drill pads after scrapers

Equipment:

CAT D-8T Dozer w/SU Blade - Exploration Drill Pads

Volume	5,544 cy	Time	14 hours
		Productivity	410 cy/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	0.90	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	700 cy/hr	direct drive trans.	1.00

Description:

Spread 20% redbed in steep areas of expl drill pads after scrapers

Equipment:

CAT D-8T Dozer

Volume	31,912 cy	Time	78 hours
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Productivity 410 cy/hr-dozer

PERFORMANCE FACTORS

material	1.20	operator	0.75
grade	0.90	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
normal production	700 cy/hr	direct drive trans.	1.00

Description: Grade, shape, and compact Plant Area

Equipment: *CAT D-8T Dozer w/SU Blade - Plant Area*

Area	38 ac	Time	17 hours
		Productivity	2.24 ac/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	1.10	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
effective blade width	12.9 feet	direct drive trans.	1.00
speed	2 miles/hr		

Description: Grade, shape, and compact Disposal Area

Equipment: *CAT D-8T Dozer w/SU Blade - Disposal Area*

Area	3 ac	Time	1 hours
		Productivity	2.24 ac/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	1.10	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
effective blade width	12.9 feet	direct drive trans.	1.00
speed	2 miles/hr		

Description: Grade, shape, and compact Quarry Area, including exploration drill pads

Equipment: *CAT D-8T Dozer w/SU Blade - Quarry Area & Expl Pads*

Area	639.5 ac	Time	285.0 hours
		Productivity	2.24 ac/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	1.10	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
effective blade width	12.9 feet	direct drive trans.	1.00
speed	2 miles/hr		

Description: Grade, shape, and compact Haul & Access Roads

Equipment: *CAT D-8T Dozer w/SU Blade - Haul & Access Roads*

Area	44 ac	Time	20 hours
		Productivity	2.24 ac/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	1.10	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
effective blade width	12.9 feet	direct drive trans.	1.00
speed	2 miles/hr		

Description: Grade, shape, and compact Haul & Access Roads

Equipment: *CAT D-8T Dozer*

Area	19 ac	Time	8 hours
		Productivity	2.24 ac/hr-dozer
PERFORMANCE FACTORS			
material	1.20	operator	0.75
grade	1.10	work hour	50 min/hr
soil weight correction	2648 lb/cy	visibility	1.00
prod. method/blade	1.00	elevation	1.00
effective blade width	12.9 feet	direct drive trans.	1.00
speed	2 miles/hr		

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
**Productivity and Hours Required for
 Ripper-Equipped Dozer Use**

Tijeras Cement Plant
 Worksheet #7
 06/09/23

Description: Rip haul roads, service roads, and plant area
 to prepare for grading and reveg

Equipment: *CAT D-8T Dozer w/3-Shanks&Beam*

Area	239 ac	Time	225 hours
Volume	985,221 cy	Productivity	4.25 ac/hr-dozers
PERFORMANCE FACTORS			
ripping length	1,000 ft	turn time	0.25 min/pass
ripper penetration	30.7 in	work hour	50 min/hr
pocket spacing	43.0 in		
no. of pockets	3		

Description: Rip redbed for scraper transport

Equipment: *CAT D-8T Dozer w/3-Shanks&Beam*

Area	471 ac	Time	443 hours
Volume	1,943,988 cy	Productivity	4.25 ac/hr-dozers
PERFORMANCE FACTORS			
ripping length	1,000 ft	turn time	0.25 min/pass
ripper penetration	30.7 in	work hour	50 min/hr
pocket spacing	43.0 in		
no. of pockets	3		

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Productivity and Hours Required for Loader Use

Tijeras Cement Plant
 Worksheet #8
 06/09/23

Description: Load trucks at 3, 5 & 7 with rock

Equipment: **CAT 980M Wheel Loader**

Volume	67,298 cy	Time	194 hours
Net Bucket Capacity	7.7 cy	Productivity	348 cy/hr-loader
Loader Cycle Time	1.10 min		
PERFORMANCE FACTORS			
heaped bucket capacity	9.0 cy	haul time	0.25 min
bucket fill factor	0.85	return time	0.20 min
		cycle time	0.65 min
		work hour	50 min/hr

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Productivity and Hours Required for Truck Use

Tijeras Cement Plant
 Worksheet #9
 06/09/23

Description: Transport rock from 3, 5 & 7 to all Sections

Equipment: **CAT 770 Rigid Frame**

Volume	67,298 cy	Time	193 hours
Truck Cycle Time	39.4 min	Productivity	349 cy/hr
No. of Trucks (calc)	9.0 trucks		
PERFORMANCE FACTORS			
struck capacity	22.4 cy	haul time	20.0 min
heaped capacity	32.9 cy	return time	8.8 min
loader cycles per truck	4 /truck	loading time	4.4 min
no. of trucks (select)	9 trucks	truck exchange time	0.7 min
one-way haul	5,200 feet	dump/manuev. time	1.1 min
haul grade	7.0 %	work hour	50 min/hr
rolling resistance	3.0 %		

BOND AMOUNT CALCULATION
New Mexico Mining and Minerals Division

Tijeras Cement Plant
Worksheet #10

Productivity for Hydraulic Excavator Use (Backhoe or Power Shovel) 06/12/23

NOT USED

Description: Spread redbed in Quarry 1

Equipment: **CAT 631-G - Quarry 1**

Volume	148,476 cy	Time	281 hours
		Productivity	529 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	1.00 min
grade (loaded)	10 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	500 ft	return trip time	0.30 min
work hour	50 min		

Description: Spread redbed in West Cap

Equipment: **CAT 631-K - West Cap**

Volume	607,378 cy	Time	1,148 hours
		Productivity	529 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	1.00 min
grade (loaded)	10 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	500 ft	return trip time	0.30 min
work hour	50 min		

Description: Spread redbed in 357

Equipment: **CAT 631-K- Quarry 3, 5, & 7**

Volume	753,115 cy	Time	1,315 hours
		Productivity	573 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	0.60 min
grade (loaded)	0 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	1,200 ft	return trip time	0.50 min
work hour	50 min		

Description: Spread redbed in Quarry 4

Equipment: **CAT 631-K - Quarry 4**

Volume	156,809 cy	Time	2,201 hours
		Productivity	71 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	14.75 min
grade (loaded)	10 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	9,000 ft	return trip time	3.25 min
work hour	50 min		

Description: Spread redbed in Quarry 19

Equipment: **CAT 631-GK- Quarry 19**

Volume	389,647 cy	Time	3,500 hours
		Productivity	111 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	9.25 min
grade (loaded)	10 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	5,000 ft	return trip time	1.80 min
work hour	50 min		

Description: Spread redbed in Exploration Drill Pads

Equipment: **CAT 631-K - Exploration Drill Pads**

Volume	55,440 cy	Time	79 hours
		Productivity	705 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	0.40 min
grade (loaded)	10 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	250 ft	return trip time	0.25 min
work hour	50 min		

Description: Spread redbed in Exploration Drill Pads

Equipment: **CAT 631-K**

Volume	319,121 cy	Time	453 hours
		Productivity	705 cy/hr-scraper
PERFORMANCE FACTORS			
struck capacity	21 cy	load time	0.60 min
heaped capacity	34 cy	loaded trip time	0.40 min
grade (loaded)	10 %	manuever and	0.70 min
rolling resistance	3 %	spread time	
haul distance	250 ft	return trip time	0.25 min
work hour	50 min		

BOND AMOUNT CALCULATION		Tijeras Cement Plant	
New Mexico Mining and Minerals Division		Worksheet #14	
Revegetation Costs		06/09/23	
Description:			
Apply seed mix to areas and chain and plow.			
Location Adjust.	Albuq.	101.7%	
Total Cost		\$471,369	
		Unit	Subtotal
		Cost	Cost
Area	Area (acres)	(\$/acre)	(\$)
Total Disturbed		540	0
Disposal Area	2.5	540	1,343
Quarry Area, incl Exploration Drill Pads	421.5	540	227,398
Haul and Access Roads	119.4	540	64,434
	750.0		
Potential interseeding	58.5	313	18,314
Annual monitoring		152,000	152,000
Total	1,293.4		463,489

BOND AMOUNT CALCULATION
New Mexico Mining and Minerals Division
Productivity and Hours Required for Motorgrader Use---Grading

Tijeras Cement Plant
Worksheet #12
06/12/23

NOT USED

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Summary Calculation of Earthmoving Costs

Tijeras Cement Plant
 Worksheet #13
 06/09/23

Total Cost	\$3,180,441
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Equipment Type	Total Hourly rate (\$/hr)	Labor Cost (\$/hr)	Time Req'd (hrs)	Total Cost (\$)	Total Production	Prod. Unit	Unit Cost (\$/unit)
Dozers-Earthmoving							
CAT D-8T Dozer w/SU Blade - Quarry 1	215.23	38.10	166	41,992	14,848	cy	2.83
CAT D-8T Dozer w/SU Blade - West Cap	215.23	38.10	291	73,812	60,738	cy	1.22
CAT D-8T Dozer w/SU Blade - 3,5 & 7	215.23	38.10	75	19,018	37,656	cy	0.51
CAT D-8T Dozer w/SU Blade - Quarry 4	215.23	38.10	175	44,349	15,681	cy	2.83
CAT D-8T Dozer w/SU Blade - Quarry 19	215.23	38.10	166	42,090	38,965	cy	1.08
CAT D-8T Dozer w/SU Blade - Exploration Drill Pads	215.23	38.10	14	3,422	5,544	cy	0.62
CAT D-8T Dozer	215.23	38.10	410	103,968	31,912	cy	3.26
Dozers-Grading							
CAT D-8T Dozer w/SU Blade - Plant Area	215.23	38.10	17	4,250	38	ac	112.90
CAT D-8T Dozer w/SU Blade - Disposal Area	215.23	38.10	1	333	3	ac	112.90
CAT D-8T Dozer w/SU Blade - Quarry Area & Expl Pads	215.23	38.10	285	72,198	639	ac	112.90
CAT D-8T Dozer w/SU Blade - Haul & Access Roads	215.23	38.10	20	5,011	44	ac	112.90
CAT D-8T Dozer	215.23	38.10	2	568	19	ac	30.73
Rippers							
CAT D-8T Dozer w/3-Shanks&Beam	216.61	38.10	225	57,224	239	ac	239.73
CAT D-8T Dozer w/3-Shanks&Beam	216.61	38.10	443	112,911	471	ac	239.73
Loaders							
CAT 980M Wheel Loader	163.77	38.10	194	39,069	67,298	cy	0.58
Trucks							
CAT 770 Rigid Frame	152.87	38.10	1,724	329,286	67,298	cy	4.89
Scrapers							
CAT 631-G - Quarry 1	203.65	38.10	281	67,873	148,476	cy	0.46
CAT 631-K - West Cap	203.65	38.10	1,148	277,649	607,378	cy	0.46

CAT 631-K- Quarry 3, 5, & 7	203.65	38.10	1,315	317,787	753,115 cy	0.42
CAT 631-K - Quarry 4	203.65	38.10	2,201	532,099	156,809 cy	3.39
CAT 631-GK- Quarry 19	203.65	38.10	3,500	846,061	389,647 cy	2.17
CAT 631-K - Exploration Drill Pads	203.65	38.10	79	19,007	55,440 cy	0.34
CAT 631-K	203.65	38.10	705	170,465	319,121 cy	0.53
TOTAL			13,436	\$3,180,441		
Total Labor Cost				\$511,931		

Data Source:

Cost Reference Construction Equipment Ownership and Operating Expense Schedule Region VI, US Army Corps of Engineers No. 2022
 2023 GCC Operator Labor hourly plus 40% benefits

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Reclamation Bond Summary

Tijeras Cement Plant
 Worksheet #16
 06/09/23

DIRECT COSTS	Facility and Structure Removal		\$3,219,601
	Earthmoving		\$3,180,441
	Revegetation @ percent bonded	160%	\$754,189.81
	Other		\$77,000
	Subtotal		\$7,231,232
	Cost Escalation Period (years)	5	
	Cost Escalation Rate	2.2%	
	Adjusted Subtotal		\$8,042,742.16
INDIRECT COSTS	Construction Indirect Costs	51%	\$4,101,798.50
	Liability Insurance (1.5% of \$467,124 labor costs)		\$7,679
TOTAL BOND AMOUNT			\$12,152,220

BOND AMOUNT CALCULATION
 New Mexico Mining and Minerals Division
Other Reclamation Activity Costs

Tijeras Cement Plant
 Worksheet #15
 06/09/23
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Activity	Quantity	Unit	Unit Cost (\$/unit)	Item Cost (\$)
Lady XX Claim, Lease on Cibola NF				55,000
Encroachment, Special Use on Cibola NF				22,000

Total **\$77,000**