



April 29th, 2022

Clint Chisler
Reclamation Soil Scientist
Mining and Minerals Division
Mining Act Reclamation Program
Via email at: Clinton.chisler@state.nm.us

Subject: Modification Application for Reference Area for Reclamation Success Criteria at GCC Rio Grande Tijeras Mine and Mill (Permit No. BE001RE)

Dear Mr. Chisler:

GCC Rio Grande, Inc. ("GCC") requests a modification 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 use a one-acre reference area to establish annual reclamation success criteria for reclaimed areas.

Details and further discussion relevant to the proposed permit modification 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 modification rather than 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. This proposed modification includes by attachment a monitoring plan for the reference and reclamation areas as well as data from reclamation monitoring that occurred in 2021.

1. 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.

2. Justification that Proposed Changes Require a Modification

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 mining and reclamation changes necessitate a permit modification, as opposed to 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 proposed permit modification activities.

(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 modification 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 proposed permit modification activities. 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 modification 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 modification activities.

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

None of the proposed permit modification activities 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 proposed permit modification 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 modification 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 modification activities will be used to set reclamation success criteria for the facilities reclamation program. There will be no changes within the permit boundary for Permit No. BE001RE. Therefore, changes described in this modification are not significantly different from the approved permit.

3. 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 modification 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 ¼ 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. Supporting documentation for these delineations are included as attachments to the application for the modification submitted by GCC in August 2016.*

(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 narrative of the Reference Area Monitoring plan attached to this application.

(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 2019 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 permit modification only.

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

The required modification fee of \$1000 is enclosed.

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

See the attached: [Reclamation Monitoring Plan, Tijeras Mine & Mill](#).

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 [2019 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.

The proposed permit modification comprises all mining operations within the proposed permit boundary; no other operations in close proximity are proposed to be considered.

4. Reference Area-Reclamation Success Criteria

4.1 Reference Area Monitoring

GCC is proposing to use a one-acre, undisturbed parcel within the permit boundary as a reference area to establish annual revegetation standards for all reclamation activities at GCC Rio Grande-Tijeras Mine and Mill.

GCC has been unable to achieve reclamation success – as defined by technical standards for vegetative cover, herbaceous production, woody plant density, and species richness in GCC’s 2019 Closeout Plan – for any of the 74 acres that have been reclaimed. In order to be considered successful, vegetation parameters measured on the reclaimed areas must be equal to or greater than the performance standard. This presented several challenges for achieving reclamation success, including, but not limited to: 1) the parameters measured during the 2003 plot study represent a best-case scenario for revegetation and don’t capture typical variability in revegetation success, 2) the parameters were measured in 2008 only and represent a snapshot in time for weather conditions, and 3) vegetation sampling would have to be identical to the 2003 study and insufficient detail was provided for the methods employed in 2008.

GCC retained Ecosphere Environmental Services, Inc. (Ecosphere) to select a potential reference area and develop new revegetation standards for the facility. GCC also included MMD in the selection of the reference area location within Tijeras Mine and Mill permit boundary.

Ecosphere conducted a monitoring event to evaluate the reference area that is being proposed. The conclusion of that monitoring is as follows: Estimates of percent cover and shrubs per acre were significantly equal to or greater than the reference area in all reclamation areas (areas reclaimed in 1994, 2003, 2007, 2008, and 2011) (Tables 3-9 and 3-10). Species diversity in all reclamation areas was less than in the reference area. However, while the shrub density sampling effort was adequate for all

areas except 1994, sampling adequacy fell short in estimates of percent cover in reclamation areas 1994, 2008, and 2011 (Table 3-8). Thus, the results of statistical tests comparing percent cover in these areas to percent cover in the reference area should be interpreted with caution.

Despite their smaller areas, additional sampling effort is recommended for future estimates of vegetation cover in reclamation areas 1994, 2008, and 2011. Additional sampling will likely not require as many transects as the initial sampling effort analysis in 2021 indicates (Table 3-8) but will likely decrease as more data are collected.

The full monitoring plan is attached to this application for additional information and reference.

5. Financial Assurance

The proposed modification does not require change to the financial assurance for GCC Tijeras Mine and Mill. The success criteria for reclamation does not affect the bond calculation.

6. 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, GCC Tijeras


Date

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

Attachment A

October 2021

Reclamation Monitoring Plan

Tijeras Mine & Mill



Prepared for:

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

Prepared by:

Ecosphere Environmental Services, Inc.
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Durango, CO
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Albuquerque, NM
Farmington, NM

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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 open pit limestone quarries in Bernalillo County, New Mexico (Appendix A – Map A-1). The Tijeras Mine and Mill operates under New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD) Permit # BE001RE. To date, approximately 658.77 acres within the permit boundary 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. GCC Rio Grande has proposed industrial/ commercial (for the plant site) and wildlife habitat and recreation (for remaining areas) as final post-closure land uses for the permitted area.

Tijeras Mine and Mill was permitted by the MMD after substantial earth disturbing activities had already occurred. Thus, methods typically used to monitor reclamation at new mines, i.e., baseline data or the use of a reference area, were not used to establish revegetation standards. In 1996, a technical standard (RGPC 1996) was developed that incorporated: 1) the results of a sampling effort to characterize the vegetation communities at the Tijeras Mine and Mill site and 2) ecological site descriptions developed by the U.S. Department of Agriculture Natural Resources Conservation Service. In 2003, 48 test plots were established to evaluate the effects of varying seeding density, woody transplants, and organic amendment treatments on revegetation efforts (Habitat Management 2009). The results of both studies yielded information about the most effective methods for revegetation at the Tijeras site. Additionally, parameters evaluated in the most effective reclamation treatment plots – vegetative cover, herbaceous production, woody plant density, and species richness – were used to establish vegetation success criteria for reclaimed areas at the Tijeras Mine and Mill Site, i.e., in order to be considered successful, vegetation parameters measured on the reclaimed areas must be equal to or greater than the performance standard. This presented several challenges for achieving reclamation success, including, but not limited to: 1) the parameters measured during the 2003 plot study represent a best-case scenario for revegetation and don't capture typical variability in revegetation success, 2) the parameters were measured in 2008 only and represent a snapshot in time for weather conditions, and 3) vegetation sampling would have to be identical to the 2003 study and insufficient detail was provided for the methods employed in 2008.

2. Reference Area

In order to provide a more reasonable measure of revegetation success for reclamation at the Tijeras Mine and Mill, GCC Rio Grande proposes to establish an approximately 1-acre reference area east of Quarry 357 (Appendix A – Map A-1). The reference area captures the pre-disturbance variation in slope, aspect, and surface soils to adequately represent disturbed and planned areas of disturbance in the quarry (Appendix A – Map A-2). Additionally, the reference area captures early-successional grassland stages of the mountain shrub vegetation community (dominated by piñon pine [*Pinus edulis*] and juniper [*Juniperus monosperma*]), which would only be expected after several decades of vegetation establishment after reclamation. Species within the proposed reference area include blue grama (*Bouteloua gracilis*), side-oats grama (*B. curtipendula*), black grama (*B. eriopoda*), hairy grama (*B. hirsuta*), bush muhly (*Muhlenbergia porteri*), sand dropseed (*Sporobolus cryptandrus*),

Tijeras Mine & Mill Reclamation Monitoring Plan

Ecosphere Environmental Services, Inc.

mountain mahogany (*Cercocarpus montanus*), snakeweed (*Gutierrezia sarothrae*), cholla (*Cylindropuntia* sp.), prickly pear (*Opuntia* sp.), and yucca (*Yucca* sp.).



Photograph 1 . Panoramic photograph of proposed reference area

Upon approval, the reference area would be marked on the vegetation map, permanently marked in the field, and would be properly managed in a manner similar to non-affected lands adjacent to the permit area. Monitoring transects within the reference area would be established after the first round of monitoring which is anticipated to occur in Fall 2020; the number of transects (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. The reference area would be monitored at least every two years during the liability period to ensure that markings are visible and that the area continues to be managed in a manner similar to non-affected adjacent lands. The condition and management of the reference area would be described in any subsequent monitoring reports.

3. 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 1 (adapted from MMD 1999).

Table 1 . 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

Tijeras Mine & Mill Reclamation Monitoring Plan

Ecosphere Environmental Services, Inc.

Attributes that will be monitored include cover, diversity, and 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.

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).

$$C = \sum_{i=1}^s (p_i)^2$$

where: C = the index number,
 s = the total number of species in the sample, and
 p_i = the proportion of all individuals in the sample (plot, transect) that belong to species i .

4. Evaluation of Revegetation Success

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

$$X_r - 0.90 (x_h)$$

$$t = \frac{S_r}{\sqrt{n_r}}$$

Where	x_r	is the reclamation mean
	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.

5. References

Barbour, M. G., J. H. Burk and W. D. Pitts. 1987. *Terrestrial Plant Ecology*. The Benjamin/Cummings Publishing Co., Inc., Menlo Park.

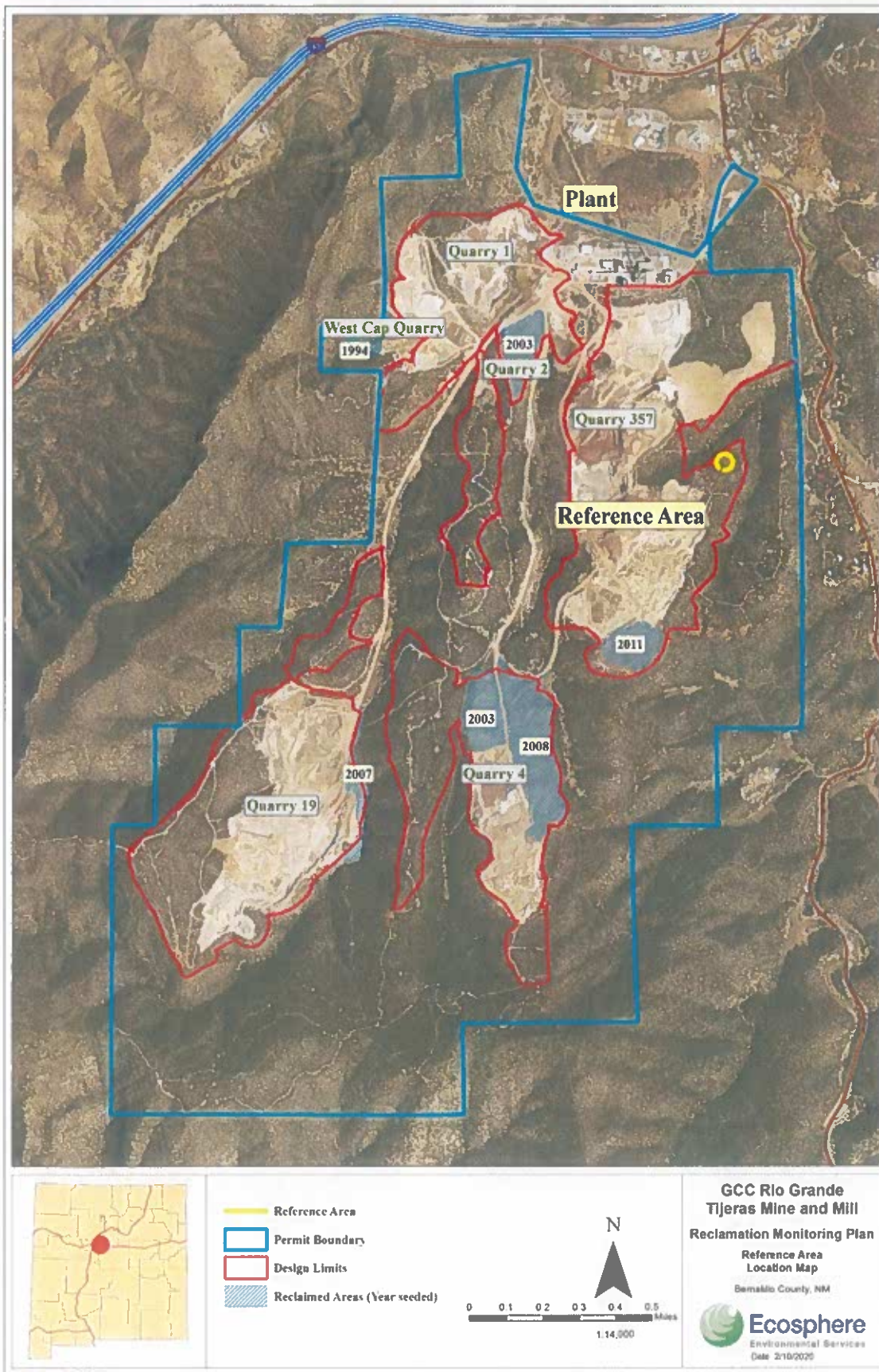
GCC Rio Grande (GCCRG). 2002. Tijeras Cement Plant and Limestone Quarry, Permit #BE001RE, Reclamation Test Plot Study Plan.

Habitat Management, Inc. 2009. GCC Rio Grande Inc., Tijeras Limestone Quarry, Vegetation Test Plots, 2008 Final Monitoring Report.

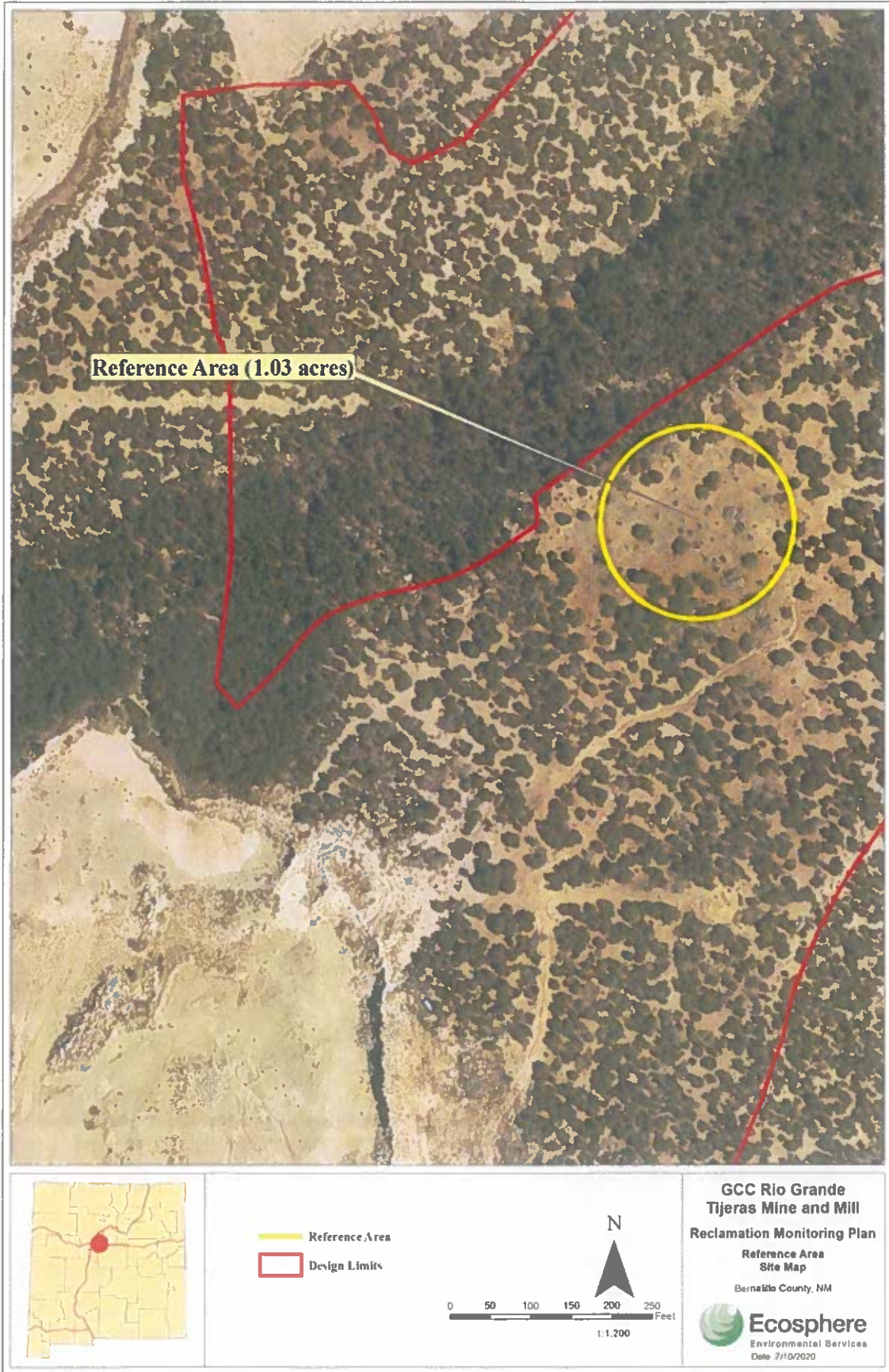
New Mexico Energy, Minerals and Natural Resources Department Mining and Minerals Division (MMD). 1999. Coal Mine Reclamation Program Vegetation Standards. 19.8 NMAC Attachment 1.

Simpson, E. H. 1949. Measurement of diversity. *Nature*. 163:688.

Appendix A – Maps



Map A-1 . Reclamation Monitoring Reference Area Location Map



Map A-2. Reclamation Monitoring Reference Area Site map

Attachment B

February 2022

2021 Reclamation Monitoring Report GCC Tijeras Mine and Mill



Prepared for:

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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 open pit limestone quarries in Bernalillo County, New Mexico (Appendix A – Map A-1). The Tijeras Mine and Mill operates under New Mexico Energy, Minerals and Natural Resources Department, Mining and Minerals Division (MMD) Permit # BE001RE. To date, approximately 658.77 acres within the permit boundary 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. GCC Rio Grande has proposed industrial/ commercial (for the plant site) and wildlife habitat and recreation (for remaining areas) as final post-closure land uses for the permitted area.

Tijeras Mine and Mill was permitted by the MMD after substantial earth disturbing activities had already occurred. Thus, methods typically used to monitor reclamation at new mines, (i.e., baseline data or the use of a reference area), were not used to establish revegetation standards. In 1996, a technical standard (RGPC 1996) was developed that incorporated: 1) the results of a sampling effort to characterize the vegetation communities at the Tijeras Mine and Mill site and 2) ecological site descriptions developed by the U.S. Department of Agriculture Natural Resources Conservation Service. In 2003, 48 test plots were established to evaluate the effects of varying seeding density, woody transplants, and organic amendment treatments on revegetation efforts (Habitat Management 2009). The results of both studies yielded information about the most effective methods for revegetation at the Tijeras site. Additionally, parameters evaluated in the most effective reclamation treatment plots – vegetative cover, herbaceous production, woody plant density, and species richness – were used to establish vegetation success criteria for reclaimed areas at the Tijeras Mine and Mill Site, (i.e., to be considered successful, vegetation parameters measured on the reclaimed areas must be equal to or greater than the performance standard). This presented several challenges for achieving reclamation success, including, but not limited to: 1) the parameters measured during the 2003 plot study represent a best-case scenario for revegetation and do not capture typical variability in revegetation success, 2) the parameters were measured in 2008 only and represent a snapshot in time for weather conditions, and 3) vegetation sampling would have to be identical to the 2003 study and insufficient detail was provided for the methods employed in 2008.

To address these challenges, GCC Rio Grande retained Ecosphere Environmental Services, Inc. (Ecosphere) to draft a Reclamation Monitoring Plan (Plan) that proposed a reference area and associated monitoring methods to capture reclamation success at the Tijeras site. GCC Rio Grande subsequently submitted the Plan to MMD. MMD reviewed the plan and requested that GCC Rio Grande apply for a permit modification regarding the proposal of the reference area and monitoring plan and provide the results of the first round of vegetative monitoring in the reference area.

In 2021, Ecosphere completed vegetation monitoring of the reference area and areas that were reclaimed in 1994, 2003, 2007, 2008, and 2011. This report presents the monitoring results, as well as

estimates of numerical sampling adequacy and statistical tests to demonstrate conformance with the proposed Plan. An assessment of the Plan and recommendations for changes, if necessary, are also included.

2. Methods

Sampling and monitoring methods accepted and recommended by MMD were used to evaluate cover, diversity, and woody plant and shrub density. All calculations, including cover, shrub density, diversity, sample adequacy, and test statistics were performed in Microsoft Excel.

2.1 Parameter Estimates

On October 26 and 27, 2022, Ecosphere biologists Tara Harris and Nicasio Gonzalez conducted vegetation monitoring at the Tijeras Quarry. Fifty-nine reclamation monitoring transects and 5 reference vegetation community transects with respective azimuths were determined prior to the field investigation using the “Random” tool in ArcGIS (Appendix A, Map 1). Vegetative cover was measured by the Line-Intercept Method (Cook and Bonham 1977). At each predetermined location, a 25-foot-long transect was established along the assigned azimuth. The plant species encountered at each 0.1 foot was recorded. Only those living plants or seedlings touched by the line or lying under or over it were considered. Bare ground and litter were also recorded.

Woody plant density was 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 3 feet perpendicular to the tape. This sampled 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 was 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).

$$C = \sum_{i=1}^s (p_i)^2$$

where: C is the index number,
 s is the total number of species in the sample, and
 p_i is the proportion of all individuals in the sample (plot, transect) that belong to species i .

2.2 Sample Adequacy

All cover estimates were arcsine square root transformed before analysis. Sample adequacy was determined using the Cochran (1977) formula:

$$n_{\min} = t^2 s^2 / (0.1\bar{x})^2$$

where: t is the tabular t value for a preliminary sample with $n-1$ degrees of freedom and a two-tailed significance level of $\alpha = 0.10$ ($P = 0.90$), s is the standard deviation of the preliminary sample, and \bar{x} is the sample mean of the preliminary sample.

Sample adequacy is the minimum number of samples required to estimate cover with a 90% confidence that the sample mean for cover represents the true population mean.

2.3 Statistical Testing

All cover estimates were arcsine square root-transformed and shrub density estimates were log-transformed before analysis. Parameter estimates were compared to the reference area (technical standard in equation below) using the one-sample, one-sided t -test:

$$t^* = \frac{\bar{x} - 0.9(\text{technical standard})}{s/\sqrt{n}}$$

where: t^* is the calculated t -statistic,
 \bar{x} is the sample mean,
 s is the standard deviation of the sample, and
 n is the sample size.

The α -level of the test is 0.10 by regulation, and the decision rules for testing the reverse null hypothesis are as follows:

- if $t^* < t(1 - \alpha; n - 1)$, conclude failure to meet the performance standard
- if $t^* \geq t(1 - \alpha; n - 1)$, conclude that the performance standard was met

Because it is a composite parameter of average percent cover per area, species diversity in the reclamation areas cannot be compared statistically to the reference area. A simple comparison (i.e., greater than or less than) is provided.

3. Reclamation Monitoring Results

3.1 Vegetation Cover

3.1.1 Reclamation Areas

Thirty-eight species were identified during the 2021 monitoring of the Tijeras Mine and Mill reclamation area (Table 3-1). Plant species observed in each reclamation area are presented in Appendix B. Nomenclature and duration information was obtained from the Natural Resources Conservation Service (NRCS) PLANTS database (NRCS 2021).

Table 3-1. Plant Species Observed at all Reclamation Areas, October 2021

Scientific Name	Common Name	Duration
Grasses		
<i>Achnatherum hymenoides</i>	Indian ricegrass	Perennial
<i>Andropogon hallii</i>	sand bluestem	Perennial
<i>Aristida purpurea</i>	purple threeawn	Perennial
<i>Bouteloua gracilis</i>	blue grama	Perennial
<i>Bouteloua hirsuta</i>	hairy grama	Perennial
<i>Bromus tectorum</i>	cheatgrass	Annual
<i>Bouteloua curtipendula</i>	sideoats grama	Perennial
<i>Elymus elymoides</i>	squirreltail	Perennial
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	Perennial
<i>Sporobolus cryptandrus</i>	sand dropseed	Perennial
<i>Pleuraphis jamesii</i>	galleta grass	Perennial
<i>Pascopyrum smithii</i>	western wheatgrass	Perennial
<i>Muhlenbergia torreyi</i>	ring muhly	Perennial
Forbs		
<i>Centaurea stoebe</i>	spotted knapweed	Perennial
<i>Helianthus annuus</i>	common sunflower	Annual
<i>Heliomeris multiflora</i>	Showy goldeneye	Perennial
<i>Heterotheca villosa</i>	hairy goldenaster	Perennial
<i>Bassia scoparia</i>	burningbush	Annual
<i>Marrubium vulgare</i>	white horehound	Perennial
<i>Melilotus albus</i>	white sweet clover	Perennial
<i>Mentzelia sp.</i>	blazingstar	Perennial
<i>Penstemon angustifolius</i>	broadbeard beardtongue	Perennial
<i>Portulaca oleracea</i>	common purslane	Annual
<i>Salsola tragus</i>	Russian thistle	Annual
<i>Sphaeralcea coccinea</i>	scarlet globemallow	Perennial
<i>Tragia nepetifolia</i>	catnip noseburn	Perennial

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Scientific Name	Common Name	Duration
Shrubs		
<i>Artemisia frigida</i>	fringed sagebrush	Perennial
<i>Atriplex canescens</i>	four-wing saltbush	Perennial
<i>Cercocarpus montanus</i>	mountain-mahogany	Perennial
<i>Ericameria nauseosa</i>	chamisa	Perennial
<i>Fallugia paradoxa</i>	Apache plume	Perennial
<i>Gutierrezia sarothrae</i>	broom snakeweed	Perennial
<i>Purshia tridentata</i>	antelope bitterbrush	Perennial
<i>Quercus gambelii</i>	Gambel oak	Perennial
<i>Rhus aromatica</i>	fragrant sumac	Perennial
<i>Krascheninnikovia lanata</i>	winterfat	Perennial
Cacti, Yucca		
<i>Opuntia polyacantha</i>	plains prickly pear	Perennial
<i>Cylindropuntia imbricata</i>	tree cholla	Perennial

Cover estimates, the most frequently observed species, and that species average cover for each reclamation year are presented in Table 3-2.

Table 3-2. 2021 Cover Estimates for Reclamation Areas.

Area	Cover (%)	<i>s</i>	<i>n</i>	Most Frequent Species; Associated Percent Cover
1994	46.20	0.214	5	western wheatgrass (<i>Pascopyrum smithii</i>); 10.86%
2003	49.49	0.193	20	four-wing saltbush (<i>Atriplex canescens</i>); 13.72%
2007	51.38	0.195	6	four-wing saltbush (<i>Atriplex canescens</i>); 13.27%
2008	67.74	0.116	20	Indian ricegrass (<i>Achnatherum hymenoides</i>); 11.91%
2011	52.01	0.319	8	western wheatgrass (<i>Pascopyrum smithii</i>); 9.53%

Note: *s* = standard deviation; *n* = number of transects sampled.

3.1.2 Reference Area

Ten species were identified during the 2021 monitoring of the Tijeras Mine and Mill reference area (Table 3-3).

Table 3-3. Plant Species Observed at the Reference Area, October 2021

Scientific Name	Common Name	Duration
Grasses		
<i>Bouteloua gracilis</i>	blue grama	Perennial
<i>Pleuraphis jamesii</i>	galleta grass	Perennial
Shrubs		
<i>Artemisia frigida</i>	fringed sagebrush	Perennial
<i>Gutierrezia sarothrae</i>	broom snakeweed	Perennial
Cacti, Yucca		
<i>Cylindropuntia imbricata</i>	tree cholla	Perennial
<i>Opuntia polyacantha</i>	plains prickly pear	Perennial
<i>Yucca baccata</i>	banana yucca	Perennial
<i>Yucca glauca</i>	small soapweed	Perennial
Trees		
<i>Juniperus monosperma</i>	oneseed juniper	Perennial
<i>Pinus edulis</i>	Colorado piñon	Perennial

Vegetation cover averaged 62.0%. Blue grama grass contributed the highest cover of any species (29.6%) and litter made up 4.7% of the cover (Table 3-4).

Table 3-4. Cover Estimates for the Reference Area, October 2021

Scientific Name	Common Name	Cover (%)	^s
Grasses			
<i>Bouteloua gracilis</i>	blue grama	29.549	0.242
<i>Pleuraphis jamesii</i>	galleta grass	0.163	0.004
Forbs			
<i>Artemisia frigida</i>	fringed sagebrush	0.245	0.005

Scientific Name	Common Name	Cover (%)	s
<i>Gutierrezia sarothrae</i>	broom snakeweed	3.203	0.037
Cacti, Yucca			
<i>Cylindropuntia imbricata</i>	tree cholla	2.080	0.047
<i>Opuntia polyacantha</i>	plains prickly pear	6.678	0.051
<i>Yucca baccata</i>	banana yucca	0.720	0.016
<i>Yucca glauca</i>	small soapweed	3.360	0.047
Trees			
<i>Juniperus monosperma</i>	oneseed juniper	14.000	0.207
<i>Pinus edulis</i>	Colorado pinon	2.000	0.045
Other			
	Total Vegetation Cover	61.998	0.137
	Litter	4.720	0.071
	Bare Ground	33.282	0.122
	Total cover	66.718	0.122

3.2 Shrub Density

3.2.1 Reclamation Areas

Twelve shrub species were observed in the reclamation areas during 2021 monitoring (Table 3-1). Shrub densities for each reclamation year are presented in Table 3-5.

Table 3-5. 2021 Shrub Density Estimates for Reclamation Areas.

Area	Shrubs per acre	s	n
1994	580.8	681.05	5
2003	2991.1	1309.26	20
2007	2274.8	1077.48	6
2008	914.8	633.96	20
2011	1306.8	580.80	8

3.2.2 Reference Area

Eight woody species, including shrubs, cacti, yucca, and trees, were observed in the reference area during 2021 monitoring (Table 3-4). Shrub density averaged 1,393.9 total shrubs per acre for the reference area; plains prickly pear (*Opuntia polyacantha*) had the highest density at 464.6 shrubs per acre (Table 3-6).

Table 3-6. 2021 Shrub Density Estimates for the Reference Area

Species	Common Name	Shrubs Per Acre
<i>Artemisia frigida</i>	fringed sagebrush	58.08
<i>Opuntia polyacantha</i>	plains prickly pear	464.64
<i>Cylindropuntia imbricata</i>	tree cholla	116.16
<i>Yucca baccata</i>	banana yucca	58.08
<i>Yucca glauca</i>	small soapweed	290.4
<i>Juniperus monosperma</i>	oneseed juniper	232.32
<i>Pinus edulis</i>	Colorado piñon	116.16
<i>Echinocereus sp.</i>	hedgehog cactus sp.	58.08
	Total	1,393.92

3.3 Diversity

Species diversity, as estimated by the Simpson’s index, was highest in the reference area. Area 2003 exhibited the highest diversity of all reclamation areas (Table 3-7).

Table 3-7. 2021 Species Diversity in Reclamation and Reference Areas

Area	Simpson's Index
1994	0.038
2003	0.050
2007	0.043
2008	0.029
2011	0.018
Reference	0.114

3.4 Sampling Adequacy

Table 3-8 presents the sample adequacy calculations for cover and shrub density estimates the 2021 monitoring effort in the reclamation and reference areas.

Table 3-8. Cochran's n_{min} for Cover and Shrub Density Estimates

Area	n	Cochran's n_{min}	
		Cover	Shrub Density
1994	5	38.5	10.1
2003	20	14.9	0.6
2007	6	25.1	1.7
2008	20	5.0	2.2
2011	8	68.7	1.1
Reference	5	8.4	1.6

3.5 Statistical Testing

3.5.1 Cover Estimates

The Student's t -test of the transformed data indicated mean percent vegetation cover was not significantly less than 0.9x of the cover in the reference area (55.8%) in all reclamation areas (i.e., $t_{calculated} > t_{critical}$; Table 3-9).

Table 3-9. Student's t -Statistics (One-tailed t -test, $\alpha=0.1$) for Transformed Vegetation Cover for Reclaimed Areas vs. Reference Area at GCC Tijeras Mine and Mill

Area	Cover (%)	s	n	$t_{calculated}$	p
1994	46.20	0.214	5	-0.856	0.208
2003	49.49	0.193	20	-0.905	0.193
2007	51.38	0.195	6	-0.457	0.330
2008	67.74	0.116	20	2.025	0.027
2011	52.01	0.319	8	-0.217	0.417

3.5.2 Shrub Density Estimates

The Student's t-test of the transformed data indicated mean shrub density was not significantly less than 0.9x of shrub density in the reference area (1,254 shrubs per acre) in all reclamation areas (i.e., $t_{\text{calculated}} > t_{\text{critical}}$; Table 3-10).

Table 3-10. Student's t-Statistics (One-tailed t-test, $\alpha=0.1$) for Transformed Shrub Density for Reclaimed Areas vs. Reference Area at GCC Tijeras Mine and Mill

Area	Shrubs per Acre	<i>s</i>	<i>n</i>	<i>t_{calculated}</i>	<i>P</i>
1994	580.8	681.05	5	-0.652	0.271
2003	2991.1	1309.26	20	7.976	0.000
2007	2274.8	1077.48	6	4.234	0.001
2008	914.8	633.96	20	0.930	0.181
2011	1306.8	580.80	8	2.937	0.007

4. Conclusion

Estimates of percent cover and shrubs per acre were significantly equal to or greater than the reference area in all reclamation areas (areas reclaimed in 1994, 2003, 2007, 2008, and 2011) (Tables 3-9 and 3-10). Species diversity in all reclamation areas was less than in the reference area. However, while the shrub density sampling effort was adequate for all areas except 1994, sampling adequacy fell short in estimates of percent cover in reclamation areas 1994, 2008, and 2011 (Table 3-8). Thus, the results of statistical tests comparing percent cover in these areas to percent cover in the reference area should be interpreted with caution.

Despite their smaller areas, additional sampling effort is recommended for future estimates of vegetation cover in reclamation areas 1994, 2008, and 2011. Additional sampling will likely not require as many transects as the initial sampling effort in 2021 indicates (Table 3-8), but will decrease as more data are collected.

5. Certification

Conclusions are based on actual field examinations and are correct to the best of my knowledge.

Signature of Field Biologist:



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Date: February 27, 2022

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Date: February 28, 2022

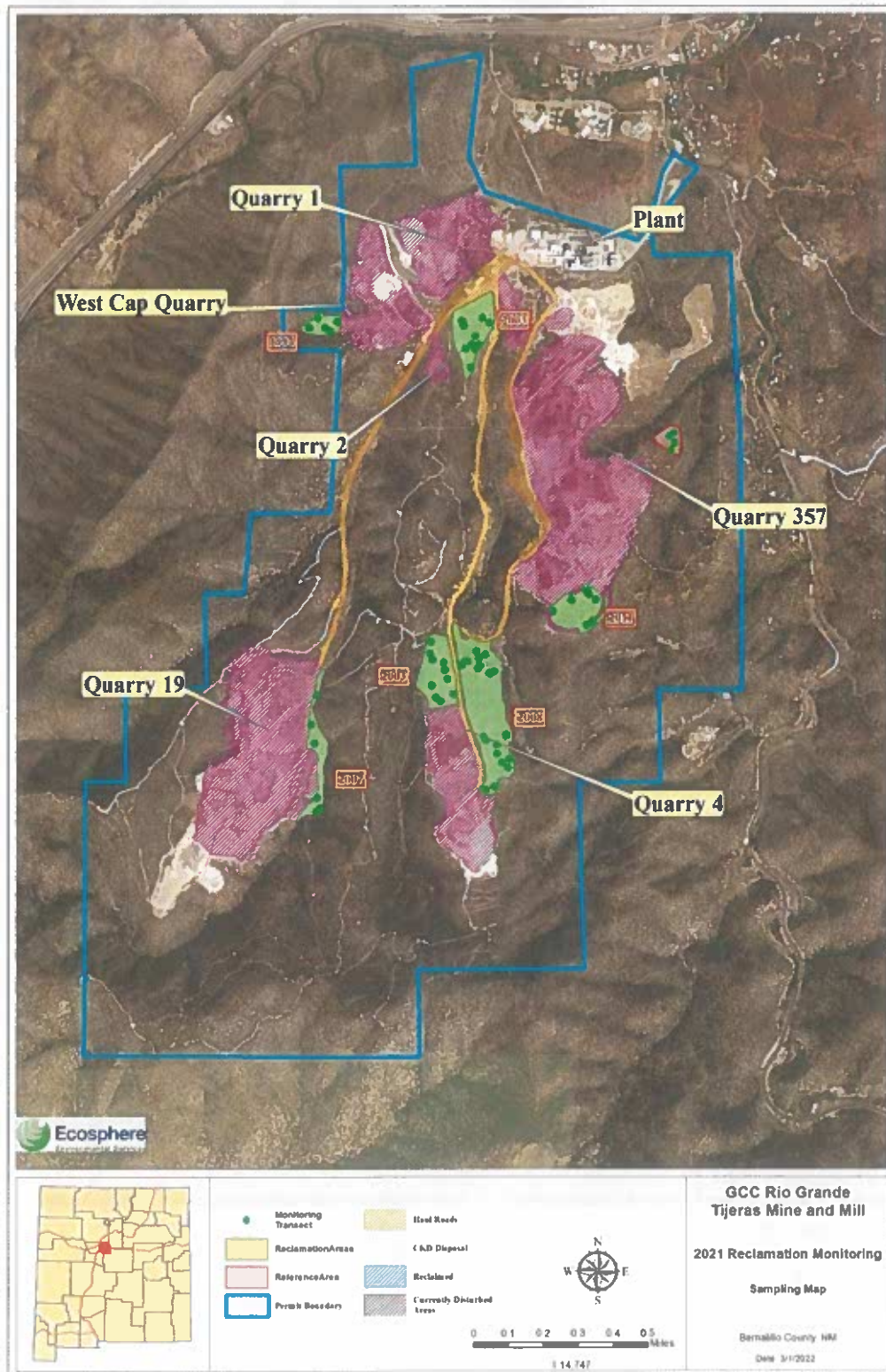
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Appendix A – Map

Tijeras Mine & Mill - 2021 Reclamation Monitoring

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Appendix B - Species Tables

Table B-1. Average Cover Values for Transects in the Reference Area.

Reference Cover (n=5)		
Species	Common Name	Average Percent Cover (%)
<i>Bouteloua gracilis</i>	blue grama	29.55
<i>Pleuraphis jamesii</i>	galleta grass	0.16
<i>Artemisia frigida</i>	fringed sagebrush	0.24
<i>Gutierrezia sarothrae</i>	broom snakeweed	3.20
<i>Cylindropuntia imbricata</i>	tree cholla	2.08
<i>Opuntia polyacantha</i>	plains prickly pear	6.68
<i>Yucca baccata</i>	banana yucca	0.72
<i>Yucca glauca</i>	small soapweed	3.36
<i>Juniperus monosperma</i>	oneseed juniper	14.00
<i>Pinus edulis</i>	Colorado pinon	2.00
Total Vegetation	Total Vegetation	62.00
Litter	Litter	4.72
Bare Ground	Bare Ground	33.28

Table B-2. Average Cover Values for Transects in Areas Reclaimed in 1994.

1994 Reclamation Cover (n=5)		
Species	Common Name	Average Percent Cover (%)
<i>Achnatherum hymenoides</i>	Indian ricegrass	8.12
<i>Aristida purpurea</i>	purple threeawn	8.13
<i>Bouteloua curtipendula</i>	sideoats grama	1.76
<i>Muhlenbergia torreyi</i>	ring muhly	0.24
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	10.86
<i>Sporobolus cryptandrus</i>	sand dropseed	0.43
<i>Helianthus annuus</i>	sunflower	0.26
<i>Marrubium vulgare</i>	white horehound	0.16
<i>Salsola tragus</i>	Russian thistle	10.61
<i>Sphaeralcea coccinea</i>	scarlet globemallow	1.02
<i>Tragia nepetifolia</i>	catnip noseburn	0.88
<i>Cercocarpus montanus</i>	mountain-mahogany	1.04
<i>Gutierrezia sarothrae</i>	broom snakeweed	2.68
Total Vegetation	Total Vegetation	46.20
Litter	Litter	7.30
Bare Ground	Bare Ground	46.50

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Table B-3. Average Cover Values for Transects in Areas Reclaimed in 2003.

2003 Reclamation Cover (n=20)		
Species	Common Name	Average Percent Cover (%)
<i>Achnatherum hymenoides</i>	Indian ricegrass	7.00
<i>Bouteloua curtipendula</i>	sideoats grama	5.38
<i>Bouteloua hirsuta</i>	hairy grama	5.97
<i>Bromus tectorum</i>	cheatgrass	0.16
<i>Muhlenbergia torreyi</i>	ring muhly	1.92
<i>Pascopyrum smithii</i>	western wheatgrass	10.02
<i>Pleuraphis jamesii</i>	galleta grass	3.85
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	2.91
<i>Sporobolus cryptandrus</i>	sand dropseed	0.47
<i>Heliomeris multiflora</i>	Showy goldeneye	1.94
<i>Melilotus albus</i>	white sweet clover	1.77
<i>Atriplex canescens</i>	four-wing saltbush	13.72
<i>Ericameria nauseosa</i>	chamisa	8.07
<i>Fallugia paradoxa</i>	Apache plume	0.38
<i>Gutierrezia sarothrae</i>	broom snakeweed	0.93
<i>Krascheninnikovia lanata</i>	winterfat	0.86
<i>Cylindropuntia imbricata</i>	tree cholla	0.72
Total Vegetation	Total Vegetation	66.06
Litter	Litter	8.28
Bare Ground	Bare Ground	25.66

Table B-4. Average Cover Values for Transects in Areas Reclaimed in 2007.

2007 Reclamation Cover (n=6)		
Species	Common Name	Average Percent Cover (%)
<i>Achnatherum hymenoides</i>	Indian ricegrass	0.53
<i>Aristida purpurae</i>	purple threeawn	1.40
<i>Bouteloua curtipendula</i>	sideoats grama	4.60
<i>Elymus elymoides</i>	squirreltail	1.27
<i>Pascopyrum smithii</i>	western wheatgrass	3.11
<i>Pleuraphis jamesii</i>	galleta grass	11.99
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	0.47
<i>Sporobolus cryptandrus</i>	sand dropseed	0.20
<i>Bassia scoparia</i>	burningbush	0.80
<i>Heliomeris multiflora</i>	Showy goldeneye	1.75
<i>Melilotus albus</i>	white sweet clover	0.34
<i>Salsola tragus</i>	Russian thistle	0.33

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2007 Reclamation Cover (n=6)		
<i>Atriplex canescens</i>	four-wing saltbush	13.27
<i>Ericameria nauseosa</i>	chamisa	7.63
<i>Gutierrezia sarothrae</i>	broom snakeweed	0.53
<i>Krascheninnikovia lanata</i>	winterfat	3.15
Total Vegetation Cover	Total Vegetation Cover	51.38
Litter	Litter	11.87
Bare Ground	Bare Ground	36.75

Table B-5. Average Cover Values for Transects in Areas Reclaimed in 2008.

2008 Reclamation Cover (n=20)		
Species	Common Name	Average Percent Cover (%)
<i>Achnatherum hymenoides</i>	Indian ricegrass	11.91
<i>Andropogon hallii</i>	sand bluestem	0.28
<i>Aristida purpurae</i>	purple threeawn	0.38
<i>Bouteloua curtipendula</i>	sideoats grama	3.30
<i>Bouteloua gracilis</i>	blue grama	0.52
<i>Bromus tectorum</i>	cheatgrass	0.12
<i>Elymus elymoides</i>	squirreltail	0.58
<i>Pascopyrum smithii</i>	western wheatgrass	6.31
<i>Pleuraphis jamesii</i>	galleta grass	5.66
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	0.63
<i>Helianthus annuus</i>	sunflower	0.08
<i>Heliomeris multiflora</i>	Showy goldeneye	0.68
<i>Melilotus albus</i>	white sweet clover	0.70
<i>Mentzelia sp.</i>	blazingstar	0.08
<i>Penstemon angustifolius</i>	broadbeard beardtongue	2.00
<i>Salsola tragus</i>	Russian thistle	0.14
<i>Atriplex canescens</i>	four-wing saltbush	6.82
<i>Ericameria nauseosa</i>	chamisa	0.70
<i>Fallugia paradoxa</i>	Apache plume	0.80
<i>Gutierrezia sarothrae</i>	broom snakeweed	0.20
<i>Purshia tridentata</i>	antelope bitterbrush	0.80
<i>Quercus gambelii</i>	Gambel oak	0.48
<i>Rhus aromatica</i>	fragrant sumac	3.35
Total Vegetation Cover	Total Vegetation Cover	46.53
Litter	Litter	21.22

Tijeras Mine & Mill - 2021 Reclamation Monitoring

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2008 Reclamation Cover (n=20)		
Bare Ground	Bare Ground	32.26

Table B-6. Average Cover Values for Transects in Areas Reclaimed in 2011.

2011 Reclamation Cover (n=8)		
Species	Common Name	Average Percent Cover (%)
<i>Achnatherum hymenoides</i>	Indian ricegrass	7.82
<i>Bouteloua curtipendula</i>	sideoats grama	0.95
<i>Bouteloua hirsuta</i>	hairy grama	0.29
<i>Elymus elymoides</i>	squirreltail	2.51
<i>Pascopyrum smithii</i>	western wheatgrass	9.53
<i>Pleuraphis jamesii</i>	galleta grass	1.30
<i>Pseudoroegneria spicata</i>	bluebunch wheatgrass	0.49
<i>Sporobolus cryptandrus</i>	sand dropseed	2.83
<i>Heterotheca villosa</i>	hairy goldenaster	0.15
<i>Melilotus albus</i>	white sweet clover	3.24
<i>Penstemon angustifolius</i>	broadbeard beardtongue	0.59
<i>Salsola tragus</i>	Russian thistle	0.35
<i>Atriplex canescens</i>	four-wing saltbush	0.15
<i>Fallugia paradoxa</i>	Apache plume	1.18
<i>Gutierrezia sarothrae</i>	broom snakeweed	1.30
Total Vegetation Cover	Total Vegetation Cover	32.69
Litter	Litter	19.32
Bare Ground	Bare Ground	47.99



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04/01/2022	19000014T5	040422	*Regulation 19.10.7.	0.00	1,000.00
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 NEW MEXICO MINING & MINERALS DIVISI
 ON
 1220 ST. FRANCIS DRIVE
 SANTA FE NM 87505

PAYEE	CHECK DATE	CHECK NUMBER	AMOUNT
600982	04/07/2022	000000485	\$****1,000.00

Oliver C.

Yoon